The wargame package

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Abstract

This package provides tools to typesetting manuals, board, and counters for wargames using LaTeX.

Contents

1 Introduction

This package provides tools for typesetting classic, hex-based wargames. The package allows an author to design a board, or map, comprised of hex, using a relatively simple interface. Units are typeset using a similar interface. Unit types are identified using the NATO Joint Military Symbology [2] standard.

2 Hex Boards

The package provides a number of facilities to set-up a board comprised of hexagon fields ("hexes").

2.1 Placing hexes

A hex can be added to the current `tikzpicture` using the macro `\hex`. It takes up to 4 arguments

`\hex[⟨key-value-pairs⟩](⟨location⟩)(⟨name⟩)`

The ⟨*key-value-pairs*⟩ specify the hex. Valid options are

`terrain=`⟨***terrain-keys***⟩ specifies the terrain of the hex. More on in this in Section 2.4.

`ridges=`⟨***ridges-keys***⟩ specifies where ridges are drawn in the hex. Section 2.5.

`label=`⟨***label-keys***⟩ specifies the how to output the hex label, if any. This is expanded upon in Section 2.6.

`town=`⟨***town-keys***⟩ specifies that a town (or similar) is present in the hex. The various keys are described in Section 2.7.

`extra=`⟨***extra-keyx***⟩ **and** `extra clipped=`⟨***extra-keyx***⟩ allows the user to put custom graphics in the hexes. See also Section 2.8 for more.

any style key defined for Ti*k*Z pictures.

The ⟨*location*⟩ argument specifies the coordinates, in the hex coordinate system where to put the hex. More about the coordinate system is given in Section 2.3. Note, the numbers starts from the lower–left corner.

The elements are rendered in the following order

1. The terrain, clipped to the hex shape.
2. The hex, including circumference and fill
3. The ridges, if any
4. The label, if any
5. Extra graphics clipped to the hex
6. Town, if any
7. Extra graphics which may extend beyond the confines of the hex.

Figure 1 illustrates some of the components of a hex. The hexes are 2 unit lengths wide. Typically, the unit length is one centimetre, which means the hexes are roughly 2 cm × 1.86 cmm — or roughly 3/4" × 3/4" — big. This allows the hexes to fit chits (see Section **??**) of size 12 mm × 12 mm — or roughly 1/2" × 1/2" — nicely. If one wants larger chits or hexes one should take care to scale both by a similar amount.

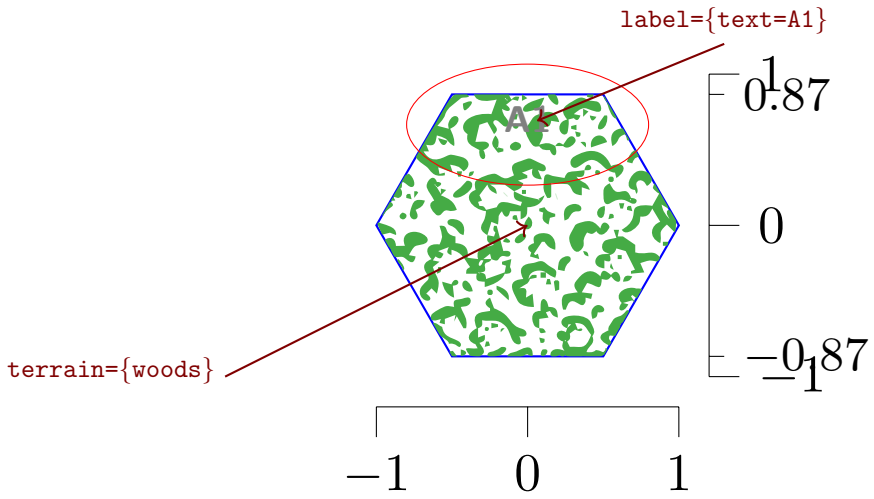


Figure 1: Hex parts. The bar on the bottom and to the right indicate two units of length.

2.2 Styling hexes

Typical Ti*k*Z options can be passed to the `\hex` macro. For example, if you want to draw the hex borders in red, simply pass `draw=red` in the `[`⟨*optional*⟩`]` arguments to `\hex`. Individual parts of the hexes can be styled separately. the default style used by `\hex` is `tikz/hex/hex`. Users can redefine this style to suit their needs. If one does not want to change the default style, or pass the same argument to all `\hex`s one can define the style `tikz/every hex`. For example, if one wants to auto label all hexes, one can do

```
\begin{tikzpicture}
  \begin{scope}[every hex/.style={label=auto}]
    % Hexes
  \end{scope}
\end{tikzpicture}
```

2.3 Hex coordinate system

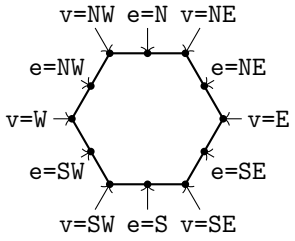
The package defines a coordinate system based on hexes. The centre of a hex is specified as ⟨*column*⟩-⟨*row*⟩ pairs, while vertexes and mid-point on edges can be specified separately. The syntax of the coordinates is

`(hex cs:row=`⟨*hex-row*⟩`,column=`⟨*hex-column*⟩`,vertex=`⟨*vertex*⟩`,edge=`⟨*edge*⟩`)`

where ⟨*vertex*⟩ and ⟨*edge*⟩ are optional. The hex row and column defaults both to 0 and can be decimal numbers. The `row`, `column`, `vertex`, and `edge` keywords may be shorted to `r`, `c`, `v`, and `e`, respectively. Possible vertexes and edges are listed in Table 1.

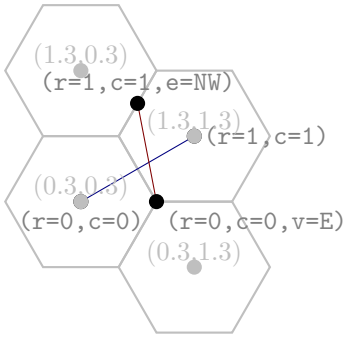
In Figure 2 is an example of a picture drawn in this coordinate system.

Important: When the horizontal distance to the centre of a hex becomes less than $-\cos 60°$ or larger than $b-\cos 60°$ we effectively have a new hex column, and the coordinates are shifted upward or downward for smaller or larger numbers. Figure **??** illustrates. this. This can make it a little hard to specify coordinates relative to a hex centre.



vertex=		Angle	edge=		Angle
east	E	0°	north east	NE	30°
north east	NE	60°	north	N	90°
north west	NW	120°	north west	NW	150°
west	W	180°	south west	SW	210°
south west	SW	240°	south	S	270°
south east	SE	300°	south east	SE	330°

Table 1: Vertex and edge positions



Hexes and lines drawn with

```
\hex(0,0)\hex(0,1)\hex(1,0)\hex(1,1)
\draw[blue!50!black] (hex cs:r=0,c=0) --
                     (hex cs:r=1,c=1);
\draw[red!50!black]  (hex cs:r=0,c=0,vertex=E) --
                     (hex cs:r=1,c=1,edge=NW);
\fill[lightgray](hex cs:r= .3,c= .3) circle(0.1);
\fill[lightgray](hex cs:r=1.3,c= .3) circle(0.1);
\fill[lightgray](hex cs:r=0.3,c=1.3) circle(0.1);
\fill[lightgray](hex cs:r=1.3,c=1.3) circle(0.1);
```

Figure 2: Hex coordinate system

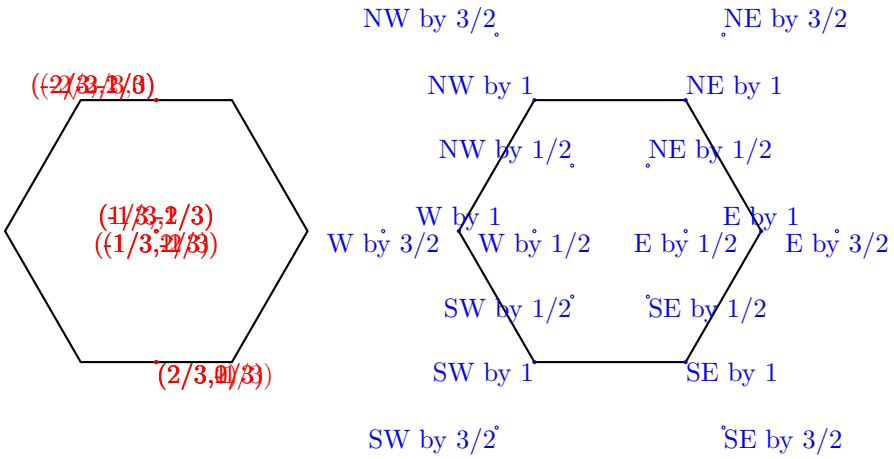


Figure 3: Relative coordinates

Alternatively one may use vertex or edge specifciations together with a relative offset in those directions.

2.4 Terrains

Terrains are rendered using tile images or Ti*k*Z `pictures`. The available terrains are shown in Tables 2 and 3. Users can provide their own tile images and select those via `terrain={image=`⟨*image*⟩`}` or defined Ti*k*Z `pictures` and select those via `terrain={pic=`⟨*pic-name*⟩`}`. In all cases, the terrain graphics is clipped to the hex.

The terrain of a hex is selected via the multi-valued key `terrain`. Sub-keys of this key are

`image=`⟨***graphics-file***⟩ Specifies terrain tile image ⟨*graphics-file*⟩.

`pic=`⟨***picture-key***⟩ Specifies terrain tile Ti*k*Z `picture`.

`code=`⟨***tikz-code***⟩ Any valid Ti*k*Z code

`clip=`⟨***path(s)***⟩ Ti*k*Z path specification to clip the terrain within the hex.

The terrain can be clipped by the sub-key `clip`. This can be useful if the game specifies movement costs in terms of hex-edge crossing, for example *First Blood* [1]. In that case, a hex may be, for example, a jungle hex, but some edges a clear. Thus movements across such an edge would count as moving into clear territory while moving over other edges will count as moving into a jungle. This is, of course, not how most games count movement costs, but this package nonetheless facilitates such rules. Table 4 shows a few examples of predefined clippings of terrain.

Users can define Ti*k*Z `pictures` that specify clipping paths as needed. For example, one could add clipping to the terrain to ensure that other graphics in the hex stands out.

2.4.1 Styling terrains

Terrains use the key `tikz/hex/terrain` to render the terrains. This is mainly useful for terrains made from Ti*k*Z `pictures`.

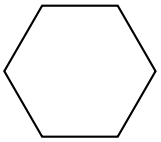
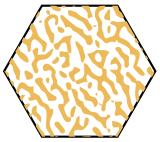
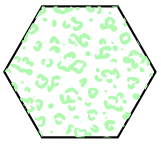
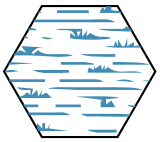
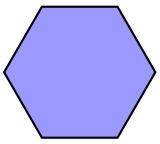
Symbol	Name	terrain={image=⟨*image*⟩}	Symbol	Name	terrain={image=⟨*image*⟩}
	Clear			Beach	{image=wargame.beach}
	Light woods	{image=wargame.light_woods}		Woods	{image=wargame.woods}
	Rough	{image=wargame.rough}		Swamp	{image=wargame.swamp}
	Mountains	{image=wargame.mountains}		Sea	{image=wargame.sea}

Table 2: Terrains specified via tile images

Symbol	Name	terrain={pic=⟨*image*⟩}
	Mountains	{pic=hex/terrain/mountain,line width=3pt}

Table 3: Terrains specified via Ti*k*Z pictures

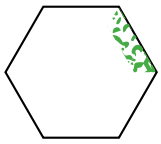
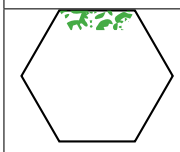
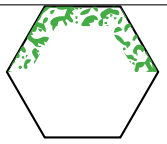
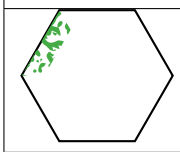
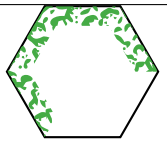
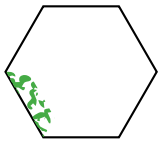
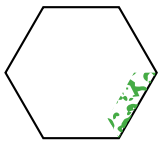
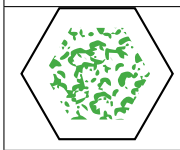
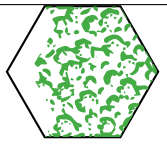
Symbol	terrain={clip=,...}	Symbol	terrain={clip=,...}
	{hex/sextant=NE}		{hex/large sextant=NE,hex/large sextant=N}
	{hex/sextant=N}		{hex/sextant=NE, hex/sextant=N, hex/sextant=NW}
	{hex/sextant=NW}		{hex/sextant=NE, hex/sextant=N, hex/sextant=NW, hex/sextant=SW}
	{hex/sextant=SW}		{hex/sextant=NE, hex/sextant=N, hex/sextant=NW, hex/sextant=SW, hex/sextant=S}
	{hex/sextant=S}		{hex/sextant=NE, hex/sextant=N, hex/sextant=NW, hex/sextant=SW, hex/sextant=S, hex/sextant=SE}
	{hex/sextant=SE}		{hex/sextant=NE, hex/sextant=N, hex/sextant=NW, hex/sextant=SW, hex/sextant=S, hex/sextant=SE, hex/sextant=C}
	{hex/sextant=C}		{hex/sextant=NE, hex/sextant=N, hex/sextant=S, hex/sextant=SE, hex/sextant=C}

Table 4: Terrain clipped via `clip` sub-key

2.5 Ridges

Ridges, or hill or mountain slopes, can be added to a hex via the keyword `ridges`. The keyword takes a list of hex edges and generates symbology for the ridge on the chosen edges. Note that the edges does not have to be continuous, as illustrated in the bottom right of Table 5, nor in any particular order. The edges are specified as compass direction

```
north east, north, north west, south west, south, south east.
NE, N, NW, SW, S, SE
```

Table 5 shows some examples.

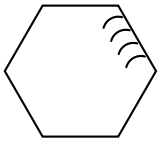
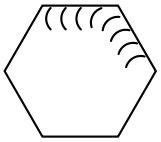
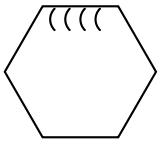
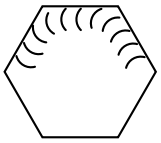
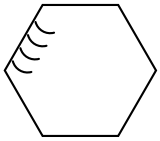
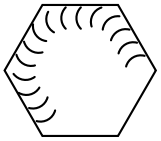
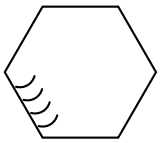
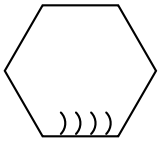
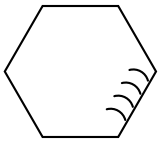
Symbol	ridges=	Symbol	ridges=
	NE		NE,N
	N		NE,N,NW
	NW		NE,N,NW,SW
	SW		NE,N,NW,SW,S,line width=3pt
	S		NE,N,NW,SW,S,SE,color=brown!70!black
	SE		N,S,NW,SE

Table 5: Ridges

2.5.1 Styling ridges

Every ridge is drawn with the style `tikz/hex/ridges`. Users can customise this style. The default is to draw thin black wave lines (Ti*k*Z decoration `waves`). The default style also takes care to auto scale line widths.

2.6 Labels

Labels can be placed on the hexes via the keyword `label`. The label can either be auto-generated or given explicitly. Table 6 shows the various choices.

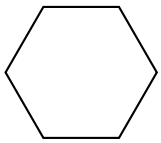
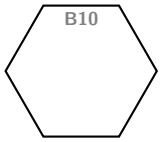
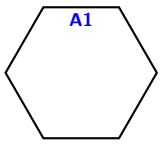
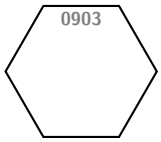
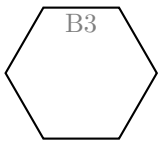
Symbol	Name	Column/Row	`label=`
	No label	n/a	`none`
	User specified	n/a	`text=B10`
	User specified	n/a	{`color=blue,text=A1`}
	Two-digit, zero padded numbers	9/3	`auto`
	Column letter, number row	2/3	{`auto=alpha column,font=\noexpand\rmfamily`} †
	Two letter column, two digit row	6/24	{`auto=alpha 2 column,anchor=north east`}

Table 6: Labels

†When specifying macros as key values in the options, for example the value `\rmfamily` for the key `font` above, we have to put a `\noexpand` in front if the macro. This is to prevent early expansion of the macro, which would cause errors. A minor nuisance.

The option `auto=inv y x plus 1` will label the rows inversely, and add one to the column number. This requires that the key `tikz/max hex row` has been set to the largest row number used.

In addition to the sub-keys `none`, `auto`, and `text`, one can also specify the following keys

`place=`⟨***coordinates***⟩ specifies the Location of label within the hex. The anchor point of the text will be placed at this point.

`[`⟨`/`⟩`]`**options** `]` at the start of the option (but inside braces {...}) can be used to give additional style options.

2.6.1 Styling labels

All labels use the style `tikz/hex/label`. By default, this places the label at the top of the hex, and renders the text as gray script sized text. Users can customise this style. If a user does not want to change the default style, or want to pass the same option to all labels, then one can set the key `tikz/every label` to those options.

2.7 Towns

Towns in hexes are made via the key `town`. This key takes several sub-keys, as illustrated in Table 7

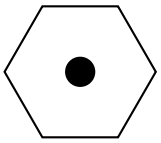
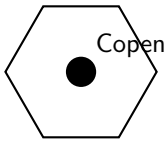
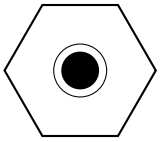
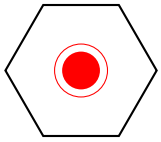
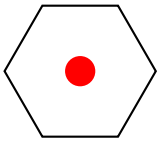
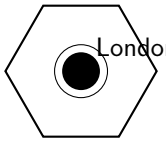
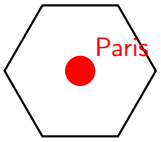
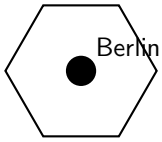
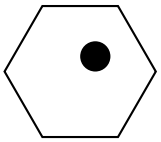
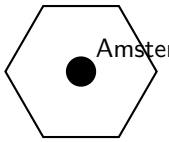
Symbol	town=	Symbol	town=
			{name=Copenhagen}
	{pic=hex/town/city}		{red,pic=hex/town/city}
	{fill=red}		{name=London}
	{red,name=Paris}		{above=0.8,name=Berlin}
	{place={(.2,.2)}}		{font=\noexpand\itshape,name=Amsterdam} †

Table 7: Towns
†When specifying macros as key values in the options, for example the value `\rmfamily` for the key `font` above, we have to put a `\noexpand` in front if the macro. This is to prevent early expansion of the macro, which would cause errors. A minor nuisance.

The sub-keys available for the `town` key are

`pic`=⟨***town-pic***⟩ The name of a Ti*k*Z `pic`ture. Currently defined are `hex/town/town` and `hex/town/city`. Users can provide alternate definitions or new types by defining Ti*k*Z `pic`tures.

`place`=⟨***coordinates***⟩ Location of label within the hex. The anchor point of the text will be placed at this point.

`name`=⟨***name***⟩ Name of town

2.7.1 Styling towns

Towns uses two styles: `tikz/hex/town` for the town graphics, and `tikz/hex/town name` for the name of the town. In addition, a user may set the key `tikz/every hex town` to contain options to be passed to all towns.

2.8 Extra graphics for hexes

Additional graphics for hexes can be added by the two keys `extra` and `extra clipped`. The difference between the two are that graphics specified by `extra clipped` are clipped (restricted) to the hex, while graphics given by `extra` may extend beyond the hex. Both keys accept a comma separated list of arguments, where each element has the syntax

`[`⟨*options*⟩`](`⟨*placement*⟩`)`⟨*picture*⟩

Both ⟨*options*⟩ and ⟨*placement*⟩ are optional, and specifies keys to draw ⟨*picture*⟩ with and the relative location in the hex, respectively. The required argument ⟨*picture*⟩ must name a Ti*k*Z `pic`ture, for example `hex/fortress`. This can be useful for marking hexes on the board. For example to mark a set-up hex for one faction of the game.

One could for example define the following pictures to define set-up points for a Sovjet and German faction

```
  setup/sovjet/.pic={
    \path[fill=red,draw=yellow,pic actions]
      ( 90:.4)--(126:.15)--
      (162:.4)--(198:.15)--
      (234:.4)--(270:.15)--
      (306:.4)--(342:.15)--
      ( 18:.4)--( 54:.15)--cycle;},
  setup/german/.pic={
    \path[fill,pic actions]
      (-.4, -.1) rectangle(.4,.1)
      (-.1, -.4) rectangle(.1,.4);
    \path[draw,pic actions]
      (-.4,-.2) -- (-.2,-.2) -- (-.2,-.4)
      (-.4, .2) -- (-.2, .2) -- (-.2, .4)
      ( .4, .2) -- ( .2, .2) -- ( .2, .4)
      ( .4,-.2) -- ( .2,-.2) -- ( .2,-.4);}
  foo/large/.pic={
    \path[fill=gray,pic actions] (-1,-.5) rectangle(1,.5);},
}
```

We can place extra graphics in hexes as shown in Table 8.

To finish off this part on hexes and what we can do with those, we generate a map in Figure 4.

2.9 Rivers, borders, and roads

Rivers and borders follow the hex sides and are added to the current `tikzpicture` using `\river` and `\border` macros respectively. They are specified as regular Ti*k*Z paths. It is useful to utilise the hex coordinate system for this.

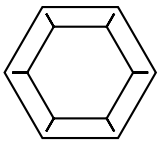
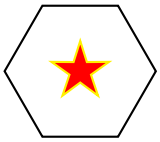
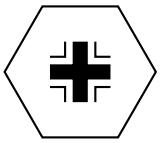
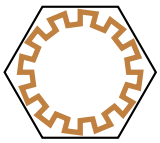
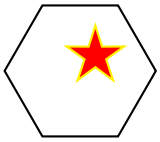
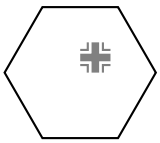
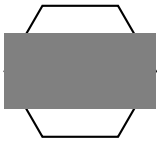
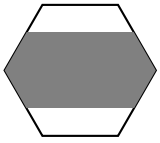
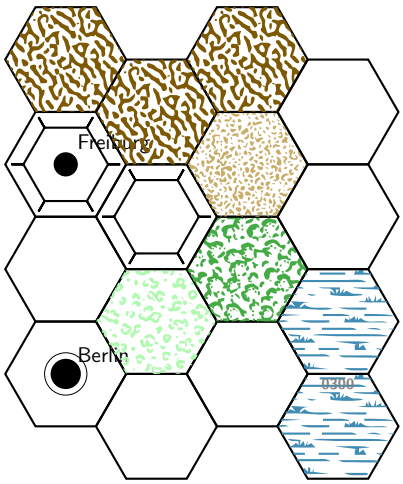
Symbol	extra=
	`hex/fortress`
	`setup/sovjet`
	`setup/german`
	`{setup/german,hex/fortress}`[†]
	`{[{line width=2pt,brown}] fortress 2}`[‡]
	`{[shift={(.2,.2)}]setup/sovjet}`[‡]
	`{[{shift={(.2,.2)},scale=.5,color=gray}] setup/german}`[‡]
	`foo/large`
Symbol	`extra clipped=`
	`foo/large`

Table 8: Hex extra graphics. Note that in the last line we use the graphics `foo/large` with `extra clipped` (compare to line just above) to restrict the graphics to the hex.
[†]When specifying more than one item, the list must be enclosed in braces ({...})
[‡]When an item in the list of `extra` contains a comma (`,`), for example in a list of graphics options, then we need to enclose the inner list *and* the whole list in braces ({...}) to protect against unwanted expansion.




```
\hex[town={pic=hex/town/city,name=Berlin}]    (r=0,c=0)
\hex[]                                        (r=0,c=1)
\hex[]                                        (r=0,c=2)
\hex[terrain={swamp},label=auto]              (r=0,c=3)
\hex[]                                        (r=1,c=0)
\hex[terrain={light woods}]                   (r=1,c=1)
\hex[terrain={woods}]                         (r=1,c=2)
\hex[terrain={swamp}]                         (r=1,c=3)
\hex[town={name=Freiburg},extra=hex/fortress](r=2,c=0)
\hex[extra=hex/fortress]                      (r=2,c=1)
\hex[terrain={rough}]                         (r=2,c=2)
\hex[]                                        (r=2,c=3)
\hex[terrain={mountains}]                     (r=3,c=0)
\hex[terrain={mountains}]                     (r=3,c=1)
\hex[terrain={mountains}]                     (r=3,c=2)
\hex[]                                        (r=3,c=3)
```

Figure 4: Placing hexes

```
\river[⟨options⟩] ⟨path⟩;
\border[⟨options⟩] ⟨path⟩;
```

Rivers are essentially borders, but are randomized to giver a more aesthetically pleasing output.

Roads and railroads typically go from hex–center to hex–center, and are added using the macro `\road`. The road or railroad is specified via a regular Ti*k*Z path.

```
\road[⟨options⟩] ⟨path⟩;
\railroad[⟨options⟩] ⟨path⟩;
```

Towns and cities conveniently serve as places to split up a road at.

2.10 Board clipping and frame

In the river, border, and road example above, the roads extend beyond the hexes, which does not look very nice. One way to deal with this, is to draw a clipping box around the hexes

This technique works fine for examples in a manual, it has a somewhat displeasing effect for a full board. The package therefor defines the macro `\boardclip` which clips the graphics according to the defined hexes.

```
\boardclip(⟨lower-left⟩)(⟨upper-right⟩){⟨options⟩}
```

A clipping path of that spans from the hex at ⟨*lower-lest*⟩ to ⟨*upper-right*⟩. Note, that both of these arguments should only specify the column and row keys. If ⟨*options*⟩ is non-empty, then the clipping path is drawn with those options.

This is particularly useful together with the `\boardframe` macro. This macro will put a frame around the board, optionally with a margin.

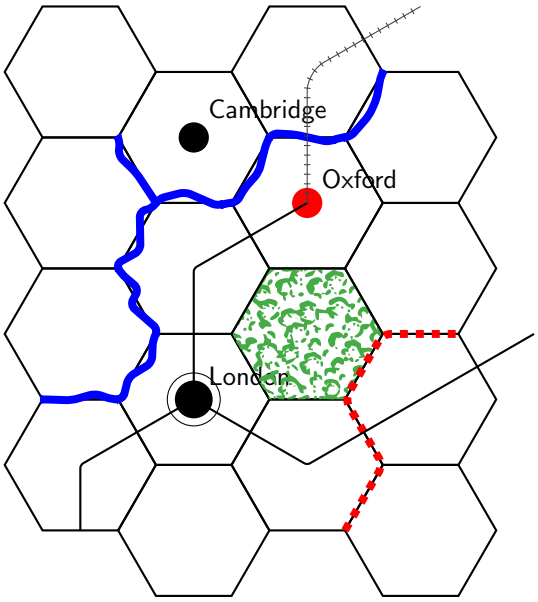


Figure 5: Adding rivers, boarders, and roads

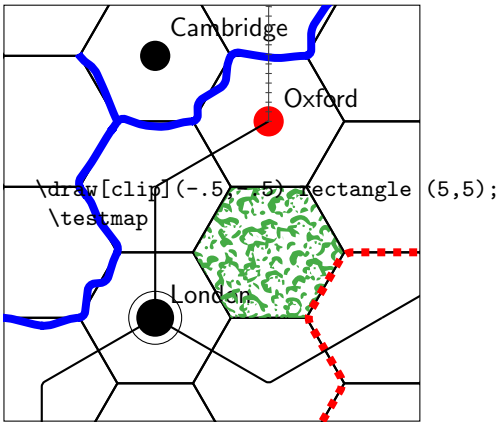
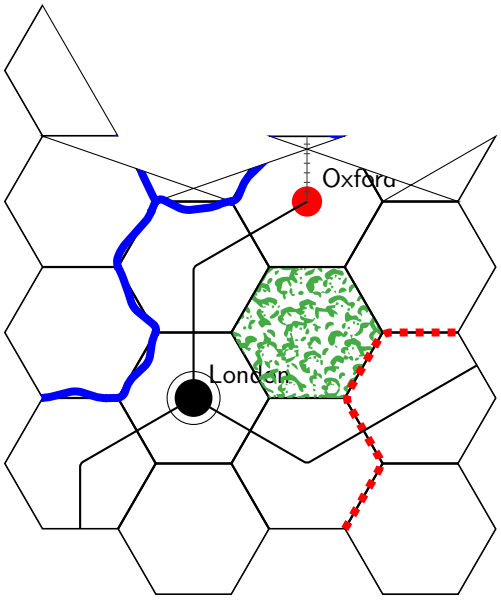


Figure 6: Clipping for a manual using a Ti*k*Z `\draw[clip]` command.




```
\begin{scope}
  \boardclip(c=0,r=0)(c=3,r=3){}
  \testmap
\end{scope}
```

Figure 7: Snug–fit clipping of board using the macro `\boardclip`

`\boardframe[`⟨*margin*⟩`](`⟨*lower-left*⟩`)upper-right`

where ⟨*lower-left*⟩ and ⟨*upper-right*⟩ are as for `\boardclip`. The ⟨*margin*⟩ must be a number, and specifies an optional margin around the hexes, The argument ⟨*options*⟩ specifies how the frame is drawn. The idea is to first draw the frame, then the clipping shape, and then the hexes. One should take care to use the ⟨*options*⟩ argument to `\boardclip` to specify a default background color. The frame is drawn with the style `hex/board frame`

The `\boardframe` macro prints the position of the rectangle to the log output, if one needs to do some more stuff around the board.

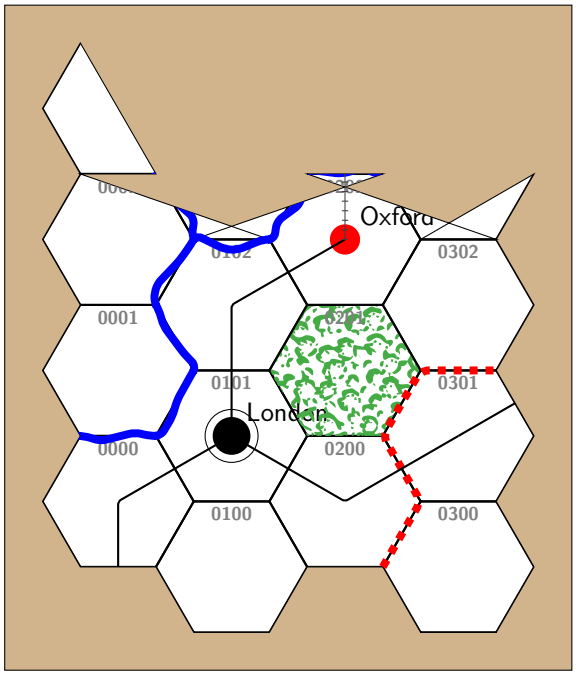


Figure 8: Combining a frame and clipping

3 Chits

Chits, or playing counters[1], can be made with the macro `\chit`. The syntax for rendering a chit is

```
\chit[⟨key-value-pairs⟩](⟨location⟩)(⟨name⟩)
```

Figure 9 shows an example of a chit.

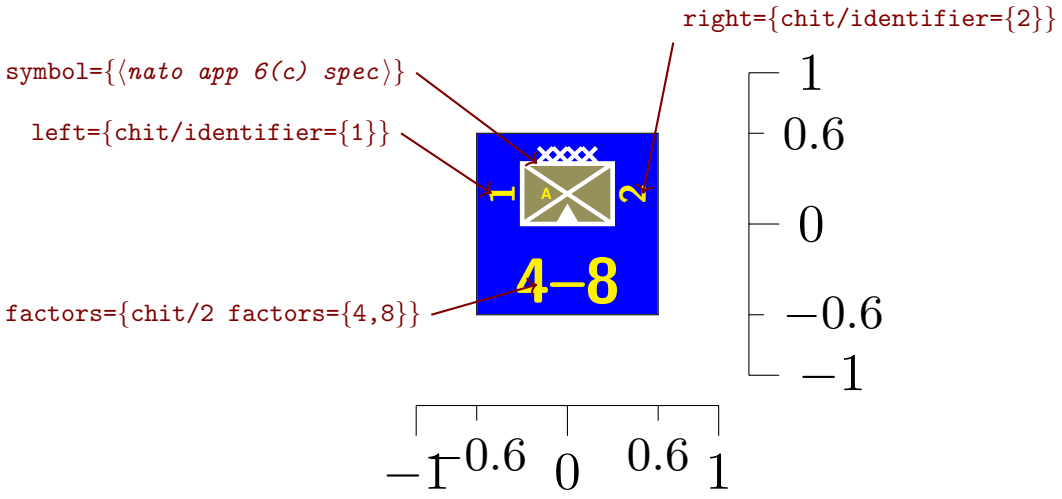


Figure 9: An example of a chit. The lines below and to the right shows two unit lengths. Other global options used are `color=white` to set the foreground colour, `fill=blue` for the background, and `text=yellow` to set the font colour to yellow. The `symbol` key also contains `frame={fill=yellow!50!black` to set the frame fill colour, and `ultra thick` to set the line width of the NATO App6(C) symbol. Note that the line width is automatically scaled.

The example in Figure 9 shows an infantry mountaineer army unit with attack factor 4, and movement factor 8. The NATO App6(c) symbol is given in terms of keywords for the `\natoapp` macro (see Section 4). The other parts of the chit (`factors`, `left`, `right`, and `below`) are rendered onto the chit via Ti*k*Z `pictures`. This allows for a great deal of flexibility in generating chits. For example, above we use the `pictures` `chit/identifier` and `chit/2 factors` to render the left- and right-hand identifiers, and the factors, respectively.

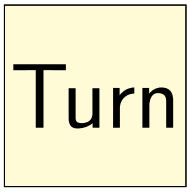
Full frame chits — that is chits which are not typically designating units or faction specific chits, e.g., a turn marker — can be made by using the key `full`. In that case, all other keys (`symbol`, `factors`, `left`, `right`, and `below`) are ignored. Figure 10 shows such an example.

The size of the chits are 1.2×1.2 unit lengths squared. This is tuned so that the chits will fit within the hexes produced by the `\hex` command (see Section). In Figure 11 we illustrate this. Typically the unit is one centimetre. which means the chits are 12 mm × 12 mm — or roughly 1/2" × 1/2", which is a fairly good size for most games.

3.1 Styling chits

Typical Ti*k*Z options can be passed to the `\chit` macro. For example, if you want to draw the chit with a red foreground, simply pass `draw=red` in the `[`⟨*optional*⟩`]` arguments to `\chits`. Individual parts of the hexes can be

[1] Since TEX has the concept of counters as in '`\count`' and LATEX's '`\newcounter`', we choose the name 'chit' for playing pieces instead.



chit made with

```
\tikzset{
  wg/big text/.pic={
    \node[font=\sffamily\fontsize{18}{0}%
          \selectfont]{#1};}}
 \tikz{
  \chit[full={wg/big text={Turn}},
        black,fill=yellow!20!white](0,0)}
\end{tikzpicture}
```

Figure 10: An example of a full-frame chit.

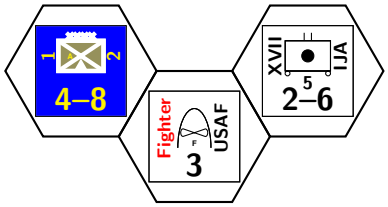


Figure 11: Example of chits fit within hexes.

styled separately.

Important: To set the colours of the various elements, one should use

`color`=⟨***foreground and text***⟩ Selects the foreground colour of lines, text, and so on, including for the NATO App6(C) symbol.

`fill`=⟨***background***⟩ Selects the background colour of the full chit. By default this is transparent.

`text`=⟨***text foreground***⟩ Selects the colour used for text in the chit. This overrides `color` for text.

`draw`=⟨***foreground***⟩ This sets the colour for foreground elements, excluding text.

Ti*k*Z allows one to pass a ⟨*colour*⟩ as arguments for drawing and understands that as giving the foreground and text colours. However, that key is *deprecated* for this library, as it does not properly propagate through[2].

The styles used by the `left`, `right`, `setup`, `factors`, and `symbol` elements are `tikz/chit/left`, `tikz/chit/right`, `tikz/setup`, `tikz/factors`, and `tikz/symbol` respectively. A user can redefine these to change the appearance of the chits. For example, one could make the symbol larger by setting a different `scale`, move the factors to the side by changing `shift`, and so on.

Pictures used by these elements are also styled by similar keys. For example, the picture `chit/identifier` is styled by `tikz/chit/identifier`.

In addition, one can define the key `tikz/every chit` to be the default options for all chits.

[2]The colour `pgfstrokecolor` is not modified by that.

3.2 Defining preset chit types

One can conveniently pre-define some chit styles. For example, given the style definition

```
\tikzset{
  my chit/.style={/chit/symbol={[
      faction=friendly,
      command=land,
      main=armoured]},
    /chit/left={chit/identifier={Mine}},
    /chit/factors={chit/2 factors={2,4}}}}
```

We can use that to make different chits with some commonalities defined by that style. For example

where, in the second example, we have passed additional options to `\chit`. Note that we *must* give the full path to the `chit` keys when defining a style like this.

4 NATO App 6(c) symbols

The NATO markers are designed to fit within the template shown in Figure 12. The template is serves as a placement guide of the the various parts of the NATO marker as illustrated in Figurefig:natoapp:usage.

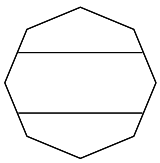


Figure 12: Template for NATO symbols

`\natoapp[`⟨*key-value-pairs*⟩`](`⟨*location*⟩`)(`⟨*name*⟩`)`

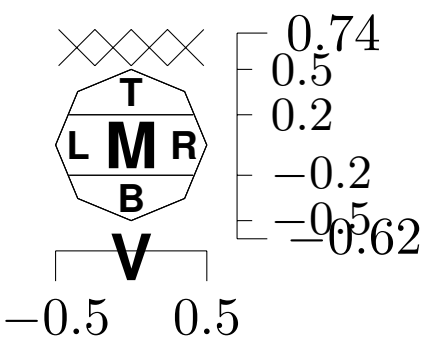
where all arguments are optional. Keys are defined to fill in the various parts of the markers. These keys are

`faction=`⟨***faction***⟩ Selects the faction used for the symbol. See also Section 4.1.

`command=`⟨***command***⟩ Selects the command used for the symbol. See also Section 4.1.

`main=`⟨***mains***⟩ Specifies the main symbol(s). This can be a comma separated list of specifiers (delimited by braces `{`⟨*first,second,...*⟩`}`), and each symbol can be preceeded by an optional argument to shift, scale, rotate, etc., the individual symbols. .

`left=`⟨***lefts***⟩, `right=`⟨***rights***⟩, `top=`⟨***tops***⟩, `bottom=`⟨***bottoms***⟩, `below=`⟨***belows***⟩ Specifies the left-, right-hand, top, bottom, and lower symbol(s). The format of the arguments ⟨*lefts*⟩, ⟨*rights*⟩, ⟨*tops*⟩, ⟨*bottoms*⟩, and ⟨*belows*⟩ has the same format as ⟨*mains*⟩.



The figure is typeset by

```
\natoapp[faction=none,
         command=base,
         echelon=army,
         main={text=M},
         top={text=T},
         bottom={text=B},
         left={text=L},
         right={text=R},
         below={text=V}]
```

Figure 13: Main keys of `\natoapp`. The bottom and right hand bars indicate one unit of length.

Other keys are available to further customise the appearance of the symbols

`echelon=`⟨***size***⟩ The size of the unit described. Possible values are `team`, `squad`, `section`, `platoon`, `company`, `battalion`, `regiment`, `brigade`, `division`, `corps`, `army`, `army group`, `theatre`, and `command`.

`frame=`⟨***keys***⟩ Extra keys for frame.

4.1 Faction and Command Selection

Table 9 shows the various bases used for the various ***faction/command*** combinations. Also shown in the table is the base template for main identifiers.

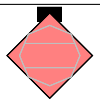
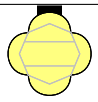
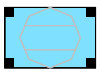
⟨*command*⟩	⟨*faction*⟩ `friendly`	`hostile`	`neutral`	`unknown`
`air`				
`land`				
`equipment`				
`installation`				
`sea surface`				
`sub surface`				
`space`				
`activity`				

Table 9: Frames for various combinations of ⟨*faction*⟩ and ⟨*command*⟩ combinations. These are drawn with the `pic` given by `natoapp6c/`⟨***faction***⟩`/`⟨***command***⟩ with the options `draw=blue,fill=`⟨***faction***⟩. If no `fill` is specified, then the background will be transparent. Note, the template for main identifiers is also shown on top of each frame.

The fill color of the frame is set by the key `frame`. If this is or contains the special value `faction`, then the frame fill colour will be the standard for the faction as illustrated in figure 14.

Elements of the frame can be controlled by the key `frame`.

`frame=`⟨***keys***⟩ Additional keys to pass to the frame drawing. The special option `faction` will make the frame be filled with the standard faction color.

Table 10 illustrates this.

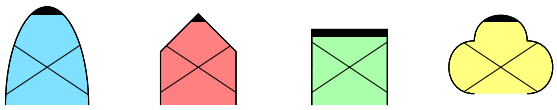


Figure 14: Illustration of using the special value `faction` for the `frame` key

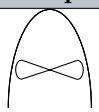
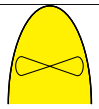
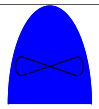
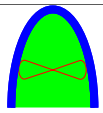
Example	`frame={color,...}`	`frame={fill,...}`	`frame={draw,...}`	`frame={line width,...}`
				
	red			thick
		yellow		thin
			blue	
		pink	magenta	
	red	green	blue	ultra thick

Table 10: Illustration of frame colour choices

4.2 Unit Size (`echelon`)

The size of a unit a marker represents is given by the `echelon` keyword. Table 11 shows the various markers and approximate unit sizes.

4.3 Unit type identification

References

[1] Hanover,C., Hendrix,C.E., & Llewelyn,S., *First Blood*, 1997, https://grognard.com/fb/

[2] *NATO Joint Military Symbology*, APP-6(C), May 2011, https://en.wikipedia.org/wiki/NATO_Joint_Military_Symbology.

[3] *NATO Joint Military Symbology*, APP-6(D), October 2017, https://nso.nato.int/nso/nsdd/main/standards/ap-details/1912/EN

[4] milsymb package, https://www.ctan.org/pkg/MilSymb.

5 Implementation

5.1 The `wargame` package

First, package identification

```
\ProvidesPackage{wargame}
```

Then needed packages

```
\RequirePackage[svgnames]{xcolor}
\RequirePackage{tikz}
```

A switch to include terrain pictures (which take a lot of memory for some reason).

```
\@ifundefined{ifhex@terrain@pic}{%
  \newif\ifhex@terrain@pic
  \hex@terrain@picfalse}{}
```

Options

```
\DeclareOption{noterrainpic}{%
  \hex@terrain@picfalse}
\DeclareOption{terrainpic}{%
  \hex@terrain@pictrue}
\ProcessOptions\relax
```

Finally, the used Ti*k*Z libraries

```
\usetikzlibrary{wargame.hex,wargame.natoapp6c,wargame.chit}
```

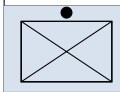
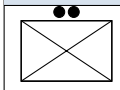
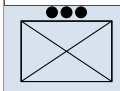
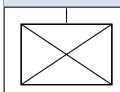
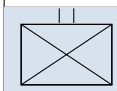
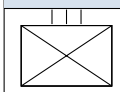
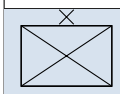
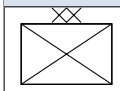
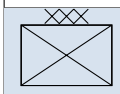
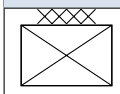
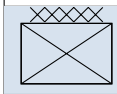
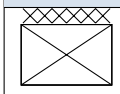
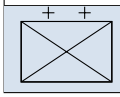
Example	echelon	Approx. size	Sub-units	Officer
	team	3–5	none	Corporal or Sergeant
	squad	5 10	1–2 teams	Sergeant
	section	7–13	2–3 teams	Sergeant
	platoon	25 40	Several squads/sections	Second Lieutenant
	company	60–250	Several platoons	Captain
	battalion	300 1 000	2–6 companies	Lieutenant colonel
	regiment	500–2 000	3–7 battalions	Colonel
	brigade	2 000 5 000	Several battalions	Colonel
	division	10 000–20 000	Several brigades/regiments	Major General
	corps	30 000 60 000	Several divisions	Lieutenant General
	army	100 000	Several corps (5–10 divisions)	General
	army group	120 000 500 000	Several armies	Field Marshal
	theatre	250 000+	Several army groups	Field Marshal
	command	Not a unit size, but designator		

Table 11: Illustration of echelon values. Approximate sizes and command officer titles are typical modern day United States of America army values and identifiers. Historically the unit sizes have changed, as has officer titles. Furthermore, both the unit sizes, names, and command officer titles may vary from country to country, even across command.

Symbol	Type & Abbreviation	
	Air assault	AA
	Air defence	ADA
	Airborne	AB
	Amphibious	AM
	Anti tank/armoured	AT
	Armoured	AR
	Chemical biological radiological nuclear	CB
	Combined arms	CAR
	Engineer	ENG
	Field artillery	FA
	Infantry	IN
	Mechanised infantry	M
	Mountaineer	MTN
	Naval	N
	Reconnaissance	REC
sof	Special Operations Forces	SOF
Symbol	**Echelon & Abbreviation**	
	Army group	AG
	Army	A
	Corps	-
	Division	D
	Brigade	BD
	Regiment	REGT
	Battalion	BN
	Company	COY
●●●	Platoon	PLT
●●	Section	
●	Squad	

Table 12: Some abbreviations of unit type identifications

5.2 The `wargame.util` Ti*k*Z library

This library contains some utilities for use in the other libraries.

5.2.1 Miscellaneous macros

`\wg@dbg`

Debugging support. The counter `\wargamedbglvl` sets the debug level. The package code then uses `\wg@dbg` to print out debugging messages. This macro takes two arguments — the first is the *least* debug level at which the message is printed, and the second is the message it self.

```
\newcount\wargamedbglvl\wargamedbglvl=0
\def\wg@dbg#1#2{%
  \ifnum#1>\wargamedbglvl\relax\else\message{^^J#2}\fi}
```

`\wg@addto@macro`

The macro `\wg@addto@macro{`⟨*macro*⟩`}{`⟨*other*⟩`}` adds the definition of the macro ⟨*other*⟩ to the macro ⟨*macro*⟩. This uses the `\toks` trick of storing the *tokens* of the definition of a ⟨*macro*⟩ and ⟨*other*⟩ into `@` and expanding that token into the definition of ⟨*macro*⟩. Effectively, this means that the top-level definition of ⟨*macro*⟩ and ⟨*other*⟩ are expanded (i.e., macros used in the definition of either macro is *not* expanded) and then that becomes the new definition of ⟨*macro*⟩.

We will use this macro to do *shallow* definitions of macros to contain keys and such.

```
\long\def\wg@addto@macro#1#2{%
  \begingroup
  \toks@\expandafter\expandafter\expandafter{\expandafter#1#2}%
  \xdef#1{\the\toks@}%
  \endgroup}
```

`\wg@sub@nchor`

Get anchor from sub node. We cannot use `\pgfpointanchor` since that returns the anchor coordinates in the global coordinate system.

```
\def\wg@sub@nchor#1#2{%
  \wg@dbg{3}{^^JGet `#2' in `#1'}%
  \@ifundefined{pgf@sh@ns@#1}{%
    \pgf@x=0cm\pgf@y=0cm}{%
    \pgf@process{%
      \csname pgf@sh@ma@#1\endcsname% MW
      \csname pgf@sh@np@#1\endcsname%
      \pgf@sh@reanchor{\csname pgf@sh@ns@#1\endcsname}{#2}}}%
  \wg@dbg{10}{-> \the\pgf@x,\the\pgf@y}%
}
```

Scratch dimensions

```
\newdimen\wg@tmpa
```

```
\newdimen\wg@tmpb
\newdimen\wg@tmpc
\newdimen\wg@tmpd
```

Macro to easy restore a saved path

```
\def\settosave#1{
  \pgfsyssoftpath@setcurrentpath{#1}}
```

5.2.2 Pictures in compound nodes

`\wg@pic`

The macro `\wg@pic` will render a `pic`. This is used by the `natoapp6cs`, `chit`, and `hex` node shapes extensively.

The arguments are

1. Prefix
2. Position
3. Fixed options
4. User options
5. Picture.

That is, the macro expects calls like

`\wg@pic[`⟨*options*⟩`]`⟨*picture*⟩`\@endwg@pic{`⟨*prefix*⟩`}{`⟨*position*⟩`}{`⟨*options*⟩`}`

Note the `\@endwg@pic` at the end of the call to swallow up ⟨*picture*⟩. Typically this macro is used as

`\edef\args{`⟨*something*⟩`} \expandafter\wg@pic\args\@endwg@pic{`⟨*prefix*⟩`}(`⟨*position*⟩`){`⟨*options*⟩`}`

where ⟨*something*⟩ typically expands to `[`⟨*user option*⟩`]`⟨*picture*⟩

First, the top-level macro `\wg@pic` that looks for user options.

```
\def\wg@pic{%
  \@ifnextchar[{\wg@@pic}{\wg@@pic[]}%]
}
```

This macro then forwards to `\wg@@pic` to gobble up ⟨*picture*⟩.

1. User options
2. Arguments

```
\def\wg@@pic[#1]#2\@endwg@pic{%
  \wg@dbg{2}{Options: `#1', picture: `#2'}%
  \wg@@@pic{#1}{#2}%
}
```

1. User options

2. Arguments
3. Prefix
4. Coordinates
5. Fixed options

```
\def\wg@@@pic#1#2#3#4#5{%
  \ifx|#2|\wg@dbg{3}{No picture given}%
  \else%
    \wg@dbg{3}{^^JWG Pic:
      ^^J  User options:  #1
      ^^J  Picture:       #2
      ^^J  Prefix:        #3
      ^^J  Coordinates:   #4
      ^^J  Fixed options: #5}%
    % \wg@dbg{2}{\string\pic[#5,#1] at (#4) {#3#2}}%
    \pic[#5,#1] at (#4) {#3#2};%
    \ifwg@s@ve%
      \pgf@relevantforpicturesizetrue%
      \begin{getbbl}%
        \pic[draw=none,fill=none,transform shape] at (#4) {#3#2};%
      \end{getbbl}%
      \wg@dbg{5}{Clipping to local bounding box}%
      \clip (L.south west) rectangle (L.north east);%
      \pgf@relevantforpicturesizefalse \global\wg@s@vefalse%
    \fi
  \fi%
  \wg@dbg{3}{End of WG Pic}
}
```

\wg@pic@all

This macro sets all pictures in a list.

1. List
2. Prefix
3. Position
4. Styles

```
\def\wg@pic@all#1#2#3#4{%
  \wg@dbg{2}{WG picture loop
    ^^J  List:    \meaning#1
    ^^J  Prefix:  `#2'
    ^^J  Position: `#3'
    ^^J  Styles:   `#4'}
  \foreach \p in #1{%
    \wg@dbg{2}{WG picture element: \meaning\p}%
    \expandafter\wg@pic\p\@endwg@pic {#2}{#3}{#4}%
  }%
}
```

5.2.3 Nodes in compound nodes

`\wg@node`

The macro `\wg@node` will render a `node`. This can be used by the `natoapp6cs`, `chit`, and `hex` node shapes.

The arguments are

1. Prefix
2. Position
3. Fixed options
4. User options
5. Body.

That is, the macro expects calls like

`\wg@node[`⟨*options*⟩`]`⟨*body*⟩`\@endwg@node{`⟨*prefix*⟩`}{`⟨*position*⟩`}{`⟨*options*⟩`}`

Note the `\@endwg@node` at the end of the call to swallow up ⟨*body*⟩. Typically this macro is used as

`\edef\args{`⟨*something*⟩`} \expandafter\wg@node\args\@endwg@node{`⟨*prefix*⟩`}(`⟨*position*⟩`){`⟨*options*⟩`}`

where ⟨*something*⟩ typically expands to `[`⟨*user option*⟩`]`⟨*body*⟩

First, the top-level macro `\wg@node` that looks for user options.

```
\def\wg@node{%
  \@ifnextchar[{\wg@@node}{\wg@@node[]}%]
}
```

This macro then forwards to `\wg@@node` to gobble up ⟨*body*⟩.

1. User options
2. Arguments

```
\def\wg@@node[#1]#2\@endwg@node{%
  \wg@dbg{2}{Options: `#1', body: `#2'}%
  \wg@@@node{#1}{#2}%
}
```

1. User options
2. Arguments
3. Prefix
4. Coordinates
5. Fixed options

```
\def\wg@@@node#1#2#3#4#5{%
  \ifx|#2|\wg@dbg{3}{No body given}%
  \else%
    \wg@dbg{3}{^^JWG Pic:
      ^^J  User options:  #1
      ^^J  Body:          #2
      ^^J  Prefix:        #3
      ^^J  Coordinates:   #4
      ^^J  Fixed options: #5}%
    % \wg@dbg{2}{\string\pic[#5,#1] at (#4) {#3#2}}%
    \node[#5,#1] at (#4) {#3#2};%
  \fi%
  \wg@dbg{3}{End of WG Node}
}
```

`\wg@node@all`

This macro sets all pictures in a list.

1. List
2. Prefix
3. Position
4. Styles

```
\def\wg@node@all#1#2#3#4{%
  \wg@dbg{2}{WG picture loop
    ^^J  List:    \meaning#1
    ^^J  Prefix:  '#2'
    ^^J  Position: '#3'
    ^^J  Styles:   '#4'}
  \foreach \p in #1{%
    \wg@dbg{2}{WG picture element: \meaning\p}%
    \expandafter\wg@node\p\@endwg@node {#2}{#3}{#4}%
  }%
}
```

5.2.4 Bounding boxes

Bounding box dimensions

```
\newdimen\wg@bb@minx
\newdimen\wg@bb@miny
\newdimen\wg@bb@maxx
\newdimen\wg@bb@maxy
```

Enable or disable bounding box tracking

```
\newif\ifwg@notrelevantforpathsize\wg@notrelevantforpathsizefalse
```

wg@resetbb

Reset the bounding box tracking dimensions

```
\def\wg@resetbb{%
  \global\wg@bb@minx=16000pt\relax%
  \global\wg@bb@miny=16000pt\relax%
  \global\wg@bb@maxx=-16000pt\relax%
  \global\wg@bb@maxy=-16000pt\relax%
}
```

\old@pgf@protocolsize

Save PGF's bounding box algorithm

```
\let\old@pgf@protocolsize\pgf@protocolsizes
```

\wg@protocolsizes

Our bounding box algorithm

```
\def\wg@protocolsizes#1#2{%
  \old@pgf@protocolsize{#1}{#2}
  \ifwg@notrelevantforpathsize\else%
  \ifdim#1<\wg@bb@minx\global\wg@bb@minx#1\fi%
  \ifdim#1>\wg@bb@maxx\global\wg@bb@maxx#1\fi%
  \ifdim#2<\wg@bb@miny\global\wg@bb@miny#2\fi%
  \ifdim#2>\wg@bb@maxy\global\wg@bb@maxy#2\fi%
  \fi
}
```

getbbl (*env.*) Environment that tracks the local bounding box

```
\newenvironment{getbbl}{%
  \wg@resetbb%
  \wg@notrelevantforpathsizefalse%
  \global\let\pgf@protocolsizes\wg@protocolsizes}{%
  \gdef\pgf@sh@ns@L{rectangle}
  \gdef\pgf@sh@np@L{%
    \def\southwest{\pgfqpoint{\the\wg@bb@minx}{\the\wg@bb@miny}}%
    \def\northeast{\pgfqpoint{\the\wg@bb@maxx}{\the\wg@bb@maxy}}%
  }
  \gdef\pgf@sh@nt@L{{1}{0}{0}{1}{0pt}{0pt}}
  \gdef\pgf@sh@pi@L{\pgfpictureid}
  \global\let\pgf@protocolsizes\old@pgf@protocolsize
}
```

getbb (*env.*) Environment to track global bounding box

```
\newenvironment{getbb}{%
```

```
  \wg@resetbb%
  \wg@notrelevantforpathsizefalse%
  \global\let\pgf@protocolsizes\wg@protocolsizes}{%
  \gdef\pgf@sh@ns@M{rectangle}
  \gdef\pgf@sh@np@M{%
    \def\southwest{\pgfqpoint{\the\wg@bb@minx}{\the\wg@bb@miny}}%
    \def\northeast{\pgfqpoint{\the\wg@bb@maxx}{\the\wg@bb@maxy}}%
  }
  \gdef\pgf@sh@nt@M{{1}{0}{0}{1}{0pt}{0pt}}
  % \pgfgettransform\pgf@temp%
  % \xdef\pgf@sh@nt@M{\pgf@temp}
  % \pgfgettransformentries{\wg@tmp@a}{\wg@tmp@b}{\wg@tmp@c}{\wg@tmp@d}{\pgf@temp}{\pgf@temp}
  % \message{^^JTransform of M: \meaning\pgf@temp}
  % \xdef\pgf@sh@nt@M{{\wg@tmp@a}{\wg@tmp@b}{\wg@tmp@c}{\wg@tmp@d}{0pt}{0pt}}%
  % \message{^^JTransform of M: \meaning\pgf@sh@nt@M}
  \gdef\pgf@sh@pi@M{\pgfpictureid}
  \global\let\pgf@protocolsizes\old@pgf@protocolsize
}
```

5.2.5 Other Tikz utilities

tikz/reverseclip

A reverse clipping path. This is used to cut out stuff outside of path defined.

```
\tikzstyle{reverseclip}=[insert path={(current bounding box.north east) --
  (current bounding box.south east) --
  (current bounding box.south west) --
  (current bounding box.north west) --
  (current bounding box.north east)}]
```

tikz/clip even odd rule

A reverse clipping path

```
\tikzset{
  clip even odd rule/.code={\pgfseteorule}, % Credit to Andrew Stacey
}
```

tikz/invclip

Inverse clipping. This should be an option *after* the path to do the inverse clipping by. This works by adding a *large* (page) path to the current path, and then use that as clipping.

```
\tikzset{
  invclip/.style={
    clip,insert path=
    [clip even odd rule]{
      [reset cm](-\maxdimen,-\maxdimen)rectangle(\maxdimen,\maxdimen)
    }
```

```
  },
}
```

save clip

An option for use with sub-elements of NATO App 6(c) or chit nodes. This will save the current path as a clipping path for the next paths to be drawn in the sub-element

```
\newif\ifwg@s@ve\wg@s@vefalse
\tikzset{
  save clip/.is choice,
  save clip/true/.code={\global\wg@s@vetrue},
  save clip/false/.code={\global\wg@s@vefalse},
  save clip/.default={true},
  save clip/.initial={false},
}
```

scale line widths

Scales any line width specified in the node options.

Use like

```
\tikzset{
  some/.style={
    scale line widths,
    line width=1pt}
}
```

Note that the order is important.

```
\tikzset{
  scale line widths/.style={%
    /utils/exec=\def\tikz@semiaddlinewidth##1{%
      \pgfgettransformentries{%
        \wg@jaca}{%
        \wg@jacb}{%
        \wg@jacc}{%
        \wg@jacd}{%
        \wg@tmp}{%
        \wg@tmp}%
      \pgfmathsetmacro{\wg@jac}{sqrt(abs(\wg@jaca*\wg@jacd-\wg@jacb*\wg@jacc))}%
      \wg@dbg{4}{Scaling line width ##1 by \wg@jac}
      \pgfmathsetmacro{\wg@lw}{\wg@jac*##1}%
      \wg@dbg{4}{Scaled ##1 -> \wg@lw}
      \tikz@addoption{\pgfsetlinewidth{\wg@lw pt}}%
      \wg@dbg{4}{Added scaled option \wg@lw}
      \pgfmathsetlength\pgflinewidth{\wg@lw pt}
      \wg@dbg{4}{Did set line width \wg@lw pt}
    }},
```

```
  relative line width/.style={%
    /utils/exec=\def\tikz@semiaddlinewidth##1{%
      \wg@dbg{4}{Relative line width #1 times ##1}%
      \pgfmathsetmacro{\wg@lv}{#1*##1}%
      \tikz@addoption{\pgfsetlinewidth{\wg@lw pt}}%
      \pgfmathsetlength\pgflinewidth{\wg@lw pt}}}
}
```

`sub pic actions`

This is key that propagates actions to sub pictures of pictures. The normal `pic actions` cannot be used as it causes an infinite loop.

```
\tikzset{
  sub pic actions/.code={%
    \tikz@picmode%
    \edef\opts{%
      \iftikz@mode@draw draw,\else draw=none,\fi
      \iftikz@mode@fill fill\else fill=none\fi}
    \wg@dbg{5}{^^JSub Mode: \meaning\tikz@picmode  \meaning\opts}
    \pgfset{/tikz/.cd}
    \pgfkeysalsofrom{\opts}
  }}
```

`wg/debug show`

Show debugging information

```
\tikzset{
  wg/debug show/.code={%
    \extractcolorspec{pgfstrokecolor}{\wg@tmp@fg}
    \def\wg@tmp@bg{none}
    \@ifundefinedcolor{pgffillcolor}{}{
      \extractcolorspec{pgffillcolor}{\wg@tmp@bg}}
    \begingroup
    \tikz@mode
    \wargamedbglvl=#1
    \wg@dbg{3}{Drawing with w/stroke `\wg@tmp@fg'
      (\tikz@strokecolor,\iftikz@mode@draw\else not\space\fi drawing)
      and fill `\wg@tmp@bg' (\tikz@fillcolor,\iftikz@mode@fill\else
      not\space\fi  filling)}
    \endgroup
  }
}
```

5.2.6 Random IDs

```
\def\wg@r@ndom@id{%
  \def\wg@uuid{}
  \foreach \i in {1,...,8}{%
    \pgfmathparse{Hex(random(0,15))}
```

```
    \xdef\wg@uuid{\wg@uuid\pgfmathresult}}}
```

5.3 The wgexport class

This document class is used for exporting game component to be used in a VASSAL module libraries.

Class identification and load `wargame` package

```
\ProvidesClass{wgexport}
\PassOptionsToClass{multi=tikzpicture,varwidth=false}{standalone}
\DeclareOption{noterrainpic}{%
  \PassOptionsToPackage{\CurrentOption}{wargame}}
\DeclareOption{terrainpic}{%
  \PassOptionsToPackage{\CurrentOption}{wargame}}
\DeclareOption*{%
  \PassOptionsToClass{\CurrentOption}{standalone}}
\ProcessOptions\relax
\LoadClass{standalone}
\RequirePackage{wargame}
```

We need a few utilities before we get to the actual environment. First, we need a tools to write out literal left and right curly braces. We do a bit of catcode hackery to accomplish that.

```
\begingroup
\catcode`\^^I=12
\def\@tabchar{^^I}
\catcode`<=1 \catcode`>=2
\catcode`{=12 \catcode`}=12
\gdef\@lbchar<{>
\gdef\@rbchar<}>
\endgroup
```

Above, we temporarily set the tab, and left and right curly brace characters to be regular letters (12), and the catcodes of less than and greater than to be those of left and right curly braces respectively. We then define the macros `\@tabchar`, `\@lbchar`, and `\@rbchar` to produce literal characters. LaTeXalready has `\@percentchar`.

Everything we do should go inside this environment. The single optional argument is the file name stem of the output JSON file.

```
\newenvironment{imagelist}[1][\jobname]{%
  \newwrite\mk@out%
  \def\mk@i{}%
  \def\mk@w{\immediate\write\mk@out}%
  \immediate\openout\mk@out=#1.json
  \mk@w{[}
}{
  \mk@w{\mk@i \@lbchar "name":"End of list", "category": "<<eol>>",
      "subcategory": "" \@rbchar }
  \mk@w{]}
  \immediate\closeout\mk@out
}
```

Preceed all images (tikzpicture) with this command

First argument is the name of the image. This can be anything. Note that for counters, if the name ends in `flipped` then it is considered the backside of a counter.

Second argument is the type of image. Recognised types are

- `board` for boards
- `oob` for OOBs
- `chart` for charts
- `counter` for counters
- `front` for front page

Other types can be used, and the images will be exported, but the Python script pays no particular attention to those then. Use for example to prepare images for help or the like.

The third argument is the sub type. This is most relevant for the counters. Sub types can be anything, but since the counters will receive different prototypes based on the sub type, it makes sense to divide into sub types a la

- factions
- common markers

The faction sub types should just be the name of the faction. E.g., Allies, Axis, Soviet, NATO, Warsaw Pact. Spaces should not matter.

For common markers, there are a few names that are recognised specifically by the Python script. These are

- `common`
- `all`
- `marker`
- `markers`

Counters that has these sub-types will no be considered to belong to any faction.

Note that the Python script uses the faction names to guess the players of the game, and uses them in several places.

```
\def\info{%
  \@ifstar{\@@info{,}}{\@@info{\@rbchar,}}}
\def\@@info#1#2#3#4{%
  \chit@dbg{2}{Making image ‘#2’ of type ‘#3’/‘#4’ on page \thepage}%
  \mk@w{ \@lbchar}%
  \mk@w{ \space "name": "#2",}%
  \mk@w{ \space "category": "#3",}%
  \mk@w{ \space "subcategory": "#4", }%
  \mk@w{ \space "number": \thepage #1}%
  \let\oldmk@i\mk@i%
  \ifx#1,\relax\edef\mk@i{\mk@i\space\space}\fi}
\def\end@info{%
  \let\mk@i\oldmk@i%
  \mk@w{ \space \@rbchar,}}
```

Make separate images for each counter (single sided).

```
\newcommand\chitimages[2][]{%
  \begingroup%
  \let\chit@report\do@chit@report%
  \let\natoapp@report\do@natoapp@report%
  \chit@dbg{2}{chits to make images of `#2'}%
  \foreach[count=\ti from 0] \t/\x in #2{%
    \ifx\t\empty\else% Ignore empty rows
      \chit@dbg{5}{^^JSubcategory: `\x' (default `#1')}
      \ifx\t\x\def\x{#1}\fi% Take sub-category or default
      \foreach \u/\m in \t{%
        \ifx\u\empty\else% Ignore empty cells
          \chit@dbg{2}{Next chit `\u' with possible multiplicity `\m'}%
          \ifx\m\@empty\def\m{1}\fi% If not multiplicity defined
          \ifx\u\m\def\m{1}\fi% If the same as unit
          \chit@dbg{2}{Next chit `\u' multiplicity `\m'}%
          %% We only make one copy of the chit, since we can duplicate
          %% it in VASSAL
          \info*{\u}{counter}{\x}
          \begin{tikzpicture}
            \chit[\u=\ti]%
          \end{tikzpicture}
          \end@info%
          %% \foreach \n in {1,...,\m}{% Make a number of copies
          %%   \ifx\u\chit@blank%
          %%     \chit@dbg{3}{Ignoring blank chit:\u}%
          %%   \else%
          %%     \info{\u}{counter}{#2}
          %%     \begin{tikzpicture}
          %%       \chit[\u=\ti](\c,\r)%
          %%     \end{tikzpicture}
          %%   \fi%
          %% }%
        \fi%
      }%
      \chit@dbg{2}{End of inner loop}%
    \fi%
  }%
  \chit@dbg{2}{End of outer loop}%
  \endgroup%
}
```

Make separate images for each counter (double sided). The back-side counters must be defined by append ‘ `flipped`’ the front face name

```
\newcommand\doublechitimages[2][]{%
  \begingroup%
  \let\chit@report\do@chit@report%
  \let\natoapp@report\do@natoapp@report%
  \foreach[count=\ti from 0] \t/\x in #2{%
    \ifx\t\empty\else% Ignore empty rows
      \chit@dbg{5}{^^JSubcategory: `\x' (default `#1')}
      \ifx\t\x\def\x{#1}\fi% Take sub-category or default
```

```
      \foreach \u/\m in \t{%
        \ifx\u\empty\else% Ignore empty cells
          \chit@dbg{2}{Next chit `\u' with possible multiplicity `\m'}%
          \ifx\m\@empty\def\m{1}\fi% If not multiplicity defined
          \ifx\u\m\def\m{1}\fi% If the same as unit
          \chit@dbg{2}{Next chit `\u' multiplicity `\m'}%
          %% Flipped chit
          \edef\s{\u\space flipped}%
          %% We only make one copy of the chit, since we can duplicate
          %% it in VASSAL
          \info*{\u}{counter}{\x}%
          \begin{tikzpicture}%
            \chit[\u=\ti]%
          \end{tikzpicture}%
          \end@info%
          \info*{\s}{counter}{\x}%
          \begin{tikzpicture}%
            \chit[\s=\ti]%
          \end{tikzpicture}%
          \end@info%
          %% \foreach \n in {1,...,\m}{% Make a number of copies
          %%   \ifx\u\chit@blank%
          %%     \chit@dbg{3}{Ignoring blank chit:\u}%
          %%   \else%
          %%     \info{\u}{counter}{#2}
          %%     \begin{tikzpicture}
          %%       \chit[\u=\ti](\c,\r)%
          %%     \end{tikzpicture}
          %%   \fi%
          %% }%
        \fi%
      }%
    \fi%
  }%
  \endgroup%
}
```

Special for boards, we have the environment boardimage. Like `\info` we must specify the name and sub-category of the board, but the category is assumed to be `board` (though the optional argument can specify a different category).

Within this environment some specific styles are defined that allows the user to specify VASSAL zones on the board. For this to work properly, the parent tikzpicture *must* have the style `zoned`. This style will record the bounding box of the picture which we will need to calculate VASSAL coordinates later on.

Other styles are `zone scope`, to be applied to `scope`s in the picture, and `zone path` to be applied to `path`s (or `\draw`, `\fill`, or the like) in the picture. These will record coordinates of these elements in side the picture. The Python script will then define VASSAL zones based on these coordinates.

For `zone scope` applied to a `scope`, what is recorded are

- The current coordinate transformation matrix
- The current translation
- The bounding box, within the current transformation and translation.

To define a zone in the board, simply enclose it in a

```
\begin{scope}[zone scope=name]
  ...
\end{scope}
```

The ⟨*name*⟩ will be the name of the scope. If this contains the sub-string `hex` (upper, lower, or mixed case), then the zone will get a hex grid with numbering attached to it.

If the ⟨*name*⟩ contains the sub-string `turn` (any case), then it is assumed to be a turn track and a rectangular grid will be attached. The column and row separator will be set to `T`, so that it won't collide with the main zone. Similar if ⟨*name*⟩ contains `oob`, except the separator is set to `O`.

If ⟨*name*⟩ contains the sub-string `pool`, then it is assumed to be a pool of counters, and *no* grid is attached.

For `zone path` applied to a `path`, what is recorded is the path coordinates (as straight line segments) in the global coordinate system.

Both styles take one argument — the name of the zone. If that name contains the sub-string `hex` anywhere in the name, then the zone is assumed to contain a hex grid. Otherwise, a rectangular grid (of fixed size) will be applied to it.

The environment `boardimage` also records the coordinate options currently in use (keys `hex/first row is`, `hex/row direction is`, and so on), as well as the current label option (as defined by `every hex` or `every hex node`).

All coordinates, and such are recorded in centimetres. It is worth remembering that the Tikz coordinate system has the y axis point upward, while typical image software has the y axis point down. `pdftocairo` typically assumes a 150 PPI (pixels-per-inch) resolution.

That means that scaling factor becomes

$$\frac{150\text{pixel}}{2.54\text{cm}} = 59.055\frac{\text{pixel}}{\text{cm}}$$

The information extracted is written to the `\jobname.json` file as a sub-object (with name given by the first optional argument) of the image object. In that way, we can later on easily get the information from our catalogue of images.

Note, the styles `zoned`, `zone scope`, and `zone path` are defined in `wargame` to be dummies so that one can have them in the definition of the board without impact.

Since we want to write all dimensions in centimetres, we need to be able to convert `pt` dimensions to centimetres. We make two macros to do that for us.

The exact definition of 1pt is

$$1\,\text{pt} = \frac{249}{250}12\text{”}\frac{1}{864} = \frac{83}{6000}1\text{”} = 0.035136\overline{}$$

```
% 2.54 / 72.27 = .03514598035145980351
% \def\pt@to@cm#1{\pgfmathparse{#1 * 0.0351460}}
\def\pt@to@cm#1{\pgfmathparse{#1 * 0.0351367}}
\def\ptpoint@to@cm#1#2{%
  \pt@to@cm{#1}\edef\x{\pgfmathresult}%
  \pt@to@cm{#2}\edef\y{\pgfmathresult}}

\def\mk@get@anchor#1#2{%
```

```
  \pgfpointanchor{#1}{#2}%
  \pgfgetlastxy\tmp@x\tmp@y%
  \pt@to@cm{\tmp@x}\edef\tmp@x{\pgfmathresult}
  \pt@to@cm{\tmp@y}\edef\tmp@y{\pgfmathresult}
}
\def\mk@get@global@anchor#1#2{%
  \pgfpointanchor{#1}{#2}%
  \pgfgetlastxy\tmp@x\tmp@y%
  \pgfpointtransformed{\pgfpoint{\tmp@x}{\tmp@y}}
  \pgf@xa=\pgf@x
  \pgf@ya=\pgf@y
  \pt@to@cm{\the\pgf@xa}\edef\tmp@x{\pgfmathresult}
  \pt@to@cm{\the\pgf@ya}\edef\tmp@y{\pgfmathresult}
}
\def\get@bb#1{%
  % \pgfpointanchor{#1}{south west}%
  % \pgfgetlastxy\tmp@llx\tmp@lly%
  % \pgfpointanchor{#1}{north east}%
  % \pgfgetlastxy\tmp@urx\tmp@ury%
  % \pt@to@cm{\tmp@llx}\edef\llx{\pgfmathresult}
  % \pt@to@cm{\tmp@lly}\edef\lly{\pgfmathresult}
  % \pt@to@cm{\tmp@urx}\edef\urx{\pgfmathresult}
  % \pt@to@cm{\tmp@ury}\edef\ury{\pgfmathresult}
  \mk@get@anchor{#1}{south west}
  \edef\llx{\tmp@x}
  \edef\lly{\tmp@y}
  \mk@get@anchor{#1}{north east}
  \edef\urx{\tmp@x}
  \edef\ury{\tmp@y}
}

\def\mk@transform{%
  \pgfgettransformentries{\mxx}{\mxy}{\myx}{\myy}{\ptdx}{\ptdy}
  \pt@to@cm{\ptdx}\edef\dx{\pgfmathresult}
  \pt@to@cm{\ptdy}\edef\dy{\pgfmathresult}
  \mk@w{ \mk@i "xx": \mxx,}
  \mk@w{ \mk@i "xy": \mxy,}
  \mk@w{ \mk@i "yx": \myx,}
  \mk@w{ \mk@i "yy": \myy,}
  \mk@w{ \mk@i "dx": \dx,}
  \mk@w{ \mk@i "dy": \dy,}
}

\def\mk@bb#1{%
  \get@bb{#1}
  \mk@w{ \mk@i "lower left":  [\llx,\lly],}
  \mk@w{ \mk@i "upper right": [\urx,\ury],}
  \begingroup
   % \pgftransforminvert
   % \pgfpointanchor{#1}{south west}%
   % \pgfgetlastxy\tmp@llx\tmp@lly%
   % \pgfpointtransformed{\pgfpoint{\tmp@llx}{\tmp@lly}}
   % \pgf@xa=\pgf@x
   % \pgf@ya=\pgf@y
```

```
    % %
    % \pgfpointanchor{#1}{north east}%
    % \pgfgetlastxy\tmp@urx\tmp@ury%
    % \pgfgetlastxy\tmp@llx\tmp@lly%
    % \pgfpointtransformed{\pgfpoint{\tmp@urx}{\tmp@ury}}
    % \pgf@xb=\pgf@x
    % \pgf@yb=\pgf@y
    % \pt@to@cm{\the\pgf@xa}\edef\llx{\pgfmathresult}
    % \pt@to@cm{\the\pgf@ya}\edef\lly{\pgfmathresult}
    % \pt@to@cm{\the\pgf@xb}\edef\urx{\pgfmathresult}
    % \pt@to@cm{\the\pgf@yb}\edef\ury{\pgfmathresult}x
    \mk@get@global@anchor{#1}{south west}
    \mk@w{ \mk@i "global lower left":  [\tmp@x,\tmp@y],}
    \mk@get@global@anchor{#1}{north east}
    \mk@w{ \mk@i "global upper right": [\tmp@x,\tmp@y]}
  \endgroup
}
\def\mk@pos#1(#2){%
  \hex@dbg{10}{^^JMarking ‘#2’ with ‘#1’ - start}
  \coordinate[transform shape] (tmp) at (#2) {};
  \mk@get@anchor{tmp}{center}
  \hex@dbg{3}{^^JMarking ‘#2’ with ‘#1’ - ‘\tmp@x’,\tmp@y’}
  \tikzset{zone point={#1}{\tmp@x}{\tmp@y}}
}
```

For the key `zone path` to work, we need to be able to record the path as it moves along. To that end, we make a custom decoration that will do that for us, and, once the path is finished, write the path to our JSON file.

```
\pgfdeclaredecoration{record path construction}{initial}{%
  \state{initial}[width=0pt,next state=more]{
    \begingroup
      \pgf@decorate@inputsegment@first
      \ptpoint@to@cm{\the\pgf@x}{\the\pgf@y}
      \xdef\wg@path{[\x,\y]}
    \endgroup
  }%
  \state{more}[width=\pgfdecoratedinputsegmentremainingdistance]{%
    \begingroup
      \pgf@decorate@inputsegment@last
      \ptpoint@to@cm{\the\pgf@x}{\the\pgf@y}
      \xdef\wg@path{\wg@path,[\x,\y]}
    \endgroup
  }
  \state{final}{%
    \begingroup
      \pgf@decorate@inputsegment@last
      \ptpoint@to@cm{\the\pgf@x}{\the\pgf@y}
      \xdef\wg@path{\wg@path,[\x,\y]}
    \endgroup
    \mk@w{ \mk@i "zone path \wg@record@path@name": \@lbchar}
    \mk@w{ \mk@i\space "path": [\wg@path] \@rbchar,}
  }
}%
```

Now we can make our environment

The first thing we do is to use the `\info` macro to mark the image. Then we open our JSON file. We make a short-hand macro for writing to that file. The macro `\bd@i` records the current indention (which is important in JSON)

```
\newenvironment{boardimage}[3][board]{%
  \def\bd@n{#2}
  \newcount\mk@point
  \mk@point=0
  \let\oomk@i\mk@i%
  \let\markpos\mk@pos%
```

Then, to extract the label option, we make a dummy `node` with the styles `every hex` and `every hex node`, so we can extract that option.

```
  \info{dummy}{<<dummy>>}{}%
  %\tikz{}%
  \tikz{\scoped[every hex/.try,every hex node/.try]{%
      \node[inner sep=0,outer sep=0]{%
        \global\let\mk@label\hex@label}}}%
```

The next thing we do is to make an object. The first things we put in are the units used ("cm"), and the grid options.

```
  \info*{#2}{#1}{#3}%
  \mk@w{ \mk@i "zones": \@lbchar}%
  \edef\mk@i{\mk@i\space}
  %% Everything is made into centimeters
  \mk@w{ \mk@i "units": "cm",}
  \@ifundefined{mk@label}{}{\mk@w{ \mk@i "labels": "\mk@label",}}
  %% Write out coordinate options as "coords" object
  \mk@w{ \mk@i"coords": \@lbchar}%
  \mk@w{ \mk@i "row": \@lbchar}%
  \mk@w{ \mk@i\space "offset": \hex@coords@row@off,}%
  \mk@w{ \mk@i\space "factor": \hex@coords@row@fac \@rbchar,}%
  \mk@w{ \mk@i "column": \@lbchar}%
  \mk@w{ \mk@i\space "offset": \hex@coords@col@off,}%
  \mk@w{ \mk@i\space "factor": \hex@coords@col@fac,}%
  \mk@w{ \mk@i\space "top short": "\hex@top@short@col",}%
  \mk@w{ \mk@i\space "bottom short": "\hex@bot@short@col" \@rbchar}%
  \mk@w{ \mk@i\@rbchar,}%
```

We then monkey-patch `\boardframe` to also output coordinates to our JSON file. Note that this will probably be embedded in a different object.

```
  %%
  \let\oldbo@rdframe\bo@rdframe%
  \def\bo@rdframe[##1](##2)(##3){%
    \oldbo@rdframe[##1](##2)(##3)%
    \mk@w{ \mk@i"board frame": \@lbchar}
    \mk@w{ \mk@i\space "lower left": [\llx,\lly],}
    \mk@w{ \mk@i\space "upper right": [\urx,\ury],}
    \mk@w{ \mk@i\space "margin": \margin,}
    \mk@w{ \mk@i\space "width": \w,}
    \mk@w{ \mk@i\space "height": \h \@rbchar,}}%
```

Next, we make the style `zoned` to be applied to the `tikzpicture` environment. This records the bounding box of the full picture.

```
\tikzset{
  zoned/.code={% Apply to whole picture
    \pgfkeys{%
      % This needs to be done in the picture!
      /tikz/execute at end picture={%
        \mk@w{ \mk@i "zoned": \@lbchar}
        \mk@transform%
        \mk@bb{current bounding box}
        \mk@w{ \mk@i \@rbchar,}
      }
    }
  },
```

The next style is the `zone scope`. At the start of the scope we record the current transformation matrix. Then we install a handler to extract the bounding box at the end of the scope. Note that we increase indention here.

```
  zone scope/.code={%
    \mk@w{ \mk@i"zone scope ##1": \@lbchar}
    \let\omk@i\mk@i
    \edef\mk@i{\mk@i\space}
    \mk@transform%
    %\bd@w{ \@rbchar,}
    \gdef\wg@export@box{##1}%
    \pgfkeys{%
      /tikz/local bounding box=wg export box,
      /tikz/execute at end scope={
        \mk@bb{wg export box}
        \let\mk@i\omk@i
        \mk@w{ \mk@i\@rbchar,}},
    } % pgfkeys
  }, % zone scope
```

The next style gets the global coordinates of the current (0,0) point - f.ex. in a node - and outputs that

```
  zone point/.code n args={3}{
    \pgf@xa=##2 cm
    \pgf@ya=##3 cm
    \pgfpointtransformed{\pgfpoint{\pgf@xa}{\pgf@ya}}
    % \pgfpointtransformed{\pgfpoint{0pt}{0pt}}
    \pgf@xa=\pgf@x
    \pgf@ya=\pgf@y
    \pt@to@cm{\the\pgf@xa}\edef\px{\pgfmathresult}
    \pt@to@cm{\the\pgf@ya}\edef\py{\pgfmathresult}
    \advance\mk@point1
    \global\mk@point=\mk@point
    \mk@w{ \mk@i "point\the\mk@point": \@lbchar "name": "##1", "type": "point", "coords":  [\px,\py]
      \@rbchar, }
    %\message{^^JZone point \the\mk@point\space ##1: ##2,##3 -> \px,\py}
  },
  zone oob point/.code n args={3}{
    \pgf@xa=##2 cm
```

```
      \pgf@ya=##3 cm
      \advance\pgf@xa.1cm
      \advance\pgf@ya.1cm
      \pgfpointtransformed{\pgfpoint{\pgf@xa}{\pgf@ya}}
      % \pgfpointtransformed{\pgfpoint{0pt}{0pt}}
      \pgf@xa=\pgf@x
      \pgf@ya=\pgf@y
      \pt@to@cm{\the\pgf@xa}\edef\px{\pgfmathresult}
      \pt@to@cm{\the\pgf@ya}\edef\py{\pgfmathresult}
      \advance\mk@point1
      \global\mk@point=\mk@point
      \mk@w{ \mk@i "point\the\mk@point": \@lbchar "name": "##1", "type": "point", "coords":  [\px,\py]
        \@rbchar, }
      %\message{^^JZone point \the\mk@point\space ##1: ##2,##3 -> \px,\py}
    },
    zone global point/.code n args={3}{
      \advance\mk@point1
      \global\mk@point=\mk@point
      \mk@w{ \mk@i "point\the\mk@point": \@lbchar "name": "##1", "type": "point", "coords":  [\px,\py]
        \@rbchar, }
    },
```

The `zone path` style is a bit more simple, but only because the bulk of the work is done in a decoration. We need to be able to pass a name to that decoration, s we make a key for that. The user need not think about that though.

```
    /pgf/decoration/record path name/.store in=\wg@record@path@name,
    zone path/.style={%
      postaction={decorate,decoration={
          record path construction,
          record path name=##1}}
    } % zone path
  }% tikzset
}
```

That finishes the first part of the environment. At the end of the environment, we simple write the name of the picture, and close our JSON output.

```
{%
  \mk@w{ \mk@i "name": "\bd@n" }%
  \let\mk@i\oomk@i%
  \mk@w{ \mk@i\@rbchar}%
  \end@info%
}
```

TO BE DONE: We could add hooks to both the `hex` and `chit` shapes that would allow us to write out the settings for each of these. This would allow us to make data files that contain the information available in the LaTeX code. For example, we could write a counters

- Left and right identifiers
- Upper left, upper right, lower left, and lower right identifiers. (some care must be taken if these contains graphics and not just text.)
- Factors

- NATO symbol
  - Faction, command, echelon
  - Mains
  - Left, right, top, and bottom attributes and modifiers
  - Below attribute

If one then assumed that for example the upper left corner holds the start-up hex, then one could use that information. The code below exports the chit information to the JSON file. Not sure how to use it though.

```
\tikzset{
  zone turn/.store in=\zone@turn,
  zone mult/.store in=\zone@mult
}
\def\do@chit@report{%
  \mk@w{ \mk@i "chit": \@lbchar}
  \@ifundefined{id}{}         {\mk@w{ \mk@i\space "id":      "\id", }}%
  \@ifundefined{chit@symbol}{}     {\mk@w{ \mk@i\space "symbol":  "true", }}%
  \@ifundefined{chit@full}{}       {\mk@w{ \mk@i\space "full":    "\chit@full", }}
  \@ifundefined{chit@factors}{}    {\mk@w{ \mk@i\space "factors": "\chit@factors", }}%
  \@ifundefined{chit@left}{}       {\mk@w{ \mk@i\space "left":    "\chit@left", }}%
  \@ifundefined{chit@right}{}      {\mk@w{ \mk@i\space "right":   "\chit@right", }}%
  \@ifundefined{chit@upper@left}{} {\mk@w{ \mk@i\space "upper left":  "\chit@upper@left", }}%
  \@ifundefined{chit@lower@left}{} {\mk@w{ \mk@i\space "lower left":  "\chit@lower@left", }}%
  \@ifundefined{chit@upper@right}{}{\mk@w{ \mk@i\space "upper right": "\chit@upper@right", }}%
  \@ifundefined{chit@lower@right}{}{\mk@w{ \mk@i\space "lower right": "\chit@lower@right}", }%
  \mk@w{ \mk@i\space "end": 0}
  \@ifundefined{chit@symbol}{
    \mk@w{ \mk@i \@rbchar }
  }{
    \mk@w{ \mk@i \@rbchar, }% NATOAPP6c will follow
  }%
}
\def\do@natoapp@report{%
  \mk@w{ \mk@i "natoapp6c": \@lbchar}
  \@ifundefined{id}{}{\mk@w{ \mk@i\space "id": "\id", }}
  \@ifundefined{natoapp@fac}{}{\mk@w{ \mk@i\space "faction": "\natoapp@fac", }}
  \@ifundefined{natoapp@cmd}{}{\mk@w{ \mk@i\space "command": "\natoapp@cmd", }}
  \@ifundefined{natoapp@ech}{}{\mk@w{ \mk@i\space "echelon": "\natoapp@ech", }}
  \@ifundefined{natoapp@main}{}{\mk@w{ \mk@i\space "main": "\natoapp@main", }}
  \@ifundefined{natoapp@left}{}{\mk@w{ \mk@i\space "left": "\natoapp@left", }}
  \@ifundefined{natoapp@right}{}{\mk@w{ \mk@i\space "right": "\natoapp@right", }}
  \@ifundefined{natoapp@upper}{}{\mk@w{ \mk@i\space "upper": "\natoapp@upper", }}
  \@ifundefined{natoapp@lower}{}{\mk@w{ \mk@i\space "lower": "\natoapp@lower", }}
  \@ifundefined{natoapp@below}{}{\mk@w{ \mk@i\space "below": "\natoapp@below", }}
  \mk@w{ \mk@i\space "end": 0}
  \mk@w{ \mk@i \@rbchar}
}
```

5.4 The wargame.hex TikZ library

Used TikZ libraries

```
\RequirePackage{alphalph}
\usetikzlibrary{calc}
\usetikzlibrary{arrows.meta}
\usetikzlibrary{arrows}
\usetikzlibrary{shapes.geometric}
\usetikzlibrary{shapes.symbols}
\usetikzlibrary{shapes.arrows}
\usetikzlibrary{decorations}
\usetikzlibrary{decorations.pathmorphing}
\usetikzlibrary{decorations.pathreplacing}
\usetikzlibrary{decorations.markings}
\usetikzlibrary{wargame.util}
```

`\@ifempty`

This is a utility macro we will use below.

```
\def\@ifempty#1{\def\temp{#1}\ifx\temp\@empty}
```

5.4.1 Debugging

The counter `\hexdbglvl` sets the debug level, and the macro `\hex@dbg` prints out (conditionally) debug messages.

`\hexdbglvl`
`\hex@dbg`

```
\newcount\hexdbglvl\hexdbglvl=\wargamedbglvl
\def\hex@dbg#1#2{%
  \ifnum#1>\hexdbglvl\relax\else\message{^^J#2}\fi}
```

5.4.2 Suppress terrain pictures

```
\@ifundefined{ifhex@terrain@pic}{%
  \newif\ifhex@terrain@pic
  \hex@terrain@pictrue}{}
\def\markpos#1(#2){}
```

5.4.3 Hex coordinate system

`\hex@xx`
`\hex@yy`

Some offsets along x and y due to offset of every second hex column.

$$\delta_x = \cos 60^\circ$$
$$\delta_y = \sin 60^\circ$$

These numbers are calculated once here and then used several times in the following code.

```
\pgfmathparse{cos(60)}        \xdef\hex@xx{\pgfmathresult}
\pgfmathparse{sin(60)}        \xdef\hex@yy{\pgfmathresult}
\pgfmathparse{\hex@yy*cos(30)}\xdef\hex@e@xx{\pgfmathresult}
\pgfmathparse{\hex@yy*sin(30)}\xdef\hex@e@yy{\pgfmathresult}
\newdimen\hex@radius\hex@radius=1cm
\newdimen\hex@dx    \expandafter\hex@dx=\hex@xx cm
\newdimen\hex@dy    \expandafter\hex@dy=\hex@yy cm
\newdimen\hex@e@dx  \expandafter\hex@e@dx=\hex@e@xx cm
\newdimen\hex@e@dy  \expandafter\hex@e@dy=\hex@e@yy cm

```

Some code we need for some options

```
\newif\ifhex@label@is@name\hex@label@is@namefalse
\def\hex@short@col{isfalse}
\def\hex@got@short{isfalse}
\pgfmathdeclarefunction{isfalse}{1}{%
  \begingroup
  \def\pgfmathresult{0}%
  \pgfmath@smuggleone\pgfmathresult
  \endgroup}
\pgfmathdeclarefunction{istrue}{1}{%
  \begingroup
  \def\pgfmathresult{1}%
  \pgfmath@smuggleone\pgfmathresult
  \endgroup}
```

What follows is a way to configure the hex coordinate system. For example, if the rows goes down, then we can flag that, but still add hexes straightforwardly. Similar for columns. We can also specify that the first row or column has number 1 (instead of 0). Since this is dealt with a the coordinate level, it means most of the rest of the code is agnostic to these choices.

Which is the first coordinate (0 or 1)

```
\tikzset{
  hex/first row is/.is choice,
  hex/first row is/0/.code={\def\hex@coords@row@off{0}},
  hex/first row is/1/.code={\def\hex@coords@row@off{-1}},
  hex/first row is=0,
  hex/first column is/.is choice,
  hex/first column is/0/.code={\def\hex@coords@col@off{0}},
  hex/first column is/1/.code={\def\hex@coords@col@off{-1}},
  hex/first column is=0,
  hex/first row and column are/.is choice,
  hex/first row and column are/0/.style={
    hex/first row is=0,%
```

```
    hex/first column is=0},
  hex/first row and column are/1/.style={
    hex/first row is=1,%
    hex/first column is=1},
```

Which way does the column and row numbers go

```
  hex/row direction is/.is choice,
  hex/row direction is/normal/.code={\def\hex@coords@row@fac{1}},
  hex/row direction is/reversed/.code={\def\hex@coords@row@fac{-1}},
  hex/row direction is/up/.style={hex/row direction is=normal},
  hex/row direction is/down/.style={hex/row direction is=reversed},
  hex/row direction is/positive/.style={hex/row direction is=normal},
  hex/row direction is/negative/.style={hex/row direction is=reversed},
  hex/row direction is=normal,
  hex/column direction is/.is choice,
  hex/column direction is/normal/.code={\def\hex@coords@col@fac{1}},
  hex/column direction is/reversed/.code={\def\hex@coords@col@fac{-1}},
  hex/column direction is/right/.style={hex/column direction is=normal},
  hex/column direction is/left/.style={hex/column direction is=reversed},
  hex/column direction is/positive/.style={hex/column direction is=normal},
  hex/column direction is/negative/.style={hex/column direction is=reversed},
  hex/column direction is=normal,
```

Make labels names of shapes of the hexes so we can use labels to place stuff

```
  hex/label is name/.is if=hex@label@is@name,
```

If we have uneven number of rows in some columns.

```
  hex/short bottom columns/.is choice,
  hex/short bottom columns/odd/.code={%
    \def\hex@bot@short@col{isodd}
    \def\hex@got@bot@short{istrue}
    \hex@dbg{4}{Short columns (odd): \meaning\hex@bot@short@col}},
  hex/short bottom columns/even/.code={
    \def\hex@bot@short@col{iseven}
    \def\hex@got@bot@short{istrue}
    \hex@dbg{4}{Short column (even): \meaning\hex@bot@short@col}},
  hex/short bottom columns/none/.code={
    \def\hex@bot@short@col{isfalse}
    \def\hex@got@bot@short{isfalse}
    \hex@dbg{4}{Short columns (none): \meaning\hex@bot@short@col}},
  hex/short bottom columns=none,
  hex/short columns/.forward to=hex/short bottom columns,
  hex/short top columns/.is choice,
  hex/short top columns/odd/.code={%
    \def\hex@top@short@col{isodd}
    \def\hex@got@top@short{istrue}
    \hex@dbg{4}{Short columns (odd): \meaning\hex@top@short@col}},
  hex/short top columns/even/.code={
    \def\hex@top@short@col{iseven}
    \def\hex@got@top@short{istrue}
    \hex@dbg{4}{Short column (even): \meaning\hex@top@short@col}},
```

```
  hex/short top columns/none/.code={
    \def\hex@top@short@col{isfalse}
    \def\hex@got@top@short{isfalse}
    \hex@dbg{4}{Short columns (none): \meaning\hex@top@short@col}},
  hex/short top columns=none,
}
\message{^^JInitial hex coordinate setup:
  Rows: factor=\hex@coords@row@fac, offset=\hex@coords@row@off
  Columns: factor=\hex@coords@col@fac, offset=\hex@coords@col@off}
```

`hex/coords/column`
`hex/coords/row`
`hex/coords/vertex`
`hex/coords/edge`
`hex/coords/offset`

We define the keys for hexagon coordinates. These are the `row`, `column`, possible `vertex` or `edge`. Vertexes and edges are defined as multiple-choice. `offset` specifies the offset from the centre in the direction of a vertex or edge. By default, the offset is one, meaning all the way to the vertex or edge.

The key `inverse row` specifies that the rows are given from the top down, but coordinates should be calculated as if the row was negative. This (should) allow us to design boards where rows increase downward, while still keeping the interface and remaining code somewhat reasonable and agnostic.

Similarly, the key `column 1`, will allow us to start the columns with 1.

```
\tikzset{
  /hex/coords/.cd,
  column/.store in=\hex@col,
  c/.store in=\hex@col,
  row/.store in=\hex@row,
  r/.store in=\hex@row,
  offset/.store in=\hex@off,
  o/.store in=\hex@off,
  vertex/.is choice,
  vertex/none/.code={\global\let\hex@vtx\@empty},
  vertex/east/.code={\def\hex@vtx{0}},
  vertex/north east/.code={\def\hex@vtx{60}},
  vertex/north west/.code={\def\hex@vtx{120}},
  vertex/west/.code={\def\hex@vtx{180}},
  vertex/south west/.code={\def\hex@vtx{240}},
  vertex/south east/.code={\def\hex@vtx{300}},
  vertex/E/.code={\def\hex@vtx{0}},
  vertex/NE/.code={\def\hex@vtx{60}},
  vertex/NW/.code={\def\hex@vtx{120}},
  vertex/W/.code={\def\hex@vtx{180}},
  vertex/SW/.code={\def\hex@vtx{240}},
  vertex/SE/.code={\def\hex@vtx{300}},
  vertex/.default=none,
  v/.forward to=/hex/coords/vertex=#1,
  edge/.is choice,
  edge/none/.code={\global\let\hex@edg\@empty},
  edge/north east/.code={\def\hex@edg{30}},
```

```
  edge/north/.code={\def\hex@edg{90}},
  edge/north west/.code={\def\hex@edg{150}},
  edge/south west/.code={\def\hex@edg{210}},
  edge/south/.code={\def\hex@edg{270}},
  edge/south east/.code={\def\hex@edg{330}},
  edge/NE/.code={\def\hex@edg{30}},
  edge/N/.code={\def\hex@edg{90}},
  edge/NW/.code={\def\hex@edg{150}},
  edge/SW/.code={\def\hex@edg{210}},
  edge/S/.code={\def\hex@edg{270}},
  edge/SE/.code={\def\hex@edg{330}},
  edge/.default=none,
  e/.forward to=/hex/coords/edge,
}
```

`\hex@coords@reset`

This macro resets the hex coordinates to default values. That is row and column 0, no vertex or edge.

```
\def\hex@coords@reset{%
  \tikzset{%
    /hex/coords/.cd,
    column=0,
    row=0,
    edge=none,
    vertex=none,
    offset=1}}
```

The following calculates the Cartesian coordinates from Hex coordinates

`(cs:hex column=⟨C⟩,row=⟨R⟩,vertex=⟨V⟩,edge=⟨E⟩)`

Given the hexagon column C and row R with hexagon radius r, the centre of the hexagon is at

$$\begin{aligned} x &= 2C\frac{3}{4}r \\ y &= r(R - (C\%2)\sin 60^\circ) \end{aligned}$$

If $\langle V \rangle$ or $\langle E \rangle$ are given, then these are added to the centre point.

Note, C and R may be fractional numbers, which will specify a point inside a hex.

We set-up the translation to Cartesian coordinates. First thing is to reset keys in `/hex/coords`, and then parse out the keys given.

```
\def\hex@coords@conv#1{%
  \hex@coords@reset%
  \tikzset{/hex/coords/.cd, #1}%
```

Then we calculate the x coordinate and set the dimension `\pgf@x`. We do this by

$$x = c_e\frac{3}{2} \quad ,$$

where

$$c_e = f_c(c + o_c) \quad ,$$

is the effective column (stored in `\hex@eff@col`) calculated from is the direction factor f_c (set by `hex/column direction is`) and the offset o_c (set by `hex/first column is`).

```
\pgfmathparse{int(\hex@coords@col@fac*(\hex@col+\hex@coords@col@off))}%
\xdef\hex@eff@col{\pgfmathresult}%
\hex@dbg{2}{Effective column: \hex@coords@col@fac * (\hex@col -
  \hex@coords@col@off) -> \hex@eff@col}%
\pgfmathparse{\hex@eff@col*1.5}%
\xdef\hex@x{\pgfmathresult}%
\expandafter\pgf@x=\hex@x cm%
```

And then for the y coordinate and set the dimension `\pgf@y`.

$$y = 2\,(r_e - c_e \bmod 2)\cos 60^\circ \quad ,$$

where

$$r_e = 2f_r(r + o_r) - (c + o_c) \bmod 2 \quad ,$$

is the effective row (stored as `\hex@eff@row`) calculated from the the direction factor f_r (set by `hex/row direction is`) and the offset o_r (set by `hex/first row is`).

```
\pgfmathparse{int(\hex@coords@row@fac*(\hex@row+\hex@coords@row@off))}%
\xdef\hex@eff@row{\pgfmathresult}%
\hex@dbg{2}{Effective row: \hex@coords@row@fac * (\hex@row +
  \hex@coords@row@off) -> \hex@eff@row}%
\pgfmathparse{(2*\hex@eff@row-mod(round((\hex@col+\hex@coords@col@off)),2))*\hex@yy}%
\xdef\hex@y{\pgfmathresult}%
\expandafter\pgf@x=\hex@y cm%
```

If we have a vertex specification add that location to the current coordinates. If not, set the point.

```
\ifx\hex@vtx\@empty\pgfpointxy{\hex@x}{\hex@y}\else%
\pgfpointadd{\pgfpointxy{\hex@x}{\hex@y}}{%
  \pgfpointscale{\hex@off}{\pgfpointpolarxy{\hex@vtx}{1}}}\fi%
```

If we have an edge specification add that location to the current coordinates.

```
\ifx\hex@edg\@empty\else%
\pgfpointadd{\pgfpointxy{\hex@x}{\hex@y}}{%
  \pgfpointscale{\hex@off}{\pgfpointpolarxy{\hex@edg}{\hex@yy}}}\fi
```

For debugging, we can print out stuff.

```
\hex@dbg{2}{Hex coordinates: #1
  ^^J c=\hex@col
  ^^J r=\hex@row
  ^^J v=\hex@vtx
  ^^J e=\hex@edg
```

```
    ^^J x=\hex@x
    ^^J y=\hex@y}%
  \global\let\hex@x\hex@x%
  \global\let\hex@y\hex@y%
  \global\let\hex@row\hex@row%
  \global\let\hex@col\hex@col%
}
\tikzdeclarecoordinatesystem{hex}{%
  \hex@coords@conv{#1}}
```

5.4.4 Hexes

In this part, we make macros etc. for the hexes.

A hex shape. We make a node of this shape if we are to give a name to the hex added. We add a bunch of anchors to it so we may easily refer to it. This is also where we actual fill stuff into the hex, such as terrain and so on.

```
\hex@dbg{5}{Base vertex: \hex@xx,\hex@yy}
\hex@dbg{5}{Base edges: \hex@e@xx,\hex@e@yy}
\pgfdeclareshape{hex/hex}{%
  \saveddimen\radius{\pgf@x=\hex@radius}
  \savedanchor{\east}{         \pgfqpoint{ \hex@radius}{0cm}}
  \savedanchor{\west}{         \pgfqpoint{-\hex@radius}{0cm}}
  \savedanchor{\northeast}{    \pgfqpoint{ \hex@dx}{ \hex@dy}}
  \savedanchor{\northwest}{    \pgfqpoint{-\hex@dx}{ \hex@dy}}
  \savedanchor{\southwest}{    \pgfqpoint{-\hex@dx}{-\hex@dy}}
  \savedanchor{\southeast}{    \pgfqpoint{ \hex@dx}{-\hex@dy}}
  \savedanchor{\northedge}{    \pgfqpoint{     0cm}{ \hex@dy}}
  \savedanchor{\southedge}{    \pgfqpoint{     0cm}{-\hex@dy}}
  \savedanchor{\northeastedge}{\pgfqpoint{ \hex@e@dx}{ \hex@e@dy}}
  \savedanchor{\northwestedge}{\pgfqpoint{-\hex@e@dx}{ \hex@e@dy}}
  \savedanchor{\southwestedge}{\pgfqpoint{-\hex@e@dx}{-\hex@e@dy}}
  \savedanchor{\southeastedge}{\pgfqpoint{ \hex@e@dx}{-\hex@e@dy}}
  \savedmacro\init{%
    \def\hexpath{%
      \pgfpathmoveto{\east}%
      \pgfpathlineto{\northeast}%
      \pgfpathlineto{\northwest}%
      \pgfpathlineto{\west}%
      \pgfpathlineto{\southwest}%
      \pgfpathlineto{\southeast}%
      \pgfpathclose}
  }
```

These are the actual user callable anchors. We make anchors for each vertex and mid points on each edge.

```
%%
  \anchor{center}{         \pgfpointorigin}
  \anchor{east}{           \east}
  \anchor{west}{           \west}
  \anchor{north east}{     \northeast}
  \anchor{north west}{     \northwest}
  \anchor{south west}{     \southwest}
  \anchor{south east}{     \southeast}
```

```
\anchor{north edge}{     \northedge}
\anchor{south edge}{     \southedge}
\anchor{north east edge}{\northeastedge}
\anchor{north west edge}{\northwestedge}
\anchor{south west edge}{\southwestedge}
\anchor{south east edge}{\southeastedge}
```

Next we make some short hand aliases for each of these anchors.

```
\anchor{E}{      \east}
\anchor{W}{      \west}
\anchor{NE}{     \northeast}
\anchor{NW}{     \northwest}
\anchor{SW}{     \southwest}
\anchor{SE}{     \southeast}
\anchor{N edge}{ \northedge}
\anchor{S edge}{ \southedge}
\anchor{NE edge}{\northeastedge}
\anchor{NW edge}{\northwestedge}
\anchor{SW edge}{\southwestedge}
\anchor{SE edge}{\southeastedge}
```

The next part is commented out because its not obvious we'll use these.

```
%%
\savedanchor{\chitnorth}{    \pgfqpoint{ 0cm}{   0.6cm}}
\savedanchor{\chitsouth}{    \pgfqpoint{ 0cm}{  -0.6cm}}
\savedanchor{\chiteast}{     \pgfqpoint{ 0.6cm}{ 0cm}}
\savedanchor{\chitwest}{     \pgfqpoint{-0.6cm}{ 0cm}}
\savedanchor{\chitnortheast}{\pgfqpoint{ 0.6cm}{ 0.6cm}}
\savedanchor{\chitnorthwest}{\pgfqpoint{-0.6cm}{ 0.6cm}}
\savedanchor{\chitsouthwest}{\pgfqpoint{-0.6cm}{-0.6cm}}
\savedanchor{\chitsoutheast}{\pgfqpoint{ 0.6cm}{-0.6cm}}
%
\anchor{chit north}{\chitnorth}
\anchor{chit south}{\chitsouth}
\anchor{chit east}{\chiteast}
\anchor{chit west}{\chitwest}
\anchor{chit north east}{\chitnortheast}
\anchor{chit north west}{\chitnorthwest}
\anchor{chit south west}{\chitsouthwest}
\anchor{chit south east}{\chitsoutheast}
%
\anchor{chit N}{\chitnorth}
\anchor{chit S}{\chitsouth}
\anchor{chit E}{\chiteast}
\anchor{chit W}{\chitwest}
\anchor{chit NE}{\chitnortheast}
\anchor{chit NW}{\chitnorthwest}
\anchor{chit SW}{\chitsouthwest}
\anchor{chit SE}{\chitsoutheast}
%
```

The background path. This path may be drawn when the node is drawn. However, we will do most of the work in

the \behindbackgroundpath which gets drawn *after* this path.

```
\backgroundpath{\init\hexpath}
```

The *behind* background path, where we do most of the work.

```
\behindforegroundpath{%
  \hex@dbg{2}{Hex behind foreground path:
    ^^JTerrain:       `\meaning\hex@terrain'
    ^^JRidges:        `\meaning\hex@ridges'
    ^^JTown:          `\meaning\hex@town'
    ^^JExtra clipped: `\meaning\hex@extra@clip'
    ^^JLabel:         `\meaning\hex@label'
    ^^JExtra:         `\meaning\hex@extra'
    ^^JLast node name:`\meaning\tikzlastnode'
    ^^JHex row:       `\meaning\hex@row'
    ^^JHex col:       `\meaning\hex@col'
  }%
  \init%
```

We start a scope and clip to the hex path first.

```
  \scope%
    \hexpath%
    \pgfusepath{clip}%
```

Anything inside this scope is clipped to the hex path. The next step is to see if we have a specified terrain for the hex.

```
    \@ifundefined{hex@terrain}{\let\hex@terrain\empty}{}%
    \ifx\hex@terrain\empty\else\hex@do@terrain\fi%
```

This concludes the processing of the terrain of the hex. Next, we must see if the user specified ridges.

```
    \@ifundefined{hex@ridges}{\let\hex@ridges\empty}{}%
    \ifx\hex@ridges\empty\else\hex@do@ridges\fi%
```

This concludes the processing of the ridges of the hex. Next, we should process any extra (clipped) stuff specified. The user may pass options to each picture by preceding it with [⟨*options*⟩].

```
    \@ifundefined{hex@extra@clip}{\let\hex@extra@clip\empty}{}
    \ifx\hex@extra@clip\empty\else%
       \hex@dbg{5}{Extra clipped: `\meaning\hex@extra'}
       \pgfpointorigin\wg@tmpa=\pgf@x\wg@tmpb=\pgf@y%
       \wg@pic@all{\hex@extra@clip}{}{\the\wg@tmpa,\the\wg@tmpb}{}%
    \fi%
```

This concludes the extra stuff put in the hex. Next, we should place the label is specified. Note, we may know the hex row and column at this point, stored in \hex@row and \hex@column, respectively. We may want to name the generated node from these if the user specified that option (perhaps use \pgfnoderename or similar).

```
    \@ifundefined{hex@label}{\let\hex@label\empty}{}
    \ifx\hex@label\empty\else\hex@do@label\fi%
  \endscope%
```

This concludes the label processing, and stuff that should be clipped to the hex shape. If the user specified a town, we can now make that.

```
    \@ifundefined{hex@town}{\let\hex@town\empty}{}
    \@ifundefined{hex@c@pic}{\let\hex@c@pic\empty}{}
    \ifx\hex@town\empty\else\hex@do@town\fi%
```

We can now add extra (non-clipped) stuff. We assume that extra stuff is `pic`tures. The user may pass options to each `pic`ture by preceding it with `[`⟨*options*⟩`]`.

```
    \@ifundefined{hex@extra}{\let\hex@extra\empty}{}
    \ifx\hex@extra\empty\else%
       \hex@dbg{5}{Extra: `\meaning\hex@extra'}
       \pgfpointorigin\wg@tmpa=\pgf@x\wg@tmpb=\pgf@y%
       \wg@pic@all{\hex@extra}{}{\the\wg@tmpa,\the\wg@tmpb}{}%
    \fi%
  }
}
```

```
/hex/terrain
/hex/town
/hex/label
/hex/ridges
/hex/extra
/hex/extra clipped
```

Next, we set up the name space for hex keys. This is the top level name space for hexes. Sub keys `terrain`, `ridges`, `town`, `extra`, `label`, and `extra clipped`, store their arguments in macros and we expand these later on. This allows us to scope some of the keys given to those specific parts.

Define keys for hexagon options. These are

Name	**Description**
`terrain`	Terrain
`label`	Label on hex
`town`	Town in hex. Optionally with a name
`ridges`	Ridge markings on hex
`extra`	More
`extra clipped`	More clipped to hex

```
\tikzset{%
  /hex/.search also={/tikz},%
  /hex/.cd,%
  terrain/.store in=\hex@terrain,%
  ridges/.store in=\hex@ridges,%
  town/.store in=\hex@town,%
  extra/.store in=\hex@extra,%
  label/.store in=\hex@label,%
  extra clipped/.store in=\hex@extra@clip%
}
```

`hex`

The next key is the real work horse of the show. Specifying the `hex` key to a node effectively creates a hex for us. Now, there are some things we cannot do outright in the node shape code. For example, we cannot set the name of the node created from the shape code. Therefore, the use of `\hex` is often the right choice.

```
\tikzset{%
  hex/hex/.style={
    transform shape,
    anchor=center,
    draw=pgfstrokecolor,
    fill=none,
    thick,
    solid},
  hex/.code={%
    \hex@dbg{1}{=== Hex with options: '#1'}%
    \pgfkeys{/tikz/transform shape,/tikz/shape=hex/hex}
    \pgfkeys{/hex/.cd,/tikz/hex/hex,/tikz/every hex/.try,#1}}}
```

The first thing is to set the default graphics options. The key `every hex` can be set to hex options to be used for all hexes. For example, if one want to label all hexes with an auto-generated label, one can do

```
\tikzset{every hex/.style={label={auto=numbered}}}
```

This, coupled with the `hex/label is name` option allows us to set up the board with really minimal effort. We can then use the board coordinates when placing units, and other things.

Now we have set up these tools we can go on and define the user facing macro.

```
\hex
\hex@
\hex@@
```

This will add a hex to the output graphics. Note, the macro need not be followed by a semi-colon (;).

First argument is optional options.

```
\def\hex{%
  \@ifnextchar[{\hex@}{\hex@[]}%]
}
```

Second optional argument is the coordinates. These should be given in the hex coordinate system.

```
\def\hex@[#1]{%
  \@ifnextchar({\hex@@{#1}}{%
    \hex@@{#1}(c=0,r=0)}%)
}
```

Third argument is the name to be used.

```
\def\hex@@#1(#2){%
  \@ifnextchar({\hex@@@{#1}{#2}}{\hex@@@{#1}{#2}()}%)
}
```

Now for the real work-horse. First thing is to reset keys and parse them out from the arguments.

```
%      Third argument is name
\def\hex@@@#1#2(#3){%
  \node[hex={#1}] (tmp) at (hex cs:#2) {};%
  \hex@dbg{8}{=== Label text: `\meaning\hex@l@text'}
  \ifx|#3|\relax%
    \@ifundefined{hex@l@text}{%
      \hex@dbg{8}{=== Label text of hex (#2) not defined}%
      \let\hex@l@text\empty%
    }{}
    \ifhex@label@is@name%
      \hex@dbg{5}{=== Use label text of hex (#2) as name}%
      \ifx\hex@l@text\@empty%
        \hex@dbg{8}{=== Argh! Label text is empty! `\meaning\hex@l@text'}
      \else%
        \hex@dbg{3}{=== Renaming hex to label text `\hex@l@text'}
        \pgfnoderename{\hex@l@text}{tmp}%
      \fi%
    \fi%
  \else%
    \hex@dbg{3}{=== Renaming hex to user defined name `#3'}%
    \pgfnoderename{#3}{tmp}%
  \fi%
  \@ifnextchar;{\@gobble}{}%
}
```

5.4.5 Terrain

With the above main routine for making hexes, we turn to decorating a hex with a terrain.

```
hex/terrain/image
hex/terrain/pic
hex/terrain/code
hex/terrain/clip
```

We make the namespace `/hex/terrain` to hold the specific terrain keys. Keys used by terrain identifiers are

Name	Description
`image`	Terrain tile image
`pic`	Terrain Ti*k*Z `pic`ture
`code`	Arbitary Ti*k*Z code
`clip`	Ti*k*Z path to clip terrain

Now, we have the keys we'll need for selecting the terrain. These live in the namespace `/hex/terrain`, and we can select between `pic`tures or `image`s (external graphics files) for making the terrain. We define some short hands to easily select the common terrains.

```
\tikzset{%
  /hex/terrain/.search also={/tikz},%
  /hex/terrain/.cd,%
  pic/.store in=\hex@t@pic,%
  image/.store in=\hex@t@image,%
  code/.store in=\hex@t@code,%
```

```
  clip/.store in=\hex@t@clip,%
  pic/.default=,
  image/.default=,
  code/.default=,
  clip/.default,
}
\iffalse
\tikzset{
  /hex/terrain/.cd,%
  beach/.style={pic=hex/terrain/beach},
  light woods/.style={pic=hex/terrain/light woods},
  woods/.style={pic=hex/terrain/woods},
  swamp/.style={pic=hex/terrain/swamp},
  rough/.style={pic=hex/terrain/rough},
  mountains/.style={pic=hex/terrain/mountains},
  village/.style={pic=hex/terrain/village},
  town/.style={pic=hex/terrain/town},
  city/.style={pic=hex/terrain/city},
}
\else
\tikzset{
  /hex/terrain/.cd,%
  beach/.style={image=wargame.beach},
  light woods/.style={image=wargame.light_woods},
  woods/.style={image=wargame.woods},
  swamp/.style={image=wargame.swamp},
  rough/.style={image=wargame.rough},
  mountains/.style={image=wargame.mountains},
  village/.style={image=wargame.village},
  town/.style={image=wargame.town},
  city/.style={image=wargame.city},
}
\fi
```

Before we go on, we define the macro that actually generates the terrain of a hex.

\hex@do@terrain

If we do have a terrain specified, we start a new scope, this time to clip the terrain by the clipping path specified by `hex={terrain={clip=...}}`. The first thing into the new scope is to process the keys specified in `hex={terrain=...}`. This will set the terrain and the clipping of the terrain.

```
\def\hex@do@terrain{%
  \hex@dbg{5}{Terrain: \meaning\hex@terrain}%
  \edef\hex@t@tmp{[/hex/terrain/.cd,\hex@terrain]}%
  \expandafter\scope\hex@t@tmp% Scope for terrain clipping.
    \hex@dbg{5}{Terrain:
      ^^J  pic:   \meaning\hex@t@pic
      ^^J  image: \meaning\hex@t@image
      ^^J  code:  \meaning\hex@t@code
      ^^J  clip:  \meaning\hex@t@clip}
```

We check to see if we have any clipping pictures. If so, we process these in turn and append the soft path to a macro.

Once this is done, we use the soft path as a clipping path for the rest of the (terrain) scope.

```
    \@ifundefined{hex@t@clip}{\let\hex@t@clip\empty}{}
    \ifx\hex@t@clip\empty\else%
      \def\hex@t@c{}
      \foreach \c in \hex@t@clip{%
        \hex@dbg{5}{Clipping to `\c'}
        \expandafter\wg@pic\c\@endwg@pic {}{\wg@tmpa,\wg@tmpb}{%
          save path=\hex@t@tmp}%
        \wg@addto@macro\hex@t@c\hex@t@tmp % Append to clippping
      }%
      \pgfsyssoftpath@setcurrentpath{\hex@t@c}% Set path
      \clip;% Clip to the path
    \fi % End of clipping terrain
```

We're new ready to make the terrain. First, we check to see if the relevant storage macros are undefined and if so, `\let` them to `\empty` so that we can deal more easily with the various cases.

```
    %% Now switch between how to draw the terrain.  If some of the
    %% macros are undefined, define them to be empty
    \@ifundefined{hex@t@pic}{\let\hex@t@pic\empty}{}
    \@ifundefined{hex@t@image}{\let\hex@t@image\empty}{}
```

First we check if we have not got terrain images, but terrain pictures. If we have that, we process these in turn. Note, the user can give options to each terrain picture by preceding the `pic`ture name with `[`⟨*options*⟩`]`.

```
    % If we have no image, check if we have pictures.
    \ifx\hex@t@image\empty%
      \hex@dbg{8}{No terrain images}%
      \ifx\hex@t@pic\empty\else%
        % We have pictures
        \hex@dbg{5}{Terrain pictures}%
        \pgfpointorigin\wg@tmpa=\pgf@x\wg@tmpb=\pgf@y%
        \wg@pic@all{\hex@t@pic}{}{\the\wg@tmpa,\the\wg@tmpb}{}%
      \fi% We have pictures.
```

If the user specified images rather than `pic`tures, then we process these in turn. Again, the user can specify options to each terrain image by preceding the image file name with `[`⟨*options*⟩`]`.

```
      \else % We have images
        \hex@dbg{5}{Terrain images}%
        \pgfpointorigin\wg@tmpa=\pgf@x\wg@tmpb=\pgf@y%
        \foreach \i in \hex@t@image{%
          \hex@dbg{10}{Terrain image: `\meaning\i'}
          \expandafter\wg@node{%
            \includegraphics[width=2cm]{\i}}\@endwg@node %
          {}{\wg@tmpa,\wg@tmpb}{%
            shape=rectangle,%
            anchor=center,%
            transform shape,%
            draw=none}%
        }
    \fi%
  \endscope% End of terrain scope
}% End of terrain
```

Next, we define some example clippings of the terrain images. Specifcally, we make clippings to sextants. We do this by first defining a macro.

`\hex@make@sextants`

When executed this macro will generate some paths that will clip to sextants. The first argument is the inner radius of the sextant and the second argument is the (possible empty) prefix to put in front of the `sextant` name.

```
\def\hex@x@r{.7}
\def\hex@make@sextants#1#2{%
  \tikzset{%
    pics/hex/#2sextant/.is choice,
    pics/hex/#2sextant/north east/.style={
      code={
        \path[pic actions](  0:1)--( 60:1)--( 60:#1)--(  0:#1)--cycle;}},
    pics/hex/#2sextant/north/.style={
      code={
        \path[pic actions]( 60:1)--(120:1)--(120:#1)--( 60:#1)--cycle;}},
    pics/hex/#2sextant/north west/.style={
      code={
        \path[pic actions](120:1)--(180:1)--(180:#1)--(120:#1)--cycle;}},
    pics/hex/#2sextant/south west/.style={
      code={
        \path[pic actions](180:1)--(240:1)--(240:#1)--(180:#1)--cycle;}},
    pics/hex/#2sextant/south/.style={
      code={
        \path[pic actions](240:1)--(300:1)--(300:#1)--(240:#1)--cycle;}},
    pics/hex/#2sextant/south east/.style={
      code={
        \path[pic actions](300:1)--(360:1)--(360:#1)--(300:#1)--cycle;}},
    pics/hex/#2sextant/center/.style={
      code={
        \path[pic actions]
        (0:#1)--
        (60:#1)--
        (120:#1)--
        (180:#1)--
        (240:#1)--
        (300:#1)--cycle;}},
    pics/hex/#2sextant/NE/.style=hex/#2sextant/north east,
    pics/hex/#2sextant/NE/.style=hex/#2sextant/north east,
    pics/hex/#2sextant/N/.style=hex/#2sextant/north,
    pics/hex/#2sextant/NW/.style=hex/#2sextant/north west,
    pics/hex/#2sextant/SW/.style=hex/#2sextant/south west,
    pics/hex/#2sextant/S/.style=hex/#2sextant/south,
    pics/hex/#2sextant/SE/.style=hex/#2sextant/south east,
    pics/hex/#2sextant/C/.style=hex/#2sextant/center,
  }
}

\hex@make@sextants{.7}{}
\hex@make@sextants{.3}{large }
\hex@make@sextants{0}{full }
```

Next, we define some styles for styling the terrain pictures. Users can change these styles (e.g., by appending to them) to change say the colour of the terrain graphics.

hex/terrain/beach

The style for beach hexes. The pattern is filled with a yellowish colour, and drawing of the outline is disabled.

```
\tikzset{
  hex/terrain/beach/.style={%
    fill={rgb,100:red,93;green,73;blue,35},%
    draw=none%
  }%
}
```

Now for the actual patterns. We go in the same order as above — i.e, we start with the beach pattern. This is rather long.

hex/terrain/beach

```
\ifhex@terrain@pic
\tikzset{
  hex/terrain/beach/.pic={
    \path[hex/terrain/beach,pic actions,draw=none]
    (-0.4931, 0.8848)
    -- (-0.4998, 0.8734)
    .. controls (-0.4908, 0.8731) and (-0.4813, 0.8762) .. (-0.4762, 0.8847)
    --cycle
    (-0.4032, 0.8841)
    .. controls (-0.4004, 0.8804) and (-0.3988, 0.8794) .. (-0.3956, 0.8745)
    .. controls (-0.3760, 0.8443) and (-0.3811, 0.8330) .. (-0.3456, 0.8112)
    .. controls (-0.3250, 0.7986) and (-0.2712, 0.7770) .. (-0.2531, 0.8032)
    .. controls (-0.2294, 0.8375) and (-0.2984, 0.8503) .. (-0.3193, 0.8690)
    .. controls (-0.3243, 0.8735) and (-0.3281, 0.8785) .. (-0.3321, 0.8835)
    --cycle
    (-0.2462, 0.8828)
    .. controls (-0.2425, 0.8681) and (-0.2383, 0.8546) .. (-0.2293, 0.8461)
    .. controls (-0.2102, 0.8280) and (-0.1892, 0.8390) .. (-0.1859, 0.8669)
    .. controls (-0.1854, 0.8711) and (-0.1871, 0.8772) .. (-0.1875, 0.8822)
    --cycle
    (-0.0997, 0.8815)
    .. controls (-0.0971, 0.8706) and (-0.0941, 0.8597) .. (-0.0907, 0.8493)
    -- (-0.0570, 0.8578)
    .. controls (-0.0570, 0.8629) and (-0.0560, 0.8730) .. (-0.0553, 0.8812)
    --cycle
    ( 0.0213, 0.8805)
    .. controls ( 0.0222, 0.8725) and ( 0.0235, 0.8650) .. ( 0.0262, 0.8587)
    .. controls ( 0.0391, 0.8281) and ( 0.0706, 0.8199) .. ( 0.0917, 0.7894)
    .. controls ( 0.1112, 0.7609) and ( 0.1058, 0.7286) .. ( 0.1050, 0.6961)
    -- ( 0.1731, 0.7216)
    -- ( 0.1203, 0.8649)
    -- ( 0.1097, 0.8797)
    --cycle
```

```
    ( 0.2978, 0.8781)
    .. controls ( 0.2985, 0.8773) and ( 0.3002, 0.8756) .. ( 0.3008, 0.8749)
    .. controls ( 0.2854, 0.8687) and ( 0.2549, 0.8572) .. ( 0.2421, 0.8487)
    .. controls ( 0.2026, 0.8224) and ( 0.1905, 0.7567) .. ( 0.2046, 0.7132)
    .. controls ( 0.2146, 0.6819) and ( 0.2330, 0.6680) .. ( 0.2394, 0.6280)
    .. controls ( 0.2413, 0.6160) and ( 0.2468, 0.5527) .. ( 0.2446, 0.5437)
    .. controls ( 0.2396, 0.5232) and ( 0.2211, 0.5122) .. ( 0.2231, 0.4913)
    .. controls ( 0.2261, 0.4603) and ( 0.2686, 0.4388) .. ( 0.2891, 0.4194)
    .. controls ( 0.3020, 0.4071) and ( 0.3136, 0.3895) .. ( 0.3281, 0.3799)
    .. controls ( 0.3688, 0.3533) and ( 0.3905, 0.3863) .. ( 0.4199, 0.3902)
    .. controls ( 0.4350, 0.3921) and ( 0.4560, 0.3849) .. ( 0.4710, 0.3812)
    -- ( 0.4795, 0.4067)
    -- ( 0.4965, 0.4067)
    .. controls ( 0.5008, 0.3961) and ( 0.5009, 0.3893) .. ( 0.5112, 0.3811)
    .. controls ( 0.5112, 0.3811) and ( 0.6172, 0.3385) .. ( 0.6481, 0.3037)
    .. controls ( 0.6729, 0.2758) and ( 0.6641, 0.2532) .. ( 0.6667, 0.2206)
    -- ( 0.7004, 0.2206)
    .. controls ( 0.7839, 0.2118) and ( 0.7047, 0.0740) .. ( 0.7057, 0.0568)
    .. controls ( 0.7067, 0.0396) and ( 0.7865,-0.0424) .. ( 0.8032,-0.0520)
    .. controls ( 0.8251,-0.0644) and ( 0.8703,-0.0686) .. ( 0.8572,-0.0293)
    .. controls ( 0.8518,-0.0131) and ( 0.7996, 0.0474) .. ( 0.7843, 0.0564)
    .. controls ( 0.7724, 0.0633) and ( 0.7645, 0.0636) .. ( 0.7518, 0.0664)
    .. controls ( 0.7688, 0.1093) and ( 0.7993, 0.1905) .. ( 0.7930, 0.2362)
    .. controls ( 0.7869, 0.2804) and ( 0.7252, 0.2982) .. ( 0.6946, 0.3268)
    .. controls ( 0.6664, 0.3531) and ( 0.6746, 0.3662) .. ( 0.6323, 0.3966)
    .. controls ( 0.5760, 0.4371) and ( 0.5386, 0.4324) .. ( 0.5250, 0.4601)
    .. controls ( 0.5090, 0.4927) and ( 0.5578, 0.6035) .. ( 0.5969, 0.5911)
    .. controls ( 0.6199, 0.5839) and ( 0.6224, 0.5471) .. ( 0.6341, 0.5291)
    .. controls ( 0.6488, 0.5064) and ( 0.7020, 0.4614) .. ( 0.7263, 0.4493)
    -- ( 0.7373, 0.4768)
    -- ( 0.6866, 0.5671)
    -- ( 0.6756, 0.5720)
    -- ( 0.6766, 0.5850)
    -- ( 0.6331, 0.6627)
    .. controls ( 0.6280, 0.6613) and ( 0.6239, 0.6599) .. ( 0.6157, 0.6589)
    -- ( 0.5646, 0.6589)
    .. controls ( 0.5375, 0.6557) and ( 0.5277, 0.6432) .. ( 0.4965, 0.6489)
    .. controls ( 0.4716, 0.6520) and ( 0.4306, 0.6774) .. ( 0.4104, 0.6489)
    .. controls ( 0.3809, 0.6093) and ( 0.4627, 0.6240) .. ( 0.4837, 0.5772)
    .. controls ( 0.4958, 0.5502) and ( 0.4652, 0.4811) .. ( 0.4429, 0.4648)
    -- ( 0.3523, 0.4350)
    .. controls ( 0.3178, 0.4372) and ( 0.3207, 0.4766) .. ( 0.3153, 0.5004)
    .. controls ( 0.3090, 0.5282) and ( 0.2968, 0.5398) .. ( 0.2922, 0.5684)
    .. controls ( 0.2896, 0.6035) and ( 0.3061, 0.6276) .. ( 0.2922, 0.6621)
    .. controls ( 0.2756, 0.6961) and ( 0.2422, 0.7190) .. ( 0.2525, 0.7640)
    .. controls ( 0.2650, 0.8188) and ( 0.3165, 0.7932) .. ( 0.3324, 0.8417)
    .. controls ( 0.3359, 0.8522) and ( 0.3385, 0.8648) .. ( 0.3399, 0.8778)
    --cycle
    ( 0.4261, 0.8770)
    -- ( 0.4333, 0.8493)
    -- ( 0.4845, 0.7440)
    .. controls ( 0.4963, 0.7304) and ( 0.5450, 0.6930) .. ( 0.5630, 0.6989)
    .. controls ( 0.5735, 0.7024) and ( 0.5838, 0.7169) .. ( 0.5932, 0.7337)
```

```
    -- ( 0.5612, 0.7909)
    .. controls ( 0.5537, 0.7875) and ( 0.5468, 0.7852) .. ( 0.5403, 0.7864)
    .. controls ( 0.5078, 0.7926) and ( 0.5191, 0.8406) .. ( 0.5145, 0.8567)
    .. controls ( 0.5121, 0.8651) and ( 0.5076, 0.8710) .. ( 0.5025, 0.8764)
    --cycle
    ( 0.3773, 0.8153)
    .. controls ( 0.3625, 0.7892) and ( 0.2993, 0.7161) .. ( 0.3316, 0.6877)
    .. controls ( 0.3432, 0.6774) and ( 0.3866, 0.6728) .. ( 0.4029, 0.6706)
    -- ( 0.3973, 0.7472)
    -- ( 0.4029, 0.8153)
    --cycle
    (-0.4224, 0.8088)
    .. controls (-0.4416, 0.8077) and (-0.4585, 0.7826) .. (-0.4275, 0.7562)
    -- (-0.3971, 0.7387)
    .. controls (-0.4780, 0.6942) and (-0.4752, 0.6640) .. (-0.4591, 0.5855)
    .. controls (-0.4391, 0.4887) and (-0.4527, 0.5347) .. (-0.4103, 0.4493)
    .. controls (-0.3870, 0.4026) and (-0.4070, 0.3747) .. (-0.3460, 0.3642)
    -- (-0.3352, 0.4823)
    .. controls (-0.3409, 0.5024) and (-0.3617, 0.5113) .. (-0.3739, 0.5281)
    -- (-0.4164, 0.6287)
    .. controls (-0.4188, 0.6375) and (-0.4186, 0.6444) .. (-0.4164, 0.6528)
    .. controls (-0.4067, 0.6807) and (-0.3521, 0.7255) .. (-0.3274, 0.6931)
    .. controls (-0.3070, 0.6694) and (-0.3336, 0.6432) .. (-0.3274, 0.6221)
    .. controls (-0.3249, 0.6055) and (-0.3059, 0.6028) .. (-0.2950, 0.6162)
    .. controls (-0.2867, 0.6265) and (-0.2838, 0.6558) .. (-0.2829, 0.6692)
    .. controls (-0.2775, 0.7444) and (-0.3333, 0.7652) .. (-0.3955, 0.7472)
    .. controls (-0.3950, 0.7586) and (-0.3916, 0.7684) .. (-0.3955, 0.7803)
    .. controls (-0.3986, 0.8016) and (-0.4109, 0.8096) .. (-0.4224, 0.8088)
    --cycle
    (-0.1391, 0.8077)
    .. controls (-0.1634, 0.8024) and (-0.1582, 0.7647) .. (-0.1487, 0.7492)
    .. controls (-0.1306, 0.7190) and (-0.1004, 0.7270) .. (-0.0652, 0.7073)
    -- (-0.0226, 0.6801)
    -- ( 0.0282, 0.6560)
    .. controls ( 0.0622, 0.6331) and ( 0.0955, 0.5639) .. ( 0.1219, 0.5259)
    .. controls ( 0.2125, 0.5714) and ( 0.1427, 0.6114) .. ( 0.1219, 0.6453)
    -- ( 0.1054, 0.6768)
    .. controls ( 0.0862, 0.7028) and ( 0.0448, 0.7080) .. ( 0.0115, 0.7299)
    .. controls (-0.0377, 0.7622) and (-0.0173, 0.7726) .. (-0.0822, 0.7918)
    .. controls (-0.0961, 0.7958) and (-0.1270, 0.8103) .. (-0.1391, 0.8077)
    --cycle
    (-0.5460, 0.7940)
    -- (-0.5911, 0.7166)
    .. controls (-0.5649, 0.7015) and (-0.5397, 0.7188) .. (-0.5308, 0.7556)
    .. controls (-0.5251, 0.7788) and (-0.5335, 0.7873) .. (-0.5460, 0.7940)
    --cycle
    (-0.2382, 0.7423)
    .. controls (-0.2453, 0.7424) and (-0.2512, 0.7383) .. (-0.2550, 0.7274)
    .. controls (-0.2635, 0.7026) and (-0.2353, 0.6726) .. (-0.2229, 0.6536)
    .. controls (-0.2031, 0.6234) and (-0.2020, 0.6105) .. (-0.1928, 0.5770)
    .. controls (-0.1763, 0.5803) and (-0.1499, 0.5890) .. (-0.1342, 0.5831)
    .. controls (-0.1112, 0.5745) and (-0.1047, 0.5481) .. (-0.0866, 0.5338)
    -- (-0.0397, 0.5102)
```

```
    -- ( 0.0664, 0.4219)
    .. controls ( 0.0874, 0.3954) and ( 0.0785, 0.3655) .. ( 0.1070, 0.3502)
    .. controls ( 0.1367, 0.3343) and ( 0.1690, 0.3592) .. ( 0.1732, 0.3899)
    .. controls ( 0.1755, 0.4075) and ( 0.1545, 0.4554) .. ( 0.1475, 0.4748)
    .. controls ( 0.0838, 0.4666) and ( 0.0509, 0.4836) .. ( 0.0454, 0.5515)
    .. controls (-0.0576, 0.5778) and (-0.0955, 0.6323) .. (-0.1754, 0.6949)
    .. controls (-0.1861, 0.7034) and (-0.2171, 0.7418) .. (-0.2382, 0.7423)
    --cycle
    (-0.5068, 0.6706)
    .. controls (-0.5119, 0.6724) and (-0.5194, 0.6726) .. (-0.5299, 0.6701)
    .. controls (-0.5512, 0.6413) and (-0.5242, 0.6333) .. (-0.5102, 0.6400)
    .. controls (-0.4981, 0.6457) and (-0.4916, 0.6653) .. (-0.5068, 0.6706)
    --cycle
    (-0.6356, 0.6402)
    -- (-0.6681, 0.5845)
    -- (-0.6588, 0.5684)
    .. controls (-0.6473, 0.5521) and (-0.6323, 0.5371) .. (-0.6265, 0.5174)
    .. controls (-0.6174, 0.4865) and (-0.6614, 0.4161) .. (-0.6950, 0.4206)
    .. controls (-0.7111, 0.4226) and (-0.7174, 0.4376) .. (-0.7460, 0.4507)
    -- (-0.7632, 0.4212)
    .. controls (-0.7629, 0.4042) and (-0.7611, 0.3875) .. (-0.7546, 0.3789)
    .. controls (-0.7424, 0.3626) and (-0.7129, 0.3612) .. (-0.6966, 0.3297)
    .. controls (-0.6823, 0.3022) and (-0.6963, 0.2741) .. (-0.6808, 0.2598)
    .. controls (-0.6602, 0.2410) and (-0.6495, 0.2720) .. (-0.6484, 0.2878)
    .. controls (-0.6461, 0.3229) and (-0.6488, 0.4046) .. (-0.6080, 0.4204)
    .. controls (-0.5750, 0.4330) and (-0.4980, 0.3514) .. (-0.4929, 0.3217)
    .. controls (-0.4895, 0.3019) and (-0.5044, 0.2671) .. (-0.4860, 0.2550)
    .. controls (-0.4691, 0.2439) and (-0.4582, 0.2679) .. (-0.4535, 0.2796)
    .. controls (-0.4450, 0.3015) and (-0.4273, 0.3562) .. (-0.4401, 0.3771)
    .. controls (-0.4495, 0.3922) and (-0.5019, 0.4172) .. (-0.5296, 0.4507)
    .. controls (-0.5656, 0.4941) and (-0.5734, 0.5631) .. (-0.5973, 0.6021)
    .. controls (-0.6099, 0.6226) and (-0.6226, 0.6316) .. (-0.6356, 0.6402)
    --cycle
    ( 0.2242, 0.6110)
    -- ( 0.1816, 0.6025)
    -- ( 0.1816, 0.5855)
    .. controls ( 0.2117, 0.5815) and ( 0.2140, 0.5821) .. ( 0.2242, 0.6110)
    --cycle
    ( 0.3924, 0.6049)
    .. controls ( 0.3895, 0.6048) and ( 0.3860, 0.6036) .. ( 0.3820, 0.6011)
    .. controls ( 0.3535, 0.5835) and ( 0.3670, 0.5238) .. ( 0.3773, 0.5004)
    -- ( 0.3944, 0.5004)
    -- ( 0.4061, 0.5429)
    .. controls ( 0.4082, 0.5540) and ( 0.4130, 0.6056) .. ( 0.3924, 0.6049)
    --cycle
    (-0.2864, 0.5940)
    .. controls (-0.2904, 0.5793) and (-0.2950, 0.5676) .. (-0.2919, 0.5518)
    .. controls (-0.2769, 0.4768) and (-0.1616, 0.5041) .. (-0.2162, 0.5623)
    .. controls (-0.2236, 0.5702) and (-0.2346, 0.5747) .. (-0.2443, 0.5790)
    --cycle
    (-0.7010, 0.5280)
    -- (-0.7269, 0.4835)
    .. controls (-0.7207, 0.4876) and (-0.7144, 0.4952) .. (-0.7081, 0.5094)
```

```
    --cycle
    (-0.0992, 0.4748)
    -- (-0.2099, 0.4556)
    -- (-0.2888, 0.3790)
    -- (-0.3460, 0.3557)
    -- (-0.3389, 0.3218)
    .. controls (-0.3310, 0.2959) and (-0.3026, 0.2636) .. (-0.2781, 0.2927)
    .. controls (-0.2745, 0.2971) and (-0.2504, 0.3947) .. (-0.1948, 0.3764)
    .. controls (-0.1607, 0.3651) and (-0.1697, 0.2984) .. (-0.1588, 0.2536)
    -- (-0.1503, 0.2536)
    -- (-0.1503, 0.2450)
    -- (-0.1163, 0.2366)
    .. controls (-0.0968, 0.3059) and (-0.1262, 0.3371) .. (-0.1239, 0.3982)
    .. controls (-0.1229, 0.4261) and (-0.1067, 0.4484) .. (-0.0992, 0.4748)
    --cycle
    (-0.1503, 0.2450)
    -- (-0.1588, 0.2536)
    .. controls (-0.2292, 0.2544) and (-0.2730, 0.2893) .. (-0.2677, 0.2195)
    -- (-0.2609, 0.1855)
    .. controls (-0.2393, 0.1890) and (-0.2005, 0.2039) .. (-0.1909, 0.1753)
    .. controls (-0.1709, 0.1163) and (-0.2582, 0.0953) .. (-0.2387, 0.0533)
    .. controls (-0.2275, 0.0292) and (-0.1430, 0.0537) .. (-0.1361, 0.0692)
    .. controls (-0.1250, 0.0859) and (-0.1359, 0.1083) .. (-0.1361, 0.1259)
    .. controls (-0.1437, 0.1788) and (-0.1186, 0.1766) .. (-0.1503, 0.2450)
    --cycle
    ( 0.7348, 0.4408)
    .. controls ( 0.7113, 0.3774) and ( 0.7569, 0.3513) .. ( 0.7901, 0.3824)
    -- ( 0.7585, 0.4390)
    --cycle
    ( 0.2071, 0.4153)
    .. controls ( 0.1984, 0.3706) and ( 0.2118, 0.3204) .. ( 0.2582, 0.3046)
    .. controls ( 0.2685, 0.3631) and ( 0.2706, 0.3931) .. ( 0.2071, 0.4153)
    --cycle
    (-0.0567, 0.3982)
    .. controls (-0.0558, 0.3230) and (-0.0460, 0.3456) .. (-0.0210, 0.2876)
    -- ( 0.0067, 0.1940)
    .. controls ( 0.0180, 0.1513) and ( 0.0026, 0.1332) .. ( 0.0454, 0.1089)
    -- ( 0.0767, 0.1940)
    -- ( 0.0546, 0.2621)
    -- ( 0.0406, 0.3185)
    -- (-0.0258, 0.3896)
    --cycle
    (-0.7969, 0.3634)
    -- (-0.8570, 0.2602)
    .. controls (-0.8515, 0.2550) and (-0.8469, 0.2514) .. (-0.8414, 0.2450)
    .. controls (-0.8020, 0.1990) and (-0.8201, 0.1971) .. (-0.7629, 0.1540)
    .. controls (-0.7462, 0.1414) and (-0.7054, 0.1023) .. (-0.6834, 0.1181)
    .. controls (-0.6662, 0.1304) and (-0.6813, 0.1625) .. (-0.6882, 0.1768)
    .. controls (-0.7213, 0.2456) and (-0.7865, 0.2417) .. (-0.8004, 0.2965)
    .. controls (-0.8052, 0.3154) and (-0.7990, 0.3413) .. (-0.7969, 0.3634)
    --cycle
    ( 0.8244, 0.3214)
    .. controls ( 0.8136, 0.3128) and ( 0.8080, 0.2984) .. ( 0.8114, 0.2706)
```

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    .. controls ( 0.8314, 0.2739) and ( 0.8424, 0.2735) .. ( 0.8526, 0.2710)
    --cycle
    ( 0.5015, 0.3207)
    .. controls ( 0.4943, 0.3196) and ( 0.4861, 0.3171) .. ( 0.4766, 0.3130)
    .. controls ( 0.4611, 0.2827) and ( 0.4839, 0.2747) .. ( 0.5028, 0.2521)
    -- ( 0.5376, 0.1972)
    .. controls ( 0.5529, 0.1772) and ( 0.5728, 0.1698) .. ( 0.5845, 0.1426)
    .. controls ( 0.5979, 0.1115) and ( 0.5837, 0.0732) .. ( 0.5987, 0.0532)
    .. controls ( 0.6095, 0.0384) and ( 0.6236, 0.0428) .. ( 0.6350, 0.0532)
    .. controls ( 0.6681, 0.0842) and ( 0.6456, 0.1087) .. ( 0.6482, 0.1429)
    .. controls ( 0.6481, 0.1614) and ( 0.6596, 0.1802) .. ( 0.6482, 0.1967)
    .. controls ( 0.6390, 0.2131) and ( 0.5992, 0.2239) .. ( 0.5768, 0.2483)
    .. controls ( 0.5547, 0.2722) and ( 0.5524, 0.3288) .. ( 0.5015, 0.3207)
    --cycle
    (-0.5678, 0.3115)
    .. controls (-0.5832, 0.3118) and (-0.6140, 0.2810) .. (-0.6269, 0.2706)
    .. controls (-0.6185, 0.2412) and (-0.5926, 0.1953) .. (-0.5973, 0.1685)
    .. controls (-0.6029, 0.1373) and (-0.6320, 0.1239) .. (-0.6369, 0.0996)
    .. controls (-0.6406, 0.0816) and (-0.6303, 0.0652) .. (-0.6237, 0.0493)
    .. controls (-0.6147, 0.0275) and (-0.6000,-0.0443) .. (-0.5641,-0.0258)
    .. controls (-0.5134,-0.0018) and (-0.5902, 0.0606) .. (-0.5641, 0.1074)
    .. controls (-0.5332, 0.1697) and (-0.4913, 0.1444) .. (-0.4481, 0.1593)
    .. controls (-0.3913, 0.1792) and (-0.3439, 0.2446) .. (-0.3545, 0.3046)
    -- (-0.4568, 0.2201)
    -- (-0.5588, 0.2201)
    .. controls (-0.5549, 0.2390) and (-0.5305, 0.3109) .. (-0.5678, 0.3115)
    --cycle
    ( 0.2243, 0.2813)
    -- ( 0.1631, 0.2450)
    -- ( 0.0965, 0.2281)
    -- ( 0.1689, 0.1131)
    -- ( 0.2065, 0.0861)
    .. controls ( 0.2453, 0.0564) and ( 0.2384, 0.0410) .. ( 0.2923, 0.0323)
    -- ( 0.2988,-0.0188)
    .. controls ( 0.2994,-0.0695) and ( 0.2657,-0.0796) .. ( 0.2249,-0.0579)
    .. controls ( 0.1337,-0.0093) and ( 0.1545, 0.0219) .. ( 0.1102, 0.0744)
    .. controls ( 0.0914, 0.0967) and ( 0.0807, 0.1010) .. ( 0.0539, 0.1089)
    .. controls ( 0.0562, 0.0613) and ( 0.0756,-0.0434) .. ( 0.0403,-0.0825)
    .. controls ( 0.0293,-0.0948) and (-0.0336,-0.1168) .. (-0.0567,-0.1294)
    .. controls (-0.0615,-0.1087) and (-0.0777,-0.0729) .. (-0.0703,-0.0546)
    .. controls (-0.0586,-0.0251) and ( 0.0562, 0.0040) .. (-0.0152, 0.0389)
    -- (-0.0397, 0.0480)
    -- (-0.0737, 0.0578)
    .. controls (-0.0806, 0.0391) and (-0.0849, 0.0192) .. (-0.1018, 0.0068)
    .. controls (-0.1154,-0.0032) and (-0.1352,-0.0018) .. (-0.1438,-0.0212)
    .. controls (-0.1562,-0.0491) and (-0.1117,-0.1243) .. (-0.0874,-0.1373)
    .. controls (-0.0745,-0.1434) and (-0.0687,-0.1394) .. (-0.0567,-0.1373)
    .. controls (-0.0358,-0.2033) and (-0.0062,-0.1612) .. ( 0.0370,-0.1500)
    -- ( 0.1050,-0.1379)
    .. controls ( 0.0882,-0.0871) and ( 0.0808,-0.0999) .. ( 0.0965,-0.0443)
    .. controls ( 0.1454,-0.0619) and ( 0.1336,-0.0743) .. ( 0.1664,-0.0940)
    .. controls ( 0.1897,-0.1081) and ( 0.2226,-0.1052) .. ( 0.2361,-0.1388)
    .. controls ( 0.2495,-0.1724) and ( 0.2245,-0.1963) .. ( 0.2412,-0.2584)
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    .. controls ( 0.2526,-0.2569) and ( 0.2622,-0.2548) .. ( 0.2735,-0.2584)
    .. controls ( 0.2987,-0.2708) and ( 0.3225,-0.3241) .. ( 0.3212,-0.3506)
    .. controls ( 0.3203,-0.3711) and ( 0.3053,-0.3950) .. ( 0.3008,-0.4443)
    -- ( 0.2497,-0.4187)
    .. controls ( 0.2599,-0.4479) and ( 0.2621,-0.4475) .. ( 0.2905,-0.4528)
    .. controls ( 0.2877,-0.4715) and ( 0.2799,-0.4998) .. ( 0.2905,-0.5182)
    .. controls ( 0.2991,-0.5392) and ( 0.3228,-0.5357) .. ( 0.3346,-0.5182)
    .. controls ( 0.3506,-0.4943) and ( 0.3355,-0.4515) .. ( 0.3532,-0.4203)
    .. controls ( 0.3716,-0.3881) and ( 0.4096,-0.3844) .. ( 0.4084,-0.3499)
    .. controls ( 0.4074,-0.3241) and ( 0.3866,-0.3087) .. ( 0.3728,-0.2897)
    -- ( 0.3426,-0.2337)
    -- ( 0.2989,-0.1879)
    .. controls ( 0.2810,-0.1587) and ( 0.2976,-0.1327) .. ( 0.3187,-0.1323)
    .. controls ( 0.3342,-0.1319) and ( 0.3489,-0.1451) .. ( 0.3603,-0.1541)
    .. controls ( 0.3817,-0.1712) and ( 0.4026,-0.1894) .. ( 0.4144,-0.2146)
    .. controls ( 0.4299,-0.2477) and ( 0.4289,-0.2977) .. ( 0.4712,-0.3110)
    .. controls ( 0.4957,-0.3188) and ( 0.5167,-0.3024) .. ( 0.5044,-0.2753)
    .. controls ( 0.4967,-0.2585) and ( 0.4769,-0.2471) .. ( 0.4676,-0.2227)
    .. controls ( 0.4582,-0.1981) and ( 0.4681,-0.1743) .. ( 0.4488,-0.1492)
    .. controls ( 0.4286,-0.1227) and ( 0.3809,-0.1095) .. ( 0.3621,-0.0696)
    .. controls ( 0.3402,-0.0230) and ( 0.3896, 0.0270) .. ( 0.3092, 0.0408)
    -- ( 0.3532, 0.1933)
    -- ( 0.3944, 0.2536)
    -- ( 0.3433, 0.2765)
    --cycle
    ( 0.2497, 0.2450)
    -- ( 0.2782, 0.2025)
    .. controls ( 0.2843, 0.1911) and ( 0.2884, 0.1815) .. ( 0.2900, 0.1685)
    .. controls ( 0.3021, 0.0654) and ( 0.1495, 0.1479) .. ( 0.2135, 0.2245)
    .. controls ( 0.2246, 0.2378) and ( 0.2346, 0.2396) .. ( 0.2497, 0.2450)
    --cycle
    ( 0.8836, 0.2157)
    .. controls ( 0.8688, 0.2061) and ( 0.8571, 0.1889) .. ( 0.8687, 0.1736)
    .. controls ( 0.8785, 0.1608) and ( 0.8967, 0.1613) .. ( 0.9161, 0.1578)
    --cycle
    (-0.3035, 0.1940)
    .. controls (-0.3340, 0.1390) and (-0.3508, 0.1491) .. (-0.3624, 0.1300)
    .. controls (-0.3738, 0.1112) and (-0.3588, 0.0896) .. (-0.3288, 0.0972)
    .. controls (-0.2842, 0.1084) and (-0.2392, 0.1714) .. (-0.3035, 0.1940)
    --cycle
    ( 0.4710, 0.1940)
    .. controls ( 0.4330, 0.1525) and ( 0.3961, 0.1447) .. ( 0.4114, 0.0833)
    .. controls ( 0.4294, 0.0897) and ( 0.4596, 0.1056) .. ( 0.4776, 0.0984)
    .. controls ( 0.5010, 0.0888) and ( 0.5182, 0.0420) .. ( 0.4925, 0.0231)
    .. controls ( 0.4698, 0.0064) and ( 0.4500, 0.0299) .. ( 0.3944, 0.0153)
    .. controls ( 0.4243,-0.0189) and ( 0.4618,-0.0333) .. ( 0.4765,-0.0621)
    .. controls ( 0.4928,-0.0939) and ( 0.4729,-0.1183) .. ( 0.4881,-0.1406)
    .. controls ( 0.4977,-0.1549) and ( 0.5241,-0.1630) .. ( 0.5425,-0.1894)
    .. controls ( 0.5557,-0.2085) and ( 0.5562,-0.2282) .. ( 0.5657,-0.2485)
    -- ( 0.6122,-0.3251)
    .. controls ( 0.6335,-0.3720) and ( 0.6160,-0.3973) .. ( 0.6323,-0.4443)
    .. controls ( 0.6532,-0.5042) and ( 0.6754,-0.5231) .. ( 0.6973,-0.5440)
    -- ( 0.7289,-0.4899)
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    .. controls ( 0.7138,-0.4739) and ( 0.6992,-0.4579) .. ( 0.6886,-0.4358)
    -- ( 0.6489,-0.2690)
    .. controls ( 0.6485,-0.2445) and ( 0.6654,-0.2180) .. ( 0.6598,-0.2002)
    .. controls ( 0.6522,-0.1752) and ( 0.6202,-0.1899) .. ( 0.5938,-0.1612)
    .. controls ( 0.5619,-0.1263) and ( 0.5907,-0.0980) .. ( 0.5797,-0.0720)
    .. controls ( 0.5714,-0.0525) and ( 0.5434,-0.0441) .. ( 0.5374,-0.0184)
    .. controls ( 0.5319, 0.0056) and ( 0.5522, 0.0300) .. ( 0.5533, 0.0578)
    .. controls ( 0.5548, 0.0943) and ( 0.4981, 0.1701) .. ( 0.4710, 0.1940)
    --cycle
    (-0.9001, 0.1862)
    -- (-0.9386, 0.1201)
    .. controls (-0.9374, 0.1181) and (-0.9371, 0.1158) .. (-0.9356, 0.1139)
    .. controls (-0.9242, 0.0996) and (-0.9046, 0.0893) .. (-0.8911, 0.0660)
    .. controls (-0.8684, 0.0268) and (-0.8960, 0.0297) .. (-0.8592,-0.0296)
    .. controls (-0.8262,-0.0830) and (-0.8655,-0.1092) .. (-0.7971,-0.1209)
    -- (-0.7875, 0.0068)
    -- (-0.8579, 0.1174)
    --cycle
    (-0.4453, 0.0979)
    .. controls (-0.4922, 0.0916) and (-0.4988, 0.0347) .. (-0.4759, 0.0116)
    .. controls (-0.4491,-0.0149) and (-0.4165, 0.0208) .. (-0.3900, 0.0116)
    .. controls (-0.3555,-0.0011) and (-0.3800,-0.0410) .. (-0.3751,-0.0698)
    -- (-0.3537,-0.1294)
    .. controls (-0.3428,-0.1879) and (-0.4042,-0.1777) .. (-0.3801,-0.2656)
    .. controls (-0.3617,-0.2531) and (-0.3352,-0.2292) .. (-0.3122,-0.2330)
    .. controls (-0.2845,-0.2375) and (-0.2669,-0.2694) .. (-0.2543,-0.2911)
    .. controls (-0.2183,-0.3533) and (-0.2004,-0.3613) .. (-0.2184,-0.4358)
    .. controls (-0.3300,-0.4097) and (-0.2723,-0.5065) .. (-0.2483,-0.5549)
    -- (-0.2129,-0.6314)
    .. controls (-0.2017,-0.6508) and (-0.1900,-0.6661) .. (-0.1670,-0.6712)
    .. controls (-0.1211,-0.6813) and (-0.1100,-0.6527) .. (-0.1163,-0.6145)
    .. controls (-0.1327,-0.6119) and (-0.1427,-0.6118) .. (-0.1568,-0.6009)
    .. controls (-0.1780,-0.5845) and (-0.2123,-0.5041) .. (-0.2042,-0.4783)
    .. controls (-0.1947,-0.4484) and (-0.1575,-0.4121) .. (-0.1333,-0.3932)
    -- (-0.1527,-0.3251)
    -- (-0.1588,-0.2656)
    .. controls (-0.2187,-0.2715) and (-0.2083,-0.2536) .. (-0.2457,-0.2163)
    .. controls (-0.2684,-0.1935) and (-0.2911,-0.1886) .. (-0.2996,-0.1546)
    -- (-0.2996,-0.1209)
    -- (-0.3232,-0.0698)
    .. controls (-0.3283,-0.0435) and (-0.3124,-0.0260) .. (-0.3175,-0.0041)
    .. controls (-0.3251, 0.0283) and (-0.3891, 0.0917) .. (-0.4227, 0.0973)
    .. controls (-0.4311, 0.0987) and (-0.4386, 0.0989) .. (-0.4453, 0.0979)
    --cycle
    (-0.1163,-0.6145)
    -- (-0.0812,-0.6009)
    -- (-0.0509,-0.4868)
    -- (-0.0567,-0.4528)
    .. controls (-0.1227,-0.4845) and (-0.1350,-0.5483) .. (-0.1163,-0.6145)
    --cycle
    ( 0.9165, 0.0573)
    .. controls ( 0.8982, 0.0512) and ( 0.8800, 0.0260) .. ( 0.8880,-0.0013)
    .. controls ( 0.8973,-0.0334) and ( 0.9330,-0.0408) .. ( 0.9466,-0.0703)
```

```
    .. controls ( 0.9528,-0.0838) and ( 0.9514,-0.0964) .. ( 0.9506,-0.1091)
    -- ( 1.0000,-0.0243)
    .. controls ( 0.9816,-0.0179) and ( 0.9678,-0.0119) .. ( 0.9563, 0.0077)
    .. controls ( 0.9465, 0.0244) and ( 0.9476, 0.0488) .. ( 0.9340, 0.0564)
    .. controls ( 0.9288, 0.0593) and ( 0.9227, 0.0593) .. ( 0.9165, 0.0573)
    --cycle
    (-0.7064, 0.0069)
    .. controls (-0.7128, 0.0077) and (-0.7187, 0.0075) .. (-0.7237, 0.0061)
    .. controls (-0.7255, 0.0030) and (-0.7310, 0.0025) .. (-0.7316,-0.0115)
    .. controls (-0.7321,-0.0230) and (-0.7071,-0.1058) .. (-0.6984,-0.1096)
    .. controls (-0.6872,-0.1176) and (-0.6721,-0.1116) .. (-0.6609,-0.1096)
    .. controls (-0.6502,-0.1046) and (-0.6316,-0.0986) .. (-0.6242,-0.0900)
    .. controls (-0.5901,-0.0507) and (-0.6615, 0.0017) .. (-0.7064, 0.0069)
    --cycle
    (-1.0000, 0.0068)
    -- (-1.0000, 0.0020)
    -- (-0.9548,-0.0788)
    .. controls (-0.9170,-0.0310) and (-0.9342,-0.0158) .. (-1.0000, 0.0068)
    --cycle
    (-0.2643, 0.0054)
    .. controls (-0.2853,-0.0295) and (-0.2523,-0.0713) .. (-0.2182,-0.0843)
    .. controls (-0.2024,-0.0902) and (-0.1781,-0.0944) .. (-0.1687,-0.0757)
    .. controls (-0.1530,-0.0441) and (-0.2378, 0.0095) .. (-0.2643, 0.0054)
    --cycle
    ( 0.6299,-0.0102)
    .. controls ( 0.6155,-0.0145) and ( 0.6071,-0.0342) .. ( 0.6128,-0.0510)
    .. controls ( 0.6198,-0.0721) and ( 0.6440,-0.0790) .. ( 0.6606,-0.0986)
    .. controls ( 0.6738,-0.1143) and ( 0.6761,-0.1328) .. ( 0.6948,-0.1437)
    .. controls ( 0.7092,-0.1520) and ( 0.7311,-0.1484) .. ( 0.7401,-0.1664)
    .. controls ( 0.7461,-0.1784) and ( 0.7351,-0.2363) .. ( 0.7348,-0.2570)
    .. controls ( 0.7336,-0.3524) and ( 0.7289,-0.3324) .. ( 0.7620,-0.4187)
    .. controls ( 0.7631,-0.4216) and ( 0.7642,-0.4246) .. ( 0.7652,-0.4275)
    -- ( 0.8003,-0.3672)
    .. controls ( 0.7976,-0.3636) and ( 0.7942,-0.3606) .. ( 0.7918,-0.3568)
    .. controls ( 0.7778,-0.3349) and ( 0.7645,-0.2537) .. ( 0.7970,-0.2417)
    .. controls ( 0.8206,-0.2330) and ( 0.8347,-0.2671) .. ( 0.8432,-0.2822)
    -- ( 0.8469,-0.2872)
    -- ( 0.8787,-0.2326)
    -- ( 0.8594,-0.1993)
    .. controls ( 0.8496,-0.1847) and ( 0.7996,-0.1314) .. ( 0.7847,-0.1281)
    .. controls ( 0.7712,-0.1229) and ( 0.7642,-0.1268) .. ( 0.7518,-0.1281)
    .. controls ( 0.7451,-0.1148) and ( 0.7397,-0.1014) .. ( 0.7293,-0.0886)
    -- ( 0.6461,-0.0117)
    .. controls ( 0.6402,-0.0090) and ( 0.6347,-0.0087) .. ( 0.6299,-0.0102)
    --cycle
    (-0.5178,-0.0844)
    .. controls (-0.5451,-0.0820) and (-0.5852,-0.0947) .. (-0.5902,-0.1144)
    .. controls (-0.6007,-0.1557) and (-0.5621,-0.1731) .. (-0.5414,-0.1997)
    .. controls (-0.5274,-0.2177) and (-0.5229,-0.2355) .. (-0.5044,-0.2525)
    .. controls (-0.4888,-0.2669) and (-0.4706,-0.2705) .. (-0.4543,-0.2923)
    .. controls (-0.4420,-0.3087) and (-0.4220,-0.3707) .. (-0.4141,-0.3932)
    .. controls (-0.3620,-0.3875) and (-0.3060,-0.4031) .. (-0.3060,-0.3592)
    .. controls (-0.3060,-0.3272) and (-0.3358,-0.3272) .. (-0.3716,-0.3008)
```

```
    .. controls (-0.4367,-0.2529) and (-0.4253,-0.2451) .. (-0.4621,-0.1914)
    .. controls (-0.4700,-0.1800) and (-0.4814,-0.1685) .. (-0.4867,-0.1556)
    .. controls (-0.4970,-0.1308) and (-0.4804,-0.1088) .. (-0.4966,-0.0923)
    .. controls (-0.5011,-0.0877) and (-0.5087,-0.0853) .. (-0.5178,-0.0844)
    --cycle
    (-0.4165,-0.0846)
    .. controls (-0.4357,-0.0807) and (-0.4622,-0.1075) .. (-0.4395,-0.1440)
    .. controls (-0.4316,-0.1566) and (-0.4254,-0.1571) .. (-0.4141,-0.1634)
    .. controls (-0.4094,-0.1522) and (-0.4042,-0.1415) .. (-0.4019,-0.1294)
    .. controls (-0.3960,-0.1004) and (-0.4049,-0.0870) .. (-0.4165,-0.0846)
    --cycle
    (-0.9358,-0.1125)
    -- (-0.8813,-0.2098)
    .. controls (-0.8768,-0.1903) and (-0.8656,-0.1673) .. (-0.8723,-0.1485)
    .. controls (-0.8801,-0.1269) and (-0.9022,-0.1274) .. (-0.9358,-0.1125)
    --cycle
    ( 0.1455,-0.1458)
    .. controls ( 0.1402,-0.1449) and ( 0.1336,-0.1452) .. ( 0.1255,-0.1471)
    .. controls ( 0.0901,-0.1850) and ( 0.1064,-0.2454) .. ( 0.1360,-0.2301)
    .. controls ( 0.1569,-0.2194) and ( 0.1827,-0.1522) .. ( 0.1455,-0.1458)
    --cycle
    (-0.1477,-0.1474)
    .. controls (-0.1646,-0.1458) and (-0.1813,-0.1543) .. (-0.1847,-0.1659)
    .. controls (-0.1889,-0.1806) and (-0.1612,-0.2953) .. (-0.1163,-0.2315)
    -- (-0.0420,-0.4418)
    .. controls (-0.0291,-0.4661) and (-0.0068,-0.4600) .. ( 0.0136,-0.4880)
    .. controls ( 0.0294,-0.5097) and ( 0.0259,-0.5331) .. ( 0.0419,-0.5487)
    .. controls ( 0.0694,-0.5755) and ( 0.1462,-0.5710) .. ( 0.1798,-0.6001)
    -- ( 0.2188,-0.6436)
    .. controls ( 0.2392,-0.6605) and ( 0.2566,-0.6577) .. ( 0.2804,-0.6838)
    .. controls ( 0.3122,-0.7186) and ( 0.3037,-0.7586) .. ( 0.3603,-0.7592)
    .. controls ( 0.3537,-0.7217) and ( 0.3358,-0.6781) .. ( 0.3603,-0.6427)
    .. controls ( 0.3743,-0.6222) and ( 0.3978,-0.6232) .. ( 0.4032,-0.6039)
    .. controls ( 0.4084,-0.5852) and ( 0.3901,-0.5654) .. ( 0.3712,-0.5741)
    .. controls ( 0.3573,-0.5804) and ( 0.3558,-0.5936) .. ( 0.3518,-0.6044)
    .. controls ( 0.3319,-0.6046) and ( 0.2996,-0.6092) .. ( 0.2842,-0.6044)
    .. controls ( 0.2568,-0.5917) and ( 0.2515,-0.5648) .. ( 0.2231,-0.5501)
    .. controls ( 0.1960,-0.5359) and ( 0.1632,-0.5421) .. ( 0.1413,-0.5292)
    -- ( 0.0626,-0.4601)
    .. controls ( 0.0525,-0.4430) and ( 0.0547,-0.4207) .. ( 0.0440,-0.4065)
    .. controls ( 0.0320,-0.3906) and ( 0.0076,-0.3898) .. (-0.0104,-0.3714)
    .. controls (-0.0515,-0.3289) and ( 0.0146,-0.2721) .. (-0.0737,-0.2358)
    .. controls (-0.0903,-0.2290) and (-0.0917,-0.2313) .. (-0.1098,-0.2315)
    -- (-0.1098,-0.1892)
    .. controls (-0.1137,-0.1607) and (-0.1308,-0.1491) .. (-0.1477,-0.1474)
    --cycle
    (-0.7679,-0.1481)
    .. controls (-0.8119,-0.1523) and (-0.8157,-0.2051) .. (-0.8303,-0.2401)
    -- (-0.8453,-0.2740)
    -- (-0.8299,-0.3015)
    .. controls (-0.7861,-0.2968) and (-0.8116,-0.2403) .. (-0.7732,-0.2278)
    .. controls (-0.7561,-0.2223) and (-0.7349,-0.2415) .. (-0.7204,-0.2497)
    .. controls (-0.6711,-0.2774) and (-0.6473,-0.2864) .. (-0.6524,-0.3506)
```

```
    -- (-0.6787,-0.3422)
    .. controls (-0.6786,-0.3475) and (-0.6826,-0.3544) .. (-0.6787,-0.3655)
    .. controls (-0.6635,-0.4244) and (-0.5943,-0.3658) .. (-0.5763,-0.3760)
    .. controls (-0.5586,-0.3861) and (-0.5497,-0.4251) .. (-0.5357,-0.4418)
    .. controls (-0.5118,-0.4701) and (-0.4694,-0.4662) .. (-0.4504,-0.5047)
    .. controls (-0.4231,-0.5599) and (-0.4535,-0.6772) .. (-0.4451,-0.7421)
    .. controls (-0.4389,-0.7901) and (-0.4023,-0.8005) .. (-0.3912,-0.8443)
    .. controls (-0.3883,-0.8558) and (-0.3874,-0.8667) .. (-0.3869,-0.8774)
    -- (-0.3386,-0.8778)
    .. controls (-0.3371,-0.8645) and (-0.3342,-0.8523) .. (-0.3394,-0.8358)
    .. controls (-0.3448,-0.8167) and (-0.3914,-0.7567) .. (-0.3962,-0.6996)
    .. controls (-0.4039,-0.6074) and (-0.3294,-0.5871) .. (-0.3545,-0.4954)
    -- (-0.3886,-0.5039)
    -- (-0.4196,-0.4442)
    -- (-0.4864,-0.4090)
    -- (-0.5345,-0.3241)
    -- (-0.6106,-0.2802)
    -- (-0.6106,-0.1975)
    .. controls (-0.6301,-0.2027) and (-0.6486,-0.2101) .. (-0.6694,-0.2022)
    .. controls (-0.7004,-0.1904) and (-0.7133,-0.1559) .. (-0.7464,-0.1495)
    .. controls (-0.7544,-0.1479) and (-0.7616,-0.1475) .. (-0.7679,-0.1481)
    --cycle
    ( 0.0029,-0.2060)
    .. controls (-0.0139,-0.2731) and ( 0.0196,-0.2608) .. ( 0.0476,-0.3014)
    .. controls ( 0.0682,-0.3314) and ( 0.0511,-0.3569) .. ( 0.0750,-0.3784)
    .. controls ( 0.0974,-0.3988) and ( 0.1304,-0.3876) .. ( 0.1549,-0.4019)
    .. controls ( 0.1795,-0.4164) and ( 0.1878,-0.4529) .. ( 0.1987,-0.4783)
    .. controls ( 0.2461,-0.4539) and ( 0.2519,-0.4021) .. ( 0.2180,-0.3618)
    .. controls ( 0.1964,-0.3362) and ( 0.1652,-0.3426) .. ( 0.1414,-0.3257)
    .. controls ( 0.1198,-0.3103) and ( 0.1183,-0.2881) .. ( 0.1007,-0.2689)
    .. controls ( 0.0838,-0.2504) and ( 0.0265,-0.2166) .. ( 0.0029,-0.2060)
    --cycle
    ( 0.2327,-0.2826)
    .. controls ( 0.1961,-0.2955) and ( 0.1961,-0.3123) .. ( 0.2327,-0.3251)
    --cycle
    (-0.7548,-0.3137)
    .. controls (-0.7774,-0.3164) and (-0.7890,-0.3323) .. (-0.7986,-0.3573)
    -- (-0.7759,-0.3979)
    .. controls (-0.7735,-0.3968) and (-0.7711,-0.3964) .. (-0.7688,-0.3946)
    -- (-0.7205,-0.3166)
    .. controls (-0.7341,-0.3135) and (-0.7454,-0.3126) .. (-0.7548,-0.3137)
    --cycle
    ( 0.4114,-0.3847)
    .. controls ( 0.4216,-0.4136) and ( 0.4238,-0.4142) .. ( 0.4540,-0.4102)
    -- ( 0.4540,-0.3932)
    --cycle
    ( 0.5395,-0.3997)
    .. controls ( 0.5263,-0.3990) and ( 0.5044,-0.4032) .. ( 0.4625,-0.4018)
    -- ( 0.4780,-0.4954)
    .. controls ( 0.4757,-0.5287) and ( 0.4518,-0.5542) .. ( 0.4648,-0.5776)
    .. controls ( 0.4852,-0.6142) and ( 0.5202,-0.5603) .. ( 0.5614,-0.5929)
    .. controls ( 0.5752,-0.6038) and ( 0.6063,-0.6359) .. ( 0.6275,-0.6638)
    -- ( 0.6570,-0.6132)
```

```
    .. controls ( 0.6460,-0.6042) and ( 0.6347,-0.5954) .. ( 0.6268,-0.5865)
    -- ( 0.5937,-0.5346)
    .. controls ( 0.5648,-0.5023) and ( 0.5031,-0.4880) .. ( 0.5646,-0.4273)
    .. controls ( 0.5574,-0.4062) and ( 0.5528,-0.4005) .. ( 0.5395,-0.3997)
    --cycle
    (-0.6609,-0.4273)
    .. controls (-0.7027,-0.4247) and (-0.7300,-0.4414) .. (-0.7397,-0.4624)
    -- (-0.7047,-0.5249)
    .. controls (-0.7013,-0.5263) and (-0.6989,-0.5282) .. (-0.6950,-0.5294)
    .. controls (-0.6935,-0.4878) and (-0.6933,-0.4806) .. (-0.6609,-0.4528)
    --cycle
    (-0.5689,-0.4528)
    .. controls (-0.6368,-0.4677) and (-0.6352,-0.5020) .. (-0.6354,-0.5634)
    -- (-0.5757,-0.6071)
    -- (-0.5162,-0.6826)
    .. controls (-0.5073,-0.6508) and (-0.5037,-0.6125) .. (-0.5241,-0.5838)
    .. controls (-0.5384,-0.5639) and (-0.5622,-0.5584) .. (-0.5689,-0.5361)
    .. controls (-0.5775,-0.5167) and (-0.5648,-0.4918) .. (-0.5689,-0.4528)
    --cycle
    (-0.6354,-0.5634)
    .. controls (-0.6583,-0.5576) and (-0.6713,-0.5579) .. (-0.6839,-0.5619)
    -- (-0.6487,-0.6248)
    .. controls (-0.6395,-0.6053) and (-0.6326,-0.5852) .. (-0.6354,-0.5634)
    --cycle
    (-0.0056,-0.5890)
    .. controls (-0.0554,-0.6155) and (-0.0426,-0.6370) .. (-0.0606,-0.6818)
    -- (-0.1199,-0.7847)
    .. controls (-0.1298,-0.8015) and (-0.1531,-0.8317) .. (-0.1499,-0.8510)
    .. controls (-0.1482,-0.8615) and (-0.1397,-0.8702) .. (-0.1295,-0.8795)
    -- (-0.0507,-0.8802)
    .. controls (-0.0629,-0.8583) and (-0.0745,-0.8380) .. (-0.0742,-0.8358)
    .. controls (-0.0792,-0.8239) and (-0.0776,-0.8135) .. (-0.0742,-0.8027)
    .. controls (-0.0460,-0.7520) and ( 0.0016,-0.7834) .. ( 0.0277,-0.7780)
    .. controls ( 0.0760,-0.7679) and ( 0.1284,-0.6914) .. ( 0.1207,-0.6405)
    .. controls ( 0.1150,-0.6017) and ( 0.0841,-0.6082) .. ( 0.0711,-0.6267)
    .. controls ( 0.0620,-0.6397) and ( 0.0556,-0.7141) .. ( 0.0539,-0.7336)
    .. controls (-0.0413,-0.7085) and ( 0.0139,-0.6637) .. (-0.0056,-0.5890)
    --cycle
    ( 0.4284,-0.6571)
    .. controls ( 0.4285,-0.7307) and ( 0.4284,-0.7652) .. ( 0.5135,-0.7336)
    .. controls ( 0.5170,-0.7469) and ( 0.5220,-0.7585) .. ( 0.5179,-0.7726)
    .. controls ( 0.5091,-0.8019) and ( 0.4473,-0.8546) .. ( 0.4851,-0.8847)
    -- ( 0.4987,-0.8848)
    -- ( 0.5768,-0.7509)
    .. controls ( 0.5767,-0.7509) and ( 0.5767,-0.7507) .. ( 0.5767,-0.7507)
    .. controls ( 0.5412,-0.6652) and ( 0.5083,-0.6726) .. ( 0.4284,-0.6571)
    --cycle
    (-0.2914,-0.6672)
    .. controls (-0.2998,-0.6666) and (-0.3106,-0.6686) .. (-0.3250,-0.6743)
    .. controls (-0.3545,-0.7128) and (-0.3081,-0.7358) .. (-0.2850,-0.7678)
    .. controls (-0.2710,-0.7873) and (-0.2601,-0.8137) .. (-0.2351,-0.8216)
    .. controls (-0.2083,-0.8301) and (-0.1916,-0.8105) .. (-0.1960,-0.7845)
    .. controls (-0.2008,-0.7566) and (-0.2232,-0.7418) .. (-0.2396,-0.7216)
```

```
    .. controls (-0.2612,-0.6950) and (-0.2660,-0.6690) .. (-0.2914,-0.6672)
    --cycle
    (-0.5641,-0.6998)
    .. controls (-0.5850,-0.6984) and (-0.5808,-0.7367) .. (-0.5766,-0.7507)
    .. controls (-0.5748,-0.7566) and (-0.5723,-0.7598) .. (-0.5702,-0.7648)
    -- (-0.5492,-0.8022)
    .. controls (-0.5310,-0.8247) and (-0.5120,-0.8367) .. (-0.5052,-0.8613)
    .. controls (-0.5044,-0.8642) and (-0.5062,-0.8717) .. (-0.5063,-0.8763)
    -- (-0.4585,-0.8767)
    .. controls (-0.4596,-0.7984) and (-0.5013,-0.7963) .. (-0.5234,-0.7583)
    .. controls (-0.5344,-0.7394) and (-0.5352,-0.7120) .. (-0.5535,-0.7030)
    .. controls (-0.5576,-0.7010) and (-0.5611,-0.7000) .. (-0.5641,-0.6998)
    --cycle
    ( 0.1990,-0.7341)
    .. controls ( 0.1094,-0.7768) and ( 0.2330,-0.8330) .. ( 0.2586,-0.8828)
    -- ( 0.3183,-0.8833)
    .. controls ( 0.3165,-0.8684) and ( 0.3066,-0.8565) .. ( 0.2991,-0.8428)
    .. controls ( 0.2762,-0.8010) and ( 0.2508,-0.7418) .. ( 0.1990,-0.7341)
    --cycle
    ( 0.3603,-0.7592)
    -- ( 0.3859,-0.8188)
    .. controls ( 0.4178,-0.7853) and ( 0.4108,-0.7527) .. ( 0.3603,-0.7592)
    --cycle
    ( 0.4369,-0.8443)
    .. controls ( 0.4147,-0.8480) and ( 0.3837,-0.8661) .. ( 0.3628,-0.8837)
    -- ( 0.4240,-0.8842)
    .. controls ( 0.4307,-0.8690) and ( 0.4358,-0.8541) .. ( 0.4369,-0.8443)
    --cycle
    (-0.3205,-0.8528)
    -- (-0.3266,-0.8779)
    -- (-0.2773,-0.8783)
    .. controls (-0.2800,-0.8719) and (-0.2850,-0.8655) .. (-0.2963,-0.8600)
    --cycle
    ( 0.1093,-0.8568)
    .. controls ( 0.0964,-0.8568) and ( 0.0834,-0.8587) .. ( 0.0710,-0.8600)
    .. controls ( 0.0605,-0.8611) and ( 0.0403,-0.8617) .. ( 0.0312,-0.8664)
    .. controls ( 0.0240,-0.8701) and ( 0.0203,-0.8751) .. ( 0.0184,-0.8808)
    -- ( 0.1002,-0.8815)
    -- ( 0.1050,-0.8698)
    -- ( 0.1085,-0.8815)
    -- ( 0.1641,-0.8820)
    .. controls ( 0.1606,-0.8757) and ( 0.1553,-0.8698) .. ( 0.1463,-0.8649)
    .. controls ( 0.1347,-0.8586) and ( 0.1221,-0.8568) .. ( 0.1093,-0.8568)
    --cycle
    ;
  }
}
\fi
```

hex/terrain/light woods

The draw style for light woods. The pattern is filled with light green, and outline is not drawn.

```
\tikzset{
```

```
  hex/terrain/light woods/.style={
    draw=none,
    fill={rgb,100:red,69;green,98;blue,69}
  }
}
```

hex/terrain/light woods

Next, we have light woods.

```
\ifhex@terrain@pic
\tikzset{
  hex/terrain/light woods/.pic={
    \path[hex/terrain/light woods,pic actions,draw=none]
    (-0.4795, 0.8736)
    -- (-0.5104, 0.8207)
    .. controls (-0.5041, 0.8191) and (-0.4967, 0.8182) .. (-0.4854, 0.8192)
    -- (-0.4770, 0.8108)
    -- (-0.4854, 0.7856)
    -- (-0.5190, 0.8023)
    .. controls (-0.5219, 0.7975) and (-0.5245, 0.7958) .. (-0.5272, 0.7916)
    -- (-0.5881, 0.6872)
    .. controls (-0.5849, 0.6876) and (-0.5819, 0.6876) .. (-0.5782, 0.6885)
    .. controls (-0.5524, 0.6946) and (-0.5387, 0.7153) .. (-0.5182, 0.7298)
    .. controls (-0.4841, 0.7540) and (-0.4420, 0.7539) .. (-0.4346, 0.7864)
    .. controls (-0.4295, 0.8088) and (-0.4470, 0.8265) .. (-0.4572, 0.8444)
    .. controls (-0.4631, 0.8549) and (-0.4670, 0.8646) .. (-0.4707, 0.8736)
    --cycle
    (-0.3185, 0.8722)
    .. controls (-0.3478, 0.8487) and (-0.3526, 0.8080) .. (-0.3290, 0.7808)
    .. controls (-0.3140, 0.7633) and (-0.2394, 0.7433) .. (-0.2165, 0.7459)
    .. controls (-0.1895, 0.7488) and (-0.1787, 0.7643) .. (-0.1561, 0.7725)
    .. controls (-0.1380, 0.7791) and (-0.1179, 0.7766) .. (-0.1025, 0.7906)
    .. controls (-0.0719, 0.8182) and (-0.0936, 0.8427) .. (-0.1240, 0.8528)
    -- (-0.1323, 0.8192)
    -- (-0.1912, 0.8359)
    .. controls (-0.1985, 0.8023) and (-0.1999, 0.7965) .. (-0.2332, 0.7856)
    .. controls (-0.2512, 0.8363) and (-0.2775, 0.8009) .. (-0.2909, 0.8240)
    .. controls (-0.2975, 0.8355) and (-0.2884, 0.8535) .. (-0.2756, 0.8719)
    --cycle
    (-0.1660, 0.8709)
    .. controls (-0.1609, 0.8538) and (-0.1460, 0.8596) .. (-0.1371, 0.8707)
    --cycle
    ( 0.0768, 0.8689)
    .. controls ( 0.0767, 0.8688) and ( 0.0765, 0.8686) .. ( 0.0764, 0.8685)
    .. controls ( 0.0704, 0.8503) and ( 0.0779, 0.7592) .. ( 0.1533, 0.7700)
    .. controls ( 0.1955, 0.7761) and ( 0.1956, 0.8018) .. ( 0.1871, 0.8359)
    -- ( 0.1366, 0.8108)
    -- ( 0.1510, 0.8683)
    --cycle
    ( 0.1840, 0.8680)
    .. controls ( 0.1910, 0.8650) and ( 0.1993, 0.8662) .. ( 0.2081, 0.8678)
    --cycle
```

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    ( 0.2214, 0.8677)
    -- ( 0.2459, 0.7939)
    .. controls ( 0.1903, 0.7716) and ( 0.2267, 0.7399) .. ( 0.2534, 0.7490)
    .. controls ( 0.2925, 0.7624) and ( 0.2842, 0.8066) .. ( 0.2735, 0.8359)
    .. controls ( 0.2690, 0.8483) and ( 0.2655, 0.8586) .. ( 0.2619, 0.8674)
    --cycle
    ( 0.4057, 0.8661)
    .. controls ( 0.4149, 0.8349) and ( 0.4483, 0.8068) .. ( 0.4873, 0.8349)
    .. controls ( 0.4993, 0.8436) and ( 0.5001, 0.8496) .. ( 0.5065, 0.8612)
    .. controls ( 0.5170, 0.8447) and ( 0.5269, 0.8297) .. ( 0.5405, 0.8189)
    -- ( 0.5145, 0.8652)
    --cycle
    (-0.0288, 0.8391)
    .. controls (-0.0335, 0.8388) and (-0.0390, 0.8377) .. (-0.0453, 0.8356)
    .. controls (-0.0698, 0.8019) and (-0.0347, 0.7882) .. (-0.0173, 0.7966)
    .. controls ( 0.0001, 0.8052) and ( 0.0042, 0.8413) .. (-0.0288, 0.8391)
    --cycle
    ( 0.3888, 0.7856)
    -- ( 0.3719, 0.7687)
    -- ( 0.3719, 0.7604)
    -- ( 0.3888, 0.7435)
    -- ( 0.3972, 0.7435)
    -- ( 0.4140, 0.7604)
    --cycle
    (-0.0821, 0.7138)
    .. controls (-0.0999, 0.7158) and (-0.1171, 0.7050) .. (-0.1211, 0.6922)
    .. controls (-0.1297, 0.6650) and (-0.0695, 0.6250) .. (-0.0468, 0.6186)
    .. controls (-0.0352, 0.6169) and (-0.0107, 0.6175) .. ( 0.0022, 0.6186)
    .. controls (-0.0326, 0.5765) and (-0.0411, 0.5767) .. (-0.0909, 0.5922)
    .. controls (-0.0924, 0.5799) and (-0.0959, 0.5731) .. (-0.0909, 0.5597)
    .. controls (-0.0591, 0.4605) and ( 0.1221, 0.6255) .. ( 0.0020, 0.6581)
    .. controls (-0.0090, 0.6597) and (-0.0281, 0.6592) .. (-0.0399, 0.6581)
    .. controls (-0.0462, 0.6969) and (-0.0645, 0.7118) .. (-0.0821, 0.7138)
    --cycle
    ( 0.3704, 0.7106)
    .. controls ( 0.3510, 0.7072) and ( 0.3332, 0.6943) .. ( 0.3224, 0.6679)
    .. controls ( 0.3172, 0.6530) and ( 0.3220, 0.6121) .. ( 0.3224, 0.5922)
    -- ( 0.3056, 0.6154)
    .. controls ( 0.2531, 0.6742) and ( 0.2322, 0.5554) .. ( 0.2966, 0.5454)
    .. controls ( 0.3239, 0.5412) and ( 0.3417, 0.5630) .. ( 0.3972, 0.5670)
    .. controls ( 0.4005, 0.5473) and ( 0.4019, 0.5314) .. ( 0.4237, 0.5231)
    .. controls ( 0.4541, 0.5116) and ( 0.4961, 0.5392) .. ( 0.4841, 0.5736)
    .. controls ( 0.4794, 0.5870) and ( 0.4556, 0.5991) .. ( 0.4331, 0.6106)
    .. controls ( 0.4972, 0.6497) and ( 0.4277, 0.7210) .. ( 0.3704, 0.7106)
    --cycle
    (-0.4679, 0.7004)
    .. controls (-0.5116, 0.6983) and (-0.4629, 0.6153) .. (-0.4266, 0.6632)
    .. controls (-0.4200, 0.6718) and (-0.4201, 0.6786) .. (-0.4182, 0.6846)
    -- (-0.4434, 0.6958)
    .. controls (-0.4536, 0.6993) and (-0.4618, 0.7007) .. (-0.4679, 0.7004)
    --cycle
    ( 0.5653, 0.7002)
    .. controls ( 0.5661, 0.6911) and ( 0.5658, 0.6799) .. ( 0.5704, 0.6702)
```

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    .. controls ( 0.5856, 0.6381) and ( 0.6183, 0.6504) .. ( 0.6246, 0.6688)
    -- ( 0.6102, 0.6944)
    .. controls ( 0.6066, 0.6965) and ( 0.6036, 0.6986) .. ( 0.5984, 0.7002)
    .. controls ( 0.5884, 0.7016) and ( 0.5757, 0.7012) .. ( 0.5653, 0.7002)
    --cycle
    ( 0.1310, 0.6925)
    .. controls ( 0.1003, 0.6568) and ( 0.1392, 0.6414) .. ( 0.1582, 0.6530)
    .. controls ( 0.1772, 0.6646) and ( 0.1778, 0.7030) .. ( 0.1310, 0.6925)
    --cycle
    (-0.3425, 0.6846)
    .. controls (-0.3485, 0.6703) and (-0.3540, 0.6584) .. (-0.3564, 0.6427)
    .. controls (-0.3714, 0.5438) and (-0.2673, 0.5839) .. (-0.3103, 0.6583)
    .. controls (-0.3198, 0.6747) and (-0.3272, 0.6765) .. (-0.3425, 0.6846)
    --cycle
    (-0.1828, 0.6763)
    .. controls (-0.2468, 0.6411) and (-0.2396, 0.5532) .. (-0.1659, 0.5602)
    .. controls (-0.1273, 0.5639) and (-0.0946, 0.6066) .. (-0.1492, 0.6258)
    -- (-0.1828, 0.6006)
    --cycle
    ( 0.3972, 0.6763)
    -- ( 0.4287, 0.6131)
    .. controls ( 0.4206, 0.6173) and ( 0.4113, 0.6217) .. ( 0.4056, 0.6258)
    -- ( 0.3719, 0.6006)
    .. controls ( 0.3635, 0.6415) and ( 0.3652, 0.6489) .. ( 0.3972, 0.6763)
    --cycle
    ( 0.5737, 0.6319)
    -- ( 0.5485, 0.6258)
    .. controls ( 0.5516, 0.6201) and ( 0.5520, 0.6138) .. ( 0.5614, 0.6043)
    .. controls ( 0.6074, 0.5569) and ( 0.6453, 0.6371) .. ( 0.5737, 0.6319)
    --cycle
    (-0.6211, 0.6305)
    -- (-0.6755, 0.5370)
    -- (-0.6787, 0.5166)
    .. controls (-0.6809, 0.5180) and (-0.6832, 0.5188) .. (-0.6854, 0.5203)
    -- (-0.7191, 0.4623)
    -- (-0.7291, 0.4073)
    .. controls (-0.7367, 0.4126) and (-0.7403, 0.4136) .. (-0.7456, 0.4169)
    -- (-0.7651, 0.3834)
    .. controls (-0.7455, 0.3798) and (-0.7239, 0.3727) .. (-0.7052, 0.3845)
    .. controls (-0.6739, 0.3993) and (-0.6763, 0.4662) .. (-0.6703, 0.4998)
    .. controls (-0.6178, 0.4665) and (-0.6044, 0.4826) .. (-0.5611, 0.5204)
    .. controls (-0.5440, 0.5353) and (-0.5267, 0.5491) .. (-0.5345, 0.5748)
    .. controls (-0.5466, 0.6149) and (-0.5841, 0.6243) .. (-0.6211, 0.6305)
    --cycle
    (-0.6450, 0.5670)
    -- (-0.5862, 0.5670)
    .. controls (-0.6029, 0.5328) and (-0.6086, 0.5274) .. (-0.6450, 0.5166)
    --cycle
    ( 0.5940, 0.5141)
    .. controls ( 0.5876, 0.5135) and ( 0.5814, 0.5119) .. ( 0.5737, 0.5105)
    .. controls ( 0.5529, 0.5005) and ( 0.5203, 0.4878) .. ( 0.5123, 0.4644)
    .. controls ( 0.5022, 0.4349) and ( 0.5312, 0.3332) .. ( 0.5982, 0.3551)
    .. controls ( 0.6173, 0.3612) and ( 0.6614, 0.3963) .. ( 0.6651, 0.4168)
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    .. controls ( 0.6700, 0.4432) and ( 0.6406, 0.5019) .. ( 0.6149, 0.5105)
    .. controls ( 0.6066, 0.5139) and ( 0.6003, 0.5146) .. ( 0.5940, 0.5141)
    --cycle
    ( 0.0525, 0.5036)
    .. controls ( 0.0223, 0.5016) and ( 0.0014, 0.4715) .. (-0.0147, 0.4493)
    .. controls (-0.0480, 0.4823) and (-0.1271, 0.5502) .. (-0.1240, 0.4493)
    -- (-0.0819, 0.4661)
    .. controls (-0.0631, 0.4289) and ( 0.0054, 0.3259) .. ( 0.0443, 0.3176)
    .. controls ( 0.1031, 0.3051) and ( 0.1431, 0.3862) .. ( 0.0694, 0.3989)
    .. controls ( 0.0551, 0.3118) and ( 0.0044, 0.4056) .. ( 0.0316, 0.4326)
    .. controls ( 0.0741, 0.4748) and ( 0.1233, 0.3699) .. ( 0.1388, 0.4261)
    .. controls ( 0.1477, 0.4584) and ( 0.0813, 0.5057) .. ( 0.0525, 0.5036)
    --cycle
    ( 0.6073, 0.4745)
    -- ( 0.6242, 0.4241)
    -- ( 0.5569, 0.3989)
    -- ( 0.5569, 0.4493)
    --cycle
    (-0.3498, 0.4626)
    .. controls (-0.3744, 0.4586) and (-0.3998, 0.4069) .. (-0.3941, 0.3847)
    .. controls (-0.3893, 0.3661) and (-0.3650, 0.3651) .. (-0.3503, 0.3798)
    -- (-0.3257, 0.4157)
    .. controls (-0.3295, 0.3698) and (-0.2940, 0.3485) .. (-0.2697, 0.3592)
    .. controls (-0.2492, 0.3684) and (-0.2611, 0.3898) .. (-0.2697, 0.4024)
    .. controls (-0.2865, 0.4277) and (-0.3149, 0.4682) .. (-0.3498, 0.4626)
    --cycle
    ( 0.7488, 0.4472)
    .. controls ( 0.7446, 0.4429) and ( 0.7413, 0.4378) .. ( 0.7395, 0.4315)
    .. controls ( 0.7338, 0.4111) and ( 0.7612, 0.3277) .. ( 0.8087, 0.3352)
    .. controls ( 0.8094, 0.3354) and ( 0.8102, 0.3361) .. ( 0.8109, 0.3364)
    --cycle
    (-0.1492, 0.4409)
    .. controls (-0.1577, 0.3701) and (-0.1298, 0.3577) .. (-0.0651, 0.3568)
    .. controls (-0.0461, 0.3027) and (-0.0025, 0.3462) .. (-0.0567, 0.3652)
    -- (-0.0567, 0.3568)
    -- (-0.0651, 0.3652)
    -- (-0.0567, 0.3652)
    -- (-0.0567, 0.3989)
    -- (-0.0988, 0.3905)
    .. controls (-0.1116, 0.4252) and (-0.1112, 0.4344) .. (-0.1492, 0.4409)
    --cycle
    ( 0.2869, 0.4351)
    .. controls ( 0.2475, 0.4293) and ( 0.2234, 0.3681) .. ( 0.2795, 0.3485)
    -- ( 0.3048, 0.3905)
    .. controls ( 0.3028, 0.3760) and ( 0.3013, 0.3442) .. ( 0.3278, 0.3583)
    .. controls ( 0.3557, 0.3731) and ( 0.3437, 0.4227) .. ( 0.3046, 0.4338)
    .. controls ( 0.2985, 0.4356) and ( 0.2925, 0.4359) .. ( 0.2869, 0.4351)
    --cycle
    (-0.5352, 0.4038)
    .. controls (-0.5519, 0.4042) and (-0.5689, 0.3932) .. (-0.5778, 0.3652)
    -- (-0.5358, 0.3652)
    -- (-0.5442, 0.3149)
    -- (-0.6030, 0.3401)
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    .. controls (-0.6099, 0.3078) and (-0.5933, 0.2580) .. (-0.5523, 0.2636)
    .. controls (-0.5251, 0.2673) and (-0.4980, 0.3070) .. (-0.4910, 0.3316)
    .. controls (-0.4799, 0.3705) and (-0.5072, 0.4030) .. (-0.5352, 0.4038)
    --cycle
    ( 0.4056, 0.3989)
    .. controls ( 0.4011, 0.3650) and ( 0.4064, 0.3627) .. ( 0.4392, 0.3568)
    .. controls ( 0.4340, 0.3865) and ( 0.4336, 0.3876) .. ( 0.4056, 0.3989)
    --cycle
    (-0.2248, 0.3737)
    -- (-0.2164, 0.3401)
    -- (-0.1828, 0.3568)
    --cycle
    ( 0.4558, 0.3414)
    .. controls ( 0.4424, 0.3419) and ( 0.4339, 0.3363) .. ( 0.4224, 0.3316)
    -- ( 0.4340, 0.2885)
    .. controls ( 0.4635, 0.2154) and ( 0.5405, 0.3381) .. ( 0.4558, 0.3414)
    --cycle
    (-0.3179, 0.3382)
    .. controls (-0.3270, 0.3401) and (-0.3357, 0.3403) .. (-0.3425, 0.3381)
    .. controls (-0.3762, 0.3275) and (-0.3957, 0.2970) .. (-0.4013, 0.2644)
    -- (-0.3341, 0.2892)
    .. controls (-0.3207, 0.2121) and (-0.2456, 0.2402) .. (-0.2545, 0.2892)
    .. controls (-0.2586, 0.3110) and (-0.2906, 0.3324) .. (-0.3179, 0.3382)
    --cycle
    ( 0.3611, 0.3359)
    .. controls ( 0.3110, 0.3372) and ( 0.2179, 0.3015) .. ( 0.2626, 0.2392)
    -- ( 0.2207, 0.2056)
    -- ( 0.2123, 0.2308)
    -- ( 0.1955, 0.2308)
    .. controls ( 0.1691, 0.1342) and ( 0.2461, 0.1660) .. ( 0.2711, 0.1678)
    .. controls ( 0.3105, 0.1704) and ( 0.3525, 0.1635) .. ( 0.3836, 0.2013)
    .. controls ( 0.4000, 0.2213) and ( 0.3935, 0.2469) .. ( 0.3552, 0.2434)
    .. controls ( 0.3256, 0.2408) and ( 0.3193, 0.2282) .. ( 0.3048, 0.2056)
    .. controls ( 0.2927, 0.2510) and ( 0.2970, 0.2476) .. ( 0.3131, 0.2897)
    -- ( 0.3552, 0.2728)
    -- ( 0.3636, 0.2980)
    -- ( 0.3719, 0.2644)
    .. controls ( 0.4287, 0.2825) and ( 0.4092, 0.3226) .. ( 0.3795, 0.3331)
    .. controls ( 0.3746, 0.3349) and ( 0.3683, 0.3357) .. ( 0.3611, 0.3359)
    --cycle
    (-0.7326, 0.3304)
    .. controls (-0.7558, 0.2996) and (-0.7303, 0.2839) .. (-0.7147, 0.2917)
    .. controls (-0.6982, 0.3000) and (-0.6941, 0.3349) .. (-0.7326, 0.3304)
    --cycle
    ( 0.5316, 0.3064)
    .. controls ( 0.5417, 0.2779) and ( 0.5439, 0.2772) .. ( 0.5737, 0.2813)
    .. controls ( 0.5591, 0.3056) and ( 0.5600, 0.3049) .. ( 0.5316, 0.3064)
    --cycle
    ( 0.7063, 0.2870)
    .. controls ( 0.6995, 0.2880) and ( 0.6923, 0.2874) .. ( 0.6840, 0.2844)
    .. controls ( 0.6531, 0.2731) and ( 0.6307, 0.2270) .. ( 0.6242, 0.1972)
    -- ( 0.6914, 0.2056)
    -- ( 0.6914, 0.2475)
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    -- ( 0.7166, 0.2139)
    -- ( 0.7670, 0.2224)
    -- ( 0.7670, 0.1887)
    -- ( 0.8091, 0.1804)
    -- ( 0.7755, 0.1047)
    -- ( 0.8343, 0.1131)
    .. controls ( 0.8409, 0.1435) and ( 0.8409, 0.1473) .. ( 0.8679, 0.1636)
    .. controls ( 0.8652, 0.1490) and ( 0.8470, 0.0581) .. ( 0.8896, 0.0809)
    .. controls ( 0.9211, 0.0965) and ( 0.9103, 0.1720) .. ( 0.8896, 0.1909)
    .. controls ( 0.8668, 0.2094) and ( 0.8421, 0.2029) .. ( 0.8174, 0.1972)
    .. controls ( 0.8135, 0.2098) and ( 0.8137, 0.2162) .. ( 0.8041, 0.2272)
    .. controls ( 0.7922, 0.2408) and ( 0.7748, 0.2458) .. ( 0.7601, 0.2552)
    .. controls ( 0.7419, 0.2667) and ( 0.7266, 0.2841) .. ( 0.7063, 0.2870)
    --cycle
    ( 0.6242, 0.1972)
    .. controls ( 0.6061, 0.1985) and ( 0.5845, 0.2023) .. ( 0.5690, 0.1902)
    .. controls ( 0.5426, 0.1695) and ( 0.5550, 0.1248) .. ( 0.5909, 0.1110)
    .. controls ( 0.6168, 0.1011) and ( 0.6421, 0.1125) .. ( 0.6679, 0.1215)
    .. controls ( 0.6663, 0.1076) and ( 0.6658, 0.0850) .. ( 0.6679, 0.0720)
    .. controls ( 0.6961,-0.0135) and ( 0.8163, 0.0895) .. ( 0.7250, 0.1215)
    -- ( 0.6998, 0.0795)
    -- ( 0.7166, 0.1299)
    -- ( 0.6830, 0.1804)
    -- ( 0.6578, 0.1636)
    --cycle
    ( 0.0950, 0.2671)
    .. controls ( 0.0367, 0.2427) and ( 0.0851, 0.1985) .. ( 0.1112, 0.2040)
    .. controls ( 0.1427, 0.2110) and ( 0.1597, 0.2672) .. ( 0.0950, 0.2671)
    --cycle
    (-0.0988, 0.2609)
    .. controls (-0.1426, 0.2672) and (-0.2761, 0.1879) .. (-0.1828, 0.1551)
    -- (-0.1743, 0.1972)
    -- (-0.1240, 0.1804)
    -- (-0.0904, 0.2308)
    -- (-0.1071, 0.1720)
    .. controls (-0.0221, 0.1543) and (-0.0435, 0.2528) .. (-0.0988, 0.2609)
    --cycle
    (-0.8142, 0.2071)
    .. controls (-0.8258, 0.2070) and (-0.8375, 0.2012) .. (-0.8466, 0.1869)
    .. controls (-0.8534, 0.1760) and (-0.8533, 0.1669) .. (-0.8551, 0.1551)
    -- (-0.7963, 0.1636)
    -- (-0.8132, 0.1215)
    .. controls (-0.8020, 0.1234) and (-0.7923, 0.1232) .. (-0.7821, 0.1301)
    .. controls (-0.7447, 0.1557) and (-0.7793, 0.2072) .. (-0.8142, 0.2071)
    --cycle
    (-0.2584, 0.2056)
    -- (-0.2584, 0.1636)
    .. controls (-0.2445, 0.1848) and (-0.2445, 0.1843) .. (-0.2584, 0.2056)
    --cycle
    (-0.7132, 0.1953)
    .. controls (-0.7373, 0.1910) and (-0.7568, 0.1647) .. (-0.7459, 0.1215)
    -- (-0.6955, 0.1551)
    .. controls (-0.7015, 0.1043) and (-0.7057, 0.0835) .. (-0.6450, 0.0963)
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    -- (-0.6535, 0.0711)
    .. controls (-0.5898, 0.0580) and (-0.5907, 0.1071) .. (-0.6081, 0.1249)
    .. controls (-0.6203, 0.1374) and (-0.6375, 0.1370) .. (-0.6535, 0.1383)
    .. controls (-0.6607, 0.1823) and (-0.6892, 0.1997) .. (-0.7132, 0.1953)
    --cycle
    (-0.4097, 0.1720)
    -- (-0.3845, 0.1215)
    -- (-0.4097, 0.0963)
    -- (-0.4349, 0.1047)
    .. controls (-0.4598,-0.0134) and (-0.2772, 0.1076) .. (-0.3690, 0.1621)
    .. controls (-0.3821, 0.1699) and (-0.3951, 0.1703) .. (-0.4097, 0.1720)
    --cycle
    ( 0.4374, 0.1711)
    .. controls ( 0.4200, 0.1682) and ( 0.4016, 0.1543) .. ( 0.3888, 0.1299)
    -- ( 0.4477, 0.1299)
    .. controls ( 0.4703, 0.1056) and ( 0.4891, 0.1252) .. ( 0.4798, 0.1463)
    .. controls ( 0.4711, 0.1661) and ( 0.4548, 0.1741) .. ( 0.4374, 0.1711)
    --cycle
    (-0.4594, 0.1707)
    .. controls (-0.4648, 0.1719) and (-0.4705, 0.1718) .. (-0.4752, 0.1698)
    .. controls (-0.4878, 0.1646) and (-0.4954, 0.1508) .. (-0.4982, 0.1382)
    .. controls (-0.5096, 0.0875) and (-0.4448, 0.0609) .. (-0.4602, 0.1299)
    .. controls (-0.4304, 0.1504) and (-0.4433, 0.1669) .. (-0.4594, 0.1707)
    --cycle
    (-0.0230, 0.1592)
    .. controls (-0.0727, 0.1609) and (-0.0799, 0.1002) .. (-0.1492, 0.0795)
    -- (-0.1576, 0.0374)
    .. controls (-0.1940, 0.0779) and (-0.1965, 0.0894) .. (-0.2500, 0.0711)
    -- (-0.2584, 0.0795)
    -- (-0.2332, 0.1383)
    .. controls (-0.2779, 0.1347) and (-0.3158, 0.0997) .. (-0.2855, 0.0563)
    .. controls (-0.2695, 0.0332) and (-0.2481, 0.0337) .. (-0.2256, 0.0248)
    .. controls (-0.1803, 0.0069) and (-0.1541,-0.0311) .. (-0.1155, 0.0290)
    .. controls (-0.0607, 0.0067) and (-0.0553,-0.0150) .. (-0.0307,-0.0232)
    .. controls ( 0.0157,-0.0389) and ( 0.0524, 0.0035) .. ( 0.0442, 0.0543)
    .. controls ( 0.0843, 0.0613) and ( 0.1010, 0.0937) .. ( 0.0727, 0.1263)
    .. controls ( 0.0598, 0.1414) and (-0.0030, 0.1586) .. (-0.0230, 0.1592)
    --cycle
    (-0.0230, 0.1215)
    -- ( 0.0442, 0.1131)
    .. controls ( 0.0289, 0.0705) and ( 0.0228, 0.0356) .. (-0.0230, 0.0207)
    .. controls (-0.0339, 0.0543) and (-0.0383, 0.0572) .. (-0.0735, 0.0543)
    -- (-0.0819, 0.0627)
    --cycle
    (-0.8973, 0.1131)
    .. controls (-0.9051, 0.0492) and (-0.8679, 0.0676) .. (-0.8321, 0.0457)
    .. controls (-0.7996, 0.0258) and (-0.7906,-0.0272) .. (-0.7039,-0.0046)
    .. controls (-0.6977,-0.0167) and (-0.6964,-0.0237) .. (-0.6846,-0.0331)
    .. controls (-0.6146,-0.0891) and (-0.5741, 0.0485) .. (-0.6619, 0.0396)
    .. controls (-0.6723, 0.0384) and (-0.6856, 0.0326) .. (-0.6955, 0.0290)
    .. controls (-0.7145, 0.0487) and (-0.7442, 0.0435) .. (-0.7712, 0.0459)
    -- (-0.7771, 0.0746)
    --cycle
```

```
    ( 0.7839, 0.0627)
    .. controls ( 0.7798, 0.0513) and ( 0.7748, 0.0421) .. ( 0.7752, 0.0292)
    .. controls ( 0.7776,-0.0409) and ( 0.8888, 0.0073) .. ( 0.8169, 0.0493)
    .. controls ( 0.8064, 0.0555) and ( 0.7952, 0.0587) .. ( 0.7839, 0.0627)
    --cycle
    ( 0.6399, 0.0543)
    .. controls ( 0.6341, 0.0555) and ( 0.6275, 0.0553) .. ( 0.6207, 0.0536)
    .. controls ( 0.5899, 0.0092) and ( 0.6489,-0.0145) .. ( 0.6606, 0.0149)
    .. controls ( 0.6690, 0.0359) and ( 0.6576, 0.0510) .. ( 0.6399, 0.0543)
    --cycle
    ( 0.2228, 0.0528)
    .. controls ( 0.1887, 0.0319) and ( 0.2131,-0.0076) .. ( 0.2361,-0.0078)
    .. controls ( 0.2619,-0.0080) and ( 0.2726, 0.0432) .. ( 0.2228, 0.0528)
    --cycle
    ( 0.4509, 0.0479)
    .. controls ( 0.4394, 0.0460) and ( 0.4290, 0.0332) .. ( 0.4224, 0.0038)
    .. controls ( 0.3826, 0.0304) and ( 0.3797, 0.0371) .. ( 0.3300, 0.0301)
    .. controls ( 0.3175, 0.0283) and ( 0.3021, 0.0266) .. ( 0.2915, 0.0192)
    .. controls ( 0.2691, 0.0036) and ( 0.2444,-0.0690) .. ( 0.3552,-0.0718)
    -- ( 0.3131,-0.0046)
    .. controls ( 0.3436,-0.0165) and ( 0.3418,-0.0171) .. ( 0.3719,-0.0046)
    .. controls ( 0.3961,-0.0513) and ( 0.4113,-0.0431) .. ( 0.4560,-0.0298)
    -- ( 0.4560, 0.0038)
    -- ( 0.4812,-0.0466)
    .. controls ( 0.4281,-0.0863) and ( 0.4953,-0.1091) .. ( 0.5137,-0.0706)
    .. controls ( 0.5296,-0.0376) and ( 0.4853, 0.0538) .. ( 0.4509, 0.0479)
    --cycle
    (-0.9381, 0.0440)
    .. controls (-0.9573, 0.0465) and (-0.9752, 0.0361) .. (-0.9800, 0.0016)
    -- (-0.9774,-0.0032)
    -- (-0.9308, 0.0123)
    .. controls (-0.9260, 0.0012) and (-0.9218,-0.0135) .. (-0.9103,-0.0200)
    .. controls (-0.8939,-0.0290) and (-0.8783,-0.0112) .. (-0.8895, 0.0115)
    .. controls (-0.8962, 0.0252) and (-0.9176, 0.0414) .. (-0.9381, 0.0440)
    --cycle
    ( 0.9435, 0.0207)
    -- ( 0.9184, 0.0123)
    -- ( 0.9435,-0.0046)
    --cycle
    ( 0.8999,-0.0129)
    .. controls ( 0.9000,-0.0216) and ( 0.8974,-0.0282) .. ( 0.8999,-0.0376)
    .. controls ( 0.9043,-0.0955) and ( 0.9800,-0.0453) .. ( 0.9254,-0.0191)
    .. controls ( 0.9173,-0.0151) and ( 0.9098,-0.0148) .. ( 0.8999,-0.0129)
    --cycle
    (-0.5187,-0.0249)
    .. controls (-0.5448,-0.0284) and (-0.5586,-0.0592) .. (-0.5611,-0.0886)
    -- (-0.5022,-0.0718)
    .. controls (-0.5038,-0.1199) and (-0.4832,-0.1244) .. (-0.4434,-0.1054)
    -- (-0.4349,-0.1139)
    -- (-0.5106,-0.1811)
    -- (-0.5442,-0.1475)
    -- (-0.5274,-0.1139)
    .. controls (-0.5482,-0.1103) and (-0.5717,-0.1068) .. (-0.5806,-0.1326)
```

```
    .. controls (-0.5943,-0.1714) and (-0.5235,-0.2179) .. (-0.5014,-0.2194)
    .. controls (-0.4612,-0.2223) and (-0.4187,-0.1658) .. (-0.4108,-0.1306)
    .. controls (-0.4075,-0.1185) and (-0.4054,-0.1026) .. (-0.4108,-0.0911)
    .. controls (-0.4193,-0.0753) and (-0.4422,-0.0688) .. (-0.4571,-0.0576)
    -- (-0.4884,-0.0315)
    .. controls (-0.4999,-0.0256) and (-0.5100,-0.0237) .. (-0.5187,-0.0249)
    --cycle
    ( 0.2098,-0.0382)
    .. controls ( 0.1959,-0.0434) and ( 0.1851,-0.0663) .. ( 0.1925,-0.0882)
    .. controls ( 0.2035,-0.1206) and ( 0.2830,-0.1639) .. ( 0.2964,-0.0882)
    .. controls ( 0.2773,-0.0896) and ( 0.2586,-0.0934) .. ( 0.2447,-0.0768)
    .. controls ( 0.2363,-0.0666) and ( 0.2352,-0.0463) .. ( 0.2242,-0.0396)
    .. controls ( 0.2194,-0.0367) and ( 0.2145,-0.0365) .. ( 0.2098,-0.0382)
    --cycle
    (-0.2960,-0.0452)
    .. controls (-0.3231,-0.0465) and (-0.3530,-0.0602) .. (-0.3592,-0.0683)
    .. controls (-0.3758,-0.0903) and (-0.3560,-0.1221) .. (-0.3845,-0.1979)
    -- (-0.4013,-0.1727)
    -- (-0.4182,-0.1727)
    .. controls (-0.4336,-0.2291) and (-0.4124,-0.2782) .. (-0.3803,-0.2577)
    .. controls (-0.3601,-0.2446) and (-0.3538,-0.2099) .. (-0.3392,-0.1970)
    .. controls (-0.3137,-0.1743) and (-0.2596,-0.2064) .. (-0.2752,-0.1306)
    -- (-0.3257,-0.1558)
    -- (-0.3341,-0.1475)
    -- (-0.3341,-0.0970)
    -- (-0.2500,-0.0970)
    .. controls (-0.2447,-0.0551) and (-0.2689,-0.0439) .. (-0.2960,-0.0452)
    --cycle
    ( 0.6563,-0.0662)
    .. controls ( 0.6458,-0.0662) and ( 0.6374,-0.0668) .. ( 0.6332,-0.0685)
    .. controls ( 0.5970,-0.0835) and ( 0.6057,-0.1189) .. ( 0.6332,-0.1391)
    -- ( 0.6493,-0.0970)
    -- ( 0.6662,-0.0970)
    .. controls ( 0.6850,-0.1248) and ( 0.6940,-0.1204) .. ( 0.7250,-0.1139)
    -- ( 0.7081,-0.1475)
    .. controls ( 0.7837,-0.1829) and ( 0.7876,-0.1033) .. ( 0.7490,-0.0804)
    .. controls ( 0.7374,-0.0735) and ( 0.6877,-0.0664) .. ( 0.6563,-0.0662)
    --cycle
    ( 0.7081,-0.1475)
    .. controls ( 0.6742,-0.1429) and ( 0.6720,-0.1483) .. ( 0.6662,-0.1811)
    .. controls ( 0.6162,-0.1289) and ( 0.6115,-0.1833) .. ( 0.6244,-0.2044)
    .. controls ( 0.6426,-0.2346) and ( 0.6823,-0.2320) .. ( 0.7016,-0.2044)
    .. controls ( 0.7147,-0.1858) and ( 0.7107,-0.1681) .. ( 0.7081,-0.1475)
    --cycle
    ( 0.0544,-0.0769)
    .. controls ( 0.0466,-0.0773) and ( 0.0382,-0.0797) .. ( 0.0297,-0.0845)
    -- (-0.0147,-0.1139)
    .. controls (-0.0057,-0.1396) and (-0.0069,-0.1385) .. ( 0.0189,-0.1475)
    .. controls (-0.0074,-0.2147) and ( 0.0346,-0.2081) .. ( 0.0553,-0.1870)
    .. controls ( 0.0667,-0.1752) and ( 0.0961,-0.1299) .. ( 0.0958,-0.1139)
    .. controls ( 0.0955,-0.0925) and ( 0.0776,-0.0759) .. ( 0.0544,-0.0769)
    --cycle
    ( 0.3572,-0.0881)
```

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    .. controls ( 0.3447,-0.0867) and ( 0.3392,-0.1053) .. ( 0.3450,-0.1208)
    .. controls ( 0.3587,-0.1579) and ( 0.4169,-0.1493) .. ( 0.4239,-0.1208)
    .. controls ( 0.4287,-0.1010) and ( 0.4113,-0.0745) .. ( 0.3888,-0.0970)
    -- ( 0.3719,-0.0970)
    .. controls ( 0.3663,-0.0912) and ( 0.3613,-0.0886) .. ( 0.3572,-0.0881)
    --cycle
    ( 0.7250,-0.1054)
    -- ( 0.7333,-0.1054)
    -- ( 0.7333,-0.1139)
    --cycle
    (-0.7357,-0.1221)
    .. controls (-0.7405,-0.1203) and (-0.7472,-0.1201) .. (-0.7562,-0.1227)
    .. controls (-0.7721,-0.1527) and (-0.7463,-0.1606) .. (-0.7339,-0.1532)
    .. controls (-0.7244,-0.1475) and (-0.7214,-0.1275) .. (-0.7357,-0.1221)
    --cycle
    (-0.8606,-0.1378)
    .. controls (-0.8718,-0.1386) and (-0.8832,-0.1446) .. (-0.8941,-0.1518)
    -- (-0.8728,-0.1897)
    -- (-0.8468,-0.1811)
    -- (-0.8613,-0.2102)
    -- (-0.8317,-0.2631)
    .. controls (-0.7953,-0.2270) and (-0.7967,-0.1536) .. (-0.8471,-0.1391)
    .. controls (-0.8514,-0.1378) and (-0.8560,-0.1374) .. (-0.8606,-0.1378)
    --cycle
    ( 0.9187,-0.1555)
    .. controls ( 0.9083,-0.1585) and ( 0.8971,-0.1627) .. ( 0.8847,-0.1675)
    .. controls ( 0.8669,-0.1743) and ( 0.8469,-0.1785) .. ( 0.8399,-0.1989)
    .. controls ( 0.8307,-0.2247) and ( 0.8481,-0.2329) .. ( 0.8679,-0.2399)
    -- ( 0.8847,-0.2063)
    .. controls ( 0.8863,-0.2068) and ( 0.8871,-0.2069) .. ( 0.8886,-0.2074)
    --cycle
    ( 0.8679,-0.2399)
    .. controls ( 0.8663,-0.2432) and ( 0.8651,-0.2468) .. ( 0.8637,-0.2502)
    -- ( 0.8693,-0.2405)
    .. controls ( 0.8687,-0.2402) and ( 0.8685,-0.2401) .. ( 0.8679,-0.2399)
    --cycle
    ( 0.4392,-0.1558)
    -- ( 0.4332,-0.1807)
    .. controls ( 0.4281,-0.2431) and ( 0.5089,-0.2120) .. ( 0.4618,-0.1688)
    .. controls ( 0.4519,-0.1597) and ( 0.4457,-0.1593) .. ( 0.4392,-0.1558)
    --cycle
    (-0.6846,-0.1952)
    .. controls (-0.6966,-0.1951) and (-0.7082,-0.2013) .. (-0.7157,-0.2171)
    .. controls (-0.7203,-0.2268) and (-0.7199,-0.2378) .. (-0.7207,-0.2483)
    -- (-0.6787,-0.2399)
    -- (-0.6703,-0.2735)
    .. controls (-0.6096,-0.2523) and (-0.6488,-0.1955) .. (-0.6846,-0.1952)
    --cycle
    (-0.1120,-0.2035)
    .. controls (-0.1188,-0.2048) and (-0.1255,-0.2071) .. (-0.1323,-0.2089)
    .. controls (-0.1785,-0.2217) and (-0.2021,-0.2285) .. (-0.1912,-0.2819)
    -- (-0.0988,-0.2483)
    -- (-0.0651,-0.2740)
```

```
    .. controls (-0.0333,-0.3228) and (-0.0165,-0.2917) .. (-0.0209,-0.2740)
    .. controls (-0.0243,-0.2616) and (-0.0384,-0.2481) .. (-0.0474,-0.2386)
    .. controls (-0.0590,-0.2264) and (-0.0744,-0.2085) .. (-0.0911,-0.2040)
    .. controls (-0.0982,-0.2021) and (-0.1052,-0.2023) .. (-0.1120,-0.2035)
    --cycle
    ( 0.1647,-0.2053)
    .. controls ( 0.1471,-0.2058) and ( 0.1297,-0.2092) .. ( 0.1164,-0.2148)
    .. controls ( 0.0833,-0.2632) and ( 0.1207,-0.3872) .. ( 0.1933,-0.3346)
    .. controls ( 0.2031,-0.3275) and ( 0.2109,-0.3165) .. ( 0.2178,-0.3068)
    .. controls ( 0.2722,-0.2297) and ( 0.2177,-0.2039) .. ( 0.1647,-0.2053)
    --cycle
    ( 0.3262,-0.2328)
    .. controls ( 0.3073,-0.2617) and ( 0.3314,-0.2707) .. ( 0.3420,-0.2638)
    .. controls ( 0.3522,-0.2572) and ( 0.3585,-0.2285) .. ( 0.3262,-0.2328)
    --cycle
    ( 0.1534,-0.2399)
    -- ( 0.2039,-0.2483)
    -- ( 0.1534,-0.2987)
    --cycle
    ( 0.5217,-0.2636)
    .. controls ( 0.5071,-0.2632) and ( 0.4918,-0.2708) .. ( 0.4798,-0.2909)
    .. controls ( 0.4713,-0.3051) and ( 0.4736,-0.3094) .. ( 0.4728,-0.3240)
    -- ( 0.4812,-0.3240)
    -- ( 0.4812,-0.3324)
    -- ( 0.5232,-0.2987)
    -- ( 0.5232,-0.3492)
    .. controls ( 0.6028,-0.3358) and ( 0.5655,-0.2645) .. ( 0.5217,-0.2636)
    --cycle
    ( 0.4812,-0.3324)
    -- ( 0.4728,-0.3240)
    .. controls ( 0.4525,-0.3209) and ( 0.4056,-0.3074) .. ( 0.3892,-0.3106)
    .. controls ( 0.3596,-0.3163) and ( 0.3503,-0.3437) .. ( 0.3892,-0.3660)
    -- ( 0.3972,-0.3407)
    .. controls ( 0.4281,-0.3611) and ( 0.4279,-0.3612) .. ( 0.4644,-0.3576)
    -- ( 0.4560,-0.4080)
    .. controls ( 0.5104,-0.3986) and ( 0.5053,-0.3736) .. ( 0.4812,-0.3324)
    --cycle
    ( 0.7282,-0.2775)
    .. controls ( 0.7176,-0.2768) and ( 0.7066,-0.2782) .. ( 0.6965,-0.2822)
    .. controls ( 0.6458,-0.3532) and ( 0.7574,-0.3899) .. ( 0.7782,-0.3306)
    .. controls ( 0.7887,-0.3013) and ( 0.7602,-0.2797) .. ( 0.7282,-0.2775)
    --cycle
    (-0.2465,-0.2903)
    .. controls (-0.2987,-0.3042) and (-0.2344,-0.4071) .. (-0.2306,-0.4102)
    .. controls (-0.1938,-0.4396) and (-0.1663,-0.4010) .. (-0.1299,-0.4027)
    .. controls (-0.1140,-0.4034) and (-0.0666,-0.4182) .. (-0.0557,-0.3820)
    .. controls (-0.0504,-0.3644) and (-0.0676,-0.3334) .. (-0.0988,-0.3744)
    -- (-0.1181,-0.3407)
    -- (-0.1308,-0.3168)
    .. controls (-0.1675,-0.2582) and (-0.1759,-0.3435) .. (-0.1781,-0.3492)
    .. controls (-0.1841,-0.3653) and (-0.1898,-0.3700) .. (-0.1996,-0.3828)
    -- (-0.2164,-0.2903)
    .. controls (-0.2291,-0.2881) and (-0.2389,-0.2883) .. (-0.2465,-0.2903)
```

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--cycle
(-0.5947,-0.3156)
-- (-0.6030,-0.3407)
-- (-0.5778,-0.3240)
--cycle
(-0.0014,-0.3194)
.. controls (-0.0278,-0.3131) and (-0.0544,-0.3497) .. (-0.0058,-0.3694)
.. controls ( 0.0049,-0.3738) and ( 0.0162,-0.3735) .. ( 0.0273,-0.3744)
.. controls ( 0.0265,-0.3636) and ( 0.0269,-0.3522) .. ( 0.0223,-0.3420)
.. controls ( 0.0163,-0.3283) and ( 0.0074,-0.3214) .. (-0.0014,-0.3194)
--cycle
(-0.6508,-0.3284)
.. controls (-0.6656,-0.3290) and (-0.6816,-0.3373) .. (-0.6955,-0.3576)
.. controls (-0.7159,-0.3441) and (-0.7363,-0.3292) .. (-0.7624,-0.3378)
.. controls (-0.7705,-0.3405) and (-0.7771,-0.3450) .. (-0.7829,-0.3501)
-- (-0.7599,-0.3912)
-- (-0.7543,-0.3744)
-- (-0.6619,-0.4164)
-- (-0.6619,-0.3660)
-- (-0.6367,-0.4164)
.. controls (-0.5723,-0.3945) and (-0.6064,-0.3266) .. (-0.6508,-0.3284)
--cycle
(-0.5287,-0.3512)
.. controls (-0.5489,-0.3498) and (-0.5690,-0.3591) .. (-0.5764,-0.3751)
.. controls (-0.5966,-0.4192) and (-0.5398,-0.3912) .. (-0.5274,-0.3828)
-- (-0.5190,-0.4500)
-- (-0.5358,-0.4333)
-- (-0.5358,-0.4248)
-- (-0.5611,-0.4248)
.. controls (-0.5664,-0.4641) and (-0.5605,-0.4735) .. (-0.5442,-0.5088)
-- (-0.5274,-0.5088)
.. controls (-0.4972,-0.4701) and (-0.4647,-0.4466) .. (-0.4806,-0.3915)
.. controls (-0.4882,-0.3649) and (-0.5085,-0.3527) .. (-0.5287,-0.3512)
--cycle
( 0.5485,-0.3594)
.. controls ( 0.5504,-0.3686) and ( 0.5513,-0.3797) .. ( 0.5560,-0.3899)
.. controls ( 0.5831,-0.4490) and ( 0.6446,-0.3809) .. ( 0.5811,-0.3594)
.. controls ( 0.5706,-0.3579) and ( 0.5594,-0.3583) .. ( 0.5485,-0.3594)
--cycle
( 0.3311,-0.3646)
.. controls ( 0.3201,-0.3659) and ( 0.3103,-0.3791) .. ( 0.3084,-0.3917)
.. controls ( 0.3035,-0.4255) and ( 0.3481,-0.5315) .. ( 0.4140,-0.4669)
.. controls ( 0.4439,-0.4932) and ( 0.4962,-0.5278) .. ( 0.5388,-0.5107)
.. controls ( 0.5684,-0.4989) and ( 0.5806,-0.4516) .. ( 0.5232,-0.4333)
-- ( 0.5232,-0.4669)
.. controls ( 0.4932,-0.4550) and ( 0.4949,-0.4563) .. ( 0.4644,-0.4669)
-- ( 0.4560,-0.4248)
-- ( 0.4224,-0.4417)
-- ( 0.3888,-0.4080)
-- ( 0.3617,-0.4500)
-- ( 0.3617,-0.4080)
.. controls ( 0.3546,-0.3735) and ( 0.3422,-0.3632) .. ( 0.3311,-0.3646)
--cycle
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    ( 0.0862,-0.3828)
    .. controls ( 0.0086,-0.4104) and ( 0.1258,-0.4856) .. ( 0.1453,-0.4236)
    .. controls ( 0.1495,-0.4116) and ( 0.1465,-0.4028) .. ( 0.1453,-0.3912)
    -- ( 0.0946,-0.4080)
    --cycle
    (-0.3761,-0.4056)
    .. controls (-0.4460,-0.4310) and (-0.4022,-0.4833) .. (-0.3686,-0.4756)
    .. controls (-0.3385,-0.4686) and (-0.3150,-0.4102) .. (-0.3761,-0.4056)
    --cycle
    (-0.1407,-0.4164)
    .. controls (-0.1510,-0.4360) and (-0.1606,-0.4518) .. (-0.1524,-0.4748)
    .. controls (-0.1401,-0.5093) and (-0.0958,-0.5218) .. (-0.0687,-0.4961)
    .. controls (-0.0363,-0.4652) and (-0.0685,-0.4086) .. (-0.0988,-0.4753)
    --cycle
    (-0.7345,-0.4223)
    .. controls (-0.7375,-0.4223) and (-0.7393,-0.4233) .. (-0.7417,-0.4237)
    -- (-0.7259,-0.4519)
    -- (-0.7123,-0.4248)
    .. controls (-0.7212,-0.4230) and (-0.7284,-0.4222) .. (-0.7345,-0.4223)
    --cycle
    (-0.6450,-0.4333)
    -- (-0.6283,-0.4753)
    -- (-0.6959,-0.5053)
    -- (-0.6728,-0.5467)
    .. controls (-0.6597,-0.5415) and (-0.6464,-0.5310) .. (-0.6353,-0.5238)
    .. controls (-0.6229,-0.5161) and (-0.6029,-0.5082) .. (-0.5949,-0.4962)
    .. controls (-0.5673,-0.4552) and (-0.6118,-0.4359) .. (-0.6450,-0.4333)
    --cycle
    ( 0.7515,-0.4421)
    .. controls ( 0.7404,-0.4518) and ( 0.7330,-0.4660) .. ( 0.7289,-0.4814)
    -- ( 0.7518,-0.4421)
    .. controls ( 0.7518,-0.4422) and ( 0.7516,-0.4421) .. ( 0.7515,-0.4421)
    --cycle
    (-0.7203,-0.4618)
    -- (-0.7004,-0.4973)
    .. controls (-0.6944,-0.4774) and (-0.6993,-0.4695) .. (-0.7203,-0.4618)
    --cycle
    ( 0.1694,-0.4873)
    .. controls ( 0.1182,-0.4851) and ( 0.0606,-0.5165) .. ( 0.1114,-0.5509)
    .. controls ( 0.1043,-0.5681) and ( 0.0968,-0.5809) .. ( 0.1030,-0.6004)
    .. controls ( 0.1160,-0.6424) and ( 0.2092,-0.6560) .. ( 0.1955,-0.5761)
    -- ( 0.1450,-0.6013)
    -- ( 0.1199,-0.5425)
    -- ( 0.1282,-0.5341)
    .. controls ( 0.1602,-0.5459) and ( 0.1584,-0.5438) .. ( 0.1871,-0.5257)
    .. controls ( 0.1977,-0.5856) and ( 0.2311,-0.5564) .. ( 0.2301,-0.5337)
    .. controls ( 0.2287,-0.5019) and ( 0.2002,-0.4885) .. ( 0.1694,-0.4873)
    --cycle
    ( 0.3143,-0.5168)
    .. controls ( 0.2653,-0.5233) and ( 0.3123,-0.5809) .. ( 0.3334,-0.5398)
    .. controls ( 0.3375,-0.5319) and ( 0.3370,-0.5251) .. ( 0.3384,-0.5168)
    --cycle
    ( 0.5821,-0.5172)
```

```
    -- ( 0.5905,-0.5425)
    .. controls ( 0.5223,-0.5546) and ( 0.5461,-0.6299) .. ( 0.5965,-0.6187)
    .. controls ( 0.6116,-0.6153) and ( 0.6642,-0.5952) .. ( 0.6693,-0.5808)
    .. controls ( 0.6859,-0.5354) and ( 0.6147,-0.5138) .. ( 0.5821,-0.5172)
    --cycle
    (-0.2667,-0.5315)
    .. controls (-0.3091,-0.5364) and (-0.3818,-0.5868) .. (-0.3173,-0.6098)
    .. controls (-0.3409,-0.7049) and (-0.2257,-0.7182) .. (-0.2332,-0.6265)
    -- (-0.2752,-0.6434)
    -- (-0.3173,-0.6013)
    .. controls (-0.2964,-0.5962) and (-0.2716,-0.5851) .. (-0.2511,-0.5945)
    .. controls (-0.2356,-0.6015) and (-0.2239,-0.6203) .. (-0.2131,-0.6252)
    .. controls (-0.1929,-0.6345) and (-0.1822,-0.6134) .. (-0.1883,-0.5942)
    .. controls (-0.1944,-0.5749) and (-0.2315,-0.5384) .. (-0.2508,-0.5323)
    .. controls (-0.2552,-0.5310) and (-0.2606,-0.5308) .. (-0.2667,-0.5315)
    --cycle
    ( 0.5989,-0.5509)
    -- ( 0.6073,-0.5509)
    -- ( 0.6073,-0.5593)
    --cycle
    (-0.0485,-0.5624)
    .. controls (-0.0662,-0.5623) and (-0.0842,-0.5741) .. (-0.0904,-0.6098)
    -- (-0.0483,-0.6013)
    .. controls (-0.0229,-0.6296) and ( 0.0007,-0.6067) .. (-0.0083,-0.5860)
    .. controls (-0.0134,-0.5744) and (-0.0308,-0.5625) .. (-0.0485,-0.5624)
    --cycle
    (-0.4918,-0.5707)
    .. controls (-0.5107,-0.5708) and (-0.5309,-0.5802) .. (-0.5442,-0.6013)
    -- (-0.5778,-0.5846)
    -- (-0.5862,-0.6181)
    .. controls (-0.5249,-0.6353) and (-0.5439,-0.6523) .. (-0.4854,-0.6098)
    -- (-0.4937,-0.6770)
    -- (-0.5442,-0.6854)
    -- (-0.5442,-0.7022)
    .. controls (-0.4313,-0.7520) and (-0.4409,-0.6069) .. (-0.4465,-0.5962)
    .. controls (-0.4550,-0.5800) and (-0.4728,-0.5707) .. (-0.4918,-0.5707)
    --cycle
    ( 0.3300,-0.5846)
    -- ( 0.3300,-0.6098)
    -- ( 0.3552,-0.6098)
    -- ( 0.3552,-0.5846)
    --cycle
    ( 0.3726,-0.6221)
    .. controls ( 0.2948,-0.6226) and ( 0.2995,-0.7351) .. ( 0.3726,-0.7632)
    .. controls ( 0.4265,-0.7841) and ( 0.4818,-0.7181) .. ( 0.4056,-0.6938)
    -- ( 0.3719,-0.7275)
    -- ( 0.3719,-0.7027)
    .. controls ( 0.3796,-0.6524) and ( 0.4200,-0.6879) .. ( 0.4450,-0.6792)
    .. controls ( 0.4638,-0.6728) and ( 0.4659,-0.6470) .. ( 0.4510,-0.6352)
    .. controls ( 0.4434,-0.6293) and ( 0.3843,-0.6220) .. ( 0.3726,-0.6221)
    --cycle
    ( 0.0022,-0.6349)
    -- ( 0.0189,-0.6686)
```

```
    -- ( 0.0189,-0.6349)
    --cycle
    (-0.1244,-0.6794)
    .. controls (-0.1314,-0.6810) and (-0.1382,-0.6846) .. (-0.1441,-0.6904)
    .. controls (-0.1605,-0.7066) and (-0.1526,-0.7279) .. (-0.1607,-0.7464)
    -- (-0.1786,-0.7721)
    .. controls (-0.1852,-0.7840) and (-0.1929,-0.8079) .. (-0.1728,-0.8122)
    .. controls (-0.1636,-0.8142) and (-0.1224,-0.7844) .. (-0.1071,-0.7778)
    -- (-0.1155,-0.7106)
    -- (-0.0735,-0.7275)
    .. controls (-0.0800,-0.6898) and (-0.1033,-0.6748) .. (-0.1244,-0.6794)
    --cycle
    ( 0.1863,-0.6829)
    .. controls ( 0.1792,-0.6828) and ( 0.1712,-0.6837) .. ( 0.1618,-0.6854)
    -- ( 0.1618,-0.7022)
    -- ( 0.2123,-0.7442)
    -- ( 0.1282,-0.7190)
    .. controls ( 0.1336,-0.7372) and ( 0.1344,-0.7442) .. ( 0.1476,-0.7594)
    .. controls ( 0.1538,-0.7664) and ( 0.1626,-0.7738) .. ( 0.1704,-0.7788)
    .. controls ( 0.2127,-0.8054) and ( 0.2462,-0.7806) .. ( 0.2481,-0.7530)
    .. controls ( 0.2492,-0.7403) and ( 0.2417,-0.7279) .. ( 0.2353,-0.7175)
    .. controls ( 0.2199,-0.6926) and ( 0.2075,-0.6832) .. ( 0.1863,-0.6829)
    --cycle
    ( 0.5905,-0.6889)
    .. controls ( 0.5769,-0.6869) and ( 0.5692,-0.6908) .. ( 0.5569,-0.6938)
    -- ( 0.5569,-0.7106)
    -- ( 0.5821,-0.7190)
    .. controls ( 0.5823,-0.7234) and ( 0.5836,-0.7260) .. ( 0.5844,-0.7296)
    -- ( 0.6046,-0.6948)
    .. controls ( 0.6001,-0.6927) and ( 0.5958,-0.6898) .. ( 0.5905,-0.6889)
    --cycle
    (-0.0391,-0.7245)
    .. controls (-0.0667,-0.7229) and (-0.0839,-0.7453) .. (-0.0753,-0.7947)
    .. controls (-0.0651,-0.8529) and (-0.0367,-0.8483) .. (-0.0106,-0.8698)
    -- ( 0.0547,-0.8704)
    .. controls ( 0.0548,-0.8616) and ( 0.0567,-0.8516) .. ( 0.0610,-0.8367)
    -- ( 0.0189,-0.8367)
    .. controls ( 0.0024,-0.8190) and ( 0.0000,-0.8231) .. (-0.0230,-0.8283)
    .. controls (-0.0380,-0.7923) and (-0.0454,-0.7840) .. (-0.0399,-0.7442)
    -- (-0.0230,-0.7442)
    -- (-0.0147,-0.7778)
    -- ( 0.0694,-0.7778)
    -- ( 0.0525,-0.8199)
    -- ( 0.1424,-0.8295)
    .. controls ( 0.1612,-0.8227) and ( 0.1619,-0.8006) .. ( 0.1424,-0.7877)
    .. controls ( 0.1265,-0.7801) and ( 0.1112,-0.7837) .. ( 0.0946,-0.7877)
    .. controls ( 0.0866,-0.7388) and ( 0.0598,-0.7228) .. ( 0.0189,-0.7526)
    .. controls (-0.0021,-0.7351) and (-0.0224,-0.7255) .. (-0.0391,-0.7245)
    --cycle
    (-0.5605,-0.7471)
    -- (-0.5242,-0.8116)
    .. controls (-0.5223,-0.8116) and (-0.5211,-0.8114) .. (-0.5190,-0.8115)
    -- (-0.5201,-0.8191)
```

```
    -- (-0.4998,-0.8552)
    .. controls (-0.4770,-0.8370) and (-0.4696,-0.8098) .. (-0.4974,-0.7815)
    --cycle
    (-0.3761,-0.7611)
    -- (-0.3845,-0.7694)
    -- (-0.3845,-0.7863)
    -- (-0.3761,-0.7947)
    -- (-0.3593,-0.7947)
    -- (-0.3508,-0.7863)
    -- (-0.3508,-0.7694)
    -- (-0.3593,-0.7611)
    --cycle
    ( 0.3384,-0.8347)
    .. controls ( 0.3106,-0.8395) and ( 0.2888,-0.8533) .. ( 0.2775,-0.8723)
    -- ( 0.3442,-0.8729)
    -- ( 0.3467,-0.8702)
    -- ( 0.3561,-0.8730)
    -- ( 0.4348,-0.8736)
    .. controls ( 0.4345,-0.8731) and ( 0.4345,-0.8727) .. ( 0.4341,-0.8721)
    .. controls ( 0.4186,-0.8512) and ( 0.3640,-0.8304) .. ( 0.3384,-0.8347)
    --cycle
    (-0.0904,-0.8535)
    .. controls (-0.1018,-0.8579) and (-0.1087,-0.8586) .. (-0.1185,-0.8680)
    .. controls (-0.1188,-0.8683) and (-0.1189,-0.8687) .. (-0.1192,-0.8690)
    -- (-0.0904,-0.8692)
    --cycle
    (-0.3081,-0.8645)
    .. controls (-0.3140,-0.8641) and (-0.3192,-0.8651) .. (-0.3238,-0.8672)
    -- (-0.2954,-0.8675)
    .. controls (-0.2996,-0.8660) and (-0.3039,-0.8648) .. (-0.3081,-0.8645)
    --cycle
    ;
  }
}
\fi
```

hex/terrain/woods

The style for woods. The pattern is filled with a darker green, and outlines are not drawn.

```
\tikzset{
  hex/terrain/woods/.style={
    draw=none,
    fill={rgb,100:red,27;green,67;blue,27}
  }
}
```

hex/terrain/woods

Regular woods.

```
\ifhex@terrain@pic
\tikzset{
```

```
hex/terrain/woods/.pic={
  \path[hex/terrain/woods,pic actions,draw=none]
  (-0.2656, 0.8694)
  .. controls (-0.3133, 0.8640) and (-0.3608, 0.8400) .. (-0.3541, 0.8219)
  .. controls (-0.3417, 0.7629) and (-0.2512, 0.7779) .. (-0.2082, 0.7875)
  -- (-0.2424, 0.6937)
  .. controls (-0.2916, 0.7000) and (-0.3535, 0.6915) .. (-0.3950, 0.6606)
  .. controls (-0.4299, 0.6330) and (-0.4373, 0.5909) .. (-0.3950, 0.5657)
  .. controls (-0.4092, 0.5022) and (-0.3694, 0.4908) .. (-0.3191, 0.4633)
  .. controls (-0.3291, 0.3852) and (-0.2535, 0.3866) .. (-0.2935, 0.4633)
  .. controls (-0.2488, 0.4801) and (-0.2488, 0.5071) .. (-0.2778, 0.5156)
  .. controls (-0.2888, 0.5201) and (-0.3300, 0.5153) .. (-0.3447, 0.5156)
  -- (-0.3191, 0.6255)
  -- (-0.2680, 0.6425)
  -- (-0.2253, 0.5657)
  .. controls (-0.2136, 0.5780) and (-0.2023, 0.5853) .. (-0.2092, 0.6046)
  .. controls (-0.2132, 0.6161) and (-0.2403, 0.6366) .. (-0.2260, 0.6502)
  .. controls (-0.2044, 0.6711) and (-0.1779, 0.6203) .. (-0.1564, 0.6147)
  .. controls (-0.1363, 0.6094) and (-0.1262, 0.6240) .. (-0.1328, 0.6430)
  .. controls (-0.1449, 0.6778) and (-0.1661, 0.6737) .. (-0.1741, 0.7278)
  .. controls (-0.1213, 0.6943) and (-0.1063, 0.7287) .. (-0.1485, 0.7534)
  -- (-0.1058, 0.7875)
  -- (-0.0718, 0.7789)
  -- (-0.0633, 0.8046)
  .. controls (-0.0937, 0.8085) and (-0.0917, 0.8079) .. (-0.1143, 0.7875)
  -- (-0.1311, 0.8194)
  .. controls (-0.0764, 0.8223) and (-0.0450, 0.8485) .. (-0.0671, 0.8554)
  .. controls (-0.1156, 0.8701) and (-0.1015, 0.8233) .. (-0.1806, 0.8398)
  .. controls (-0.1900, 0.8580) and (-0.2089, 0.8664) .. (-0.2307, 0.8694)
  --cycle
  ( 0.3814, 0.8694)
  .. controls ( 0.3767, 0.8683) and ( 0.3712, 0.8666) .. ( 0.3632, 0.8643)
  -- ( 0.3974, 0.8387)
  .. controls ( 0.3974, 0.8591) and ( 0.3972, 0.8674) .. ( 0.3911, 0.8694)
  --cycle
  (-0.2452, 0.8541)
  .. controls (-0.2324, 0.8571) and (-0.2266, 0.8501) .. (-0.2079, 0.8422)
  -- (-0.2167, 0.8284)
  .. controls (-0.2397, 0.8309) and (-0.2848, 0.8202) .. (-0.2983, 0.8284)
  .. controls (-0.3215, 0.8378) and (-0.2860, 0.8342) .. (-0.2614, 0.8473)
  .. controls (-0.2547, 0.8509) and (-0.2496, 0.8531) .. (-0.2452, 0.8541)
  --cycle
  (-0.4331, 0.8427)
  .. controls (-0.4534, 0.8538) and (-0.5066, 0.7937) .. (-0.5170, 0.7773)
  .. controls (-0.5802, 0.6871) and (-0.6279, 0.5503) .. (-0.6704, 0.5650)
  .. controls (-0.6703, 0.5117) and (-0.7322, 0.4917) .. (-0.7340, 0.4547)
  .. controls (-0.7365, 0.4053) and (-0.6948, 0.3832) .. (-0.6621, 0.3593)
  .. controls (-0.6271, 0.3335) and (-0.6254, 0.2860) .. (-0.5409, 0.3014)
  -- (-0.5409, 0.3184)
  -- (-0.5750, 0.3099)
  -- (-0.5836, 0.3524)
  -- (-0.4898, 0.3184)
  -- (-0.5068, 0.3696)
```

```
    .. controls (-0.4593, 0.3586) and (-0.4552, 0.3659) .. (-0.4214, 0.3269)
    .. controls (-0.3754, 0.3528) and (-0.3794, 0.4022) .. (-0.4295, 0.4177)
    .. controls (-0.4450, 0.4224) and (-0.4931, 0.4354) .. (-0.5068, 0.4333)
    .. controls (-0.5383, 0.4284) and (-0.6200, 0.3557) .. (-0.6774, 0.4548)
    -- (-0.6432, 0.4548)
    -- (-0.6603, 0.4975)
    .. controls (-0.6019, 0.4851) and (-0.6021, 0.5053) .. (-0.5921, 0.5572)
    .. controls (-0.4969, 0.5307) and (-0.5431, 0.5224) .. (-0.4812, 0.4890)
    .. controls (-0.4749, 0.5293) and (-0.4896, 0.5637) .. (-0.5068, 0.5998)
    .. controls (-0.4948, 0.6064) and (-0.4850, 0.6107) .. (-0.4746, 0.6204)
    .. controls (-0.4177, 0.6740) and (-0.4877, 0.7151) .. (-0.5154, 0.6423)
    .. controls (-0.5225, 0.6240) and (-0.5189, 0.6174) .. (-0.5154, 0.5998)
    -- (-0.5889, 0.6190)
    .. controls (-0.5889, 0.6190) and (-0.5470, 0.6607) .. (-0.5396, 0.6879)
    .. controls (-0.5254, 0.7392) and (-0.4740, 0.7624) .. (-0.4378, 0.7960)
    .. controls (-0.4256, 0.8071) and (-0.3322, 0.7872) .. (-0.4331, 0.8427)
    --cycle
    ( 0.1374, 0.8418)
    .. controls ( 0.1320, 0.8428) and ( 0.1261, 0.8424) .. ( 0.1202, 0.8403)
    .. controls ( 0.1031, 0.8066) and ( 0.1641, 0.7460) .. ( 0.1812, 0.7545)
    .. controls ( 0.1999, 0.7639) and ( 0.1758, 0.8354) .. ( 0.1374, 0.8418)
    --cycle
    (-0.0462, 0.8217)
    -- (-0.0462, 0.7789)
    -- (-0.0121, 0.7961)
    --cycle
    ( 0.3717, 0.8217)
    -- ( 0.3717, 0.8046)
    -- ( 0.4059, 0.7961)
    -- ( 0.4144, 0.8217)
    --cycle
    ( 0.4898, 0.8122)
    .. controls ( 0.4741, 0.8124) and ( 0.4748, 0.7893) .. ( 0.4981, 0.7754)
    .. controls ( 0.5017, 0.7550) and ( 0.5313, 0.6452) .. ( 0.5686, 0.6689)
    .. controls ( 0.5928, 0.6844) and ( 0.5339, 0.7103) .. ( 0.5653, 0.7412)
    .. controls ( 0.5710, 0.7471) and ( 0.5728, 0.7507) .. ( 0.5731, 0.7536)
    -- ( 0.5703, 0.7583)
    .. controls ( 0.5582, 0.7647) and ( 0.5121, 0.7531) .. ( 0.5343, 0.7796)
    .. controls ( 0.5145, 0.8036) and ( 0.4992, 0.8122) .. ( 0.4898, 0.8122)
    --cycle
    ( 0.3291, 0.7997)
    .. controls ( 0.3112, 0.7975) and ( 0.2934, 0.7843) .. ( 0.2780, 0.7757)
    .. controls ( 0.2235, 0.7455) and ( 0.1913, 0.7199) .. ( 0.2438, 0.6595)
    .. controls ( 0.2287, 0.6542) and ( 0.2176, 0.6521) .. ( 0.2063, 0.6389)
    .. controls ( 0.1704, 0.5968) and ( 0.2192, 0.5413) .. ( 0.2430, 0.5712)
    .. controls ( 0.2494, 0.5791) and ( 0.2509, 0.6061) .. ( 0.2523, 0.6170)
    .. controls ( 0.2545, 0.6376) and ( 0.2547, 0.6388) .. ( 0.2523, 0.6595)
    -- ( 0.2865, 0.6681)
    .. controls ( 0.3094, 0.6426) and ( 0.3194, 0.6608) .. ( 0.3291, 0.6852)
    -- ( 0.2865, 0.6937)
    .. controls ( 0.3061, 0.7101) and ( 0.3276, 0.7308) .. ( 0.3547, 0.7322)
    .. controls ( 0.3792, 0.7335) and ( 0.4787, 0.6707) .. ( 0.4596, 0.7446)
    .. controls ( 0.4487, 0.7866) and ( 0.4132, 0.7751) .. ( 0.3912, 0.7800)
```

```
    .. controls ( 0.3681, 0.7853) and ( 0.3549, 0.8026) .. ( 0.3291, 0.7997)
    --cycle
    ( 0.0971, 0.7996)
    .. controls ( 0.0971, 0.7996) and (-0.0371, 0.7713) .. (-0.0393, 0.7247)
    .. controls (-0.0408, 0.6927) and ( 0.0217, 0.7175) .. ( 0.0521, 0.7277)
    .. controls ( 0.0789, 0.7366) and ( 0.0971, 0.7996) .. ( 0.0971, 0.7996)
    --cycle
    (-0.1571, 0.7961)
    -- (-0.1485, 0.7961)
    -- (-0.1485, 0.7875)
    -- (-0.1400, 0.7875)
    -- (-0.1400, 0.7789)
    -- (-0.1485, 0.7875)
    --cycle
    (-0.3689, 0.7733)
    .. controls (-0.3791, 0.7835) and (-0.4247, 0.7612) .. (-0.4247, 0.7612)
    .. controls (-0.4247, 0.7612) and (-0.4258, 0.7138) .. (-0.4104, 0.7184)
    .. controls (-0.3965, 0.7227) and (-0.3586, 0.7631) .. (-0.3689, 0.7733)
    --cycle
    ( 0.3462, 0.7278)
    -- ( 0.3462, 0.6766)
    -- ( 0.3804, 0.7107)
    --cycle
    ( 0.1142, 0.7077)
    .. controls ( 0.1016, 0.7065) and ( 0.0878, 0.7029) .. ( 0.0733, 0.6974)
    .. controls ( 0.0595, 0.6920) and ( 0.0449, 0.6883) .. ( 0.0332, 0.6789)
    .. controls ( 0.0192, 0.6678) and ( 0.0113, 0.6500) .. ( 0.0014, 0.6354)
    .. controls (-0.0079, 0.6219) and (-0.0221, 0.6074) .. (-0.0243, 0.5905)
    .. controls (-0.0267, 0.5713) and ( 0.0128, 0.4923) .. ( 0.0326, 0.4877)
    .. controls ( 0.0455, 0.4824) and ( 0.0530, 0.4866) .. ( 0.0647, 0.4877)
    .. controls ( 0.0870, 0.4591) and ( 0.0975, 0.4638) .. ( 0.1331, 0.4633)
    .. controls ( 0.1499, 0.4110) and ( 0.1908, 0.4198) .. ( 0.1671, 0.4890)
    .. controls ( 0.1267, 0.5142) and ( 0.1094, 0.5105) .. ( 0.0647, 0.4975)
    .. controls ( 0.0889, 0.5509) and ( 0.0981, 0.5486) .. ( 0.0733, 0.6084)
    .. controls ( 0.1221, 0.6144) and ( 0.1333, 0.6047) .. ( 0.1415, 0.6510)
    -- ( 0.1927, 0.6425)
    .. controls ( 0.1814, 0.6932) and ( 0.1526, 0.7111) .. ( 0.1142, 0.7077)
    --cycle
    ( 0.1671, 0.4890)
    -- ( 0.2182, 0.4890)
    .. controls ( 0.2474, 0.4580) and ( 0.2982, 0.5061) .. ( 0.2981, 0.5238)
    .. controls ( 0.2981, 0.5425) and ( 0.2721, 0.5720) .. ( 0.2418, 0.5318)
    -- ( 0.2182, 0.4975)
    .. controls ( 0.1923, 0.5152) and ( 0.1850, 0.5158) .. ( 0.1671, 0.4890)
    --cycle
    (-0.1058, 0.6937)
    -- (-0.0973, 0.6595)
    -- (-0.0802, 0.6595)
    -- (-0.0718, 0.6937)
    --cycle
    ( 0.3889, 0.6852)
    .. controls ( 0.3954, 0.6469) and ( 0.4108, 0.6416) .. ( 0.4314, 0.6766)
    --cycle
```

```
    ( 0.4826, 0.6852)
    -- ( 0.4562, 0.6475)
    .. controls ( 0.4460, 0.6335) and ( 0.4249, 0.5852) .. ( 0.4639, 0.5976)
    .. controls ( 0.4953, 0.6076) and ( 0.5058, 0.6583) .. ( 0.4998, 0.6852)
    --cycle
    (-0.0879, 0.6326)
    .. controls (-0.1189, 0.6139) and (-0.0956, 0.5976) .. (-0.0822, 0.6003)
    .. controls (-0.0699, 0.6027) and (-0.0544, 0.6253) .. (-0.0879, 0.6326)
    --cycle
    ( 0.3034, 0.6255)
    -- ( 0.2694, 0.6170)
    -- ( 0.2694, 0.5998)
    -- ( 0.3034, 0.5913)
    --cycle
    ( 0.6085, 0.6015)
    .. controls ( 0.5969, 0.6043) and ( 0.5796, 0.6004) .. ( 0.5688, 0.5964)
    .. controls ( 0.5189, 0.5780) and ( 0.5216, 0.5317) .. ( 0.5338, 0.4890)
    .. controls ( 0.5892, 0.5200) and ( 0.5513, 0.5451) .. ( 0.6191, 0.5657)
    .. controls ( 0.6318, 0.5296) and ( 0.6176, 0.4979) .. ( 0.6703, 0.5572)
    .. controls ( 0.6580, 0.5662) and ( 0.6196, 0.5989) .. ( 0.6085, 0.6015)
    --cycle
    ( 0.6703, 0.5572)
    .. controls ( 0.6650, 0.4639) and ( 0.7377, 0.4434) .. ( 0.6703, 0.5572)
    --cycle
    ( 0.2950, 0.5828)
    -- ( 0.3034, 0.5487)
    -- ( 0.3206, 0.5487)
    -- ( 0.3291, 0.5572)
    -- ( 0.3291, 0.5743)
    --cycle
    (-0.2167, 0.5572)
    .. controls (-0.2524, 0.4984) and (-0.2378, 0.4949) .. (-0.1997, 0.4463)
    -- (-0.1656, 0.4548)
    -- (-0.1656, 0.4719)
    -- (-0.1997, 0.4804)
    -- (-0.1997, 0.4719)
    -- (-0.2082, 0.4804)
    -- (-0.1997, 0.4804)
    .. controls (-0.1944, 0.5170) and (-0.1913, 0.5288) .. (-0.2167, 0.5572)
    --cycle
    ( 0.4528, 0.5567)
    .. controls ( 0.4208, 0.5591) and ( 0.3875, 0.5291) .. ( 0.3974, 0.4804)
    -- ( 0.4998, 0.5146)
    .. controls ( 0.4909, 0.5422) and ( 0.4721, 0.5552) .. ( 0.4528, 0.5567)
    --cycle
    (-0.5836, 0.5401)
    .. controls (-0.5724, 0.5036) and (-0.5428, 0.4697) .. (-0.5238, 0.5231)
    --cycle
    (-0.0890, 0.5163)
    .. controls (-0.1486, 0.4959) and (-0.1212, 0.4523) .. (-0.0806, 0.4615)
    .. controls (-0.0429, 0.4702) and (-0.0388, 0.5108) .. (-0.0890, 0.5163)
    --cycle
    ( 0.3494, 0.5160)
```

```
    .. controls ( 0.3442, 0.5162) and ( 0.3376, 0.5157) .. ( 0.3291, 0.5146)
    -- ( 0.3632, 0.4804)
    .. controls ( 0.3666, 0.5059) and ( 0.3648, 0.5149) .. ( 0.3494, 0.5160)
    --cycle
    ( 0.6832, 0.4635)
    .. controls ( 0.6577, 0.4592) and ( 0.6354, 0.4224) .. ( 0.6277, 0.3866)
    -- ( 0.6618, 0.3781)
    .. controls ( 0.6758, 0.4215) and ( 0.6897, 0.4164) .. ( 0.7299, 0.4293)
    .. controls ( 0.7150, 0.4573) and ( 0.6984, 0.4662) .. ( 0.6832, 0.4635)
    --cycle
    ( 0.3846, 0.4569)
    .. controls ( 0.3643, 0.4547) and ( 0.3427, 0.4484) .. ( 0.3206, 0.4379)
    .. controls ( 0.2993, 0.4278) and ( 0.2743, 0.4198) .. ( 0.2665, 0.3948)
    .. controls ( 0.2602, 0.3747) and ( 0.2710, 0.3497) .. ( 0.2940, 0.3491)
    .. controls ( 0.3208, 0.3484) and ( 0.3628, 0.4037) .. ( 0.4059, 0.3999)
    .. controls ( 0.4648, 0.3948) and ( 0.4817, 0.3238) .. ( 0.5508, 0.3184)
    -- ( 0.5594, 0.2842)
    .. controls ( 0.6325, 0.3301) and ( 0.6184, 0.4000) .. ( 0.5253, 0.3610)
    .. controls ( 0.4966, 0.4310) and ( 0.4457, 0.4630) .. ( 0.3846, 0.4569)
    --cycle
    ( 0.0020, 0.4093)
    .. controls (-0.0096, 0.4099) and (-0.0218, 0.4039) .. (-0.0547, 0.3920)
    .. controls (-0.0742, 0.3851) and (-0.1009, 0.3815) .. (-0.1085, 0.3591)
    .. controls (-0.1143, 0.3413) and (-0.1036, 0.3179) .. (-0.0973, 0.3014)
    .. controls (-0.1114, 0.2946) and (-0.1334, 0.2825) .. (-0.1485, 0.2820)
    .. controls (-0.1767, 0.2809) and (-0.1949, 0.3055) .. (-0.2182, 0.3110)
    .. controls (-0.2417, 0.3165) and (-0.3307, 0.2833) .. (-0.3437, 0.2635)
    .. controls (-0.3530, 0.2471) and (-0.3474, 0.2253) .. (-0.3437, 0.2075)
    .. controls (-0.4324, 0.1756) and (-0.3706, 0.0831) .. (-0.2765, 0.0710)
    .. controls (-0.2795, 0.0550) and (-0.2801, 0.0364) .. (-0.2860, 0.0213)
    .. controls (-0.2997,-0.0142) and (-0.3382,-0.0416) .. (-0.2680,-0.0825)
    -- (-0.2424, 0.0027)
    -- (-0.1997,-0.0143)
    .. controls (-0.1918, 0.0295) and (-0.2082, 0.0371) .. (-0.1741, 0.0710)
    .. controls (-0.1600, 0.0270) and (-0.1316, 0.0212) .. (-0.1230, 0.0710)
    -- (-0.0547, 0.0710)
    -- (-0.0547, 0.0198)
    .. controls (-0.0089, 0.0346) and (-0.0127, 0.0528) .. (-0.0121, 0.0966)
    .. controls ( 0.0434, 0.0981) and ( 0.0809, 0.1179) .. ( 0.0988, 0.1733)
    -- ( 0.0561, 0.1477)
    -- ( 0.0647, 0.1477)
    -- ( 0.0647, 0.1392)
    -- ( 0.0561, 0.1477)
    -- (-0.0333, 0.1681)
    -- (-0.0973, 0.1990)
    .. controls (-0.1035, 0.1519) and (-0.0915, 0.1406) .. (-0.0462, 0.1307)
    -- (-0.0547, 0.1051)
    .. controls (-0.0809, 0.1134) and (-0.1575, 0.1376) .. (-0.1816, 0.1275)
    .. controls (-0.1979, 0.1207) and (-0.2008, 0.1105) .. (-0.2082, 0.0966)
    -- (-0.2765, 0.0796)
    .. controls (-0.2913, 0.1042) and (-0.2904, 0.1037) .. (-0.3191, 0.1051)
    -- (-0.3277, 0.1307)
    -- (-0.3020, 0.1392)
```

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    -- (-0.3191, 0.1733)
    -- (-0.2680, 0.2416)
    .. controls (-0.2555, 0.2025) and (-0.2434, 0.1999) .. (-0.2082, 0.1819)
    .. controls (-0.2103, 0.2198) and (-0.2204, 0.2217) .. (-0.2509, 0.2416)
    -- (-0.1571, 0.2416)
    -- (-0.0973, 0.1990)
    .. controls (-0.0622, 0.2159) and (-0.0506, 0.2107) .. (-0.0376, 0.2501)
    -- (-0.0718, 0.2672)
    -- (-0.0121, 0.2842)
    -- (-0.0121, 0.3014)
    -- (-0.0462, 0.3184)
    -- ( 0.0221, 0.3439)
    .. controls ( 0.0070, 0.2950) and ( 0.0355, 0.2771) .. ( 0.0818, 0.2757)
    -- ( 0.0561, 0.3354)
    .. controls ( 0.1139, 0.3092) and ( 0.1160, 0.3517) .. ( 0.0949, 0.3683)
    -- ( 0.0561, 0.3859)
    .. controls ( 0.0248, 0.4010) and ( 0.0136, 0.4085) .. ( 0.0020, 0.4093)
    --cycle
    (-0.2680,-0.0825)
    .. controls (-0.2752,-0.1245) and (-0.2656,-0.1332) .. (-0.2253,-0.1423)
    .. controls (-0.2780,-0.1694) and (-0.3487,-0.1517) .. (-0.3277,-0.2360)
    -- (-0.3958,-0.2275)
    .. controls (-0.3850,-0.1662) and (-0.4133,-0.1372) .. (-0.4727,-0.1337)
    -- (-0.4727,-0.0910)
    .. controls (-0.5590,-0.0763) and (-0.5042,-0.0134) .. (-0.5750,-0.0228)
    .. controls (-0.5589,-0.0849) and (-0.5477,-0.0819) .. (-0.5750,-0.1423)
    .. controls (-0.6476,-0.1314) and (-0.6815,-0.1792) .. (-0.6262,-0.2360)
    .. controls (-0.6614,-0.2507) and (-0.6863,-0.2704) .. (-0.6674,-0.3120)
    .. controls (-0.6596,-0.3292) and (-0.6399,-0.3442) .. (-0.6461,-0.3629)
    .. controls (-0.6528,-0.3836) and (-0.7224,-0.4151) .. (-0.6960,-0.4711)
    .. controls (-0.6692,-0.5273) and (-0.5938,-0.5008) .. (-0.6603,-0.4579)
    -- (-0.6262,-0.4237)
    -- (-0.5921,-0.4579)
    .. controls (-0.5645,-0.3552) and (-0.5902,-0.3724) .. (-0.6177,-0.2872)
    -- (-0.5750,-0.2531)
    -- (-0.6177,-0.2446)
    -- (-0.6006,-0.2190)
    .. controls (-0.5707,-0.2398) and (-0.5626,-0.2347) .. (-0.5494,-0.2019)
    -- (-0.5836,-0.1848)
    -- (-0.5153,-0.1592)
    .. controls (-0.5297,-0.1903) and (-0.5326,-0.1983) .. (-0.4983,-0.2105)
    -- (-0.4983,-0.1763)
    .. controls (-0.4268,-0.1951) and (-0.4189,-0.2337) .. (-0.3789,-0.2872)
    .. controls (-0.4036,-0.3020) and (-0.4028,-0.3012) .. (-0.4044,-0.3299)
    -- (-0.3362,-0.3299)
    .. controls (-0.3465,-0.3786) and (-0.3284,-0.3796) .. (-0.2850,-0.3811)
    -- (-0.2850,-0.4151)
    .. controls (-0.2401,-0.4035) and (-0.1731,-0.3767) .. (-0.1571,-0.3299)
    .. controls (-0.1233,-0.3324) and (-0.1022,-0.3221) .. (-0.1230,-0.2872)
    -- (-0.1143,-0.2360)
    -- (-0.1741,-0.2531)
    -- (-0.1741,-0.2701)
    -- (-0.1485,-0.2787)
```

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    -- (-0.1571,-0.3214)
    -- (-0.2765,-0.3640)
    .. controls (-0.2785,-0.3286) and (-0.2853,-0.3271) .. (-0.3191,-0.3214)
    -- (-0.3191,-0.3299)
    -- (-0.3277,-0.3214)
    -- (-0.3191,-0.3214)
    .. controls (-0.3191,-0.3214) and (-0.2922,-0.3221) .. (-0.2850,-0.3128)
    .. controls (-0.2781,-0.3038) and (-0.2850,-0.2787) .. (-0.2850,-0.2787)
    .. controls (-0.2850,-0.2462) and (-0.2522,-0.2669) .. (-0.2424,-0.2360)
    -- (-0.2935,-0.2360)
    -- (-0.2509,-0.2019)
    -- (-0.2424,-0.2360)
    .. controls (-0.1852,-0.2624) and (-0.2046,-0.2259) .. (-0.1740,-0.2170)
    .. controls (-0.1599,-0.2119) and (-0.1427,-0.2266) .. (-0.1281,-0.2170)
    .. controls (-0.1166,-0.2109) and (-0.1070,-0.1747) .. (-0.1656,-0.1848)
    -- (-0.2082,-0.0228)
    -- (-0.2253,-0.0228)
    .. controls (-0.2307,-0.0463) and (-0.2347,-0.0485) .. (-0.2167,-0.0654)
    -- (-0.2253,-0.0910)
    --cycle
    ( 0.7385, 0.3781)
    .. controls ( 0.7464, 0.3334) and ( 0.7712, 0.3235) .. ( 0.7897, 0.3696)
    --cycle
    ( 0.3825, 0.3684)
    .. controls ( 0.3722, 0.3709) and ( 0.3598, 0.3638) .. ( 0.3547, 0.3341)
    -- ( 0.3712, 0.3341)
    .. controls ( 0.4107, 0.3328) and ( 0.3998, 0.3641) .. ( 0.3825, 0.3684)
    --cycle
    ( 0.3547, 0.3341)
    -- ( 0.3034, 0.3280)
    .. controls ( 0.2587, 0.3223) and ( 0.2449, 0.3331) .. ( 0.2267, 0.2842)
    -- ( 0.1515, 0.2970)
    .. controls ( 0.1395, 0.3001) and ( 0.1217, 0.3113) .. ( 0.1096, 0.3062)
    .. controls ( 0.0947, 0.3000) and ( 0.0955, 0.2804) .. ( 0.0944, 0.2671)
    .. controls ( 0.0897, 0.2118) and ( 0.0889, 0.2059) .. ( 0.1158, 0.1563)
    -- ( 0.1331, 0.1563)
    -- ( 0.1415, 0.1648)
    -- ( 0.1415, 0.2501)
    -- ( 0.2449, 0.2446)
    .. controls ( 0.2870, 0.2248) and ( 0.2549, 0.1801) .. ( 0.3376, 0.1733)
    -- ( 0.3376, 0.2245)
    -- ( 0.3889, 0.2075)
    .. controls ( 0.3692, 0.2680) and ( 0.3319, 0.2493) .. ( 0.3034, 0.2928)
    .. controls ( 0.3440, 0.2858) and ( 0.3561, 0.2934) .. ( 0.3547, 0.3341)
    --cycle
    ( 0.4285, 0.3341)
    .. controls ( 0.4111, 0.3048) and ( 0.4418, 0.2997) .. ( 0.4508, 0.3082)
    .. controls ( 0.4603, 0.3170) and ( 0.4582, 0.3376) .. ( 0.4285, 0.3341)
    --cycle
    ( 0.7199, 0.3309)
    .. controls ( 0.7120, 0.3311) and ( 0.7041, 0.3301) .. ( 0.6963, 0.3276)
    .. controls ( 0.6516, 0.3141) and ( 0.5998, 0.2127) .. ( 0.6788, 0.2075)
    -- ( 0.6874, 0.1819)
```

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    .. controls ( 0.6908, 0.1882) and ( 0.6948, 0.1871) .. ( 0.6958, 0.2009)
    .. controls ( 0.6967, 0.2152) and ( 0.6850, 0.2341) .. ( 0.6875, 0.2482)
    .. controls ( 0.6912, 0.2697) and ( 0.7185, 0.2790) .. ( 0.7404, 0.2558)
    -- ( 0.7556, 0.2330)
    .. controls ( 0.8209, 0.2699) and ( 0.7743, 0.3292) .. ( 0.7199, 0.3309)
    --cycle
    (-0.4641, 0.3269)
    -- (-0.4556, 0.2928)
    -- (-0.4386, 0.2928)
    -- (-0.4300, 0.3269)
    --cycle
    (-0.3532, 0.3269)
    .. controls (-0.3838, 0.3252) and (-0.3857, 0.3233) .. (-0.3874, 0.2928)
    .. controls (-0.3613, 0.3019) and (-0.3623, 0.3007) .. (-0.3532, 0.3269)
    --cycle
    (-0.7723, 0.3114)
    .. controls (-0.9303, 0.2491) and (-0.8236, 0.1766) .. (-0.9066, 0.1318)
    .. controls (-0.9222, 0.1231) and (-0.9315, 0.1156) .. (-0.9385, 0.1084)
    -- (-0.9505, 0.0875)
    .. controls (-0.9537, 0.0757) and (-0.9542, 0.0621) .. (-0.9542, 0.0410)
    -- (-0.9333, 0.0454)
    .. controls (-0.9116, 0.1020) and (-0.8383, 0.0970) .. (-0.8943, 0.1349)
    .. controls (-0.8577, 0.1472) and (-0.8473, 0.1249) .. (-0.8748, 0.1652)
    -- (-0.8414, 0.1559)
    .. controls (-0.8055, 0.1614) and (-0.8119, 0.2075) .. (-0.8279, 0.2170)
    .. controls (-0.8020, 0.2197) and (-0.8300, 0.2698) .. (-0.8062, 0.2572)
    .. controls (-0.7862, 0.2467) and (-0.7713, 0.2258) .. (-0.7547, 0.2261)
    .. controls (-0.7211, 0.2267) and (-0.7384, 0.2895) .. (-0.7723, 0.3114)
    --cycle
    ( 0.5167, 0.2928)
    -- ( 0.5083, 0.2842)
    -- ( 0.5083, 0.2672)
    -- ( 0.5167, 0.2587)
    -- ( 0.5338, 0.2587)
    -- ( 0.5423, 0.2672)
    -- ( 0.5423, 0.2842)
    -- ( 0.5338, 0.2928)
    --cycle
    ( 0.8233, 0.2914)
    .. controls ( 0.8159, 0.2897) and ( 0.8101, 0.2823) .. ( 0.8101, 0.2664)
    .. controls ( 0.8101, 0.2592) and ( 0.7901, 0.2245) .. ( 0.7943, 0.2184)
    .. controls ( 0.8010, 0.2085) and ( 0.8177, 0.1916) .. ( 0.8341, 0.1843)
    -- ( 0.7897, 0.1051)
    .. controls ( 0.7638, 0.1109) and ( 0.6977, 0.1143) .. ( 0.6790, 0.0913)
    .. controls ( 0.6678, 0.0772) and ( 0.6727, 0.0528) .. ( 0.6644, 0.0283)
    .. controls ( 0.6511,-0.0104) and ( 0.6263,-0.0275) .. ( 0.5936,-0.0484)
    .. controls ( 0.5977,-0.0521) and ( 0.6009,-0.0593) .. ( 0.6125,-0.0633)
    .. controls ( 0.6432,-0.0738) and ( 0.6954,-0.0310) .. ( 0.7067,-0.0043)
    .. controls ( 0.7123, 0.0088) and ( 0.7121, 0.0229) .. ( 0.7130, 0.0368)
    .. controls ( 0.7585, 0.0333) and ( 0.7707, 0.0484) .. ( 0.7897, 0.0881)
    -- ( 0.8409, 0.0027)
    .. controls ( 0.7828,-0.0157) and ( 0.7583,-0.0941) .. ( 0.8409,-0.1337)
    .. controls ( 0.8561,-0.0647) and ( 0.8176,-0.0742) .. ( 0.8836,-0.0143)
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    -- ( 0.9348,-0.0654)
    .. controls ( 0.9443,-0.0311) and ( 0.9398,-0.0319) .. ( 0.9430,-0.0008)
    .. controls ( 0.9475, 0.0433) and ( 0.9603, 0.0556) .. ( 0.8921, 0.0796)
    -- ( 0.8836, 0.0710)
    -- ( 0.8836, 0.0540)
    -- ( 0.9006, 0.0198)
    .. controls ( 0.8705, 0.0555) and ( 0.8589, 0.0671) .. ( 0.8494, 0.1137)
    -- ( 0.8921, 0.0881)
    .. controls ( 0.9100, 0.1275) and ( 0.9093, 0.1211) .. ( 0.9077, 0.1641)
    .. controls ( 0.8502, 0.2199) and ( 0.8502, 0.2055) .. ( 0.8245, 0.2294)
    .. controls ( 0.8511, 0.2387) and ( 0.8571, 0.2533) .. ( 0.8546, 0.2660)
    -- ( 0.8445, 0.2834)
    .. controls ( 0.8380, 0.2892) and ( 0.8301, 0.2928) .. ( 0.8233, 0.2914)
    --cycle
    (-0.6221, 0.2851)
    .. controls (-0.6403, 0.2814) and (-0.6578, 0.2533) .. (-0.6578, 0.2330)
    .. controls (-0.6578, 0.2083) and (-0.6228, 0.1685) .. (-0.6090, 0.1392)
    .. controls (-0.6712, 0.1174) and (-0.6013, 0.0486) .. (-0.5914, 0.0454)
    .. controls (-0.5625, 0.0361) and (-0.5594, 0.0690) .. (-0.5384, 0.0751)
    .. controls (-0.5161, 0.0820) and (-0.5142, 0.0619) .. (-0.4641, 0.0796)
    .. controls (-0.4838, 0.1372) and (-0.5135, 0.1504) .. (-0.5665, 0.1733)
    -- (-0.5323, 0.2075)
    -- (-0.5665, 0.2160)
    -- (-0.5665, 0.1819)
    -- (-0.5921, 0.2245)
    -- (-0.6006, 0.2330)
    -- (-0.6090, 0.2416)
    -- (-0.6006, 0.2416)
    -- (-0.6006, 0.2330)
    -- (-0.5921, 0.2330)
    -- (-0.5921, 0.2245)
    .. controls (-0.5591, 0.2361) and (-0.5513, 0.2585) .. (-0.5921, 0.2587)
    .. controls (-0.5999, 0.2809) and (-0.6112, 0.2874) .. (-0.6221, 0.2851)
    --cycle
    (-0.4001, 0.2659)
    -- (-0.4398, 0.2231)
    -- (-0.4713, 0.1989)
    .. controls (-0.5030, 0.1708) and (-0.4873, 0.1496) .. (-0.4486, 0.1607)
    .. controls (-0.4215, 0.1683) and (-0.3832, 0.1951) .. (-0.3704, 0.2199)
    .. controls (-0.3565, 0.2464) and (-0.3702, 0.2690) .. (-0.4001, 0.2659)
    --cycle
    ( 0.5167, 0.2501)
    .. controls ( 0.4726, 0.2275) and ( 0.4751, 0.2109) .. ( 0.4771, 0.1648)
    .. controls ( 0.4776, 0.1495) and ( 0.4771, 0.1247) .. ( 0.4946, 0.1178)
    .. controls ( 0.5149, 0.1096) and ( 0.5288, 0.1359) .. ( 0.5681, 0.1435)
    .. controls ( 0.6164, 0.1530) and ( 0.6391, 0.1274) .. ( 0.6568, 0.1214)
    .. controls ( 0.6669, 0.1180) and ( 0.6795, 0.1163) .. ( 0.6862, 0.1272)
    .. controls ( 0.7003, 0.1512) and ( 0.6673, 0.1556) .. ( 0.6532, 0.1563)
    .. controls ( 0.6261, 0.2314) and ( 0.5966, 0.1859) .. ( 0.5605, 0.1960)
    .. controls ( 0.5390, 0.2022) and ( 0.5268, 0.2319) .. ( 0.5167, 0.2501)
    --cycle
    (-0.0462, 0.2075)
    -- (-0.0462, 0.1819)
```

```
    -- (-0.0206, 0.1819)
    -- (-0.0206, 0.2075)
    --cycle
    (-0.7371, 0.1990)
    -- (-0.7371, 0.1563)
    -- (-0.7115, 0.1905)
    -- (-0.7200, 0.1990)
    --cycle
    (-0.1656, 0.1905)
    -- (-0.1400, 0.1648)
    --cycle
    (-0.7797, 0.1819)
    -- (-0.7883, 0.1733)
    -- (-0.7883, 0.1563)
    -- (-0.7542, 0.1477)
    -- (-0.7627, 0.1819)
    --cycle
    ( 0.1671, 0.1819)
    -- ( 0.1841, 0.1477)
    --cycle
    ( 0.6447, 0.1477)
    -- ( 0.6532, 0.1477)
    -- ( 0.6532, 0.1392)
    --cycle
    (-0.7081, 0.1437)
    .. controls (-0.7387, 0.1429) and (-0.7462, 0.1254) .. (-0.7593, 0.0844)
    .. controls (-0.7628, 0.0670) and (-0.7720, 0.0499) .. (-0.7593, 0.0321)
    .. controls (-0.7496, 0.0145) and (-0.7241, 0.0137) .. (-0.7173, 0.0321)
    .. controls (-0.7114, 0.0479) and (-0.7222, 0.0657) .. (-0.7285, 0.0796)
    .. controls (-0.6938, 0.0968) and (-0.6811, 0.1011) .. (-0.6688, 0.1392)
    .. controls (-0.6852, 0.1425) and (-0.6979, 0.1439) .. (-0.7081, 0.1437)
    --cycle
    ( 0.8921, 0.1392)
    -- ( 0.9006, 0.1392)
    -- ( 0.9006, 0.1307)
    --cycle
    ( 0.5765, 0.1222)
    -- ( 0.5850, 0.0881)
    -- ( 0.6021, 0.0881)
    -- ( 0.6106, 0.1222)
    --cycle
    ( 0.2872, 0.1175)
    .. controls ( 0.2767, 0.1166) and ( 0.2651, 0.1135) .. ( 0.2533, 0.1071)
    .. controls ( 0.2151, 0.0867) and ( 0.2220, 0.0479) .. ( 0.2267, 0.0113)
    .. controls ( 0.2625, 0.0237) and ( 0.2504, 0.0254) .. ( 0.2701, 0.0519)
    .. controls ( 0.2958, 0.0863) and ( 0.3249, 0.0559) .. ( 0.3338, 0.0822)
    .. controls ( 0.3402, 0.1009) and ( 0.3185, 0.1198) .. ( 0.2872, 0.1175)
    --cycle
    ( 0.4845, 0.1051)
    .. controls ( 0.4706, 0.1009) and ( 0.4616, 0.0995) .. ( 0.4512, 0.0905)
    .. controls ( 0.4040, 0.0493) and ( 0.4796,-0.0172) .. ( 0.4845, 0.0710)
    .. controls ( 0.4877, 0.0867) and ( 0.4856, 0.0907) .. ( 0.4845, 0.1051)
    --cycle
```

```
    ( 0.6362, 0.1051)
    -- ( 0.6277, 0.0966)
    -- ( 0.6277, 0.0796)
    -- ( 0.6618, 0.0710)
    -- ( 0.6532, 0.1051)
    --cycle
    ( 0.0988, 0.0966)
    -- ( 0.0647, 0.0881)
    -- ( 0.0647, 0.0710)
    -- ( 0.0902, 0.0625)
    .. controls ( 0.0813, 0.0194) and ( 0.0842, 0.0065) .. ( 0.1244,-0.0143)
    -- ( 0.1331, 0.0283)
    -- ( 0.1671, 0.0368)
    -- ( 0.1671, 0.0540)
    .. controls ( 0.1326, 0.0659) and ( 0.1186, 0.0637) .. ( 0.0988, 0.0966)
    --cycle
    (-0.8125, 0.0621)
    .. controls (-0.8490, 0.0401) and (-0.8237, 0.0162) .. (-0.8062, 0.0190)
    .. controls (-0.7883, 0.0219) and (-0.7704, 0.0544) .. (-0.8125, 0.0621)
    --cycle
    ( 0.5167, 0.0540)
    -- ( 0.5083, 0.0198)
    -- ( 0.5423, 0.0283)
    -- ( 0.5423, 0.0454)
    -- ( 0.5338, 0.0540)
    --cycle
    (-0.0973, 0.0454)
    -- (-0.1058, 0.0368)
    -- (-0.1058, 0.0198)
    -- (-0.0718, 0.0113)
    -- (-0.0802, 0.0454)
    --cycle
    (-0.0035, 0.0368)
    -- (-0.0210, 0.0109)
    .. controls (-0.0655,-0.0708) and ( 0.0385,-0.0566) .. ( 0.0166, 0.0109)
    .. controls ( 0.0120, 0.0245) and ( 0.0056, 0.0275) .. (-0.0035, 0.0368)
    --cycle
    (-0.4977, 0.0207)
    .. controls (-0.5147, 0.0204) and (-0.5312, 0.0080) .. (-0.5211,-0.0096)
    .. controls (-0.5118,-0.0261) and (-0.4926,-0.0166) .. (-0.4645,-0.0487)
    .. controls (-0.4440,-0.0720) and (-0.4524,-0.0706) .. (-0.4214,-0.0825)
    .. controls (-0.4050,-0.0235) and (-0.4308, 0.0217) .. (-0.4977, 0.0207)
    --cycle
    ( 0.3756, 0.0075)
    .. controls ( 0.3646, 0.0069) and ( 0.3522, 0.0045) .. ( 0.3376, 0.0002)
    .. controls ( 0.3227,-0.0042) and ( 0.3054,-0.0075) .. ( 0.2946,-0.0193)
    -- ( 0.2742,-0.0568)
    .. controls ( 0.2649,-0.0745) and ( 0.2554,-0.0861) .. ( 0.2571,-0.1073)
    .. controls ( 0.2601,-0.1471) and ( 0.2967,-0.2295) .. ( 0.3408,-0.1666)
    .. controls ( 0.3653,-0.1317) and ( 0.3284,-0.1299) .. ( 0.3717,-0.0654)
    .. controls ( 0.4033,-0.0789) and ( 0.4049,-0.0788) .. ( 0.4314,-0.0568)
    .. controls ( 0.4664,-0.1165) and ( 0.5153,-0.0409) .. ( 0.5152,-0.0308)
    .. controls ( 0.5148,-0.0111) and ( 0.4690, 0.0277) .. ( 0.4571,-0.0399)
```

```
    .. controls ( 0.4280,-0.0054) and ( 0.4082, 0.0095) .. ( 0.3756, 0.0075)
    --cycle
    (-0.9801, 0.0047)
    -- (-0.9427,-0.0792)
    -- (-0.8931,-0.0669)
    -- (-0.8538,-0.0818)
    .. controls (-0.8464,-0.0219) and (-0.9339,-0.0180) .. (-0.9801, 0.0047)
    --cycle
    ( 0.5423,-0.0484)
    -- ( 0.5594,-0.0997)
    .. controls ( 0.5416,-0.1040) and ( 0.4986,-0.1096) .. ( 0.4864,-0.1181)
    .. controls ( 0.4658,-0.1324) and ( 0.4601,-0.1677) .. ( 0.4793,-0.1854)
    .. controls ( 0.4883,-0.1938) and ( 0.5053,-0.1981) .. ( 0.5167,-0.2019)
    .. controls ( 0.4933,-0.2045) and ( 0.4609,-0.2005) .. ( 0.4427,-0.2156)
    .. controls ( 0.4166,-0.2372) and ( 0.4089,-0.2872) .. ( 0.4826,-0.2957)
    -- ( 0.4826,-0.2446)
    .. controls ( 0.5217,-0.2597) and ( 0.5287,-0.2486) .. ( 0.5167,-0.2105)
    .. controls ( 0.5424,-0.2023) and ( 0.5512,-0.1934) .. ( 0.5594,-0.1677)
    -- ( 0.6191,-0.1848)
    -- ( 0.6788,-0.3042)
    -- ( 0.6532,-0.3128)
    -- ( 0.6532,-0.3299)
    -- ( 0.7385,-0.3214)
    -- ( 0.7130,-0.2617)
    .. controls ( 0.7337,-0.2558) and ( 0.7608,-0.2439) .. ( 0.7812,-0.2454)
    .. controls ( 0.7973,-0.2453) and ( 0.8226,-0.2581) .. ( 0.8346,-0.2454)
    .. controls ( 0.8523,-0.2285) and ( 0.8216,-0.2043) .. ( 0.8067,-0.1989)
    .. controls ( 0.7691,-0.1854) and ( 0.7439,-0.2093) .. ( 0.6805,-0.1933)
    -- ( 0.6805,-0.1448)
    -- ( 0.6017,-0.0907)
    -- ( 0.5680,-0.0907)
    -- ( 0.5765,-0.0484)
    --cycle
    (-0.7372,-0.0610)
    .. controls (-0.7812,-0.0612) and (-0.8222,-0.0885) .. (-0.7969,-0.1508)
    -- (-0.8546,-0.1518)
    .. controls (-0.8578,-0.0809) and (-0.9199,-0.0961) .. (-0.9322,-0.1220)
    -- (-0.9145,-0.1528)
    .. controls (-0.9119,-0.1539) and (-0.9110,-0.1554) .. (-0.9080,-0.1566)
    .. controls (-0.8746,-0.1628) and (-0.8911,-0.2081) .. (-0.8709,-0.2184)
    .. controls (-0.8479,-0.2301) and (-0.8289,-0.2160) .. (-0.8075,-0.2238)
    .. controls (-0.7880,-0.2309) and (-0.7418,-0.2959) .. (-0.7285,-0.2190)
    -- (-0.7712,-0.2105)
    .. controls (-0.7608,-0.1935) and (-0.7474,-0.1633) .. (-0.7309,-0.1535)
    .. controls (-0.7132,-0.1433) and (-0.6647,-0.1458) .. (-0.6532,-0.1225)
    .. controls (-0.6410,-0.0974) and (-0.6763,-0.0776) .. (-0.6945,-0.0697)
    .. controls (-0.7075,-0.0641) and (-0.7225,-0.0610) .. (-0.7372,-0.0610)
    --cycle
    ( 0.0790,-0.0703)
    .. controls ( 0.0586,-0.0724) and ( 0.0391,-0.0799) .. ( 0.0314,-0.0938)
    .. controls ( 0.0258,-0.1059) and ( 0.0293,-0.1207) .. ( 0.0314,-0.1337)
    .. controls (-0.0051,-0.1451) and (-0.0235,-0.1672) .. ( 0.0136,-0.1933)
    -- ( 0.0050,-0.2190)
```

```
    -- ( 0.0647,-0.2360)
    -- ( 0.0561,-0.2019)
    -- ( 0.0391,-0.2105)
    -- ( 0.0307,-0.2019)
    -- ( 0.0818,-0.1251)
    -- ( 0.0988,-0.1251)
    .. controls ( 0.1190,-0.1566) and ( 0.1311,-0.1660) .. ( 0.1671,-0.1763)
    .. controls ( 0.1712,-0.1381) and ( 0.1680,-0.1029) .. ( 0.1325,-0.0792)
    .. controls ( 0.1208,-0.0715) and ( 0.0994,-0.0682) .. ( 0.0790,-0.0703)
    --cycle
    (-0.0347,-0.0729)
    .. controls (-0.0400,-0.0723) and (-0.0465,-0.0725) .. (-0.0547,-0.0739)
    .. controls (-0.1154,-0.1097) and (-0.0914,-0.1419) .. (-0.0629,-0.1331)
    .. controls (-0.0318,-0.1235) and ( 0.0014,-0.0769) .. (-0.0347,-0.0729)
    --cycle
    (-0.1485,-0.0997)
    -- (-0.1656,-0.1166)
    -- (-0.1656,-0.1251)
    .. controls (-0.1656,-0.1251) and (-0.1284,-0.1383) .. (-0.1230,-0.1251)
    .. controls (-0.1184,-0.1140) and (-0.1485,-0.0997) .. (-0.1485,-0.0997)
    --cycle
    ( 0.8579,-0.1251)
    -- ( 0.8579,-0.1508)
    -- ( 0.8921,-0.1508)
    -- ( 0.8921,-0.1251)
    --cycle
    ( 0.3462,-0.1848)
    .. controls ( 0.3553,-0.2111) and ( 0.3541,-0.2099) .. ( 0.3804,-0.2190)
    .. controls ( 0.3789,-0.1929) and ( 0.3722,-0.1863) .. ( 0.3462,-0.1848)
    --cycle
    ( 0.5680,-0.2105)
    -- ( 0.5680,-0.2360)
    -- ( 0.5936,-0.2360)
    -- ( 0.5936,-0.2105)
    --cycle
    ( 0.2429,-0.2175)
    .. controls ( 0.2301,-0.2183) and ( 0.2146,-0.2250) .. ( 0.2042,-0.2351)
    .. controls ( 0.1851,-0.2515) and ( 0.1867,-0.2802) .. ( 0.1841,-0.3042)
    -- ( 0.2267,-0.3128)
    .. controls ( 0.2366,-0.2535) and ( 0.2673,-0.2625) .. ( 0.2665,-0.2351)
    .. controls ( 0.2661,-0.2218) and ( 0.2558,-0.2167) .. ( 0.2429,-0.2175)
    --cycle
    (-0.8394,-0.2360)
    .. controls (-0.8657,-0.2452) and (-0.8037,-0.2814) .. (-0.8128,-0.3076)
    .. controls (-0.7841,-0.3060) and (-0.8155,-0.2595) .. (-0.8394,-0.2360)
    --cycle
    (-0.3106,-0.2446)
    .. controls (-0.3061,-0.2411) and (-0.2935,-0.2446) .. (-0.2935,-0.2446)
    .. controls (-0.2935,-0.2446) and (-0.3063,-0.2847) .. (-0.3191,-0.2787)
    .. controls (-0.3297,-0.2736) and (-0.3199,-0.2518) .. (-0.3106,-0.2446)
    --cycle
    ( 0.0809,-0.2495)
    .. controls ( 0.0629,-0.2468) and ( 0.0475,-0.2563) .. ( 0.0307,-0.2602)
```

```
    .. controls ( 0.0102,-0.2651) and (-0.0913,-0.2616) .. (-0.0376,-0.3640)
    .. controls (-0.1141,-0.3685) and (-0.1262,-0.4016) .. (-0.0926,-0.4664)
    .. controls (-0.0856,-0.4795) and (-0.0758,-0.5040) .. (-0.0668,-0.5138)
    .. controls (-0.0449,-0.5377) and ( 0.0001,-0.5440) .. ( 0.0307,-0.5431)
    -- ( 0.0221,-0.4579)
    -- (-0.0206,-0.4833)
    .. controls (-0.0180,-0.4388) and (-0.0055,-0.4140) .. (-0.0633,-0.4237)
    .. controls (-0.0215,-0.3935) and (-0.0083,-0.4022) .. ( 0.0050,-0.3640)
    -- ( 0.0476,-0.3555)
    -- ( 0.0476,-0.3384)
    .. controls ( 0.0149,-0.3341) and ( 0.0150,-0.3375) .. (-0.0035,-0.3640)
    .. controls (-0.0031,-0.3175) and ( 0.0507,-0.3021) .. ( 0.0895,-0.3132)
    .. controls ( 0.0967,-0.3153) and ( 0.1020,-0.3182) .. ( 0.1069,-0.3214)
    -- ( 0.0733,-0.3214)
    -- ( 0.0733,-0.3555)
    -- ( 0.1073,-0.3555)
    -- ( 0.1073,-0.3217)
    .. controls ( 0.1209,-0.3306) and ( 0.1314,-0.3431) .. ( 0.1671,-0.3555)
    .. controls ( 0.1861,-0.3011) and ( 0.1658,-0.3044) .. ( 0.1276,-0.2793)
    .. controls ( 0.1121,-0.2692) and ( 0.1003,-0.2524) .. ( 0.0809,-0.2495)
    --cycle
    ( 0.5253,-0.2617)
    .. controls ( 0.5159,-0.2894) and ( 0.5137,-0.2935) .. ( 0.5423,-0.3042)
    --cycle
    (-0.5836,-0.2872)
    -- (-0.5921,-0.3299)
    .. controls (-0.5632,-0.3196) and (-0.5624,-0.3175) .. (-0.5665,-0.2872)
    --cycle
    ( 0.4825,-0.3113)
    .. controls ( 0.4709,-0.3098) and ( 0.4621,-0.3187) .. ( 0.4571,-0.3470)
    .. controls ( 0.4065,-0.2945) and ( 0.3565,-0.3080) .. ( 0.3141,-0.3613)
    .. controls ( 0.3029,-0.3754) and ( 0.2880,-0.3874) .. ( 0.2903,-0.4075)
    .. controls ( 0.2921,-0.4247) and ( 0.3027,-0.4361) .. ( 0.3120,-0.4493)
    .. controls ( 0.2945,-0.4516) and ( 0.2350,-0.4574) .. ( 0.2234,-0.4665)
    .. controls ( 0.2011,-0.4843) and ( 0.2099,-0.5378) .. ( 0.2182,-0.5602)
    -- ( 0.2352,-0.5602)
    .. controls ( 0.2421,-0.5417) and ( 0.2492,-0.5116) .. ( 0.2706,-0.5071)
    .. controls ( 0.3048,-0.4961) and ( 0.3439,-0.5674) .. ( 0.3618,-0.5071)
    -- ( 0.3618,-0.4833)
    -- ( 0.3974,-0.4919)
    -- ( 0.4059,-0.4579)
    -- ( 0.3376,-0.4493)
    -- ( 0.3717,-0.3896)
    .. controls ( 0.4306,-0.3991) and ( 0.4623,-0.4570) .. ( 0.4656,-0.3640)
    .. controls ( 0.4971,-0.3707) and ( 0.5062,-0.3751) .. ( 0.5253,-0.3470)
    -- ( 0.5451,-0.3694)
    .. controls ( 0.6171,-0.4271) and ( 0.5795,-0.2610) .. ( 0.5253,-0.3384)
    .. controls ( 0.5089,-0.3248) and ( 0.4943,-0.3128) .. ( 0.4825,-0.3113)
    --cycle
    ( 0.6371,-0.3426)
    .. controls ( 0.6165,-0.3414) and ( 0.6075,-0.3499) .. ( 0.6021,-0.3811)
    .. controls ( 0.6375,-0.3781) and ( 0.6440,-0.3786) .. ( 0.6618,-0.3470)
    .. controls ( 0.6521,-0.3447) and ( 0.6439,-0.3431) .. ( 0.6371,-0.3426)
```

```
--cycle
( 0.1158,-0.3640)
-- ( 0.1073,-0.3981)
-- ( 0.1415,-0.3981)
-- ( 0.1331,-0.3640)
--cycle
(-0.4660,-0.3701)
.. controls (-0.4757,-0.3670) and (-0.4894,-0.3727) .. (-0.4983,-0.3981)
-- (-0.5580,-0.3811)
.. controls (-0.5508,-0.4276) and (-0.5277,-0.4685) .. (-0.4812,-0.4833)
-- (-0.4898,-0.4066)
.. controls (-0.4444,-0.4042) and (-0.4498,-0.3750) .. (-0.4660,-0.3701)
--cycle
( 0.1671,-0.3724)
-- ( 0.1585,-0.3811)
-- ( 0.1671,-0.4407)
-- ( 0.1927,-0.4322)
-- ( 0.1927,-0.3811)
-- ( 0.1841,-0.3724)
--cycle
(-0.4061,-0.3746)
.. controls (-0.4337,-0.3682) and (-0.4432,-0.4275) .. (-0.3933,-0.4421)
.. controls (-0.3807,-0.4474) and (-0.3733,-0.4433) .. (-0.3617,-0.4421)
.. controls (-0.3654,-0.4287) and (-0.3677,-0.4184) .. (-0.3740,-0.4070)
.. controls (-0.3858,-0.3861) and (-0.3969,-0.3767) .. (-0.4061,-0.3746)
--cycle
(-0.2091,-0.4066)
-- (-0.2091,-0.4298)
-- (-0.1315,-0.5004)
.. controls (-0.1221,-0.4446) and (-0.1606,-0.4228) .. (-0.2091,-0.4066)
--cycle
( 0.6634,-0.4202)
.. controls ( 0.6063,-0.4164) and ( 0.5403,-0.4628) .. ( 0.5936,-0.5175)
.. controls ( 0.5533,-0.5676) and ( 0.6039,-0.5913) .. ( 0.6362,-0.5261)
-- ( 0.6021,-0.5175)
-- ( 0.6618,-0.5004)
-- ( 0.6874,-0.5261)
-- ( 0.6532,-0.4749)
-- ( 0.6618,-0.4664)
.. controls ( 0.6767,-0.4763) and ( 0.6924,-0.4939) .. ( 0.7031,-0.4938)
.. controls ( 0.7482,-0.4516) and ( 0.7588,-0.4217) .. ( 0.6869,-0.4249)
.. controls ( 0.6795,-0.4222) and ( 0.6716,-0.4207) .. ( 0.6634,-0.4202)
--cycle
(-0.2595,-0.4322)
-- (-0.2680,-0.4407)
-- (-0.2680,-0.4579)
-- (-0.2595,-0.4664)
-- (-0.2424,-0.4664)
-- (-0.2338,-0.4579)
-- (-0.2338,-0.4407)
-- (-0.2424,-0.4322)
--cycle
(-0.3947,-0.4820)
```

```
    .. controls (-0.4064,-0.4819) and (-0.4202,-0.4884) .. (-0.4300,-0.4906)
    .. controls (-0.4705,-0.5000) and (-0.4926,-0.4888) .. (-0.4812,-0.5431)
    .. controls (-0.4962,-0.5405) and (-0.5172,-0.5356) .. (-0.5319,-0.5380)
    .. controls (-0.5497,-0.5409) and (-0.6218,-0.5786) .. (-0.6276,-0.5954)
    .. controls (-0.6443,-0.6458) and (-0.5896,-0.6294) .. (-0.5665,-0.6198)
    -- (-0.5750,-0.6455)
    -- (-0.5409,-0.6540)
    -- (-0.5409,-0.6198)
    -- (-0.4727,-0.5943)
    -- (-0.4812,-0.6370)
    -- (-0.4641,-0.6028)
    -- (-0.4214,-0.6796)
    -- (-0.4044,-0.6796)
    .. controls (-0.3922,-0.6110) and (-0.4199,-0.5974) .. (-0.4386,-0.5431)
    -- (-0.4053,-0.5384)
    .. controls (-0.3682,-0.5271) and (-0.3698,-0.4934) .. (-0.3840,-0.4848)
    .. controls (-0.3872,-0.4829) and (-0.3908,-0.4821) .. (-0.3947,-0.4820)
    --cycle
    (-0.2509,-0.4833)
    .. controls (-0.2897,-0.5056) and (-0.2886,-0.5289) .. (-0.2509,-0.5516)
    -- (-0.2509,-0.5688)
    .. controls (-0.3046,-0.5780) and (-0.3807,-0.5721) .. (-0.3362,-0.6796)
    .. controls (-0.3905,-0.7060) and (-0.4127,-0.7567) .. (-0.3447,-0.7820)
    -- (-0.3305,-0.8084)
    .. controls (-0.3952,-0.8150) and (-0.4330,-0.7851) .. (-0.3796,-0.8551)
    .. controls (-0.3707,-0.8560) and (-0.2665,-0.8846) .. (-0.3191,-0.8587)
    .. controls (-0.2670,-0.8376) and (-0.2955,-0.8083) .. (-0.3191,-0.7735)
    .. controls (-0.2852,-0.7626) and (-0.2805,-0.7579) .. (-0.2850,-0.7222)
    -- (-0.3277,-0.7393)
    -- (-0.3277,-0.6796)
    .. controls (-0.2965,-0.6680) and (-0.3000,-0.6597) .. (-0.3020,-0.6285)
    .. controls (-0.2349,-0.6402) and (-0.2059,-0.6119) .. (-0.1513,-0.6666)
    .. controls (-0.1144,-0.7033) and (-0.1214,-0.7764) .. (-0.0716,-0.7828)
    .. controls (-0.0398,-0.7870) and (-0.0581,-0.7438) .. (-0.0633,-0.7307)
    .. controls (-0.0105,-0.7419) and (-0.0101,-0.7107) .. (-0.0259,-0.6944)
    .. controls (-0.0416,-0.6781) and (-0.0638,-0.6847) .. (-0.0920,-0.6613)
    .. controls (-0.1363,-0.6245) and (-0.1312,-0.5893) .. (-0.2253,-0.5516)
    --cycle
    ( 0.0893,-0.4928)
    .. controls ( 0.0854,-0.4941) and ( 0.0816,-0.4977) .. ( 0.0781,-0.5045)
    .. controls ( 0.0717,-0.5167) and ( 0.0733,-0.5538) .. ( 0.0733,-0.5688)
    .. controls (-0.0068,-0.5661) and ( 0.0229,-0.6522) .. ( 0.0360,-0.6661)
    .. controls ( 0.0456,-0.6761) and ( 0.0531,-0.6759) .. ( 0.0647,-0.6796)
    -- ( 0.0647,-0.6198)
    -- ( 0.1244,-0.6113)
    -- ( 0.1073,-0.5773)
    -- ( 0.1331,-0.5688)
    .. controls ( 0.1502,-0.5983) and ( 0.1514,-0.6011) .. ( 0.1841,-0.6113)
    .. controls ( 0.1815,-0.5647) and ( 0.1767,-0.5414) .. ( 0.1244,-0.5431)
    -- ( 0.1174,-0.5185)
    .. controls ( 0.1127,-0.5047) and ( 0.1008,-0.4886) .. ( 0.0893,-0.4928)
    --cycle
    ( 0.0647,-0.6796)
```

```
    .. controls ( 0.0651,-0.7162) and ( 0.0755,-0.7152) .. ( 0.1073,-0.7052)
    .. controls ( 0.0927,-0.6800) and ( 0.0939,-0.6798) .. ( 0.0647,-0.6796)
    --cycle
    ( 0.4429,-0.5307)
    .. controls ( 0.4305,-0.5311) and ( 0.4171,-0.5380) .. ( 0.4059,-0.5558)
    .. controls ( 0.3999,-0.5655) and ( 0.3989,-0.5750) .. ( 0.3994,-0.5861)
    .. controls ( 0.3998,-0.5978) and ( 0.4033,-0.6088) .. ( 0.4059,-0.6198)
    .. controls ( 0.4351,-0.6096) and ( 0.4347,-0.6075) .. ( 0.4400,-0.5773)
    .. controls ( 0.5088,-0.5860) and ( 0.4802,-0.5296) .. ( 0.4429,-0.5307)
    --cycle
    ( 0.6296,-0.5636)
    .. controls ( 0.6201,-0.5648) and ( 0.6129,-0.5872) .. ( 0.5850,-0.6007)
    .. controls ( 0.5662,-0.6071) and ( 0.5466,-0.6101) .. ( 0.5358,-0.6303)
    .. controls ( 0.5238,-0.6524) and ( 0.5014,-0.6717) .. ( 0.5092,-0.6929)
    .. controls ( 0.4879,-0.7051) and ( 0.4594,-0.7105) .. ( 0.4574,-0.7383)
    .. controls ( 0.4557,-0.7622) and ( 0.5198,-0.8058) .. ( 0.5459,-0.7885)
    .. controls ( 0.5602,-0.7791) and ( 0.4924,-0.7612) .. ( 0.5176,-0.7262)
    -- ( 0.5713,-0.7309)
    .. controls ( 0.6461,-0.7123) and ( 0.5265,-0.6556) .. ( 0.6262,-0.6344)
    .. controls ( 0.6303,-0.6340) and ( 0.6389,-0.6314) .. ( 0.6474,-0.6278)
    -- ( 0.6629,-0.6006)
    .. controls ( 0.6611,-0.5976) and ( 0.6583,-0.5944) .. ( 0.6541,-0.5908)
    .. controls ( 0.6418,-0.5698) and ( 0.6353,-0.5628) .. ( 0.6296,-0.5636)
    --cycle
    ( 0.2723,-0.5991)
    .. controls ( 0.2592,-0.6003) and ( 0.2468,-0.6028) .. ( 0.2363,-0.6064)
    .. controls ( 0.1997,-0.6189) and ( 0.1915,-0.6622) .. ( 0.2438,-0.6796)
    -- ( 0.2524,-0.6540)
    -- ( 0.2694,-0.6540)
    -- ( 0.2438,-0.6796)
    -- ( 0.2352,-0.7052)
    .. controls ( 0.1815,-0.6689) and ( 0.1445,-0.7418) .. ( 0.2182,-0.7649)
    .. controls ( 0.2103,-0.7956) and ( 0.2084,-0.7983) .. ( 0.2267,-0.8246)
    .. controls ( 0.1155,-0.7748) and ( 0.1095,-0.9097) .. ( 0.1942,-0.8505)
    -- ( 0.2141,-0.8675)
    .. controls ( 0.2535,-0.8323) and ( 0.2056,-0.8655) .. ( 0.2756,-0.8643)
    -- ( 0.2903,-0.8720)
    -- ( 0.3279,-0.8720)
    -- ( 0.3427,-0.8612)
    .. controls ( 0.3869,-0.8663) and ( 0.4661,-0.8748) .. ( 0.4741,-0.8502)
    .. controls ( 0.5431,-0.8855) and ( 0.5233,-0.7888) .. ( 0.5039,-0.8143)
    .. controls ( 0.4752,-0.7958) and ( 0.5046,-0.8131) .. ( 0.4741,-0.8331)
    .. controls ( 0.3949,-0.7997) and ( 0.4522,-0.8406) .. ( 0.3683,-0.8327)
    .. controls ( 0.3744,-0.7942) and ( 0.4288,-0.7829) .. ( 0.4051,-0.7307)
    .. controls ( 0.4260,-0.7007) and ( 0.4185,-0.6946) .. ( 0.4051,-0.6626)
    .. controls ( 0.3990,-0.6503) and ( 0.3940,-0.6359) .. ( 0.3839,-0.6265)
    .. controls ( 0.3585,-0.6027) and ( 0.3119,-0.5953) .. ( 0.2723,-0.5991)
    --cycle
    (-0.2424,-0.6455)
    -- (-0.2424,-0.6796)
    -- (-0.1997,-0.6711)
    -- (-0.1997,-0.6540)
    --cycle
```

```
    ( 0.2950,-0.6455)
    .. controls ( 0.3615,-0.6477) and ( 0.3567,-0.6705) .. ( 0.3974,-0.7222)
    .. controls ( 0.3592,-0.8249) and ( 0.3353,-0.7947) .. ( 0.2609,-0.7990)
    -- ( 0.2438,-0.7649)
    .. controls ( 0.2681,-0.7474) and ( 0.2638,-0.7424) .. ( 0.2609,-0.7137)
    -- ( 0.2950,-0.6881)
    .. controls ( 0.3035,-0.6916) and ( 0.3102,-0.6959) .. ( 0.3198,-0.6974)
    .. controls ( 0.3496,-0.7020) and ( 0.3487,-0.6665) .. ( 0.3120,-0.6881)
    --cycle
    (-0.6122,-0.6460)
    .. controls (-0.6202,-0.6484) and (-0.6222,-0.6534) .. (-0.6220,-0.6591)
    -- (-0.6084,-0.6829)
    .. controls (-0.6039,-0.6880) and (-0.6001,-0.6940) .. (-0.5958,-0.6974)
    .. controls (-0.5822,-0.7078) and (-0.5979,-0.7175) .. (-0.5836,-0.7137)
    -- (-0.5557,-0.7397)
    .. controls (-0.5863,-0.7181) and (-0.4852,-0.7770) .. (-0.5233,-0.7812)
    .. controls (-0.4643,-0.7650) and (-0.4542,-0.8172) .. (-0.4400,-0.7940)
    .. controls (-0.4310,-0.7794) and (-0.4454,-0.7672) .. (-0.4569,-0.7609)
    .. controls (-0.5042,-0.7356) and (-0.5468,-0.7364) .. (-0.5580,-0.6711)
    .. controls (-0.5740,-0.6662) and (-0.5960,-0.6410) .. (-0.6122,-0.6460)
    --cycle
    (-0.2799,-0.6723)
    .. controls (-0.2946,-0.6977) and (-0.2726,-0.7009) .. (-0.2645,-0.6954)
    .. controls (-0.2563,-0.6899) and (-0.2508,-0.6683) .. (-0.2799,-0.6723)
    --cycle
    (-0.1741,-0.6796)
    -- (-0.1826,-0.6881)
    -- (-0.1826,-0.7052)
    -- (-0.1571,-0.6796)
    --cycle
    ( 0.0647,-0.7393)
    -- ( 0.0733,-0.7735)
    -- ( 0.0902,-0.7735)
    -- ( 0.0988,-0.7649)
    -- ( 0.0988,-0.7478)
    --cycle
    ( 0.2267,-0.7564)
    -- ( 0.2352,-0.7564)
    -- ( 0.2352,-0.7649)
    --cycle
    (-0.2765,-0.7649)
    -- (-0.2850,-0.7990)
    -- (-0.2509,-0.7905)
    -- (-0.2595,-0.7649)
    --cycle
    (-0.1620,-0.7999)
    .. controls (-0.1665,-0.7994) and (-0.1723,-0.7994) .. (-0.1792,-0.8003)
    .. controls (-0.2378,-0.8436) and (-0.2549,-0.8217) .. (-0.2658,-0.8441)
    .. controls (-0.2799,-0.8733) and (-0.2098,-0.8685) .. (-0.1746,-0.8466)
    .. controls (-0.1557,-0.8347) and (-0.1302,-0.8033) .. (-0.1620,-0.7999)
    --cycle
    (-0.0021,-0.8033)
    .. controls (-0.0289,-0.7979) and (-0.0697,-0.8240) .. (-0.0817,-0.8284)
```

```
    .. controls (-0.1018,-0.8361) and (-0.1245,-0.8333) .. (-0.1384,-0.8539)
    .. controls (-0.1534,-0.8760) and (-0.1093,-0.8641) .. (-0.0866,-0.8639)
    .. controls (-0.0704,-0.8637) and (-0.0573,-0.8695) .. (-0.0331,-0.8549)
    .. controls ( 0.0004,-0.8348) and (-0.0157,-0.8559) .. ( 0.0221,-0.8587)
    .. controls ( 0.0252,-0.8212) and ( 0.0141,-0.8066) .. (-0.0021,-0.8033)
    --cycle
    ( 0.1096,-0.8160)
    .. controls ( 0.1044,-0.8138) and ( 0.0965,-0.8137) .. ( 0.0850,-0.8167)
    .. controls ( 0.0624,-0.8514) and ( 0.0794,-0.8648) .. ( 0.0988,-0.8546)
    .. controls ( 0.1148,-0.8462) and ( 0.1249,-0.8224) .. ( 0.1096,-0.8160)
    --cycle
    (-0.4386,-0.8161)
    -- (-0.4386,-0.8587)
    .. controls (-0.3929,-0.8508) and (-0.3929,-0.8240) .. (-0.4386,-0.8161)
    --cycle
    (-0.4898,-0.8246)
    -- (-0.5227,-0.8312)
    -- (-0.5082,-0.8563)
    .. controls (-0.5034,-0.8573) and (-0.4999,-0.8586) .. (-0.4898,-0.8587)
    -- (-0.4878,-0.8720)
    -- (-0.4837,-0.8720)
    -- (-0.4565,-0.8673)
    --cycle
    ;
  }
}
\fi
```

hex/terrain/swamp

The pattern for swamps. The pattern is filled with a light blue.

```
\tikzset{
  hex/terrain/swamp/.style={
    draw=none,
    fill={rgb,100:red,26;green,55;blue,70}
  }
}
```

hex/terrain/swamp

Swamps. This is probably the shortest of the terrain patterns.

```
\ifhex@terrain@pic
\tikzset{
  hex/terrain/swamp/.pic={
    \path[hex/terrain/swamp,pic actions,draw=none]
    (-0.5026, 0.8699)
    -- (-0.5041, 0.8672)
    .. controls (-0.3586, 0.8441) and (-0.1148, 0.8722) .. ( 0.0006, 0.8697)
    -- ( 0.2386, 0.8529)
    -- ( 0.2386, 0.8699)
    --cycle
```

```
    ( 0.4257, 0.8699)
    -- ( 0.4257, 0.8529)
    -- ( 0.5112, 0.8558)
    -- ( 0.5033, 0.8699)
    --cycle
    ( 0.3067, 0.8359)
    -- ( 0.2897, 0.7848)
    -- ( 0.2726, 0.8188)
    -- ( 0.2556, 0.8188)
    -- ( 0.2217, 0.7509)
    -- ( 0.5719, 0.7509)
    -- ( 0.5621, 0.7679)
    -- ( 0.5617, 0.7679)
    -- ( 0.3746, 0.7848)
    -- ( 0.3746, 0.8359)
    --cycle
    (-0.3225, 0.7848)
    -- (-0.3225, 0.7509)
    -- ( 0.0856, 0.7509)
    -- ( 0.0856, 0.7848)
    --cycle
    (-0.5555, 0.7782)
    -- (-0.5713, 0.7509)
    -- (-0.5097, 0.7509)
    --cycle
    ( 0.2789, 0.6696)
    .. controls ( 0.2234, 0.6713) and ( 0.1659, 0.6658) .. ( 0.1195, 0.6658)
    -- (-0.6117, 0.6658)
    -- (-0.6117, 0.6318)
    -- ( 0.4257, 0.6318)
    .. controls ( 0.3878, 0.6597) and ( 0.3344, 0.6681) .. ( 0.2789, 0.6696)
    --cycle
    ( 0.6297, 0.6318)
    -- ( 0.6297, 0.5468)
    -- ( 0.5617, 0.5807)
    .. controls ( 0.5449, 0.5387) and ( 0.5194, 0.5474) .. ( 0.4764, 0.5468)
    -- ( 0.2047, 0.5468)
    .. controls ( 0.2857, 0.5146) and ( 0.5508, 0.5135) .. ( 0.7089, 0.5136)
    -- ( 0.6740, 0.5740)
    -- ( 0.6638, 0.5637)
    --cycle
    (-0.6684, 0.5591)
    .. controls (-0.6731, 0.5588) and (-0.6784, 0.5577) .. (-0.6832, 0.5571)
    -- (-0.6990, 0.5298)
    -- (-0.5777, 0.5298)
    .. controls (-0.6139, 0.5561) and (-0.6407, 0.5608) .. (-0.6684, 0.5591)
    --cycle
    (-0.3396, 0.5468)
    .. controls (-0.2194, 0.4991) and (-0.1285, 0.5826) .. (-0.0845, 0.4447)
    -- (-0.1525, 0.4957)
    -- (-0.1525, 0.4277)
    .. controls (-0.0482, 0.4023) and ( 0.2732, 0.3989) .. ( 0.3746, 0.4277)
    .. controls ( 0.2597, 0.4733) and ( 0.2397, 0.4045) .. ( 0.1026, 0.4957)
```

```
    -- ( 0.0686, 0.4617)
    -- ( 0.0516, 0.4617)
    -- ( 0.0686, 0.5298)
    -- ( 0.0006, 0.4447)
    -- ( 0.0006, 0.5468)
    --cycle
    (-0.0675, 0.5127)
    -- (-0.0164, 0.5127)
    -- (-0.0505, 0.4447)
    --cycle
    (-0.7435, 0.4527)
    -- (-0.7580, 0.4277)
    -- (-0.6797, 0.4277)
    .. controls (-0.6982, 0.4394) and (-0.7200, 0.4471) .. (-0.7435, 0.4527)
    --cycle
    (-0.5266, 0.4447)
    .. controls (-0.4681, 0.4018) and (-0.4413, 0.4086) .. (-0.3736, 0.4277)
    --cycle
    ( 0.5787, 0.4277)
    -- ( 0.5447, 0.3257)
    -- ( 0.5108, 0.3257)
    -- ( 0.4597, 0.4107)
    -- ( 0.4597, 0.3257)
    -- ( 0.4257, 0.3937)
    -- ( 0.4087, 0.3257)
    -- ( 0.2897, 0.3257)
    .. controls ( 0.3725, 0.2928) and ( 0.6913, 0.3087) .. ( 0.7998, 0.3087)
    .. controls ( 0.7426, 0.3376) and ( 0.7264, 0.3382) .. ( 0.6638, 0.3257)
    -- ( 0.6638, 0.3767)
    -- ( 0.5787, 0.3257)
    --cycle
    (-0.7817, 0.3257)
    -- (-0.7137, 0.2407)
    -- (-0.7988, 0.2746)
    .. controls (-0.8162, 0.2534) and (-0.8404, 0.2432) .. (-0.8672, 0.2385)
    -- (-0.8857, 0.2066)
    -- (-0.6627, 0.2066)
    .. controls (-0.5059, 0.2059) and (-0.2690, 0.1655) .. (-0.1185, 0.2066)
    .. controls (-0.2358, 0.2532) and (-0.4834, 0.1773) .. (-0.5607, 0.2746)
    -- (-0.6287, 0.2237)
    -- (-0.6457, 0.2407)
    .. controls (-0.5823, 0.3108) and (-0.5667, 0.3074) .. (-0.4756, 0.3087)
    --cycle
    ( 0.8338, 0.2576)
    -- ( 0.7998, 0.2066)
    -- ( 0.8906, 0.1990)
    -- ( 0.8567, 0.2576)
    --cycle
    (-0.0164, 0.2237)
    .. controls ( 0.0715, 0.1799) and ( 0.3189, 0.1896) .. ( 0.4257, 0.1896)
    -- ( 0.4257, 0.2237)
    --cycle
    (-0.2716, 0.1216)
```

```
    -- (-0.2716, 0.0876)
    -- ( 0.1501, 0.0876)
    -- ( 0.1434, 0.1042)
    -- ( 0.0345, 0.1216)
    --cycle
    ( 0.1501, 0.0876)
    -- ( 0.1536, 0.0789)
    -- ( 0.1536, 0.0876)
    --cycle
    ( 0.1536, 0.0789)
    -- ( 0.1536, 0.0196)
    -- ( 0.0856, 0.0534)
    -- ( 0.0686,-0.0145)
    -- ( 0.7658,-0.0145)
    .. controls ( 0.6332, 0.0380) and ( 0.4479,-0.0524) .. ( 0.3406, 0.0534)
    -- ( 0.3236, 0.0534)
    -- ( 0.2897, 0.0196)
    -- ( 0.2897, 0.0876)
    -- ( 0.2556, 0.0196)
    -- ( 0.2386, 0.0876)
    -- ( 0.1705, 0.0365)
    --cycle
    ( 0.3917, 0.1216)
    -- ( 0.3917, 0.0876)
    -- ( 0.8678, 0.0876)
    .. controls ( 0.7768, 0.1266) and ( 0.5022, 0.1216) .. ( 0.3917, 0.1216)
    --cycle
    (-0.9351, 0.1208)
    -- (-0.9518, 0.0921)
    -- (-0.9518, 0.0876)
    -- (-0.6117, 0.1045)
    --cycle
    (-0.9144, 0.0213)
    .. controls (-0.9468, 0.0204) and (-0.9775, 0.0109) .. (-0.9996,-0.0116)
    -- (-0.9982,-0.0141)
    -- (-0.8158, 0.0026)
    .. controls (-0.8449, 0.0142) and (-0.8804, 0.0222) .. (-0.9144, 0.0213)
    --cycle
    (-0.6287, 0.0196)
    .. controls (-0.5470,-0.0404) and (-0.2796,-0.0145) .. (-0.1695,-0.0145)
    -- (-0.1695, 0.0196)
    --cycle
    (-0.9488,-0.0996)
    -- (-0.9292,-0.1335)
    -- (-0.4756,-0.1335)
    -- (-0.4756,-0.0996)
    --cycle
    (-0.2886,-0.0996)
    -- (-0.2886,-0.1335)
    -- ( 0.2726,-0.1335)
    .. controls ( 0.2164,-0.0920) and ( 0.1871,-0.0997) .. ( 0.1195,-0.0996)
    --cycle
    ( 0.5478,-0.1025)
```

```
    .. controls ( 0.5070,-0.1018) and ( 0.4651,-0.1086) .. ( 0.4257,-0.1165)
    -- ( 0.6638,-0.1335)
    .. controls ( 0.6286,-0.1113) and ( 0.5887,-0.1031) .. ( 0.5478,-0.1025)
    --cycle
    ( 0.8928,-0.1132)
    .. controls ( 0.8481,-0.1114) and ( 0.8007,-0.1165) .. ( 0.7658,-0.1165)
    -- ( 0.9264,-0.1394)
    -- ( 0.9384,-0.1186)
    .. controls ( 0.9238,-0.1157) and ( 0.9087,-0.1137) .. ( 0.8928,-0.1132)
    --cycle
    (-0.2982,-0.2002)
    .. controls (-0.3469,-0.2010) and (-0.3950,-0.2053) .. (-0.4416,-0.2185)
    -- (-0.0505,-0.2355)
    -- ( 0.7827,-0.2355)
    .. controls ( 0.6739,-0.1909) and ( 0.4335,-0.2017) .. ( 0.3067,-0.2016)
    -- (-0.1525,-0.2016)
    .. controls (-0.2005,-0.2016) and (-0.2496,-0.1992) .. (-0.2982,-0.2002)
    --cycle
    (-0.8328,-0.2016)
    .. controls (-0.7894,-0.2498) and (-0.7244,-0.2355) .. (-0.6627,-0.2355)
    -- (-0.6627,-0.3034)
    -- (-0.6967,-0.2696)
    -- (-0.7137,-0.2696)
    .. controls (-0.7385,-0.3064) and (-0.7772,-0.3191) .. (-0.8200,-0.3227)
    -- (-0.8113,-0.3377)
    .. controls (-0.6682,-0.3440) and (-0.4684,-0.3376) .. (-0.3906,-0.3376)
    -- (-0.4586,-0.2696)
    -- (-0.5266,-0.3034)
    -- (-0.5097,-0.2355)
    -- (-0.5607,-0.3206)
    -- (-0.5777,-0.2355)
    -- (-0.6457,-0.3034)
    -- (-0.6287,-0.2185)
    --cycle
    ( 0.8169,-0.2866)
    -- ( 0.7489,-0.3206)
    .. controls ( 0.7652,-0.3284) and ( 0.7871,-0.3345) .. ( 0.8114,-0.3386)
    -- ( 0.8324,-0.3020)
    --cycle
    ( 0.2076,-0.3170)
    .. controls ( 0.0913,-0.3168) and (-0.0288,-0.3206) .. (-0.0845,-0.3206)
    -- ( 0.2509,-0.3621)
    -- ( 0.2897,-0.4056)
    -- ( 0.2556,-0.3716)
    -- ( 0.2386,-0.3716)
    -- ( 0.2386,-0.4566)
    -- ( 0.4257,-0.4566)
    -- ( 0.3746,-0.3716)
    -- ( 0.3067,-0.4226)
    -- ( 0.3067,-0.3547)
    -- ( 0.4766,-0.3376)
    .. controls ( 0.4363,-0.3215) and ( 0.3237,-0.3172) .. ( 0.2076,-0.3170)
    --cycle
```

```
    (-0.7622,-0.4226)
    -- (-0.7427,-0.4566)
    -- (-0.5607,-0.4566)
    -- (-0.5607,-0.4226)
    --cycle
    (-0.3396,-0.4226)
    -- (-0.3396,-0.4566)
    -- (-0.0164,-0.4566)
    -- (-0.0164,-0.4226)
    --cycle
    ( 0.5787,-0.4226)
    .. controls ( 0.6179,-0.4661) and ( 0.6835,-0.4595) .. ( 0.7407,-0.4607)
    -- ( 0.7528,-0.4400)
    .. controls ( 0.6947,-0.4396) and ( 0.6370,-0.4368) .. ( 0.5787,-0.4226)
    --cycle
    (-0.2496,-0.5239)
    .. controls (-0.2827,-0.5212) and (-0.3176,-0.5246) .. (-0.3566,-0.5246)
    -- (-0.7034,-0.5246)
    -- (-0.6873,-0.5524)
    .. controls (-0.6429,-0.5639) and (-0.5972,-0.5587) .. (-0.5436,-0.5587)
    -- (-0.1525,-0.5587)
    .. controls (-0.1848,-0.5349) and (-0.2163,-0.5263) .. (-0.2496,-0.5239)
    --cycle
    (-0.0164,-0.5417)
    .. controls ( 0.0514,-0.5917) and ( 0.1065,-0.5717) .. ( 0.1876,-0.5736)
    .. controls ( 0.2932,-0.5761) and ( 0.5300,-0.5848) .. ( 0.6766,-0.5720)
    -- ( 0.6872,-0.5538)
    -- ( 0.4937,-0.5417)
    --cycle
    (-0.6255,-0.6593)
    -- (-0.6248,-0.6607)
    -- (-0.6117,-0.6607)
    --cycle
    (-0.5777,-0.6607)
    -- (-0.5777,-0.7287)
    -- (-0.5856,-0.7287)
    -- (-0.5659,-0.7627)
    -- (-0.3906,-0.7627)
    -- (-0.1695,-0.7627)
    -- (-0.4246,-0.7287)
    -- (-0.4076,-0.6607)
    -- (-0.4416,-0.7287)
    -- (-0.4756,-0.7287)
    -- (-0.4756,-0.6607)
    -- (-0.5097,-0.6607)
    -- (-0.5097,-0.7287)
    --cycle
    ( 0.0686,-0.7457)
    .. controls ( 0.1464,-0.8028) and ( 0.3428,-0.7798) .. ( 0.4427,-0.7798)
    -- ( 0.4427,-0.7457)
    --cycle
    (-0.3736,-0.8478)
    -- (-0.3736,-0.8722)
```

```
    -- (-0.2203,-0.8722)
    .. controls (-0.2708,-0.8419) and (-0.3097,-0.8478) .. (-0.3736,-0.8478)
    --cycle
    (-0.0172,-0.8544)
    .. controls (-0.0398,-0.8556) and (-0.0623,-0.8586) .. (-0.0845,-0.8648)
    .. controls (-0.0753,-0.8684) and (-0.0664,-0.8700) .. (-0.0573,-0.8722)
    -- ( 0.5033,-0.8722)
    -- ( 0.5088,-0.8626)
    .. controls ( 0.3892,-0.8602) and ( 0.2527,-0.8649) .. ( 0.1876,-0.8648)
    .. controls ( 0.1186,-0.8647) and ( 0.0502,-0.8509) .. (-0.0172,-0.8544)
    --cycle
    ;
  }
}
\fi
```

hex/terrain/rough

The style for rough hexes. The pattern is filled with a light brown, and outlines are not drawn.

```
\tikzset{
  hex/terrain/rough/.style={
    draw=none,
    fill={rgb,100:red,79;green,68;blue,41}
  }
}
```

hex/terrain/rough

Roughs. Again, a bit long.

```
\ifhex@terrain@pic
\tikzset{
  hex/terrain/rough/.pic={
    \path[hex/terrain/rough,pic actions,draw=none]
    (-0.2701, 0.8873)
    .. controls (-0.2982, 0.8927) and (-0.3250, 0.8675) .. (-0.3296, 0.8537)
    .. controls (-0.3363, 0.8337) and (-0.3058, 0.8263) .. (-0.2820, 0.8610)
    .. controls (-0.2717, 0.8450) and (-0.2591, 0.8228) .. (-0.2441, 0.8112)
    .. controls (-0.2057, 0.7817) and (-0.1394, 0.7709) .. (-0.1208, 0.8270)
    -- (-0.2226, 0.8355)
    .. controls (-0.2359, 0.8698) and (-0.2532, 0.8840) .. (-0.2701, 0.8873)
    --cycle
    (-0.1081, 0.8792)
    .. controls (-0.1371, 0.8680) and (-0.1265, 0.8900) .. (-0.1377, 0.8610)
    .. controls (-0.1121, 0.8691) and (-0.1163, 0.8536) .. (-0.1081, 0.8792)
    --cycle
    ( 0.1762, 0.8752)
    -- ( 0.1761, 0.8710)
    .. controls ( 0.1746, 0.8556) and ( 0.1707, 0.8704) .. ( 0.1822, 0.8575)
    .. controls ( 0.1958, 0.8423) and ( 0.2514, 0.8065) .. ( 0.2435, 0.8694)
    --cycle
    ( 0.3216, 0.8740)
```

```
    .. controls ( 0.3061, 0.8744) and ( 0.2932, 0.8668) .. ( 0.2896, 0.8414)
    .. controls ( 0.2869, 0.8222) and ( 0.3049, 0.8110) .. ( 0.3122, 0.7930)
    -- ( 0.3292, 0.7930)
    -- ( 0.3377, 0.8440)
    -- ( 0.3874, 0.8438)
    -- ( 0.3702, 0.8584)
    .. controls ( 0.3556, 0.8652) and ( 0.3372, 0.8736) .. ( 0.3216, 0.8740)
    --cycle
    ( 0.4696, 0.8697)
    .. controls ( 0.4362, 0.8687) and ( 0.4116, 0.8113) .. ( 0.4594, 0.7865)
    -- ( 0.4565, 0.8238)
    -- ( 0.5034, 0.8485)
    .. controls ( 0.4927, 0.8641) and ( 0.4807, 0.8700) .. ( 0.4696, 0.8697)
    --cycle
    (-0.0783, 0.8695)
    -- (-0.0698, 0.8185)
    -- (-0.0528, 0.8185)
    .. controls (-0.0488, 0.8507) and (-0.0499, 0.8533) .. (-0.0783, 0.8695)
    --cycle
    ( 0.0321, 0.8695)
    .. controls (-0.0074, 0.8534) and (-0.0195, 0.8453) .. (-0.0104, 0.8015)
    .. controls ( 0.0252, 0.8183) and ( 0.0356, 0.8295) .. ( 0.0321, 0.8695)
    --cycle
    (-0.4155, 0.8596)
    .. controls (-0.4417, 0.8307) and (-0.4165, 0.8213) .. (-0.4032, 0.8284)
    .. controls (-0.3903, 0.8353) and (-0.3789, 0.8639) .. (-0.4155, 0.8596)
    --cycle
    (-0.4857, 0.8525)
    .. controls (-0.4972, 0.8321) and (-0.5172, 0.8207) .. (-0.5389, 0.8116)
    -- (-0.5595, 0.7763)
    .. controls (-0.5377, 0.7748) and (-0.5144, 0.7944) .. (-0.4942, 0.8100)
    -- (-0.4857, 0.7845)
    .. controls (-0.4503, 0.8051) and (-0.4552, 0.8169) .. (-0.4688, 0.8525)
    --cycle
    ( 0.1002, 0.8511)
    .. controls ( 0.0869, 0.8528) and ( 0.0769, 0.8478) .. ( 0.0696, 0.8260)
    -- ( 0.1509, 0.8185)
    -- ( 0.1509, 0.8355)
    .. controls ( 0.1302, 0.8408) and ( 0.1135, 0.8493) .. ( 0.1002, 0.8511)
    --cycle
    ( 0.2485, 0.8268)
    .. controls ( 0.2378, 0.8296) and ( 0.2250, 0.8213) .. ( 0.2103, 0.7930)
    .. controls ( 0.2410, 0.7676) and ( 0.2451, 0.7555) .. ( 0.2867, 0.7591)
    .. controls ( 0.2791, 0.7861) and ( 0.2665, 0.8220) .. ( 0.2485, 0.8268)
    --cycle
    (-0.3754, 0.8100)
    -- (-0.3754, 0.7930)
    -- (-0.3330, 0.7930)
    -- (-0.3330, 0.8100)
    --cycle
    ( 0.5066, 0.8010)
    -- ( 0.5131, 0.7667)
    -- ( 0.5443, 0.7538)
```

```
    -- ( 0.5566, 0.7611)
    -- ( 0.5392, 0.7958)
    --cycle
    (-0.4008, 0.7930)
    -- (-0.4348, 0.7591)
    --cycle
    ( 0.1509, 0.7930)
    -- ( 0.1254, 0.7676)
    .. controls ( 0.1432, 0.7361) and ( 0.1497, 0.7365) .. ( 0.1849, 0.7336)
    .. controls ( 0.1820, 0.7688) and ( 0.1824, 0.7753) .. ( 0.1509, 0.7930)
    --cycle
    ( 0.0301, 0.7854)
    .. controls ( 0.0240, 0.7861) and ( 0.0162, 0.7858) .. ( 0.0066, 0.7845)
    -- ( 0.0490, 0.7421)
    .. controls ( 0.0527, 0.7709) and ( 0.0486, 0.7831) .. ( 0.0301, 0.7854)
    --cycle
    (-0.2757, 0.7847)
    .. controls (-0.2819, 0.7857) and (-0.2896, 0.7857) .. (-0.2990, 0.7845)
    -- (-0.2820, 0.7411)
    .. controls (-0.3010, 0.7423) and (-0.3576, 0.7485) .. (-0.3704, 0.7411)
    .. controls (-0.3832, 0.7314) and (-0.3819, 0.7137) .. (-0.3644, 0.7089)
    .. controls (-0.3522, 0.7029) and (-0.3199, 0.7069) .. (-0.3075, 0.7089)
    .. controls (-0.2647, 0.7227) and (-0.2326, 0.7776) .. (-0.2757, 0.7847)
    --cycle
    ( 0.3631, 0.7676)
    -- ( 0.3122, 0.7479)
    .. controls ( 0.3064, 0.6995) and ( 0.3021, 0.7030) .. ( 0.3546, 0.7166)
    .. controls ( 0.3550, 0.6777) and ( 0.3499, 0.6644) .. ( 0.3886, 0.6488)
    .. controls ( 0.3854, 0.7398) and ( 0.3467, 0.6989) .. ( 0.3631, 0.7676)
    --cycle
    ( 0.5753, 0.7676)
    .. controls ( 0.5837, 0.7354) and ( 0.5927, 0.7219) .. ( 0.6097, 0.7131)
    -- ( 0.5796, 0.7669)
    .. controls ( 0.5781, 0.7670) and ( 0.5768, 0.7674) .. ( 0.5753, 0.7676)
    --cycle
    (-0.5536, 0.7591)
    -- (-0.5706, 0.7082)
    -- (-0.5621, 0.6997)
    -- (-0.5027, 0.6997)
    .. controls (-0.5136, 0.7365) and (-0.5192, 0.7422) .. (-0.5536, 0.7591)
    --cycle
    (-0.1361, 0.7534)
    .. controls (-0.1512, 0.7509) and (-0.1612, 0.7304) .. (-0.1462, 0.6912)
    -- (-0.0953, 0.7082)
    .. controls (-0.1007, 0.7406) and (-0.1210, 0.7560) .. (-0.1361, 0.7534)
    --cycle
    (-0.4655, 0.7519)
    .. controls (-0.4811, 0.7476) and (-0.4887, 0.7146) .. (-0.4551, 0.6911)
    .. controls (-0.4447, 0.6838) and (-0.4376, 0.6846) .. (-0.4263, 0.6827)
    -- (-0.4362, 0.7201)
    .. controls (-0.4440, 0.7466) and (-0.4562, 0.7544) .. (-0.4655, 0.7519)
    --cycle
    (-0.2311, 0.7421)
```

```
    -- (-0.2480, 0.7082)
    -- (-0.1971, 0.6827)
    -- (-0.2141, 0.7421)
    --cycle
    ( 0.4819, 0.7421)
    -- ( 0.5244, 0.7082)
    -- ( 0.5329, 0.7166)
    -- ( 0.5329, 0.7336)
    --cycle
    ( 0.4140, 0.7336)
    .. controls ( 0.4091, 0.6951) and ( 0.4180, 0.6863) .. ( 0.4565, 0.6912)
    --cycle
    ( 0.1000, 0.7166)
    .. controls ( 0.0969, 0.7064) and ( 0.0893, 0.6845) .. ( 0.0896, 0.6747)
    .. controls ( 0.0911, 0.6142) and ( 0.1603, 0.6571) .. ( 0.1849, 0.6658)
    -- ( 0.2260, 0.6725)
    .. controls ( 0.2381, 0.6766) and ( 0.2515, 0.6891) .. ( 0.2429, 0.7019)
    .. controls ( 0.2330, 0.7185) and ( 0.1897, 0.7058) .. ( 0.1756, 0.7019)
    -- ( 0.1339, 0.6827)
    --cycle
    ( 0.0321, 0.7082)
    -- (-0.0019, 0.6318)
    .. controls ( 0.0528, 0.6362) and ( 0.0992, 0.6731) .. ( 0.0321, 0.7082)
    --cycle
    ( 0.5074, 0.6997)
    .. controls ( 0.5090, 0.6563) and ( 0.5107, 0.6351) .. ( 0.5584, 0.6572)
    --cycle
    (-0.6116, 0.6867)
    -- (-0.6413, 0.6359)
    .. controls (-0.6321, 0.6229) and (-0.6158, 0.6171) .. (-0.6009, 0.6289)
    .. controls (-0.5820, 0.6437) and (-0.5846, 0.6623) .. (-0.5876, 0.6827)
    --cycle
    (-0.3414, 0.6742)
    .. controls (-0.3515, 0.6371) and (-0.3559, 0.6083) .. (-0.3075, 0.6148)
    -- (-0.3245, 0.6742)
    --cycle
    (-0.5112, 0.6657)
    -- (-0.5112, 0.6318)
    -- (-0.4772, 0.6233)
    -- (-0.5027, 0.5893)
    -- (-0.5027, 0.5808)
    -- (-0.4857, 0.5638)
    .. controls (-0.4400, 0.6074) and (-0.4373, 0.6597) .. (-0.5112, 0.6657)
    --cycle
    (-0.2905, 0.6657)
    .. controls (-0.2682, 0.6064) and (-0.2058, 0.5997) .. (-0.2141, 0.6657)
    --cycle
    (-0.0953, 0.6488)
    -- (-0.1547, 0.6403)
    -- (-0.1377, 0.5553)
    -- (-0.1208, 0.5553)
    .. controls (-0.0926, 0.5982) and (-0.0954, 0.5977) .. (-0.0953, 0.6488)
    --cycle
```

```
    ( 0.0915, 0.6403)
    .. controls ( 0.0497, 0.6269) and ( 0.0505, 0.6133) .. ( 0.0490, 0.5723)
    .. controls ( 0.0796, 0.5913) and ( 0.0822, 0.6066) .. ( 0.0915, 0.6403)
    --cycle
    ( 0.4310, 0.6403)
    .. controls ( 0.4211, 0.6043) and ( 0.4125, 0.5931) .. ( 0.4480, 0.5723)
    -- ( 0.4819, 0.6148)
    -- ( 0.4819, 0.6318)
    --cycle
    ( 0.5838, 0.6403)
    .. controls ( 0.5923, 0.5846) and ( 0.5925, 0.5918) .. ( 0.6362, 0.5668)
    -- ( 0.6521, 0.5663)
    -- ( 0.6615, 0.5890)
    .. controls ( 0.6340, 0.6304) and ( 0.6328, 0.6347) .. ( 0.5838, 0.6403)
    --cycle
    ( 0.2018, 0.6233)
    -- ( 0.2018, 0.5808)
    -- ( 0.2358, 0.5808)
    .. controls ( 0.2306, 0.6108) and ( 0.2301, 0.6119) .. ( 0.2018, 0.6233)
    --cycle
    ( 0.3200, 0.6175)
    .. controls ( 0.3147, 0.6171) and ( 0.3095, 0.6162) .. ( 0.3037, 0.6159)
    -- ( 0.3144, 0.5906)
    .. controls ( 0.3494, 0.5385) and ( 0.3913, 0.6066) .. ( 0.3367, 0.6159)
    .. controls ( 0.3306, 0.6176) and ( 0.3252, 0.6178) .. ( 0.3200, 0.6175)
    --cycle
    ( 0.1254, 0.6148)
    -- ( 0.1169, 0.5553)
    -- ( 0.1339, 0.5553)
    -- ( 0.1594, 0.5808)
    --cycle
    (-0.0188, 0.6063)
    .. controls (-0.0629, 0.5361) and (-0.0925, 0.5785) .. (-0.1038, 0.5044)
    -- (-0.0528, 0.4875)
    .. controls (-0.0307, 0.5232) and (-0.0275, 0.5285) .. ( 0.0151, 0.5299)
    .. controls ( 0.0257, 0.5724) and ( 0.0206, 0.5860) .. (-0.0188, 0.6063)
    --cycle
    (-0.2820, 0.5893)
    .. controls (-0.2753, 0.5073) and (-0.2107, 0.5185) .. (-0.1801, 0.5808)
    --cycle
    ( 0.5244, 0.5893)
    .. controls ( 0.5408, 0.5621) and ( 0.5447, 0.5620) .. ( 0.5753, 0.5553)
    .. controls ( 0.5625, 0.5873) and ( 0.5579, 0.5867) .. ( 0.5244, 0.5893)
    --cycle
    (-0.4023, 0.5839)
    .. controls (-0.4095, 0.5826) and (-0.4161, 0.5794) .. (-0.4210, 0.5751)
    .. controls (-0.4340, 0.5638) and (-0.4334, 0.5376) .. (-0.4348, 0.5214)
    .. controls (-0.3835, 0.5433) and (-0.4044, 0.5361) .. (-0.3499, 0.5299)
    .. controls (-0.3537, 0.5756) and (-0.3808, 0.5879) .. (-0.4023, 0.5839)
    --cycle
    (-0.6717, 0.5836)
    -- (-0.7007, 0.5338)
    .. controls (-0.6810, 0.5286) and (-0.6639, 0.5441) .. (-0.6717, 0.5836)
```

```
    --cycle
    (-0.5683, 0.5760)
    .. controls (-0.5775, 0.5769) and (-0.5875, 0.5722) .. (-0.6045, 0.5638)
    -- (-0.5876, 0.5214)
    -- (-0.5367, 0.5553)
    .. controls (-0.5506, 0.5688) and (-0.5590, 0.5752) .. (-0.5683, 0.5760)
    --cycle
    ( 0.2527, 0.5638)
    -- ( 0.2782, 0.5129)
    -- ( 0.2867, 0.5129)
    -- ( 0.3037, 0.5299)
    .. controls ( 0.2852, 0.5566) and ( 0.2848, 0.5585) .. ( 0.2527, 0.5638)
    --cycle
    ( 0.6946, 0.5616)
    .. controls ( 0.6944, 0.5600) and ( 0.6921, 0.5548) .. ( 0.6787, 0.5413)
    -- ( 0.6878, 0.5061)
    .. controls ( 0.6794, 0.4976) and ( 0.6747, 0.5161) .. ( 0.6694, 0.5045)
    -- ( 0.6262, 0.5469)
    .. controls ( 0.6001, 0.4510) and ( 0.6708, 0.4762) .. ( 0.6776, 0.4804)
    .. controls ( 0.6913, 0.4889) and ( 0.7003, 0.4848) .. ( 0.7078, 0.4982)
    -- ( 0.7283, 0.4862)
    -- ( 0.7151, 0.5087)
    -- ( 0.6995, 0.5381)
    .. controls ( 0.6915, 0.5505) and ( 0.6933, 0.5583) .. ( 0.6948, 0.5614)
    --cycle
    ( 0.1764, 0.5469)
    .. controls ( 0.1765, 0.5023) and ( 0.1718, 0.4964) .. ( 0.2018, 0.4620)
    -- ( 0.2443, 0.4790)
    .. controls ( 0.2287, 0.5015) and ( 0.2286, 0.4995) .. ( 0.2018, 0.4960)
    -- ( 0.1934, 0.5044)
    -- ( 0.1934, 0.5469)
    --cycle
    ( 0.3971, 0.5384)
    -- ( 0.4056, 0.5044)
    -- ( 0.4649, 0.4875)
    -- ( 0.4904, 0.5384)
    -- ( 0.4395, 0.5214)
    --cycle
    ( 0.5668, 0.5384)
    .. controls ( 0.5368, 0.5332) and ( 0.5357, 0.5327) .. ( 0.5244, 0.5044)
    -- ( 0.5329, 0.4960)
    -- ( 0.5668, 0.5044)
    -- ( 0.5499, 0.4620)
    .. controls ( 0.5250, 0.4718) and ( 0.5240, 0.4756) .. ( 0.5074, 0.4535)
    -- ( 0.5584, 0.4280)
    .. controls ( 0.6164, 0.4608) and ( 0.5800, 0.4918) .. ( 0.5668, 0.5384)
    --cycle
    ( 0.0770, 0.5310)
    .. controls ( 0.0682, 0.5304) and ( 0.0588, 0.5222) .. ( 0.0538, 0.5053)
    .. controls ( 0.0343, 0.4401) and ( 0.0794, 0.3794) .. ( 0.1169, 0.4450)
    -- ( 0.0830, 0.4535)
    .. controls ( 0.0904, 0.4711) and ( 0.1010, 0.4920) .. ( 0.0968, 0.5117)
    .. controls ( 0.0941, 0.5249) and ( 0.0858, 0.5317) .. ( 0.0770, 0.5310)
```

```
--cycle
(-0.3075, 0.5299)
-- (-0.3414, 0.4790)
-- (-0.3330, 0.4705)
.. controls (-0.2926, 0.4813) and (-0.2724, 0.4931) .. (-0.3075, 0.5299)
--cycle
(-0.6105, 0.5210)
.. controls (-0.6292, 0.5286) and (-0.6359, 0.5102) .. (-0.6385, 0.4790)
-- (-0.5876, 0.5044)
.. controls (-0.5967, 0.5132) and (-0.6043, 0.5185) .. (-0.6105, 0.5210)
--cycle
(-0.6810, 0.5129)
.. controls (-0.6924, 0.5121) and (-0.7036, 0.5121) .. (-0.7147, 0.5086)
.. controls (-0.7151, 0.5085) and (-0.7153, 0.5083) .. (-0.7157, 0.5081)
-- (-0.7430, 0.4612)
.. controls (-0.7297, 0.4478) and (-0.7007, 0.4457) .. (-0.6860, 0.4801)
.. controls (-0.6815, 0.4906) and (-0.6819, 0.5019) .. (-0.6810, 0.5129)
--cycle
(-0.1462, 0.5129)
.. controls (-0.1949, 0.5129) and (-0.2098, 0.5207) .. (-0.2480, 0.4875)
-- (-0.2480, 0.4790)
-- (-0.2311, 0.4620)
-- (-0.1801, 0.4790)
-- (-0.1801, 0.4535)
-- (-0.1462, 0.4535)
--cycle
( 0.0066, 0.5044)
-- (-0.0019, 0.4620)
.. controls (-0.0908, 0.4424) and (-0.0252, 0.3738) .. ( 0.0185, 0.4370)
.. controls ( 0.0238, 0.4448) and ( 0.0272, 0.4527) .. ( 0.0290, 0.4620)
.. controls ( 0.0322, 0.4784) and ( 0.0277, 0.4893) .. ( 0.0236, 0.5044)
--cycle
(-0.5118, 0.4944)
.. controls (-0.5315, 0.4962) and (-0.5506, 0.4944) .. (-0.5676, 0.4798)
.. controls (-0.5973, 0.4546) and (-0.5662, 0.4306) .. (-0.5676, 0.4033)
.. controls (-0.5682, 0.3806) and (-0.5896, 0.3679) .. (-0.5934, 0.3509)
.. controls (-0.6001, 0.3209) and (-0.5656, 0.2986) .. (-0.5452, 0.2838)
-- (-0.5621, 0.2498)
-- (-0.5282, 0.2498)
.. controls (-0.5165, 0.2920) and (-0.5111, 0.3040) .. (-0.5536, 0.3262)
.. controls (-0.5263, 0.3959) and (-0.5223, 0.3799) .. (-0.5452, 0.4535)
-- (-0.4857, 0.4705)
-- (-0.4518, 0.4535)
-- (-0.4518, 0.4875)
.. controls (-0.4715, 0.4873) and (-0.4920, 0.4926) .. (-0.5118, 0.4944)
--cycle
( 0.3588, 0.4802)
.. controls ( 0.3533, 0.4806) and ( 0.3465, 0.4801) .. ( 0.3377, 0.4790)
-- ( 0.3801, 0.4365)
-- ( 0.3886, 0.4450)
.. controls ( 0.3795, 0.4694) and ( 0.3752, 0.4789) .. ( 0.3588, 0.4802)
--cycle
(-0.3923, 0.4620)
```

```
    .. controls (-0.3995, 0.4156) and (-0.3752, 0.3562) .. (-0.3330, 0.3347)
    -- (-0.3245, 0.3431)
    -- (-0.3172, 0.4229)
    -- (-0.3754, 0.4620)
    --cycle
    ( 0.1254, 0.4620)
    .. controls ( 0.1311, 0.4303) and ( 0.1371, 0.3466) .. ( 0.1909, 0.3657)
    .. controls ( 0.2082, 0.3718) and ( 0.2132, 0.3929) .. ( 0.2274, 0.4041)
    .. controls ( 0.2376, 0.4123) and ( 0.2569, 0.4158) .. ( 0.2697, 0.4196)
    .. controls ( 0.2404, 0.4707) and ( 0.2211, 0.4375) .. ( 0.1594, 0.4196)
    --cycle
    ( 0.6347, 0.4620)
    .. controls ( 0.5865, 0.3970) and ( 0.5594, 0.4145) .. ( 0.5753, 0.3516)
    .. controls ( 0.6248, 0.3639) and ( 0.6190, 0.3659) .. ( 0.6687, 0.3516)
    .. controls ( 0.6624, 0.3942) and ( 0.6392, 0.4050) .. ( 0.6772, 0.4280)
    --cycle
    (-0.2735, 0.4535)
    .. controls (-0.2776, 0.4212) and (-0.2764, 0.4187) .. (-0.2480, 0.4026)
    -- (-0.2565, 0.4535)
    --cycle
    ( 0.4565, 0.4535)
    -- ( 0.4395, 0.4365)
    -- ( 0.4395, 0.4280)
    -- ( 0.4565, 0.4111)
    -- ( 0.4649, 0.4111)
    -- ( 0.4819, 0.4280)
    --cycle
    ( 0.7558, 0.4524)
    .. controls ( 0.7494, 0.4473) and ( 0.7430, 0.4394) .. ( 0.7366, 0.4280)
    .. controls ( 0.7552, 0.4225) and ( 0.7653, 0.4183) .. ( 0.7753, 0.4176)
    --cycle
    (-0.4518, 0.4450)
    -- (-0.4772, 0.4365)
    -- (-0.4518, 0.4196)
    --cycle
    (-0.6423, 0.4300)
    .. controls (-0.6532, 0.4307) and (-0.6637, 0.4304) .. (-0.6690, 0.4274)
    .. controls (-0.6866, 0.4158) and (-0.6850, 0.3910) .. (-0.6630, 0.3848)
    -- (-0.6130, 0.3848)
    -- (-0.6130, 0.4274)
    .. controls (-0.6201, 0.4279) and (-0.6314, 0.4294) .. (-0.6423, 0.4300)
    --cycle
    ( 0.7111, 0.4196)
    -- ( 0.7451, 0.3771)
    .. controls ( 0.7399, 0.4071) and ( 0.7394, 0.4082) .. ( 0.7111, 0.4196)
    --cycle
    (-0.7404, 0.4111)
    -- (-0.7574, 0.3347)
    -- (-0.7065, 0.3262)
    -- (-0.7234, 0.4111)
    --cycle
    (-0.1547, 0.4111)
    -- (-0.1462, 0.3601)
```

```
    -- (-0.1038, 0.3856)
    .. controls (-0.0885, 0.3562) and (-0.0864, 0.3520) .. (-0.0528, 0.3516)
    -- (-0.0783, 0.4026)
    --cycle
    ( 0.3886, 0.4111)
    .. controls ( 0.3213, 0.4055) and ( 0.3289, 0.3610) .. ( 0.3801, 0.3347)
    --cycle
    ( 0.3801, 0.3347)
    -- ( 0.3801, 0.3262)
    -- ( 0.3631, 0.3092)
    -- ( 0.3801, 0.2753)
    -- ( 0.3971, 0.2753)
    .. controls ( 0.4050, 0.3067) and ( 0.4083, 0.3157) .. ( 0.3801, 0.3347)
    --cycle
    ( 0.5074, 0.4026)
    -- ( 0.4565, 0.3516)
    .. controls ( 0.4935, 0.3518) and ( 0.5571, 0.3505) .. ( 0.5074, 0.4026)
    --cycle
    (-0.4348, 0.3941)
    -- (-0.4433, 0.3856)
    -- (-0.4348, 0.3516)
    -- (-0.4008, 0.3856)
    --cycle
    (-0.5112, 0.3856)
    -- (-0.5027, 0.3347)
    -- (-0.4518, 0.3856)
    --cycle
    ( 0.0405, 0.3856)
    .. controls ( 0.0481, 0.3444) and ( 0.0444, 0.3224) .. ( 0.0830, 0.3007)
    -- ( 0.1169, 0.3686)
    --cycle
    ( 0.2586, 0.3821)
    .. controls ( 0.2327, 0.3759) and ( 0.2165, 0.3319) .. ( 0.2699, 0.3440)
    -- ( 0.2952, 0.3516)
    .. controls ( 0.2928, 0.3578) and ( 0.2924, 0.3646) .. ( 0.2856, 0.3722)
    .. controls ( 0.2770, 0.3820) and ( 0.2672, 0.3842) .. ( 0.2586, 0.3821)
    --cycle
    (-0.2650, 0.3686)
    .. controls (-0.2695, 0.3349) and (-0.2648, 0.3302) .. (-0.2311, 0.3347)
    --cycle
    ( 0.8037, 0.3670)
    .. controls ( 0.7958, 0.3549) and ( 0.8002, 0.3405) .. ( 0.8215, 0.3262)
    -- ( 0.8225, 0.3334)
    --cycle
    (-0.0104, 0.3601)
    -- (-0.0273, 0.3007)
    -- (-0.0698, 0.3007)
    .. controls (-0.0385, 0.2465) and ( 0.0057, 0.2824) .. ( 0.0066, 0.3601)
    --cycle
    (-0.4348, 0.3431)
    -- (-0.4348, 0.3007)
    .. controls (-0.4123, 0.3163) and (-0.4143, 0.3163) .. (-0.4178, 0.3431)
    --cycle
```

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    (-0.8185, 0.3317)
    -- (-0.8365, 0.3007)
    -- (-0.7998, 0.3007)
    -- (-0.7998, 0.3177)
    --cycle
    ( 0.4649, 0.3315)
    .. controls ( 0.4219, 0.3238) and ( 0.4094, 0.2904) .. ( 0.4395, 0.2583)
    -- ( 0.4565, 0.2922)
    -- ( 0.5414, 0.2922)
    -- ( 0.5414, 0.3092)
    .. controls ( 0.5190, 0.3194) and ( 0.4902, 0.3361) .. ( 0.4649, 0.3315)
    --cycle
    (-0.6388, 0.3309)
    .. controls (-0.6527, 0.3328) and (-0.6597, 0.3256) .. (-0.6674, 0.3156)
    -- (-0.6895, 0.2838)
    .. controls (-0.6839, 0.2742) and (-0.6820, 0.2649) .. (-0.6700, 0.2597)
    .. controls (-0.6290, 0.2418) and (-0.5917, 0.3244) .. (-0.6388, 0.3309)
    --cycle
    (-0.1462, 0.3262)
    .. controls (-0.1623, 0.2693) and (-0.1610, 0.2418) .. (-0.0953, 0.2498)
    -- (-0.1292, 0.3262)
    --cycle
    ( 0.2103, 0.3262)
    -- ( 0.1849, 0.2753)
    .. controls ( 0.2243, 0.2757) and ( 0.2321, 0.2881) .. ( 0.2273, 0.3262)
    --cycle
    ( 0.3292, 0.3262)
    -- ( 0.2782, 0.2668)
    -- ( 0.2782, 0.2498)
    -- ( 0.3390, 0.2109)
    .. controls ( 0.3506, 0.1937) and ( 0.3360, 0.1683) .. ( 0.3513, 0.1579)
    .. controls ( 0.3686, 0.1461) and ( 0.4096, 0.1877) .. ( 0.3631, 0.2073)
    -- ( 0.3801, 0.2243)
    -- ( 0.3377, 0.2583)
    -- ( 0.3546, 0.3007)
    --cycle
    ( 0.6941, 0.3262)
    -- ( 0.6941, 0.2838)
    -- ( 0.7111, 0.2838)
    -- ( 0.7111, 0.3262)
    --cycle
    ( 0.7706, 0.3177)
    -- ( 0.7366, 0.3092)
    -- ( 0.7366, 0.2922)
    -- ( 0.7451, 0.2838)
    -- ( 0.7621, 0.2838)
    --cycle
    (-0.7913, 0.3092)
    -- (-0.7828, 0.2583)
    -- (-0.7658, 0.2583)
    -- (-0.7574, 0.2668)
    -- (-0.7743, 0.3092)
    --cycle
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    ( 0.6093, 0.3092)
    -- ( 0.5838, 0.2413)
    -- ( 0.6093, 0.2668)
    -- ( 0.6347, 0.2583)
    -- ( 0.6432, 0.3092)
    --cycle
    (-0.3494, 0.3079)
    .. controls (-0.4142, 0.2885) and (-0.3452, 0.2195) .. (-0.3258, 0.2842)
    -- (-0.3258, 0.3079)
    --cycle
    ( 0.1084, 0.3007)
    .. controls ( 0.1005, 0.2885) and ( 0.0956, 0.2764) .. ( 0.0807, 0.2708)
    .. controls ( 0.0663, 0.2653) and ( 0.0431, 0.2752) .. ( 0.0335, 0.2617)
    .. controls ( 0.0200, 0.2427) and ( 0.0540, 0.2322) .. ( 0.0660, 0.2298)
    .. controls ( 0.1034, 0.2226) and ( 0.1204, 0.2407) .. ( 0.1509, 0.2583)
    --cycle
    (-0.2201, 0.2946)
    .. controls (-0.2487, 0.2922) and (-0.2701, 0.2767) .. (-0.2990, 0.2583)
    -- (-0.2565, 0.2073)
    -- (-0.1886, 0.2922)
    .. controls (-0.2003, 0.2947) and (-0.2106, 0.2954) .. (-0.2201, 0.2946)
    --cycle
    (-0.4772, 0.2583)
    .. controls (-0.5022, 0.2481) and (-0.5267, 0.2367) .. (-0.5427, 0.2138)
    .. controls (-0.5681, 0.1773) and (-0.5547, 0.1549) .. (-0.5112, 0.1575)
    .. controls (-0.4976, 0.1584) and (-0.4899, 0.1613) .. (-0.4772, 0.1649)
    -- (-0.4688, 0.1564)
    -- (-0.4688, 0.1225)
    -- (-0.4518, 0.1225)
    .. controls (-0.4302, 0.1774) and (-0.4489, 0.1866) .. (-0.5027, 0.1988)
    --cycle
    (-0.4433, 0.2583)
    -- (-0.4348, 0.2073)
    -- (-0.4263, 0.2073)
    -- (-0.4093, 0.2243)
    -- (-0.4263, 0.2583)
    --cycle
    (-0.8446, 0.2512)
    .. controls (-0.8626, 0.2459) and (-0.8672, 0.2066) .. (-0.8677, 0.1903)
    .. controls (-0.8362, 0.1909) and (-0.8333, 0.1924) .. (-0.8168, 0.1649)
    -- (-0.7913, 0.1734)
    .. controls (-0.7979, 0.1888) and (-0.8118, 0.2347) .. (-0.8218, 0.2431)
    .. controls (-0.8311, 0.2510) and (-0.8386, 0.2530) .. (-0.8446, 0.2512)
    --cycle
    (-0.6130, 0.2498)
    -- (-0.6385, 0.1988)
    .. controls (-0.5969, 0.2023) and (-0.5781, 0.2132) .. (-0.6130, 0.2498)
    --cycle
    ( 0.7209, 0.2469)
    .. controls ( 0.7057, 0.2498) and ( 0.6918, 0.2452) .. ( 0.6875, 0.2241)
    .. controls ( 0.6832, 0.1844) and ( 0.7333, 0.1800) .. ( 0.6875, 0.1309)
    .. controls ( 0.6935, 0.1147) and ( 0.6966, 0.1050) .. ( 0.7123, 0.0936)
    .. controls ( 0.7287, 0.0815) and ( 0.7996, 0.0650) .. ( 0.8166, 0.0782)
```

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    .. controls ( 0.8441, 0.0997) and ( 0.8443, 0.1468) .. ( 0.7875, 0.1564)
    -- ( 0.8130, 0.1055)
    -- ( 0.7706, 0.0970)
    .. controls ( 0.7537, 0.1222) and ( 0.7493, 0.1200) .. ( 0.7196, 0.1225)
    -- ( 0.7621, 0.2241)
    .. controls ( 0.7526, 0.2335) and ( 0.7361, 0.2440) .. ( 0.7209, 0.2469)
    --cycle
    ( 0.5029, 0.2452)
    .. controls ( 0.4837, 0.2409) and ( 0.4663, 0.2223) .. ( 0.4749, 0.2012)
    .. controls ( 0.4861, 0.1737) and ( 0.5371, 0.1377) .. ( 0.5668, 0.1819)
    .. controls ( 0.5276, 0.2081) and ( 0.5495, 0.2337) .. ( 0.5218, 0.2442)
    .. controls ( 0.5159, 0.2464) and ( 0.5093, 0.2466) .. ( 0.5029, 0.2452)
    --cycle
    (-0.7065, 0.2328)
    .. controls (-0.7174, 0.2318) and (-0.7287, 0.2323) .. (-0.7391, 0.2277)
    .. controls (-0.7803, 0.2096) and (-0.7474, 0.1632) .. (-0.7171, 0.2086)
    --cycle
    (-0.0188, 0.2328)
    .. controls (-0.0280, 0.2283) and (-0.0341, 0.2273) .. (-0.0430, 0.2197)
    .. controls (-0.1097, 0.1629) and ( 0.0304, 0.1216) .. (-0.0010, 0.2037)
    --cycle
    ( 0.2612, 0.2328)
    -- ( 0.1849, 0.2073)
    .. controls ( 0.2210, 0.1548) and ( 0.2532, 0.1800) .. ( 0.2612, 0.2328)
    --cycle
    (-0.3330, 0.2243)
    -- (-0.3958, 0.1938)
    .. controls (-0.4203, 0.1689) and (-0.3928, 0.1505) .. (-0.4518, 0.0970)
    -- (-0.4518, 0.0800)
    .. controls (-0.4010, 0.0738) and (-0.3851, 0.1024) .. (-0.3754, 0.1479)
    .. controls (-0.3297, 0.1544) and (-0.3165, 0.1646) .. (-0.2990, 0.2073)
    --cycle
    (-0.1971, 0.2243)
    -- (-0.2056, 0.1479)
    -- (-0.1462, 0.1394)
    -- (-0.1462, 0.1564)
    -- (-0.1801, 0.2243)
    --cycle
    ( 0.8384, 0.2243)
    .. controls ( 0.8324, 0.1770) and ( 0.8519, 0.1318) .. ( 0.8979, 0.1140)
    -- ( 0.9064, 0.1225)
    .. controls ( 0.8952, 0.1805) and ( 0.8898, 0.1922) .. ( 0.8384, 0.2243)
    --cycle
    ( 0.0151, 0.2073)
    -- ( 0.0151, 0.1903)
    -- ( 0.0405, 0.1819)
    -- ( 0.0405, 0.1479)
    -- ( 0.0575, 0.1479)
    -- ( 0.0575, 0.1564)
    -- ( 0.0745, 0.1734)
    .. controls ( 0.0548, 0.2031) and ( 0.0517, 0.2101) .. ( 0.0151, 0.2073)
    --cycle
    ( 0.6262, 0.2073)
```

```
    -- ( 0.6347, 0.1734)
    -- ( 0.6517, 0.1734)
    -- ( 0.6602, 0.1819)
    -- ( 0.6602, 0.1988)
    --cycle
    ( 0.7621, 0.2073)
    -- ( 0.7621, 0.1649)
    .. controls ( 0.7903, 0.1763) and ( 0.7908, 0.1774) .. ( 0.7960, 0.2073)
    --cycle
    (-0.8988, 0.1938)
    -- (-0.9014, 0.1893)
    .. controls (-0.9006, 0.1906) and (-0.8994, 0.1914) .. (-0.8988, 0.1930)
    .. controls (-0.8987, 0.1933) and (-0.8989, 0.1936) .. (-0.8988, 0.1938)
    --cycle
    (-0.1292, 0.1903)
    -- (-0.1292, 0.1479)
    -- (-0.0953, 0.1819)
    --cycle
    ( 0.2952, 0.1903)
    .. controls ( 0.2890, 0.1611) and ( 0.2867, 0.1567) .. ( 0.3122, 0.1394)
    -- ( 0.3122, 0.1903)
    --cycle
    (-0.6895, 0.1819)
    -- (-0.6895, 0.1479)
    -- (-0.6640, 0.1564)
    -- (-0.6640, 0.1734)
    -- (-0.6725, 0.1819)
    --cycle
    ( 0.1480, 0.1735)
    .. controls ( 0.1310, 0.1697) and ( 0.1252, 0.1423) .. ( 0.1594, 0.1225)
    -- ( 0.1849, 0.1479)
    .. controls ( 0.1726, 0.1694) and ( 0.1583, 0.1757) .. ( 0.1480, 0.1735)
    --cycle
    (-0.6300, 0.1734)
    .. controls (-0.6429, 0.1238) and (-0.6284, 0.1142) .. (-0.5876, 0.0885)
    -- (-0.6215, 0.0461)
    -- (-0.6640, 0.0800)
    .. controls (-0.6670, 0.0697) and (-0.6746, 0.0478) .. (-0.6743, 0.0381)
    .. controls (-0.6736, 0.0066) and (-0.6456, 0.0044) .. (-0.6219, 0.0135)
    .. controls (-0.5925, 0.0247) and (-0.5281, 0.0777) .. (-0.5319, 0.1120)
    .. controls (-0.5350, 0.1399) and (-0.5677, 0.1315) .. (-0.5853, 0.1410)
    .. controls (-0.5998, 0.1487) and (-0.6048, 0.1603) .. (-0.6130, 0.1734)
    --cycle
    (-0.6640, 0.0800)
    .. controls (-0.6595, 0.1137) and (-0.6643, 0.1185) .. (-0.6980, 0.1140)
    --cycle
    (-0.2565, 0.1734)
    -- (-0.3584, 0.1309)
    -- (-0.3330, 0.0800)
    -- (-0.2990, 0.1140)
    .. controls (-0.2519, 0.1142) and (-0.2453, 0.1302) .. (-0.2565, 0.1734)
    --cycle
    ( 0.2271, 0.1407)
```

```
    .. controls ( 0.1925, 0.1328) and ( 0.1533, 0.0767) .. ( 0.2190, 0.0890)
    -- ( 0.2612, 0.0970)
    .. controls ( 0.2604, 0.1073) and ( 0.2611, 0.1186) .. ( 0.2562, 0.1281)
    .. controls ( 0.2497, 0.1405) and ( 0.2386, 0.1433) .. ( 0.2271, 0.1407)
    --cycle
    (-0.0698, 0.1394)
    .. controls (-0.0981, 0.1280) and (-0.0986, 0.1270) .. (-0.1038, 0.0970)
    -- (-0.0698, 0.0970)
    --cycle
    ( 0.3971, 0.1394)
    -- ( 0.3971, 0.1225)
    -- ( 0.4056, 0.1140)
    -- ( 0.4395, 0.1225)
    -- ( 0.4395, 0.1394)
    --cycle
    ( 0.6090, 0.1316)
    .. controls ( 0.5968, 0.1320) and ( 0.5847, 0.1313) .. ( 0.5753, 0.1309)
    .. controls ( 0.5937, 0.1034) and ( 0.6031, 0.1066) .. ( 0.6347, 0.1055)
    .. controls ( 0.5863, 0.0654) and ( 0.5849, 0.0269) .. ( 0.6432,-0.0049)
    -- ( 0.6262, 0.0461)
    -- ( 0.6488, 0.0715)
    .. controls ( 0.6828, 0.1212) and ( 0.6456, 0.1307) .. ( 0.6090, 0.1316)
    --cycle
    (-0.9354, 0.1309)
    -- (-0.9422, 0.1193)
    -- (-0.9356, 0.0800)
    -- (-0.8847, 0.0970)
    -- (-0.8847, 0.1309)
    --cycle
    (-0.8507, 0.1309)
    .. controls (-0.8417, 0.0965) and (-0.8401, 0.0890) .. (-0.8083, 0.0715)
    .. controls (-0.8126, 0.1087) and (-0.8139, 0.1187) .. (-0.8507, 0.1309)
    --cycle
    ( 0.1084, 0.1309)
    -- ( 0.0575, 0.1225)
    .. controls ( 0.0537, 0.0923) and ( 0.0510, 0.0922) .. ( 0.0236, 0.0800)
    .. controls ( 0.0578, 0.0292) and ( 0.1015, 0.0713) .. ( 0.1084, 0.1309)
    --cycle
    ( 0.4819, 0.1309)
    -- ( 0.5028, 0.0739)
    -- ( 0.4819,-0.0049)
    .. controls ( 0.4993,-0.0102) and ( 0.5299,-0.0233) .. ( 0.5472,-0.0163)
    .. controls ( 0.5677,-0.0081) and ( 0.5663, 0.0195) .. ( 0.5644, 0.0376)
    .. controls ( 0.5592, 0.0860) and ( 0.5308, 0.1235) .. ( 0.4819, 0.1309)
    --cycle
    ( 0.3461, 0.1140)
    .. controls ( 0.3108, 0.0951) and ( 0.3082, 0.0849) .. ( 0.3037, 0.0461)
    .. controls ( 0.3481, 0.0535) and ( 0.3552, 0.0713) .. ( 0.3461, 0.1140)
    --cycle
    (-0.4857, 0.0970)
    .. controls (-0.5241, 0.0326) and (-0.4983, 0.0214) .. (-0.4348, 0.0206)
    .. controls (-0.4420,-0.0343) and (-0.4036,-0.0413) .. (-0.3728,-0.0186)
    .. controls (-0.3557,-0.0061) and (-0.3442, 0.0265) .. (-0.3330, 0.0461)
```

```
    .. controls (-0.3807, 0.0916) and (-0.3834, 0.0423) .. (-0.3839, 0.0036)
    --cycle
    (-0.2480, 0.0970)
    -- (-0.2480, 0.0800)
    -- (-0.2056, 0.0800)
    -- (-0.2056, 0.0970)
    --cycle
    (-0.1292, 0.0970)
    -- (-0.1462, 0.0800)
    -- (-0.1462, 0.0715)
    -- (-0.1292, 0.0546)
    -- (-0.1208, 0.0546)
    -- (-0.1038, 0.0715)
    --cycle
    ( 0.3801, 0.0800)
    -- ( 0.3801, 0.0206)
    -- ( 0.3971, 0.0206)
    -- ( 0.4056, 0.0291)
    -- ( 0.4140, 0.0800)
    --cycle
    ( 0.4225, 0.0800)
    .. controls ( 0.4316, 0.0456) and ( 0.4332, 0.0381) .. ( 0.4649, 0.0206)
    .. controls ( 0.4618, 0.0591) and ( 0.4606, 0.0679) .. ( 0.4225, 0.0800)
    --cycle
    ( 0.8809, 0.0759)
    .. controls ( 0.8722, 0.0759) and ( 0.8634, 0.0659) .. ( 0.8554, 0.0461)
    -- ( 0.9064, 0.0461)
    .. controls ( 0.8984, 0.0659) and ( 0.8897, 0.0759) .. ( 0.8809, 0.0759)
    --cycle
    ( 0.1413, 0.0752)
    .. controls ( 0.1324, 0.0761) and ( 0.1215, 0.0749) .. ( 0.1084, 0.0715)
    .. controls ( 0.1253, 0.0362) and ( 0.1326, 0.0290) .. ( 0.1679, 0.0121)
    .. controls ( 0.1762, 0.0511) and ( 0.1679, 0.0726) .. ( 0.1413, 0.0752)
    --cycle
    (-0.7409, 0.0649)
    .. controls (-0.7448, 0.0648) and (-0.7485, 0.0639) .. (-0.7518, 0.0618)
    .. controls (-0.7690, 0.0508) and (-0.7544,-0.0147) .. (-0.7438,-0.0279)
    .. controls (-0.7341,-0.0398) and (-0.7273,-0.0409) .. (-0.7149,-0.0473)
    -- (-0.7065, 0.0546)
    .. controls (-0.7159, 0.0583) and (-0.7292, 0.0653) .. (-0.7409, 0.0649)
    --cycle
    ( 0.9762, 0.0591)
    -- ( 0.9564, 0.0203)
    .. controls ( 0.9517,-0.0013) and ( 0.9637,-0.0270) .. ( 0.9761,-0.0510)
    -- ( 0.9997,-0.0105)
    .. controls ( 1.0000,-0.0010) and ( 1.0000, 0.0075) .. ( 0.9998, 0.0171)
    --cycle
    (-0.1717, 0.0546)
    .. controls (-0.2038, 0.0492) and (-0.2042, 0.0472) .. (-0.2226, 0.0206)
    -- (-0.1717, 0.0206)
    --cycle
    ( 0.7281, 0.0546)
    -- ( 0.6687, 0.0461)
```

```
    -- ( 0.6687, 0.0291)
    .. controls ( 0.7027, 0.0233) and ( 0.7100, 0.0245) .. ( 0.7281, 0.0546)
    --cycle
    (-0.9726, 0.0477)
    .. controls (-0.9758, 0.0477) and (-0.9806, 0.0473) .. (-0.9843, 0.0471)
    -- (-1.0000, 0.0201)
    -- (-0.9912, 0.0044)
    -- (-0.9696, 0.0206)
    -- (-0.9448,-0.0784)
    -- (-0.9432,-0.0812)
    -- (-0.8422,-0.0728)
    -- (-0.8677,-0.0982)
    -- (-0.8677,-0.1322)
    .. controls (-0.8159,-0.1280) and (-0.7904,-0.1016) .. (-0.8308,-0.0569)
    .. controls (-0.8618,-0.0226) and (-0.8917,-0.0142) .. (-0.9356,-0.0049)
    .. controls (-0.9393, 0.0402) and (-0.9477, 0.0479) .. (-0.9726, 0.0477)
    --cycle
    (-0.0273, 0.0430)
    .. controls (-0.1037, 0.0283) and (-0.0659,-0.0617) .. (-0.0043, 0.0049)
    .. controls ( 0.0066, 0.0167) and ( 0.0086, 0.0240) .. ( 0.0151, 0.0376)
    .. controls ( 0.0001, 0.0416) and (-0.0110, 0.0461) .. (-0.0273, 0.0430)
    --cycle
    ( 0.2361, 0.0409)
    .. controls ( 0.2189, 0.0454) and ( 0.2022, 0.0366) .. ( 0.2018, 0.0036)
    .. controls ( 0.2379, 0.0017) and ( 0.2409,-0.0057) .. ( 0.2527,-0.0388)
    .. controls ( 0.2946,-0.0103) and ( 0.2647, 0.0336) .. ( 0.2361, 0.0409)
    --cycle
    (-0.2852, 0.0389)
    .. controls (-0.3005, 0.0379) and (-0.3023, 0.0289) .. (-0.2990, 0.0036)
    -- (-0.2650, 0.0376)
    .. controls (-0.2735, 0.0387) and (-0.2801, 0.0393) .. (-0.2852, 0.0389)
    --cycle
    ( 0.3037, 0.0291)
    .. controls ( 0.3231,-0.0055) and ( 0.3338,-0.0035) .. ( 0.3716,-0.0049)
    .. controls ( 0.3519, 0.0279) and ( 0.3402, 0.0269) .. ( 0.3037, 0.0291)
    --cycle
    (-0.8206, 0.0192)
    .. controls (-0.8430,-0.0126) and (-0.8179,-0.0291) .. (-0.8045,-0.0204)
    .. controls (-0.7923,-0.0127) and (-0.7854, 0.0239) .. (-0.8206, 0.0192)
    --cycle
    (-0.1371, 0.0134)
    .. controls (-0.1438, 0.0114) and (-0.1493, 0.0019) .. (-0.1547,-0.0134)
    -- (-0.1123,-0.0049)
    .. controls (-0.1224, 0.0099) and (-0.1303, 0.0154) .. (-0.1371, 0.0134)
    --cycle
    ( 0.7536, 0.0121)
    -- ( 0.7111, 0.0036)
    -- ( 0.7111,-0.0304)
    .. controls ( 0.7469,-0.0274) and ( 0.7588,-0.0268) .. ( 0.7536, 0.0121)
    --cycle
    ( 0.0750, 0.0106)
    .. controls ( 0.0661, 0.0093) and ( 0.0570, 0.0067) .. ( 0.0490, 0.0036)
    .. controls ( 0.0651,-0.0248) and ( 0.0680,-0.0250) .. ( 0.1000,-0.0304)
```

```
    .. controls ( 0.0590,-0.0732) and ( 0.0241,-0.0913) .. ( 0.0745,-0.1492)
    .. controls ( 0.1110,-0.1331) and ( 0.1272,-0.1362) .. ( 0.1424,-0.0982)
    -- ( 0.1339,-0.0897)
    -- ( 0.1000,-0.0982)
    .. controls ( 0.1057,-0.0835) and ( 0.1261,-0.0416) .. ( 0.1266,-0.0304)
    .. controls ( 0.1284, 0.0069) and ( 0.1019, 0.0144) .. ( 0.0750, 0.0106)
    --cycle
    (-0.2311, 0.0036)
    -- (-0.2311,-0.0049)
    -- (-0.2480,-0.0219)
    .. controls (-0.2373,-0.0386) and (-0.2259,-0.0581) .. (-0.2054,-0.0643)
    .. controls (-0.1781,-0.0725) and (-0.1665,-0.0457) .. (-0.1984,-0.0158)
    .. controls (-0.2100,-0.0050) and (-0.2177,-0.0027) .. (-0.2311, 0.0036)
    --cycle
    ( 0.8469, 0.0036)
    .. controls ( 0.8030,-0.0174) and ( 0.7970,-0.0343) .. ( 0.7706,-0.0728)
    .. controls ( 0.7934,-0.1060) and ( 0.7994,-0.1083) .. ( 0.8384,-0.0982)
    -- ( 0.8384,-0.0813)
    -- ( 0.8130,-0.0728)
    -- ( 0.8130,-0.0558)
    .. controls ( 0.8448,-0.0370) and ( 0.8501,-0.0340) .. ( 0.8469, 0.0036)
    --cycle
    (-0.4603,-0.0049)
    .. controls (-0.4831,-0.0157) and (-0.5088,-0.0301) .. (-0.5182,-0.0557)
    .. controls (-0.5278,-0.0816) and (-0.5057,-0.0969) .. (-0.4907,-0.0883)
    .. controls (-0.4763,-0.0802) and (-0.4829,-0.0617) .. (-0.4518,-0.0304)
    -- (-0.4518,-0.0134)
    --cycle
    ( 0.4264,-0.0112)
    .. controls ( 0.3999,-0.0108) and ( 0.3834,-0.0280) .. ( 0.4056,-0.0728)
    -- ( 0.4565,-0.0558)
    -- ( 0.4649,-0.1237)
    -- ( 0.4819,-0.1237)
    -- ( 0.5074,-0.0558)
    .. controls ( 0.4895,-0.0297) and ( 0.4529,-0.0116) .. ( 0.4264,-0.0112)
    --cycle
    (-0.5706,-0.0134)
    -- (-0.6045,-0.0388)
    .. controls (-0.6509,-0.0147) and (-0.6809,-0.0236) .. (-0.6725,-0.0813)
    -- (-0.6980,-0.0897)
    .. controls (-0.6821,-0.1195) and (-0.6788,-0.1210) .. (-0.6470,-0.1322)
    .. controls (-0.6222,-0.0713) and (-0.6544,-0.0848) .. (-0.6130,-0.0473)
    .. controls (-0.5953,-0.0788) and (-0.5888,-0.0784) .. (-0.5536,-0.0813)
    --cycle
    ( 0.1679,-0.0219)
    .. controls ( 0.1573,-0.0941) and ( 0.2349,-0.1063) .. ( 0.2526,-0.0847)
    .. controls ( 0.2609,-0.0744) and ( 0.2602,-0.0596) .. ( 0.2612,-0.0473)
    --cycle
    (-0.3112,-0.0274)
    .. controls (-0.3586,-0.0281) and (-0.4163,-0.0558) .. (-0.4212,-0.0609)
    .. controls (-0.4295,-0.0692) and (-0.4319,-0.0787) .. (-0.4327,-0.0899)
    -- (-0.4327,-0.1492)
    -- (-0.4327,-0.2086)
```

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    .. controls (-0.3777,-0.1999) and (-0.3244,-0.1312) .. (-0.4008,-0.1067)
    -- (-0.3823,-0.0879)
    .. controls (-0.3347,-0.0526) and (-0.3277,-0.1099) .. (-0.2903,-0.1163)
    .. controls (-0.2612,-0.1213) and (-0.2444,-0.0914) .. (-0.2507,-0.0659)
    .. controls (-0.2581,-0.0362) and (-0.2828,-0.0269) .. (-0.3112,-0.0274)
    --cycle
    ( 0.9234,-0.0304)
    -- ( 0.9149,-0.0643)
    -- ( 0.9488,-0.0558)
    -- ( 0.9488,-0.0388)
    -- ( 0.9403,-0.0304)
    --cycle
    ( 0.6406,-0.0369)
    .. controls ( 0.6333,-0.0375) and ( 0.6251,-0.0419) .. ( 0.6177,-0.0522)
    .. controls ( 0.6105,-0.0620) and ( 0.6112,-0.0704) .. ( 0.6093,-0.0799)
    -- ( 0.6342,-0.0799)
    .. controls ( 0.6760,-0.0673) and ( 0.6625,-0.0350) .. ( 0.6406,-0.0369)
    --cycle
    (-0.0016,-0.0449)
    .. controls (-0.0461,-0.0548) and (-0.0410,-0.0663) .. (-0.0297,-0.1043)
    .. controls (-0.0250,-0.1199) and (-0.0232,-0.1440) .. (-0.0016,-0.1422)
    .. controls ( 0.0349,-0.1392) and ( 0.0554,-0.0537) .. (-0.0016,-0.0449)
    --cycle
    (-0.1123,-0.0473)
    -- (-0.1208,-0.1067)
    .. controls (-0.0719,-0.1062) and (-0.0661,-0.0635) .. (-0.1123,-0.0473)
    --cycle
    ( 0.3037,-0.0473)
    .. controls ( 0.3198,-0.0756) and ( 0.3223,-0.0769) .. ( 0.3546,-0.0728)
    .. controls ( 0.3383,-0.0447) and ( 0.3358,-0.0446) .. ( 0.3037,-0.0473)
    --cycle
    ( 0.5329,-0.0473)
    .. controls ( 0.5004,-0.0966) and ( 0.4981,-0.1266) .. ( 0.5668,-0.1322)
    -- ( 0.5499,-0.0473)
    --cycle
    (-0.1632,-0.0728)
    -- (-0.1462,-0.1067)
    -- (-0.1462,-0.0728)
    --cycle
    ( 0.7090,-0.0817)
    .. controls ( 0.6987,-0.0843) and ( 0.6911,-0.0952) .. ( 0.6894,-0.1068)
    .. controls ( 0.6863,-0.1276) and ( 0.7043,-0.1387) .. ( 0.7111,-0.1831)
    .. controls ( 0.7499,-0.1786) and ( 0.7602,-0.1760) .. ( 0.7791,-0.1407)
    -- ( 0.7196,-0.1322)
    -- ( 0.7451,-0.1068)
    .. controls ( 0.7324,-0.0850) and ( 0.7193,-0.0791) .. ( 0.7090,-0.0817)
    --cycle
    ( 0.9485,-0.0984)
    .. controls ( 0.9284,-0.1094) and ( 0.8781,-0.1542) .. ( 0.8706,-0.1754)
    .. controls ( 0.8655,-0.1897) and ( 0.8704,-0.2051) .. ( 0.8817,-0.2131)
    --cycle
    (-0.9323,-0.1007)
    -- (-0.9101,-0.1405)
```

```
    .. controls (-0.9101,-0.1287) and (-0.9146,-0.1173) .. (-0.9187,-0.1067)
    --cycle
    (-0.0528,-0.1067)
    .. controls (-0.0616,-0.1167) and (-0.0681,-0.1217) .. (-0.0735,-0.1348)
    .. controls (-0.0802,-0.1513) and (-0.0835,-0.2032) .. (-0.0603,-0.2082)
    .. controls (-0.0462,-0.2108) and (-0.0167,-0.1971) .. (-0.0603,-0.1577)
    .. controls (-0.0459,-0.1339) and (-0.0396,-0.1326) .. (-0.0528,-0.1067)
    --cycle
    (-0.4876,-0.1114)
    .. controls (-0.4992,-0.1127) and (-0.5150,-0.1170) .. (-0.5367,-0.1237)
    -- (-0.5367,-0.1577)
    -- (-0.4433,-0.1916)
    .. controls (-0.4544,-0.1299) and (-0.4526,-0.1074) .. (-0.4876,-0.1114)
    --cycle
    (-0.7635,-0.1120)
    .. controls (-0.7788,-0.1114) and (-0.7890,-0.1295) .. (-0.7913,-0.1577)
    -- (-0.7574,-0.1577)
    .. controls (-0.7442,-0.2093) and (-0.7301,-0.2080) .. (-0.6810,-0.2086)
    -- (-0.6810,-0.1746)
    -- (-0.7149,-0.1916)
    .. controls (-0.7175,-0.1714) and (-0.7177,-0.1520) .. (-0.7311,-0.1350)
    .. controls (-0.7433,-0.1194) and (-0.7544,-0.1124) .. (-0.7635,-0.1120)
    --cycle
    (-0.2082,-0.1145)
    .. controls (-0.2215,-0.1126) and (-0.2378,-0.1199) .. (-0.2495,-0.1410)
    .. controls (-0.2530,-0.1510) and (-0.2546,-0.1612) .. (-0.2495,-0.1721)
    .. controls (-0.2475,-0.1840) and (-0.2388,-0.1913) .. (-0.2311,-0.2001)
    .. controls (-0.2202,-0.1931) and (-0.2111,-0.1884) .. (-0.2020,-0.1785)
    .. controls (-0.1722,-0.1464) and (-0.1860,-0.1177) .. (-0.2082,-0.1145)
    --cycle
    ( 0.4225,-0.1152)
    -- ( 0.3631,-0.1492)
    -- ( 0.3801,-0.1831)
    .. controls ( 0.4160,-0.1656) and ( 0.4276,-0.1565) .. ( 0.4225,-0.1152)
    --cycle
    (-0.5925,-0.1174)
    .. controls (-0.6021,-0.1151) and (-0.6144,-0.1208) .. (-0.6203,-0.1336)
    .. controls (-0.6283,-0.1508) and (-0.6192,-0.1674) .. (-0.6130,-0.1831)
    -- (-0.5961,-0.1831)
    .. controls (-0.5903,-0.1723) and (-0.5831,-0.1615) .. (-0.5803,-0.1494)
    .. controls (-0.5758,-0.1301) and (-0.5828,-0.1197) .. (-0.5925,-0.1174)
    --cycle
    ( 0.2952,-0.1237)
    -- ( 0.3292,-0.1746)
    -- ( 0.3377,-0.1746)
    -- ( 0.3546,-0.1577)
    .. controls ( 0.3339,-0.1275) and ( 0.3315,-0.1266) .. ( 0.2952,-0.1237)
    --cycle
    ( 0.1832,-0.1240)
    .. controls ( 0.1608,-0.1263) and ( 0.1298,-0.1544) .. ( 0.1254,-0.2086)
    .. controls ( 0.1747,-0.2011) and ( 0.2191,-0.1503) .. ( 0.2015,-0.1301)
    .. controls ( 0.1972,-0.1252) and ( 0.1907,-0.1232) .. ( 0.1832,-0.1240)
    --cycle
```

```
    (-0.3330,-0.1407)
    .. controls (-0.3325,-0.1552) and (-0.3330,-0.1683) .. (-0.3280,-0.1824)
    .. controls (-0.3221,-0.1993) and (-0.2907,-0.2626) .. (-0.2674,-0.2496)
    .. controls (-0.2290,-0.2283) and (-0.2939,-0.1556) .. (-0.3330,-0.1407)
    --cycle
    (-0.8677,-0.1492)
    .. controls (-0.8906,-0.2074) and (-0.8704,-0.2079) .. (-0.8168,-0.2086)
    -- (-0.8168,-0.2341)
    -- (-0.7828,-0.2341)
    .. controls (-0.7876,-0.1754) and (-0.8159,-0.1679) .. (-0.8677,-0.1492)
    --cycle
    ( 0.6507,-0.1523)
    .. controls ( 0.6150,-0.1514) and ( 0.5790,-0.1648) .. ( 0.5634,-0.2019)
    .. controls ( 0.5467,-0.2418) and ( 0.5701,-0.2915) .. ( 0.6347,-0.2595)
    -- ( 0.5923,-0.2426)
    .. controls ( 0.6167,-0.1901) and ( 0.6349,-0.1909) .. ( 0.6857,-0.1746)
    -- ( 0.6857,-0.1577)
    .. controls ( 0.6745,-0.1545) and ( 0.6627,-0.1526) .. ( 0.6507,-0.1523)
    --cycle
    ( 0.4992,-0.1530)
    .. controls ( 0.4893,-0.1544) and ( 0.4788,-0.1613) .. ( 0.4723,-0.1757)
    .. controls ( 0.4601,-0.2024) and ( 0.4716,-0.2265) .. ( 0.4819,-0.2510)
    -- ( 0.4310,-0.2510)
    .. controls ( 0.4659,-0.3129) and ( 0.5002,-0.2692) .. ( 0.5329,-0.2341)
    .. controls ( 0.5195,-0.1890) and ( 0.5320,-0.1766) .. ( 0.5232,-0.1628)
    .. controls ( 0.5186,-0.1555) and ( 0.5091,-0.1515) .. ( 0.4992,-0.1530)
    --cycle
    (-0.1462,-0.1577)
    -- (-0.1462,-0.2001)
    -- (-0.1292,-0.2001)
    -- (-0.1292,-0.1577)
    --cycle
    ( 0.0490,-0.1577)
    -- ( 0.0066,-0.1831)
    -- ( 0.0066,-0.2001)
    .. controls ( 0.0224,-0.2077) and ( 0.0639,-0.2307) .. ( 0.0802,-0.2267)
    .. controls ( 0.1236,-0.2159) and ( 0.0615,-0.1657) .. ( 0.0490,-0.1577)
    --cycle
    ( 0.2527,-0.1577)
    -- ( 0.2358,-0.1746)
    -- ( 0.2273,-0.1746)
    -- ( 0.2273,-0.1916)
    .. controls ( 0.2817,-0.2389) and ( 0.2612,-0.2548) .. ( 0.3207,-0.2595)
    -- ( 0.2952,-0.2341)
    .. controls ( 0.2952,-0.1946) and ( 0.2813,-0.1829) .. ( 0.2527,-0.1577)
    --cycle
    ( 0.4124,-0.1906)
    .. controls ( 0.3901,-0.1934) and ( 0.3801,-0.2077) .. ( 0.3631,-0.2341)
    .. controls ( 0.4031,-0.2391) and ( 0.4075,-0.2303) .. ( 0.4395,-0.2086)
    -- ( 0.4395,-0.1916)
    .. controls ( 0.4286,-0.1900) and ( 0.4198,-0.1897) .. ( 0.4124,-0.1906)
    --cycle
    (-0.5282,-0.1916)
```

```
    -- (-0.5536,-0.2001)
    -- (-0.5282,-0.2171)
    --cycle
    (-0.6045,-0.2001)
    .. controls (-0.6700,-0.2056) and (-0.6485,-0.2287) .. (-0.6330,-0.2741)
    .. controls (-0.6243,-0.2991) and (-0.6268,-0.3013) .. (-0.6130,-0.3274)
    .. controls (-0.5769,-0.3048) and (-0.5602,-0.2946) .. (-0.5536,-0.2510)
    -- (-0.6045,-0.2510)
    --cycle
    (-0.3584,-0.2086)
    .. controls (-0.3921,-0.2259) and (-0.3939,-0.2318) .. (-0.4008,-0.2680)
    .. controls (-0.4235,-0.2397) and (-0.4237,-0.2318) .. (-0.4603,-0.2256)
    -- (-0.4603,-0.2850)
    .. controls (-0.4267,-0.2892) and (-0.3194,-0.3199) .. (-0.3429,-0.2424)
    --cycle
    ( 0.7960,-0.2086)
    -- ( 0.8384,-0.2510)
    .. controls ( 0.8428,-0.2169) and ( 0.8301,-0.2042) .. ( 0.7960,-0.2086)
    --cycle
    ( 0.1928,-0.2162)
    .. controls ( 0.1816,-0.2174) and ( 0.1689,-0.2258) .. ( 0.1598,-0.2322)
    .. controls ( 0.1191,-0.2606) and ( 0.1214,-0.2831) .. ( 0.1339,-0.3274)
    -- ( 0.1509,-0.3274)
    .. controls ( 0.1561,-0.3114) and ( 0.1614,-0.2848) .. ( 0.1729,-0.2730)
    .. controls ( 0.1867,-0.2591) and ( 0.2098,-0.2594) .. ( 0.2174,-0.2461)
    .. controls ( 0.2253,-0.2321) and ( 0.2130,-0.2142) .. ( 0.1928,-0.2162)
    --cycle
    (-0.1905,-0.2188)
    .. controls (-0.1970,-0.2195) and (-0.2037,-0.2233) .. (-0.2087,-0.2284)
    .. controls (-0.2248,-0.2451) and (-0.2297,-0.2881) .. (-0.2311,-0.3104)
    -- (-0.1801,-0.3104)
    .. controls (-0.1960,-0.2531) and (-0.1611,-0.2530) .. (-0.1738,-0.2284)
    .. controls (-0.1778,-0.2206) and (-0.1840,-0.2181) .. (-0.1905,-0.2188)
    --cycle
    (-0.5112,-0.2256)
    -- (-0.5112,-0.2595)
    -- (-0.4772,-0.2595)
    -- (-0.4772,-0.2256)
    --cycle
    ( 0.7451,-0.2256)
    -- ( 0.6687,-0.2341)
    -- ( 0.6602,-0.2426)
    .. controls ( 0.6862,-0.3159) and ( 0.7361,-0.2848) .. ( 0.7451,-0.2256)
    --cycle
    (-0.8578,-0.2336)
    -- (-0.8203,-0.3006)
    .. controls (-0.7747,-0.3108) and (-0.8112,-0.2349) .. (-0.8578,-0.2336)
    --cycle
    (-0.0280,-0.2369)
    .. controls (-0.0529,-0.2386) and (-0.0646,-0.2625) .. (-0.0273,-0.3019)
    -- ( 0.0236,-0.2595)
    .. controls ( 0.0068,-0.2430) and (-0.0130,-0.2359) .. (-0.0280,-0.2369)
    --cycle
```

```
    (-0.7234,-0.2510)
    .. controls (-0.7141,-0.2750) and (-0.7050,-0.2842) .. (-0.6810,-0.2935)
    -- (-0.6725,-0.2850)
    .. controls (-0.6853,-0.2530) and (-0.6899,-0.2536) .. (-0.7234,-0.2510)
    --cycle
    ( 0.0504,-0.2510)
    -- ( 0.0504,-0.2760)
    .. controls ( 0.0689,-0.3381) and ( 0.1243,-0.2780) .. ( 0.0804,-0.2561)
    .. controls ( 0.0707,-0.2513) and ( 0.0594,-0.2519) .. ( 0.0504,-0.2510)
    --cycle
    (-0.1292,-0.2595)
    -- (-0.1462,-0.2765)
    -- (-0.1038,-0.3274)
    -- (-0.0953,-0.3274)
    -- (-0.0783,-0.3104)
    --cycle
    ( 0.7877,-0.2632)
    .. controls ( 0.7523,-0.2682) and ( 0.7335,-0.3052) .. ( 0.7960,-0.3359)
    .. controls ( 0.8015,-0.3335) and ( 0.8068,-0.3333) .. ( 0.8122,-0.3324)
    -- ( 0.8442,-0.2774)
    .. controls ( 0.8248,-0.2696) and ( 0.8026,-0.2612) .. ( 0.7877,-0.2632)
    --cycle
    ( 0.5329,-0.2765)
    .. controls ( 0.5358,-0.3116) and ( 0.5353,-0.3182) .. ( 0.5668,-0.3359)
    .. controls ( 0.5639,-0.3008) and ( 0.5644,-0.2942) .. ( 0.5329,-0.2765)
    --cycle
    ( 0.3385,-0.2820)
    .. controls ( 0.3148,-0.2878) and ( 0.2673,-0.3492) .. ( 0.3385,-0.3614)
    -- ( 0.3122,-0.4038)
    .. controls ( 0.3574,-0.4463) and ( 0.3787,-0.4004) .. ( 0.3701,-0.3806)
    .. controls ( 0.3644,-0.3672) and ( 0.3492,-0.3602) .. ( 0.3377,-0.3529)
    -- ( 0.3886,-0.3019)
    .. controls ( 0.3746,-0.2928) and ( 0.3572,-0.2777) .. ( 0.3385,-0.2820)
    --cycle
    (-0.3075,-0.2850)
    -- (-0.3669,-0.3359)
    .. controls (-0.3237,-0.3346) and (-0.3194,-0.3327) .. (-0.2820,-0.3104)
    --cycle
    ( 0.6347,-0.2850)
    -- ( 0.6093,-0.3359)
    -- ( 0.6687,-0.3359)
    .. controls ( 0.6634,-0.3038) and ( 0.6614,-0.3034) .. ( 0.6347,-0.2850)
    --cycle
    ( 0.2482,-0.2927)
    .. controls ( 0.2430,-0.2922) and ( 0.2370,-0.2926) .. ( 0.2301,-0.2942)
    .. controls ( 0.1967,-0.3336) and ( 0.2478,-0.3609) .. ( 0.2647,-0.3515)
    .. controls ( 0.2796,-0.3431) and ( 0.2843,-0.2960) .. ( 0.2482,-0.2927)
    --cycle
    (-0.5371,-0.2933)
    .. controls (-0.5481,-0.2970) and (-0.5577,-0.3098) .. (-0.5621,-0.3359)
    -- (-0.5112,-0.3869)
    .. controls (-0.4600,-0.3526) and (-0.5043,-0.2822) .. (-0.5371,-0.2933)
    --cycle
```

```
    (-0.4433,-0.3019)
    .. controls (-0.4430,-0.3328) and (-0.4401,-0.3356) .. (-0.4093,-0.3359)
    -- (-0.4263,-0.3019)
    --cycle
    ( 0.0236,-0.3104)
    -- ( 0.0066,-0.3274)
    -- ( 0.0066,-0.3359)
    -- ( 0.0236,-0.3529)
    -- ( 0.0321,-0.3529)
    -- ( 0.0490,-0.3359)
    --cycle
    ( 0.4140,-0.3104)
    -- ( 0.4140,-0.3274)
    -- ( 0.4565,-0.3274)
    -- ( 0.4565,-0.3104)
    --cycle
    (-0.6555,-0.3189)
    .. controls (-0.7282,-0.3463) and (-0.7047,-0.4238) .. (-0.6385,-0.3614)
    --cycle
    (-0.7635,-0.3203)
    .. controls (-0.7897,-0.3491) and (-0.7645,-0.3586) .. (-0.7512,-0.3515)
    .. controls (-0.7383,-0.3446) and (-0.7269,-0.3159) .. (-0.7635,-0.3203)
    --cycle
    (-0.1547,-0.3359)
    .. controls (-0.2375,-0.3951) and (-0.1886,-0.3975) .. (-0.2106,-0.4536)
    .. controls (-0.2221,-0.4826) and (-0.2548,-0.4886) .. (-0.2435,-0.5309)
    .. controls (-0.2373,-0.5540) and (-0.1692,-0.6520) .. (-0.1548,-0.5893)
    .. controls (-0.1503,-0.5696) and (-0.1713,-0.5323) .. (-0.1801,-0.5141)
    -- (-0.2141,-0.5141)
    -- (-0.1801,-0.4836)
    -- (-0.1632,-0.3784)
    -- (-0.1292,-0.3614)
    --cycle
    ( 0.5838,-0.3444)
    -- ( 0.6178,-0.3869)
    .. controls ( 0.6126,-0.3569) and ( 0.6121,-0.3558) .. ( 0.5838,-0.3444)
    --cycle
    (-0.5876,-0.3529)
    -- (-0.5876,-0.3869)
    -- (-0.5536,-0.3869)
    --cycle
    (-0.3075,-0.3529)
    .. controls (-0.3075,-0.4259) and (-0.3150,-0.4459) .. (-0.2480,-0.4378)
    .. controls (-0.2520,-0.3893) and (-0.2634,-0.3741) .. (-0.3075,-0.3529)
    --cycle
    ( 0.0745,-0.3529)
    .. controls ( 0.0603,-0.3977) and ( 0.0512,-0.3786) .. ( 0.0066,-0.3869)
    .. controls ( 0.0321,-0.4377) and ( 0.0562,-0.4373) .. ( 0.1084,-0.4378)
    -- ( 0.1254,-0.3614)
    --cycle
    ( 0.1868,-0.3534)
    .. controls ( 0.1605,-0.3550) and ( 0.1563,-0.3921) .. ( 0.1681,-0.4095)
    .. controls ( 0.1887,-0.4397) and ( 0.2596,-0.3970) .. ( 0.2782,-0.3784)
```

```
    .. controls ( 0.2016,-0.3640) and ( 0.2352,-0.3656) .. ( 0.1995,-0.3551)
    .. controls ( 0.1948,-0.3537) and ( 0.1906,-0.3532) .. ( 0.1868,-0.3534)
    --cycle
    (-0.0650,-0.3585)
    .. controls (-0.0712,-0.3584) and (-0.0783,-0.3594) .. (-0.0865,-0.3617)
    .. controls (-0.1407,-0.4045) and (-0.1029,-0.4414) .. (-0.0731,-0.4301)
    .. controls (-0.0250,-0.4118) and (-0.0217,-0.3591) .. (-0.0650,-0.3585)
    --cycle
    (-0.4008,-0.3614)
    -- (-0.3584,-0.4293)
    .. controls (-0.3814,-0.4389) and (-0.3792,-0.4389) .. (-0.3839,-0.4632)
    .. controls (-0.3078,-0.4504) and (-0.3334,-0.3529) .. (-0.4008,-0.3614)
    --cycle
    ( 0.7706,-0.3784)
    -- ( 0.6689,-0.4004)
    -- ( 0.6602,-0.4378)
    .. controls ( 0.6990,-0.4346) and ( 0.7019,-0.4328) .. ( 0.7281,-0.4038)
    .. controls ( 0.7344,-0.4232) and ( 0.7382,-0.4373) .. ( 0.7461,-0.4460)
    -- ( 0.7747,-0.3969)
    --cycle
    (-0.7404,-0.3869)
    -- (-0.7574,-0.4038)
    .. controls (-0.7352,-0.4249) and (-0.7368,-0.4246) .. (-0.7065,-0.4208)
    -- (-0.7065,-0.4038)
    --cycle
    ( 0.3971,-0.3953)
    -- ( 0.3801,-0.4378)
    -- ( 0.4140,-0.4378)
    -- ( 0.4140,-0.3953)
    --cycle
    (-0.6640,-0.4038)
    .. controls (-0.6429,-0.4478) and (-0.6261,-0.4537) .. (-0.5876,-0.4802)
    -- (-0.5367,-0.4378)
    .. controls (-0.5592,-0.4163) and (-0.5680,-0.4098) .. (-0.5876,-0.4378)
    .. controls (-0.6195,-0.4110) and (-0.6224,-0.4072) .. (-0.6640,-0.4038)
    --cycle
    (-0.4603,-0.4038)
    -- (-0.4603,-0.4378)
    -- (-0.4263,-0.4378)
    -- (-0.4263,-0.4038)
    --cycle
    ( 0.5584,-0.4038)
    .. controls ( 0.5189,-0.4043) and ( 0.5111,-0.4167) .. ( 0.5159,-0.4548)
    -- ( 0.5329,-0.4548)
    --cycle
    ( 0.6093,-0.4123)
    -- ( 0.6008,-0.4378)
    -- ( 0.6262,-0.4378)
    --cycle
    ( 0.2273,-0.4293)
    -- ( 0.2273,-0.4632)
    -- ( 0.2612,-0.4632)
    -- ( 0.2612,-0.4293)
```

```
--cycle
( 0.1339,-0.4378)
.. controls ( 0.1294,-0.4715) and ( 0.1342,-0.4762) .. ( 0.1679,-0.4717)
--cycle
(-0.1337,-0.4435)
.. controls (-0.1394,-0.4438) and (-0.1452,-0.4454) .. (-0.1547,-0.4474)
-- (-0.1547,-0.4632)
-- (-0.1038,-0.4972)
-- (-0.1547,-0.5057)
.. controls (-0.1508,-0.5315) and (-0.1180,-0.5928) .. (-0.0833,-0.5723)
.. controls (-0.0768,-0.5684) and (-0.0244,-0.4827) .. (-0.1123,-0.4474)
.. controls (-0.1220,-0.4442) and (-0.1279,-0.4432) .. (-0.1337,-0.4435)
--cycle
(-0.0033,-0.4457)
.. controls (-0.0284,-0.4445) and (-0.0459,-0.4662) .. (-0.0273,-0.5141)
-- ( 0.0660,-0.5141)
.. controls ( 0.0545,-0.4708) and ( 0.0219,-0.4468) .. (-0.0033,-0.4457)
--cycle
(-0.7383,-0.4470)
-- (-0.7101,-0.4972)
.. controls (-0.7099,-0.4756) and (-0.7233,-0.4577) .. (-0.7383,-0.4470)
--cycle
(-0.4942,-0.4548)
-- (-0.4857,-0.5065)
.. controls (-0.4998,-0.5043) and (-0.5212,-0.5004) .. (-0.5329,-0.5065)
.. controls (-0.5629,-0.5229) and (-0.5515,-0.5662) .. (-0.5329,-0.5843)
.. controls (-0.5068,-0.6075) and (-0.4879,-0.6033) .. (-0.4603,-0.5906)
.. controls (-0.4787,-0.5639) and (-0.4791,-0.5620) .. (-0.5112,-0.5566)
-- (-0.5112,-0.5396)
.. controls (-0.4518,-0.5306) and (-0.4206,-0.4773) .. (-0.4942,-0.4548)
--cycle
( 0.3377,-0.4548)
.. controls ( 0.3023,-0.4717) and ( 0.2951,-0.4788) .. ( 0.2782,-0.5141)
.. controls ( 0.3342,-0.5180) and ( 0.3822,-0.5526) .. ( 0.3886,-0.4717)
-- ( 0.3631,-0.4972)
--cycle
( 0.5663,-0.4671)
.. controls ( 0.5583,-0.4668) and ( 0.5478,-0.4680) .. ( 0.5329,-0.4717)
-- ( 0.5329,-0.4887)
.. controls ( 0.5814,-0.5209) and ( 0.6607,-0.5778) .. ( 0.6687,-0.4802)
-- ( 0.6201,-0.4852)
.. controls ( 0.5908,-0.4828) and ( 0.5901,-0.4680) .. ( 0.5663,-0.4671)
--cycle
(-0.6640,-0.4802)
.. controls (-0.6763,-0.5067) and (-0.6845,-0.5204) .. (-0.6886,-0.5355)
-- (-0.6647,-0.5782)
-- (-0.5876,-0.5396)
.. controls (-0.6003,-0.5515) and (-0.6232,-0.5710) .. (-0.6310,-0.5860)
.. controls (-0.6373,-0.5982) and (-0.6388,-0.6155) .. (-0.6360,-0.6294)
-- (-0.6224,-0.6537)
.. controls (-0.5951,-0.6768) and (-0.5385,-0.6561) .. (-0.5112,-0.6415)
.. controls (-0.5400,-0.5996) and (-0.5579,-0.6048) .. (-0.6045,-0.6161)
-- (-0.5621,-0.5651)
```

```
    -- (-0.5621,-0.5566)
    -- (-0.5791,-0.5481)
    -- (-0.5621,-0.5141)
    --cycle
    ( 0.1000,-0.4802)
    -- ( 0.0745,-0.5396)
    .. controls ( 0.1186,-0.5345) and ( 0.1548,-0.5114) .. ( 0.1000,-0.4802)
    --cycle
    ( 0.2188,-0.4802)
    -- ( 0.2358,-0.5141)
    -- ( 0.2358,-0.4802)
    --cycle
    ( 0.4310,-0.4802)
    -- ( 0.4140,-0.5311)
    -- ( 0.4140,-0.5396)
    -- ( 0.4310,-0.5566)
    .. controls ( 0.4679,-0.5313) and ( 0.4644,-0.5230) .. ( 0.4649,-0.4802)
    --cycle
    ( 0.7111,-0.4802)
    -- ( 0.7111,-0.5059)
    -- ( 0.7261,-0.4802)
    --cycle
    (-0.3414,-0.4972)
    .. controls (-0.3911,-0.5256) and (-0.3704,-0.5729) .. (-0.3075,-0.5566)
    -- (-0.3075,-0.5396)
    --cycle
    (-0.4348,-0.5057)
    -- (-0.4348,-0.5736)
    .. controls (-0.4068,-0.5549) and (-0.4098,-0.5369) .. (-0.4008,-0.5057)
    --cycle
    ( 0.1509,-0.5311)
    -- ( 0.1254,-0.5736)
    -- ( 0.1849,-0.5651)
    --cycle
    ( 0.2273,-0.5311)
    -- ( 0.2103,-0.5975)
    .. controls ( 0.1971,-0.5957) and ( 0.1843,-0.5904) .. ( 0.1705,-0.5975)
    .. controls ( 0.1304,-0.6124) and ( 0.1679,-0.7346) .. ( 0.2142,-0.6893)
    .. controls ( 0.2226,-0.6812) and ( 0.2236,-0.6741) .. ( 0.2273,-0.6670)
    -- ( 0.1849,-0.6330)
    .. controls ( 0.2427,-0.6183) and ( 0.2598,-0.5884) .. ( 0.2443,-0.5311)
    --cycle
    ( 0.5074,-0.5311)
    .. controls ( 0.5252,-0.5626) and ( 0.5317,-0.5622) .. ( 0.5668,-0.5651)
    .. controls ( 0.5491,-0.5336) and ( 0.5426,-0.5340) .. ( 0.5074,-0.5311)
    --cycle
    ( 0.0269,-0.5388)
    .. controls ( 0.0166,-0.5396) and ( 0.0072,-0.5496) .. ( 0.0090,-0.5738)
    -- ( 0.0151,-0.5991)
    .. controls ( 0.0222,-0.5954) and ( 0.0287,-0.5947) .. ( 0.0377,-0.5860)
    .. controls ( 0.0637,-0.5611) and ( 0.0441,-0.5373) .. ( 0.0269,-0.5388)
    --cycle
    ( 0.2782,-0.5481)
```

```
    -- ( 0.2612,-0.5821)
    -- ( 0.3122,-0.6245)
    .. controls ( 0.3120,-0.5837) and ( 0.3197,-0.5648) .. ( 0.2782,-0.5481)
    --cycle
    (-0.2820,-0.5566)
    .. controls (-0.2791,-0.5918) and (-0.2795,-0.5983) .. (-0.2480,-0.6161)
    .. controls (-0.2450,-0.5789) and (-0.2492,-0.5737) .. (-0.2820,-0.5566)
    --cycle
    ( 0.3631,-0.5651)
    .. controls ( 0.3595,-0.5776) and ( 0.3566,-0.5855) .. ( 0.3557,-0.5990)
    .. controls ( 0.3500,-0.6875) and ( 0.4541,-0.6501) .. ( 0.3934,-0.5846)
    .. controls ( 0.3826,-0.5729) and ( 0.3761,-0.5717) .. ( 0.3631,-0.5651)
    --cycle
    ( 0.4330,-0.5736)
    -- ( 0.4330,-0.6379)
    .. controls ( 0.4274,-0.6731) and ( 0.3959,-0.6885) .. ( 0.4395,-0.7179)
    .. controls ( 0.4751,-0.6405) and ( 0.4954,-0.6629) .. ( 0.4480,-0.5736)
    --cycle
    ( 0.5329,-0.5821)
    .. controls ( 0.5362,-0.6232) and ( 0.5740,-0.6869) .. ( 0.6222,-0.6585)
    -- ( 0.6513,-0.6086)
    .. controls ( 0.6095,-0.6116) and ( 0.5939,-0.6354) .. ( 0.5668,-0.5821)
    --cycle
    ( 0.1000,-0.5906)
    -- ( 0.0830,-0.6245)
    -- ( 0.0575,-0.6161)
    .. controls ( 0.0477,-0.6898) and ( 0.1617,-0.6541) .. ( 0.1000,-0.5906)
    --cycle
    (-0.3245,-0.5991)
    .. controls (-0.3790,-0.5920) and (-0.3824,-0.6312) .. (-0.3839,-0.6754)
    -- (-0.3245,-0.6161)
    --cycle
    (-0.4348,-0.6076)
    -- (-0.4603,-0.6670)
    -- (-0.4942,-0.6585)
    -- (-0.5027,-0.6670)
    .. controls (-0.4589,-0.7510) and (-0.3531,-0.6544) .. (-0.4348,-0.6076)
    --cycle
    (-0.1377,-0.6076)
    .. controls (-0.1554,-0.6464) and (-0.1574,-0.6512) .. (-0.1292,-0.6839)
    -- (-0.1208,-0.6839)
    -- (-0.1038,-0.6670)
    -- (-0.1208,-0.6076)
    --cycle
    (-0.0698,-0.6161)
    -- (-0.0698,-0.6330)
    -- (-0.0019,-0.6330)
    -- (-0.0019,-0.6161)
    --cycle
    (-0.2735,-0.6330)
    .. controls (-0.3246,-0.6408) and (-0.3550,-0.6906) .. (-0.3754,-0.7356)
    -- (-0.3510,-0.7356)
    -- (-0.2786,-0.6658)
```

```
--cycle
(-0.1971,-0.6330)
.. controls (-0.2393,-0.6535) and (-0.2774,-0.6931) .. (-0.2226,-0.7264)
--cycle
( 0.2782,-0.6415)
-- ( 0.2612,-0.6585)
.. controls ( 0.2834,-0.6795) and ( 0.2819,-0.6792) .. ( 0.3122,-0.6754)
-- ( 0.3122,-0.6585)
--cycle
( 0.5244,-0.6630)
.. controls ( 0.5103,-0.6630) and ( 0.4934,-0.6765) .. ( 0.4819,-0.6839)
.. controls ( 0.4916,-0.7019) and ( 0.4915,-0.7036) .. ( 0.5078,-0.7175)
-- ( 0.5293,-0.7332)
.. controls ( 0.6028,-0.7786) and ( 0.5789,-0.6636) .. ( 0.5244,-0.6630)
--cycle
(-0.0698,-0.6839)
-- (-0.0613,-0.7433)
-- (-0.0528,-0.7518)
.. controls (-0.0005,-0.7307) and (-0.0190,-0.6844) .. (-0.0698,-0.6839)
--cycle
( 0.1339,-0.6839)
.. controls ( 0.0648,-0.6945) and ( 0.0512,-0.7734) .. ( 0.1169,-0.7943)
.. controls ( 0.1059,-0.7314) and ( 0.1116,-0.7410) .. ( 0.1339,-0.6839)
--cycle
( 0.3546,-0.6839)
.. controls ( 0.3575,-0.7191) and ( 0.3571,-0.7256) .. ( 0.3886,-0.7433)
-- ( 0.3716,-0.6839)
--cycle
( 0.3886,-0.7433)
-- ( 0.3886,-0.7603)
-- ( 0.3546,-0.7943)
-- ( 0.3631,-0.7943)
-- ( 0.3801,-0.8113)
.. controls ( 0.4252,-0.7878) and ( 0.4333,-0.7840) .. ( 0.4140,-0.7349)
--cycle
(-0.5653,-0.6922)
.. controls (-0.5767,-0.6913) and (-0.5873,-0.6939) .. (-0.5981,-0.6969)
-- (-0.5741,-0.7399)
.. controls (-0.5528,-0.7446) and (-0.5350,-0.7433) .. (-0.5027,-0.7433)
.. controls (-0.5172,-0.7077) and (-0.5409,-0.6942) .. (-0.5653,-0.6922)
--cycle
(-0.1547,-0.7099)
.. controls (-0.1719,-0.7103) and (-0.1811,-0.7133) .. (-0.1971,-0.7179)
.. controls (-0.1923,-0.7317) and (-0.1881,-0.7454) .. (-0.1792,-0.7574)
.. controls (-0.1162,-0.8422) and (-0.0444,-0.7079) .. (-0.1547,-0.7099)
--cycle
(-0.4348,-0.7179)
.. controls (-0.4394,-0.7549) and (-0.4359,-0.7636) .. (-0.4008,-0.7773)
--cycle
( 0.2358,-0.7179)
-- ( 0.2358,-0.7349)
-- ( 0.3037,-0.7349)
-- ( 0.3037,-0.7179)
```

```
--cycle
( 0.4649,-0.7179)
-- ( 0.4734,-0.7858)
.. controls ( 0.4612,-0.7900) and ( 0.4516,-0.7918) .. ( 0.4409,-0.8004)
.. controls ( 0.3964,-0.8360) and ( 0.4585,-0.8927) .. ( 0.4819,-0.8198)
-- ( 0.5159,-0.8283)
.. controls ( 0.5142,-0.8359) and ( 0.5131,-0.8417) .. ( 0.5125,-0.8468)
-- ( 0.5398,-0.8000)
.. controls ( 0.5329,-0.7638) and ( 0.5138,-0.7350) .. ( 0.4649,-0.7179)
--cycle
( 0.2103,-0.7264)
-- ( 0.1509,-0.7349)
-- ( 0.1509,-0.7688)
.. controls ( 0.1894,-0.7657) and ( 0.1982,-0.7645) .. ( 0.2103,-0.7264)
--cycle
(-0.2905,-0.7349)
.. controls (-0.3009,-0.7717) and (-0.3009,-0.7829) .. (-0.2905,-0.8198)
-- (-0.2480,-0.8028)
-- (-0.2311,-0.8367)
.. controls (-0.1820,-0.7845) and (-0.2454,-0.7805) .. (-0.2735,-0.7349)
--cycle
(-0.0019,-0.7349)
.. controls (-0.0202,-0.7845) and (-0.0471,-0.8007) .. (-0.0358,-0.8537)
-- ( 0.0066,-0.8113)
-- ( 0.0236,-0.8113)
.. controls ( 0.0412,-0.8384) and ( 0.0421,-0.8410) .. ( 0.0745,-0.8367)
.. controls ( 0.0599,-0.7914) and ( 0.0500,-0.7437) .. (-0.0019,-0.7349)
--cycle
(-0.5282,-0.7688)
.. controls (-0.5349,-0.8205) and (-0.5012,-0.8219) .. (-0.4603,-0.8113)
-- (-0.4603,-0.7943)
--cycle
( 0.3122,-0.7688)
-- ( 0.3037,-0.7773)
.. controls ( 0.3122,-0.8236) and ( 0.3093,-0.8598) .. ( 0.3608,-0.8698)
-- ( 0.3628,-0.8698)
-- ( 0.3292,-0.7688)
--cycle
(-0.3584,-0.7858)
-- (-0.3770,-0.8622)
.. controls (-0.3770,-0.8627) and (-0.3768,-0.8631) .. (-0.3768,-0.8636)
-- (-0.3401,-0.8639)
-- (-0.3245,-0.7858)
--cycle
( 0.2612,-0.7858)
.. controls ( 0.2125,-0.7858) and ( 0.1976,-0.7780) .. ( 0.1594,-0.8113)
.. controls ( 0.2029,-0.8570) and ( 0.2552,-0.8596) .. ( 0.2612,-0.7858)
--cycle
(-0.1292,-0.7943)
-- (-0.1886,-0.8537)
.. controls (-0.1453,-0.8604) and (-0.1341,-0.8487) .. (-0.1038,-0.8198)
--cycle
(-0.4348,-0.8367)
```

```
    -- (-0.4479,-0.8630)
    -- (-0.4228,-0.8632)
    .. controls (-0.4191,-0.8583) and (-0.4180,-0.8505) .. (-0.4178,-0.8367)
    --cycle
    (-0.0783,-0.8452)
    .. controls (-0.0928,-0.8536) and (-0.0996,-0.8588) .. (-0.1026,-0.8659)
    -- (-0.0748,-0.8661)
    -- (-0.0698,-0.8537)
    --cycle
    ( 0.1503,-0.8501)
    .. controls ( 0.1440,-0.8514) and ( 0.1387,-0.8545) .. ( 0.1353,-0.8602)
    .. controls ( 0.1334,-0.8621) and ( 0.1330,-0.8649) .. ( 0.1333,-0.8679)
    -- ( 0.2103,-0.8685)
    -- ( 0.2103,-0.8602)
    .. controls ( 0.1968,-0.8575) and ( 0.1690,-0.8460) .. ( 0.1503,-0.8501)
    --cycle
    (-0.2396,-0.8622)
    -- (-0.2421,-0.8647)
    -- (-0.2217,-0.8649)
    .. controls (-0.2221,-0.8638) and (-0.2222,-0.8633) .. (-0.2226,-0.8622)
    --cycle
    ( 0.2867,-0.8622)
    .. controls ( 0.2782,-0.8636) and ( 0.2734,-0.8665) .. ( 0.2676,-0.8690)
    -- ( 0.2859,-0.8691)
    --cycle
    ( 0.3942,-0.8639)
    .. controls ( 0.3909,-0.8650) and ( 0.3884,-0.8678) .. ( 0.3855,-0.8700)
    -- ( 0.4192,-0.8703)
    .. controls ( 0.4168,-0.8684) and ( 0.4154,-0.8656) .. ( 0.4124,-0.8643)
    .. controls ( 0.4062,-0.8618) and ( 0.4000,-0.8619) .. ( 0.3942,-0.8639)
    --cycle
    ;
  }
}
\fi
```

`hex/terrain/mountains`

The style for mountains. The pattern is filled with a darker brown, and outlines are not drawn. Note that the mountain pattern is the same as the beach pattern, just with a different colour.

```
\tikzset{
  hex/terrain/mountains/.style={
    draw=none,
    fill={rgb,100:red,49;green,35;blue,1}
  }
}
```

`hex/terrain/mountains`

And the mountains pattern. This is the same as the beach pattern, only filled with a darker brown colour.

```
\ifhex@terrain@pic
\tikzset{
  hex/terrain/mountains/.pic={
    \path[hex/terrain/mountains,pic actions,draw=none]
    (-0.4931, 0.8848)
    -- (-0.4998, 0.8734)
    .. controls (-0.4908, 0.8731) and (-0.4813, 0.8762) .. (-0.4762, 0.8847)
    --cycle
    (-0.4032, 0.8841)
    .. controls (-0.4004, 0.8804) and (-0.3988, 0.8794) .. (-0.3956, 0.8745)
    .. controls (-0.3760, 0.8443) and (-0.3811, 0.8330) .. (-0.3456, 0.8112)
    .. controls (-0.3250, 0.7986) and (-0.2712, 0.7770) .. (-0.2531, 0.8032)
    .. controls (-0.2294, 0.8375) and (-0.2984, 0.8503) .. (-0.3193, 0.8690)
    .. controls (-0.3243, 0.8735) and (-0.3281, 0.8785) .. (-0.3321, 0.8835)
    --cycle
    (-0.2462, 0.8828)
    .. controls (-0.2425, 0.8681) and (-0.2383, 0.8546) .. (-0.2293, 0.8461)
    .. controls (-0.2102, 0.8280) and (-0.1892, 0.8390) .. (-0.1859, 0.8669)
    .. controls (-0.1854, 0.8711) and (-0.1871, 0.8772) .. (-0.1875, 0.8822)
    --cycle
    (-0.0997, 0.8815)
    .. controls (-0.0971, 0.8706) and (-0.0941, 0.8597) .. (-0.0907, 0.8493)
    -- (-0.0570, 0.8578)
    .. controls (-0.0570, 0.8629) and (-0.0560, 0.8730) .. (-0.0553, 0.8812)
    --cycle
    ( 0.0213, 0.8805)
    .. controls ( 0.0222, 0.8725) and ( 0.0235, 0.8650) .. ( 0.0262, 0.8587)
    .. controls ( 0.0391, 0.8281) and ( 0.0706, 0.8199) .. ( 0.0917, 0.7894)
    .. controls ( 0.1112, 0.7609) and ( 0.1058, 0.7286) .. ( 0.1050, 0.6961)
    -- ( 0.1731, 0.7216)
    -- ( 0.1203, 0.8649)
    -- ( 0.1097, 0.8797)
    --cycle
    ( 0.2978, 0.8781)
    .. controls ( 0.2985, 0.8773) and ( 0.3002, 0.8756) .. ( 0.3008, 0.8749)
    .. controls ( 0.2854, 0.8687) and ( 0.2549, 0.8572) .. ( 0.2421, 0.8487)
    .. controls ( 0.2026, 0.8224) and ( 0.1905, 0.7567) .. ( 0.2046, 0.7132)
    .. controls ( 0.2146, 0.6819) and ( 0.2330, 0.6680) .. ( 0.2394, 0.6280)
    .. controls ( 0.2413, 0.6160) and ( 0.2468, 0.5527) .. ( 0.2446, 0.5437)
    .. controls ( 0.2396, 0.5232) and ( 0.2211, 0.5122) .. ( 0.2231, 0.4913)
    .. controls ( 0.2261, 0.4603) and ( 0.2686, 0.4388) .. ( 0.2891, 0.4194)
    .. controls ( 0.3020, 0.4071) and ( 0.3136, 0.3895) .. ( 0.3281, 0.3799)
    .. controls ( 0.3688, 0.3533) and ( 0.3905, 0.3863) .. ( 0.4199, 0.3902)
    .. controls ( 0.4350, 0.3921) and ( 0.4560, 0.3849) .. ( 0.4710, 0.3812)
    -- ( 0.4795, 0.4067)
    -- ( 0.4965, 0.4067)
    .. controls ( 0.5008, 0.3961) and ( 0.5009, 0.3893) .. ( 0.5112, 0.3811)
    .. controls ( 0.5112, 0.3811) and ( 0.6172, 0.3385) .. ( 0.6481, 0.3037)
    .. controls ( 0.6729, 0.2758) and ( 0.6641, 0.2532) .. ( 0.6667, 0.2206)
    -- ( 0.7004, 0.2206)
    .. controls ( 0.7839, 0.2118) and ( 0.7047, 0.0740) .. ( 0.7057, 0.0568)
    .. controls ( 0.7067, 0.0396) and ( 0.7865,-0.0424) .. ( 0.8032,-0.0520)
    .. controls ( 0.8251,-0.0644) and ( 0.8703,-0.0686) .. ( 0.8572,-0.0293)
```

```
    .. controls ( 0.8518,-0.0131) and ( 0.7996, 0.0474) .. ( 0.7843, 0.0564)
    .. controls ( 0.7724, 0.0633) and ( 0.7645, 0.0636) .. ( 0.7518, 0.0664)
    .. controls ( 0.7688, 0.1093) and ( 0.7993, 0.1905) .. ( 0.7930, 0.2362)
    .. controls ( 0.7869, 0.2804) and ( 0.7252, 0.2982) .. ( 0.6946, 0.3268)
    .. controls ( 0.6664, 0.3531) and ( 0.6746, 0.3662) .. ( 0.6323, 0.3966)
    .. controls ( 0.5760, 0.4371) and ( 0.5386, 0.4324) .. ( 0.5250, 0.4601)
    .. controls ( 0.5090, 0.4927) and ( 0.5578, 0.6035) .. ( 0.5969, 0.5911)
    .. controls ( 0.6199, 0.5839) and ( 0.6224, 0.5471) .. ( 0.6341, 0.5291)
    .. controls ( 0.6488, 0.5064) and ( 0.7020, 0.4614) .. ( 0.7263, 0.4493)
    -- ( 0.7373, 0.4768)
    -- ( 0.6866, 0.5671)
    -- ( 0.6756, 0.5720)
    -- ( 0.6766, 0.5850)
    -- ( 0.6331, 0.6627)
    .. controls ( 0.6280, 0.6613) and ( 0.6239, 0.6599) .. ( 0.6157, 0.6589)
    -- ( 0.5646, 0.6589)
    .. controls ( 0.5375, 0.6557) and ( 0.5277, 0.6432) .. ( 0.4965, 0.6489)
    .. controls ( 0.4716, 0.6520) and ( 0.4306, 0.6774) .. ( 0.4104, 0.6489)
    .. controls ( 0.3809, 0.6093) and ( 0.4627, 0.6240) .. ( 0.4837, 0.5772)
    .. controls ( 0.4958, 0.5502) and ( 0.4652, 0.4811) .. ( 0.4429, 0.4648)
    -- ( 0.3523, 0.4350)
    .. controls ( 0.3178, 0.4372) and ( 0.3207, 0.4766) .. ( 0.3153, 0.5004)
    .. controls ( 0.3090, 0.5282) and ( 0.2968, 0.5398) .. ( 0.2922, 0.5684)
    .. controls ( 0.2896, 0.6035) and ( 0.3061, 0.6276) .. ( 0.2922, 0.6621)
    .. controls ( 0.2756, 0.6961) and ( 0.2422, 0.7190) .. ( 0.2525, 0.7640)
    .. controls ( 0.2650, 0.8188) and ( 0.3165, 0.7932) .. ( 0.3324, 0.8417)
    .. controls ( 0.3359, 0.8522) and ( 0.3385, 0.8648) .. ( 0.3399, 0.8778)
    --cycle
    ( 0.4261, 0.8770)
    -- ( 0.4333, 0.8493)
    -- ( 0.4845, 0.7440)
    .. controls ( 0.4963, 0.7304) and ( 0.5450, 0.6930) .. ( 0.5630, 0.6989)
    .. controls ( 0.5735, 0.7024) and ( 0.5838, 0.7169) .. ( 0.5932, 0.7337)
    -- ( 0.5612, 0.7909)
    .. controls ( 0.5537, 0.7875) and ( 0.5468, 0.7852) .. ( 0.5403, 0.7864)
    .. controls ( 0.5078, 0.7926) and ( 0.5191, 0.8406) .. ( 0.5145, 0.8567)
    .. controls ( 0.5121, 0.8651) and ( 0.5076, 0.8710) .. ( 0.5025, 0.8764)
    --cycle
    ( 0.3773, 0.8153)
    .. controls ( 0.3625, 0.7892) and ( 0.2993, 0.7161) .. ( 0.3316, 0.6877)
    .. controls ( 0.3432, 0.6774) and ( 0.3866, 0.6728) .. ( 0.4029, 0.6706)
    -- ( 0.3973, 0.7472)
    -- ( 0.4029, 0.8153)
    --cycle
    (-0.4224, 0.8088)
    .. controls (-0.4416, 0.8077) and (-0.4585, 0.7826) .. (-0.4275, 0.7562)
    -- (-0.3971, 0.7387)
    .. controls (-0.4780, 0.6942) and (-0.4752, 0.6640) .. (-0.4591, 0.5855)
    .. controls (-0.4391, 0.4887) and (-0.4527, 0.5347) .. (-0.4103, 0.4493)
    .. controls (-0.3870, 0.4026) and (-0.4070, 0.3747) .. (-0.3460, 0.3642)
    -- (-0.3352, 0.4823)
    .. controls (-0.3409, 0.5024) and (-0.3617, 0.5113) .. (-0.3739, 0.5281)
    -- (-0.4164, 0.6287)
```

```
    .. controls (-0.4188, 0.6375) and (-0.4186, 0.6444) .. (-0.4164, 0.6528)
    .. controls (-0.4067, 0.6807) and (-0.3521, 0.7255) .. (-0.3274, 0.6931)
    .. controls (-0.3070, 0.6694) and (-0.3336, 0.6432) .. (-0.3274, 0.6221)
    .. controls (-0.3249, 0.6055) and (-0.3059, 0.6028) .. (-0.2950, 0.6162)
    .. controls (-0.2867, 0.6265) and (-0.2838, 0.6558) .. (-0.2829, 0.6692)
    .. controls (-0.2775, 0.7444) and (-0.3333, 0.7652) .. (-0.3955, 0.7472)
    .. controls (-0.3950, 0.7586) and (-0.3916, 0.7684) .. (-0.3955, 0.7803)
    .. controls (-0.3986, 0.8016) and (-0.4109, 0.8096) .. (-0.4224, 0.8088)
    --cycle
    (-0.1391, 0.8077)
    .. controls (-0.1634, 0.8024) and (-0.1582, 0.7647) .. (-0.1487, 0.7492)
    .. controls (-0.1306, 0.7190) and (-0.1004, 0.7270) .. (-0.0652, 0.7073)
    -- (-0.0226, 0.6801)
    -- ( 0.0282, 0.6560)
    .. controls ( 0.0622, 0.6331) and ( 0.0955, 0.5639) .. ( 0.1219, 0.5259)
    .. controls ( 0.2125, 0.5714) and ( 0.1427, 0.6114) .. ( 0.1219, 0.6453)
    -- ( 0.1054, 0.6768)
    .. controls ( 0.0862, 0.7028) and ( 0.0448, 0.7080) .. ( 0.0115, 0.7299)
    .. controls (-0.0377, 0.7622) and (-0.0173, 0.7726) .. (-0.0822, 0.7918)
    .. controls (-0.0961, 0.7958) and (-0.1270, 0.8103) .. (-0.1391, 0.8077)
    --cycle
    (-0.5460, 0.7940)
    -- (-0.5911, 0.7166)
    .. controls (-0.5649, 0.7015) and (-0.5397, 0.7188) .. (-0.5308, 0.7556)
    .. controls (-0.5251, 0.7788) and (-0.5335, 0.7873) .. (-0.5460, 0.7940)
    --cycle
    (-0.2382, 0.7423)
    .. controls (-0.2453, 0.7424) and (-0.2512, 0.7383) .. (-0.2550, 0.7274)
    .. controls (-0.2635, 0.7026) and (-0.2353, 0.6726) .. (-0.2229, 0.6536)
    .. controls (-0.2031, 0.6234) and (-0.2020, 0.6105) .. (-0.1928, 0.5770)
    .. controls (-0.1763, 0.5803) and (-0.1499, 0.5890) .. (-0.1342, 0.5831)
    .. controls (-0.1112, 0.5745) and (-0.1047, 0.5481) .. (-0.0866, 0.5338)
    -- (-0.0397, 0.5102)
    -- ( 0.0664, 0.4219)
    .. controls ( 0.0874, 0.3954) and ( 0.0785, 0.3655) .. ( 0.1070, 0.3502)
    .. controls ( 0.1367, 0.3343) and ( 0.1690, 0.3592) .. ( 0.1732, 0.3899)
    .. controls ( 0.1755, 0.4075) and ( 0.1545, 0.4554) .. ( 0.1475, 0.4748)
    .. controls ( 0.0838, 0.4666) and ( 0.0509, 0.4836) .. ( 0.0454, 0.5515)
    .. controls (-0.0576, 0.5778) and (-0.0955, 0.6323) .. (-0.1754, 0.6949)
    .. controls (-0.1861, 0.7034) and (-0.2171, 0.7418) .. (-0.2382, 0.7423)
    --cycle
    (-0.5068, 0.6706)
    .. controls (-0.5119, 0.6724) and (-0.5194, 0.6726) .. (-0.5299, 0.6701)
    .. controls (-0.5512, 0.6413) and (-0.5242, 0.6333) .. (-0.5102, 0.6400)
    .. controls (-0.4981, 0.6457) and (-0.4916, 0.6653) .. (-0.5068, 0.6706)
    --cycle
    (-0.6356, 0.6402)
    -- (-0.6681, 0.5845)
    -- (-0.6588, 0.5684)
    .. controls (-0.6473, 0.5521) and (-0.6323, 0.5371) .. (-0.6265, 0.5174)
    .. controls (-0.6174, 0.4865) and (-0.6614, 0.4161) .. (-0.6950, 0.4206)
    .. controls (-0.7111, 0.4226) and (-0.7174, 0.4376) .. (-0.7460, 0.4507)
    -- (-0.7632, 0.4212)
```

```
    .. controls (-0.7629, 0.4042) and (-0.7611, 0.3875) .. (-0.7546, 0.3789)
    .. controls (-0.7424, 0.3626) and (-0.7129, 0.3612) .. (-0.6966, 0.3297)
    .. controls (-0.6823, 0.3022) and (-0.6963, 0.2741) .. (-0.6808, 0.2598)
    .. controls (-0.6602, 0.2410) and (-0.6495, 0.2720) .. (-0.6484, 0.2878)
    .. controls (-0.6461, 0.3229) and (-0.6488, 0.4046) .. (-0.6080, 0.4204)
    .. controls (-0.5750, 0.4330) and (-0.4980, 0.3514) .. (-0.4929, 0.3217)
    .. controls (-0.4895, 0.3019) and (-0.5044, 0.2671) .. (-0.4860, 0.2550)
    .. controls (-0.4691, 0.2439) and (-0.4582, 0.2679) .. (-0.4535, 0.2796)
    .. controls (-0.4450, 0.3015) and (-0.4273, 0.3562) .. (-0.4401, 0.3771)
    .. controls (-0.4495, 0.3922) and (-0.5019, 0.4172) .. (-0.5296, 0.4507)
    .. controls (-0.5656, 0.4941) and (-0.5734, 0.5631) .. (-0.5973, 0.6021)
    .. controls (-0.6099, 0.6226) and (-0.6226, 0.6316) .. (-0.6356, 0.6402)
    --cycle
    ( 0.2242, 0.6110)
    -- ( 0.1816, 0.6025)
    -- ( 0.1816, 0.5855)
    .. controls ( 0.2117, 0.5815) and ( 0.2140, 0.5821) .. ( 0.2242, 0.6110)
    --cycle
    ( 0.3924, 0.6049)
    .. controls ( 0.3895, 0.6048) and ( 0.3860, 0.6036) .. ( 0.3820, 0.6011)
    .. controls ( 0.3535, 0.5835) and ( 0.3670, 0.5238) .. ( 0.3773, 0.5004)
    -- ( 0.3944, 0.5004)
    -- ( 0.4061, 0.5429)
    .. controls ( 0.4082, 0.5540) and ( 0.4130, 0.6056) .. ( 0.3924, 0.6049)
    --cycle
    (-0.2864, 0.5940)
    .. controls (-0.2904, 0.5793) and (-0.2950, 0.5676) .. (-0.2919, 0.5518)
    .. controls (-0.2769, 0.4768) and (-0.1616, 0.5041) .. (-0.2162, 0.5623)
    .. controls (-0.2236, 0.5702) and (-0.2346, 0.5747) .. (-0.2443, 0.5790)
    --cycle
    (-0.7010, 0.5280)
    -- (-0.7269, 0.4835)
    .. controls (-0.7207, 0.4876) and (-0.7144, 0.4952) .. (-0.7081, 0.5094)
    --cycle
    (-0.0992, 0.4748)
    -- (-0.2099, 0.4556)
    -- (-0.2888, 0.3790)
    -- (-0.3460, 0.3557)
    -- (-0.3389, 0.3218)
    .. controls (-0.3310, 0.2959) and (-0.3026, 0.2636) .. (-0.2781, 0.2927)
    .. controls (-0.2745, 0.2971) and (-0.2504, 0.3947) .. (-0.1948, 0.3764)
    .. controls (-0.1607, 0.3651) and (-0.1697, 0.2984) .. (-0.1588, 0.2536)
    -- (-0.1503, 0.2536)
    -- (-0.1503, 0.2450)
    -- (-0.1163, 0.2366)
    .. controls (-0.0968, 0.3059) and (-0.1262, 0.3371) .. (-0.1239, 0.3982)
    .. controls (-0.1229, 0.4261) and (-0.1067, 0.4484) .. (-0.0992, 0.4748)
    --cycle
    (-0.1503, 0.2450)
    -- (-0.1588, 0.2536)
    .. controls (-0.2292, 0.2544) and (-0.2730, 0.2893) .. (-0.2677, 0.2195)
    -- (-0.2609, 0.1855)
    .. controls (-0.2393, 0.1890) and (-0.2005, 0.2039) .. (-0.1909, 0.1753)
```

```
    .. controls (-0.1709, 0.1163) and (-0.2582, 0.0953) .. (-0.2387, 0.0533)
    .. controls (-0.2275, 0.0292) and (-0.1430, 0.0537) .. (-0.1361, 0.0692)
    .. controls (-0.1250, 0.0859) and (-0.1359, 0.1083) .. (-0.1361, 0.1259)
    .. controls (-0.1437, 0.1788) and (-0.1186, 0.1766) .. (-0.1503, 0.2450)
    --cycle
    ( 0.7348, 0.4408)
    .. controls ( 0.7113, 0.3774) and ( 0.7569, 0.3513) .. ( 0.7901, 0.3824)
    -- ( 0.7585, 0.4390)
    --cycle
    ( 0.2071, 0.4153)
    .. controls ( 0.1984, 0.3706) and ( 0.2118, 0.3204) .. ( 0.2582, 0.3046)
    .. controls ( 0.2685, 0.3631) and ( 0.2706, 0.3931) .. ( 0.2071, 0.4153)
    --cycle
    (-0.0567, 0.3982)
    .. controls (-0.0558, 0.3230) and (-0.0460, 0.3456) .. (-0.0210, 0.2876)
    -- ( 0.0067, 0.1940)
    .. controls ( 0.0180, 0.1513) and ( 0.0026, 0.1332) .. ( 0.0454, 0.1089)
    -- ( 0.0767, 0.1940)
    -- ( 0.0546, 0.2621)
    -- ( 0.0406, 0.3185)
    -- (-0.0258, 0.3896)
    --cycle
    (-0.7969, 0.3634)
    -- (-0.8570, 0.2602)
    .. controls (-0.8515, 0.2550) and (-0.8469, 0.2514) .. (-0.8414, 0.2450)
    .. controls (-0.8020, 0.1990) and (-0.8201, 0.1971) .. (-0.7629, 0.1540)
    .. controls (-0.7462, 0.1414) and (-0.7054, 0.1023) .. (-0.6834, 0.1181)
    .. controls (-0.6662, 0.1304) and (-0.6813, 0.1625) .. (-0.6882, 0.1768)
    .. controls (-0.7213, 0.2456) and (-0.7865, 0.2417) .. (-0.8004, 0.2965)
    .. controls (-0.8052, 0.3154) and (-0.7990, 0.3413) .. (-0.7969, 0.3634)
    --cycle
    ( 0.8244, 0.3214)
    .. controls ( 0.8136, 0.3128) and ( 0.8080, 0.2984) .. ( 0.8114, 0.2706)
    .. controls ( 0.8314, 0.2739) and ( 0.8424, 0.2735) .. ( 0.8526, 0.2710)
    --cycle
    ( 0.5015, 0.3207)
    .. controls ( 0.4943, 0.3196) and ( 0.4861, 0.3171) .. ( 0.4766, 0.3130)
    .. controls ( 0.4611, 0.2827) and ( 0.4839, 0.2747) .. ( 0.5028, 0.2521)
    -- ( 0.5376, 0.1972)
    .. controls ( 0.5529, 0.1772) and ( 0.5728, 0.1698) .. ( 0.5845, 0.1426)
    .. controls ( 0.5979, 0.1115) and ( 0.5837, 0.0732) .. ( 0.5987, 0.0532)
    .. controls ( 0.6095, 0.0384) and ( 0.6236, 0.0428) .. ( 0.6350, 0.0532)
    .. controls ( 0.6681, 0.0842) and ( 0.6456, 0.1087) .. ( 0.6482, 0.1429)
    .. controls ( 0.6481, 0.1614) and ( 0.6596, 0.1802) .. ( 0.6482, 0.1967)
    .. controls ( 0.6390, 0.2131) and ( 0.5992, 0.2239) .. ( 0.5768, 0.2483)
    .. controls ( 0.5547, 0.2722) and ( 0.5524, 0.3288) .. ( 0.5015, 0.3207)
    --cycle
    (-0.5678, 0.3115)
    .. controls (-0.5832, 0.3118) and (-0.6140, 0.2810) .. (-0.6269, 0.2706)
    .. controls (-0.6185, 0.2412) and (-0.5926, 0.1953) .. (-0.5973, 0.1685)
    .. controls (-0.6029, 0.1373) and (-0.6320, 0.1239) .. (-0.6369, 0.0996)
    .. controls (-0.6406, 0.0816) and (-0.6303, 0.0652) .. (-0.6237, 0.0493)
    .. controls (-0.6147, 0.0275) and (-0.6000,-0.0443) .. (-0.5641,-0.0258)
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    .. controls (-0.5134,-0.0018) and (-0.5902, 0.0606) .. (-0.5641, 0.1074)
    .. controls (-0.5332, 0.1697) and (-0.4913, 0.1444) .. (-0.4481, 0.1593)
    .. controls (-0.3913, 0.1792) and (-0.3439, 0.2446) .. (-0.3545, 0.3046)
    -- (-0.4568, 0.2201)
    -- (-0.5588, 0.2201)
    .. controls (-0.5549, 0.2390) and (-0.5305, 0.3109) .. (-0.5678, 0.3115)
    --cycle
    ( 0.2243, 0.2813)
    -- ( 0.1631, 0.2450)
    -- ( 0.0965, 0.2281)
    -- ( 0.1689, 0.1131)
    -- ( 0.2065, 0.0861)
    .. controls ( 0.2453, 0.0564) and ( 0.2384, 0.0410) .. ( 0.2923, 0.0323)
    -- ( 0.2988,-0.0188)
    .. controls ( 0.2994,-0.0695) and ( 0.2657,-0.0796) .. ( 0.2249,-0.0579)
    .. controls ( 0.1337,-0.0093) and ( 0.1545, 0.0219) .. ( 0.1102, 0.0744)
    .. controls ( 0.0914, 0.0967) and ( 0.0807, 0.1010) .. ( 0.0539, 0.1089)
    .. controls ( 0.0562, 0.0613) and ( 0.0756,-0.0434) .. ( 0.0403,-0.0825)
    .. controls ( 0.0293,-0.0948) and (-0.0336,-0.1168) .. (-0.0567,-0.1294)
    .. controls (-0.0615,-0.1087) and (-0.0777,-0.0729) .. (-0.0703,-0.0546)
    .. controls (-0.0586,-0.0251) and ( 0.0562, 0.0040) .. (-0.0152, 0.0389)
    -- (-0.0397, 0.0480)
    -- (-0.0737, 0.0578)
    .. controls (-0.0806, 0.0391) and (-0.0849, 0.0192) .. (-0.1018, 0.0068)
    .. controls (-0.1154,-0.0032) and (-0.1352,-0.0018) .. (-0.1438,-0.0212)
    .. controls (-0.1562,-0.0491) and (-0.1117,-0.1243) .. (-0.0874,-0.1373)
    .. controls (-0.0745,-0.1434) and (-0.0687,-0.1394) .. (-0.0567,-0.1373)
    .. controls (-0.0358,-0.2033) and (-0.0062,-0.1612) .. ( 0.0370,-0.1500)
    -- ( 0.1050,-0.1379)
    .. controls ( 0.0882,-0.0871) and ( 0.0808,-0.0999) .. ( 0.0965,-0.0443)
    .. controls ( 0.1454,-0.0619) and ( 0.1336,-0.0743) .. ( 0.1664,-0.0940)
    .. controls ( 0.1897,-0.1081) and ( 0.2226,-0.1052) .. ( 0.2361,-0.1388)
    .. controls ( 0.2495,-0.1724) and ( 0.2245,-0.1963) .. ( 0.2412,-0.2584)
    .. controls ( 0.2526,-0.2569) and ( 0.2622,-0.2548) .. ( 0.2735,-0.2584)
    .. controls ( 0.2987,-0.2708) and ( 0.3225,-0.3241) .. ( 0.3212,-0.3506)
    .. controls ( 0.3203,-0.3711) and ( 0.3053,-0.3950) .. ( 0.3008,-0.4443)
    -- ( 0.2497,-0.4187)
    .. controls ( 0.2599,-0.4479) and ( 0.2621,-0.4475) .. ( 0.2905,-0.4528)
    .. controls ( 0.2877,-0.4715) and ( 0.2799,-0.4998) .. ( 0.2905,-0.5182)
    .. controls ( 0.2991,-0.5392) and ( 0.3228,-0.5357) .. ( 0.3346,-0.5182)
    .. controls ( 0.3506,-0.4943) and ( 0.3355,-0.4515) .. ( 0.3532,-0.4203)
    .. controls ( 0.3716,-0.3881) and ( 0.4096,-0.3844) .. ( 0.4084,-0.3499)
    .. controls ( 0.4074,-0.3241) and ( 0.3866,-0.3087) .. ( 0.3728,-0.2897)
    -- ( 0.3426,-0.2337)
    -- ( 0.2989,-0.1879)
    .. controls ( 0.2810,-0.1587) and ( 0.2976,-0.1327) .. ( 0.3187,-0.1323)
    .. controls ( 0.3342,-0.1319) and ( 0.3489,-0.1451) .. ( 0.3603,-0.1541)
    .. controls ( 0.3817,-0.1712) and ( 0.4026,-0.1894) .. ( 0.4144,-0.2146)
    .. controls ( 0.4299,-0.2477) and ( 0.4289,-0.2977) .. ( 0.4712,-0.3110)
    .. controls ( 0.4957,-0.3188) and ( 0.5167,-0.3024) .. ( 0.5044,-0.2753)
    .. controls ( 0.4967,-0.2585) and ( 0.4769,-0.2471) .. ( 0.4676,-0.2227)
    .. controls ( 0.4582,-0.1981) and ( 0.4681,-0.1743) .. ( 0.4488,-0.1492)
    .. controls ( 0.4286,-0.1227) and ( 0.3809,-0.1095) .. ( 0.3621,-0.0696)
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    .. controls ( 0.3402,-0.0230) and ( 0.3896, 0.0270) .. ( 0.3092, 0.0408)
    -- ( 0.3532, 0.1933)
    -- ( 0.3944, 0.2536)
    -- ( 0.3433, 0.2765)
    --cycle
    ( 0.2497, 0.2450)
    -- ( 0.2782, 0.2025)
    .. controls ( 0.2843, 0.1911) and ( 0.2884, 0.1815) .. ( 0.2900, 0.1685)
    .. controls ( 0.3021, 0.0654) and ( 0.1495, 0.1479) .. ( 0.2135, 0.2245)
    .. controls ( 0.2246, 0.2378) and ( 0.2346, 0.2396) .. ( 0.2497, 0.2450)
    --cycle
    ( 0.8836, 0.2157)
    .. controls ( 0.8688, 0.2061) and ( 0.8571, 0.1889) .. ( 0.8687, 0.1736)
    .. controls ( 0.8785, 0.1608) and ( 0.8967, 0.1613) .. ( 0.9161, 0.1578)
    --cycle
    (-0.3035, 0.1940)
    .. controls (-0.3340, 0.1390) and (-0.3508, 0.1491) .. (-0.3624, 0.1300)
    .. controls (-0.3738, 0.1112) and (-0.3588, 0.0896) .. (-0.3288, 0.0972)
    .. controls (-0.2842, 0.1084) and (-0.2392, 0.1714) .. (-0.3035, 0.1940)
    --cycle
    ( 0.4710, 0.1940)
    .. controls ( 0.4330, 0.1525) and ( 0.3961, 0.1447) .. ( 0.4114, 0.0833)
    .. controls ( 0.4294, 0.0897) and ( 0.4596, 0.1056) .. ( 0.4776, 0.0984)
    .. controls ( 0.5010, 0.0888) and ( 0.5182, 0.0420) .. ( 0.4925, 0.0231)
    .. controls ( 0.4698, 0.0064) and ( 0.4500, 0.0299) .. ( 0.3944, 0.0153)
    .. controls ( 0.4243,-0.0189) and ( 0.4618,-0.0333) .. ( 0.4765,-0.0621)
    .. controls ( 0.4928,-0.0939) and ( 0.4729,-0.1183) .. ( 0.4881,-0.1406)
    .. controls ( 0.4977,-0.1549) and ( 0.5241,-0.1630) .. ( 0.5425,-0.1894)
    .. controls ( 0.5557,-0.2085) and ( 0.5562,-0.2282) .. ( 0.5657,-0.2485)
    -- ( 0.6122,-0.3251)
    .. controls ( 0.6335,-0.3720) and ( 0.6160,-0.3973) .. ( 0.6323,-0.4443)
    .. controls ( 0.6532,-0.5042) and ( 0.6754,-0.5231) .. ( 0.6973,-0.5440)
    -- ( 0.7289,-0.4899)
    .. controls ( 0.7138,-0.4739) and ( 0.6992,-0.4579) .. ( 0.6886,-0.4358)
    -- ( 0.6489,-0.2690)
    .. controls ( 0.6485,-0.2445) and ( 0.6654,-0.2180) .. ( 0.6598,-0.2002)
    .. controls ( 0.6522,-0.1752) and ( 0.6202,-0.1899) .. ( 0.5938,-0.1612)
    .. controls ( 0.5619,-0.1263) and ( 0.5907,-0.0980) .. ( 0.5797,-0.0720)
    .. controls ( 0.5714,-0.0525) and ( 0.5434,-0.0441) .. ( 0.5374,-0.0184)
    .. controls ( 0.5319, 0.0056) and ( 0.5522, 0.0300) .. ( 0.5533, 0.0578)
    .. controls ( 0.5548, 0.0943) and ( 0.4981, 0.1701) .. ( 0.4710, 0.1940)
    --cycle
    (-0.9001, 0.1862)
    -- (-0.9386, 0.1201)
    .. controls (-0.9374, 0.1181) and (-0.9371, 0.1158) .. (-0.9356, 0.1139)
    .. controls (-0.9242, 0.0996) and (-0.9046, 0.0893) .. (-0.8911, 0.0660)
    .. controls (-0.8684, 0.0268) and (-0.8960, 0.0297) .. (-0.8592,-0.0296)
    .. controls (-0.8262,-0.0830) and (-0.8655,-0.1092) .. (-0.7971,-0.1209)
    -- (-0.7875, 0.0068)
    -- (-0.8579, 0.1174)
    --cycle
    (-0.4453, 0.0979)
    .. controls (-0.4922, 0.0916) and (-0.4988, 0.0347) .. (-0.4759, 0.0116)
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    .. controls (-0.4491,-0.0149) and (-0.4165, 0.0208) .. (-0.3900, 0.0116)
    .. controls (-0.3555,-0.0011) and (-0.3800,-0.0410) .. (-0.3751,-0.0698)
    -- (-0.3537,-0.1294)
    .. controls (-0.3428,-0.1879) and (-0.4042,-0.1777) .. (-0.3801,-0.2656)
    .. controls (-0.3617,-0.2531) and (-0.3352,-0.2292) .. (-0.3122,-0.2330)
    .. controls (-0.2845,-0.2375) and (-0.2669,-0.2694) .. (-0.2543,-0.2911)
    .. controls (-0.2183,-0.3533) and (-0.2004,-0.3613) .. (-0.2184,-0.4358)
    .. controls (-0.3300,-0.4097) and (-0.2723,-0.5065) .. (-0.2483,-0.5549)
    -- (-0.2129,-0.6314)
    .. controls (-0.2017,-0.6508) and (-0.1900,-0.6661) .. (-0.1670,-0.6712)
    .. controls (-0.1211,-0.6813) and (-0.1100,-0.6527) .. (-0.1163,-0.6145)
    .. controls (-0.1327,-0.6119) and (-0.1427,-0.6118) .. (-0.1568,-0.6009)
    .. controls (-0.1780,-0.5845) and (-0.2123,-0.5041) .. (-0.2042,-0.4783)
    .. controls (-0.1947,-0.4484) and (-0.1575,-0.4121) .. (-0.1333,-0.3932)
    -- (-0.1527,-0.3251)
    -- (-0.1588,-0.2656)
    .. controls (-0.2187,-0.2715) and (-0.2083,-0.2536) .. (-0.2457,-0.2163)
    .. controls (-0.2684,-0.1935) and (-0.2911,-0.1886) .. (-0.2996,-0.1546)
    -- (-0.2996,-0.1209)
    -- (-0.3232,-0.0698)
    .. controls (-0.3283,-0.0435) and (-0.3124,-0.0260) .. (-0.3175,-0.0041)
    .. controls (-0.3251, 0.0283) and (-0.3891, 0.0917) .. (-0.4227, 0.0973)
    .. controls (-0.4311, 0.0987) and (-0.4386, 0.0989) .. (-0.4453, 0.0979)
    --cycle
    (-0.1163,-0.6145)
    -- (-0.0812,-0.6009)
    -- (-0.0509,-0.4868)
    -- (-0.0567,-0.4528)
    .. controls (-0.1227,-0.4845) and (-0.1350,-0.5483) .. (-0.1163,-0.6145)
    --cycle
    ( 0.9165, 0.0573)
    .. controls ( 0.8982, 0.0512) and ( 0.8800, 0.0260) .. ( 0.8880,-0.0013)
    .. controls ( 0.8973,-0.0334) and ( 0.9330,-0.0408) .. ( 0.9466,-0.0703)
    .. controls ( 0.9528,-0.0838) and ( 0.9514,-0.0964) .. ( 0.9506,-0.1091)
    -- ( 1.0000,-0.0243)
    .. controls ( 0.9816,-0.0179) and ( 0.9678,-0.0119) .. ( 0.9563, 0.0077)
    .. controls ( 0.9465, 0.0244) and ( 0.9476, 0.0488) .. ( 0.9340, 0.0564)
    .. controls ( 0.9288, 0.0593) and ( 0.9227, 0.0593) .. ( 0.9165, 0.0573)
    --cycle
    (-0.7064, 0.0069)
    .. controls (-0.7128, 0.0077) and (-0.7187, 0.0075) .. (-0.7237, 0.0061)
    .. controls (-0.7255, 0.0030) and (-0.7310, 0.0025) .. (-0.7316,-0.0115)
    .. controls (-0.7321,-0.0230) and (-0.7071,-0.1058) .. (-0.6984,-0.1096)
    .. controls (-0.6872,-0.1176) and (-0.6721,-0.1116) .. (-0.6609,-0.1096)
    .. controls (-0.6502,-0.1046) and (-0.6316,-0.0986) .. (-0.6242,-0.0900)
    .. controls (-0.5901,-0.0507) and (-0.6615, 0.0017) .. (-0.7064, 0.0069)
    --cycle
    (-1.0000, 0.0068)
    -- (-1.0000, 0.0020)
    -- (-0.9548,-0.0788)
    .. controls (-0.9170,-0.0310) and (-0.9342,-0.0158) .. (-1.0000, 0.0068)
    --cycle
    (-0.2643, 0.0054)
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    .. controls (-0.2853,-0.0295) and (-0.2523,-0.0713) .. (-0.2182,-0.0843)
    .. controls (-0.2024,-0.0902) and (-0.1781,-0.0944) .. (-0.1687,-0.0757)
    .. controls (-0.1530,-0.0441) and (-0.2378, 0.0095) .. (-0.2643, 0.0054)
    --cycle
    ( 0.6299,-0.0102)
    .. controls ( 0.6155,-0.0145) and ( 0.6071,-0.0342) .. ( 0.6128,-0.0510)
    .. controls ( 0.6198,-0.0721) and ( 0.6440,-0.0790) .. ( 0.6606,-0.0986)
    .. controls ( 0.6738,-0.1143) and ( 0.6761,-0.1328) .. ( 0.6948,-0.1437)
    .. controls ( 0.7092,-0.1520) and ( 0.7311,-0.1484) .. ( 0.7401,-0.1664)
    .. controls ( 0.7461,-0.1784) and ( 0.7351,-0.2363) .. ( 0.7348,-0.2570)
    .. controls ( 0.7336,-0.3524) and ( 0.7289,-0.3324) .. ( 0.7620,-0.4187)
    .. controls ( 0.7631,-0.4216) and ( 0.7642,-0.4246) .. ( 0.7652,-0.4275)
    -- ( 0.8003,-0.3672)
    .. controls ( 0.7976,-0.3636) and ( 0.7942,-0.3606) .. ( 0.7918,-0.3568)
    .. controls ( 0.7778,-0.3349) and ( 0.7645,-0.2537) .. ( 0.7970,-0.2417)
    .. controls ( 0.8206,-0.2330) and ( 0.8347,-0.2671) .. ( 0.8432,-0.2822)
    -- ( 0.8469,-0.2872)
    -- ( 0.8787,-0.2326)
    -- ( 0.8594,-0.1993)
    .. controls ( 0.8496,-0.1847) and ( 0.7996,-0.1314) .. ( 0.7847,-0.1281)
    .. controls ( 0.7712,-0.1229) and ( 0.7642,-0.1268) .. ( 0.7518,-0.1281)
    .. controls ( 0.7451,-0.1148) and ( 0.7397,-0.1014) .. ( 0.7293,-0.0886)
    -- ( 0.6461,-0.0117)
    .. controls ( 0.6402,-0.0090) and ( 0.6347,-0.0087) .. ( 0.6299,-0.0102)
    --cycle
    (-0.5178,-0.0844)
    .. controls (-0.5451,-0.0820) and (-0.5852,-0.0947) .. (-0.5902,-0.1144)
    .. controls (-0.6007,-0.1557) and (-0.5621,-0.1731) .. (-0.5414,-0.1997)
    .. controls (-0.5274,-0.2177) and (-0.5229,-0.2355) .. (-0.5044,-0.2525)
    .. controls (-0.4888,-0.2669) and (-0.4706,-0.2705) .. (-0.4543,-0.2923)
    .. controls (-0.4420,-0.3087) and (-0.4220,-0.3707) .. (-0.4141,-0.3932)
    .. controls (-0.3620,-0.3875) and (-0.3060,-0.4031) .. (-0.3060,-0.3592)
    .. controls (-0.3060,-0.3272) and (-0.3358,-0.3272) .. (-0.3716,-0.3008)
    .. controls (-0.4367,-0.2529) and (-0.4253,-0.2451) .. (-0.4621,-0.1914)
    .. controls (-0.4700,-0.1800) and (-0.4814,-0.1685) .. (-0.4867,-0.1556)
    .. controls (-0.4970,-0.1308) and (-0.4804,-0.1088) .. (-0.4966,-0.0923)
    .. controls (-0.5011,-0.0877) and (-0.5087,-0.0853) .. (-0.5178,-0.0844)
    --cycle
    (-0.4165,-0.0846)
    .. controls (-0.4357,-0.0807) and (-0.4622,-0.1075) .. (-0.4395,-0.1440)
    .. controls (-0.4316,-0.1566) and (-0.4254,-0.1571) .. (-0.4141,-0.1634)
    .. controls (-0.4094,-0.1522) and (-0.4042,-0.1415) .. (-0.4019,-0.1294)
    .. controls (-0.3960,-0.1004) and (-0.4049,-0.0870) .. (-0.4165,-0.0846)
    --cycle
    (-0.9358,-0.1125)
    -- (-0.8813,-0.2098)
    .. controls (-0.8768,-0.1903) and (-0.8656,-0.1673) .. (-0.8723,-0.1485)
    .. controls (-0.8801,-0.1269) and (-0.9022,-0.1274) .. (-0.9358,-0.1125)
    --cycle
    ( 0.1455,-0.1458)
    .. controls ( 0.1402,-0.1449) and ( 0.1336,-0.1452) .. ( 0.1255,-0.1471)
    .. controls ( 0.0901,-0.1850) and ( 0.1064,-0.2454) .. ( 0.1360,-0.2301)
    .. controls ( 0.1569,-0.2194) and ( 0.1827,-0.1522) .. ( 0.1455,-0.1458)
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--cycle
(-0.1477,-0.1474)
.. controls (-0.1646,-0.1458) and (-0.1813,-0.1543) .. (-0.1847,-0.1659)
.. controls (-0.1889,-0.1806) and (-0.1612,-0.2953) .. (-0.1163,-0.2315)
-- (-0.0420,-0.4418)
.. controls (-0.0291,-0.4661) and (-0.0068,-0.4600) .. ( 0.0136,-0.4880)
.. controls ( 0.0294,-0.5097) and ( 0.0259,-0.5331) .. ( 0.0419,-0.5487)
.. controls ( 0.0694,-0.5755) and ( 0.1462,-0.5710) .. ( 0.1798,-0.6001)
-- ( 0.2188,-0.6436)
.. controls ( 0.2392,-0.6605) and ( 0.2566,-0.6577) .. ( 0.2804,-0.6838)
.. controls ( 0.3122,-0.7186) and ( 0.3037,-0.7586) .. ( 0.3603,-0.7592)
.. controls ( 0.3537,-0.7217) and ( 0.3358,-0.6781) .. ( 0.3603,-0.6427)
.. controls ( 0.3743,-0.6222) and ( 0.3978,-0.6232) .. ( 0.4032,-0.6039)
.. controls ( 0.4084,-0.5852) and ( 0.3901,-0.5654) .. ( 0.3712,-0.5741)
.. controls ( 0.3573,-0.5804) and ( 0.3558,-0.5936) .. ( 0.3518,-0.6044)
.. controls ( 0.3319,-0.6046) and ( 0.2996,-0.6092) .. ( 0.2842,-0.6044)
.. controls ( 0.2568,-0.5917) and ( 0.2515,-0.5648) .. ( 0.2231,-0.5501)
.. controls ( 0.1960,-0.5359) and ( 0.1632,-0.5421) .. ( 0.1413,-0.5292)
-- ( 0.0626,-0.4601)
.. controls ( 0.0525,-0.4430) and ( 0.0547,-0.4207) .. ( 0.0440,-0.4065)
.. controls ( 0.0320,-0.3906) and ( 0.0076,-0.3898) .. (-0.0104,-0.3714)
.. controls (-0.0515,-0.3289) and ( 0.0146,-0.2721) .. (-0.0737,-0.2358)
.. controls (-0.0903,-0.2290) and (-0.0917,-0.2313) .. (-0.1098,-0.2315)
-- (-0.1098,-0.1892)
.. controls (-0.1137,-0.1607) and (-0.1308,-0.1491) .. (-0.1477,-0.1474)
--cycle
(-0.7679,-0.1481)
.. controls (-0.8119,-0.1523) and (-0.8157,-0.2051) .. (-0.8303,-0.2401)
-- (-0.8453,-0.2740)
-- (-0.8299,-0.3015)
.. controls (-0.7861,-0.2968) and (-0.8116,-0.2403) .. (-0.7732,-0.2278)
.. controls (-0.7561,-0.2223) and (-0.7349,-0.2415) .. (-0.7204,-0.2497)
.. controls (-0.6711,-0.2774) and (-0.6473,-0.2864) .. (-0.6524,-0.3506)
-- (-0.6787,-0.3422)
.. controls (-0.6786,-0.3475) and (-0.6826,-0.3544) .. (-0.6787,-0.3655)
.. controls (-0.6635,-0.4244) and (-0.5943,-0.3658) .. (-0.5763,-0.3760)
.. controls (-0.5586,-0.3861) and (-0.5497,-0.4251) .. (-0.5357,-0.4418)
.. controls (-0.5118,-0.4701) and (-0.4694,-0.4662) .. (-0.4504,-0.5047)
.. controls (-0.4231,-0.5599) and (-0.4535,-0.6772) .. (-0.4451,-0.7421)
.. controls (-0.4389,-0.7901) and (-0.4023,-0.8005) .. (-0.3912,-0.8443)
.. controls (-0.3883,-0.8558) and (-0.3874,-0.8667) .. (-0.3869,-0.8774)
-- (-0.3386,-0.8778)
.. controls (-0.3371,-0.8645) and (-0.3342,-0.8523) .. (-0.3394,-0.8358)
.. controls (-0.3448,-0.8167) and (-0.3914,-0.7567) .. (-0.3962,-0.6996)
.. controls (-0.4039,-0.6074) and (-0.3294,-0.5871) .. (-0.3545,-0.4954)
-- (-0.3886,-0.5039)
-- (-0.4196,-0.4442)
-- (-0.4864,-0.4090)
-- (-0.5345,-0.3241)
-- (-0.6106,-0.2802)
-- (-0.6106,-0.1975)
.. controls (-0.6301,-0.2027) and (-0.6486,-0.2101) .. (-0.6694,-0.2022)
.. controls (-0.7004,-0.1904) and (-0.7133,-0.1559) .. (-0.7464,-0.1495)
```

```
    .. controls (-0.7544,-0.1479) and (-0.7616,-0.1475) .. (-0.7679,-0.1481)
    --cycle
    ( 0.0029,-0.2060)
    .. controls (-0.0139,-0.2731) and ( 0.0196,-0.2608) .. ( 0.0476,-0.3014)
    .. controls ( 0.0682,-0.3314) and ( 0.0511,-0.3569) .. ( 0.0750,-0.3784)
    .. controls ( 0.0974,-0.3988) and ( 0.1304,-0.3876) .. ( 0.1549,-0.4019)
    .. controls ( 0.1795,-0.4164) and ( 0.1878,-0.4529) .. ( 0.1987,-0.4783)
    .. controls ( 0.2461,-0.4539) and ( 0.2519,-0.4021) .. ( 0.2180,-0.3618)
    .. controls ( 0.1964,-0.3362) and ( 0.1652,-0.3426) .. ( 0.1414,-0.3257)
    .. controls ( 0.1198,-0.3103) and ( 0.1183,-0.2881) .. ( 0.1007,-0.2689)
    .. controls ( 0.0838,-0.2504) and ( 0.0265,-0.2166) .. ( 0.0029,-0.2060)
    --cycle
    ( 0.2327,-0.2826)
    .. controls ( 0.1961,-0.2955) and ( 0.1961,-0.3123) .. ( 0.2327,-0.3251)
    --cycle
    (-0.7548,-0.3137)
    .. controls (-0.7774,-0.3164) and (-0.7890,-0.3323) .. (-0.7986,-0.3573)
    -- (-0.7759,-0.3979)
    .. controls (-0.7735,-0.3968) and (-0.7711,-0.3964) .. (-0.7688,-0.3946)
    -- (-0.7205,-0.3166)
    .. controls (-0.7341,-0.3135) and (-0.7454,-0.3126) .. (-0.7548,-0.3137)
    --cycle
    ( 0.4114,-0.3847)
    .. controls ( 0.4216,-0.4136) and ( 0.4238,-0.4142) .. ( 0.4540,-0.4102)
    -- ( 0.4540,-0.3932)
    --cycle
    ( 0.5395,-0.3997)
    .. controls ( 0.5263,-0.3990) and ( 0.5044,-0.4032) .. ( 0.4625,-0.4018)
    -- ( 0.4780,-0.4954)
    .. controls ( 0.4757,-0.5287) and ( 0.4518,-0.5542) .. ( 0.4648,-0.5776)
    .. controls ( 0.4852,-0.6142) and ( 0.5202,-0.5603) .. ( 0.5614,-0.5929)
    .. controls ( 0.5752,-0.6038) and ( 0.6063,-0.6359) .. ( 0.6275,-0.6638)
    -- ( 0.6570,-0.6132)
    .. controls ( 0.6460,-0.6042) and ( 0.6347,-0.5954) .. ( 0.6268,-0.5865)
    -- ( 0.5937,-0.5346)
    .. controls ( 0.5648,-0.5023) and ( 0.5031,-0.4880) .. ( 0.5646,-0.4273)
    .. controls ( 0.5574,-0.4062) and ( 0.5528,-0.4005) .. ( 0.5395,-0.3997)
    --cycle
    (-0.6609,-0.4273)
    .. controls (-0.7027,-0.4247) and (-0.7300,-0.4414) .. (-0.7397,-0.4624)
    -- (-0.7047,-0.5249)
    .. controls (-0.7013,-0.5263) and (-0.6989,-0.5282) .. (-0.6950,-0.5294)
    .. controls (-0.6935,-0.4878) and (-0.6933,-0.4806) .. (-0.6609,-0.4528)
    --cycle
    (-0.5689,-0.4528)
    .. controls (-0.6368,-0.4677) and (-0.6352,-0.5020) .. (-0.6354,-0.5634)
    -- (-0.5757,-0.6071)
    -- (-0.5162,-0.6826)
    .. controls (-0.5073,-0.6508) and (-0.5037,-0.6125) .. (-0.5241,-0.5838)
    .. controls (-0.5384,-0.5639) and (-0.5622,-0.5584) .. (-0.5689,-0.5361)
    .. controls (-0.5775,-0.5167) and (-0.5648,-0.4918) .. (-0.5689,-0.4528)
    --cycle
    (-0.6354,-0.5634)
```

```
    .. controls (-0.6583,-0.5576) and (-0.6713,-0.5579) .. (-0.6839,-0.5619)
    -- (-0.6487,-0.6248)
    .. controls (-0.6395,-0.6053) and (-0.6326,-0.5852) .. (-0.6354,-0.5634)
    --cycle
    (-0.0056,-0.5890)
    .. controls (-0.0554,-0.6155) and (-0.0426,-0.6370) .. (-0.0606,-0.6818)
    -- (-0.1199,-0.7847)
    .. controls (-0.1298,-0.8015) and (-0.1531,-0.8317) .. (-0.1499,-0.8510)
    .. controls (-0.1482,-0.8615) and (-0.1397,-0.8702) .. (-0.1295,-0.8795)
    -- (-0.0507,-0.8802)
    .. controls (-0.0629,-0.8583) and (-0.0745,-0.8380) .. (-0.0742,-0.8358)
    .. controls (-0.0792,-0.8239) and (-0.0776,-0.8135) .. (-0.0742,-0.8027)
    .. controls (-0.0460,-0.7520) and ( 0.0016,-0.7834) .. ( 0.0277,-0.7780)
    .. controls ( 0.0760,-0.7679) and ( 0.1284,-0.6914) .. ( 0.1207,-0.6405)
    .. controls ( 0.1150,-0.6017) and ( 0.0841,-0.6082) .. ( 0.0711,-0.6267)
    .. controls ( 0.0620,-0.6397) and ( 0.0556,-0.7141) .. ( 0.0539,-0.7336)
    .. controls (-0.0413,-0.7085) and ( 0.0139,-0.6637) .. (-0.0056,-0.5890)
    --cycle
    ( 0.4284,-0.6571)
    .. controls ( 0.4285,-0.7307) and ( 0.4284,-0.7652) .. ( 0.5135,-0.7336)
    .. controls ( 0.5170,-0.7469) and ( 0.5220,-0.7585) .. ( 0.5179,-0.7726)
    .. controls ( 0.5091,-0.8019) and ( 0.4473,-0.8546) .. ( 0.4851,-0.8847)
    -- ( 0.4987,-0.8848)
    -- ( 0.5768,-0.7509)
    .. controls ( 0.5767,-0.7509) and ( 0.5767,-0.7507) .. ( 0.5767,-0.7507)
    .. controls ( 0.5412,-0.6652) and ( 0.5083,-0.6726) .. ( 0.4284,-0.6571)
    --cycle
    (-0.2914,-0.6672)
    .. controls (-0.2998,-0.6666) and (-0.3106,-0.6686) .. (-0.3250,-0.6743)
    .. controls (-0.3545,-0.7128) and (-0.3081,-0.7358) .. (-0.2850,-0.7678)
    .. controls (-0.2710,-0.7873) and (-0.2601,-0.8137) .. (-0.2351,-0.8216)
    .. controls (-0.2083,-0.8301) and (-0.1916,-0.8105) .. (-0.1960,-0.7845)
    .. controls (-0.2008,-0.7566) and (-0.2232,-0.7418) .. (-0.2396,-0.7216)
    .. controls (-0.2612,-0.6950) and (-0.2660,-0.6690) .. (-0.2914,-0.6672)
    --cycle
    (-0.5641,-0.6998)
    .. controls (-0.5850,-0.6984) and (-0.5808,-0.7367) .. (-0.5766,-0.7507)
    .. controls (-0.5748,-0.7566) and (-0.5723,-0.7598) .. (-0.5702,-0.7648)
    -- (-0.5492,-0.8022)
    .. controls (-0.5310,-0.8247) and (-0.5120,-0.8367) .. (-0.5052,-0.8613)
    .. controls (-0.5044,-0.8642) and (-0.5062,-0.8717) .. (-0.5063,-0.8763)
    -- (-0.4585,-0.8767)
    .. controls (-0.4596,-0.7984) and (-0.5013,-0.7963) .. (-0.5234,-0.7583)
    .. controls (-0.5344,-0.7394) and (-0.5352,-0.7120) .. (-0.5535,-0.7030)
    .. controls (-0.5576,-0.7010) and (-0.5611,-0.7000) .. (-0.5641,-0.6998)
    --cycle
    ( 0.1990,-0.7341)
    .. controls ( 0.1094,-0.7768) and ( 0.2330,-0.8330) .. ( 0.2586,-0.8828)
    -- ( 0.3183,-0.8833)
    .. controls ( 0.3165,-0.8684) and ( 0.3066,-0.8565) .. ( 0.2991,-0.8428)
    .. controls ( 0.2762,-0.8010) and ( 0.2508,-0.7418) .. ( 0.1990,-0.7341)
    --cycle
    ( 0.3603,-0.7592)
```

```
    -- ( 0.3859,-0.8188)
    .. controls ( 0.4178,-0.7853) and ( 0.4108,-0.7527) .. ( 0.3603,-0.7592)
    --cycle
    ( 0.4369,-0.8443)
    .. controls ( 0.4147,-0.8480) and ( 0.3837,-0.8661) .. ( 0.3628,-0.8837)
    -- ( 0.4240,-0.8842)
    .. controls ( 0.4307,-0.8690) and ( 0.4358,-0.8541) .. ( 0.4369,-0.8443)
    --cycle
    (-0.3205,-0.8528)
    -- (-0.3266,-0.8779)
    -- (-0.2773,-0.8783)
    .. controls (-0.2800,-0.8719) and (-0.2850,-0.8655) .. (-0.2963,-0.8600)
    --cycle
    ( 0.1093,-0.8568)
    .. controls ( 0.0964,-0.8568) and ( 0.0834,-0.8587) .. ( 0.0710,-0.8600)
    .. controls ( 0.0605,-0.8611) and ( 0.0403,-0.8617) .. ( 0.0312,-0.8664)
    .. controls ( 0.0240,-0.8701) and ( 0.0203,-0.8751) .. ( 0.0184,-0.8808)
    -- ( 0.1002,-0.8815)
    -- ( 0.1050,-0.8698)
    -- ( 0.1085,-0.8815)
    -- ( 0.1641,-0.8820)
    .. controls ( 0.1606,-0.8757) and ( 0.1553,-0.8698) .. ( 0.1463,-0.8649)
    .. controls ( 0.1347,-0.8586) and ( 0.1221,-0.8568) .. ( 0.1093,-0.8568)
    --cycle
    ;
  }
}
\fi
```

```
hex/terrain/town/road
hex/terrain/town/small road
hex/terrain/town/house
```

For villages, towns, and cities, we need three styles: one for houses, and separate styles for regular and small roads. Note that we draw using the stroke colour for roads and houses.

```
\ifhex@terrain@pic
\tikzset{
  hex/terrain/town/road/.style={
    fill=none,
    draw=gray!50!black,
    scale line widths,
    line width=.3mm
  },
  hex/terrain/town/small road/.style={
    fill=none,
    draw=gray!75!black,
    scale line widths,
    line width=.15mm
  },
  hex/terrain/town/post road/.style={
    fill=none
  },
```

```
  hex/terrain/town/house/.style={
    draw=none,
    fill=gray!75!black,
  }
}
```

hex/terrain/village

Now for village, town, and city patterns.

```
\tikzset{
  hex/terrain/village/.pic={
    \path[hex/terrain/town/road,pic actions,hex/terrain/town/post road]
    ( 0.0073, 0.8700)
    -- ( 0.3952, 0.3373)
    -- ( 0.3884, 0.2029)
    -- ( 0.3555, 0.1378)
    -- ( 0.3751, 0.0880)
    -- ( 0.2513,-0.1997)
    -- ( 0.1396,-0.4505)
    -- ( 0.0641,-0.6512)
    -- ( 0.0070,-0.8700)
    -- ( 0.0070,-0.8700)
    ;
    \path[hex/terrain/town/road,pic actions,hex/terrain/town/post road]
    ( 0.7575, 0.4367)
    -- ( 0.3945, 0.3375)
    -- ( 0.3945, 0.3375)
    ;
    \path[hex/terrain/town/road,pic actions,hex/terrain/town/post road]
    (-0.1900,-0.0806)
    -- (-0.1155, 0.1588)
    ;
    \path[hex/terrain/town/road,pic actions,hex/terrain/town/post road]
    (-0.1308, 0.1580)
    -- (-0.7603, 0.4394)
    ;
    \path[hex/terrain/town/road,pic actions,hex/terrain/town/post road]
    (-0.6615,-0.2309)
    -- (-0.6777,-0.3255)
    -- (-0.7607,-0.4327)
    ;
    \path[hex/terrain/town/road,pic actions,hex/terrain/town/post road]
    (-0.6676,-0.2405)
    -- (-0.4599,-0.1067)
    -- (-0.1877,-0.0679)
    ;
    \path[hex/terrain/town/road,pic actions,hex/terrain/town/post road]
    ( 0.2082,-0.3003)
    -- ( 0.4578,-0.4855)
    -- ( 0.5914,-0.3675)
    -- ( 0.7607,-0.4420)
    ;
```

```
6204    \path[hex/terrain/town/road,pic actions,hex/terrain/town/post road]
6205    ( 0.3827, 0.1864)
6206    -- (-0.1290, 0.1576)
6207    ;
6208    \path[hex/terrain/town/house,pic actions]
6209    ( 0.2259, 0.4898)
6210    -- ( 0.2453, 0.4680)
6211    -- ( 0.2052, 0.4324)
6212    -- ( 0.1858, 0.4542)
6213    --cycle
6214    ;
6215    \path[hex/terrain/town/house,pic actions]
6216    ( 0.2259, 0.4898)
6217    -- ( 0.2453, 0.4680)
6218    -- ( 0.2052, 0.4324)
6219    -- ( 0.1858, 0.4542)
6220    --cycle
6221    ;
6222    \path[hex/terrain/town/house,pic actions]
6223    (-0.1978, 0.1663)
6224    -- (-0.1534, 0.1549)
6225    -- (-0.1685, 0.0960)
6226    -- (-0.2130, 0.1074)
6227    --cycle
6228    ;
6229    \path[hex/terrain/town/house,pic actions]
6230    (-0.1978, 0.1663)
6231    -- (-0.1534, 0.1549)
6232    -- (-0.1685, 0.0960)
6233    -- (-0.2130, 0.1074)
6234    --cycle
6235    ;
6236    \path[hex/terrain/town/house,pic actions]
6237    ( 0.5127,-0.3559)
6238    -- ( 0.5341,-0.3759)
6239    -- ( 0.4975,-0.4151)
6240    -- ( 0.4761,-0.3951)
6241    --cycle
6242    ;
6243    \path[hex/terrain/town/house,pic actions]
6244    ( 0.5127,-0.3559)
6245    -- ( 0.5341,-0.3759)
6246    -- ( 0.4975,-0.4151)
6247    -- ( 0.4761,-0.3951)
6248    --cycle
6249    ;
6250    \path[hex/terrain/town/house,pic actions]
6251    ( 0.2761, 0.3992)
6252    -- ( 0.2947, 0.3765)
6253    -- ( 0.2533, 0.3425)
6254    -- ( 0.2347, 0.3651)
6255    --cycle
6256    ;
```

```
    \path[hex/terrain/town/house,pic actions]
    ( 0.2761, 0.3992)
    -- ( 0.2947, 0.3765)
    -- ( 0.2533, 0.3425)
    -- ( 0.2347, 0.3651)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3227, 0.3548)
    -- ( 0.3421, 0.3329)
    -- ( 0.3020, 0.2974)
    -- ( 0.2826, 0.3192)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3227, 0.3548)
    -- ( 0.3421, 0.3329)
    -- ( 0.3020, 0.2974)
    -- ( 0.2826, 0.3192)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2901, 0.6234)
    -- ( 0.3088, 0.6008)
    -- ( 0.2674, 0.5667)
    -- ( 0.2487, 0.5893)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2901, 0.6234)
    -- ( 0.3088, 0.6008)
    -- ( 0.2674, 0.5667)
    -- ( 0.2487, 0.5893)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3456, 0.2854)
    -- (-0.3335, 0.3120)
    -- (-0.2847, 0.2898)
    -- (-0.2968, 0.2632)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3456, 0.2854)
    -- (-0.3335, 0.3120)
    -- (-0.2847, 0.2898)
    -- (-0.2968, 0.2632)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6678,-0.1369)
    -- (-0.6492,-0.1143)
    -- (-0.6078,-0.1484)
```

```
    -- (-0.6264,-0.1710)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6678,-0.1369)
    -- (-0.6492,-0.1143)
    -- (-0.6078,-0.1484)
    -- (-0.6264,-0.1710)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4610, 0.0967)
    -- ( 0.4896, 0.0909)
    -- ( 0.4790, 0.0384)
    -- ( 0.4503, 0.0442)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4610, 0.0967)
    -- ( 0.4896, 0.0909)
    -- ( 0.4790, 0.0384)
    -- ( 0.4503, 0.0442)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2924,-0.1375)
    -- ( 0.3110,-0.0955)
    -- ( 0.3667,-0.1202)
    -- ( 0.3481,-0.1621)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2924,-0.1375)
    -- ( 0.3110,-0.0955)
    -- ( 0.3667,-0.1202)
    -- ( 0.3481,-0.1621)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5094, 0.3292)
    -- ( 0.5505, 0.3494)
    -- ( 0.5773, 0.2947)
    -- ( 0.5362, 0.2746)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5094, 0.3292)
    -- ( 0.5505, 0.3494)
    -- ( 0.5773, 0.2947)
    -- ( 0.5362, 0.2746)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
```

```
    (-0.1323, 0.2640)
    -- (-0.0890, 0.2489)
    -- (-0.1092, 0.1914)
    -- (-0.1524, 0.2065)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1323, 0.2640)
    -- (-0.0890, 0.2489)
    -- (-0.1092, 0.1914)
    -- (-0.1524, 0.2065)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4115,-0.5373)
    -- ( 0.4390,-0.5006)
    -- ( 0.4877,-0.5372)
    -- ( 0.4601,-0.5739)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4115,-0.5373)
    -- ( 0.4390,-0.5006)
    -- ( 0.4877,-0.5372)
    -- ( 0.4601,-0.5739)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3095, 0.1272)
    -- ( 0.3519, 0.1095)
    -- ( 0.3284, 0.0533)
    -- ( 0.2861, 0.0710)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3095, 0.1272)
    -- ( 0.3519, 0.1095)
    -- ( 0.3284, 0.0533)
    -- ( 0.2861, 0.0710)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2904, 0.2714)
    -- ( 0.3361, 0.2681)
    -- ( 0.3318, 0.2074)
    -- ( 0.2861, 0.2106)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2904, 0.2714)
    -- ( 0.3361, 0.2681)
    -- ( 0.3318, 0.2074)
    -- ( 0.2861, 0.2106)
```

```
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4665, 0.4396)
    -- ( 0.4868, 0.3985)
    -- ( 0.4321, 0.3716)
    -- ( 0.4119, 0.4127)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4665, 0.4396)
    -- ( 0.4868, 0.3985)
    -- ( 0.4321, 0.3716)
    -- ( 0.4119, 0.4127)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4187, 0.2523)
    -- ( 0.4643, 0.2574)
    -- ( 0.4711, 0.1969)
    -- ( 0.4256, 0.1917)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4187, 0.2523)
    -- ( 0.4643, 0.2574)
    -- ( 0.4711, 0.1969)
    -- ( 0.4256, 0.1917)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3746, 0.1600)
    -- ( 0.4021, 0.1699)
    -- ( 0.4204, 0.1195)
    -- ( 0.3929, 0.1095)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3746, 0.1600)
    -- ( 0.4021, 0.1699)
    -- ( 0.4204, 0.1195)
    -- ( 0.3929, 0.1095)
    --cycle
    ;
  }
}
\fi
```

hex/terrain/town

A town.

```
\ifhex@terrain@pic
```

```
\tikzset{
  hex/terrain/town/.pic={
    \path[hex/terrain/town/small road,pic actions,hex/terrain/town/post road]
    ( 0.1432,-0.4518)
    -- (-0.0320,-0.2906)
    -- ( 0.0745,-0.0351)
    -- ( 0.1130,-0.0387)
    ;
    \path[hex/terrain/town/small road,pic actions,hex/terrain/town/post road]
    ( 0.0729,-0.0352)
    -- (-0.1716, 0.0254)
    ;
    \path[hex/terrain/town/small road,pic actions,hex/terrain/town/post road]
    (-0.2493, 0.5648)
    -- (-0.2192, 0.4501)
    ;
    \path[hex/terrain/town/small road,pic actions,hex/terrain/town/post road]
    ( 0.0677,-0.6538)
    -- ( 0.1754,-0.7052)
    -- ( 0.4358,-0.4688)
    ;
    \path[hex/terrain/town/small road,pic actions,hex/terrain/town/post road]
    ( 0.0439,-0.3617)
    -- (-0.0921,-0.5012)
    -- (-0.2865,-0.3243)
    -- (-0.4420,-0.4608)
    -- (-0.5795,-0.4446)
    -- (-0.6421,-0.3520)
    ;
    \path[hex/terrain/town/small road,pic actions,hex/terrain/town/post road]
    ( 0.0622,-0.6515)
    -- (-0.0316,-0.6176)
    -- (-0.0221,-0.5364)
    ;
    \path[hex/terrain/town/small road,pic actions,hex/terrain/town/post road]
    ( 0.0048,-0.2069)
    -- (-0.1945,-0.1818)
    -- (-0.2278,-0.2247)
    -- (-0.5051,-0.1356)
    ;
    \path[hex/terrain/town/small road,pic actions,hex/terrain/town/post road]
    (-0.3383, 0.0449)
    -- (-0.2189, 0.4510)
    ;
    \path[hex/terrain/town/road,pic actions,hex/terrain/town/post road]
    ( 0.0073, 0.8700)
    -- ( 0.3952, 0.3373)
    -- ( 0.3884, 0.2029)
    -- ( 0.3555, 0.1378)
    -- ( 0.3751, 0.0880)
    -- ( 0.2513,-0.1997)
    -- ( 0.1396,-0.4505)
    -- ( 0.0641,-0.6512)
```

```
    -- ( 0.0070,-0.8700)
    -- ( 0.0070,-0.8700)
    ;
    \path[hex/terrain/town/road,pic actions,hex/terrain/town/post road]
    ( 0.7575, 0.4367)
    -- ( 0.3945, 0.3375)
    -- ( 0.3945, 0.3375)
    ;
    \path[hex/terrain/town/road,pic actions,hex/terrain/town/post road]
    (-0.1900,-0.0806)
    -- (-0.0751, 0.3938)
    -- (-0.0765, 0.3925)
    ;
    \path[hex/terrain/town/road,pic actions,hex/terrain/town/post road]
    (-0.1308, 0.1580)
    -- (-0.7603, 0.4394)
    ;
    \path[hex/terrain/town/road,pic actions,hex/terrain/town/post road]
    (-0.7139,-0.1526)
    -- (-0.6147,-0.3362)
    -- (-0.7607,-0.4327)
    ;
    \path[hex/terrain/town/road,pic actions,hex/terrain/town/post road]
    (-0.6676,-0.2405)
    -- (-0.4599,-0.1067)
    -- (-0.1877,-0.0679)
    ;
    \path[hex/terrain/town/road,pic actions,hex/terrain/town/post road]
    ( 0.2082,-0.3003)
    -- ( 0.4578,-0.4855)
    -- ( 0.5914,-0.3675)
    -- ( 0.7607,-0.4420)
    ;
    \path[hex/terrain/town/road,pic actions,hex/terrain/town/post road]
    ( 0.3827, 0.1864)
    -- (-0.1290, 0.1576)
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4493,-0.3075)
    -- (-0.4043,-0.2868)
    -- (-0.3710,-0.3593)
    -- (-0.4160,-0.3799)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4493,-0.3075)
    -- (-0.4043,-0.2868)
    -- (-0.3710,-0.3593)
    -- (-0.4160,-0.3799)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5264,-0.1066)
```

```
    -- (-0.5514,-0.0681)
    -- (-0.5002,-0.0349)
    -- (-0.4753,-0.0733)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5264,-0.1066)
    -- (-0.5514,-0.0681)
    -- (-0.5002,-0.0349)
    -- (-0.4753,-0.0733)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1978, 0.1663)
    -- (-0.1534, 0.1549)
    -- (-0.1685, 0.0960)
    -- (-0.2130, 0.1074)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1978, 0.1663)
    -- (-0.1534, 0.1549)
    -- (-0.1685, 0.0960)
    -- (-0.2130, 0.1074)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2259, 0.4898)
    -- ( 0.2453, 0.4680)
    -- ( 0.2052, 0.4324)
    -- ( 0.1858, 0.4542)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2259, 0.4898)
    -- ( 0.2453, 0.4680)
    -- ( 0.2052, 0.4324)
    -- ( 0.1858, 0.4542)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0986, 0.2553)
    -- (-0.0882, 0.2827)
    -- (-0.0380, 0.2637)
    -- (-0.0484, 0.2363)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0986, 0.2553)
    -- (-0.0882, 0.2827)
    -- (-0.0380, 0.2637)
    -- (-0.0484, 0.2363)
    --cycle
```

```
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0834, 0.2379)
    -- ( 0.0888, 0.2667)
    -- ( 0.1415, 0.2566)
    -- ( 0.1361, 0.2279)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0834, 0.2379)
    -- ( 0.0888, 0.2667)
    -- ( 0.1415, 0.2566)
    -- ( 0.1361, 0.2279)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0207,-0.0604)
    -- (-0.0103,-0.0331)
    -- ( 0.0398,-0.0521)
    -- ( 0.0294,-0.0794)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0207,-0.0604)
    -- (-0.0103,-0.0331)
    -- ( 0.0398,-0.0521)
    -- ( 0.0294,-0.0794)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3580,-0.4608)
    -- ( 0.3837,-0.4748)
    -- ( 0.3581,-0.5219)
    -- ( 0.3324,-0.5080)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3580,-0.4608)
    -- ( 0.3837,-0.4748)
    -- ( 0.3581,-0.5219)
    -- ( 0.3324,-0.5080)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5127,-0.3559)
    -- ( 0.5341,-0.3759)
    -- ( 0.4975,-0.4151)
    -- ( 0.4761,-0.3951)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5127,-0.3559)
    -- ( 0.5341,-0.3759)
```

```
    -- ( 0.4975,-0.4151)
    -- ( 0.4761,-0.3951)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2118,-0.3884)
    -- ( 0.2245,-0.3620)
    -- ( 0.2728,-0.3854)
    -- ( 0.2600,-0.4118)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2118,-0.3884)
    -- ( 0.2245,-0.3620)
    -- ( 0.2728,-0.3854)
    -- ( 0.2600,-0.4118)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1651,-0.4740)
    -- ( 0.1775,-0.4475)
    -- ( 0.2260,-0.4702)
    -- ( 0.2137,-0.4968)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1651,-0.4740)
    -- ( 0.1775,-0.4475)
    -- ( 0.2260,-0.4702)
    -- ( 0.2137,-0.4968)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2834,-0.4196)
    -- ( 0.2957,-0.3932)
    -- ( 0.3443,-0.4159)
    -- ( 0.3319,-0.4423)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2834,-0.4196)
    -- ( 0.2957,-0.3932)
    -- ( 0.3443,-0.4159)
    -- ( 0.3319,-0.4423)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1447,-0.5170)
    -- ( 0.1555,-0.4899)
    -- ( 0.2053,-0.5096)
    -- ( 0.1945,-0.5368)
    --cycle
    ;
```

```
    \path[hex/terrain/town/house,pic actions]
    ( 0.1447,-0.5170)
    -- ( 0.1555,-0.4899)
    -- ( 0.2053,-0.5096)
    -- ( 0.1945,-0.5368)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0154,-0.5671)
    -- ( 0.0244,-0.5392)
    -- ( 0.0754,-0.5558)
    -- ( 0.0664,-0.5836)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0154,-0.5671)
    -- ( 0.0244,-0.5392)
    -- ( 0.0754,-0.5558)
    -- ( 0.0664,-0.5836)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2958,-0.3614)
    -- (-0.2707,-0.3764)
    -- (-0.2983,-0.4224)
    -- (-0.3234,-0.4073)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2958,-0.3614)
    -- (-0.2707,-0.3764)
    -- (-0.2983,-0.4224)
    -- (-0.3234,-0.4073)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3024,-0.2385)
    -- (-0.2753,-0.2491)
    -- (-0.2948,-0.2990)
    -- (-0.3220,-0.2883)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3024,-0.2385)
    -- (-0.2753,-0.2491)
    -- (-0.2948,-0.2990)
    -- (-0.3220,-0.2883)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5719,-0.2295)
    -- (-0.5577,-0.2550)
    -- (-0.6045,-0.2811)
```

```
    -- (-0.6187,-0.2556)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5719,-0.2295)
    -- (-0.5577,-0.2550)
    -- (-0.6045,-0.2811)
    -- (-0.6187,-0.2556)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5909,-0.3922)
    -- (-0.5677,-0.3744)
    -- (-0.5351,-0.4170)
    -- (-0.5584,-0.4348)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5909,-0.3922)
    -- (-0.5677,-0.3744)
    -- (-0.5351,-0.4170)
    -- (-0.5584,-0.4348)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4367,-0.3858)
    -- (-0.4233,-0.4119)
    -- (-0.4709,-0.4364)
    -- (-0.4843,-0.4105)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4367,-0.3858)
    -- (-0.4233,-0.4119)
    -- (-0.4709,-0.4364)
    -- (-0.4843,-0.4105)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6605,-0.4272)
    -- (-0.6489,-0.4540)
    -- (-0.6982,-0.4752)
    -- (-0.7097,-0.4483)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6605,-0.4272)
    -- (-0.6489,-0.4540)
    -- (-0.6982,-0.4752)
    -- (-0.7097,-0.4483)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
```

```
    ( 0.2694,-0.2379)
    -- ( 0.2777,-0.2098)
    -- ( 0.3291,-0.2250)
    -- ( 0.3209,-0.2530)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2694,-0.2379)
    -- ( 0.2777,-0.2098)
    -- ( 0.3291,-0.2250)
    -- ( 0.3209,-0.2530)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1131,-0.3134)
    -- ( 0.1237,-0.2861)
    -- ( 0.1737,-0.3055)
    -- ( 0.1630,-0.3328)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1131,-0.3134)
    -- ( 0.1237,-0.2861)
    -- ( 0.1737,-0.3055)
    -- ( 0.1630,-0.3328)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1931,-0.0936)
    -- ( 0.2058,-0.0673)
    -- ( 0.2541,-0.0904)
    -- ( 0.2415,-0.1168)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1931,-0.0936)
    -- ( 0.2058,-0.0673)
    -- ( 0.2541,-0.0904)
    -- ( 0.2415,-0.1168)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1779, 0.1198)
    -- ( 0.1984, 0.0990)
    -- ( 0.1603, 0.0613)
    -- ( 0.1398, 0.0821)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1779, 0.1198)
    -- ( 0.1984, 0.0990)
    -- ( 0.1603, 0.0613)
    -- ( 0.1398, 0.0821)
```

```
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2761, 0.3992)
    -- ( 0.2947, 0.3765)
    -- ( 0.2533, 0.3425)
    -- ( 0.2347, 0.3651)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2761, 0.3992)
    -- ( 0.2947, 0.3765)
    -- ( 0.2533, 0.3425)
    -- ( 0.2347, 0.3651)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3227, 0.3548)
    -- ( 0.3421, 0.3329)
    -- ( 0.3020, 0.2974)
    -- ( 0.2826, 0.3192)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3227, 0.3548)
    -- ( 0.3421, 0.3329)
    -- ( 0.3020, 0.2974)
    -- ( 0.2826, 0.3192)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2473, 0.2770)
    -- (-0.2380, 0.3048)
    -- (-0.1871, 0.2879)
    -- (-0.1964, 0.2601)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2473, 0.2770)
    -- (-0.2380, 0.3048)
    -- (-0.1871, 0.2879)
    -- (-0.1964, 0.2601)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1395, 0.3602)
    -- (-0.1127, 0.3488)
    -- (-0.1335, 0.2995)
    -- (-0.1604, 0.3109)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1395, 0.3602)
```

```
    -- (-0.1127, 0.3488)
    -- (-0.1335, 0.2995)
    -- (-0.1604, 0.3109)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2901, 0.6234)
    -- ( 0.3088, 0.6008)
    -- ( 0.2674, 0.5667)
    -- ( 0.2487, 0.5893)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2901, 0.6234)
    -- ( 0.3088, 0.6008)
    -- ( 0.2674, 0.5667)
    -- ( 0.2487, 0.5893)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3456, 0.2854)
    -- (-0.3335, 0.3120)
    -- (-0.2847, 0.2898)
    -- (-0.2968, 0.2632)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3456, 0.2854)
    -- (-0.3335, 0.3120)
    -- (-0.2847, 0.2898)
    -- (-0.2968, 0.2632)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3040, 0.3746)
    -- (-0.2919, 0.4012)
    -- (-0.2431, 0.3791)
    -- (-0.2552, 0.3524)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3040, 0.3746)
    -- (-0.2919, 0.4012)
    -- (-0.2431, 0.3791)
    -- (-0.2552, 0.3524)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.7420,-0.2456)
    -- (-0.7302,-0.2189)
    -- (-0.6812,-0.2407)
    -- (-0.6930,-0.2674)
    --cycle
```

```
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.7420,-0.2456)
    -- (-0.7302,-0.2189)
    -- (-0.6812,-0.2407)
    -- (-0.6930,-0.2674)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6678,-0.1369)
    -- (-0.6492,-0.1143)
    -- (-0.6078,-0.1484)
    -- (-0.6264,-0.1710)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6678,-0.1369)
    -- (-0.6492,-0.1143)
    -- (-0.6078,-0.1484)
    -- (-0.6264,-0.1710)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2252,-0.0023)
    -- (-0.1960,-0.0023)
    -- (-0.1960,-0.0559)
    -- (-0.2252,-0.0559)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2252,-0.0023)
    -- (-0.1960,-0.0023)
    -- (-0.1960,-0.0559)
    -- (-0.2252,-0.0559)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0041,-0.2944)
    -- ( 0.0064,-0.2671)
    -- ( 0.0564,-0.2862)
    -- ( 0.0460,-0.3135)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0041,-0.2944)
    -- ( 0.0064,-0.2671)
    -- ( 0.0564,-0.2862)
    -- ( 0.0460,-0.3135)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1877,-0.2296)
    -- (-0.1764,-0.2026)
```

```
    -- (-0.1270,-0.2233)
    -- (-0.1383,-0.2503)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1877,-0.2296)
    -- (-0.1764,-0.2026)
    -- (-0.1270,-0.2233)
    -- (-0.1383,-0.2503)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1170,-0.3014)
    -- (-0.1067,-0.2740)
    -- (-0.0566,-0.2928)
    -- (-0.0668,-0.3202)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1170,-0.3014)
    -- (-0.1067,-0.2740)
    -- (-0.0566,-0.2928)
    -- (-0.0668,-0.3202)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0719,-0.3499)
    -- (-0.0428,-0.3468)
    -- (-0.0371,-0.4001)
    -- (-0.0661,-0.4032)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0719,-0.3499)
    -- (-0.0428,-0.3468)
    -- (-0.0371,-0.4001)
    -- (-0.0661,-0.4032)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4610, 0.0967)
    -- ( 0.4896, 0.0909)
    -- ( 0.4790, 0.0384)
    -- ( 0.4503, 0.0442)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4610, 0.0967)
    -- ( 0.4896, 0.0909)
    -- ( 0.4790, 0.0384)
    -- ( 0.4503, 0.0442)
    --cycle
    ;
```

```
    \path[hex/terrain/town/house,pic actions]
    (-0.1944,-0.4810)
    -- (-0.1500,-0.4925)
    -- (-0.1653,-0.5515)
    -- (-0.2097,-0.5399)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1944,-0.4810)
    -- (-0.1500,-0.4925)
    -- (-0.1653,-0.5515)
    -- (-0.2097,-0.5399)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2924,-0.1375)
    -- ( 0.3110,-0.0955)
    -- ( 0.3667,-0.1202)
    -- ( 0.3481,-0.1621)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2924,-0.1375)
    -- ( 0.3110,-0.0955)
    -- ( 0.3667,-0.1202)
    -- ( 0.3481,-0.1621)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3062, 0.5810)
    -- (-0.2635, 0.5641)
    -- (-0.2859, 0.5075)
    -- (-0.3285, 0.5243)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3062, 0.5810)
    -- (-0.2635, 0.5641)
    -- (-0.2859, 0.5075)
    -- (-0.3285, 0.5243)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0310,-0.4661)
    -- ( 0.0449,-0.4224)
    -- ( 0.1029,-0.4409)
    -- ( 0.0889,-0.4846)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0310,-0.4661)
    -- ( 0.0449,-0.4224)
    -- ( 0.1029,-0.4409)
```

```
    -- ( 0.0889,-0.4846)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1523,-0.2013)
    -- ( 0.1718,-0.1598)
    -- ( 0.2270,-0.1857)
    -- ( 0.2075,-0.2272)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1523,-0.2013)
    -- ( 0.1718,-0.1598)
    -- ( 0.2270,-0.1857)
    -- ( 0.2075,-0.2272)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0857,-0.3676)
    -- ( 0.1052,-0.3261)
    -- ( 0.1603,-0.3520)
    -- ( 0.1409,-0.3935)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0857,-0.3676)
    -- ( 0.1052,-0.3261)
    -- ( 0.1603,-0.3520)
    -- ( 0.1409,-0.3935)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0204,-0.2046)
    -- ( 0.0398,-0.1631)
    -- ( 0.0950,-0.1890)
    -- ( 0.0755,-0.2305)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0204,-0.2046)
    -- ( 0.0398,-0.1631)
    -- ( 0.0950,-0.1890)
    -- ( 0.0755,-0.2305)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5094, 0.3292)
    -- ( 0.5505, 0.3494)
    -- ( 0.5773, 0.2947)
    -- ( 0.5362, 0.2746)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
```

```
    ( 0.5094, 0.3292)
    -- ( 0.5505, 0.3494)
    -- ( 0.5773, 0.2947)
    -- ( 0.5362, 0.2746)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0647, 0.4710)
    -- (-0.0215, 0.4559)
    -- (-0.0416, 0.3984)
    -- (-0.0848, 0.4135)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0647, 0.4710)
    -- (-0.0215, 0.4559)
    -- (-0.0416, 0.3984)
    -- (-0.0848, 0.4135)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1476,-0.3704)
    -- (-0.1403,-0.3251)
    -- (-0.0802,-0.3347)
    -- (-0.0873,-0.3799)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1476,-0.3704)
    -- (-0.1403,-0.3251)
    -- (-0.0802,-0.3347)
    -- (-0.0873,-0.3799)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0755, 0.3210)
    -- (-0.0531, 0.3610)
    -- ( 0.0001, 0.3312)
    -- (-0.0224, 0.2912)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0755, 0.3210)
    -- (-0.0531, 0.3610)
    -- ( 0.0001, 0.3312)
    -- (-0.0224, 0.2912)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1354, 0.0442)
    -- (-0.1129, 0.0842)
    -- (-0.0599, 0.0544)
    -- (-0.0823, 0.0144)
```

```
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1354, 0.0442)
    -- (-0.1129, 0.0842)
    -- (-0.0599, 0.0544)
    -- (-0.0823, 0.0144)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1672,-0.0608)
    -- (-0.1524,-0.0175)
    -- (-0.0948,-0.0371)
    -- (-0.1096,-0.0805)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1672,-0.0608)
    -- (-0.1524,-0.0175)
    -- (-0.0948,-0.0371)
    -- (-0.1096,-0.0805)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0920,-0.6296)
    -- ( 0.1069,-0.5863)
    -- ( 0.1645,-0.6060)
    -- ( 0.1497,-0.6493)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0920,-0.6296)
    -- ( 0.1069,-0.5863)
    -- ( 0.1645,-0.6060)
    -- ( 0.1497,-0.6493)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4115,-0.5373)
    -- ( 0.4390,-0.5006)
    -- ( 0.4877,-0.5372)
    -- ( 0.4601,-0.5739)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4115,-0.5373)
    -- ( 0.4390,-0.5006)
    -- ( 0.4877,-0.5372)
    -- ( 0.4601,-0.5739)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3095, 0.1272)
```

```
    -- ( 0.3519, 0.1095)
    -- ( 0.3284, 0.0533)
    -- ( 0.2861, 0.0710)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3095, 0.1272)
    -- ( 0.3519, 0.1095)
    -- ( 0.3284, 0.0533)
    -- ( 0.2861, 0.0710)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3558, 0.0291)
    -- (-0.3124, 0.0144)
    -- (-0.3318,-0.0433)
    -- (-0.3753,-0.0287)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3558, 0.0291)
    -- (-0.3124, 0.0144)
    -- (-0.3318,-0.0433)
    -- (-0.3753,-0.0287)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2904, 0.2714)
    -- ( 0.3361, 0.2681)
    -- ( 0.3318, 0.2074)
    -- ( 0.2861, 0.2106)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2904, 0.2714)
    -- ( 0.3361, 0.2681)
    -- ( 0.3318, 0.2074)
    -- ( 0.2861, 0.2106)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0124, 0.1558)
    -- ( 0.0333, 0.1525)
    -- ( 0.0290, 0.0918)
    -- (-0.0167, 0.0950)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0124, 0.1558)
    -- ( 0.0333, 0.1525)
    -- ( 0.0290, 0.0918)
    -- (-0.0167, 0.0950)
    --cycle
```

```
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4665, 0.4396)
    -- ( 0.4868, 0.3985)
    -- ( 0.4321, 0.3716)
    -- ( 0.4119, 0.4127)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4665, 0.4396)
    -- ( 0.4868, 0.3985)
    -- ( 0.4321, 0.3716)
    -- ( 0.4119, 0.4127)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2433,-0.1480)
    -- (-0.2141,-0.1472)
    -- (-0.2127,-0.2008)
    -- (-0.2419,-0.2015)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2433,-0.1480)
    -- (-0.2141,-0.1472)
    -- (-0.2127,-0.2008)
    -- (-0.2419,-0.2015)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4187, 0.2523)
    -- ( 0.4643, 0.2574)
    -- ( 0.4711, 0.1969)
    -- ( 0.4256, 0.1917)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4187, 0.2523)
    -- ( 0.4643, 0.2574)
    -- ( 0.4711, 0.1969)
    -- ( 0.4256, 0.1917)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2599,-0.2379)
    -- (-0.2164,-0.2525)
    -- (-0.2358,-0.3102)
    -- (-0.2793,-0.2955)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2599,-0.2379)
    -- (-0.2164,-0.2525)
```

```
    -- (-0.2358,-0.3102)
    -- (-0.2793,-0.2955)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0167, 0.0438)
    -- ( 0.0385, 0.0365)
    -- ( 0.0301, 0.0113)
    -- ( 0.0082, 0.0187)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0167, 0.0438)
    -- ( 0.0385, 0.0365)
    -- ( 0.0301, 0.0113)
    -- ( 0.0082, 0.0187)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2901,-0.1193)
    -- (-0.2450,-0.1273)
    -- (-0.2556,-0.1872)
    -- (-0.3008,-0.1792)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2901,-0.1193)
    -- (-0.2450,-0.1273)
    -- (-0.2556,-0.1872)
    -- (-0.3008,-0.1792)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1275,-0.0001)
    -- ( 0.1734,-0.0022)
    -- ( 0.1707,-0.0630)
    -- ( 0.1248,-0.0610)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1275,-0.0001)
    -- ( 0.1734,-0.0022)
    -- ( 0.1707,-0.0630)
    -- ( 0.1248,-0.0610)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0645,-0.5272)
    -- (-0.0415,-0.5245)
    -- (-0.0383,-0.5509)
    -- (-0.0612,-0.5536)
    --cycle
    ;
```

```
    \path[hex/terrain/town/house,pic actions]
    (-0.0645,-0.5272)
    -- (-0.0415,-0.5245)
    -- (-0.0383,-0.5509)
    -- (-0.0612,-0.5536)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3209, 0.2176)
    -- (-0.2989, 0.2105)
    -- (-0.3069, 0.1853)
    -- (-0.3289, 0.1923)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3209, 0.2176)
    -- (-0.2989, 0.2105)
    -- (-0.3069, 0.1853)
    -- (-0.3289, 0.1923)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3746, 0.1600)
    -- ( 0.4021, 0.1699)
    -- ( 0.4204, 0.1195)
    -- ( 0.3929, 0.1095)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3746, 0.1600)
    -- ( 0.4021, 0.1699)
    -- ( 0.4204, 0.1195)
    -- ( 0.3929, 0.1095)
    --cycle
    ;
  }
}
\fi
```

hex/terrain/city

And finally a city

```
\ifhex@terrain@pic
\tikzset{
  hex/terrain/city/.pic={
    \path[hex/terrain/town/small road,pic actions,hex/terrain/town/post road]
    ( 0.6475, 0.4068)
    -- ( 0.7314,-0.0575)
    -- ( 0.7314,-0.0575)
    ;
    \path[hex/terrain/town/small road,pic actions,hex/terrain/town/post road]
    ( 0.3200,-0.0497)
    -- ( 0.7360,-0.0572)
```

```
    -- ( 0.9222,-0.0903)
    -- ( 0.7082,-0.4210)
    ;
    \path[hex/terrain/town/small road,pic actions,hex/terrain/town/post road]
    ( 0.3828, 0.1855)
    -- ( 0.0279, 0.1945)
    ;
    \path[hex/terrain/town/small road,pic actions,hex/terrain/town/post road]
    ( 0.0433, 0.3473)
    -- ( 0.0217, 0.1444)
    ;
    \path[hex/terrain/town/small road,pic actions,hex/terrain/town/post road]
    ( 0.1413, 0.1884)
    -- ( 0.3369,-0.0066)
    ;
    \path[hex/terrain/town/small road,pic actions,hex/terrain/town/post road]
    (-0.1278, 0.7257)
    -- (-0.2203, 0.4496)
    ;
    \path[hex/terrain/town/small road,pic actions,hex/terrain/town/post road]
    ( 0.1602, 0.6526)
    -- ( 0.0382, 0.6110)
    -- (-0.1527, 0.6534)
    ;
    \path[hex/terrain/town/small road,pic actions,hex/terrain/town/post road]
    (-0.1688, 0.6051)
    -- (-0.4768, 0.7222)
    ;
    \path[hex/terrain/town/small road,pic actions,hex/terrain/town/post road]
    ( 0.3602,-0.4159)
    .. controls ( 0.4139,-0.2355) and ( 0.4139,-0.2352) .. ( 0.4139,-0.2352)
    -- ( 0.4838,-0.2184)
    -- ( 0.5251,-0.0570)
    ;
    \path[hex/terrain/town/small road,pic actions,hex/terrain/town/post road]
    ( 0.5443,-0.6880)
    -- ( 0.5887,-0.5618)
    -- ( 0.4781,-0.4650)
    -- ( 0.4781,-0.4650)
    ;
    \path[hex/terrain/town/small road,pic actions,hex/terrain/town/post road]
    ( 0.0671,-0.6564)
    -- ( 0.2799,-0.7025)
    -- ( 0.4360,-0.4711)
    ;
    \path[hex/terrain/town/small road,pic actions,hex/terrain/town/post road]
    ( 0.2023,-0.8374)
    -- ( 0.2231,-0.6909)
    ;
    \path[hex/terrain/town/small road,pic actions,hex/terrain/town/post road]
    ( 0.0433,-0.3639)
    -- (-0.0931,-0.5036)
    -- (-0.3798,-0.4049)
```

```
    -- (-0.4436,-0.4630)
    -- (-0.5468,-0.5027)
    -- (-0.6442,-0.3540)
    ;
    \path[hex/terrain/town/small road,pic actions,hex/terrain/town/post road]
    (-0.3296,-0.7486)
    -- (-0.3153,-0.6107)
    -- (-0.4388,-0.4598)
    ;
    \path[hex/terrain/town/small road,pic actions,hex/terrain/town/post road]
    (-0.3247,-0.6883)
    -- (-0.0201,-0.7169)
    -- ( 0.0501,-0.7042)
    ;
    \path[hex/terrain/town/small road,pic actions,hex/terrain/town/post road]
    ( 0.0616,-0.6541)
    -- (-0.0427,-0.6505)
    -- (-0.0229,-0.5387)
    ;
    \path[hex/terrain/town/small road,pic actions,hex/terrain/town/post road]
    ( 0.0040,-0.2086)
    -- (-0.1956,-0.1835)
    -- (-0.2290,-0.2265)
    -- (-0.5068,-0.1372)
    ;
    \path[hex/terrain/town/small road,pic actions,hex/terrain/town/post road]
    (-0.3396, 0.0437)
    -- (-0.2201, 0.4506)
    ;
    \path[hex/terrain/town/road,pic actions,hex/terrain/town/post road]
    ( 0.0066, 0.8705)
    -- ( 0.3952, 0.3367)
    -- ( 0.3885, 0.2021)
    -- ( 0.3555, 0.1368)
    -- ( 0.3751, 0.0869)
    -- ( 0.2511,-0.2014)
    -- ( 0.1393,-0.4528)
    -- ( 0.0636,-0.6538)
    -- ( 0.0063,-0.8731)
    -- ( 0.0063,-0.8731)
    ;
    \path[hex/terrain/town/road,pic actions,hex/terrain/town/post road]
    ( 0.1775, 0.6355)
    -- ( 0.4288, 0.7459)
    -- ( 0.5543, 0.5148)
    -- ( 0.5543, 0.5148)
    ;
    \path[hex/terrain/town/road,pic actions,hex/terrain/town/post road]
    ( 0.7584, 0.4363)
    -- ( 0.3946, 0.3369)
    -- ( 0.3946, 0.3369)
    ;
    \path[hex/terrain/town/road,pic actions,hex/terrain/town/post road]
```

```
    ( 0.1428,-0.4540)
    -- (-0.0329,-0.2925)
    -- ( 0.0739,-0.0364)
    -- ( 0.1645,-0.0483)
    ;
    \path[hex/terrain/town/road,pic actions,hex/terrain/town/post road]
    ( 0.0723,-0.0367)
    -- (-0.5150, 0.0791)
    ;
    \path[hex/terrain/town/road,pic actions,hex/terrain/town/post road]
    (-0.1911,-0.0821)
    -- (-0.0760, 0.3934)
    -- (-0.0774, 0.3920)
    ;
    \path[hex/terrain/town/road,pic actions,hex/terrain/town/post road]
    ( 0.0439, 0.3452)
    -- (-0.3449, 0.4978)
    -- (-0.4614, 0.2954)
    -- (-0.4614, 0.2954)
    ;
    \path[hex/terrain/town/road,pic actions,hex/terrain/town/post road]
    (-0.4152, 0.2683)
    -- (-0.7626, 0.4390)
    -- (-0.7626, 0.4390)
    ;
    \path[hex/terrain/town/road,pic actions,hex/terrain/town/post road]
    (-0.5846, 0.3486)
    -- (-0.8106,-0.1286)
    -- (-0.7727,-0.2079)
    -- (-0.7053,-0.1745)
    ;
    \path[hex/terrain/town/road,pic actions,hex/terrain/town/post road]
    (-0.7161,-0.1542)
    -- (-0.6166,-0.3381)
    -- (-0.7630,-0.4349)
    ;
    \path[hex/terrain/town/road,pic actions,hex/terrain/town/post road]
    (-0.6697,-0.2422)
    -- (-0.4615,-0.1081)
    -- (-0.4615,-0.1081)
    ;
    \path[hex/terrain/town/road,pic actions,hex/terrain/town/post road]
    ( 0.2080,-0.3022)
    -- ( 0.4581,-0.4878)
    -- ( 0.5919,-0.3695)
    -- ( 0.7615,-0.4441)
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1146, 0.0405)
    -- ( 0.1598, 0.0323)
    -- ( 0.1489,-0.0277)
    -- ( 0.1036,-0.0196)
    --cycle
```

```
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1146, 0.0405)
    -- ( 0.1598, 0.0323)
    -- ( 0.1489,-0.0277)
    -- ( 0.1036,-0.0196)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0844, 0.4998)
    -- (-0.0599, 0.4835)
    -- (-0.0898, 0.4389)
    -- (-0.1141, 0.4551)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0844, 0.4998)
    -- (-0.0599, 0.4835)
    -- (-0.0898, 0.4389)
    -- (-0.1141, 0.4551)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6143,-0.0454)
    -- (-0.6005,-0.0196)
    -- (-0.5531,-0.0447)
    -- (-0.5668,-0.0707)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6143,-0.0454)
    -- (-0.6005,-0.0196)
    -- (-0.5531,-0.0447)
    -- (-0.5668,-0.0707)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3809,-0.0792)
    -- (-0.3371,-0.0929)
    -- (-0.3553,-0.1511)
    -- (-0.3991,-0.1375)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3809,-0.0792)
    -- (-0.3371,-0.0929)
    -- (-0.3553,-0.1511)
    -- (-0.3991,-0.1375)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5133, 0.1838)
    -- (-0.4733, 0.1613)
```

```
    -- (-0.5032, 0.1081)
    -- (-0.5433, 0.1307)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5133, 0.1838)
    -- (-0.4733, 0.1613)
    -- (-0.5032, 0.1081)
    -- (-0.5433, 0.1307)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3878, 0.1398)
    -- (-0.3421, 0.1442)
    -- (-0.3362, 0.0834)
    -- (-0.3819, 0.0790)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3878, 0.1398)
    -- (-0.3421, 0.1442)
    -- (-0.3362, 0.0834)
    -- (-0.3819, 0.0790)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5622, 0.0806)
    -- (-0.5234, 0.0560)
    -- (-0.5559, 0.0044)
    -- (-0.5948, 0.0290)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5622, 0.0806)
    -- (-0.5234, 0.0560)
    -- (-0.5559, 0.0044)
    -- (-0.5948, 0.0290)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6218, 0.1903)
    -- (-0.6097, 0.2346)
    -- (-0.5508, 0.2185)
    -- (-0.5629, 0.1742)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6218, 0.1903)
    -- (-0.6097, 0.2346)
    -- (-0.5508, 0.2185)
    -- (-0.5629, 0.1742)
    --cycle
    ;
```

```
    \path[hex/terrain/town/house,pic actions]
    (-0.2884, 0.7423)
    -- (-0.2596, 0.7372)
    -- (-0.2691, 0.6843)
    -- (-0.2980, 0.6895)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2884, 0.7423)
    -- (-0.2596, 0.7372)
    -- (-0.2691, 0.6843)
    -- (-0.2980, 0.6895)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1219, 0.8731)
    -- ( 0.1475, 0.8350)
    -- ( 0.0970, 0.8008)
    -- ( 0.0712, 0.8389)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1219, 0.8731)
    -- ( 0.1475, 0.8350)
    -- ( 0.0970, 0.8008)
    -- ( 0.0712, 0.8389)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3659, 0.5557)
    -- ( 0.3913, 0.5175)
    -- ( 0.3405, 0.4837)
    -- ( 0.3150, 0.5219)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3659, 0.5557)
    -- ( 0.3913, 0.5175)
    -- ( 0.3405, 0.4837)
    -- ( 0.3150, 0.5219)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0626, 0.4298)
    -- ( 0.0896, 0.4184)
    -- ( 0.0686, 0.3690)
    -- ( 0.0416, 0.3804)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0626, 0.4298)
    -- ( 0.0896, 0.4184)
    -- ( 0.0686, 0.3690)
```

```
    -- ( 0.0416, 0.3804)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4510,-0.3094)
    -- (-0.4058,-0.2887)
    -- (-0.3725,-0.3614)
    -- (-0.4176,-0.3821)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4510,-0.3094)
    -- (-0.4058,-0.2887)
    -- (-0.3725,-0.3614)
    -- (-0.4176,-0.3821)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5282,-0.1080)
    -- (-0.5533,-0.0695)
    -- (-0.5021,-0.0363)
    -- (-0.4770,-0.0749)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5282,-0.1080)
    -- (-0.5533,-0.0695)
    -- (-0.5021,-0.0363)
    -- (-0.4770,-0.0749)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0108,-0.2602)
    -- ( 0.0173,-0.2316)
    -- ( 0.0696,-0.2435)
    -- ( 0.0632,-0.2721)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0108,-0.2602)
    -- ( 0.0173,-0.2316)
    -- ( 0.0696,-0.2435)
    -- ( 0.0632,-0.2721)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1989, 0.1654)
    -- (-0.1544, 0.1540)
    -- (-0.1696, 0.0948)
    -- (-0.2141, 0.1063)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
```

```
    (-0.1989, 0.1654)
    -- (-0.1544, 0.1540)
    -- (-0.1696, 0.0948)
    -- (-0.2141, 0.1063)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0216,-0.0407)
    -- ( 0.0230,-0.0521)
    -- ( 0.0078,-0.1112)
    -- (-0.0368,-0.0997)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0216,-0.0407)
    -- ( 0.0230,-0.0521)
    -- ( 0.0078,-0.1112)
    -- (-0.0368,-0.0997)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1936, 0.5180)
    -- ( 0.2045, 0.4909)
    -- ( 0.1547, 0.4709)
    -- ( 0.1437, 0.4981)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1936, 0.5180)
    -- ( 0.2045, 0.4909)
    -- ( 0.1547, 0.4709)
    -- ( 0.1437, 0.4981)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1903, 0.4858)
    -- (-0.1678, 0.5258)
    -- (-0.1146, 0.4960)
    -- (-0.1371, 0.4559)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1903, 0.4858)
    -- (-0.1678, 0.5258)
    -- (-0.1146, 0.4960)
    -- (-0.1371, 0.4559)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1470, 0.3493)
    -- ( 0.1689, 0.3567)
    -- ( 0.1775, 0.3315)
    -- ( 0.1555, 0.3241)
```

```
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1470, 0.3493)
    -- ( 0.1689, 0.3567)
    -- ( 0.1775, 0.3315)
    -- ( 0.1555, 0.3241)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1892, 0.2562)
    -- ( 0.2118, 0.2510)
    -- ( 0.2058, 0.2251)
    -- ( 0.1833, 0.2303)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1892, 0.2562)
    -- ( 0.2118, 0.2510)
    -- ( 0.2058, 0.2251)
    -- ( 0.1833, 0.2303)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.8016, 0.0292)
    -- ( 0.8235, 0.0367)
    -- ( 0.8321, 0.0116)
    -- ( 0.8103, 0.0040)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.8016, 0.0292)
    -- ( 0.8235, 0.0367)
    -- ( 0.8321, 0.0116)
    -- ( 0.8103, 0.0040)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.7392, 0.1737)
    -- ( 0.7609, 0.1816)
    -- ( 0.7702, 0.1568)
    -- ( 0.7485, 0.1487)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.7392, 0.1737)
    -- ( 0.7609, 0.1816)
    -- ( 0.7702, 0.1568)
    -- ( 0.7485, 0.1487)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3736, 0.7805)
```

```
    -- ( 0.3937, 0.7921)
    -- ( 0.4071, 0.7691)
    -- ( 0.3870, 0.7575)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3736, 0.7805)
    -- ( 0.3937, 0.7921)
    -- ( 0.4071, 0.7691)
    -- ( 0.3870, 0.7575)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4808,-0.6251)
    -- (-0.4706,-0.6459)
    -- (-0.4946,-0.6576)
    -- (-0.5047,-0.6368)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4808,-0.6251)
    -- (-0.4706,-0.6459)
    -- (-0.4946,-0.6576)
    -- (-0.5047,-0.6368)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4514,-0.6075)
    -- (-0.4393,-0.6272)
    -- (-0.4620,-0.6412)
    -- (-0.4740,-0.6215)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4514,-0.6075)
    -- (-0.4393,-0.6272)
    -- (-0.4620,-0.6412)
    -- (-0.4740,-0.6215)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2390,-0.7174)
    -- (-0.2175,-0.7260)
    -- (-0.2273,-0.7508)
    -- (-0.2489,-0.7421)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2390,-0.7174)
    -- (-0.2175,-0.7260)
    -- (-0.2273,-0.7508)
    -- (-0.2489,-0.7421)
    --cycle
```

```
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2386,-0.5506)
    -- (-0.2108,-0.5598)
    -- (-0.2277,-0.6108)
    -- (-0.2555,-0.6015)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2386,-0.5506)
    -- (-0.2108,-0.5598)
    -- (-0.2277,-0.6108)
    -- (-0.2555,-0.6015)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3574, 0.2226)
    -- (-0.3530, 0.2515)
    -- (-0.2999, 0.2435)
    -- (-0.3043, 0.2145)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3574, 0.2226)
    -- (-0.3530, 0.2515)
    -- (-0.2999, 0.2435)
    -- (-0.3043, 0.2145)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3315, 0.3242)
    -- (-0.3271, 0.3532)
    -- (-0.2740, 0.3451)
    -- (-0.2783, 0.3162)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3315, 0.3242)
    -- (-0.3271, 0.3532)
    -- (-0.2740, 0.3451)
    -- (-0.2783, 0.3162)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2256, 0.4895)
    -- ( 0.2451, 0.4676)
    -- ( 0.2049, 0.4320)
    -- ( 0.1854, 0.4539)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2256, 0.4895)
    -- ( 0.2451, 0.4676)
```

```
    -- ( 0.2049, 0.4320)
    -- ( 0.1854, 0.4539)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1717, 0.5777)
    -- ( 0.1903, 0.5551)
    -- ( 0.1488, 0.5210)
    -- ( 0.1302, 0.5436)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1717, 0.5777)
    -- ( 0.1903, 0.5551)
    -- ( 0.1488, 0.5210)
    -- ( 0.1302, 0.5436)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0995, 0.2545)
    -- (-0.0891, 0.2819)
    -- (-0.0389, 0.2629)
    -- (-0.0492, 0.2355)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0995, 0.2545)
    -- (-0.0891, 0.2819)
    -- (-0.0389, 0.2629)
    -- (-0.0492, 0.2355)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0828, 0.2371)
    -- ( 0.0883, 0.2659)
    -- ( 0.1411, 0.2559)
    -- ( 0.1357, 0.2271)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0828, 0.2371)
    -- ( 0.0883, 0.2659)
    -- ( 0.1411, 0.2559)
    -- ( 0.1357, 0.2271)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1049, 0.1819)
    -- (-0.0945, 0.2094)
    -- (-0.0443, 0.1904)
    -- (-0.0546, 0.1629)
    --cycle
    ;
```

```
    \path[hex/terrain/town/house,pic actions]
    (-0.1049, 0.1819)
    -- (-0.0945, 0.2094)
    -- (-0.0443, 0.1904)
    -- (-0.0546, 0.1629)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0889,-0.0631)
    -- (-0.0785,-0.0357)
    -- (-0.0283,-0.0549)
    -- (-0.0388,-0.0823)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0889,-0.0631)
    -- (-0.0785,-0.0357)
    -- (-0.0283,-0.0549)
    -- (-0.0388,-0.0823)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2282,-0.7907)
    -- (-0.1823,-0.7907)
    -- (-0.1823,-0.8518)
    -- (-0.2282,-0.8518)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2282,-0.7907)
    -- (-0.1823,-0.7907)
    -- (-0.1823,-0.8518)
    -- (-0.2282,-0.8518)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2275,-0.7989)
    -- ( 0.2734,-0.7989)
    -- ( 0.2734,-0.8599)
    -- ( 0.2275,-0.8599)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2275,-0.7989)
    -- ( 0.2734,-0.7989)
    -- ( 0.2734,-0.8599)
    -- ( 0.2275,-0.8599)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2516,-0.7126)
    -- ( 0.2808,-0.7126)
    -- ( 0.2808,-0.7663)
```

```
    -- ( 0.2516,-0.7663)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2516,-0.7126)
    -- ( 0.2808,-0.7126)
    -- ( 0.2808,-0.7663)
    -- ( 0.2516,-0.7663)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1669,-0.7129)
    -- ( 0.1954,-0.7199)
    -- ( 0.1826,-0.7721)
    -- ( 0.1542,-0.7650)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1669,-0.7129)
    -- ( 0.1954,-0.7199)
    -- ( 0.1826,-0.7721)
    -- ( 0.1542,-0.7650)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1222,-0.7854)
    -- ( 0.1514,-0.7854)
    -- ( 0.1514,-0.8390)
    -- ( 0.1222,-0.8390)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1222,-0.7854)
    -- ( 0.1514,-0.7854)
    -- ( 0.1514,-0.8390)
    -- ( 0.1222,-0.8390)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3031,-0.7156)
    -- ( 0.3325,-0.7156)
    -- ( 0.3325,-0.7693)
    -- ( 0.3031,-0.7693)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3031,-0.7156)
    -- ( 0.3325,-0.7156)
    -- ( 0.3325,-0.7693)
    -- ( 0.3031,-0.7693)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
```

```
    ( 0.3574,-0.7174)
    -- ( 0.3867,-0.7174)
    -- ( 0.3867,-0.7712)
    -- ( 0.3574,-0.7712)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3574,-0.7174)
    -- ( 0.3867,-0.7174)
    -- ( 0.3867,-0.7712)
    -- ( 0.3574,-0.7712)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3742,-0.8016)
    -- ( 0.4036,-0.8016)
    -- ( 0.4036,-0.8554)
    -- ( 0.3742,-0.8554)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3742,-0.8016)
    -- ( 0.4036,-0.8016)
    -- ( 0.4036,-0.8554)
    -- ( 0.3742,-0.8554)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4107,-0.8072)
    -- ( 0.4400,-0.8072)
    -- ( 0.4400,-0.8610)
    -- ( 0.4107,-0.8610)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4107,-0.8072)
    -- ( 0.4400,-0.8072)
    -- ( 0.4400,-0.8610)
    -- ( 0.4107,-0.8610)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4612,-0.7886)
    -- ( 0.4905,-0.7886)
    -- ( 0.4905,-0.8423)
    -- ( 0.4612,-0.8423)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4612,-0.7886)
    -- ( 0.4905,-0.7886)
    -- ( 0.4905,-0.8423)
    -- ( 0.4612,-0.8423)
```

```
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5733,-0.6570)
    -- ( 0.6007,-0.6675)
    -- ( 0.5814,-0.7176)
    -- ( 0.5540,-0.7071)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5733,-0.6570)
    -- ( 0.6007,-0.6675)
    -- ( 0.5814,-0.7176)
    -- ( 0.5540,-0.7071)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.6698,-0.4454)
    -- ( 0.6958,-0.4589)
    -- ( 0.6710,-0.5065)
    -- ( 0.6450,-0.4930)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.6698,-0.4454)
    -- ( 0.6958,-0.4589)
    -- ( 0.6710,-0.5065)
    -- ( 0.6450,-0.4930)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5789,-0.4658)
    -- ( 0.6009,-0.4851)
    -- ( 0.5654,-0.5254)
    -- ( 0.5434,-0.5061)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5789,-0.4658)
    -- ( 0.6009,-0.4851)
    -- ( 0.5654,-0.5254)
    -- ( 0.5434,-0.5061)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.6025,-0.4876)
    -- ( 0.6259,-0.5054)
    -- ( 0.5934,-0.5481)
    -- ( 0.5701,-0.5304)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.6025,-0.4876)
```

```
    -- ( 0.6259,-0.5054)
    -- ( 0.5934,-0.5481)
    -- ( 0.5701,-0.5304)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.6466,-0.5044)
    -- ( 0.6729,-0.5172)
    -- ( 0.6493,-0.5654)
    -- ( 0.6230,-0.5526)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.6466,-0.5044)
    -- ( 0.6729,-0.5172)
    -- ( 0.6493,-0.5654)
    -- ( 0.6230,-0.5526)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4854,-0.5939)
    -- ( 0.5002,-0.5686)
    -- ( 0.5466,-0.5955)
    -- ( 0.5320,-0.6208)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4854,-0.5939)
    -- ( 0.5002,-0.5686)
    -- ( 0.5466,-0.5955)
    -- ( 0.5320,-0.6208)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4577,-0.6299)
    -- ( 0.4750,-0.6063)
    -- ( 0.5183,-0.6380)
    -- ( 0.5010,-0.6617)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4577,-0.6299)
    -- ( 0.4750,-0.6063)
    -- ( 0.5183,-0.6380)
    -- ( 0.5010,-0.6617)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4354,-0.6506)
    -- ( 0.4568,-0.6305)
    -- ( 0.4935,-0.6697)
    -- ( 0.4721,-0.6898)
    --cycle
```

```
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4354,-0.6506)
    -- ( 0.4568,-0.6305)
    -- ( 0.4935,-0.6697)
    -- ( 0.4721,-0.6898)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3580,-0.4631)
    -- ( 0.3837,-0.4771)
    -- ( 0.3581,-0.5243)
    -- ( 0.3323,-0.5103)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3580,-0.4631)
    -- ( 0.3837,-0.4771)
    -- ( 0.3581,-0.5243)
    -- ( 0.3323,-0.5103)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5131,-0.3580)
    -- ( 0.5345,-0.3780)
    -- ( 0.4978,-0.4172)
    -- ( 0.4763,-0.3972)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5131,-0.3580)
    -- ( 0.5345,-0.3780)
    -- ( 0.4978,-0.4172)
    -- ( 0.4763,-0.3972)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2116,-0.3904)
    -- ( 0.2243,-0.3641)
    -- ( 0.2726,-0.3875)
    -- ( 0.2598,-0.4139)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2116,-0.3904)
    -- ( 0.2243,-0.3641)
    -- ( 0.2726,-0.3875)
    -- ( 0.2598,-0.4139)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1786,-0.4343)
    -- ( 0.1889,-0.4069)
```

```
    -- ( 0.2391,-0.4259)
    -- ( 0.2289,-0.4532)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1786,-0.4343)
    -- ( 0.1889,-0.4069)
    -- ( 0.2391,-0.4259)
    -- ( 0.2289,-0.4532)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1647,-0.4763)
    -- ( 0.1772,-0.4497)
    -- ( 0.2258,-0.4725)
    -- ( 0.2134,-0.4990)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1647,-0.4763)
    -- ( 0.1772,-0.4497)
    -- ( 0.2258,-0.4725)
    -- ( 0.2134,-0.4990)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2335,-0.5197)
    -- ( 0.2460,-0.4932)
    -- ( 0.2946,-0.5160)
    -- ( 0.2821,-0.5425)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2335,-0.5197)
    -- ( 0.2460,-0.4932)
    -- ( 0.2946,-0.5160)
    -- ( 0.2821,-0.5425)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2832,-0.4218)
    -- ( 0.2956,-0.3952)
    -- ( 0.3443,-0.4180)
    -- ( 0.3318,-0.4445)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2832,-0.4218)
    -- ( 0.2956,-0.3952)
    -- ( 0.3443,-0.4180)
    -- ( 0.3318,-0.4445)
    --cycle
    ;
```

```
\path[hex/terrain/town/house,pic actions]
( 0.2064,-0.6136)
-- ( 0.2189,-0.5871)
-- ( 0.2675,-0.6099)
-- ( 0.2551,-0.6364)
--cycle
;
\path[hex/terrain/town/house,pic actions]
( 0.2064,-0.6136)
-- ( 0.2189,-0.5871)
-- ( 0.2675,-0.6099)
-- ( 0.2551,-0.6364)
--cycle
;
\path[hex/terrain/town/house,pic actions]
( 0.1443,-0.5195)
-- ( 0.1550,-0.4922)
-- ( 0.2050,-0.5120)
-- ( 0.1942,-0.5392)
--cycle
;
\path[hex/terrain/town/house,pic actions]
( 0.1443,-0.5195)
-- ( 0.1550,-0.4922)
-- ( 0.2050,-0.5120)
-- ( 0.1942,-0.5392)
--cycle
;
\path[hex/terrain/town/house,pic actions]
( 0.3128,-0.5333)
-- ( 0.3394,-0.5455)
-- ( 0.3173,-0.5943)
-- ( 0.2906,-0.5823)
--cycle
;
\path[hex/terrain/town/house,pic actions]
( 0.3128,-0.5333)
-- ( 0.3394,-0.5455)
-- ( 0.3173,-0.5943)
-- ( 0.2906,-0.5823)
--cycle
;
\path[hex/terrain/town/house,pic actions]
( 0.1781,-0.6526)
-- ( 0.1883,-0.6250)
-- ( 0.2386,-0.6435)
-- ( 0.2286,-0.6710)
--cycle
;
\path[hex/terrain/town/house,pic actions]
( 0.1781,-0.6526)
-- ( 0.1883,-0.6250)
-- ( 0.2386,-0.6435)
```

```
    -- ( 0.2286,-0.6710)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0147,-0.5695)
    -- ( 0.0238,-0.5417)
    -- ( 0.0749,-0.5582)
    -- ( 0.0658,-0.5861)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0147,-0.5695)
    -- ( 0.0238,-0.5417)
    -- ( 0.0749,-0.5582)
    -- ( 0.0658,-0.5861)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0205,-0.5124)
    -- ( 0.0287,-0.4843)
    -- ( 0.0803,-0.4994)
    -- ( 0.0720,-0.5275)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0205,-0.5124)
    -- ( 0.0287,-0.4843)
    -- ( 0.0803,-0.4994)
    -- ( 0.0720,-0.5275)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0719,-0.6560)
    -- (-0.0678,-0.6849)
    -- (-0.1209,-0.6925)
    -- (-0.1250,-0.6635)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0719,-0.6560)
    -- (-0.0678,-0.6849)
    -- (-0.1209,-0.6925)
    -- (-0.1250,-0.6635)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1330,-0.6411)
    -- (-0.1375,-0.6700)
    -- (-0.1906,-0.6618)
    -- (-0.1861,-0.6329)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
```

```
    (-0.1330,-0.6411)
    -- (-0.1375,-0.6700)
    -- (-0.1906,-0.6618)
    -- (-0.1861,-0.6329)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0334,-0.7381)
    -- (-0.0042,-0.7381)
    -- (-0.0042,-0.7917)
    -- (-0.0334,-0.7917)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0334,-0.7381)
    -- (-0.0042,-0.7381)
    -- (-0.0042,-0.7917)
    -- (-0.0334,-0.7917)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0998,-0.7315)
    -- (-0.0706,-0.7315)
    -- (-0.0706,-0.7852)
    -- (-0.0998,-0.7852)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0998,-0.7315)
    -- (-0.0706,-0.7315)
    -- (-0.0706,-0.7852)
    -- (-0.0998,-0.7852)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2018,-0.7234)
    -- (-0.1730,-0.7180)
    -- (-0.1631,-0.7708)
    -- (-0.1919,-0.7762)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2018,-0.7234)
    -- (-0.1730,-0.7180)
    -- (-0.1631,-0.7708)
    -- (-0.1919,-0.7762)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2956,-0.7184)
    -- (-0.2667,-0.7229)
    -- (-0.2750,-0.7760)
    -- (-0.3039,-0.7714)
```

```
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2956,-0.7184)
    -- (-0.2667,-0.7229)
    -- (-0.2750,-0.7760)
    -- (-0.3039,-0.7714)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1661,-0.8014)
    -- (-0.1372,-0.8060)
    -- (-0.1454,-0.8590)
    -- (-0.1744,-0.8545)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1661,-0.8014)
    -- (-0.1372,-0.8060)
    -- (-0.1454,-0.8590)
    -- (-0.1744,-0.8545)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1269,-0.8074)
    -- (-0.0977,-0.8054)
    -- (-0.0940,-0.8590)
    -- (-0.1232,-0.8610)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1269,-0.8074)
    -- (-0.0977,-0.8054)
    -- (-0.0940,-0.8590)
    -- (-0.1232,-0.8610)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2787,-0.7975)
    -- (-0.2495,-0.7956)
    -- (-0.2459,-0.8492)
    -- (-0.2751,-0.8511)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2787,-0.7975)
    -- (-0.2495,-0.7956)
    -- (-0.2459,-0.8492)
    -- (-0.2751,-0.8511)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3966,-0.5592)
```

```
    -- (-0.3802,-0.5834)
    -- (-0.4246,-0.6135)
    -- (-0.4411,-0.5892)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3966,-0.5592)
    -- (-0.3802,-0.5834)
    -- (-0.4246,-0.6135)
    -- (-0.4411,-0.5892)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4189,-0.5000)
    -- (-0.4033,-0.5248)
    -- (-0.4488,-0.5534)
    -- (-0.4644,-0.5286)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4189,-0.5000)
    -- (-0.4033,-0.5248)
    -- (-0.4488,-0.5534)
    -- (-0.4644,-0.5286)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3561,-0.4332)
    -- (-0.3310,-0.4483)
    -- (-0.3586,-0.4944)
    -- (-0.3837,-0.4793)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3561,-0.4332)
    -- (-0.3310,-0.4483)
    -- (-0.3586,-0.4944)
    -- (-0.3837,-0.4793)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3120,-0.4787)
    -- (-0.2896,-0.4976)
    -- (-0.3241,-0.5386)
    -- (-0.3466,-0.5198)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3120,-0.4787)
    -- (-0.2896,-0.4976)
    -- (-0.3241,-0.5386)
    -- (-0.3466,-0.5198)
    --cycle
```

```
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2660,-0.5113)
    -- (-0.2456,-0.5323)
    -- (-0.2840,-0.5697)
    -- (-0.3045,-0.5487)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2660,-0.5113)
    -- (-0.2456,-0.5323)
    -- (-0.2840,-0.5697)
    -- (-0.3045,-0.5487)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3939,-0.2212)
    -- (-0.3666,-0.2319)
    -- (-0.3863,-0.2819)
    -- (-0.4135,-0.2712)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3939,-0.2212)
    -- (-0.3666,-0.2319)
    -- (-0.3863,-0.2819)
    -- (-0.4135,-0.2712)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3038,-0.2403)
    -- (-0.2765,-0.2509)
    -- (-0.2961,-0.3010)
    -- (-0.3234,-0.2902)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3038,-0.2403)
    -- (-0.2765,-0.2509)
    -- (-0.2961,-0.3010)
    -- (-0.3234,-0.2902)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3532,-0.2251)
    -- (-0.3255,-0.2346)
    -- (-0.3428,-0.2854)
    -- (-0.3705,-0.2760)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3532,-0.2251)
    -- (-0.3255,-0.2346)
```

```
    -- (-0.3428,-0.2854)
    -- (-0.3705,-0.2760)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3482,-0.3198)
    -- (-0.3204,-0.3293)
    -- (-0.3377,-0.3801)
    -- (-0.3655,-0.3706)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3482,-0.3198)
    -- (-0.3204,-0.3293)
    -- (-0.3377,-0.3801)
    -- (-0.3655,-0.3706)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5006,-0.1767)
    -- (-0.4737,-0.1885)
    -- (-0.4953,-0.2376)
    -- (-0.5221,-0.2258)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5006,-0.1767)
    -- (-0.4737,-0.1885)
    -- (-0.4953,-0.2376)
    -- (-0.5221,-0.2258)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5739,-0.2312)
    -- (-0.5595,-0.2568)
    -- (-0.6065,-0.2830)
    -- (-0.6207,-0.2575)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5739,-0.2312)
    -- (-0.5595,-0.2568)
    -- (-0.6065,-0.2830)
    -- (-0.6207,-0.2575)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5929,-0.3943)
    -- (-0.5696,-0.3765)
    -- (-0.5369,-0.4192)
    -- (-0.5602,-0.4370)
    --cycle
    ;
```

```
    \path[hex/terrain/town/house,pic actions]
    (-0.5929,-0.3943)
    -- (-0.5696,-0.3765)
    -- (-0.5369,-0.4192)
    -- (-0.5602,-0.4370)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5005,-0.3312)
    -- (-0.4775,-0.3129)
    -- (-0.4441,-0.3550)
    -- (-0.4670,-0.3733)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5005,-0.3312)
    -- (-0.4775,-0.3129)
    -- (-0.4441,-0.3550)
    -- (-0.4670,-0.3733)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5523,-0.3618)
    -- (-0.5293,-0.3436)
    -- (-0.4960,-0.3857)
    -- (-0.5189,-0.4038)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5523,-0.3618)
    -- (-0.5293,-0.3436)
    -- (-0.4960,-0.3857)
    -- (-0.5189,-0.4038)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4383,-0.3880)
    -- (-0.4249,-0.4140)
    -- (-0.4726,-0.4386)
    -- (-0.4861,-0.4126)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4383,-0.3880)
    -- (-0.4249,-0.4140)
    -- (-0.4726,-0.4386)
    -- (-0.4861,-0.4126)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6626,-0.4293)
    -- (-0.6510,-0.4562)
    -- (-0.7003,-0.4775)
```

```
    -- (-0.7119,-0.4506)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6626,-0.4293)
    -- (-0.6510,-0.4562)
    -- (-0.7003,-0.4775)
    -- (-0.7119,-0.4506)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6449,-0.4759)
    -- (-0.6280,-0.4998)
    -- (-0.6717,-0.5309)
    -- (-0.6887,-0.5069)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6449,-0.4759)
    -- (-0.6280,-0.4998)
    -- (-0.6717,-0.5309)
    -- (-0.6887,-0.5069)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5766,-0.5683)
    -- (-0.5643,-0.5948)
    -- (-0.6130,-0.6174)
    -- (-0.6254,-0.5909)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5766,-0.5683)
    -- (-0.5643,-0.5948)
    -- (-0.6130,-0.6174)
    -- (-0.6254,-0.5909)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4733,-0.5728)
    -- (-0.4590,-0.5983)
    -- (-0.5061,-0.6244)
    -- (-0.5202,-0.5988)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4733,-0.5728)
    -- (-0.4590,-0.5983)
    -- (-0.5061,-0.6244)
    -- (-0.5202,-0.5988)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
```

```
    (-0.4272,-0.6520)
    -- (-0.4128,-0.6774)
    -- (-0.4595,-0.7039)
    -- (-0.4740,-0.6785)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4272,-0.6520)
    -- (-0.4128,-0.6774)
    -- (-0.4595,-0.7039)
    -- (-0.4740,-0.6785)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5374,-0.6782)
    -- (-0.5236,-0.7040)
    -- (-0.5710,-0.7292)
    -- (-0.5848,-0.7034)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5374,-0.6782)
    -- (-0.5236,-0.7040)
    -- (-0.5710,-0.7292)
    -- (-0.5848,-0.7034)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5214,-0.7131)
    -- (-0.5038,-0.7365)
    -- (-0.5468,-0.7687)
    -- (-0.5644,-0.7453)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5214,-0.7131)
    -- (-0.5038,-0.7365)
    -- (-0.5468,-0.7687)
    -- (-0.5644,-0.7453)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2847,-0.1917)
    -- ( 0.2954,-0.1644)
    -- ( 0.3454,-0.1841)
    -- ( 0.3347,-0.2114)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2847,-0.1917)
    -- ( 0.2954,-0.1644)
    -- ( 0.3454,-0.1841)
    -- ( 0.3347,-0.2114)
```

```
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2692,-0.2397)
    -- ( 0.2775,-0.2116)
    -- ( 0.3291,-0.2268)
    -- ( 0.3208,-0.2548)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2692,-0.2397)
    -- ( 0.2775,-0.2116)
    -- ( 0.3291,-0.2268)
    -- ( 0.3208,-0.2548)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2587,-0.2944)
    -- ( 0.2585,-0.2651)
    -- ( 0.3123,-0.2648)
    -- ( 0.3125,-0.2941)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2587,-0.2944)
    -- ( 0.2585,-0.2651)
    -- ( 0.3123,-0.2648)
    -- ( 0.3125,-0.2941)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1269,-0.2581)
    -- ( 0.1359,-0.2303)
    -- ( 0.1871,-0.2468)
    -- ( 0.1780,-0.2746)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1269,-0.2581)
    -- ( 0.1359,-0.2303)
    -- ( 0.1871,-0.2468)
    -- ( 0.1780,-0.2746)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1127,-0.3153)
    -- ( 0.1232,-0.2880)
    -- ( 0.1733,-0.3074)
    -- ( 0.1626,-0.3348)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1127,-0.3153)
```

```
    -- ( 0.1232,-0.2880)
    -- ( 0.1733,-0.3074)
    -- ( 0.1626,-0.3348)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1928,-0.0951)
    -- ( 0.2055,-0.0687)
    -- ( 0.2539,-0.0920)
    -- ( 0.2412,-0.1184)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1928,-0.0951)
    -- ( 0.2055,-0.0687)
    -- ( 0.2539,-0.0920)
    -- ( 0.2412,-0.1184)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2202,-0.0375)
    -- ( 0.2335,-0.0113)
    -- ( 0.2814,-0.0356)
    -- ( 0.2682,-0.0617)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2202,-0.0375)
    -- ( 0.2335,-0.0113)
    -- ( 0.2814,-0.0356)
    -- ( 0.2682,-0.0617)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2582, 0.0509)
    -- ( 0.2736, 0.0259)
    -- ( 0.2278,-0.0022)
    -- ( 0.2125, 0.0227)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2582, 0.0509)
    -- ( 0.2736, 0.0259)
    -- ( 0.2278,-0.0022)
    -- ( 0.2125, 0.0227)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2111, 0.0849)
    -- ( 0.2307, 0.0632)
    -- ( 0.1908, 0.0273)
    -- ( 0.1712, 0.0490)
    --cycle
```

```
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2111, 0.0849)
    -- ( 0.2307, 0.0632)
    -- ( 0.1908, 0.0273)
    -- ( 0.1712, 0.0490)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1776, 0.1187)
    -- ( 0.1982, 0.0978)
    -- ( 0.1599, 0.0601)
    -- ( 0.1394, 0.0810)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1776, 0.1187)
    -- ( 0.1982, 0.0978)
    -- ( 0.1599, 0.0601)
    -- ( 0.1394, 0.0810)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2760, 0.3987)
    -- ( 0.2946, 0.3760)
    -- ( 0.2531, 0.3420)
    -- ( 0.2345, 0.3646)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2760, 0.3987)
    -- ( 0.2946, 0.3760)
    -- ( 0.2531, 0.3420)
    -- ( 0.2345, 0.3646)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3226, 0.3543)
    -- ( 0.3420, 0.3323)
    -- ( 0.3018, 0.2967)
    -- ( 0.2824, 0.3185)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3226, 0.3543)
    -- ( 0.3420, 0.3323)
    -- ( 0.3018, 0.2967)
    -- ( 0.2824, 0.3185)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2277, 0.3599)
    -- (-0.2171, 0.3872)
```

```
    -- (-0.1671, 0.3676)
    -- (-0.1777, 0.3404)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2277, 0.3599)
    -- (-0.2171, 0.3872)
    -- (-0.1671, 0.3676)
    -- (-0.1777, 0.3404)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1722, 0.5368)
    -- (-0.1616, 0.5642)
    -- (-0.1116, 0.5446)
    -- (-0.1223, 0.5174)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1722, 0.5368)
    -- (-0.1616, 0.5642)
    -- (-0.1116, 0.5446)
    -- (-0.1223, 0.5174)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2400, 0.3081)
    -- (-0.2307, 0.3359)
    -- (-0.1797, 0.3189)
    -- (-0.1890, 0.2912)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2400, 0.3081)
    -- (-0.2307, 0.3359)
    -- (-0.1797, 0.3189)
    -- (-0.1890, 0.2912)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2735, 0.1997)
    -- (-0.2631, 0.2270)
    -- (-0.2129, 0.2080)
    -- (-0.2233, 0.1807)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2735, 0.1997)
    -- (-0.2631, 0.2270)
    -- (-0.2129, 0.2080)
    -- (-0.2233, 0.1807)
    --cycle
    ;
```

```
    \path[hex/terrain/town/house,pic actions]
    (-0.3047, 0.1045)
    -- (-0.2975, 0.1329)
    -- (-0.2455, 0.1200)
    -- (-0.2525, 0.0915)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3047, 0.1045)
    -- (-0.2975, 0.1329)
    -- (-0.2455, 0.1200)
    -- (-0.2525, 0.0915)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1406, 0.3596)
    -- (-0.1136, 0.3482)
    -- (-0.1345, 0.2988)
    -- (-0.1615, 0.3102)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1406, 0.3596)
    -- (-0.1136, 0.3482)
    -- (-0.1345, 0.2988)
    -- (-0.1615, 0.3102)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0597, 0.5878)
    -- (-0.0327, 0.5763)
    -- (-0.0536, 0.5269)
    -- (-0.0806, 0.5383)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0597, 0.5878)
    -- (-0.0327, 0.5763)
    -- (-0.0536, 0.5269)
    -- (-0.0806, 0.5383)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0206, 0.5864)
    -- ( 0.0064, 0.5749)
    -- (-0.0146, 0.5255)
    -- (-0.0416, 0.5369)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0206, 0.5864)
    -- ( 0.0064, 0.5749)
    -- (-0.0146, 0.5255)
```

```
    -- (-0.0416, 0.5369)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1653, 0.2738)
    -- (-0.1360, 0.2738)
    -- (-0.1360, 0.2200)
    -- (-0.1653, 0.2200)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1653, 0.2738)
    -- (-0.1360, 0.2738)
    -- (-0.1360, 0.2200)
    -- (-0.1653, 0.2200)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1782, 0.2207)
    -- (-0.1501, 0.2122)
    -- (-0.1657, 0.1608)
    -- (-0.1937, 0.1693)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1782, 0.2207)
    -- (-0.1501, 0.2122)
    -- (-0.1657, 0.1608)
    -- (-0.1937, 0.1693)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2343, 0.0622)
    -- (-0.2239, 0.0896)
    -- (-0.1737, 0.0706)
    -- (-0.1840, 0.0432)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2343, 0.0622)
    -- (-0.2239, 0.0896)
    -- (-0.1737, 0.0706)
    -- (-0.1840, 0.0432)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1289, 0.0933)
    -- (-0.1186, 0.1207)
    -- (-0.0683, 0.1017)
    -- (-0.0787, 0.0743)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
```

```
    (-0.1289, 0.0933)
    -- (-0.1186, 0.1207)
    -- (-0.0683, 0.1017)
    -- (-0.0787, 0.0743)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2223, 0.7399)
    -- ( 0.2483, 0.7532)
    -- ( 0.2727, 0.7054)
    -- ( 0.2467, 0.6920)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2223, 0.7399)
    -- ( 0.2483, 0.7532)
    -- ( 0.2727, 0.7054)
    -- ( 0.2467, 0.6920)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5440, 0.7476)
    -- ( 0.5576, 0.7217)
    -- ( 0.5102, 0.6965)
    -- ( 0.4965, 0.7224)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5440, 0.7476)
    -- ( 0.5576, 0.7217)
    -- ( 0.5102, 0.6965)
    -- ( 0.4965, 0.7224)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5919, 0.6377)
    -- ( 0.6068, 0.6125)
    -- ( 0.5604, 0.5853)
    -- ( 0.5456, 0.6106)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5919, 0.6377)
    -- ( 0.6068, 0.6125)
    -- ( 0.5604, 0.5853)
    -- ( 0.5456, 0.6106)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.6224, 0.5979)
    -- ( 0.6382, 0.5732)
    -- ( 0.5930, 0.5443)
    -- ( 0.5772, 0.5690)
```

```
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.6224, 0.5979)
    -- ( 0.6382, 0.5732)
    -- ( 0.5930, 0.5443)
    -- ( 0.5772, 0.5690)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4104, 0.6743)
    -- ( 0.4255, 0.6491)
    -- ( 0.3795, 0.6215)
    -- ( 0.3644, 0.6466)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4104, 0.6743)
    -- ( 0.4255, 0.6491)
    -- ( 0.3795, 0.6215)
    -- ( 0.3644, 0.6466)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4437, 0.6203)
    -- ( 0.4592, 0.5954)
    -- ( 0.4136, 0.5671)
    -- ( 0.3981, 0.5918)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4437, 0.6203)
    -- ( 0.4592, 0.5954)
    -- ( 0.4136, 0.5671)
    -- ( 0.3981, 0.5918)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5275, 0.4892)
    -- ( 0.5449, 0.4656)
    -- ( 0.5018, 0.4337)
    -- ( 0.4844, 0.4571)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5275, 0.4892)
    -- ( 0.5449, 0.4656)
    -- ( 0.5018, 0.4337)
    -- ( 0.4844, 0.4571)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2900, 0.6234)
```

```
    -- ( 0.3087, 0.6008)
    -- ( 0.2671, 0.5666)
    -- ( 0.2485, 0.5892)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2900, 0.6234)
    -- ( 0.3087, 0.6008)
    -- ( 0.2671, 0.5666)
    -- ( 0.2485, 0.5892)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3295, 0.5855)
    -- ( 0.3477, 0.5626)
    -- ( 0.3058, 0.5291)
    -- ( 0.2875, 0.5519)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3295, 0.5855)
    -- ( 0.3477, 0.5626)
    -- ( 0.3058, 0.5291)
    -- ( 0.2875, 0.5519)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3915, 0.5035)
    -- ( 0.4098, 0.4807)
    -- ( 0.3680, 0.4471)
    -- ( 0.3497, 0.4699)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3915, 0.5035)
    -- ( 0.4098, 0.4807)
    -- ( 0.3680, 0.4471)
    -- ( 0.3497, 0.4699)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4274, 0.4691)
    -- ( 0.4472, 0.4474)
    -- ( 0.4075, 0.4112)
    -- ( 0.3878, 0.4327)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4274, 0.4691)
    -- ( 0.4472, 0.4474)
    -- ( 0.4075, 0.4112)
    -- ( 0.3878, 0.4327)
    --cycle
```

```
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0465, 0.7243)
    -- ( 0.0751, 0.7305)
    -- ( 0.0864, 0.6779)
    -- ( 0.0578, 0.6717)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0465, 0.7243)
    -- ( 0.0751, 0.7305)
    -- ( 0.0864, 0.6779)
    -- ( 0.0578, 0.6717)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0312, 0.7116)
    -- (-0.0338, 0.7407)
    -- ( 0.0197, 0.7456)
    -- ( 0.0223, 0.7164)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0312, 0.7116)
    -- (-0.0338, 0.7407)
    -- ( 0.0197, 0.7456)
    -- ( 0.0223, 0.7164)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1044, 0.7143)
    -- (-0.1084, 0.7434)
    -- (-0.0552, 0.7507)
    -- (-0.0512, 0.7216)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1044, 0.7143)
    -- (-0.1084, 0.7434)
    -- (-0.0552, 0.7507)
    -- (-0.0512, 0.7216)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1250, 0.6753)
    -- (-0.1169, 0.7034)
    -- (-0.0653, 0.6887)
    -- (-0.0733, 0.6605)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1250, 0.6753)
    -- (-0.1169, 0.7034)
```

```
    -- (-0.0653, 0.6887)
    -- (-0.0733, 0.6605)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2293, 0.7263)
    -- (-0.2016, 0.7170)
    -- (-0.2185, 0.6660)
    -- (-0.2463, 0.6753)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2293, 0.7263)
    -- (-0.2016, 0.7170)
    -- (-0.2185, 0.6660)
    -- (-0.2463, 0.6753)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4164, 0.8019)
    -- (-0.3886, 0.7926)
    -- (-0.4056, 0.7417)
    -- (-0.4335, 0.7510)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4164, 0.8019)
    -- (-0.3886, 0.7926)
    -- (-0.4056, 0.7417)
    -- (-0.4335, 0.7510)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3769, 0.7827)
    -- (-0.3486, 0.7746)
    -- (-0.3636, 0.7230)
    -- (-0.3918, 0.7311)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3769, 0.7827)
    -- (-0.3486, 0.7746)
    -- (-0.3636, 0.7230)
    -- (-0.3918, 0.7311)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2690, 0.8085)
    -- (-0.2696, 0.8379)
    -- (-0.2159, 0.8389)
    -- (-0.2153, 0.8097)
    --cycle
    ;
```

```
    \path[hex/terrain/town/house,pic actions]
    (-0.2690, 0.8085)
    -- (-0.2696, 0.8379)
    -- (-0.2159, 0.8389)
    -- (-0.2153, 0.8097)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0864, 0.8532)
    -- (-0.0767, 0.8256)
    -- (-0.1273, 0.8076)
    -- (-0.1371, 0.8352)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0864, 0.8532)
    -- (-0.0767, 0.8256)
    -- (-0.1273, 0.8076)
    -- (-0.1371, 0.8352)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3699, 0.6041)
    -- (-0.3425, 0.5939)
    -- (-0.3609, 0.5436)
    -- (-0.3885, 0.5537)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3699, 0.6041)
    -- (-0.3425, 0.5939)
    -- (-0.3609, 0.5436)
    -- (-0.3885, 0.5537)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4770, 0.6412)
    -- (-0.4500, 0.6299)
    -- (-0.4707, 0.5804)
    -- (-0.4978, 0.5918)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4770, 0.6412)
    -- (-0.4500, 0.6299)
    -- (-0.4707, 0.5804)
    -- (-0.4978, 0.5918)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4348, 0.4860)
    -- (-0.4060, 0.4806)
    -- (-0.4159, 0.4278)
```

```
    -- (-0.4447, 0.4332)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4348, 0.4860)
    -- (-0.4060, 0.4806)
    -- (-0.4159, 0.4278)
    -- (-0.4447, 0.4332)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4771, 0.4952)
    -- (-0.4520, 0.4800)
    -- (-0.4799, 0.4341)
    -- (-0.5050, 0.4493)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4771, 0.4952)
    -- (-0.4520, 0.4800)
    -- (-0.4799, 0.4341)
    -- (-0.5050, 0.4493)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5175, 0.4232)
    -- (-0.4917, 0.4092)
    -- (-0.5176, 0.3620)
    -- (-0.5433, 0.3761)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5175, 0.4232)
    -- (-0.4917, 0.4092)
    -- (-0.5176, 0.3620)
    -- (-0.5433, 0.3761)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5739, 0.5614)
    -- (-0.5487, 0.5464)
    -- (-0.5762, 0.5003)
    -- (-0.6013, 0.5152)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5739, 0.5614)
    -- (-0.5487, 0.5464)
    -- (-0.5762, 0.5003)
    -- (-0.6013, 0.5152)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
```

```
    (-0.6244, 0.4780)
    -- (-0.5977, 0.4661)
    -- (-0.6195, 0.4170)
    -- (-0.6463, 0.4289)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6244, 0.4780)
    -- (-0.5977, 0.4661)
    -- (-0.6195, 0.4170)
    -- (-0.6463, 0.4289)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6236, 0.1401)
    -- (-0.6192, 0.1691)
    -- (-0.5661, 0.1611)
    -- (-0.5705, 0.1321)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6236, 0.1401)
    -- (-0.6192, 0.1691)
    -- (-0.5661, 0.1611)
    -- (-0.5705, 0.1321)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3872, 0.3590)
    -- (-0.3829, 0.3880)
    -- (-0.3297, 0.3800)
    -- (-0.3341, 0.3510)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3872, 0.3590)
    -- (-0.3829, 0.3880)
    -- (-0.3297, 0.3800)
    -- (-0.3341, 0.3510)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6525, 0.1021)
    -- (-0.6404, 0.1288)
    -- (-0.5915, 0.1066)
    -- (-0.6036, 0.0799)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6525, 0.1021)
    -- (-0.6404, 0.1288)
    -- (-0.5915, 0.1066)
    -- (-0.6036, 0.0799)
```

```
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4323, 0.3237)
    -- (-0.4202, 0.3503)
    -- (-0.3713, 0.3280)
    -- (-0.3834, 0.3014)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4323, 0.3237)
    -- (-0.4202, 0.3503)
    -- (-0.3713, 0.3280)
    -- (-0.3834, 0.3014)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3470, 0.2846)
    -- (-0.3349, 0.3113)
    -- (-0.2859, 0.2891)
    -- (-0.2981, 0.2624)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3470, 0.2846)
    -- (-0.3349, 0.3113)
    -- (-0.2859, 0.2891)
    -- (-0.2981, 0.2624)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3053, 0.3741)
    -- (-0.2932, 0.4008)
    -- (-0.2443, 0.3786)
    -- (-0.2564, 0.3519)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3053, 0.3741)
    -- (-0.2932, 0.4008)
    -- (-0.2443, 0.3786)
    -- (-0.2564, 0.3519)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6751, 0.0465)
    -- (-0.6666, 0.0746)
    -- (-0.6152, 0.0590)
    -- (-0.6237, 0.0310)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6751, 0.0465)
```

```
    -- (-0.6666, 0.0746)
    -- (-0.6152, 0.0590)
    -- (-0.6237, 0.0310)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.7316,-0.0595)
    -- (-0.7215,-0.0320)
    -- (-0.6711,-0.0505)
    -- (-0.6812,-0.0780)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.7316,-0.0595)
    -- (-0.7215,-0.0320)
    -- (-0.6711,-0.0505)
    -- (-0.6812,-0.0780)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.7748,-0.1355)
    -- (-0.7629,-0.1088)
    -- (-0.7138,-0.1305)
    -- (-0.7257,-0.1573)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.7748,-0.1355)
    -- (-0.7629,-0.1088)
    -- (-0.7138,-0.1305)
    -- (-0.7257,-0.1573)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6698,-0.1385)
    -- (-0.6512,-0.1159)
    -- (-0.6098,-0.1501)
    -- (-0.6284,-0.1727)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6698,-0.1385)
    -- (-0.6512,-0.1159)
    -- (-0.6098,-0.1501)
    -- (-0.6284,-0.1727)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3325,-0.1175)
    -- (-0.3067,-0.1313)
    -- (-0.3320,-0.1787)
    -- (-0.3579,-0.1649)
    --cycle
```

```
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3325,-0.1175)
    -- (-0.3067,-0.1313)
    -- (-0.3320,-0.1787)
    -- (-0.3579,-0.1649)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4097,-0.0630)
    -- (-0.3827,-0.0741)
    -- (-0.4031,-0.1238)
    -- (-0.4302,-0.1127)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4097,-0.0630)
    -- (-0.3827,-0.0741)
    -- (-0.4031,-0.1238)
    -- (-0.4302,-0.1127)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3028, 0.0016)
    -- (-0.2734, 0.0016)
    -- (-0.2734,-0.0522)
    -- (-0.3028,-0.0522)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3028, 0.0016)
    -- (-0.2734, 0.0016)
    -- (-0.2734,-0.0522)
    -- (-0.3028,-0.0522)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2492,-0.0037)
    -- (-0.2198,-0.0037)
    -- (-0.2198,-0.0574)
    -- (-0.2492,-0.0574)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2492,-0.0037)
    -- (-0.2198,-0.0037)
    -- (-0.2198,-0.0574)
    -- (-0.2492,-0.0574)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4151, 0.0294)
    -- (-0.3858, 0.0294)
```

```
    -- (-0.3858,-0.0243)
    -- (-0.4151,-0.0243)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4151, 0.0294)
    -- (-0.3858, 0.0294)
    -- (-0.3858,-0.0243)
    -- (-0.4151,-0.0243)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4687, 0.0340)
    -- (-0.4394, 0.0340)
    -- (-0.4394,-0.0197)
    -- (-0.4687,-0.0197)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4687, 0.0340)
    -- (-0.4394, 0.0340)
    -- (-0.4394,-0.0197)
    -- (-0.4687,-0.0197)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5170, 0.0545)
    -- (-0.4876, 0.0545)
    -- (-0.4876, 0.0008)
    -- (-0.5170, 0.0008)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5170, 0.0545)
    -- (-0.4876, 0.0545)
    -- (-0.4876, 0.0008)
    -- (-0.5170, 0.0008)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4695, 0.1540)
    -- (-0.4413, 0.1461)
    -- (-0.4557, 0.0943)
    -- (-0.4839, 0.1022)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4695, 0.1540)
    -- (-0.4413, 0.1461)
    -- (-0.4557, 0.0943)
    -- (-0.4839, 0.1022)
    --cycle
    ;
```

```
    \path[hex/terrain/town/house,pic actions]
    (-0.4511, 0.2320)
    -- (-0.4227, 0.2241)
    -- (-0.4372, 0.1724)
    -- (-0.4654, 0.1803)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4511, 0.2320)
    -- (-0.4227, 0.2241)
    -- (-0.4372, 0.1724)
    -- (-0.4654, 0.1803)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4191, 0.1396)
    -- (-0.3904, 0.1335)
    -- (-0.4017, 0.0809)
    -- (-0.4304, 0.0871)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4191, 0.1396)
    -- (-0.3904, 0.1335)
    -- (-0.4017, 0.0809)
    -- (-0.4304, 0.0871)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0048,-0.2963)
    -- ( 0.0056,-0.2689)
    -- ( 0.0558,-0.2881)
    -- ( 0.0453,-0.3155)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0048,-0.2963)
    -- ( 0.0056,-0.2689)
    -- ( 0.0558,-0.2881)
    -- ( 0.0453,-0.3155)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0804,-0.1001)
    -- ( 0.0908,-0.0728)
    -- ( 0.1410,-0.0919)
    -- ( 0.1305,-0.1192)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0804,-0.1001)
    -- ( 0.0908,-0.0728)
    -- ( 0.1410,-0.0919)
```

```
    -- ( 0.1305,-0.1192)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1027,-0.2588)
    -- (-0.0979,-0.2299)
    -- (-0.0449,-0.2387)
    -- (-0.0498,-0.2676)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1027,-0.2588)
    -- (-0.0979,-0.2299)
    -- (-0.0449,-0.2387)
    -- (-0.0498,-0.2676)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1889,-0.2314)
    -- (-0.1776,-0.2043)
    -- (-0.1281,-0.2251)
    -- (-0.1394,-0.2521)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1889,-0.2314)
    -- (-0.1776,-0.2043)
    -- (-0.1281,-0.2251)
    -- (-0.1394,-0.2521)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1180,-0.3033)
    -- (-0.1077,-0.2759)
    -- (-0.0575,-0.2947)
    -- (-0.0677,-0.3221)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1180,-0.3033)
    -- (-0.1077,-0.2759)
    -- (-0.0575,-0.2947)
    -- (-0.0677,-0.3221)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2120,-0.2801)
    -- (-0.2010,-0.2529)
    -- (-0.1512,-0.2729)
    -- (-0.1622,-0.3002)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
```

```
    (-0.2120,-0.2801)
    -- (-0.2010,-0.2529)
    -- (-0.1512,-0.2729)
    -- (-0.1622,-0.3002)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2265,-0.3343)
    -- (-0.2161,-0.3069)
    -- (-0.1659,-0.3259)
    -- (-0.1762,-0.3533)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2265,-0.3343)
    -- (-0.2161,-0.3069)
    -- (-0.1659,-0.3259)
    -- (-0.1762,-0.3533)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0728,-0.3520)
    -- (-0.0436,-0.3488)
    -- (-0.0379,-0.4022)
    -- (-0.0670,-0.4054)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0728,-0.3520)
    -- (-0.0436,-0.3488)
    -- (-0.0379,-0.4022)
    -- (-0.0670,-0.4054)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3598,-0.6299)
    -- ( 0.3752,-0.6051)
    -- ( 0.4209,-0.6334)
    -- ( 0.4054,-0.6583)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3598,-0.6299)
    -- ( 0.3752,-0.6051)
    -- ( 0.4209,-0.6334)
    -- ( 0.4054,-0.6583)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3284,-0.6582)
    -- ( 0.3482,-0.6365)
    -- ( 0.3879,-0.6727)
    -- ( 0.3681,-0.6944)
```

```
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3284,-0.6582)
    -- ( 0.3482,-0.6365)
    -- ( 0.3879,-0.6727)
    -- ( 0.3681,-0.6944)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.8159,-0.3188)
    -- (-0.7892,-0.3067)
    -- (-0.7670,-0.3556)
    -- (-0.7937,-0.3677)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.8159,-0.3188)
    -- (-0.7892,-0.3067)
    -- (-0.7670,-0.3556)
    -- (-0.7937,-0.3677)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.8755, 0.1805)
    -- (-0.8623, 0.2066)
    -- (-0.8144, 0.1824)
    -- (-0.8276, 0.1562)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.8755, 0.1805)
    -- (-0.8623, 0.2066)
    -- (-0.8144, 0.1824)
    -- (-0.8276, 0.1562)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.9400, 0.0507)
    -- (-0.9275, 0.0771)
    -- (-0.8789, 0.0541)
    -- (-0.8916, 0.0276)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.9400, 0.0507)
    -- (-0.9275, 0.0771)
    -- (-0.8789, 0.0541)
    -- (-0.8916, 0.0276)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.9500,-0.0171)
```

```
    -- (-0.9467, 0.0120)
    -- (-0.8934, 0.0060)
    -- (-0.8966,-0.0232)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.9500,-0.0171)
    -- (-0.9467, 0.0120)
    -- (-0.8934, 0.0060)
    -- (-0.8966,-0.0232)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0374, 0.6594)
    -- (-0.0376, 0.6887)
    -- ( 0.0161, 0.6890)
    -- ( 0.0162, 0.6598)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0374, 0.6594)
    -- (-0.0376, 0.6887)
    -- ( 0.0161, 0.6890)
    -- ( 0.0162, 0.6598)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1600, 0.8267)
    -- ( 0.1793, 0.8046)
    -- ( 0.1388, 0.7692)
    -- ( 0.1195, 0.7913)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1600, 0.8267)
    -- ( 0.1793, 0.8046)
    -- ( 0.1388, 0.7692)
    -- ( 0.1195, 0.7913)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4284, 0.3107)
    -- ( 0.4572, 0.3163)
    -- ( 0.4672, 0.2634)
    -- ( 0.4384, 0.2580)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4284, 0.3107)
    -- ( 0.4572, 0.3163)
    -- ( 0.4672, 0.2634)
    -- ( 0.4384, 0.2580)
    --cycle
```

```
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4721, 0.3149)
    -- ( 0.5003, 0.3230)
    -- ( 0.5151, 0.2714)
    -- ( 0.4870, 0.2633)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4721, 0.3149)
    -- ( 0.5003, 0.3230)
    -- ( 0.5151, 0.2714)
    -- ( 0.4870, 0.2633)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5761, 0.3388)
    -- ( 0.6049, 0.3443)
    -- ( 0.6150, 0.2916)
    -- ( 0.5862, 0.2860)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5761, 0.3388)
    -- ( 0.6049, 0.3443)
    -- ( 0.6150, 0.2916)
    -- ( 0.5862, 0.2860)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.6283, 0.3369)
    -- ( 0.6567, 0.3296)
    -- ( 0.6432, 0.2775)
    -- ( 0.6148, 0.2849)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.6283, 0.3369)
    -- ( 0.6567, 0.3296)
    -- ( 0.6432, 0.2775)
    -- ( 0.6148, 0.2849)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5378, 0.2581)
    -- ( 0.5670, 0.2616)
    -- ( 0.5734, 0.2083)
    -- ( 0.5443, 0.2047)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5378, 0.2581)
    -- ( 0.5670, 0.2616)
```

```
    -- ( 0.5734, 0.2083)
    -- ( 0.5443, 0.2047)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4853, 0.2500)
    -- ( 0.5140, 0.2555)
    -- ( 0.5241, 0.2028)
    -- ( 0.4953, 0.1973)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4853, 0.2500)
    -- ( 0.5140, 0.2555)
    -- ( 0.5241, 0.2028)
    -- ( 0.4953, 0.1973)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4028, 0.0895)
    -- ( 0.4321, 0.0895)
    -- ( 0.4321, 0.0358)
    -- ( 0.4028, 0.0358)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4028, 0.0895)
    -- ( 0.4321, 0.0895)
    -- ( 0.4321, 0.0358)
    -- ( 0.4028, 0.0358)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4612, 0.0957)
    -- ( 0.4899, 0.0898)
    -- ( 0.4793, 0.0371)
    -- ( 0.4506, 0.0430)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4612, 0.0957)
    -- ( 0.4899, 0.0898)
    -- ( 0.4793, 0.0371)
    -- ( 0.4506, 0.0430)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5422,-0.0041)
    -- ( 0.5437,-0.0333)
    -- ( 0.4900,-0.0361)
    -- ( 0.4885,-0.0068)
    --cycle
    ;
```

```
    \path[hex/terrain/town/house,pic actions]
    ( 0.5422,-0.0041)
    -- ( 0.5437,-0.0333)
    -- ( 0.4900,-0.0361)
    -- ( 0.4885,-0.0068)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.6654,-0.0050)
    -- ( 0.6664,-0.0343)
    -- ( 0.6128,-0.0361)
    -- ( 0.6117,-0.0068)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.6654,-0.0050)
    -- ( 0.6664,-0.0343)
    -- ( 0.6128,-0.0361)
    -- ( 0.6117,-0.0068)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.7573, 0.2817)
    -- ( 0.7646, 0.2533)
    -- ( 0.7124, 0.2402)
    -- ( 0.7053, 0.2686)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.7573, 0.2817)
    -- ( 0.7646, 0.2533)
    -- ( 0.7124, 0.2402)
    -- ( 0.7053, 0.2686)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.7393, 0.3502)
    -- ( 0.7456, 0.3216)
    -- ( 0.6931, 0.3101)
    -- ( 0.6868, 0.3387)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.7393, 0.3502)
    -- ( 0.7456, 0.3216)
    -- ( 0.6931, 0.3101)
    -- ( 0.6868, 0.3387)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.8114, 0.0963)
    -- ( 0.8188, 0.0679)
    -- ( 0.7668, 0.0543)
```

```
    -- ( 0.7594, 0.0826)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.8114, 0.0963)
    -- ( 0.8188, 0.0679)
    -- ( 0.7668, 0.0543)
    -- ( 0.7594, 0.0826)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.8247,-0.0115)
    -- ( 0.8312,-0.0401)
    -- ( 0.7788,-0.0521)
    -- ( 0.7723,-0.0235)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.8247,-0.0115)
    -- ( 0.8312,-0.0401)
    -- ( 0.7788,-0.0521)
    -- ( 0.7723,-0.0235)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.9279, 0.0392)
    -- ( 0.9358, 0.0110)
    -- ( 0.8842,-0.0036)
    -- ( 0.8762, 0.0245)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.9279, 0.0392)
    -- ( 0.9358, 0.0110)
    -- ( 0.8842,-0.0036)
    -- ( 0.8762, 0.0245)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.9473,-0.0199)
    -- ( 0.9500,-0.0490)
    -- ( 0.8965,-0.0540)
    -- ( 0.8939,-0.0248)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.9473,-0.0199)
    -- ( 0.9500,-0.0490)
    -- ( 0.8965,-0.0540)
    -- ( 0.8939,-0.0248)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
```

```
    ( 0.8832, 0.1513)
    -- ( 0.8949, 0.1245)
    -- ( 0.8456, 0.1031)
    -- ( 0.8339, 0.1300)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.8832, 0.1513)
    -- ( 0.8949, 0.1245)
    -- ( 0.8456, 0.1031)
    -- ( 0.8339, 0.1300)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.8604, 0.2135)
    -- ( 0.8734, 0.1872)
    -- ( 0.8254, 0.1634)
    -- ( 0.8123, 0.1896)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.8604, 0.2135)
    -- ( 0.8734, 0.1872)
    -- ( 0.8254, 0.1634)
    -- ( 0.8123, 0.1896)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.7675, 0.2368)
    -- ( 0.7736, 0.2082)
    -- ( 0.7210, 0.1970)
    -- ( 0.7150, 0.2257)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.7675, 0.2368)
    -- ( 0.7736, 0.2082)
    -- ( 0.7210, 0.1970)
    -- ( 0.7150, 0.2257)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.7696,-0.1796)
    -- ( 0.7978,-0.1875)
    -- ( 0.7835,-0.2392)
    -- ( 0.7552,-0.2314)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.7696,-0.1796)
    -- ( 0.7978,-0.1875)
    -- ( 0.7835,-0.2392)
    -- ( 0.7552,-0.2314)
```

```
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.7546,-0.0830)
    -- ( 0.7838,-0.0830)
    -- ( 0.7838,-0.1367)
    -- ( 0.7546,-0.1367)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.7546,-0.0830)
    -- ( 0.7838,-0.0830)
    -- ( 0.7838,-0.1367)
    -- ( 0.7546,-0.1367)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.7114,-0.1735)
    -- ( 0.7402,-0.1784)
    -- ( 0.7313,-0.2313)
    -- ( 0.7024,-0.2265)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.7114,-0.1735)
    -- ( 0.7402,-0.1784)
    -- ( 0.7313,-0.2313)
    -- ( 0.7024,-0.2265)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.6398,-0.0896)
    -- ( 0.6691,-0.0896)
    -- ( 0.6691,-0.1433)
    -- ( 0.6398,-0.1433)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.6398,-0.0896)
    -- ( 0.6691,-0.0896)
    -- ( 0.6691,-0.1433)
    -- ( 0.6398,-0.1433)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5390,-0.1093)
    -- ( 0.5377,-0.0801)
    -- ( 0.5913,-0.0776)
    -- ( 0.5927,-0.1069)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5390,-0.1093)
```

```
    -- ( 0.5377,-0.0801)
    -- ( 0.5913,-0.0776)
    -- ( 0.5927,-0.1069)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5171,-0.2250)
    -- ( 0.5252,-0.1968)
    -- ( 0.5767,-0.2117)
    -- ( 0.5687,-0.2399)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5171,-0.2250)
    -- ( 0.5252,-0.1968)
    -- ( 0.5767,-0.2117)
    -- ( 0.5687,-0.2399)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5024,-0.2807)
    -- ( 0.5066,-0.2517)
    -- ( 0.5597,-0.2597)
    -- ( 0.5555,-0.2887)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5024,-0.2807)
    -- ( 0.5066,-0.2517)
    -- ( 0.5597,-0.2597)
    -- ( 0.5555,-0.2887)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.6783,-0.2717)
    -- ( 0.7056,-0.2824)
    -- ( 0.6858,-0.3324)
    -- ( 0.6585,-0.3216)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.6783,-0.2717)
    -- ( 0.7056,-0.2824)
    -- ( 0.6858,-0.3324)
    -- ( 0.6585,-0.3216)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4010,-0.3903)
    -- ( 0.4019,-0.3609)
    -- ( 0.4556,-0.3627)
    -- ( 0.4547,-0.3921)
    --cycle
```

```
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4010,-0.3903)
    -- ( 0.4019,-0.3609)
    -- ( 0.4556,-0.3627)
    -- ( 0.4547,-0.3921)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.6576,-0.1610)
    -- ( 0.6852,-0.1708)
    -- ( 0.6672,-0.2214)
    -- ( 0.6396,-0.2116)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.6576,-0.1610)
    -- ( 0.6852,-0.1708)
    -- ( 0.6672,-0.2214)
    -- ( 0.6396,-0.2116)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4024,-0.7175)
    -- ( 0.4484,-0.7175)
    -- ( 0.4484,-0.7785)
    -- ( 0.4024,-0.7785)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4024,-0.7175)
    -- ( 0.4484,-0.7175)
    -- ( 0.4484,-0.7785)
    -- ( 0.4024,-0.7785)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3999,-0.7917)
    -- (-0.3540,-0.7917)
    -- (-0.3540,-0.8527)
    -- (-0.3999,-0.8527)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3999,-0.7917)
    -- (-0.3540,-0.7917)
    -- (-0.3540,-0.8527)
    -- (-0.3999,-0.8527)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.7770,-0.2886)
    -- (-0.7319,-0.2679)
```

```
    -- (-0.6985,-0.3406)
    -- (-0.7437,-0.3613)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.7770,-0.2886)
    -- (-0.7319,-0.2679)
    -- (-0.6985,-0.3406)
    -- (-0.7437,-0.3613)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1783,-0.5367)
    -- (-0.1339,-0.5483)
    -- (-0.1492,-0.6074)
    -- (-0.1937,-0.5958)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1783,-0.5367)
    -- (-0.1339,-0.5483)
    -- (-0.1492,-0.6074)
    -- (-0.1937,-0.5958)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3106,-0.7770)
    -- ( 0.3564,-0.7770)
    -- ( 0.3564,-0.8380)
    -- ( 0.3106,-0.8380)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3106,-0.7770)
    -- ( 0.3564,-0.7770)
    -- ( 0.3564,-0.8380)
    -- ( 0.3106,-0.8380)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0626,-0.7954)
    -- (-0.0196,-0.8113)
    -- (-0.0406,-0.8686)
    -- (-0.0837,-0.8527)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0626,-0.7954)
    -- (-0.0196,-0.8113)
    -- (-0.0406,-0.8686)
    -- (-0.0837,-0.8527)
    --cycle
    ;
```

```
    \path[hex/terrain/town/house,pic actions]
    ( 0.0570,-0.7843)
    -- ( 0.1025,-0.7910)
    -- ( 0.0936,-0.8514)
    -- ( 0.0481,-0.8446)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0570,-0.7843)
    -- ( 0.1025,-0.7910)
    -- ( 0.0936,-0.8514)
    -- ( 0.0481,-0.8446)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0906,-0.6908)
    -- ( 0.1345,-0.7046)
    -- ( 0.1161,-0.7629)
    -- ( 0.0723,-0.7490)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0906,-0.6908)
    -- ( 0.1345,-0.7046)
    -- ( 0.1161,-0.7629)
    -- ( 0.0723,-0.7490)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4731,-0.7998)
    -- (-0.4283,-0.7899)
    -- (-0.4151,-0.8496)
    -- (-0.4600,-0.8595)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4731,-0.7998)
    -- (-0.4283,-0.7899)
    -- (-0.4151,-0.8496)
    -- (-0.4600,-0.8595)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4125,-0.0879)
    -- ( 0.4578,-0.0951)
    -- ( 0.4483,-0.1553)
    -- ( 0.4029,-0.1481)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4125,-0.0879)
    -- ( 0.4578,-0.0951)
    -- ( 0.4483,-0.1553)
```

```
    -- ( 0.4029,-0.1481)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2078, 0.8568)
    -- ( 0.2536, 0.8583)
    -- ( 0.2555, 0.7973)
    -- ( 0.2097, 0.7958)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2078, 0.8568)
    -- ( 0.2536, 0.8583)
    -- ( 0.2555, 0.7973)
    -- ( 0.2097, 0.7958)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5829,-0.2493)
    -- ( 0.6289,-0.2493)
    -- ( 0.6289,-0.3104)
    -- ( 0.5829,-0.3104)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5829,-0.2493)
    -- ( 0.6289,-0.2493)
    -- ( 0.6289,-0.3104)
    -- ( 0.5829,-0.3104)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2923,-0.1390)
    -- ( 0.3109,-0.0970)
    -- ( 0.3667,-0.1218)
    -- ( 0.3481,-0.1638)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2923,-0.1390)
    -- ( 0.3109,-0.0970)
    -- ( 0.3667,-0.1218)
    -- ( 0.3481,-0.1638)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.6866,-0.0789)
    -- ( 0.7324,-0.0789)
    -- ( 0.7324,-0.1400)
    -- ( 0.6866,-0.1400)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
```

```
    ( 0.6866,-0.0789)
    -- ( 0.7324,-0.0789)
    -- ( 0.7324,-0.1400)
    -- ( 0.6866,-0.1400)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.8206,-0.0922)
    -- ( 0.8649,-0.1044)
    -- ( 0.8487,-0.1632)
    -- ( 0.8045,-0.1511)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.8206,-0.0922)
    -- ( 0.8649,-0.1044)
    -- ( 0.8487,-0.1632)
    -- ( 0.8045,-0.1511)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3075, 0.5809)
    -- (-0.2648, 0.5640)
    -- (-0.2872, 0.5072)
    -- (-0.3299, 0.5241)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3075, 0.5809)
    -- (-0.2648, 0.5640)
    -- (-0.2872, 0.5072)
    -- (-0.3299, 0.5241)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.7746, 0.3900)
    -- (-0.7312, 0.3750)
    -- (-0.7511, 0.3173)
    -- (-0.7945, 0.3322)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.7746, 0.3900)
    -- (-0.7312, 0.3750)
    -- (-0.7511, 0.3173)
    -- (-0.7945, 0.3322)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.8224, 0.3024)
    -- (-0.7807, 0.2831)
    -- (-0.8064, 0.2277)
    -- (-0.8481, 0.2470)
```

```
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.8224, 0.3024)
    -- (-0.7807, 0.2831)
    -- (-0.8064, 0.2277)
    -- (-0.8481, 0.2470)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.7172, 0.2999)
    -- (-0.6959, 0.3406)
    -- (-0.6418, 0.3122)
    -- (-0.6632, 0.2715)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.7172, 0.2999)
    -- (-0.6959, 0.3406)
    -- (-0.6418, 0.3122)
    -- (-0.6632, 0.2715)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.7505, 0.2368)
    -- (-0.7273, 0.2764)
    -- (-0.6746, 0.2456)
    -- (-0.6979, 0.2060)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.7505, 0.2368)
    -- (-0.7273, 0.2764)
    -- (-0.6746, 0.2456)
    -- (-0.6979, 0.2060)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.7726, 0.1668)
    -- (-0.7521, 0.2080)
    -- (-0.6975, 0.1808)
    -- (-0.7180, 0.1396)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.7726, 0.1668)
    -- (-0.7521, 0.2080)
    -- (-0.6975, 0.1808)
    -- (-0.7180, 0.1396)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.8067, 0.1033)
```

```
    -- (-0.7877, 0.1452)
    -- (-0.7322, 0.1199)
    -- (-0.7512, 0.0781)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.8067, 0.1033)
    -- (-0.7877, 0.1452)
    -- (-0.7322, 0.1199)
    -- (-0.7512, 0.0781)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.8292, 0.0434)
    -- (-0.8106, 0.0854)
    -- (-0.7548, 0.0608)
    -- (-0.7733, 0.0188)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.8292, 0.0434)
    -- (-0.8106, 0.0854)
    -- (-0.7548, 0.0608)
    -- (-0.7733, 0.0188)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.8479,-0.0238)
    -- (-0.8336, 0.0199)
    -- (-0.7757, 0.0009)
    -- (-0.7899,-0.0427)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.8479,-0.0238)
    -- (-0.8336, 0.0199)
    -- (-0.7757, 0.0009)
    -- (-0.7899,-0.0427)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.9015,-0.0795)
    -- (-0.8746,-0.0423)
    -- (-0.8252,-0.0782)
    -- (-0.8521,-0.1153)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.9015,-0.0795)
    -- (-0.8746,-0.0423)
    -- (-0.8252,-0.0782)
    -- (-0.8521,-0.1153)
    --cycle
```

```
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5616,-0.6142)
    -- (-0.5431,-0.6563)
    -- (-0.5990,-0.6808)
    -- (-0.6175,-0.6387)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5616,-0.6142)
    -- (-0.5431,-0.6563)
    -- (-0.5990,-0.6808)
    -- (-0.6175,-0.6387)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0094,-0.6230)
    -- ( 0.0047,-0.5793)
    -- ( 0.0627,-0.5978)
    -- ( 0.0487,-0.6416)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0094,-0.6230)
    -- ( 0.0047,-0.5793)
    -- ( 0.0627,-0.5978)
    -- ( 0.0487,-0.6416)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0303,-0.4683)
    -- ( 0.0443,-0.4246)
    -- ( 0.1024,-0.4432)
    -- ( 0.0884,-0.4869)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0303,-0.4683)
    -- ( 0.0443,-0.4246)
    -- ( 0.1024,-0.4432)
    -- ( 0.0884,-0.4869)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2507,-0.3956)
    -- (-0.2367,-0.3518)
    -- (-0.1786,-0.3704)
    -- (-0.1926,-0.4142)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2507,-0.3956)
    -- (-0.2367,-0.3518)
```

```
    -- (-0.1786,-0.3704)
    -- (-0.1926,-0.4142)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3208,-0.3936)
    -- (-0.3069,-0.3498)
    -- (-0.2487,-0.3684)
    -- (-0.2627,-0.4122)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3208,-0.3936)
    -- (-0.3069,-0.3498)
    -- (-0.2487,-0.3684)
    -- (-0.2627,-0.4122)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1634,-0.1430)
    -- ( 0.1790,-0.0997)
    -- ( 0.2365,-0.1205)
    -- ( 0.2209,-0.1637)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1634,-0.1430)
    -- ( 0.1790,-0.0997)
    -- ( 0.2365,-0.1205)
    -- ( 0.2209,-0.1637)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1520,-0.2030)
    -- ( 0.1715,-0.1614)
    -- ( 0.2268,-0.1873)
    -- ( 0.2072,-0.2289)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1520,-0.2030)
    -- ( 0.1715,-0.1614)
    -- ( 0.2268,-0.1873)
    -- ( 0.2072,-0.2289)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0852,-0.3696)
    -- ( 0.1047,-0.3280)
    -- ( 0.1600,-0.3540)
    -- ( 0.1404,-0.3956)
    --cycle
    ;
```

```
    \path[hex/terrain/town/house,pic actions]
    ( 0.0852,-0.3696)
    -- ( 0.1047,-0.3280)
    -- ( 0.1600,-0.3540)
    -- ( 0.1404,-0.3956)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0197,-0.2063)
    -- ( 0.0392,-0.1647)
    -- ( 0.0944,-0.1907)
    -- ( 0.0750,-0.2323)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0197,-0.2063)
    -- ( 0.0392,-0.1647)
    -- ( 0.0944,-0.1907)
    -- ( 0.0750,-0.2323)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3100, 0.7769)
    -- ( 0.3513, 0.7971)
    -- ( 0.3781, 0.7423)
    -- ( 0.3369, 0.7221)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3100, 0.7769)
    -- ( 0.3513, 0.7971)
    -- ( 0.3781, 0.7423)
    -- ( 0.3369, 0.7221)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5097, 0.3286)
    -- ( 0.5510, 0.3488)
    -- ( 0.5778, 0.2940)
    -- ( 0.5366, 0.2738)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5097, 0.3286)
    -- ( 0.5510, 0.3488)
    -- ( 0.5778, 0.2940)
    -- ( 0.5366, 0.2738)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4014, 0.8173)
    -- ( 0.4429, 0.8369)
    -- ( 0.4689, 0.7817)
```

```
    -- ( 0.4274, 0.7621)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4014, 0.8173)
    -- ( 0.4429, 0.8369)
    -- ( 0.4689, 0.7817)
    -- ( 0.4274, 0.7621)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2627, 0.7599)
    -- ( 0.3055, 0.7765)
    -- ( 0.3276, 0.7196)
    -- ( 0.2848, 0.7030)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2627, 0.7599)
    -- ( 0.3055, 0.7765)
    -- ( 0.3276, 0.7196)
    -- ( 0.2848, 0.7030)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1763, 0.7193)
    -- ( 0.2174, 0.7400)
    -- ( 0.2448, 0.6855)
    -- ( 0.2038, 0.6648)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1763, 0.7193)
    -- ( 0.2174, 0.7400)
    -- ( 0.2448, 0.6855)
    -- ( 0.2038, 0.6648)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0655, 0.4707)
    -- (-0.0222, 0.4555)
    -- (-0.0424, 0.3979)
    -- (-0.0858, 0.4131)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0655, 0.4707)
    -- (-0.0222, 0.4555)
    -- (-0.0424, 0.3979)
    -- (-0.0858, 0.4131)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
```

```
    ( 0.0019, 0.5606)
    -- ( 0.0452, 0.5454)
    -- ( 0.0251, 0.4878)
    -- (-0.0183, 0.5030)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0019, 0.5606)
    -- ( 0.0452, 0.5454)
    -- ( 0.0251, 0.4878)
    -- (-0.0183, 0.5030)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0634, 0.0555)
    -- ( 0.1067, 0.0403)
    -- ( 0.0865,-0.0174)
    -- ( 0.0432,-0.0022)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0634, 0.0555)
    -- ( 0.1067, 0.0403)
    -- ( 0.0865,-0.0174)
    -- ( 0.0432,-0.0022)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0445, 0.0687)
    -- (-0.0010, 0.0535)
    -- (-0.0213,-0.0041)
    -- (-0.0646, 0.0110)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0445, 0.0687)
    -- (-0.0010, 0.0535)
    -- (-0.0213,-0.0041)
    -- (-0.0646, 0.0110)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0541, 0.5519)
    -- ( 0.0966, 0.5344)
    -- ( 0.0732, 0.4779)
    -- ( 0.0308, 0.4956)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0541, 0.5519)
    -- ( 0.0966, 0.5344)
    -- ( 0.0732, 0.4779)
    -- ( 0.0308, 0.4956)
```

```
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0096, 0.8274)
    -- ( 0.0163, 0.7820)
    -- (-0.0441, 0.7731)
    -- (-0.0508, 0.8185)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0096, 0.8274)
    -- ( 0.0163, 0.7820)
    -- (-0.0441, 0.7731)
    -- (-0.0508, 0.8185)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0878, 0.6237)
    -- (-0.0810, 0.5783)
    -- (-0.1415, 0.5693)
    -- (-0.1482, 0.6147)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0878, 0.6237)
    -- (-0.0810, 0.5783)
    -- (-0.1415, 0.5693)
    -- (-0.1482, 0.6147)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0678, 0.8193)
    -- (-0.0575, 0.7745)
    -- (-0.1168, 0.7608)
    -- (-0.1273, 0.8055)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0678, 0.8193)
    -- (-0.0575, 0.7745)
    -- (-0.1168, 0.7608)
    -- (-0.1273, 0.8055)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1958, 0.8007)
    -- (-0.1517, 0.7877)
    -- (-0.1688, 0.7292)
    -- (-0.2129, 0.7420)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1958, 0.8007)
```

```
    -- (-0.1517, 0.7877)
    -- (-0.1688, 0.7292)
    -- (-0.2129, 0.7420)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.6001, 0.0672)
    -- ( 0.6452, 0.0758)
    -- ( 0.6566, 0.0159)
    -- ( 0.6115, 0.0072)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.6001, 0.0672)
    -- ( 0.6452, 0.0758)
    -- ( 0.6566, 0.0159)
    -- ( 0.6115, 0.0072)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.8357, 0.2798)
    -- ( 0.8514, 0.2365)
    -- ( 0.7940, 0.2158)
    -- ( 0.7783, 0.2591)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.8357, 0.2798)
    -- ( 0.8514, 0.2365)
    -- ( 0.7940, 0.2158)
    -- ( 0.7783, 0.2591)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4450, 0.0292)
    -- ( 0.4606,-0.0141)
    -- ( 0.4032,-0.0348)
    -- ( 0.3876, 0.0085)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4450, 0.0292)
    -- ( 0.4606,-0.0141)
    -- ( 0.4032,-0.0348)
    -- ( 0.3876, 0.0085)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.9043, 0.1125)
    -- ( 0.9184, 0.0687)
    -- ( 0.8603, 0.0500)
    -- ( 0.8462, 0.0937)
    --cycle
```

```
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.9043, 0.1125)
    -- ( 0.9184, 0.0687)
    -- ( 0.8603, 0.0500)
    -- ( 0.8462, 0.0937)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.7148,-0.2814)
    -- ( 0.7591,-0.2935)
    -- ( 0.7430,-0.3524)
    -- ( 0.6987,-0.3402)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.7148,-0.2814)
    -- ( 0.7591,-0.2935)
    -- ( 0.7430,-0.3524)
    -- ( 0.6987,-0.3402)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5891,-0.1425)
    -- ( 0.5806,-0.1876)
    -- ( 0.5207,-0.1764)
    -- ( 0.5291,-0.1313)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5891,-0.1425)
    -- ( 0.5806,-0.1876)
    -- ( 0.5207,-0.1764)
    -- ( 0.5291,-0.1313)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5865, 0.0684)
    -- ( 0.5782, 0.0233)
    -- ( 0.5181, 0.0345)
    -- ( 0.5266, 0.0796)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5865, 0.0684)
    -- ( 0.5782, 0.0233)
    -- ( 0.5181, 0.0345)
    -- ( 0.5266, 0.0796)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4044,-0.3422)
    -- ( 0.4189,-0.2987)
```

```
    -- ( 0.4768,-0.3180)
    -- ( 0.4623,-0.3616)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4044,-0.3422)
    -- ( 0.4189,-0.2987)
    -- ( 0.4768,-0.3180)
    -- ( 0.4623,-0.3616)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4665,-0.7188)
    -- ( 0.5125,-0.7188)
    -- ( 0.5125,-0.7799)
    -- ( 0.4665,-0.7799)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4665,-0.7188)
    -- ( 0.5125,-0.7188)
    -- ( 0.5125,-0.7799)
    -- ( 0.4665,-0.7799)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1285,-0.5747)
    -- (-0.0826,-0.5747)
    -- (-0.0826,-0.6356)
    -- (-0.1285,-0.6356)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1285,-0.5747)
    -- (-0.0826,-0.5747)
    -- (-0.0826,-0.6356)
    -- (-0.1285,-0.6356)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2861,-0.6694)
    -- (-0.2789,-0.6240)
    -- (-0.2186,-0.6336)
    -- (-0.2258,-0.6789)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2861,-0.6694)
    -- (-0.2789,-0.6240)
    -- (-0.2186,-0.6336)
    -- (-0.2258,-0.6789)
    --cycle
    ;
```

```
    \path[hex/terrain/town/house,pic actions]
    (-0.1486,-0.3725)
    -- (-0.1414,-0.3271)
    -- (-0.0811,-0.3367)
    -- (-0.0883,-0.3820)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1486,-0.3725)
    -- (-0.1414,-0.3271)
    -- (-0.0811,-0.3367)
    -- (-0.0883,-0.3820)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3576,-0.5916)
    -- (-0.3319,-0.6297)
    -- (-0.3826,-0.6638)
    -- (-0.4082,-0.6256)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3576,-0.5916)
    -- (-0.3319,-0.6297)
    -- (-0.3826,-0.6638)
    -- (-0.4082,-0.6256)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5468,-0.2716)
    -- (-0.5213,-0.3098)
    -- (-0.5719,-0.3438)
    -- (-0.5976,-0.3056)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5468,-0.2716)
    -- (-0.5213,-0.3098)
    -- (-0.5719,-0.3438)
    -- (-0.5976,-0.3056)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4969,-0.5222)
    -- (-0.4767,-0.5634)
    -- (-0.5315,-0.5902)
    -- (-0.5518,-0.5490)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4969,-0.5222)
    -- (-0.4767,-0.5634)
    -- (-0.5315,-0.5902)
```

```
    -- (-0.5518,-0.5490)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3963,-0.6922)
    -- (-0.3778,-0.7343)
    -- (-0.4338,-0.7588)
    -- (-0.4522,-0.7168)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3963,-0.6922)
    -- (-0.3778,-0.7343)
    -- (-0.4338,-0.7588)
    -- (-0.4522,-0.7168)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6145,-0.5157)
    -- (-0.5944,-0.5570)
    -- (-0.6493,-0.5836)
    -- (-0.6694,-0.5423)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6145,-0.5157)
    -- (-0.5944,-0.5570)
    -- (-0.6493,-0.5836)
    -- (-0.6694,-0.5423)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.8791,-0.2053)
    -- (-0.8402,-0.1810)
    -- (-0.8079,-0.2327)
    -- (-0.8468,-0.2571)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.8791,-0.2053)
    -- (-0.8402,-0.1810)
    -- (-0.8079,-0.2327)
    -- (-0.8468,-0.2571)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.9144, 0.1039)
    -- (-0.8919, 0.1439)
    -- (-0.8388, 0.1140)
    -- (-0.8613, 0.0740)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
```

```
    (-0.9144, 0.1039)
    -- (-0.8919, 0.1439)
    -- (-0.8388, 0.1140)
    -- (-0.8613, 0.0740)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4095, 0.2277)
    -- (-0.3639, 0.2229)
    -- (-0.3703, 0.1622)
    -- (-0.4159, 0.1670)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4095, 0.2277)
    -- (-0.3639, 0.2229)
    -- (-0.3703, 0.1622)
    -- (-0.4159, 0.1670)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3590, 0.4200)
    -- (-0.3365, 0.4600)
    -- (-0.2833, 0.4302)
    -- (-0.3058, 0.3901)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3590, 0.4200)
    -- (-0.3365, 0.4600)
    -- (-0.2833, 0.4302)
    -- (-0.3058, 0.3901)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0764, 0.3204)
    -- (-0.0539, 0.3604)
    -- (-0.0007, 0.3306)
    -- (-0.0232, 0.2905)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0764, 0.3204)
    -- (-0.0539, 0.3604)
    -- (-0.0007, 0.3306)
    -- (-0.0232, 0.2905)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1364, 0.0430)
    -- (-0.1139, 0.0831)
    -- (-0.0607, 0.0532)
    -- (-0.0832, 0.0131)
```

```
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1364, 0.0430)
    -- (-0.1139, 0.0831)
    -- (-0.0607, 0.0532)
    -- (-0.0832, 0.0131)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1269, 0.1239)
    -- (-0.1149, 0.1681)
    -- (-0.0560, 0.1521)
    -- (-0.0681, 0.1078)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1269, 0.1239)
    -- (-0.1149, 0.1681)
    -- (-0.0560, 0.1521)
    -- (-0.0681, 0.1078)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6443,-0.1022)
    -- (-0.6321,-0.0579)
    -- (-0.5733,-0.0740)
    -- (-0.5854,-0.1183)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6443,-0.1022)
    -- (-0.6321,-0.0579)
    -- (-0.5733,-0.0740)
    -- (-0.5854,-0.1183)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6032, 0.2357)
    -- (-0.5912, 0.2800)
    -- (-0.5323, 0.2639)
    -- (-0.5443, 0.2196)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6032, 0.2357)
    -- (-0.5912, 0.2800)
    -- (-0.5323, 0.2639)
    -- (-0.5443, 0.2196)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.7230, 0.0020)
```

```
    -- (-0.7026, 0.0432)
    -- (-0.6479, 0.0162)
    -- (-0.6682,-0.0250)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.7230, 0.0020)
    -- (-0.7026, 0.0432)
    -- (-0.6479, 0.0162)
    -- (-0.6682,-0.0250)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5055, 0.2596)
    -- (-0.4629, 0.2423)
    -- (-0.4859, 0.1858)
    -- (-0.5285, 0.2031)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5055, 0.2596)
    -- (-0.4629, 0.2423)
    -- (-0.4859, 0.1858)
    -- (-0.5285, 0.2031)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1337, 0.3296)
    -- ( 0.1283, 0.2840)
    -- ( 0.0677, 0.2911)
    -- ( 0.0731, 0.3367)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1337, 0.3296)
    -- ( 0.1283, 0.2840)
    -- ( 0.0677, 0.2911)
    -- ( 0.0731, 0.3367)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1476, 0.4414)
    -- ( 0.1506, 0.3955)
    -- ( 0.0897, 0.3916)
    -- ( 0.0867, 0.4375)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1476, 0.4414)
    -- ( 0.1506, 0.3955)
    -- ( 0.0897, 0.3916)
    -- ( 0.0867, 0.4375)
    --cycle
```

```
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0539,-0.1542)
    -- ( 0.0687,-0.1107)
    -- ( 0.1264,-0.1304)
    -- ( 0.1116,-0.1738)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0539,-0.1542)
    -- ( 0.0687,-0.1107)
    -- ( 0.1264,-0.1304)
    -- ( 0.1116,-0.1738)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0962,-0.1436)
    -- (-0.0814,-0.1001)
    -- (-0.0237,-0.1198)
    -- (-0.0385,-0.1633)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0962,-0.1436)
    -- (-0.0814,-0.1001)
    -- (-0.0237,-0.1198)
    -- (-0.0385,-0.1633)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1683,-0.0622)
    -- (-0.1535,-0.0188)
    -- (-0.0958,-0.0385)
    -- (-0.1106,-0.0820)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1683,-0.0622)
    -- (-0.1535,-0.0188)
    -- (-0.0958,-0.0385)
    -- (-0.1106,-0.0820)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1842,-0.1310)
    -- (-0.1694,-0.0876)
    -- (-0.1116,-0.1073)
    -- (-0.1264,-0.1508)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1842,-0.1310)
    -- (-0.1694,-0.0876)
```

```
    -- (-0.1116,-0.1073)
    -- (-0.1264,-0.1508)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1167,-0.5813)
    -- ( 0.1315,-0.5379)
    -- ( 0.1892,-0.5576)
    -- ( 0.1744,-0.6011)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1167,-0.5813)
    -- ( 0.1315,-0.5379)
    -- ( 0.1892,-0.5576)
    -- ( 0.1744,-0.6011)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0916,-0.6322)
    -- ( 0.1064,-0.5888)
    -- ( 0.1642,-0.6085)
    -- ( 0.1493,-0.6520)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0916,-0.6322)
    -- ( 0.1064,-0.5888)
    -- ( 0.1642,-0.6085)
    -- ( 0.1493,-0.6520)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3791,-0.5978)
    -- ( 0.3941,-0.5544)
    -- ( 0.4518,-0.5741)
    -- ( 0.4369,-0.6176)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3791,-0.5978)
    -- ( 0.3941,-0.5544)
    -- ( 0.4518,-0.5741)
    -- ( 0.4369,-0.6176)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4116,-0.5397)
    -- ( 0.4392,-0.5029)
    -- ( 0.4880,-0.5396)
    -- ( 0.4604,-0.5764)
    --cycle
    ;
```

```
    \path[hex/terrain/town/house,pic actions]
    ( 0.4116,-0.5397)
    -- ( 0.4392,-0.5029)
    -- ( 0.4880,-0.5396)
    -- ( 0.4604,-0.5764)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2218,-0.5853)
    -- ( 0.2366,-0.5418)
    -- ( 0.2944,-0.5615)
    -- ( 0.2796,-0.6051)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2218,-0.5853)
    -- ( 0.2366,-0.5418)
    -- ( 0.2944,-0.5615)
    -- ( 0.2796,-0.6051)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3094, 0.1262)
    -- ( 0.3519, 0.1085)
    -- ( 0.3284, 0.0522)
    -- ( 0.2860, 0.0698)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3094, 0.1262)
    -- ( 0.3519, 0.1085)
    -- ( 0.3284, 0.0522)
    -- ( 0.2860, 0.0698)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2797, 0.1784)
    -- ( 0.3041, 0.1395)
    -- ( 0.2524, 0.1070)
    -- ( 0.2280, 0.1459)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2797, 0.1784)
    -- ( 0.3041, 0.1395)
    -- ( 0.2524, 0.1070)
    -- ( 0.2280, 0.1459)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.7950, 0.1548)
    -- ( 0.8065, 0.1103)
    -- ( 0.7475, 0.0949)
```

```
    -- ( 0.7359, 0.1394)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.7950, 0.1548)
    -- ( 0.8065, 0.1103)
    -- ( 0.7475, 0.0949)
    -- ( 0.7359, 0.1394)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5739, 0.6926)
    -- ( 0.5961, 0.6525)
    -- ( 0.5427, 0.6229)
    -- ( 0.5205, 0.6632)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5739, 0.6926)
    -- ( 0.5961, 0.6525)
    -- ( 0.5427, 0.6229)
    -- ( 0.5205, 0.6632)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.6499, 0.5535)
    -- ( 0.6714, 0.5129)
    -- ( 0.6174, 0.4844)
    -- ( 0.5959, 0.5250)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.6499, 0.5535)
    -- ( 0.6714, 0.5129)
    -- ( 0.6174, 0.4844)
    -- ( 0.5959, 0.5250)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4994, 0.7998)
    -- (-0.4558, 0.8143)
    -- (-0.4364, 0.7565)
    -- (-0.4800, 0.7419)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4994, 0.7998)
    -- (-0.4558, 0.8143)
    -- (-0.4364, 0.7565)
    -- (-0.4800, 0.7419)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
```

```
    (-0.3350, 0.7630)
    -- (-0.2917, 0.7475)
    -- (-0.3125, 0.6901)
    -- (-0.3558, 0.7057)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3350, 0.7630)
    -- (-0.2917, 0.7475)
    -- (-0.3125, 0.6901)
    -- (-0.3558, 0.7057)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4472, 0.6282)
    -- (-0.4040, 0.6124)
    -- (-0.4252, 0.5551)
    -- (-0.4683, 0.5710)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4472, 0.6282)
    -- (-0.4040, 0.6124)
    -- (-0.4252, 0.5551)
    -- (-0.4683, 0.5710)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5200, 0.6603)
    -- (-0.4792, 0.6394)
    -- (-0.5070, 0.5851)
    -- (-0.5480, 0.6061)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5200, 0.6603)
    -- (-0.4792, 0.6394)
    -- (-0.5070, 0.5851)
    -- (-0.5480, 0.6061)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5301, 0.5359)
    -- (-0.4915, 0.5109)
    -- (-0.5247, 0.4597)
    -- (-0.5633, 0.4846)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5301, 0.5359)
    -- (-0.4915, 0.5109)
    -- (-0.5247, 0.4597)
    -- (-0.5633, 0.4846)
```

```
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6860, 0.5063)
    -- (-0.6426, 0.4914)
    -- (-0.6624, 0.4337)
    -- (-0.7058, 0.4486)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6860, 0.5063)
    -- (-0.6426, 0.4914)
    -- (-0.6624, 0.4337)
    -- (-0.7058, 0.4486)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5849, 0.4574)
    -- (-0.5414, 0.4425)
    -- (-0.5613, 0.3847)
    -- (-0.6047, 0.3997)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5849, 0.4574)
    -- (-0.5414, 0.4425)
    -- (-0.5613, 0.3847)
    -- (-0.6047, 0.3997)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4531,-0.1794)
    -- (-0.4094,-0.1941)
    -- (-0.4289,-0.2518)
    -- (-0.4725,-0.2372)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.4531,-0.1794)
    -- (-0.4094,-0.1941)
    -- (-0.4289,-0.2518)
    -- (-0.4725,-0.2372)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3573, 0.0277)
    -- (-0.3138, 0.0131)
    -- (-0.3333,-0.0447)
    -- (-0.3768,-0.0300)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3573, 0.0277)
```

```
    -- (-0.3138, 0.0131)
    -- (-0.3333,-0.0447)
    -- (-0.3768,-0.0300)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3354,-0.4695)
    -- ( 0.3141,-0.5101)
    -- ( 0.2601,-0.4816)
    -- ( 0.2815,-0.4410)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3354,-0.4695)
    -- ( 0.3141,-0.5101)
    -- ( 0.2601,-0.4816)
    -- ( 0.2815,-0.4410)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.6206,-0.4111)
    -- ( 0.6599,-0.4350)
    -- ( 0.6281,-0.4872)
    -- ( 0.5889,-0.4632)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.6206,-0.4111)
    -- ( 0.6599,-0.4350)
    -- ( 0.6281,-0.4872)
    -- ( 0.5889,-0.4632)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.6061,-0.5834)
    -- ( 0.6495,-0.5984)
    -- ( 0.6296,-0.6561)
    -- ( 0.5861,-0.6411)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.6061,-0.5834)
    -- ( 0.6495,-0.5984)
    -- ( 0.6296,-0.6561)
    -- ( 0.5861,-0.6411)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2902, 0.2707)
    -- ( 0.3361, 0.2673)
    -- ( 0.3317, 0.2065)
    -- ( 0.2859, 0.2098)
    --cycle
```

```
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2902, 0.2707)
    -- ( 0.3361, 0.2673)
    -- ( 0.3317, 0.2065)
    -- ( 0.2859, 0.2098)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2215, 0.2766)
    -- ( 0.2673, 0.2733)
    -- ( 0.2630, 0.2124)
    -- ( 0.2172, 0.2157)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2215, 0.2766)
    -- ( 0.2673, 0.2733)
    -- ( 0.2630, 0.2124)
    -- ( 0.2172, 0.2157)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0159, 0.4498)
    -- ( 0.0299, 0.4466)
    -- ( 0.0256, 0.3857)
    -- (-0.0202, 0.3889)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0159, 0.4498)
    -- ( 0.0299, 0.4466)
    -- ( 0.0256, 0.3857)
    -- (-0.0202, 0.3889)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0377, 0.1701)
    -- ( 0.0835, 0.1668)
    -- ( 0.0791, 0.1060)
    -- ( 0.0333, 0.1092)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0377, 0.1701)
    -- ( 0.0835, 0.1668)
    -- ( 0.0791, 0.1060)
    -- ( 0.0333, 0.1092)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0944, 0.1648)
    -- ( 0.1403, 0.1657)
```

```
    -- ( 0.1415, 0.1047)
    -- ( 0.0955, 0.1038)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0944, 0.1648)
    -- ( 0.1403, 0.1657)
    -- ( 0.1415, 0.1047)
    -- ( 0.0955, 0.1038)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2434, 0.4429)
    -- ( 0.2698, 0.4054)
    -- ( 0.2199, 0.3702)
    -- ( 0.1935, 0.4077)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.2434, 0.4429)
    -- ( 0.2698, 0.4054)
    -- ( 0.2199, 0.3702)
    -- ( 0.1935, 0.4077)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4777, 0.5914)
    -- ( 0.4980, 0.5501)
    -- ( 0.4432, 0.5232)
    -- ( 0.4229, 0.5644)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4777, 0.5914)
    -- ( 0.4980, 0.5501)
    -- ( 0.4432, 0.5232)
    -- ( 0.4229, 0.5644)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4936, 0.5331)
    -- ( 0.5191, 0.4949)
    -- ( 0.4683, 0.4611)
    -- ( 0.4428, 0.4993)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4936, 0.5331)
    -- ( 0.5191, 0.4949)
    -- ( 0.4683, 0.4611)
    -- ( 0.4428, 0.4993)
    --cycle
    ;
```

```
    \path[hex/terrain/town/house,pic actions]
    ( 0.4667, 0.4393)
    -- ( 0.4871, 0.3980)
    -- ( 0.4323, 0.3711)
    -- ( 0.4120, 0.4123)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4667, 0.4393)
    -- ( 0.4871, 0.3980)
    -- ( 0.4323, 0.3711)
    -- ( 0.4120, 0.4123)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2446,-0.1495)
    -- (-0.2153,-0.1488)
    -- (-0.2138,-0.2024)
    -- (-0.2431,-0.2032)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2446,-0.1495)
    -- (-0.2153,-0.1488)
    -- (-0.2138,-0.2024)
    -- (-0.2431,-0.2032)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1018, 0.2179)
    -- (-0.0915, 0.2454)
    -- (-0.0412, 0.2264)
    -- (-0.0516, 0.1989)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1018, 0.2179)
    -- (-0.0915, 0.2454)
    -- (-0.0412, 0.2264)
    -- (-0.0516, 0.1989)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4189, 0.2515)
    -- ( 0.4645, 0.2567)
    -- ( 0.4714, 0.1960)
    -- ( 0.4257, 0.1909)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.4189, 0.2515)
    -- ( 0.4645, 0.2567)
    -- ( 0.4714, 0.1960)
```

```
    -- ( 0.4257, 0.1909)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5784, 0.2650)
    -- ( 0.6240, 0.2702)
    -- ( 0.6308, 0.2095)
    -- ( 0.5852, 0.2043)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5784, 0.2650)
    -- ( 0.6240, 0.2702)
    -- ( 0.6308, 0.2095)
    -- ( 0.5852, 0.2043)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5509, 0.4874)
    -- ( 0.5966, 0.4925)
    -- ( 0.6034, 0.4319)
    -- ( 0.5577, 0.4267)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.5509, 0.4874)
    -- ( 0.5966, 0.4925)
    -- ( 0.6034, 0.4319)
    -- ( 0.5577, 0.4267)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1390, 0.6195)
    -- ( 0.1654, 0.5820)
    -- ( 0.1155, 0.5468)
    -- ( 0.0890, 0.5843)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1390, 0.6195)
    -- ( 0.1654, 0.5820)
    -- ( 0.1155, 0.5468)
    -- ( 0.0890, 0.5843)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1780,-0.4082)
    -- (-0.1533,-0.3695)
    -- (-0.1018,-0.4023)
    -- (-0.1265,-0.4410)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
```

```
    (-0.1780,-0.4082)
    -- (-0.1533,-0.3695)
    -- (-0.1018,-0.4023)
    -- (-0.1265,-0.4410)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2611,-0.2396)
    -- (-0.2175,-0.2543)
    -- (-0.2370,-0.3121)
    -- (-0.2805,-0.2974)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2611,-0.2396)
    -- (-0.2175,-0.2543)
    -- (-0.2370,-0.3121)
    -- (-0.2805,-0.2974)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1640,-0.8299)
    -- ( 0.1872,-0.8299)
    -- ( 0.1872,-0.8565)
    -- ( 0.1640,-0.8565)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1640,-0.8299)
    -- ( 0.1872,-0.8299)
    -- ( 0.1872,-0.8565)
    -- ( 0.1640,-0.8565)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1330,-0.7413)
    -- (-0.1099,-0.7413)
    -- (-0.1099,-0.7679)
    -- (-0.1330,-0.7679)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.1330,-0.7413)
    -- (-0.1099,-0.7413)
    -- (-0.1099,-0.7679)
    -- (-0.1330,-0.7679)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3280,-0.8061)
    -- (-0.3049,-0.8061)
    -- (-0.3049,-0.8327)
    -- (-0.3280,-0.8327)
```

```
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3280,-0.8061)
    -- (-0.3049,-0.8061)
    -- (-0.3049,-0.8327)
    -- (-0.3280,-0.8327)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.7302,-0.0754)
    -- (-0.7099,-0.0866)
    -- (-0.7228,-0.1099)
    -- (-0.7430,-0.0988)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.7302,-0.0754)
    -- (-0.7099,-0.0866)
    -- (-0.7228,-0.1099)
    -- (-0.7430,-0.0988)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0147, 0.1985)
    -- ( 0.0078, 0.1934)
    -- ( 0.0020, 0.1675)
    -- (-0.0206, 0.1726)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0147, 0.1985)
    -- ( 0.0078, 0.1934)
    -- ( 0.0020, 0.1675)
    -- (-0.0206, 0.1726)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.7613, 0.0272)
    -- ( 0.7841, 0.0313)
    -- ( 0.7889, 0.0050)
    -- ( 0.7661, 0.0009)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.7613, 0.0272)
    -- ( 0.7841, 0.0313)
    -- ( 0.7889, 0.0050)
    -- ( 0.7661, 0.0009)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0160, 0.0427)
```

```
    -- ( 0.0379, 0.0352)
    -- ( 0.0294, 0.0100)
    -- ( 0.0075, 0.0174)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0160, 0.0427)
    -- ( 0.0379, 0.0352)
    -- ( 0.0294, 0.0100)
    -- ( 0.0075, 0.0174)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3515,-0.2403)
    -- ( 0.3743,-0.2442)
    -- ( 0.3697,-0.2705)
    -- ( 0.3469,-0.2665)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3515,-0.2403)
    -- ( 0.3743,-0.2442)
    -- ( 0.3697,-0.2705)
    -- ( 0.3469,-0.2665)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0718, 0.3637)
    -- ( 0.0933, 0.3723)
    -- ( 0.1032, 0.3476)
    -- ( 0.0817, 0.3390)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.0718, 0.3637)
    -- ( 0.0933, 0.3723)
    -- ( 0.1032, 0.3476)
    -- ( 0.0817, 0.3390)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2555, 0.2647)
    -- (-0.2413, 0.2902)
    -- (-0.1944, 0.2641)
    -- (-0.2086, 0.2385)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2555, 0.2647)
    -- (-0.2413, 0.2902)
    -- (-0.1944, 0.2641)
    -- (-0.2086, 0.2385)
    --cycle
```

```
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2832, 0.1509)
    -- (-0.2826, 0.1802)
    -- (-0.2289, 0.1792)
    -- (-0.2295, 0.1498)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2832, 0.1509)
    -- (-0.2826, 0.1802)
    -- (-0.2289, 0.1792)
    -- (-0.2295, 0.1498)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5694, 0.6977)
    -- (-0.5248, 0.6870)
    -- (-0.5390, 0.6277)
    -- (-0.5837, 0.6384)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.5694, 0.6977)
    -- (-0.5248, 0.6870)
    -- (-0.5390, 0.6277)
    -- (-0.5837, 0.6384)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6046, 0.6071)
    -- (-0.5747, 0.5723)
    -- (-0.6210, 0.5326)
    -- (-0.6509, 0.5674)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.6046, 0.6071)
    -- (-0.5747, 0.5723)
    -- (-0.6210, 0.5326)
    -- (-0.6509, 0.5674)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2915,-0.1208)
    -- (-0.2462,-0.1288)
    -- (-0.2569,-0.1889)
    -- (-0.3021,-0.1809)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2915,-0.1208)
    -- (-0.2462,-0.1288)
```

```
    -- (-0.2569,-0.1889)
    -- (-0.3021,-0.1809)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1636, 0.0236)
    -- ( 0.2095, 0.0215)
    -- ( 0.2067,-0.0394)
    -- ( 0.1608,-0.0374)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.1636, 0.0236)
    -- ( 0.2095, 0.0215)
    -- ( 0.2067,-0.0394)
    -- ( 0.1608,-0.0374)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0653,-0.5296)
    -- (-0.0423,-0.5269)
    -- (-0.0391,-0.5533)
    -- (-0.0621,-0.5560)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.0653,-0.5296)
    -- (-0.0423,-0.5269)
    -- (-0.0391,-0.5533)
    -- (-0.0621,-0.5560)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3393, 0.1912)
    -- (-0.3173, 0.1843)
    -- (-0.3254, 0.1589)
    -- (-0.3474, 0.1659)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.3393, 0.1912)
    -- (-0.3173, 0.1843)
    -- (-0.3254, 0.1589)
    -- (-0.3474, 0.1659)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    (-0.2247, 0.5875)
    -- (-0.2027, 0.5801)
    -- (-0.2113, 0.5549)
    -- (-0.2332, 0.5623)
    --cycle
    ;
```

```
    \path[hex/terrain/town/house,pic actions]
    (-0.2247, 0.5875)
    -- (-0.2027, 0.5801)
    -- (-0.2113, 0.5549)
    -- (-0.2332, 0.5623)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3747, 0.1590)
    -- ( 0.4022, 0.1690)
    -- ( 0.4206, 0.1185)
    -- ( 0.3930, 0.1085)
    --cycle
    ;
    \path[hex/terrain/town/house,pic actions]
    ( 0.3747, 0.1590)
    -- ( 0.4022, 0.1690)
    -- ( 0.4206, 0.1185)
    -- ( 0.3930, 0.1085)
    --cycle
    ;
  }
}
\fi
```

hex/terrain/mountain

This is an example of a terrain picture.

```
\tikzset{
  hex/terrain/mountain/.pic={%
    \path[draw=black,fill=white] (0,0) -- (.3,.9)--(.45,0) -- cycle;
    \path[draw=black,fill=lightgray,pic actions]
    (-.6 ,- .9) --
    (-.3 ,  .3) --
    (  0,    0) --
    ( .45,   0)  --
    ( .6 , -.9) -- cycle;
  }
}
```

hex/terrain/tree

```
\tikzset{
  hex/terrain/tree/.pic={
    \path[draw,very thick,pic actions]
    (-.15,.0)
    arc (269:135:.1)
    arc (215: 90:.1)
    arc (180: 45:.1)
    arc (135:  0:.1)
    arc ( 90:-45:.1)
```

```
    arc ( 45:-90:.1)
    (-.15,.025)
    arc (60:-60:.25)
    arc (150:30:.075)
    arc (150:30:.075)
    arc (150:30:.075)
    arc (-120:-240:.25);

  }
}
```

5.4.6 Ridges

A hex can be decorated with up to 6 ridges — one for each edge of the hexagon. The first thing is to set up the graphics style to use for the ridges. We use the `wave` decoration.

```
\tikzset{%
  hex/ridges/.style={
    line cap=round,
    draw=pgfstrokecolor,
    rounded corners=.25cm,
    scale line widths,
    decoration={
      path has corners=true,
      pre=waves,
      post=waves,
      pre length=-.1cm,
      post length=0cm,
      waves,
      radius=.2cm,
      segment length=.2cm},
    decorate}}
```

To properly set up the ridges, we need to concatenate ridge paths in order. To facilitate that, we define 6 `\if`s — one for each edge.

```
\newif\ifhex@r@ne
\newif\ifhex@r@n
\newif\ifhex@r@nw
\newif\ifhex@r@sw
\newif\ifhex@r@s
\newif\ifhex@r@se
```

Next is the keys for each edge. These will set the above `\if`s to `true`. We put these into the family `/hex/r` so that we can parse them separately.

```
\tikzset{%
  /hex/ridges/.search also={/tikz},
  /hex/ridges/.cd,
  north east/.is if=hex@r@ne,
  north/.is if=hex@r@n,
  north west/.is if=hex@r@nw,
  south west/.is if=hex@r@sw,
```

```
  south/.is if=hex@r@s,
  south east/.is if=hex@r@se,
  radius/.store in=\hex@r@r,
  NE/.is if=hex@r@ne,
  N/.is if=hex@r@n,
  NW/.is if=hex@r@nw,
  SW/.is if=hex@r@sw,
  S/.is if=hex@r@s,
  SE/.is if=hex@r@se,
  r/.store in=\hex@r@r,
}
```

\hex@do@ridges

This is the macro that actually generates the ridge. We use the same PGF filtered key parsing trick as above. Note that the routine below is handcrafted since it is relatively simple.

```
\def\hex@do@ridges{%
  \edef\hex@r@tmp{[
    /hex/ridges/.cd,%
    radius=0.8,%
    /tikz/every hex ridges/.try,
    \hex@ridges]}
  \expandafter\scope\hex@r@tmp%
    \hex@dbg{3}{Ridges: `\meaning\hex@ridges', `\meaning\hex@r@tmp'
      ^^Jnorth east=\ifhex@r@ne yes\else no\fi
      ^^Jnorth     =\ifhex@r@n  yes\else no\fi
      ^^Jnorth west=\ifhex@r@nw yes\else no\fi
      ^^Jsouth west=\ifhex@r@sw yes\else no\fi
      ^^Jsouth     =\ifhex@r@s  yes\else no\fi
      ^^Jsouth east=\ifhex@r@se yes\else no\fi
      ^^Jradius    =\hex@r@r
    }
    \def\hex@r@p{}
    % Hand written algorithm
    \ifhex@r@ne
      \def\hex@r@p{(0:\hex@r@r)--(60:\hex@r@r)}
    \fi
    \ifhex@r@n
      \hex@dbg{4}{Ridge along north edge: `\hex@r@p'}
      \ifhex@r@ne\else
        \xdef\hex@r@p{\hex@r@p ( 60:\hex@r@r)}
      \fi
      \xdef\hex@r@p{\hex@r@p --(120:\hex@r@r)}
    \fi
    \ifhex@r@nw
      \ifhex@r@n\else
        \xdef\hex@r@p{\hex@r@p (120:\hex@r@r)}
      \fi
      \xdef\hex@r@p{\hex@r@p --(180:\hex@r@r)}
    \fi
    \ifhex@r@sw
      \ifhex@r@nw\else
```

```
        \xdef\hex@r@p{\hex@r@p (180:\hex@r@r)}
      \fi
      \xdef\hex@r@p{\hex@r@p --(240:\hex@r@r)}
    \fi
    \ifhex@r@s
      \ifhex@r@sw\else
        \xdef\hex@r@p{\hex@r@p (240:\hex@r@r)}
      \fi
      \xdef\hex@r@p{\hex@r@p --(300:\hex@r@r)}
    \fi
    \ifhex@r@se
      \ifhex@r@s\else
        \xdef\hex@r@p{\hex@r@p (300:\hex@r@r)}
      \fi
      \xdef\hex@r@p{\hex@r@p --(360:\hex@r@r)}
    \fi
    \hex@dbg{3}{ Ridges path: \hex@r@p}
    \draw[hex/ridges] \hex@r@p;
  \endscope% End of ridges scope
}
```

5.4.7 Towns

Similar to above, we define a namespace and family for towns. First thing is the graphics style for towns.

```
\tikzset{%
  hex/town/.style={
    scale line widths,
    thin,
    fill=pgfstrokecolor,
    color=pgfstrokecolor},
  hex/town name/.style={
    transform shape,
    shape=rectangle,
    above right=.1,
    color=pgfstrokecolor,
    font=\sffamily\normalsize}
}
```

Next is the namespace for dealing with towns.

```
\tikzset{%
  /hex/town/.search also={/tikz},%
  /hex/town/.cd,
  pic/.store in=\hex@c@pic,
  type/.store in=\hex@c@pic,
  place/.store in=\hex@c@pos,
  location/.store in=\hex@c@pos,
  name/.store in=\hex@c@name,
  village/.style={pic=hex/town/village},
  town/.style={pic=hex/town/town},
  city/.style={pic=hex/town/city}
}
```

And some pictures for making the towns.

```
\tikzset{%
  hex/town/village/.pic={\path[fill,pic actions] circle(.1);},
  hex/town/town/.pic={\path[fill,pic actions] circle(.2);},
  hex/town/city/.pic={%
    \path[fill,pic actions] circle(.25);
    \path[draw,pic actions] circle(.35);}
}
```

\hex@do@town

The macro to make the towns. This uses same tricks as above.

```
\def\hex@c@nameparse{%
  \@ifnextchar[{\hex@c@namep@rse}{\hex@c@namep@rse[]}%]
}
\def\hex@c@namep@rse[#1]#2\endhex@c@nameparse{%
  \def\hex@c@node{node[shape=rectangle,hex/town name,#1]{#2}}}

\def\hex@do@town{%
  \edef\hex@c@tmp{[
    /hex/town/.cd,%
    town,%
    /tikz/hex/town,%
    /tikz/every hex town/.try,
    \hex@town]}
  \expandafter\scope\hex@c@tmp%
    \ifx\hex@c@pic\empty\else%
      \@ifundefined{hex@c@pos}{\let\hex@c@pos\empty}{}
      \@ifundefined{hex@c@name}{\let\hex@c@name\empty}{}
      \expandafter\hex@c@nameparse\hex@c@name\endhex@c@nameparse%
      \ifx\hex@c@pos\empty\def\hex@c@pos{(0,0)}\fi
      \hex@dbg{2}{Town:
        ^^J text=\hex@c@name
        ^^J pic=\hex@c@pic
        ^^J place=\hex@c@pos
        ^^J node=\hex@c@node
      }
      \filldraw \hex@c@pos pic{\hex@c@pic} \hex@c@node;
    \fi%
  \endscope%
}
```

5.4.8 Labels

Like terrains, we will set up some macros for dealing with labels.

To process coordinates and turn them into labels, we set up two counters.

```
\newcounter{hex@l@c}
\newcounter{hex@l@r}
```

In case we want to invert the row axis, we set-up a key to set the maximum row number.

```
\def\hex@max@row{-1}
\tikzset{
  max hex row/.store in=\hex@max@row,
}
```

Again, we will make a separate namespace/family for the handling labels. We also define a counter which we will use to typeset alphabetic column numbers.

First a graphics style.

```
\tikzset{%
  hex/label/.style={%
    draw=none,%
    shape=rectangle,%
    anchor=north,%
    color=gray,%
    font=\sffamily\bfseries\scriptsize,%
    inner sep=0},
}
```

Next, the choices of how to make a label. These are put in the `/hex/label` family to make it easy to parse out only these keys. This uses some macros defined below. Note, this uses the macros `\hex@col` and `\hex@row` defined by the hex coordinate system.

```
\tikzset{%
  /hex/label/.search also={/tikz},
  /hex/label/.cd,
  none/.code={\global\let\hex@l@text\@empty},
  auto/.is choice,
  auto/none/.code={\global\let\hex@l@text\@empty},
  auto/numbers/.code={%
    \hex@l@abs%
    \xdef\hex@l@text{%
      \hex@l@n@pad{\the\c@hex@l@c}%
      \hex@l@n@pad{\the\c@hex@l@r}}},
  auto/alpha column/.code={%
    \xdef\hex@l@text{%
      \ifnum0>\hex@col\AlphAlph{-\hex@col}\else\AlphAlph{\hex@col}\fi%
      \hex@row}},
  auto/alpha 2 column/.code={%
    \hex@l@abs%
    \advance\c@hex@l@c27\relax%
    \xdef\hex@l@text{%
      \AlphAlph{\value{hex@l@c}}%
      \hex@l@n@pad{\hex@row}}},
  auto/inv y x plus 1/.code={%
    \hex@dbg{3}{Inverse row, add one to column with arg `#1'}
    \let\hex@l@text\@empty%
    \ifnum\hex@max@row>0%
      \pgfmathtruncatemacro{\hex@l@row}{\hex@max@row-\hex@row}
      \pgfmathtruncatemacro{\hex@l@col}{1+\hex@col}
      \xdef\hex@l@text{%
        \hex@l@n@pad{\hex@l@col}%
```

```
        \hex@l@n@pad{\hex@l@row}}
    \else\message{Max row number not set}\fi},
  auto/x and y plus 1/.code={%
    \hex@dbg{3}{Inverse row, add one to column with arg '#1'}
    \pgfmathtruncatemacro{\hex@l@row}{1+\hex@row}
    \pgfmathtruncatemacro{\hex@l@col}{1+\hex@col}
    \xdef\hex@l@text{%
      \hex@l@n@pad{\hex@l@col}%
      \hex@l@n@pad{\hex@l@row}}},
  auto/.default=numbers,
  %text/.store in=\hex@l@text,
  text/.code={\gdef\hex@l@text{#1}},
  place/.store in=\hex@l@pos,
  location/.forward to=/hex/label/place,
  rotate/.store in=\hex@l@rot
}
```

\hex@l@abs

This takes the absolute value of row and column numbers.

```
\def\hex@l@abs{
  \setcounter{hex@l@c}{\hex@col}
  \setcounter{hex@l@r}{\hex@row}
  \expandafter\ifnum\value{hex@l@c}<0\multiply\c@hex@l@c by-1\fi%
  \expandafter\ifnum\value{hex@l@r}<0\multiply\c@hex@l@r by-1\fi%
  % \hex@dbg{0}{\hex@col->\the\c@hex@l@c\space\hex@row->\the\c@hex@l@r}
}
```

\hex@l@n@pad

This will pad a number with a 0 if the number is smaller than 10.

```
\long\def\hex@l@n@pad#1{%
  \ifnum#1<10 0\fi%
  #1}
```

\hex@do@label

This macro puts in the label. First, we reset label keys, then we read in the keys from the argument. If this results in the macro `\hex@l@text` to be non-empty, then we set the label via a Ti*k*Z `node`.

```
\def\hex@do@label{%
  \hex@dbg{1}{Hex label: '\meaning\hex@label'}%
  \edef\hex@l@tmp{[%
    /hex/label/.cd,%
    rotate=0,%
    place={(90:.8)},%
    /tikz/hex/label/.try,%
    /tikz/every hex label/.try,%
    \hex@label]}%
```

```
  \expandafter\scope\hex@l@tmp%
    \hex@dbg{1}{Label:
      ^^J  Text: ‘\meaning\hex@l@text’
      ^^J  Location: ‘\meaning\hex@l@pos’
      ^^J  Rotation: ‘\meaning\hex@l@rot’
    }%
    \@ifundefined{hex@l@text}{\let\hex@l@text\empty}{}%
    \ifx\hex@l@text\empty\else%
    \node[rotate=\hex@l@rot] at \hex@l@pos {\hex@l@text};%
    \fi%
  \endscope%
}
```

5.4.9 Extra graphics

To make the interface a bit more flexible we allow for adding arbitrary stuff to the hexes. Some examples of pictures to add in the `extra` stuff.

`hex/fortress`

Draw a fortress. An example of a extra graphics entity.

```
\tikzset{%
  hex/fortress/.pic={
    \path[draw,pic actions]
    (0:  .9) --
    (0:  .7) --
    (60: .7) -- ( 60:.9) -- ( 60:.7) --
    (120:.7) -- (120:.9) -- (120:.7) --
    (180:.7) -- (180:.9) -- (180:.7) --
    (240:.7) -- (240:.9) -- (240:.7) --
    (300:.7) -- (300:.9) -- (300:.7) --
    (0:  .7) -- cycle;}}
```

`hex/fortress 2`

Draw a fortress. An example of a extra graphics entity.

```
\tikzset{
  hex/fortress 2/.pic={%
    \draw[pic actions,transform shape] (0:0.64)
    foreach \a in {15,45,...,345}{
      --(\a:0.64)
      --(\a:0.80)
      --(\a+15:0.80)
      --(\a+15:0.64)}
    --cycle;
  },
}
```

5.4.10 Some macros

```
\DeclareRobustCommand\fortmark[1][scale=.25]{\tikz[#1,transform shape]{%
    \pic{hex/fortress 2}}}
\providecommand\terrainmark[2][scale=.2]{%
  \tikz[#1]{\hex[label=,terrain=#2]}}
\providecommand\clearhex[1][scale=.2]{\tikz[#1]{\hex[label=]}}
\providecommand\woodshex[1][scale=.2]{\terrainmark[#1]{woods}}
\providecommand\mountainhex[1][scale=.2]{\terrainmark[#1]{mountains}}
\providecommand\cityhex[1][scale=.2]{\terrainmark[#1]{city}}
\providecommand\beachhex[1][scale=.2]{\terrainmark[#1]{beach}}
\providecommand\seahex[1][scale=.2]{\tikz[#1]{\hex[label=,fill=sea]}}
\providecommand\riverhex[1][scale=.2]{%
  \tikz[#1]{%
    \hex[label=](c=0,r=0)%
    \river[](hex cs:e=SW)--(hex cs:e=NE);}}
\providecommand\roadhex[1][scale=.2]{%
  \tikz[#1]{%
    \hex[label=](c=0,r=0)%
    \road(hex cs:e=SW)--(hex cs:e=NE);}}
```

5.4.11 Edges, borders, roads, rivers, and so on

Styles of drawing edges, borders, rivers, roads, and railroads.

```
% A decoration to extract outline of a path
\pgfdeclaredecoration{outline}{init}
{%
  \state{init}[next state=tick,width=0pt]{
    \xdef\outlinerev{}}
  \state{tick}[%
  width=+\pgfdecorationsegmentlength]%
  {
    \pgfpathlineto{\pgfpointadd{\pgfpointorigin}{
        \pgfpointpolar{\pgfdecorationsegmentangle}{
          +\pgfdecorationsegmentamplitude}}}
    \pgf@xa=\pgf@x
    \pgf@ya=\pgf@y
    \message{^^J\the\pgf@x,\the\pgf@y}
    \pgfpointadd{\pgfpointorigin}{
      \pgfpointpolar{-\pgfdecorationsegmentangle}{
        \pgfdecorationsegmentamplitude}}
    \pgfpointtransformed{\pgfpoint{\pgf@x}{\pgf@y}}%
    \message{^^J\the\pgf@x,\the\pgf@y}
    \xdef\outlinerev{\the\pgf@x/\the\pgf@y,\outlinerev}
    \pgf@x=\pgf@xa
    \pgf@y=\pgf@ya
  }%
  \state{final}
  {
    \pgfpathlineto{\pgfpointdecoratedpathlast}
    \foreach \x/\y in \outlinerev{
      \ifx\x\empty\else
         \ifx\y\empty\else
```

```
            \pgf@xa=\x
            \pgf@ya=\y
            \pgf@nlt@lineto{\pgf@xa}{\pgf@ya}
          \fi
        \fi
      }
    }%
}%

\tikzset{
  hex/road/.style={
    rounded corners=3\pgflinewidth,% .25cm,
    color=black,
    transform shape,
    scale line widths,
    thick},
  hex/railroad/.style={
    %scale line widths,
    rounded corners=.25cm,
    color=gray!50!black,
    transform shape,
    postaction={draw,decorate},
    decoration={ticks,
      segment length=9\pgflinewidth,
      amplitude=3\pgflinewidth,%.1cm
    }
  },
  hex/river/.style={
    color=blue,
    scale line widths,
    line width=3pt,
    transform shape,
    decorate,
    decoration={random steps,
      segment length=.3cm,
       amplitude=.15cm,
       pre=lineto,
       post=lineto,
       pre length=.05cm,
       post length=.05cm},
     rounded corners=.08cm},
   hex/border/.style={
     color=gray,
     rounded corners=3pt,
     dashed,
     transform shape,
     scale line widths,
     very thick
   },
   every river/.style={},
   every road/.style={},
   every railroad/.style={},
   every border/.style={},
```

```
}
```

```
\road
\railroad
\river
\border
```

```
\def\road{%
  \hex@dbg{3}{Road}
  \@ifnextchar[{\road@}{\road@[]}%]
}
\def\road@[#1]{\draw[hex/road,every hex road/.try,#1]}
\def\railroad{%
  \hex@dbg{3}{Rail road}
  \@ifnextchar[{\railroad@}{\railroad@[]}%]
}
\def\railroad@[#1]{\draw[hex/railroad,every hex railroad/.try,#1]}
\def\river{%
  \hex@dbg{3}{River}
  \@ifnextchar[{\river@}{\river@[]}%]
}
\def\river@[#1]{\draw[hex/river,every hex river/.try,#1]}
\def\border{%
  \hex@dbg{3}{Border}
  \@ifnextchar[{\border@}{\border@[]}%]
}
\def\border@[#1]{\draw[hex/border,every hex border/.try,#1]}
```

5.4.12 Other paths

```
\shiftScalePath
```

Shifts and scales a path and defines a macro to contain the path

```
\shiftScalePath{⟨macro⟩}{⟨relative-coordinates⟩}
```

where ⟨*relative-coordinates*⟩ is a comma separated list of relative coordinates (to the lower-left and upper-right corners)

```
⟨x⟩/⟨y⟩
```

Note, this requires that `\boardXmin`,`\boardYmin` and `\boardXmax`,`\boardYmax` is defined. This can be done using the `\boardframe` macro.

```
\def\shiftScalePath#1#2{%
  \let\tmp@path\@undefined%
  \foreach \x/\y in {#2}{%
    \pgfmathparse{\x*\boardW+\boardXmin}\xdef\tmp@x{\pgfmathresult}%
    \pgfmathparse{\y*\boardH+\boardYmin}\xdef\tmp@y{\pgfmathresult}%
    \@ifundefined{tmp@path}{\def\tmp@path{}}{\xdef\tmp@path{\tmp@path--}}%
    \xdef\tmp@path{\tmp@path(\tmp@x,\tmp@y)}}%
  \expandafter\xdef\csname #1\endcsname{\tmp@path}}
```

5.4.13 Move, attacks, retreats from hex to hex

`\hex@getscale`

Get current scaling factor.

```
\def\hex@getscale#1{%
  \begingroup
  \pgfgettransformentries{%
    \scaleA}{%
    \scaleB}{%
    \scaleC}{%
    \scaleD}{%
    \whatevs}{%
    \whatevs}%
  \pgfmathsetmacro{#1}{sqrt(abs(\scaleA*\scaleD-\scaleB*\scaleC))}%
  \expandafter
  \endgroup
  \expandafter\def\expandafter#1\expandafter{#1}%
}
```

Key to get the scale

```
\tikzset{%
  hex/get scale/.code={
    \hex@getscale{\hex@scale}},
}
```

Style for moves. Use like

`\path[move] ⟨coordinates⟩;`

```
\tikzset{%
  % Argument is colour
  hex/move/.style={
    hex/get scale,
    decorate,
    decoration={
      markings,
      mark=between positions 0 and 1 step 0.75*\hex@scale*\hex@dy with {
        \node [single arrow,
               single arrow head extend=3pt,
               fill=#1,
               inner sep=\hex@scale*.5mm,
               minimum width=\hex@scale*2mm,
               minimum height=\hex@scale*\hex@dy/2,
               transform shape]{};
      }
    },
  },
```

A short move style

`\path[short move] ⟨coordinates⟩;`

```
% Argument is colour
hex/short move/.style={
  hex/get scale,
  decorate,
  decoration={
    markings,
    mark=between positions 0 and 1 step 0.5*\hex@scale*\hex@dy with {
      \node [single arrow,
             single arrow head extend=3pt,
             fill=#1,
             inner sep=\hex@scale*.5mm,
             minimum width=\hex@scale*2mm,
             minimum height=\hex@scale*\hex@dy/3,
             transform shape]{};
    }
  },
},
```

A short move style

`\path[long move]` ⟨*coordinates*⟩;

```
% Argument is colour
hex/long move/.style={
  hex/get scale,
  transform shape,
  decorate,
  decoration={
    markings,
    mark=between positions 0 and -.7*\hex@scale*\hex@dy
    step 2*\hex@scale*\hex@dy with {
      \node [single arrow,
             single arrow head extend=3pt,
             fill=#1,
             anchor=west,
             inner sep=\hex@scale*.25mm,
             outer sep=.3*\hex@scale*\hex@dy,
             minimum width=\hex@scale*2mm,
             minimum height=1.4*\hex@scale*\hex@dy,
             transform shape]{};
    }
  },
},
```

A short move style

`\path[move with start]` ⟨*coordinates*⟩;

```
% Argument is colour
hex/move with start/.style={
  hex/get scale,
  decorate,
  decoration={
    markings,
    mark=at position 0 with {
```

```
        \node [inner sep=0,
        circle,
        minimum size=\hex@scale*5mm,
        fill=#1,
        transform shape] {};},
      mark=between positions 0 and 1 step 0.75*\hex@scale*\hex@dy with {
        \node [single arrow,
               single arrow head extend=\hex@scale*3pt,
               fill=#1,
               inner sep=\hex@scale*1mm,
               minimum width=\hex@scale*3mm,
               minimum height=\hex@scale*\hex@dy/2,
               transform shape]{};
      }
    },
  },
  % Default fill colour is black
  hex/move/.default=black,
  hex/move with start/.default=black,
  hex/short move/.default=black,
  hex/long move/.default=black,
  % Arguments are draw and fill color
```

A move cost style

```
\path[move] ...(coordinate)node[hex/move cost] ...;
```

```
  hex/move cost/.style 2 args={
    minimum size=1mm,
    inner sep=0.1mm,
    circle,
    fill=#2,
    transform shape,
    text=#1,
    font=\sffamily\bfseries\Large},
  hex/move cost/.default={black}{none},
  % Argument is fill colour
```

A short line style for retreates, advances, and so on

```
\path[short line] (start)--(end);
```

```
  hex/short line/.style={%
    hex/get scale,
    inherit options/.code={\csname tikz@options\endcsname},
    inherit options,
    decorate,
    decoration={
      markings,
      mark=between positions \hex@scale*\hex@dy
      and 1 step 2*\hex@scale*\hex@dy with {
        \node [single arrow,draw=black,fill=#1,
        single arrow head extend=\hex@scale*3pt,
        inner sep=1mm,
        minimum width=0.75*\hex@scale*\hex@dy,
```

```
        minimum height=\hex@scale*\hex@dy,
        transform shape]{};
      }
    },
  },
```

An attack indication style

```
\path[attack] (start)--(end);
```

```
  % Argument is fill color
  hex/attack/.style={
    hex/get scale,
    inherit options/.code={\csname tikz@options\endcsname},
    inherit options,
    decorate,
    decoration={
      markings,
      mark=between positions \hex@scale*\hex@dy
      and 1 step 2*\hex@scale*\hex@dy with {
        \node [regular polygon,
        fill=#1,
        draw=#1,
        regular polygon sides=3,
        inner sep=0,
        minimum size=0.75*\hex@scale*\hex@dy,
        rotate=-90,
        transform shape]{};
      }
    },
  },
```

Short hands

```
\path[attack] (start)--(end);
```

```
  % Default colour is red for attachs
  hex/attack/.default=red!70!black,
  %%
  hex/retreat/.style={hex/short line=#1},
  hex/retreat/.default=white,
  %%
  hex/advance/.style={hex/short line=#1},
  hex/advance/.default={green!70!black},
}
```

5.4.14 Board clipping and frame

```
\boardframe
```

Define the bounding box around the board

```
\boardframe[⟨margin⟩](⟨lower=left⟩)(⟨upper-right⟩){⟨margin⟩}
```

where ⟨*lower-left*⟩ and ⟨*upper-right*⟩ specifies the lower left and upper right hexes (inclusive) of the board.

```
\tikzset{
  hex/board frame/.style={draw}
}
\def\boardframe{%
  \@ifnextchar[{\bo@rdframe}{\bo@rdframe[0]}%}
}
\def\bo@rdframe[#1](#2)(#3){%
  \hex@coords@conv{#2}
  \edef\llx{\hex@x}
  \edef\lly{\hex@y}
  \edef\llc{\hex@col}
  \edef\llr{\hex@row}
  \edef\ellc{\hex@eff@col}
  \edef\ellr{\hex@eff@row}
  %
  \hex@coords@conv{#3}
  \edef\urx{\hex@x}
  \edef\ury{\hex@y}
  \edef\urc{\hex@col}
  \edef\urr{\hex@row}
  \edef\eurc{\hex@eff@col}
  \edef\eurr{\hex@eff@row}
  %
  \def\margin{#1}
  %
  \hex@dbg{2}{%
    Board Hex range: (\llc,\llr)x(\urc,\urr)
    ^^JEffective range: (\ellc,\ellr)x(\eurc,\eurr)
    ^^JBB:              (\llx,\lly)x(\urx,\ury)}%
  \ifnum\hexdbglvl>1
    %\draw[red,very thick](hex cs:c=\llc,r=\llr) rectangle(hex cs:c=\urc,r=\urr);
    \draw[red,ultra thick,dashed](\llx,\lly) rectangle(\urx,\ury);
    \draw[->,very thick,blue] (0,0) -- (0,1) (0,0) -- (1,0);
  \fi
  % Calculate how many half hex hides to add to the "bottom"
  %
  \def\oddeven{isodd}
  \ifnum\hex@coords@row@fac<0\def\oddeven{iseven}\fi%
  \pgfmathparse{
    ifthenelse(\hex@got@bot@short(\ellc),
     ifthenelse(\hex@bot@short@col(\llc)*not(\oddeven(\ellc)),2,
      ifthenelse(\hex@bot@short@col(\llc),0,1)),
     ifthenelse(\oddeven(\ellc),1,2))}
  \edef\olly{\pgfmathresult}%
  \hex@dbg{2}{Delta lly: \olly half heights}
  % Calculate how many half hex heights to add to the "top"
  \def\oddeven{iseven}
  \ifnum\hex@coords@row@fac<0\def\oddeven{isodd}\fi%
  %
  \pgfmathparse{
    ifthenelse(\hex@got@top@short(\urc),
     ifthenelse(\hex@top@short@col(\urc)*\oddeven(\eurc),0,
```

```
      ifthenelse(\hex@top@short@col(\urc),2,1)),
    ifthenelse(\oddeven(\eurc),1,2))}
  \edef\oury{\pgfmathresult}%
  \hex@dbg{2}{Delta ury: \oury half heights}
  % Calculate new LLY and URY
  \pgfmathparse{\lly-\hex@coords@row@fac*(\olly*\hex@yy+\margin)}
  \edef\lly{\pgfmathresult}
  \pgfmathparse{\ury+\hex@coords@row@fac*(\oury*\hex@yy+\margin)}
  \edef\ury{\pgfmathresult}
  % Calculate new LLX and URX
  \pgfmathparse{\llx-1-\margin}\edef\llx{\pgfmathresult}
  \pgfmathparse{\urx+1+\margin}\edef\urx{\pgfmathresult}
  % Calculate width and height
  \pgfmathparse{\urx-\llx}\edef\w{\pgfmathresult}
  \pgfmathparse{\ury-\lly}\edef\h{\pgfmathresult}
  \hex@dbg{0}{Board Frame: (\llx,\lly)x(\urx,\ury) (\w x\h) (\llc,\llr)x(\urc,\urr)}
  \draw[hex/board frame/.try](\llx,\lly) rectangle(\urx,\ury);
  \xdef\boardXmin{\llx}%
  \xdef\boardYmin{\lly}%
  \xdef\boardXmax{\urx}%
  \xdef\boardYmax{\ury}%
}
```

\boardclip

Clip the board to not show incomplete hexes

\boardclip{⟨*nx*⟩}{⟨*ny*⟩}{⟨*preaction*⟩}

```
\def\boardpath(#1)(#2){%
  \hex@coords@reset%
  \tikzset{/hex/coords/.cd, #1}
  \edef\llx{\hex@col}
  \edef\lly{\hex@row}
  %%
  \hex@coords@reset%
  \tikzset{/hex/coords/.cd, #2}
  \edef\urx{\hex@col}
  \edef\ury{\hex@row}
  \let\board@odd\@undefined%
  \hex@dbg{1}{Board BB in hex: (\llx,\lly)x(\urx,\ury)}
  %%
  \def\fv{south}
  \def\sv{north}
  \ifnum\hex@coords@row@fac<0
    \def\fv{north}
    \def\sv{south}
  \fi

  \edef\hex@board@path{(hex cs:c=\llx,r=\lly,v=\fv\space west)}
  %% First the left side
  \foreach \r in {\lly,...,\ury} {%
```

```
    \edef\t{
      --(hex cs:c=\llx,r=\r,v=west)
      --(hex cs:c=\llx,r=\r,v=\sv\space west)}
    \wg@addto@macro{\hex@board@path}{\t}}
  %% Then for top of board
  \foreach \c in {\llx,...,\urx} {%
    % To be done
    %\pgfmathparse{int(ifthenelse(\hex@bot@short@col(\c),1,0))}
    %\edef\tmp{\pgfmathresult}
    %\ifnum\tmp>0
    %\edef\t{
    %  --(hex cs:c=\c,r=\ury,v=\sv\space west)
    %  --(hex cs:c=\c,r=\ury,v=\sv\space east)}
    %\else
    \edef\t{
      --(hex cs:c=\c,r=\ury,v=\fv\space east)
      --(hex cs:c=\c,r=\ury,v=\fv\space west)}
    %\fi
    \wg@addto@macro{\hex@board@path}{\t}}
  %% Then for right of board
  \foreach \r in {\ury,...,\lly} {%
    \edef\t{
      --(hex cs:c=\urx,r=\r,v=east)
      --(hex cs:c=\urx,r=\r,v=\fv\space east)}
    \wg@addto@macro{\hex@board@path}{\t}}

  %% Then for bottom of board
  \edef\t{--(hex cs:r=\lly,c=\urx,v=\fv\space west)}
  \wg@addto@macro{\hex@board@path}{\t}
  \foreach \c in {\urx,...,\llx} {%
    \pgfmathparse{int(ifthenelse(\hex@bot@short@col(\c),1,0))}
    \edef\tmp{\pgfmathresult}
    \ifnum\tmp>0
    \edef\t{
      --(hex cs:c=\c,r=\lly,v=\sv\space east)
      --(hex cs:c=\c,r=\lly,v=\sv\space west)}
    \else
    \edef\t{
      --(hex cs:c=\c,r=\lly,v=\fv\space east)
      --(hex cs:c=\c,r=\lly,v=\fv\space west)}
    \fi
    \wg@addto@macro{\hex@board@path}{\t}}

  \def\t{--cycle}
  \wg@addto@macro{\hex@board@path}{\t}
  \global\let\hexboardpath\hex@board@path
}
%\def\boardclip#1#2#3{%
%  \pgfmathparse{int(#1-1)}\xdef\board@range{\pgfmathresult,...,0}%
%  %% \show\board@range
%  \draw \ifx|#3|\else[preaction={#3}]\fi%
%  [clip]
%  % [decorate,decoration={show path construction,
```

```
%  % moveto code={\fill[red](\tikzinputsegmentfirst) circle(2pt)
%  % node [fill=none,below]{moveto};},
%  % lineto code={\draw[thick,blue,->](\tikzinputsegmentfirst)--
%  % (\tikzinputsegmentlast) node [above] {lineto};},
%  % curveto code={\draw[thick,green,->](\tikzinputsegmentfirst)..
%  % controls(\tikzinputsegmentsupporta) and
%  % (\tikzinputsegmentsupportb)
%  % ..(\tikzinputsegmentlast) node[above]{curveto};},
%  % closepath code={\draw[thick,orange,->](\tikzinputsegmentfirst)--
%  % (\tikzinputsegmentlast) node [above] {closepath};}
%  % }]
%  (hex cs:r=0,c=0,v=south west)
%  %% First the left side
%  \foreach \r in {0,1,...,#2} {%
%    --(hex cs:c=0,r=\r,v=west)--(hex cs:c=0,r=\r,v=north west)}
%  %% Then for top of board
%  \foreach \c in {0,1,...,#1} {%
%    --(hex cs:r=#2,c=\c,v=north west)--(hex cs:c=\c,r=#2,v=north east)}
%  %% Then for right of board
%  \foreach \r in {#2,...,0} {%
%    --(hex cs:c=#1,r=\r,v=east)--(hex cs:c=#1,r=\r,v=south east)}
%  %% Then for bottom of board
%  --(hex cs:r=0,c=#1,v=south west) \foreach \c in \board@range {%
%    --(hex cs:r=0,c=\c,v=south east) --(hex cs:c=\c,r=0,v=south west) }
%  --cycle; }
%% New definition - much simpler
\def\boardclip(#1)(#2)#3{%
  \boardpath(#1)(#2)
  \draw \ifx|#3|\else[preaction={#3}]\fi%
  [clip] \hexboardpath;
}
```

\debuggrid

Show a debug grid. This requires `\boardframe`.

```
\def\debuggrid{%
  \foreach \i in {0,0.1,0.2,0.3,0.4,0.5,0.6,0.7,0.8,0.9,1} {%
    \pgfmathparse{\i*\boardW+\boardXmin}%
    \edef\debug@x{\pgfmathresult}%
    \draw [very thin,gray](\debug@x,\boardYmin) --
    (\debug@x,\boardYmax) node [below,rotate=90] at
    (\debug@x,\boardYmin) {$\i$}; }%
  \foreach \i in {0,0.1,0.2,0.3,0.4,0.5,0.6,0.7,0.8,0.9,1} {%
    \pgfmathparse{\i*\boardH+\boardYmin}%
    \edef\debug@x{\pgfmathresult}%
    \draw [very thin,gray] (\boardXmin,\debug@x) --
    (\boardXmax,\debug@x) node [left,rotate=90] at
    (\boardXmin,\debug@x) {$\i$}; } }
```

Some dummy styles. These will be defined by the export class to facilitate getting information from the board.

```
\tikzset{%
  zoned/.style={},
  zone scope/.style={},
  zone path/.style={}
}
```

5.5 The wargame.chit TikZ library

We define the library for making chits. We load the hex TikZ wargame.natoapp6c library and the amsmath and amstext packages as we need those.

```
\RequirePackage{amsmath}
\RequirePackage{amstext}
\usetikzlibrary{wargame.util,wargame.natoapp6c,math}
```

5.5.1 Debugging

```
\chitdbglvl
\chit@dbg
```

Some macros for debugging. Similar to what we have in wargame.hex (see Section 5.4.

```
\newcount\chitdbglvl\chitdbglvl=\wargamedbglvl
\def\chit@dbg#1#2{%
  \ifnum#1>\chitdbglvl\relax\else\message{^^J#2}\fi}
```

5.5.2 The chit key namespace

```
/chit/full
/chit/symbol
/chit/left
/chit/right
/chit/upper left
/chit/upper right
/chit/lower left
/chit/lower right
/chit/factors
/chit/setup
/chit/id
```

The parts of a chit

```
\tikzset{%
  /chit/.search also={/tikz},
  /chit/.cd,
  full/.store in=\chit@full,              full/.initial=,%
  symbol/.store in=\chit@symbol,          symbol/.initial=,%
  left/.store in=\chit@left,              left/.initial=,%
  unique/.style={/chit/left={#1}},%
  right/.store in=\chit@right,            right/.initial=,%
```

```
  parent/.style={/chit/right={#1}},%
  upper left/.store in=\chit@upper@left,   upper left/.initial=,%
  upper right/.store in=\chit@upper@right, upper right/.initial=,%
  lower left/.store in=\chit@lower@left,   lower left/.initial=,%
  lower right/.store in=\chit@lower@right, lower right/.initial=,%
  factors/.store in=\chit@factors,         factors/.initial=,%
  setup/.store in=\chit@setup,             setup/.initial=,%
  id/.store in=\chit@id,                   id/.initial=,%
  frame/.store in=\chit@frame,             frame/.initial=,%
}
```

```
/tikz/chit/full
/tikz/chit/symbol
/tikz/chit/left
/tikz/chit/right
/tikz/chit/upper left
/tikz/chit/upper right
/tikz/chit/lower left
/tikz/chit/lower right
/tikz/chit/factors
/tikz/chit/setup
/tikz/chit/id
```

Styles of each element in a chit. Users may override these at their own peril. That is, it is OK to override them, but the user should be careful.

```
\tikzset{
  chit/symbol/.style={scale=.4,transform shape},
  chit/parts/.style={shape=rectangle,transform shape},
  chit/factors/.style={chit/parts,anchor=south},
  chit/left/.style={chit/parts,anchor=south,rotate=90},
  chit/right/.style={chit/parts,anchor=north,rotate=90},
  chit/upper left/.style={chit/parts,anchor=north west},
  chit/upper right/.style={chit/parts,anchor=north east},
  chit/lower left/.style={chit/parts,anchor=south west},
  chit/lower right/.style={chit/parts,anchor=south east},
  chit/setup/.style={chit/parts},
  chit/full/.style={chit/parts},
}
```

5.5.3 The `chit` styles

```
/tikz/chit
```

This key sets up a node to make a chit. The key takes a single argument which in turn must contain key–value pairs in the `/chit` (or `/tikz`) namespace(s). We set the `shape` parameter of the node, and calls the passed keys in the `/chit` namespace to set-up elements of the chit.

```
\tikzset{%
  chit/.code={%
    \pgfkeys{/tikz/transform shape,/tikz/shape=chit}
```

```
    \pgfkeys{/chit/.cd,#1}}}
```

We define a counter to set-up unique names for chit nodes.

```
\newcounter{chit@id}\setcounter{chit@id}{0}
```

5.5.4 The `\chit` shape

```
\chit@n@to
\@chit@n@to
\@@chit@n@to
\@chit@n@to@
```

These macros puts the NATO App6(c) symbol into a chit. The first macro takes the identifier and position of the symbol, and then scans for options. If no options are given, then we go directly to the rendering (`\@chit@n@to@`). Otherwise, we may also need to scan for an offset given as (⟨*delta-x,delta-y*⟩).

```
\def\chit@n@to#1#2{%
  %% Without a following start square bracket '[' by-pass to final
  \chit@dbg{4}{Chit NATO App6(c) first step `#1' `#2'}
  \@ifnextchar[{%
    %\message{^^JStart square bracket}%
    \@chit@n@to{#1}{#2}}{%
    %\message{^^JNo start square bracket}%
    \@chit@n@to@{#1}{#2}}%]]
}
```

The following macro is called if we had no options.

```
\def\@chit@n@to@#1#2#3\@end@chit@n@to{%
  \chit@dbg{4}{Chit NATO App6(c) w/o offset:
    ^^J  Options:  #3
    ^^J  ID:       #1
    ^^J  Position: #2}
  \node[chit/symbol,natoapp6c={#3,id=#1}] (#1) at (#2) {};
  \chit@dbg{4}{Chit NATO App6(c) ended}%
}
```

This is called if we had an option-like argument. Check if we have an offset

```
\def\@chit@n@to#1#2[#3]{%
  \chit@dbg{4}{Chit NATO App6(c) second step `#1' `#2' `#3'}
  \@ifnextchar({\@@chit@n@to{#1}{#2}{#3}}{\@@chit@n@to{#1}{#2}{#3}(0,0)}%)
}
```

This called if we had option-like argument.

```
\def\@@chit@n@to#1#2#3(#4)\@end@chit@n@to{%
  \chit@dbg{4}{Chit NATO App6(c) w/offset:
    ^^J  Options:  #3
    ^^J  ID:       #1
    ^^J  Position: #2
    ^^J  Offset:   #4}
  \node[chit/symbol,natoapp6c={#3,id=#1}] (#1) at ($(#2)+(#4)$) {};}
```

```
\chit@tr@ns@nchor
\chit@nchor
```

Get anchor of sub-symbol element in chit. We need to do this, because the symbol is translated and scaled.

```
\def\chit@tr@ns@nchor#1{%
  \pgf@x=0.4\pgf@x%
  \pgf@y=0.4\pgf@y\advance\pgf@y#1}

\def\chit@nchor#1#2#3{%
  \wg@sub@nchor{#1}{#2}
  \chit@tr@ns@nchor{#3}}
\def\chit@report{}
\tikzset{
  zone turn/.style={},
  zone mult/.style={}
}
```

Now follows the actual chit shape. This is rather long, so we will break it up a bit

The first thing is we declare some saved anchors. These are computed (and defined as internal macros) when the shape is instantised. The anchors give the centre and north east corner of the node, the place to put the NATO App6(c) symbol and factors. We also set a dimension for the margins (corner and factors elements).

```
\pgfdeclareshape{chit}{
  \savedanchor\center{\pgf@x=0cm\pgf@y=0cm}
  \savedanchor\northeast{\pgf@x=0.6cm\pgf@y=0.6cm}
  \savedanchor\symbol{\pgf@x=0cm\pgf@y=0.2cm}
  \savedanchor\factors{\pgf@x=0cm\pgf@y=-0.5cm}
  \saveddimen\margin{\pgf@x=0.04cm}
```

Next, we define some saved macros. These are called (and declares internal macros) when the shape is instantised. We define macros for the identifier,

```
  \savedmacro\id{%
    \chit@dbg{4}{Chit ID: \meaning\chit@id}%
    \@ifundefined{chit@id}{\let\chit@id\pgfutil@empty}{}%
    \ifx\chit@id\pgfutil@empty%
      \wg@r@ndom@id%
      \edef\id{chit\wg@uuid}%
    \else%
      \edef\id{\chit@id}%
    \fi%
    \chit@dbg{4}{Chit ID stored: \meaning\chit@id}
  }
  \savedmacro\chitframeopt{%
    \let\chitframeopt\pgfutil@empty%
    \@ifundefined{chit@frame}{}{%
      \edef\chitframeopt{\chit@frame}}
    \n@to@pp@dbg{3}{Chit Frame options: \meaning\chitframeopt}%
  }
```

We define the regular anchors of the shape. That is, the centre, corners, and edges.

```
\anchor{center}{\center}
\anchor{north east}{\northeast}
\anchor{north west}{\northeast\pgf@x=-\pgf@x}
\anchor{south west}{\northeast\pgf@x=-\pgf@x\pgf@y=-\pgf@y}
\anchor{south east}{\northeast\pgf@y=-\pgf@y}
\anchor{north}     {\northeast\pgf@x=0cm}
\anchor{south}     {\northeast\pgf@x=0cm\pgf@y=-\pgf@y}
\anchor{east}      {\northeast\pgf@y=0cm}
\anchor{west}      {\northeast\pgf@x=-\pgf@x\pgf@y=0cm}
```

Next, we want to be able to reference the symbol anchors too. So we define these anchors from the embedded node anchors. Note, these anchors will not exist if the chit is made with `full=`⟨*args*⟩.

```
\anchor{symbol north east}{\chit@nchor{M\id symbol}{north east}{0.2cm}}
\anchor{symbol north west}{\chit@nchor{M\id symbol}{north west}{0.2cm}}
\anchor{symbol south east}{\chit@nchor{M\id symbol}{south east}{0.2cm}}
\anchor{symbol south west}{\chit@nchor{M\id symbol}{south west}{0.2cm}}
\anchor{symbol north}     {\chit@nchor{M\id symbol}{north}{0.2cm}}
\anchor{symbol west}      {\chit@nchor{M\id symbol}{west}{0.2cm}}
\anchor{symbol south}     {\chit@nchor{M\id symbol}{south}{0.2cm}}
\anchor{symbol east}      {\chit@nchor{M\id symbol}{east}{0.2cm}}
\anchor{symbol upper}     {\chit@nchor{M\id symbol}{upper}{0.2cm}}
\anchor{symbol lower}     {\chit@nchor{M\id symbol}{lower}{0.2cm}}
\anchor{symbol left}      {\chit@nchor{M\id symbol}{left}{0.2cm}}
\anchor{symbol right}     {\chit@nchor{M\id symbol}{right}{0.2cm}}
\anchor{symbol echelon}   {\chit@nchor{M\id symbol}{north}{0.2cm}}
\anchor{symbol below}     {\chit@nchor{M\id symbol}{south}{0.1cm}}
```

Some anchors to sub-elements. Some of them only exists if we have NATO App6(c) symbol in the chit.

```
\anchor{symbol}    {\symbol}
\anchor{factors}   {\factors}
\anchor{left} {\chit@nchor{M\id symbol}{west}{.2cm}\advance\pgf@x-\margin}
\anchor{right}{\chit@nchor{M\id symbol}{east}{.2cm}\advance\pgf@x+\margin}
\anchor{upper right} {%
  \northeast \advance\pgf@x-\margin \advance\pgf@y-\margin%
}
\anchor{upper left}{
  \northeast \advance\pgf@x-\margin \advance\pgf@y-\margin \pgf@x=-\pgf@x%
}
\anchor{lower right} {%
  \northeast \advance\pgf@x-\margin \advance\pgf@y-\margin \pgf@y=-\pgf@y%
}
\anchor{lower left}{
  \northeast \advance\pgf@x-\margin \advance\pgf@y-\margin%
  \pgf@x=-\pgf@x \pgf@y=-\pgf@y%
}
```

Now for the actual path. For the background path, we simply specify the frame. This is so that this will get drawn (and possibly filled) using the appropriate options.

```
\backgroundpath{%
  %% This is the outline of the chit only.  The rest of the chit is
  %% made on the foreground "path".
```

```
    \northeast%
    \wg@tmpa=\pgf@x\wg@tmpb=\pgf@y%
    \pgfpathmoveto{\pgfqpoint{\wg@tmpa}{\wg@tmpb}}%
    \wg@tmpa=-\wg@tmpa \pgfpathlineto{\pgfqpoint{\wg@tmpa}{\wg@tmpb}}%
    \wg@tmpb=-\wg@tmpb \pgfpathlineto{\pgfqpoint{\wg@tmpa}{\wg@tmpb}}%
    \wg@tmpa=-\wg@tmpa \pgfpathlineto{\pgfqpoint{\wg@tmpa}{\wg@tmpb}}%
    \pgfclosepath
  }
```

Finally, we make the foreground rendered path. This is where we do the most stuff. We do it in the *behind* foreground path so that we can ensure things are drawn the way we want it.

The first thing is to set-up the clipping to the chit frame.

```
  \behindforegroundpath{%
    \chit@dbg{4}{%
      Chit foreground: \meaning\id
      ^^J  ID (set):    \meaning\chit@id
      ^^J  Symbol:      \meaning\chit@symbol
      ^^J  Full:        \meaning\chit@full
      ^^J  Factors:     \meaning\chit@factors
      ^^J  Left:        \meaning\chit@left
      ^^J  Right:       \meaning\chit@right
      ^^J  Upper left:  \meaning\chit@upper@left
      ^^J  Lower left:  \meaning\chit@lower@left
      ^^J  Upper right: \meaning\chit@upper@right
      ^^J  Lower right: \meaning\chit@lower@right}
    \chit@report{}
    \pgfscope
    %
    \northeast%
    \wg@tmpa=\pgf@x\wg@tmpb=\pgf@y%
    \pgfpathmoveto{\pgfqpoint{\wg@tmpa}{\wg@tmpb}}%
    \wg@tmpa=-\wg@tmpa \pgfpathlineto{\pgfqpoint{\wg@tmpa}{\wg@tmpb}}%
    \wg@tmpb=-\wg@tmpb \pgfpathlineto{\pgfqpoint{\wg@tmpa}{\wg@tmpb}}%
    \wg@tmpa=-\wg@tmpa \pgfpathlineto{\pgfqpoint{\wg@tmpa}{\wg@tmpb}}%
    \pgfclosepath
    \pgfusepath{clip}
```

If we do not have the `symbol` key set, then we set the `full` key as a picture.

```
    \@ifundefined{chit@symbol}{%
      %% Draw full stuff
      \@ifundefined{chit@full}{}{%
        \center\wg@tmpa=\pgf@x\wg@tmpb=\pgf@y%
        \wg@pic@all{\chit@full}{}{\the\wg@tmpa,\the\wg@tmpb}{chit/full}}%
    }{%
```

Otherwise, we put in a node with shape `natoapp6c` and pass the `symbol` key–value pairs as options.

```
      \edef\symid{\id symbol}%
      \symbol%
      \edef\args{{\symid}{\the\pgf@x,\the\pgf@y}\chit@symbol}%
      \chit@dbg{6}{Arguments to chit NATO symbol: \meaning\args}%
      \expandafter\chit@n@to\args\@end@chit@n@to%
```

```
13613       \chit@dbg{6}{After making NATO symbol in chit}%
```

Having made the NATO App6(c) symbol, which we gave the node name ⟨*id*⟩`symbol` where ⟨*id*⟩ is the ID of this chit, we can make the rest of the chit elements. These are the left and right elements, which are set west and east of the symbol, respectively; the factors; and the four corner elements.

If the respective elements have not been specified, we do not make them.

First the left and right elements. Note that these uses the anchors of the embedded `natoapp6c` node for placement.

```
13614       % Put in left of symbol
13615       \@ifundefined{chit@left}{}{%
13616         \begin{scope}[]
13617           \pgfpointanchor{\symid}{west}%
13618           \wg@tmpa=\pgf@x\advance\wg@tmpa-\margin%
13619           \wg@tmpb=\pgf@y%
13620           \wg@pic@all{\chit@left}{}{\the\wg@tmpa,\the\wg@tmpb}{chit/left}%
13621         \end{scope}}%
13622       % Put in right of symbol
13623       \@ifundefined{chit@right}{}{%
13624         \begin{scope}[]
13625           \pgfpointanchor{\symid}{east}%
13626           \wg@tmpa=\pgf@x\advance\wg@tmpa+\margin%
13627           \wg@tmpb=\pgf@y%
13628           \wg@pic@all{\chit@right}{}{\the\wg@tmpa,\the\wg@tmpb}{chit/right}%
13629         \end{scope}}%
```

Next, we want to put in the corner elements. But before we do that, we use our saved anchors and dimensions to calculate the coordinates. Note that the corner elements are anchored to the corners (plus margin) of the chit frame.

```
13630       % Get coordinates
13631       \northeast%
13632       \wg@tmpa=\pgf@x%
13633       \wg@tmpb=\pgf@y%
13634       \advance\wg@tmpa-\margin%
13635       \advance\wg@tmpb-\margin%
```

With the coordinates extracted, we set the four corner elements. Note, for the anchoring to work, we should specify pictures that have anchors (e.g., nodes). If not, we must take care to give offsets or the like.

```
13636       % Put in upper left corner
13637       \@ifundefined{chit@upper@left}{}{%
13638         \begin{scope}[]
13639           \wg@pic@all{\chit@upper@left}{}{-\the\wg@tmpa,\the\wg@tmpb}{%
13640             chit/upper left}%
13641         \end{scope}}
13642       % Put in upper right corner
13643       \@ifundefined{chit@upper@right}{}{%
13644         \begin{scope}[]
13645           \wg@pic@all{\chit@upper@right}{}{\the\wg@tmpa,\the\wg@tmpb}{%
13646             chit/upper right}%
13647         \end{scope}}
13648       % Put in lower left corner
13649       \@ifundefined{chit@lower@left}{}{%
13650         \begin{scope}[]
```

```
13651           \wg@pic@all{\chit@lower@left}{}{-\the\wg@tmpa,-\the\wg@tmpb}{%
13652             chit/lower left}%
13653         \end{scope}}
13654       % Put in lower right corner
13655       \@ifundefined{chit@lower@right}{}{%
13656         \begin{scope}[]
13657           \wg@pic@all{\chit@lower@right}{}{\the\wg@tmpa,-\the\wg@tmpb}{%
13658             chit/lower right}%
13659         \end{scope}}
```

Finally, we put in the unit factors. They are put at the bottom of the chit frame (plus margin) and are typically anchored to the south anchor of the element. Note, we can put in several factors if need be.

```
13660       % Put in factors
13661       \@ifundefined{chit@factors}{}{%
13662         \advance\wg@tmpb-\margin%
13663         \begin{scope}[]
13664           \wg@pic@all{\chit@factors}{}{0,-\the\wg@tmpb}{chit/factors}%
13665         \end{scope}}%
13666     }%
13667     \endpgfscope%
13668     % Draw frame?
13669     \edef\tmp@opt{[\chitframeopt]}
13670     \expandafter\scope\tmp@opt
13671     \northeast%
13672     \wg@tmpa=\pgf@x\wg@tmpb=\pgf@y%
13673     \pgfpathmoveto{\pgfqpoint{\wg@tmpa}{\wg@tmpb}}%
13674     \wg@tmpa=-\wg@tmpa \pgfpathlineto{\pgfqpoint{\wg@tmpa}{\wg@tmpb}}%
13675     \wg@tmpb=-\wg@tmpb \pgfpathlineto{\pgfqpoint{\wg@tmpa}{\wg@tmpb}}%
13676     \wg@tmpa=-\wg@tmpa \pgfpathlineto{\pgfqpoint{\wg@tmpa}{\wg@tmpb}}%
13677     \pgfclosepath
13678     \pgfusepath{stroke}
13679     \endscope
13680   }
13681 }
```

5.5.5 The `\chit` wrapper macro

```
\chit
\chit@
\chit@@
```

The macro to make the chits. This is a wrapper around a `node` with shape `chit`. The syntax of this macro is

```
\chit[⟨chit options⟩](⟨position⟩)(⟨identifier⟩);
```

Note that the trailing semi-colon is optional. Here ⟨*chit options*⟩ are any key-value pairs in the `/chit` (and `/tikz`) namespace.

The first macro parses for options.

```
13682 \def\chit{%
13683   \chit@dbg{5}{Chit}
```

```
  \@ifnextchar[{\chit@}{\chit@[]}%]
}
```

Parse for coordinates.

```
\def\chit@[#1]{%
  \chit@dbg{5}{Chit second: `#1'}
  \@ifnextchar({\chit@@{#1}}{\chit@@{#1}(0,0)}%)
}
```

Parse for name.

```
\def\chit@@#1(#2){%
  \@ifnextchar({\chit@@@{#1}{#2}}{\chit@@@{#1}{#2}()}%)
}
```

The work horse. This simply makes a `\node` with the shape `chit`. Note, we allow for a trailing semi-colon (`;`) to have a similar feel to other Ti*k*Z macros.

```
\def\chit@@@#1#2(#3){%
  \chit@dbg{5}{Chit final:
    ^^J  Options:    #1
    ^^J  Position:   #2
    ^^J  Name:       `#3'}
  \let\name\pgfutil@empty%
  \chit@dbg{1}{=== Before chit node}%
  \node[draw,chit={every chit/.try,id=#3,#1}] (tmp) at (#2) {};
  \chit@dbg{2}{=== After chit node}%
  \ifx|#3|\relax%
  \else%
    \chit@dbg{3}{=== Renaming chit to user defined name `#3'}%
    \pgfnoderename{#3}{tmp}%
  \fi%
  \@ifnextchar;{\@gobble}{}%
}
```

5.5.6 Predefined `chit` element pictures

```
/tikz/pics/chit/1 factor
/tikz/pics/chit/2 factors
/tikz/pics/chit/2 factors artillery
/tikz/pics/chit/3 factors
/tikz/pics/chit/4 factors
/tikz/pics/chit/identifier
/tikz/pics/chit/small identifier
/tikz/pics/chit/identifier macro
```

These pictures can be used as the value of `chit` keys.

```
\tikzset{%
  chit/1 factor/.pic={
    \chit@dbg{4}{ Chit 1 factor: #1}%
    \node[chit/factor,chit/1 factor,pic actions]{#1};},
```

```
  pics/chit/2 factors/.style args={#1,#2}{%
    code={%
      \chit@dbg{4}{ Chit 2 factors: #1 and #2}%
      \node[chit/factor,chit/2 factors,pic actions]{#1--#2};}},
  pics/chit/2 factors artillery/.style args={#1,#2,#3}{%
    code={
      \chit@dbg{4}{ Chit 2 factors w/artillery: `#1' `#2' `#3'}%
      \node[chit/factor,chit/2 factors,pic actions]{%
        #1$\overset{\text{\scriptsize #3}}{\text{--}}$#2};}},
  pics/chit/3 factors/.style args={#1,#2,#3}{%
    code={
      \chit@dbg{4}{ Chit 3 factors: `#1' `#2' `#3'}%
      \node[chit/factor,chit/3 factors,pic actions]{#1-#2-#3};}},
  pics/chit/4 factors/.style args={#1,#2,#3,#4}{%
    code={
      \chit@dbg{4}{ Chit 3 factors: `#1' `#2' `#3' `#4'}%
      \node[chit/factor,chit/4 factors,pic actions]{#1-#2-#3-#4};}},
  chit/identifier/.pic={
    \chit@dbg{4}{  Chit identifier: `#1'}%
    \node[chit/identifier,pic actions]{#1};
  },
  chit/small identifier/.pic={
    \chit@dbg{4}{  Chit small identifier: `#1'}%
    \node[chit/small identifier,pic actions]{#1};
  },
  chit/identifier macro/.pic={%
    \chit@dbg{4}{ Chit identifier macro: \meaning#1}
    \edef\chit@i@tmp{#1}
    \node[chit/identifier,pic actions]{\chit@i@tmp};},
}
```

```
/tikz/chit/factor
/tikz/chit/1 factor
/tikz/chit/2 factors
/tikz/chit/3 factors
/tikz/chit/4 factors
/tikz/chit/identifier
/tikz/chit/small identifier
```

Styles used by the above pictures. Users can change these as they see fit.

```
\tikzset{%
  chit/factor/.style={
    shape=rectangle,
    font=\sffamily\bfseries\large,
    anchor=base,
    inner sep=0,
    %text=pgfstrokecolor,
    draw=none,
    fill=none,
  },
  chit/1 factor/.style={},
```

```
  chit/2 factors/.style={},
  chit/3 factors/.style={},
  chit/4 factors/.style={text/.append style=\small},
  chit/identifier/.style={
    shape=rectangle,
    font=\sffamily\bfseries\scriptsize,
    inner sep=0,
    % text=pgfstrokecolor,
    draw=none,
    fill=none,
  },
  chit/small identifier/.style={
    shape=rectangle,
    font=\sffamily\bfseries\tiny,
    inner sep=0,
    % text=pgfstrokecolor,
    draw=none,
    fill=none,
  },
}
```

5.5.7 Other pictures

Pictures for frame, factors, left, right, and below.

```
\tikzset{
  pics/chit/shade/.style={
    code={%
      \path[fill=white,opacity=#1,pic actions] (-.6,-.6) rectangle(.6,.6);}},
  pics/chit/eliminate/.style={
    code={%
      \path[fill=red,opacity=#1,pic actions] (-.6,-.6) rectangle(.6,.6);}},
  pics/chit/shade/.default=0.5,
  pics/chit/eliminate/.default=0.25,
}
\def\shadechit(#1){%
  \pic at (#1) {chit/shade};}
\def\eliminatechit(#1){%
  \pic at (#1) {chit/eliminate};}
```

5.5.8 Stacking of chits

Stacking of chits. The key `chit/stack direction` sets the default direction to make the stack in.

```
% offset, location, direction, list
\tikzset{%
  chit/stack direction/.store in=\chit@stack@dir,
  chit/stack direction/.initial={(.3,.3)},
}
```

Now the code

```
\def\chit@stack@dir{(.3,.3)}
```

```
\def\stackchits(#1){%
  \@ifnextchar({\st@ckchits{#1}}{\st@ckchits{#1}(.3,.3)}%)
}
\def\st@ckchits#1(#2)#3{
  \chit@dbg{2}{Stacking chits ‘#1’, ‘#2’, ‘#3’}
  \edef\xy{#1}
  \chit@dbg{4}{Stack start at \xy}
  \foreach[count=\i from 0] \c/\o in {#3} {%
    \ifx\c\empty\else%
      \edef\ccc{\c}
      \chit@dbg{2}{Adding \meaning\ccc\space to stack at (\xy)’ ‘\o’}
      \expandafter\ccc(\xy)
      %%
      \ifx\c\o\else
        %\chit@dbg{0}{Option: \o}
        \edef\ccc{\o}
        \expandafter\ccc(\xy)
      \fi
      \expandafter\ccc(\xy)
      \tikzmath{%
        coordinate \cc;
        \cc = (\xy) + (#2);}
      \xdef\xy{\cc}
    \fi
  }
}
```

5.5.9 Making order of battle charts

Macros for making OOBs

Style for turns

```
\tikzset{
  chit/oob turn/.pic={\node[pic actions]{#1};}}
```

current c, current r, n-columns, cell size, y

```
\def\chit@oob@cellupdate(#1,#2)#3#4#5{%
  \edef\f{\ifwg@oob@inv-1\else1\fi}%
  \chit@dbg{1}{ \space Cell update ‘c=|#1|’ vs ‘#4’*(‘#3’-1)}
  \pgfmathparse{int(ifthenelse(abs(#1)>=#4*(#3-1),#5-1,#5))}%
  \xdef#5{\pgfmathresult}
  \pgfmathparse{ifthenelse(abs(#1)>=#4*(#3-1),#2-#4,#2)}%
  \xdef#2{\pgfmathresult}%
  \pgfmathparse{ifthenelse(abs(#1)>=#4*(#3-1),0,#1+\f*#4)}%
  \xdef#1{\pgfmathresult}%
  \chit@dbg{1}{ \space\space-> ‘\string#5’=#5 ‘\string#2’=#2 ‘\string#1’=#1}
}
```

current c, current r, cell size, extra vertical spacing

```
\def\chit@oob@rowupdate(#1,#2)#3#4{%
  \chit@dbg{2}{ Row update  c=‘#1’,r=‘#2’,s=‘#3’,e=‘#4’}
```

```
  %\pgfmathparse{ifthenelse(#1>0,#2-#3,#2)}%
  \pgfmathparse{#2-#3)}%
  \xdef#2{\pgfmathresult}%
  %\xdef#1{0}
  \chit@dbg{2}{ \space\space-> update `\string#2'=#2}
}
```

current c, current r, cell size, extra spacing

```
\def\chit@oob@turnupdate(#1,#2)#3#4{%
  \chit@dbg{2}{ Turn update c=`#1',r=`#2',s=`#3',e=`#4'}
  % \pgfmathparse{#2-ifthenelse(#1>0,#3,0)-#4}%
  \pgfmathparse{#2-#4-ifthenelse(abs(#1)>0.0001,#3,0)}
  \xdef#2{\pgfmathresult}%
  \xdef#1{0}%
  \chit@dbg{2}{ \space\space-> update `\string#1'=#1,`\string#2'=#2}
}
```

chit list, n-colls, cell size, extra vertical spacing

This expects a list of lists of chits, one list per turn; the maximum number of columns; the size of cells, extra spacing between turns.

Note, the list of lists leaf elements should be styles for the chits.

This depends on the Tikz pic `chit/oob turn` which takes the number as argument.

```
\newif\ifwg@oob@inv\wg@oob@invfalse
\def\wg@star@oob{\wg@oob@invtrue\wg@oob}
\def\wg@nostar@oob{\wg@oob@invfalse\wg@oob}
\def\oob{%
  \@ifstar{\wg@star@oob%
  }{\wg@nostar@oob%
  }%
}
\def\wg@oob#1#2#3#4{
  \def\r{0}
  \chit@dbg{1}{OOB: `#1'}
  \foreach[count=\ti from 0] \t/\y in #1{
    \xdef\o{\r}
    \def\c{0}
    \ifx\t\y\def\y{0}\fi
    \chit@dbg{1}{Turn \ti\space(\r,\t,y=\y):'}
    \ifwg@oob@inv%
      \pic at ( .5,\r) {chit/oob turn=\ti};%
    \else
      \pic at (-.5,\r) {chit/oob turn=\ti};%
    \fi%
    \ifx\t\empty\else%
      \foreach \u/\m in \t{
        %% \chit@dbg{2}{ `\u'=`\m'}
        \ifx\u\empty\else
          \ifx\m\@empty\def\m{1}\fi
          \ifx\u\m\def\m{1}\fi
          \foreach \n in {1,...,\m}{%
            \ifx\u\chit@blank\else
```

```
              \chit[\u=\ti,zone oob point={\u}{\c}{\r}](\c,\r);
            \fi
            \chit@oob@cellupdate(\c,\r){#2}{#3}{\y}
          }
        \fi
      }
    \fi
    \chit@dbg{1}{ End of chits in turn
      \ti\space(c=‘\c’,r=‘\r’,o=’\o’,y=’\y’)}
    % IF no units where given, then we force \c to be non-zero so that
    % \chit@oob@turnupdate increments the row
    \ifx\t\@empty
      \def\c{#3}
      \chit@dbg{2}{ Turn is empty, set c=‘\c’}
    \fi
    %\ifnum\y<0% No explicit number of rows given
    %  \def\c{#3}
    %  \chit@dbg{2}{ No explicit number of rows given, set c=‘\c’}
    %\fi
    % In case the user gave and explicit number of rows, add the rows
    % that are missing.  \y is initially set to the number of
    % requested rows, and then decremented every time we go down one
    % row.  So if the number of rows we did so far is N, and the
    % requested number of rows is M, then the loop below adds M-N
    % rows.
    \ifnum\y>0%
      \chit@dbg{2}{ Looping rows from 2 to \y, break when row > \y}%
      \foreach \rr  in {2,...,\y}{
        %\ifnum\rr>\y% A little funny, but \y can be negative!
        %  \chit@dbg{2}{ \space Breaking loop \rr\space > \y}%
        %  \breakforeach%
        %\else%
          \chit@oob@rowupdate(\c,\r){#3}{#4}
        %\fi
      }
    \fi
    % This will zero \c.  However, if on entry |\c|>0, then we also
    % increment the row
    \chit@oob@turnupdate(\c,\r){#3}{#4}
    \chit@dbg{1}{End of turn \ti\space(c=‘\c’,r=‘\r’,o=’\o’,y=’\y’)}
  }
  \chit@dbg{2}{End of OOB (c=‘\c’,r=‘\r’,y=‘\y’)}
}
```

5.5.10 Table of chits

```
\tikzset{
  chit/cell background/.style={fill=black},
  blank chit/.style={/chit/frame={draw=none,fill=none}},
}
```

These macros are used when we set tables of chits. This allows us to define blank spaces in the table by giving the element `blank chit`.

```
\def\chit@blank{blank chit}
\def\chit@cellbg(#1,#2)#3{%
  \draw[chit/cell background](#1-#3/2,#2-#3/2) rectangle++(#3,#3);
}
```

\ifchits@reset

This 'if' controls whether to reset the coordinates to the origin when \chits is called. If true, then reset for a new table.

```
\newif\ifchits@reset\chits@resettrue
```

\chits
\@chits
\chit@sng@cellupdate

```
\def\chit@sng@cellupdate(#1,#2)#3#4{%
  \chit@dbg{2}{Current '#1' vs '#4'*('#3'+1)}
  \pgfmathparse{ifthenelse(#1>=#4*(#3-1),#2-#4,#2)}%
  \xdef#2{\pgfmathresult}%
  \pgfmathparse{ifthenelse(#1>=#4*(#3-1),0,#1+#4)}%
  \xdef#1{\pgfmathresult}%
}
```

The stared version (\chits*) of this macro continues the previously set chit table.

```
\def\chits{%
  \@ifstar{\chits@resetfalse\@chits}{\chits@resettrue\@chits}}
\def\@chits#1#2#3{
  \ifchits@reset
    \def\r{0}%
    \def\c{0}%
  \fi
  \chit@dbg{1}{Chits to make: #1}%
  \foreach[count=\ti from 0] \t/\x in #1{%
    \chit@dbg{2}{Turn '\t' with option '\x'}
    \ifx\t\empty\else%
      \foreach \u/\m in \t{%
        \ifx\u\empty\else%
          \chit@dbg{2}{Next chit '\u' with possible multiplicity '\m'}%
          \ifx\m\@empty\def\m{1}\fi%
          \ifx\u\m\def\m{1}\fi%
          \chit@dbg{2}{Next chit '\u' multiplicity '\m'}%
          \foreach \n in {1,...,\m}{%
            \ifx\u\chit@blank%
              \chit@dbg{3}{Ignoring blank chit:\u}%
            \else%
              \chit@cellbg(\c,\r){#3}%
              \chit[\u=\ti](\c,\r)%
              \chit@sng@cellupdate(\c,\r){#2}{#3}%
            \fi%
          }%
```

```
        \fi%
      }%
    \fi%
  }%
}
```

\doublechits
\@doublechits
\chit@dbl@cellupdate
\chit@dbl@flip

1. coordinates
2. coordinates
3. cell-size

```
\def\chit@dbl@flip(#1,#2)#3{%
  \pgfmathparse{-#1}%
  \xdef\mc{\pgfmathresult}%
}
```

1. coordinates
2. coordinates
3. Number of columns
4. cell-size

```
\def\chit@dbl@cellupdate(#1,#2)#3#4{%
  \pgfmathparse{ifthenelse(#1<-#4/2,#2,#4+#2)}%
  \xdef#2{\pgfmathresult}%
  \pgfmathparse{ifthenelse(#1<-#4/2,#4+#1,-(#3-.5)*#4)}%
  \xdef#1{\pgfmathresult}%
}
```

1. List of list of keys
2. Number of columns
3. size of each cell

The stared version (`\doublechits*`) of this macro continues the previously set chit table.

```
\def\doublechits{%
  \@ifstar{\chits@resetfalse\@doublechits}{\chits@resettrue\@doublechits}}

\def\@doublechits#1#2#3{%
  \chit@dbg{1}{Setting double-sided chits: #1}
  \ifchits@reset
    \pgfmathparse{-(#2-.5)*#3}
    \xdef\c{\pgfmathresult}
```

```
    \def\r{0}
  \fi

  \foreach[count=\ti from 0] \t/\x in #1{
    \ifx\t\empty\else%
      \foreach \u/\m in \t{
        \ifx\u\empty\else
          \ifx\m\@empty\def\m{1}\else%
            \ifx\u\m\def\m{1}\fi\fi
          \chit@dbg{2}{`\u'=`\m' (\c,\r)}
          \foreach \n in {1,...,\m}{%
            \ifx\u\chit@blank
              \chit@dbg{3}{Ignoring blank chit:\u}
            \else
              \chit@cellbg(\c,\r){#3}
              \chit[\u=\ti](\c,\r)
              \chit@dbl@flip(\c,\r){#3}
              \chit@cellbg(\mc,\r){#3}
              \chit[\u\space flipped=\ti,zone turn=\t,zone mult=\n](\mc,\r)
              \chit@dbl@cellupdate(\c,\r){#2}{#3}
            \fi
          }
        \fi
      }
    \fi
  }
  \draw[dashed](0,-3*#3/4)--(0,\r-#3/4);
  \draw[dashed,<-] (#3/5,-2*#3/3)--(#3/2,-2*#3/3) node[anchor=west]{Back};
  \draw[dashed,<-] (-#3/5,-2*#3/3)--(-#3/2,-2*#3/3) node[anchor=east]{Front};
}
```

5.5.11 Some utilities

Game turn marker

```
\tikzset{
  number chit/.pic={
    \node[shape=rectangle,font=\sffamily\bfseries\LARGE]{%
      \begin{tabular}{c} #1\end{tabular}};},
  game turn/.pic={
    \node[shape=rectangle,font=\sffamily\bfseries]{%
      \begin{tabular}{c} Game\\Turn\end{tabular}};},
  game turn/.style={
    /chit/full={game turn},
    color=black,
    fill=white},
  game turn flipped/.style={game turn},
  dummy chit/.style={fill=white},
}
```

Marks of chits

```
\providecommand\chitmark[2][]{\tikz[scale=.25,#1]{\chit[#2]}}
```

Stacking mark

```
\tikzset{
  wg stacking/.style={fill=white,
    /chit/symbol={[faction=friendly,command=land]}},
}
\DeclareRobustCommand\stackmark[1][]{%
  \tikz[baseline=(current bounding box.center),scale=.3,#1]{
    \stackchits(0,0)(.3,-.3){%
      \noexpand\chit[wg stacking],
      \noexpand\chit[wg stacking],
      \noexpand\chit[wg stacking]}}}
```

ZOC mark

```
\DeclareRobustCommand\zocmark[1][]{%
  \tikz[baseline=(current bounding box.center),scale=.1,#1]{%
    \begin{scope}[hex/first row and column are=0,
      hex/row direction is=normal,
      hex/column direction is=normal,
      hex/short columns=none]
      \hex[label=,fill=gray](c=1,r=1)%
      \hex[label=,fill=white](c=1,r=2)%
      \hex[label=,fill=white](c=1,r=0)%
      \hex[label=,fill=white](c=0,r=0)%
      \hex[label=,fill=white](c=0,r=1)%
      \hex[label=,fill=white](c=2,r=1)%
      \hex[label=,fill=white](c=2,r=0)
    \end{scope}}}
```

```
\tikzset{
  zone point/.code n args={3}{},
  zone oob point/.code n args={3}{}}
```

5.6 The `wargame.natoapp6c` Ti*k*Z library

In this section we define the code for the Tikz library. The library defines a number of `pic` keys we can use to draw various parts of a marker. The markers conform to NATO App 6(c) specification. The implementation here is heavily inspired by the package milsymb [4] available at CTAN.

5.6.1 Debugging

```
\natoappdbglvl
\n@to@pp@dbg
```

Set the debug level, and make debug message.

```
\usetikzlibrary{wargame.util}
\usetikzlibrary{calc}
\usetikzlibrary{arrows.meta}
\usetikzlibrary{shapes.symbols}
\usetikzlibrary{positioning,intersections}
```

```
\newcount\natoappdbglvl\natoappdbglvl=\wargamedbglvl
\def\n@to@pp@dbg#1#2{%
  \ifnum#1>\natoappdbglvl\relax\else\message{^^J#2}\fi}
```

5.6.2 Colours

```
\c@friendly
\c@hostile
\c@neutral
\c@unknown
```

Define standard colours for marker affiliations.

Name	
friendly	
hostile	
neutral	
unknown	

```
\definecolor{friendly}{RGB}{128, 224, 255}
\definecolor{hostile}{RGB}{255, 128, 128}
\definecolor{neutral}{RGB}{170, 255, 170}
\definecolor{unknown}{RGB}{255, 255, 128}
\tikzset{%
  faction/.code={%
    \@ifundefined{natoapp@fac}{%
    }{\tikzset{fill=\natoapp@fac}}}}
```

5.6.3 Some dimensions

We define a number of dimensions which we will use in the following. They provide a rough parameterisation of the node shapes, but shouldn't really be changed. We have them here so that the code uses as few hard coded numbers as possible.

The dimensions are

- Installation 'hat' x coordinate
- Installation 'hat' height
- Activity width of boxes
- Height of space bar
- Radius of the symbol

```
\newdimen\n@to@pp@inst@x\n@to@pp@inst@x=0.2cm
\newdimen\n@to@pp@inst@h\n@to@pp@inst@h=0.15cm
\newdimen\n@to@pp@act@w\n@to@pp@act@w=0.15cm
\newdimen\n@to@pp@space@h\n@to@pp@space@h=0.1cm
\newdimen\n@to@pp@r\n@to@pp@r=0.5cm
```

5.6.4 Some utilities

`\n@to@pp@isclip`

This detects if we're in a node that is being used for clipping

```
%\def\n@to@pp@cliptoken{clip}
%\def\n@to@pp@isclip{FF\fi%
%  % \message{^^Jclip is \meaning\pgf@up@clip}%
%  \ifx\pgf@up@clip\n@to@pp@cliptoken}
\newif\ifn@to@pp@isclip\n@to@pp@isclipfalse
```

`\n@to@pp@saved@fill@color`
`\n@to@pp@saved@stroke@color`

Macros to hold saved colours.

```
\let\n@to@pp@saved@stroke@color\relax
\let\n@to@pp@saved@fill@color\relax
```

`\n@to@pp@stroke@to@fill`
`\n@to@pp@restore@fill`

Macro to get stroke and fill colours and set the fill colour to the stroke colour, and to restore to the old setting. This is used by the frame shapes below to make sure that filled elements of the frame uses the same colour as the for strokes.

```
\newcommand\n@to@pp@stroke@to@fill{%
  %
  \expandafter\let\expandafter\n@to@pp@saved@stroke@color%
  \csname\string\color@pgfstrokecolor\endcsname%
  %
  \expandafter\let\expandafter\n@to@pp@saved@fill@color%
  \csname\string\color@pgffillcolor\endcsname%
  %
  \expandafter\pgf@setfillcolor\n@to@pp@saved@stroke@color%
  %
  % \message{^^J=== Set fill to stroke color
  %   ^^J  Old fill:   \meaning\n@to@pp@saved@fill@color
  %   ^^J  Old stroke: \meaning\n@to@pp@saved@stroke@color}
}

\newcommand\n@to@pp@restore@fill{%
  % \message{^^J=== Restore fill color
  %   ^^J  Old fill:   \meaning\n@to@pp@saved@fill@color
  %   ^^J  Old stroke: \meaning\n@to@pp@saved@stroke@color}
  %
  \ifx\n@to@pp@saved@fill@color\relax\else%
    \expandafter\pgf@setfillcolor\n@to@pp@saved@fill@color%
  \fi%
  \global\let\n@to@pp@saved@fill@color\relax
  \global\let\n@to@pp@saved@stroke@color\relax
}
```

We also make an environment, just to simplify the use

```
\newenvironment{n@to@pp@stroketofill}{%
  \pgfscope%
  \n@to@pp@stroke@to@fill%
}{%
  \n@to@pp@restore@fill%
  \endpgfscope%
}
```

5.6.5 Faction names as macros

```
\def\n@to@pp@friendly{friendly}
\def\n@to@pp@hostile{hostile}
\def\n@to@pp@neutral{neutral}
\def\n@to@pp@unknown{unknown}
```

5.6.6 Node shapes

Here we define bases for all commands and affiliations. These are defined as node shapes. This means we will render the NATO App6(c) symbols as nodes with embedded nodes of the relevant shape.

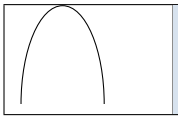
First, the generic bounding box symbol for all markers.

Place-holder symbol. This shape will form the basis of many of the other frame shapes. We define the relevant sizes and anchors.

```
\pgfdeclareshape{natoapp6c base}{%
  \saveddimen\radius{\pgf@x=\n@to@pp@r}
  \saveddimen\liney{\pgf@x=.2cm}
  \saveddimen\linex{\pgf@x=0.41cm}
  \savedanchor\center{\pgf@x=0cm\pgf@y=0cm}
  \savedanchor\upper{\pgf@x=0cm\pgf@y=0.35cm}
  \anchor{north east}{\pgf@x=\radius\pgf@y=\radius}
  \anchor{south west}{\pgf@x=-\radius\pgf@y=-\radius}
  \anchor{north west}{\pgf@x=-\radius\pgf@y=\radius}
  \anchor{south east}{\pgf@x=\radius\pgf@y=-\radius}
  \anchor{south}{\pgf@x=0cm\pgf@y=-\radius}
  \anchor{north}{\pgf@x=0cm\pgf@y=\radius}
  \anchor{west}{\pgf@x=-\radius\pgf@y=0cm}
  \anchor{east}{\pgf@x=\radius\pgf@y=0cm}
  \anchor{center}{\center}
  \anchor{upper}{\upper}
  \anchor{lower}{\upper\pgf@y=-\pgf@y}
  \anchor{left}{\upper\pgf@x=-\pgf@y\pgf@y=0cm}
  \anchor{right}{\upper\pgf@x=\pgf@y\pgf@y=0cm}
  \savedmacro\init{
    \def\octagon{%
      \pgfpathmoveto{\pgfqpointpolar{0}  {\radius}}%
      \pgfpathlineto{\pgfqpointpolar{45} {\radius}}%
```

```
      \pgfpathlineto{\pgfqpointpolar{90} {\radius}}%
      \pgfpathlineto{\pgfqpointpolar{135}{\radius}}%
      \pgfpathlineto{\pgfqpointpolar{180}{\radius}}%
      \pgfpathlineto{\pgfqpointpolar{225}{\radius}}%
      \pgfpathlineto{\pgfqpointpolar{270}{\radius}}%
      \pgfpathlineto{\pgfqpointpolar{315}{\radius}}%
      \pgfpathclose}
    \def\topline{%
      \pgfpathmoveto{\pgfqpoint{\linex}{\liney}}%
      \pgfpathlineto{\pgfqpoint{-\linex}{\liney}}}
    \def\bottomline{%
      \pgfpathmoveto{\pgfqpoint{\linex}{-\liney}}%
      \pgfpathlineto{\pgfqpoint{-\linex}{-\liney}}}
  }
  \backgroundpath{%
    \init%
    \octagon}
  \behindforegroundpath{%
    \init%
    \octagon%
    \pgfusepath{stroke}%
    \topline%
    \pgfusepath{stroke}%
    \bottomline%
    \pgfusepath{stroke}%
  }
}
```

5.6.7 'Friendly' node shapes



natoapp6c friendly air

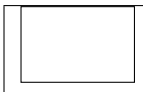
Macro for friendly air shape

```
\def\n@to@friendly@@ir{%
  \southeast \wg@tmpa=\pgf@x\wg@tmpb=\pgf@y%
  \pgfpathmoveto{\pgfqpoint{-\wg@tmpa}{\wg@tmpb}}%
  \cntrl \wg@tmpb=\pgf@y%
  \pgfpatharc{180}{0}{\wg@tmpa and \wg@tmpb}}
```

The friendly air command.

```
\pgfdeclareshape{natoapp6c friendly air}{%
  \inheritsavedanchors[from=natoapp6c base]
  \savedanchor\southeast{%
    \pgf@x=1.1\n@to@pp@r%
    \pgf@y=-\n@to@pp@r}
  \savedanchor\cntrl{\pgf@x=0cm\pgf@y=2.6\n@to@pp@r}
  \savedanchor\north{\pgf@x=0cm\pgf@y=1.6\n@to@pp@r}
  \anchor{south east}{\southeast}
```

```
  \anchor{south west}{\southeast\pgf@x=-\pgf@x}
  \anchor{north east}{\southeast\wg@tmpa=\pgf@x\north\pgf@x=\wg@tmpa}
  \anchor{north west}{\southeast\wg@tmpa=\pgf@x\north\pgf@x=-\wg@tmpa}
  \anchor{north}{\north}
  \anchor{east}{%
    \north\wg@tmpb\pgf@y%
    \southeast\wg@tmpc=\pgf@y\wg@tmpa=\pgf@x%
    \advance\wg@tmpb-\wg@tmpc
    \divide\wg@tmpb2%
    \advance\wg@tmpb\wg@tmpc%
    \pgf@x=\wg@tmpa%
    \pgf@y=\wg@tmpb}
  \anchor{west}{%
    \north\wg@tmpb\pgf@y%
    \southeast\wg@tmpc=\pgf@y\wg@tmpa=\pgf@x%
    \advance\wg@tmpb-\wg@tmpc
    \divide\wg@tmpb2%
    \advance\wg@tmpb\wg@tmpc%
    \pgf@x=-\wg@tmpa%
    \pgf@y=\wg@tmpb}
  \anchor{south}{\southeast\pgf@x=0cm}
  \inheritanchor[from=natoapp6c base]{upper}
  \inheritanchor[from=natoapp6c base]{lower}
  \inheritanchor[from=natoapp6c base]{left}
  \inheritanchor[from=natoapp6c base]{right}
  \inheritanchor[from=natoapp6c base]{center}
  \backgroundpath{%
    \n@to@friendly@@ir%
  }
  \behindforegroundpath{%
    \n@to@friendly@@ir%
    \pgfusepath{stroke}%
  }
}
```



natoapp6c friendly land

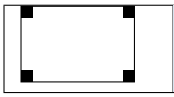
Macro for friendly land command

```
\def\n@to@friendly@l@nd{%
  \northeast \wg@tmpa=\pgf@x\wg@tmpb=\pgf@y%
  \pgfpathmoveto{\pgfqpoint{ \wg@tmpa}{ \wg@tmpb}}%
  \pgfpathlineto{\pgfqpoint{-\wg@tmpa}{ \wg@tmpb}}%
  \pgfpathlineto{\pgfqpoint{-\wg@tmpa}{-\wg@tmpb}}%
  \pgfpathlineto{\pgfqpoint{ \wg@tmpa}{-\wg@tmpb}}%
  \pgfclosepath}
```

The friendly land command. The most used command frame.

```
\pgfdeclareshape{natoapp6c friendly land}{%
  \inheritsavedanchors[from=natoapp6c base]
```

```
  \savedanchor\northeast{%
    \pgf@x=1.5\n@to@pp@r%
    \pgf@y=\n@to@pp@r}
  \anchor{north east}{\northeast}
  \anchor{north west}{\northeast\pgf@x=-\pgf@x}
  \anchor{south east}{\northeast\pgf@y=-\pgf@y}
  \anchor{south west}{\northeast\pgf@x=-\pgf@x\pgf@y=-\pgf@y}
  \anchor{north}{\northeast\pgf@x=0cm}
  \anchor{south}{\northeast\pgf@x=0cm\pgf@y=-\pgf@y}
  \anchor{east}{\northeast\pgf@y=0cm}
  \anchor{west}{\northeast\pgf@x=-\pgf@x\pgf@y=0cm}
  \inheritanchor[from=natoapp6c base]{upper}
  \inheritanchor[from=natoapp6c base]{lower}
  \inheritanchor[from=natoapp6c base]{left}
  \inheritanchor[from=natoapp6c base]{right}
  \inheritanchor[from=natoapp6c base]{center}
  \backgroundpath{%
    \n@to@friendly@l@nd%
  }
  \behindforegroundpath{%
    \n@to@friendly@l@nd%
    \pgfusepath{stroke}%
  }
}
```

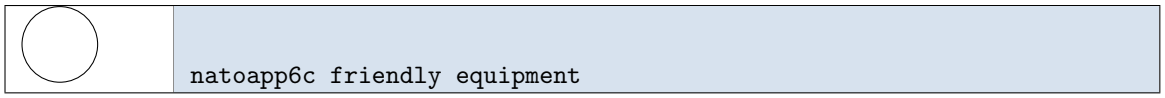


natoapp6c friendly activity

The friendly activity command. Similar to land command, but with boxes in the corners.

```
\pgfdeclareshape{natoapp6c friendly activity}{%
  \inheritsavedanchors[from=natoapp6c friendly land]
  \inheritanchor[from=natoapp6c friendly land]{center}
  \inheritanchor[from=natoapp6c friendly land]{inner north east}
  \inheritanchor[from=natoapp6c friendly land]{inner north west}
  \inheritanchor[from=natoapp6c friendly land]{inner south west}
  \inheritanchor[from=natoapp6c friendly land]{inner south east}
  \inheritanchor[from=natoapp6c friendly land]{north east}
  \inheritanchor[from=natoapp6c friendly land]{north west}
  \inheritanchor[from=natoapp6c friendly land]{south east}
  \inheritanchor[from=natoapp6c friendly land]{south west}
  \inheritanchor[from=natoapp6c friendly land]{north}
  \inheritanchor[from=natoapp6c friendly land]{west}
  \inheritanchor[from=natoapp6c friendly land]{east}
  \inheritanchor[from=natoapp6c friendly land]{south}
  \inheritanchor[from=natoapp6c friendly land]{upper}
  \inheritanchor[from=natoapp6c friendly land]{lower}
  \inheritanchor[from=natoapp6c friendly land]{left}
  \inheritanchor[from=natoapp6c friendly land]{right}
  \inheritanchor[from=natoapp6c friendly land]{center}
  \inheritbackgroundpath[from=natoapp6c friendly land]
  \behindforegroundpath{
```

```
    \begin{n@to@pp@stroketofill}
      \n@to@friendly@l@nd%
      \pgfusepath{stroke}
      %
      \northeast \wg@tmpa=\pgf@x\wg@tmpb\pgf@y%
      \wg@tmpc=\wg@tmpa\advance\wg@tmpc-\n@to@pp@act@w
      \wg@tmpd=\wg@tmpb\advance\wg@tmpd-\n@to@pp@act@w
      %
      \pgfpathmoveto{\pgfqpoint{\wg@tmpa}{\wg@tmpb}}%
      \pgfpathlineto{\pgfqpoint{\wg@tmpc}{\wg@tmpb}}%
      \pgfpathlineto{\pgfqpoint{\wg@tmpc}{\wg@tmpd}}%
      \pgfpathlineto{\pgfqpoint{\wg@tmpa}{\wg@tmpd}}%
      \pgfclosepath
      %
      \pgfusepath{fill}%
      \pgfpathmoveto{\pgfqpoint{\wg@tmpa}{-\wg@tmpd}}%
      \pgfpathlineto{\pgfqpoint{\wg@tmpc}{-\wg@tmpd}}%
      \pgfpathlineto{\pgfqpoint{\wg@tmpc}{-\wg@tmpb}}%
      \pgfpathlineto{\pgfqpoint{\wg@tmpa}{-\wg@tmpb}}%
      \pgfclosepath
      \pgfusepath{fill}%
      %
      \pgfpathmoveto{\pgfqpoint{-\wg@tmpc}{\wg@tmpb}}%
      \pgfpathlineto{\pgfqpoint{-\wg@tmpa}{\wg@tmpb}}%
      \pgfpathlineto{\pgfqpoint{-\wg@tmpa}{\wg@tmpd}}%
      \pgfpathlineto{\pgfqpoint{-\wg@tmpc}{\wg@tmpd}}%
      \pgfclosepath
      \pgfusepath{fill}%
      %
      \pgfpathmoveto{\pgfqpoint{-\wg@tmpc}{-\wg@tmpd}}%
      \pgfpathlineto{\pgfqpoint{-\wg@tmpa}{-\wg@tmpd}}%
      \pgfpathlineto{\pgfqpoint{-\wg@tmpa}{-\wg@tmpb}}%
      \pgfpathlineto{\pgfqpoint{-\wg@tmpc}{-\wg@tmpb}}%
      \pgfclosepath
      \pgfusepath{fill}%
    \end{n@to@pp@stroketofill}
  }
}
```

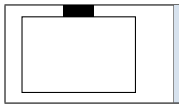


natoapp6c friendly equipment

The friendly equipment command. A circle.

```
\pgfdeclareshape{natoapp6c friendly equipment}{%
  \inheritsavedanchors[from=natoapp6c base]
  \savedanchor\northeast{%
    \pgf@x=\n@to@pp@r%
    \pgf@y=\n@to@pp@r}
  \anchor{north east}{\northeast}
  \anchor{north west}{\northeast\pgf@x=-\pgf@x}
  \anchor{south east}{\northeast\pgf@y=-\pgf@y}
```

```
  \anchor{south west}{\northeast\pgf@x=-\pgf@x\pgf@y=-\pgf@y}
  \anchor{north}{\northeast\pgf@x=0cm}
  \anchor{south}{\northeast\pgf@x=0cm\pgf@y=-\pgf@y}
  \anchor{east}{\northeast\pgf@y=0cm}
  \anchor{west}{\northeast\pgf@x=-\pgf@x\pgf@y=0cm}
  \inheritanchor[from=natoapp6c base]{upper}
  \inheritanchor[from=natoapp6c base]{lower}
  \inheritanchor[from=natoapp6c base]{left}
  \inheritanchor[from=natoapp6c base]{right}
  \inheritanchor[from=natoapp6c base]{center}
  \backgroundpath{%
    \northeast\wg@tmpa\pgf@x%
    \pgfpathcircle{\pgfqpoint{0cm}{0cm}}{\wg@tmpa}
  }
  \behindforegroundpath{%
    \northeast\wg@tmpa\pgf@x%
    \pgfpathcircle{\pgfqpoint{0cm}{0cm}}{\wg@tmpa}
    \pgfusepath{stroke}%
  }
}
```

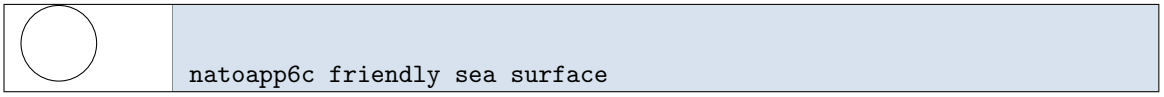


natoapp6c friendly installation

The friendly installation command. Similar to the land command, but with a 'hat' on top.

```
\pgfdeclareshape{natoapp6c friendly installation}{%
  \inheritsavedanchors[from=natoapp6c friendly land]
  \inheritanchor[from=natoapp6c friendly land]{center}
  \inheritanchor[from=natoapp6c friendly land]{inner north east}
  \inheritanchor[from=natoapp6c friendly land]{inner north west}
  \inheritanchor[from=natoapp6c friendly land]{inner south west}
  \inheritanchor[from=natoapp6c friendly land]{inner south east}
  \inheritanchor[from=natoapp6c friendly land]{north east}
  \inheritanchor[from=natoapp6c friendly land]{north west}
  \inheritanchor[from=natoapp6c friendly land]{south east}
  \inheritanchor[from=natoapp6c friendly land]{south west}
  \inheritanchor[from=natoapp6c friendly land]{north}
  \inheritanchor[from=natoapp6c friendly land]{west}
  \inheritanchor[from=natoapp6c friendly land]{east}
  \inheritanchor[from=natoapp6c friendly land]{south}
  \inheritanchor[from=natoapp6c friendly land]{upper}
  \inheritanchor[from=natoapp6c friendly land]{lower}
  \inheritanchor[from=natoapp6c friendly land]{left}
  \inheritanchor[from=natoapp6c friendly land]{right}
  \inheritanchor[from=natoapp6c friendly land]{center}
  \inheritbackgroundpath[from=natoapp6c friendly land]
  \behindforegroundpath{
    \begin{n@to@pp@stroketofill}
      \n@to@friendly@l@nd%
      \pgfusepath{stroke}
      %
```

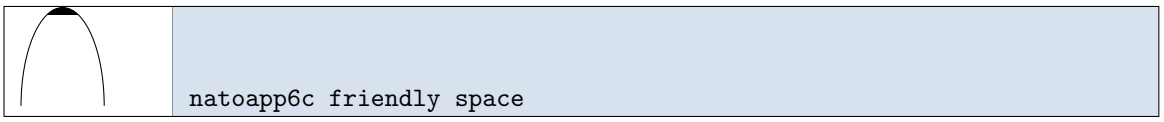
```
      \northeast \wg@tmpa=\pgf@y%
      \wg@tmpb=\wg@tmpa\advance\wg@tmpb\n@to@pp@inst@h%
      %
      \pgfpathmoveto{\pgfqpoint{ \n@to@pp@inst@x}{\wg@tmpb}}%
      \pgfpathlineto{\pgfqpoint{-\n@to@pp@inst@x}{\wg@tmpb}}%
      \pgfpathlineto{\pgfqpoint{-\n@to@pp@inst@x}{\wg@tmpa}}%
      \pgfpathlineto{\pgfqpoint{ \n@to@pp@inst@x}{\wg@tmpa}}%
      \pgfclosepath
      \pgfusepath{fill}%
    \end{n@to@pp@stroketofill}
  }
}
```



natoapp6c friendly sea surface

The friendly sea surface command. Same as equipment command.

```
\pgfdeclareshape{natoapp6c friendly sea surface}{%
  \inheritsavedanchors[from=natoapp6c friendly equipment]
  \inheritanchor[from=natoapp6c friendly equipment]{inner north east}
  \inheritanchor[from=natoapp6c friendly equipment]{inner north west}
  \inheritanchor[from=natoapp6c friendly equipment]{inner south west}
  \inheritanchor[from=natoapp6c friendly equipment]{inner south east}
  \inheritanchor[from=natoapp6c friendly equipment]{north east}
  \inheritanchor[from=natoapp6c friendly equipment]{north west}
  \inheritanchor[from=natoapp6c friendly equipment]{south east}
  \inheritanchor[from=natoapp6c friendly equipment]{south west}
  \inheritanchor[from=natoapp6c friendly equipment]{north}
  \inheritanchor[from=natoapp6c friendly equipment]{west}
  \inheritanchor[from=natoapp6c friendly equipment]{east}
  \inheritanchor[from=natoapp6c friendly equipment]{south}
  \inheritanchor[from=natoapp6c friendly equipment]{upper}
  \inheritanchor[from=natoapp6c friendly equipment]{lower}
  \inheritanchor[from=natoapp6c friendly equipment]{left}
  \inheritanchor[from=natoapp6c friendly equipment]{right}
  \inheritanchor[from=natoapp6c friendly equipment]{center}
  \inheritbackgroundpath[from=natoapp6c friendly equipment]
  \inheritbehindforegroundpath[from=natoapp6c friendly equipment]
}
```

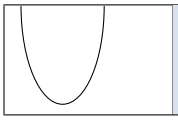


natoapp6c friendly space

The friendly space command. Similar to air command, but with a bar on top.

```
\pgfdeclareshape{natoapp6c friendly space}{%
  \inheritsavedanchors[from=natoapp6c friendly air]
  \inheritanchor[from=natoapp6c friendly air]{north east}
```

```
  \inheritanchor[from=natoapp6c friendly air]{north west}
  \inheritanchor[from=natoapp6c friendly air]{south east}
  \inheritanchor[from=natoapp6c friendly air]{south west}
  \inheritanchor[from=natoapp6c friendly air]{north}
  \inheritanchor[from=natoapp6c friendly air]{west}
  \inheritanchor[from=natoapp6c friendly air]{east}
  \inheritanchor[from=natoapp6c friendly air]{south}
  \inheritanchor[from=natoapp6c friendly air]{upper}
  \inheritanchor[from=natoapp6c friendly air]{lower}
  \inheritanchor[from=natoapp6c friendly air]{left}
  \inheritanchor[from=natoapp6c friendly air]{right}
  \inheritanchor[from=natoapp6c friendly air]{center}
  \inheritbackgroundpath[from=natoapp6c friendly air]
  \behindforegroundpath{%
    \begin{n@to@pp@stroketofill}
      \n@to@friendly@@ir%
      \pgfusepath{stroke,clip}%
      %
      \cntrl\wg@tmpa=\pgf@y%
      \north\wg@tmpb=\pgf@y
      \advance\wg@tmpb-\n@to@pp@space@h
      %
      \pgfpathmoveto{\pgfqpoint{ \n@to@pp@r}{\wg@tmpa}}%
      \pgfpathlineto{\pgfqpoint{-\n@to@pp@r}{\wg@tmpa}}%
      \pgfpathlineto{\pgfqpoint{-\n@to@pp@r}{\wg@tmpb}}%
      \pgfpathlineto{\pgfqpoint{ \n@to@pp@r}{\wg@tmpb}}%
      \pgfclosepath%
      \pgfusepath{fill}%
    \end{n@to@pp@stroketofill}
  }
}
```



```
natoapp6c friendly sub surface
```

Macro for friendly sub surface command

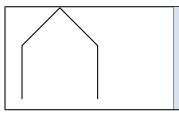
```
\def\n@to@friendly@sub{%
  \northeast \wg@tmpa=\pgf@x\wg@tmpb=\pgf@y%
  \pgfpathmoveto{\pgfqpoint{-\wg@tmpa}{\wg@tmpb}}%
  \cntrl \wg@tmpb=\pgf@y%
  \pgfpatharc{180}{0}{\wg@tmpa and \wg@tmpb}}
```

The friendly sub surface command.

```
\pgfdeclareshape{natoapp6c friendly sub surface}{%
  \inheritsavedanchors[from=natoapp6c base]
  \savedanchor\northeast{%
    \pgf@x=1.1\n@to@pp@r%
    \pgf@y=\n@to@pp@r}
  \savedanchor\cntrl{\pgf@x=0cm\pgf@y=-2.6\n@to@pp@r}
```

```
  \savedanchor\south{\pgf@x=0cm\pgf@y=-1.6\n@to@pp@r}
  \anchor{north east}{\northeast}
  \anchor{north west}{\northeast\pgf@x=-\pgf@x}
  \anchor{south east}{\northeast\wg@tmpa=\pgf@x\south\pgf@x=\wg@tmpa}
  \anchor{south west}{\northeast\wg@tmpa=\pgf@x\south\pgf@x=-\wg@tmpa}
  \anchor{south}{\south}
  \anchor{east}{
    \northeast\wg@tmpb=\pgf@y\wg@tmpa=\pgf@x%
    \south\wg@tmpc\pgf@y%
    \advance\wg@tmpb-\wg@tmpc
    \divide\wg@tmpb2%
    \advance\wg@tmpb\wg@tmpc%
    \pgf@x=\wg@tmpa%
    \pgf@y=\wg@tmpb}
  \anchor{west}{
    \northeast\wg@tmpb=\pgf@y\wg@tmpa=\pgf@x%
    \south\wg@tmpc\pgf@y%
    \advance\wg@tmpb-\wg@tmpc
    \divide\wg@tmpb2%
    \advance\wg@tmpb\wg@tmpc%
    \pgf@x=-\wg@tmpa%
    \pgf@y=\wg@tmpb}
  \anchor{north}{\northeast\pgf@x=0cm}
  \inheritanchor[from=natoapp6c base]{upper}
  \inheritanchor[from=natoapp6c base]{lower}
  \inheritanchor[from=natoapp6c base]{left}
  \inheritanchor[from=natoapp6c base]{right}
  \inheritanchor[from=natoapp6c base]{center}
  \backgroundpath{%
    \n@to@friendly@sub%
  }
  \behindforegroundpath{%
    \n@to@friendly@sub%
    \pgfusepath{stroke}%
  }
}
```

5.6.8 'Hostile' node shapes



natoapp6c hostile air

The hostile air command

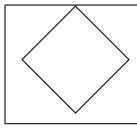
Macro for hostile air shape

```
\def\n@to@hostile@@ir{%
  \southeast \wg@tmpa=\pgf@x\wg@tmpb=\pgf@y%
  \cntrl \wg@tmpc=\pgf@y%
  \north \wg@tmpd=\pgf@y%
  \pgfpathmoveto{\pgfqpoint{-\wg@tmpa}{\wg@tmpb}}%
  \pgfpathlineto{\pgfqpoint{-\wg@tmpa}{\wg@tmpc}}%
```

```
  \pgfpathlineto{\pgfqpoint{ 0cm}{\wg@tmpd}}%
  \pgfpathlineto{\pgfqpoint{\wg@tmpa}{\wg@tmpc}}%
  \pgfpathlineto{\pgfqpoint{\wg@tmpa}{\wg@tmpb}}%
}
```

The hostile air command.

```
\pgfdeclareshape{natoapp6c hostile air}{%
  \inheritsavedanchors[from=natoapp6c base]
  \savedanchor\southeast{%
    \pgf@x=\n@to@pp@r%
    \pgf@y=-\n@to@pp@r}
  \savedanchor\cntrl{%
    \pgf@x=\n@to@pp@r%
    \pgf@y=0.414\n@to@pp@r% (sqrt(2)-1)
  }
  \savedanchor\north{\pgf@x=0cm\pgf@y=1.414\n@to@pp@r}
  \anchor{south east}{\southeast}
  \anchor{south west}{\southeast\pgf@x=-\pgf@x}
  \anchor{north east}{\southeast\wg@tmpa=\pgf@x\north\pgf@x=\wg@tmpa}
  \anchor{north west}{\southeast\wg@tmpa=\pgf@x\north\pgf@x=-\wg@tmpa}
  \anchor{north}{\north}
  \anchor{east}{%
    \north\wg@tmpb\pgf@y%
    \southeast\wg@tmpc=\pgf@y\wg@tmpa=\pgf@x%
    \advance\wg@tmpb-\wg@tmpc
    \divide\wg@tmpb2%
    \advance\wg@tmpb\wg@tmpc%
    \pgf@x=\wg@tmpa%
    \pgf@y=\wg@tmpb}
  \anchor{west}{%
    \north\wg@tmpb\pgf@y%
    \southeast\wg@tmpc=\pgf@y\wg@tmpa=\pgf@x%
    \advance\wg@tmpb-\wg@tmpc
    \divide\wg@tmpb2%
    \advance\wg@tmpb\wg@tmpc%
    \pgf@x=-\wg@tmpa%
    \pgf@y=\wg@tmpb}
  \anchor{south}{\southeast\pgf@x=0cm}
  \inheritanchor[from=natoapp6c base]{upper}
  \inheritanchor[from=natoapp6c base]{lower}
  \inheritanchor[from=natoapp6c base]{left}
  \inheritanchor[from=natoapp6c base]{right}
  \inheritanchor[from=natoapp6c base]{center}
  \backgroundpath{%
    \n@to@hostile@@ir%
  }
  \behindforegroundpath{%
    \n@to@hostile@@ir%
    \pgfusepath{stroke}%
  }
}
```



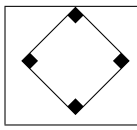
natoapp6c hostile land

Macro for hostile land command

```
\def\n@to@hostile@l@nd{%
  \northeast \wg@tmpa=\pgf@x\wg@tmpb=\pgf@y%
  \pgfpathmoveto{\pgfqpoint{ \wg@tmpa}{ 0cm}}%
  \pgfpathlineto{\pgfqpoint{ 0cm}{ \wg@tmpb}}%
  \pgfpathlineto{\pgfqpoint{-\wg@tmpa}{ 0cm}}%
  \pgfpathlineto{\pgfqpoint{ 0cm}{-\wg@tmpb}}%
  \pgfclosepath}
```

The hostile land command.

```
\pgfdeclareshape{natoapp6c hostile land}{%
  \inheritsavedanchors[from=natoapp6c base]
  \savedanchor\northeast{%
    \pgf@x=1.414\n@to@pp@r%
    \pgf@y=1.414\n@to@pp@r}
  \anchor{north east}{\northeast}
  \anchor{north west}{\northeast\pgf@x=-\pgf@x}
  \anchor{south east}{\northeast\pgf@y=-\pgf@y}
  \anchor{south west}{\northeast\pgf@x=-\pgf@x\pgf@y=-\pgf@y}
  \anchor{north}{\northeast\pgf@x=0cm}
  \anchor{south}{\northeast\pgf@x=0cm\pgf@y=-\pgf@y}
  \anchor{east}{\northeast\pgf@y=0cm}
  \anchor{west}{\northeast\pgf@x=-\pgf@x\pgf@y=0cm}
  \inheritanchor[from=natoapp6c base]{upper}
  \inheritanchor[from=natoapp6c base]{lower}
  \inheritanchor[from=natoapp6c base]{left}
  \inheritanchor[from=natoapp6c base]{right}
  \inheritanchor[from=natoapp6c base]{center}
  \backgroundpath{%
    \n@to@hostile@l@nd%
  }
  \behindforegroundpath{%
    \n@to@hostile@l@nd%
    \pgfusepath{stroke}%
  }
}
```



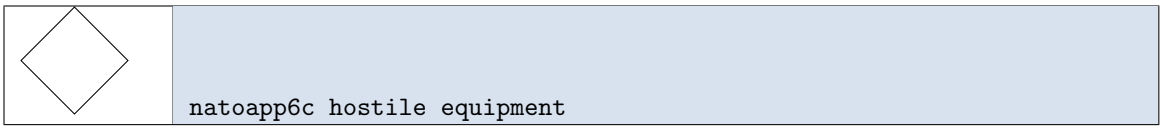
natoapp6c hostile activity

The hostile activity command. Similar to land command, but with boxes in the corners.

```
\pgfdeclareshape{natoapp6c hostile activity}{%
  \inheritsavedanchors[from=natoapp6c hostile land]
  \inheritanchor[from=natoapp6c hostile land]{center}
```

```
\inheritanchor[from=natoapp6c hostile land]{inner north east}
\inheritanchor[from=natoapp6c hostile land]{inner north west}
\inheritanchor[from=natoapp6c hostile land]{inner south west}
\inheritanchor[from=natoapp6c hostile land]{inner south east}
\inheritanchor[from=natoapp6c hostile land]{north east}
\inheritanchor[from=natoapp6c hostile land]{north west}
\inheritanchor[from=natoapp6c hostile land]{south east}
\inheritanchor[from=natoapp6c hostile land]{south west}
\inheritanchor[from=natoapp6c hostile land]{north}
\inheritanchor[from=natoapp6c hostile land]{west}
\inheritanchor[from=natoapp6c hostile land]{east}
\inheritanchor[from=natoapp6c hostile land]{south}
\inheritanchor[from=natoapp6c hostile land]{upper}
\inheritanchor[from=natoapp6c hostile land]{lower}
\inheritanchor[from=natoapp6c hostile land]{left}
\inheritanchor[from=natoapp6c hostile land]{right}
\inheritanchor[from=natoapp6c hostile land]{center}
\inheritbackgroundpath[from=natoapp6c hostile land]
\behindforegroundpath{
  \begin{n@to@pp@stroketofill}
    \n@to@hostile@l@nd%
    \pgfusepath{stroke}
    %
    \northeast \wg@tmpb=\pgf@y%
    \wg@tmpa=0.707\n@to@pp@act@w
    \wg@tmpc=\wg@tmpb\advance\wg@tmpc-1.414\n@to@pp@act@w
    \wg@tmpd=\wg@tmpb\advance\wg@tmpd-\wg@tmpa
    %
    \pgfpathmoveto{\pgfqpoint{ \wg@tmpa}{\wg@tmpd}}%
    \pgfpathlineto{\pgfqpoint{      0cm}{\wg@tmpb}}%
    \pgfpathlineto{\pgfqpoint{-\wg@tmpa}{\wg@tmpd}}%
    \pgfpathlineto{\pgfqpoint{      0cm}{\wg@tmpc}}%
    \pgfclosepath
    \pgfusepath{fill}%
    %
    \pgfpathmoveto{\pgfqpoint{-\wg@tmpc}{0cm}}%
    \pgfpathlineto{\pgfqpoint{-\wg@tmpd}{\wg@tmpa}}%
    \pgfpathlineto{\pgfqpoint{-\wg@tmpb}{0cm}}%
    \pgfpathlineto{\pgfqpoint{-\wg@tmpd}{-\wg@tmpa}}%
    \pgfclosepath
    \pgfusepath{fill}%
    %
    \pgfpathmoveto{\pgfqpoint{ \wg@tmpa}{-\wg@tmpd}}%
    \pgfpathlineto{\pgfqpoint{      0cm}{-\wg@tmpc}}%
    \pgfpathlineto{\pgfqpoint{-\wg@tmpa}{-\wg@tmpd}}%
    \pgfpathlineto{\pgfqpoint{      0cm}{-\wg@tmpb}}%
    \pgfclosepath
    \pgfusepath{fill}%
    %
    \pgfpathmoveto{\pgfqpoint{\wg@tmpb}{0cm}}%
    \pgfpathlineto{\pgfqpoint{\wg@tmpd}{\wg@tmpa}}%
    \pgfpathlineto{\pgfqpoint{\wg@tmpc}{0cm}}%
    \pgfpathlineto{\pgfqpoint{\wg@tmpd}{-\wg@tmpa}}%
```

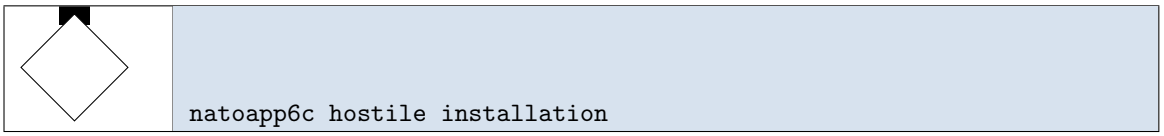
```
      \pgfclosepath
      \pgfusepath{fill}%
    \end{n@to@pp@stroketofill}
  }
}
```



natoapp6c hostile equipment

The hostile equipment command. Same as land command.

```
\pgfdeclareshape{natoapp6c hostile equipment}{%
  \inheritsavedanchors[from=natoapp6c hostile land]
  \inheritanchor[from=natoapp6c hostile land]{inner north east}
  \inheritanchor[from=natoapp6c hostile land]{inner north west}
  \inheritanchor[from=natoapp6c hostile land]{inner south west}
  \inheritanchor[from=natoapp6c hostile land]{inner south east}
  \inheritanchor[from=natoapp6c hostile land]{north east}
  \inheritanchor[from=natoapp6c hostile land]{north west}
  \inheritanchor[from=natoapp6c hostile land]{south east}
  \inheritanchor[from=natoapp6c hostile land]{south west}
  \inheritanchor[from=natoapp6c hostile land]{north}
  \inheritanchor[from=natoapp6c hostile land]{west}
  \inheritanchor[from=natoapp6c hostile land]{east}
  \inheritanchor[from=natoapp6c hostile land]{south}
  \inheritanchor[from=natoapp6c hostile land]{upper}
  \inheritanchor[from=natoapp6c hostile land]{lower}
  \inheritanchor[from=natoapp6c hostile land]{left}
  \inheritanchor[from=natoapp6c hostile land]{right}
  \inheritanchor[from=natoapp6c hostile land]{center}
  \inheritbackgroundpath[from=natoapp6c hostile land]
  \inheritbehindforegroundpath[from=natoapp6c hostile land]
}
```

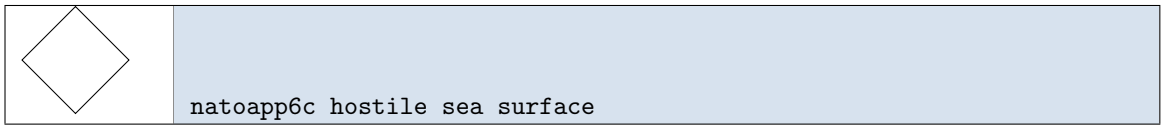


natoapp6c hostile installation

The hostile installation command. Similar to land command, but with a ‘hat’ on top.

```
\pgfdeclareshape{natoapp6c hostile installation}{%
  \inheritsavedanchors[from=natoapp6c hostile land]
  \inheritanchor[from=natoapp6c hostile land]{center}
  \inheritanchor[from=natoapp6c hostile land]{inner north east}
  \inheritanchor[from=natoapp6c hostile land]{inner north west}
  \inheritanchor[from=natoapp6c hostile land]{inner south west}
  \inheritanchor[from=natoapp6c hostile land]{inner south east}
  \inheritanchor[from=natoapp6c hostile land]{north east}
  \inheritanchor[from=natoapp6c hostile land]{north west}
```

```
  \inheritanchor[from=natoapp6c hostile land]{south east}
  \inheritanchor[from=natoapp6c hostile land]{south west}
  \inheritanchor[from=natoapp6c hostile land]{north}
  \inheritanchor[from=natoapp6c hostile land]{west}
  \inheritanchor[from=natoapp6c hostile land]{east}
  \inheritanchor[from=natoapp6c hostile land]{south}
  \inheritanchor[from=natoapp6c hostile land]{upper}
  \inheritanchor[from=natoapp6c hostile land]{lower}
  \inheritanchor[from=natoapp6c hostile land]{left}
  \inheritanchor[from=natoapp6c hostile land]{right}
  \inheritanchor[from=natoapp6c hostile land]{center}
  \inheritbackgroundpath[from=natoapp6c hostile land]
  \behindforegroundpath{
    \begin{n@to@pp@stroketofill}
      \n@to@hostile@l@nd%
      \pgfusepath{stroke}
      %
      \northeast \wg@tmpa=\pgf@x\wg@tmpb\pgf@y%
      \wg@tmpc=\wg@tmpb
      \advance\wg@tmpc\n@to@pp@inst@h%
      \advance\wg@tmpc-0.05cm%
      %
      \pgfpathmoveto{\pgfqpoint{ \wg@tmpa}{0cm}}
      \pgfpathlineto{\pgfqpoint{ \wg@tmpa}{\wg@tmpc}}
      \pgfpathlineto{\pgfqpoint{-\wg@tmpa}{\wg@tmpc}}
      \pgfpathlineto{\pgfqpoint{-\wg@tmpa}{0cm}}
      \pgfpathlineto{\pgfqpoint{ 0cm}{\wg@tmpb}}
      \pgfclosepath%
      \pgfusepath{clip}
      %
      \wg@tmpd=\wg@tmpb%
      \advance\wg@tmpd-\n@to@pp@inst@h%
      %
      \pgfpathmoveto{\pgfqpoint{ \n@to@pp@inst@x}{\wg@tmpc}}%
      \pgfpathlineto{\pgfqpoint{-\n@to@pp@inst@x}{\wg@tmpc}}%
      \pgfpathlineto{\pgfqpoint{-\n@to@pp@inst@x}{\wg@tmpd}}%
      \pgfpathlineto{\pgfqpoint{ \n@to@pp@inst@x}{\wg@tmpd}}%
      \pgfclosepath
      \pgfusepath{fill}%
    \end{n@to@pp@stroketofill}
  }
}
```

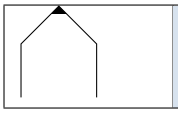


natoapp6c hostile sea surface

The hostile sea surface command. Same as land command

```
\pgfdeclareshape{natoapp6c hostile sea surface}{%
  \inheritsavedanchors[from=natoapp6c hostile equipment]
  \inheritanchor[from=natoapp6c hostile equipment]{inner north east}
```

```
  \inheritanchor[from=natoapp6c hostile equipment]{inner north west}
  \inheritanchor[from=natoapp6c hostile equipment]{inner south west}
  \inheritanchor[from=natoapp6c hostile equipment]{inner south east}
  \inheritanchor[from=natoapp6c hostile equipment]{north east}
  \inheritanchor[from=natoapp6c hostile equipment]{north west}
  \inheritanchor[from=natoapp6c hostile equipment]{south east}
  \inheritanchor[from=natoapp6c hostile equipment]{south west}
  \inheritanchor[from=natoapp6c hostile equipment]{north}
  \inheritanchor[from=natoapp6c hostile equipment]{west}
  \inheritanchor[from=natoapp6c hostile equipment]{east}
  \inheritanchor[from=natoapp6c hostile equipment]{south}
  \inheritanchor[from=natoapp6c hostile equipment]{upper}
  \inheritanchor[from=natoapp6c hostile equipment]{lower}
  \inheritanchor[from=natoapp6c hostile equipment]{left}
  \inheritanchor[from=natoapp6c hostile equipment]{right}
  \inheritanchor[from=natoapp6c hostile equipment]{center}
  \inheritbackgroundpath[from=natoapp6c hostile equipment]
  \inheritbehindforegroundpath[from=natoapp6c hostile equipment]
}
```

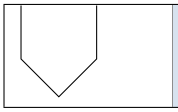


natoapp6c hostile space

The hostile space command. Similar to air command, but with bar on top.

```
\pgfdeclareshape{natoapp6c hostile space}{%
  \inheritsavedanchors[from=natoapp6c hostile air]
  \inheritanchor[from=natoapp6c hostile air]{north east}
  \inheritanchor[from=natoapp6c hostile air]{north west}
  \inheritanchor[from=natoapp6c hostile air]{south east}
  \inheritanchor[from=natoapp6c hostile air]{south west}
  \inheritanchor[from=natoapp6c hostile air]{north}
  \inheritanchor[from=natoapp6c hostile air]{west}
  \inheritanchor[from=natoapp6c hostile air]{east}
  \inheritanchor[from=natoapp6c hostile air]{south}
  \inheritanchor[from=natoapp6c hostile air]{upper}
  \inheritanchor[from=natoapp6c hostile air]{lower}
  \inheritanchor[from=natoapp6c hostile air]{left}
  \inheritanchor[from=natoapp6c hostile air]{right}
  \inheritanchor[from=natoapp6c hostile air]{center}
  \inheritbackgroundpath[from=natoapp6c hostile air]
  \behindforegroundpath{%
    \begin{n@to@pp@stroketofill}
      \n@to@hostile@@ir%
      \pgfusepath{stroke,clip}%
      %
      \north\wg@tmpa=\pgf@y\wg@tmpb=\pgf@y
      \advance\wg@tmpb-\n@to@pp@space@h
      %
      \pgfpathmoveto{\pgfqpoint{ \n@to@pp@r}{\wg@tmpa}}%
      \pgfpathlineto{\pgfqpoint{-\n@to@pp@r}{\wg@tmpa}}%
```

```
      \pgfpathlineto{\pgfqpoint{-\n@to@pp@r}{\wg@tmpb}}%
      \pgfpathlineto{\pgfqpoint{ \n@to@pp@r}{\wg@tmpb}}%
      \pgfclosepath%
      \pgfusepath{fill}%
    \end{n@to@pp@stroketofill}
  }
}
```



natoapp6c hostile sub surface

Macro for hostile sub surface command

```
\def\n@to@hostile@sub{%
  \northeast \wg@tmpa=\pgf@x\wg@tmpb=\pgf@y%
  \cntrl \wg@tmpc=\pgf@y%
  \south \wg@tmpd=\pgf@y%
  \pgfpathmoveto{\pgfqpoint{-\wg@tmpa}{\wg@tmpb}}%
  \pgfpathlineto{\pgfqpoint{-\wg@tmpa}{\wg@tmpc}}%
  \pgfpathlineto{\pgfqpoint{ 0cm}{\wg@tmpd}}%
  \pgfpathlineto{\pgfqpoint{\wg@tmpa}{\wg@tmpc}}%
  \pgfpathlineto{\pgfqpoint{\wg@tmpa}{\wg@tmpb}}%
}
```

The hostile sub surface command

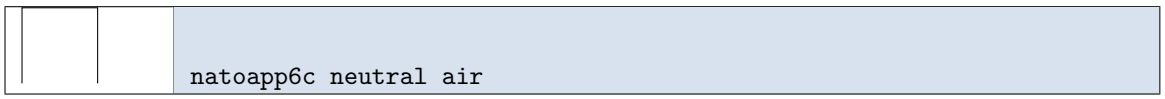
```
\pgfdeclareshape{natoapp6c hostile sub surface}{%
  \inheritsavedanchors[from=natoapp6c base]
  \savedanchor\northeast{%
    \pgf@x=\n@to@pp@r%
    \pgf@y=\n@to@pp@r}
  \savedanchor\cntrl{\pgf@x=\n@to@pp@r\pgf@y=-0.414\n@to@pp@r}
  \savedanchor\south{\pgf@x=0cm\pgf@y=-1.414\n@to@pp@r}
  \anchor{north east}{\northeast}
  \anchor{north west}{\northeast\pgf@x=-\pgf@x}
  \anchor{south east}{\northeast\wg@tmpa=\pgf@x\south\pgf@x=\wg@tmpa}
  \anchor{south west}{\northeast\wg@tmpa=\pgf@x\south\pgf@x=-\wg@tmpa}
  \anchor{south}{\south}
  \anchor{east}{
    \northeast\wg@tmpb=\pgf@y\wg@tmpa=\pgf@x%
    \south\wg@tmpc\pgf@y%
    \advance\wg@tmpb-\wg@tmpc
    \divide\wg@tmpb2%
    \advance\wg@tmpb\wg@tmpc%
    \pgf@x=\wg@tmpa%
    \pgf@y=\wg@tmpb}
  \anchor{west}{
    \northeast\wg@tmpb=\pgf@y\wg@tmpa=\pgf@x%
    \south\wg@tmpc\pgf@y%
    \advance\wg@tmpb-\wg@tmpc
    \divide\wg@tmpb2%
    \advance\wg@tmpb\wg@tmpc%
```

```
    \pgf@x=-\wg@tmpa%
    \pgf@y=\wg@tmpb}
  \anchor{north}{\northeast\pgf@x=0cm}
  \inheritanchor[from=natoapp6c base]{upper}
  \inheritanchor[from=natoapp6c base]{lower}
  \inheritanchor[from=natoapp6c base]{left}
  \inheritanchor[from=natoapp6c base]{right}
  \inheritanchor[from=natoapp6c base]{center}
  \backgroundpath{%
    \n@to@hostile@sub%
  }
  \behindforegroundpath{%
    \n@to@hostile@sub%
    \pgfusepath{stroke}%
  }
}
```

5.6.9 'Neutral' node shapes

Macro for neutral shapes

```
\def\n@to@pp@neutr@l@init{%
  \northeast\wg@tmpa=\pgf@x\wg@tmpb=\pgf@y%
  \def\n@to@pp@neutr@l@left  {\pgflineto{\pgfqpoint{-\wg@tmpa}{-\wg@tmpb}}}%
  \def\n@to@pp@neutr@l@right {\pgflineto{\pgfqpoint{ \wg@tmpa}{ \wg@tmpb}}}%
  \def\n@to@pp@neutr@l@top   {\pgflineto{\pgfqpoint{-\wg@tmpa}{ \wg@tmpb}}}%
  \def\n@to@pp@neutr@l@bottom{\pgflineto{\pgfqpoint{ \wg@tmpa}{-\wg@tmpb}}}%
  \def\n@to@pp@neutr@l@nw    {\pgfmoveto{\pgfqpoint{-\wg@tmpa}{ \wg@tmpb}}}%
  \def\n@to@pp@neutr@l@ne    {\pgfmoveto{\pgfqpoint{ \wg@tmpa}{ \wg@tmpb}}}%
  \def\n@to@pp@neutr@l@se    {\pgfmoveto{\pgfqpoint{ \wg@tmpa}{-\wg@tmpb}}}%
  \def\n@to@pp@neutr@l@sw    {\pgfmoveto{\pgfqpoint{-\wg@tmpa}{-\wg@tmpb}}}%
}
```



The neutral air command

```
\pgfdeclareshape{natoapp6c neutral air}{%
  \inheritsavedanchors[from=natoapp6c base]
  \savedanchor\northeast{\pgf@x=\n@to@pp@r\pgf@y=\n@to@pp@r}
  \anchor{north east}{\northeast}
  \anchor{north west}{\northeast\pgf@x=-\pgf@x}
  \anchor{south east}{\northeast\pgf@y=-\pgf@y}
  \anchor{south west}{\northeast\pgf@x=-\pgf@x\pgf@y=-\pgf@y}
  \anchor{north}{\northeast\pgf@x=0cm}
  \anchor{east}{\northeast\pgf@y=0cm}
  \anchor{west}{\northeast\pgf@x=-\pgf@x\pgf@y=0cm}
  \anchor{south}{\northeast\pgf@x=0cm\pgf@y=-\pgf@y}
  \inheritanchor[from=natoapp6c base]{upper}
  \inheritanchor[from=natoapp6c base]{lower}
```

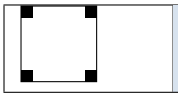
```
  \inheritanchor[from=natoapp6c base]{left}
  \inheritanchor[from=natoapp6c base]{right}
  \inheritanchor[from=natoapp6c base]{center}
  \backgroundpath{%
    \n@to@pp@neutr@l@init%
    \n@to@pp@neutr@l@se
    \n@to@pp@neutr@l@right%
    \n@to@pp@neutr@l@top%
    \n@to@pp@neutr@l@left%
  }
  \behindforegroundpath{%
    \n@to@pp@neutr@l@init%
    \n@to@pp@neutr@l@se
    \n@to@pp@neutr@l@right%
    \n@to@pp@neutr@l@top%
    \n@to@pp@neutr@l@left%
    \pgfusepath{stroke}%
  }
}
```

natoapp6c neutral land

The neutral land command

```
\pgfdeclareshape{natoapp6c neutral land}{%
  \inheritsavedanchors[from=natoapp6c neutral air]
  \inheritanchor[from=natoapp6c neutral air]{north east}
  \inheritanchor[from=natoapp6c neutral air]{north west}
  \inheritanchor[from=natoapp6c neutral air]{south east}
  \inheritanchor[from=natoapp6c neutral air]{south west}
  \inheritanchor[from=natoapp6c neutral air]{north}
  \inheritanchor[from=natoapp6c neutral air]{west}
  \inheritanchor[from=natoapp6c neutral air]{east}
  \inheritanchor[from=natoapp6c neutral air]{south}
  \inheritanchor[from=natoapp6c neutral air]{upper}
  \inheritanchor[from=natoapp6c neutral air]{lower}
  \inheritanchor[from=natoapp6c neutral air]{left}
  \inheritanchor[from=natoapp6c neutral air]{right}
  \inheritanchor[from=natoapp6c neutral air]{center}
  \backgroundpath{%
    \n@to@pp@neutr@l@init%
    \n@to@pp@neutr@l@ne
    \n@to@pp@neutr@l@top%
    \n@to@pp@neutr@l@left%
    \n@to@pp@neutr@l@bottom%
    \pgfclosepath
  }
  \behindforegroundpath{%
    \n@to@pp@neutr@l@init%
    \n@to@pp@neutr@l@ne
    \n@to@pp@neutr@l@top%
```

```
    \n@to@pp@neutr@l@left%
    \n@to@pp@neutr@l@bottom%
    \pgfclosepath
    \pgfusepath{stroke}%
  }
}
```



natoapp6c neutral activity

The neutral activity command. Similar to land command but with boxes added in the corners.

```
\pgfdeclareshape{natoapp6c neutral activity}{%
  \inheritsavedanchors[from=natoapp6c neutral land]
  \inheritanchor[from=natoapp6c neutral land]{center}
  \inheritanchor[from=natoapp6c neutral land]{inner north east}
  \inheritanchor[from=natoapp6c neutral land]{inner north west}
  \inheritanchor[from=natoapp6c neutral land]{inner south west}
  \inheritanchor[from=natoapp6c neutral land]{inner south east}
  \inheritanchor[from=natoapp6c neutral land]{north east}
  \inheritanchor[from=natoapp6c neutral land]{north west}
  \inheritanchor[from=natoapp6c neutral land]{south east}
  \inheritanchor[from=natoapp6c neutral land]{south west}
  \inheritanchor[from=natoapp6c neutral land]{north}
  \inheritanchor[from=natoapp6c neutral land]{west}
  \inheritanchor[from=natoapp6c neutral land]{east}
  \inheritanchor[from=natoapp6c neutral land]{south}
  \inheritanchor[from=natoapp6c neutral land]{upper}
  \inheritanchor[from=natoapp6c neutral land]{lower}
  \inheritanchor[from=natoapp6c neutral land]{left}
  \inheritanchor[from=natoapp6c neutral land]{right}
  \inheritanchor[from=natoapp6c neutral land]{center}
  \inheritbackgroundpath[from=natoapp6c neutral land]
  \behindforegroundpath{
    \begin{n@to@pp@stroketofill}
      \n@to@pp@neutr@l@init%
      \n@to@pp@neutr@l@ne
      \n@to@pp@neutr@l@top%
      \n@to@pp@neutr@l@left%
      \n@to@pp@neutr@l@bottom%
      \pgfclosepath
      \pgfusepath{stroke}
      %
      \northeast \wg@tmpa=\pgf@x\wg@tmpb\pgf@y%
      \wg@tmpc=\wg@tmpa\advance\wg@tmpc-\n@to@pp@act@w
      \wg@tmpd=\wg@tmpb\advance\wg@tmpd-\n@to@pp@act@w
      %
      \pgfpathmoveto{\pgfqpoint{\wg@tmpa}{\wg@tmpb}}%
      \pgfpathlineto{\pgfqpoint{\wg@tmpc}{\wg@tmpb}}%
      \pgfpathlineto{\pgfqpoint{\wg@tmpc}{\wg@tmpd}}%
      \pgfpathlineto{\pgfqpoint{\wg@tmpa}{\wg@tmpd}}%
      \pgfclosepath
```

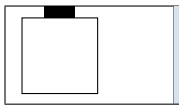
```
      \pgfusepath{fill}%
      %
      \pgfpathmoveto{\pgfqpoint{\wg@tmpa}{-\wg@tmpd}}%
      \pgfpathlineto{\pgfqpoint{\wg@tmpc}{-\wg@tmpd}}%
      \pgfpathlineto{\pgfqpoint{\wg@tmpc}{-\wg@tmpb}}%
      \pgfpathlineto{\pgfqpoint{\wg@tmpa}{-\wg@tmpb}}%
      \pgfclosepath
      \pgfusepath{fill}%
      %
      \pgfpathmoveto{\pgfqpoint{-\wg@tmpc}{\wg@tmpb}}%
      \pgfpathlineto{\pgfqpoint{-\wg@tmpa}{\wg@tmpb}}%
      \pgfpathlineto{\pgfqpoint{-\wg@tmpa}{\wg@tmpd}}%
      \pgfpathlineto{\pgfqpoint{-\wg@tmpc}{\wg@tmpd}}%
      \pgfclosepath
      \pgfusepath{fill}%
      %
      \pgfpathmoveto{\pgfqpoint{-\wg@tmpc}{-\wg@tmpd}}%
      \pgfpathlineto{\pgfqpoint{-\wg@tmpa}{-\wg@tmpd}}%
      \pgfpathlineto{\pgfqpoint{-\wg@tmpa}{-\wg@tmpb}}%
      \pgfpathlineto{\pgfqpoint{-\wg@tmpc}{-\wg@tmpb}}%
      \pgfclosepath
      \pgfusepath{fill}%
    \end{n@to@pp@stroketofill}
  }
}
```

	natoapp6c neutral equipment

The neutral equipment command. Same as land command

```
\pgfdeclareshape{natoapp6c neutral equipment}{%
  \inheritsavedanchors[from=natoapp6c neutral land]
  \inheritanchor[from=natoapp6c neutral land]{center}
  \inheritanchor[from=natoapp6c neutral land]{inner north east}
  \inheritanchor[from=natoapp6c neutral land]{inner north west}
  \inheritanchor[from=natoapp6c neutral land]{inner south west}
  \inheritanchor[from=natoapp6c neutral land]{inner south east}
  \inheritanchor[from=natoapp6c neutral land]{north east}
  \inheritanchor[from=natoapp6c neutral land]{north west}
  \inheritanchor[from=natoapp6c neutral land]{south east}
  \inheritanchor[from=natoapp6c neutral land]{south west}
  \inheritanchor[from=natoapp6c neutral land]{north}
  \inheritanchor[from=natoapp6c neutral land]{west}
  \inheritanchor[from=natoapp6c neutral land]{east}
  \inheritanchor[from=natoapp6c neutral land]{south}
  \inheritanchor[from=natoapp6c neutral land]{upper}
  \inheritanchor[from=natoapp6c neutral land]{lower}
  \inheritanchor[from=natoapp6c neutral land]{left}
  \inheritanchor[from=natoapp6c neutral land]{right}
  \inheritanchor[from=natoapp6c neutral land]{center}
  \inheritbackgroundpath[from=natoapp6c neutral land]
```

```
  \inheritbehindbackgroundpath[from=natoapp6c neutral land]
}
```



natoapp6c neutral installation

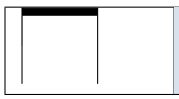
The neutral installation command. Similar to land command but with a ‘hat’ on top.

```
\pgfdeclareshape{natoapp6c neutral installation}{%
  \inheritsavedanchors[from=natoapp6c neutral land]
  \inheritanchor[from=natoapp6c neutral land]{center}
  \inheritanchor[from=natoapp6c neutral land]{inner north east}
  \inheritanchor[from=natoapp6c neutral land]{inner north west}
  \inheritanchor[from=natoapp6c neutral land]{inner south west}
  \inheritanchor[from=natoapp6c neutral land]{inner south east}
  \inheritanchor[from=natoapp6c neutral land]{north east}
  \inheritanchor[from=natoapp6c neutral land]{north west}
  \inheritanchor[from=natoapp6c neutral land]{south east}
  \inheritanchor[from=natoapp6c neutral land]{south west}
  \inheritanchor[from=natoapp6c neutral land]{north}
  \inheritanchor[from=natoapp6c neutral land]{west}
  \inheritanchor[from=natoapp6c neutral land]{east}
  \inheritanchor[from=natoapp6c neutral land]{south}
  \inheritanchor[from=natoapp6c neutral land]{upper}
  \inheritanchor[from=natoapp6c neutral land]{lower}
  \inheritanchor[from=natoapp6c neutral land]{left}
  \inheritanchor[from=natoapp6c neutral land]{right}
  \inheritanchor[from=natoapp6c neutral land]{center}
  \inheritbackgroundpath[from=natoapp6c neutral land]
  \behindforegroundpath{
    \begin{n@to@pp@stroketofill}
      \n@to@pp@neutr@l@init%
      \n@to@pp@neutr@l@ne
      \n@to@pp@neutr@l@top%
      \n@to@pp@neutr@l@left%
      \n@to@pp@neutr@l@bottom%
      \pgfclosepath
      \pgfusepath{stroke}
      %
      \northeast \wg@tmpa=\pgf@y%
      \wg@tmpb=\wg@tmpa\advance\wg@tmpb\n@to@pp@inst@h%
      %
      \pgfpathmoveto{\pgfqpoint{ \n@to@pp@inst@x}{\wg@tmpb}}%
      \pgfpathlineto{\pgfqpoint{-\n@to@pp@inst@x}{\wg@tmpb}}%
      \pgfpathlineto{\pgfqpoint{-\n@to@pp@inst@x}{\wg@tmpa}}%
      \pgfpathlineto{\pgfqpoint{ \n@to@pp@inst@x}{\wg@tmpa}}%
      \pgfclosepath
      \pgfusepath{fill}%
    \end{n@to@pp@stroketofill}
  }
}
```

natoapp6c neutral sea surface

The neutral sea surface command. Same as land command.

```
\pgfdeclareshape{natoapp6c neutral sea surface}{%
  \inheritsavedanchors[from=natoapp6c neutral equipment]
  \inheritanchor[from=natoapp6c neutral equipment]{inner north east}
  \inheritanchor[from=natoapp6c neutral equipment]{inner north west}
  \inheritanchor[from=natoapp6c neutral equipment]{inner south west}
  \inheritanchor[from=natoapp6c neutral equipment]{inner south east}
  \inheritanchor[from=natoapp6c neutral equipment]{north east}
  \inheritanchor[from=natoapp6c neutral equipment]{north west}
  \inheritanchor[from=natoapp6c neutral equipment]{south east}
  \inheritanchor[from=natoapp6c neutral equipment]{south west}
  \inheritanchor[from=natoapp6c neutral equipment]{north}
  \inheritanchor[from=natoapp6c neutral equipment]{west}
  \inheritanchor[from=natoapp6c neutral equipment]{east}
  \inheritanchor[from=natoapp6c neutral equipment]{south}
  \inheritanchor[from=natoapp6c neutral equipment]{upper}
  \inheritanchor[from=natoapp6c neutral equipment]{lower}
  \inheritanchor[from=natoapp6c neutral equipment]{left}
  \inheritanchor[from=natoapp6c neutral equipment]{right}
  \inheritanchor[from=natoapp6c neutral equipment]{center}
  \inheritbackgroundpath[from=natoapp6c neutral equipment]
  \inheritbehindforegroundpath[from=natoapp6c neutral equipment]
}
```

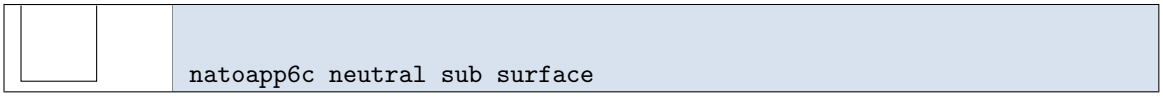


natoapp6c neutral space

The neutral space command. Similar to air command but with a bar.

```
\pgfdeclareshape{natoapp6c neutral space}{%
  \inheritsavedanchors[from=natoapp6c neutral air]
  \inheritanchor[from=natoapp6c neutral air]{north east}
  \inheritanchor[from=natoapp6c neutral air]{north west}
  \inheritanchor[from=natoapp6c neutral air]{south east}
  \inheritanchor[from=natoapp6c neutral air]{south west}
  \inheritanchor[from=natoapp6c neutral air]{north}
  \inheritanchor[from=natoapp6c neutral air]{west}
  \inheritanchor[from=natoapp6c neutral air]{east}
  \inheritanchor[from=natoapp6c neutral air]{south}
  \inheritanchor[from=natoapp6c neutral air]{upper}
  \inheritanchor[from=natoapp6c neutral air]{lower}
  \inheritanchor[from=natoapp6c neutral air]{left}
  \inheritanchor[from=natoapp6c neutral air]{right}
  \inheritanchor[from=natoapp6c neutral air]{center}
  \inheritbackgroundpath[from=natoapp6c neutral air]
  \behindforegroundpath{%
```

```
    \begin{n@to@pp@stroketofill}
      \n@to@pp@neutr@l@init%
      \n@to@pp@neutr@l@se
      \n@to@pp@neutr@l@right%
      \n@to@pp@neutr@l@top%
      \n@to@pp@neutr@l@left%
      \pgfusepath{stroke}%
      %
      \n@to@pp@neutr@l@ne
      \n@to@pp@neutr@l@top%
      \northeast\wg@tmpa=\pgf@x\wg@tmpb=\pgf@y%
      \advance\wg@tmpb-\n@to@pp@space@h
      %
      \pgfpathlineto{\pgfqpoint{-\wg@tmpa}{\wg@tmpc}}%
      \pgfpathlineto{\pgfqpoint{-\wg@tmpa}{\wg@tmpb}}%
      \pgfpathlineto{\pgfqpoint{ \wg@tmpa}{\wg@tmpb}}%
      \pgfclosepath%
      \pgfusepath{fill}%
    \end{n@to@pp@stroketofill}
  }
}
```



natoapp6c neutral sub surface

The neutral sub surface command

```
\pgfdeclareshape{natoapp6c neutral sub surface}{%
  \inheritsavedanchors[from=natoapp6c neutral air]
  \inheritanchor[from=natoapp6c neutral air]{north east}
  \inheritanchor[from=natoapp6c neutral air]{north west}
  \inheritanchor[from=natoapp6c neutral air]{south east}
  \inheritanchor[from=natoapp6c neutral air]{south west}
  \inheritanchor[from=natoapp6c neutral air]{north}
  \inheritanchor[from=natoapp6c neutral air]{west}
  \inheritanchor[from=natoapp6c neutral air]{east}
  \inheritanchor[from=natoapp6c neutral air]{south}
  \inheritanchor[from=natoapp6c neutral air]{upper}
  \inheritanchor[from=natoapp6c neutral air]{lower}
  \inheritanchor[from=natoapp6c neutral air]{left}
  \inheritanchor[from=natoapp6c neutral air]{right}
  \inheritanchor[from=natoapp6c neutral air]{center}
  \backgroundpath{%
    \n@to@pp@neutr@l@init%
    \n@to@pp@neutr@l@nw
    \n@to@pp@neutr@l@left%
    \n@to@pp@neutr@l@bottom%
    \n@to@pp@neutr@l@right%
  }
  \behindforegroundpath{%
    \n@to@pp@neutr@l@init%
    \n@to@pp@neutr@l@nw
```

```
    \n@to@pp@neutr@l@left%
    \n@to@pp@neutr@l@bottom%
    \n@to@pp@neutr@l@right%
    \pgfusepath{stroke}%
  }
}
```

5.6.10 'Unknown' node shapes

Macro to define unknown path elements

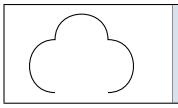
```
\def\n@to@pp@unknown@init{%
  \def\n@to@pp@unknown@top{%
    \innernortheast \wg@tmpa=\pgf@x%
    \cntrlnortheast \wg@tmpb=\pgf@x%
    \pgfpathcurveto{%
      \pgfqpoint{ \wg@tmpa}{\wg@tmpb}}{%
      \pgfqpoint{-\wg@tmpa}{\wg@tmpb}}{%
      \pgfqpoint{-\wg@tmpa}{\wg@tmpa}}}
  \def\n@to@pp@unknown@left{%
    \innernortheast \wg@tmpa=\pgf@x%
    \cntrlnortheast \wg@tmpb=\pgf@x%
    \pgfpathcurveto{%
      \pgfqpoint{-\wg@tmpb}{ \wg@tmpa}}{%
      \pgfqpoint{-\wg@tmpb}{-\wg@tmpa}}{%
      \pgfqpoint{-\wg@tmpa}{-\wg@tmpa}}}
  \def\n@to@pp@unknown@bottom{%
    \innernortheast \wg@tmpa=\pgf@x%
    \cntrlnortheast \wg@tmpb=\pgf@x%
    \pgfpathcurveto{%
      \pgfqpoint{-\wg@tmpa}{-\wg@tmpb}}{%
      \pgfqpoint{ \wg@tmpa}{-\wg@tmpb}}{%
      \pgfqpoint{ \wg@tmpa}{-\wg@tmpa}}}
  \def\n@to@pp@unknown@right{%
    \innernortheast \wg@tmpa=\pgf@x%
    \cntrlnortheast \wg@tmpb=\pgf@x%
    \pgfpathcurveto{%
      \pgfqpoint{ \wg@tmpb}{-\wg@tmpa}}{%
      \pgfqpoint{ \wg@tmpb}{ \wg@tmpa}}{%
      \pgfqpoint{ \wg@tmpa}{ \wg@tmpa}}}
}
```

natoapp6c unknown land

The unknown land command

```
\pgfdeclareshape{natoapp6c unknown land}{%
  \inheritsavedanchors[from=natoapp6c base]
  \savedanchor\innernortheast{\pgf@x=.7\n@to@pp@r\pgf@y=.7\n@to@pp@r}
```

```
  \savedanchor\cntrlnortheast{\pgf@x=1.6\n@to@pp@r\pgf@y=1.6\n@to@pp@r}
  \savedanchor\northeast{\pgf@x=1.4\n@to@pp@r\pgf@y=1.4\n@to@pp@r}
  \anchor{inner north east}{\innernortheast}
  \anchor{inner north west}{\innernortheast\pgf@x=-\pgf@x}
  \anchor{inner south west}{\innernortheast\pgf@x=-\pgf@x\pgf@y=-\pgf@y}
  \anchor{inner south east}{\innernortheast\pgf@y=-\pgf@y}
  \anchor{north east}{\northeast}
  \anchor{north west}{\northeast\pgf@x=-\pgf@x}
  \anchor{south west}{\northeast\pgf@x=-\pgf@x\pgf@y=-\pgf@y}
  \anchor{south east}{\northeast\pgf@y=-\pgf@y}
  \anchor{north}{\northeast\pgf@x=0cm}
  \anchor{east}{\northeast\pgf@y=0cm}
  \anchor{south}{\northeast\pgf@x=0cm\pgf@y=-\pgf@y}
  \anchor{west}{\northeast\pgf@x=-\pgf@x\pgf@y=0cm}
  \inheritanchor[from=natoapp6c base]{center}
  \inheritanchor[from=natoapp6c base]{upper}
  \inheritanchor[from=natoapp6c base]{lower}
  \inheritanchor[from=natoapp6c base]{left}
  \inheritanchor[from=natoapp6c base]{right}
  \backgroundpath{%
    \n@to@pp@unknown@init
    \innernortheast \wg@tmpa=\pgf@x%
    \pgfpathmoveto{\pgfqpoint{\wg@tmpa}{-\wg@tmpa}}%
    \n@to@pp@unknown@right %
    \n@to@pp@unknown@top   %
    \n@to@pp@unknown@left  %
    \n@to@pp@unknown@bottom%
  }
  \behindforegroundpath{%
    \n@to@pp@unknown@init
    \innernortheast \wg@tmpa=\pgf@x%
    \pgfpathmoveto{\pgfqpoint{\wg@tmpa}{-\wg@tmpa}}%
    \n@to@pp@unknown@right %
    \n@to@pp@unknown@top   %
    \n@to@pp@unknown@left  %
    \n@to@pp@unknown@bottom%
    \pgfusepath{stroke}}
}
```

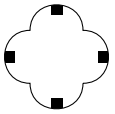


natoapp6c unknown air

The unknown air command. To consider: Should clipping path extend below the actual symbol to include that part of the base symbol?

```
\pgfdeclareshape{natoapp6c unknown air}{%
  \inheritsavedanchors[from=natoapp6c unknown land]
  \inheritanchor[from=natoapp6c unknown land]{inner north east}
  \inheritanchor[from=natoapp6c unknown land]{inner north west}
  \inheritanchor[from=natoapp6c unknown land]{inner south west}
  \inheritanchor[from=natoapp6c unknown land]{inner south east}
```

```
  \inheritanchor[from=natoapp6c unknown land]{north east}
  \inheritanchor[from=natoapp6c unknown land]{north west}
  \inheritanchor[from=natoapp6c unknown land]{north}
  \inheritanchor[from=natoapp6c unknown land]{west}
  \inheritanchor[from=natoapp6c unknown land]{east}
  \inheritanchor[from=natoapp6c unknown land]{upper}
  \inheritanchor[from=natoapp6c unknown land]{lower}
  \inheritanchor[from=natoapp6c unknown land]{left}
  \inheritanchor[from=natoapp6c unknown land]{right}
  \inheritanchor[from=natoapp6c unknown land]{center}
  \anchor{south}{\innernortheast\pgf@x=0cm\pgf@y=-\pgf@y}
  \anchor{south east}{
    \northeast\wg@tmpa=\pgf@x
    \innernortheast\pgf@y=-\pgf@y
    \pgf@x=\wg@tmpa}
  \anchor{south west}{
    \northeast\wg@tmpa=\pgf@x
    \innernortheast\pgf@y=-\pgf@y
    \pgf@x=-\wg@tmpa}
  \backgroundpath{%
    \n@to@pp@unknown@init
    \innernortheast \wg@tmpa=\pgf@x%
    \pgfpathmoveto{\pgfqpoint{\wg@tmpa}{-\wg@tmpa}}%
    \n@to@pp@unknown@right %
    \n@to@pp@unknown@top   %
    \n@to@pp@unknown@left  %
    \ifn@to@pp@isclip
    \pgfpathlineto{\pgfqpoint{0cm}{-\radius}}
    \pgfpathclose
    \fi
  }
  \behindforegroundpath{%
    \n@to@pp@unknown@init
    \innernortheast \wg@tmpa=\pgf@x%
    \pgfpathmoveto{\pgfqpoint{\wg@tmpa}{-\wg@tmpa}}%
    \n@to@pp@unknown@right %
    \n@to@pp@unknown@top   %
    \n@to@pp@unknown@left  %
    \pgfusepath{stroke}%
  }
}
```



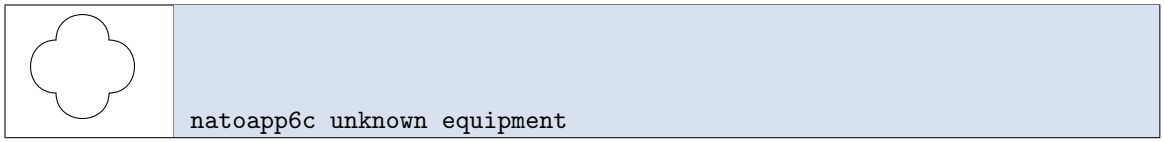
natoapp6c unknown activity

The unknown activity command. Similar to land command, but with boxes in the the ‘corners’.

```
\pgfdeclareshape{natoapp6c unknown activity}{%
  \inheritsavedanchors[from=natoapp6c unknown land]
  \inheritanchor[from=natoapp6c unknown land]{inner north east}
```

```
\inheritanchor[from=natoapp6c unknown land]{inner north west}
\inheritanchor[from=natoapp6c unknown land]{inner south west}
\inheritanchor[from=natoapp6c unknown land]{inner south east}
\inheritanchor[from=natoapp6c unknown land]{north east}
\inheritanchor[from=natoapp6c unknown land]{north west}
\inheritanchor[from=natoapp6c unknown land]{south east}
\inheritanchor[from=natoapp6c unknown land]{south west}
\inheritanchor[from=natoapp6c unknown land]{north}
\inheritanchor[from=natoapp6c unknown land]{west}
\inheritanchor[from=natoapp6c unknown land]{east}
\inheritanchor[from=natoapp6c unknown land]{south}
\inheritanchor[from=natoapp6c unknown land]{upper}
\inheritanchor[from=natoapp6c unknown land]{lower}
\inheritanchor[from=natoapp6c unknown land]{left}
\inheritanchor[from=natoapp6c unknown land]{right}
\inheritanchor[from=natoapp6c unknown land]{center}
\inheritbackgroundpath[from=natoapp6c unknown land]
\behindforegroundpath{
  \n@to@pp@unknown@init
  \innernortheast \wg@tmpa=\pgf@x%
  \begin{n@to@pp@stroketofill}
    \pgfpathmoveto{\pgfqpoint{\wg@tmpa}{-\wg@tmpa}}%
    \n@to@pp@unknown@right %
    \n@to@pp@unknown@top   %
    \n@to@pp@unknown@left  %
    \n@to@pp@unknown@bottom%
    \pgfusepath{stroke,clip}
    %
    \northeast\wg@tmpa\pgf@x
    \advance\wg@tmpa0.005cm
    \wg@tmpb=\wg@tmpa
    \advance\wg@tmpb-\n@to@pp@act@w
    \wg@tmpc=\n@to@pp@act@w
    \divide\wg@tmpc2
    %
    \pgfpathmoveto{\pgfqpoint{ \wg@tmpc}{\wg@tmpa}}%
    \pgfpathlineto{\pgfqpoint{-\wg@tmpc}{\wg@tmpa}}%
    \pgfpathlineto{\pgfqpoint{-\wg@tmpc}{\wg@tmpb}}%
    \pgfpathlineto{\pgfqpoint{ \wg@tmpc}{\wg@tmpb}}%
    \pgfclosepath%
    \pgfusepath{fill}
    %
    \pgfpathmoveto{\pgfqpoint{ \wg@tmpc}{-\wg@tmpb}}%
    \pgfpathlineto{\pgfqpoint{-\wg@tmpc}{-\wg@tmpb}}%
    \pgfpathlineto{\pgfqpoint{-\wg@tmpc}{-\wg@tmpa}}%
    \pgfpathlineto{\pgfqpoint{ \wg@tmpc}{-\wg@tmpa}}%
    \pgfclosepath%
    \pgfusepath{fill}
    %
    \pgfpathmoveto{\pgfqpoint{ \wg@tmpa}{ \wg@tmpc}}%
    \pgfpathlineto{\pgfqpoint{ \wg@tmpb}{ \wg@tmpc}}%
    \pgfpathlineto{\pgfqpoint{ \wg@tmpb}{-\wg@tmpc}}%
    \pgfpathlineto{\pgfqpoint{ \wg@tmpa}{-\wg@tmpc}}%
```

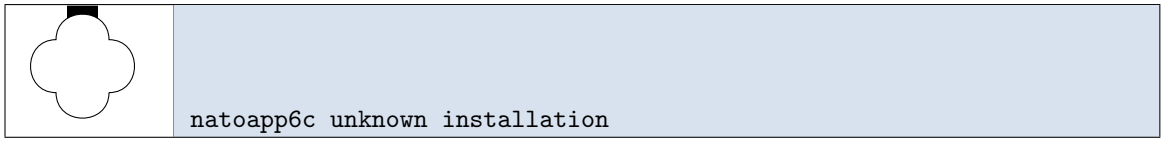
```
      \pgfclosepath%
      \pgfusepath{fill}
      %
      \pgfpathmoveto{\pgfqpoint{-\wg@tmpb}{ \wg@tmpc}}%
      \pgfpathlineto{\pgfqpoint{-\wg@tmpa}{ \wg@tmpc}}%
      \pgfpathlineto{\pgfqpoint{-\wg@tmpa}{-\wg@tmpc}}%
      \pgfpathlineto{\pgfqpoint{-\wg@tmpb}{-\wg@tmpc}}%
      \pgfclosepath%
      \pgfusepath{fill}
    \end{n@to@pp@stroketofill}
  }
}
```



natoapp6c unknown equipment

The unknown equipment command. Same as land command.

```
\pgfdeclareshape{natoapp6c unknown equipment}{%
  \inheritsavedanchors[from=natoapp6c unknown land]
  \inheritanchor[from=natoapp6c unknown land]{inner north east}
  \inheritanchor[from=natoapp6c unknown land]{inner north west}
  \inheritanchor[from=natoapp6c unknown land]{inner south west}
  \inheritanchor[from=natoapp6c unknown land]{inner south east}
  \inheritanchor[from=natoapp6c unknown land]{north east}
  \inheritanchor[from=natoapp6c unknown land]{north west}
  \inheritanchor[from=natoapp6c unknown land]{south east}
  \inheritanchor[from=natoapp6c unknown land]{south west}
  \inheritanchor[from=natoapp6c unknown land]{north}
  \inheritanchor[from=natoapp6c unknown land]{west}
  \inheritanchor[from=natoapp6c unknown land]{east}
  \inheritanchor[from=natoapp6c unknown land]{south}
  \inheritanchor[from=natoapp6c unknown land]{upper}
  \inheritanchor[from=natoapp6c unknown land]{lower}
  \inheritanchor[from=natoapp6c unknown land]{left}
  \inheritanchor[from=natoapp6c unknown land]{right}
  \inheritanchor[from=natoapp6c unknown land]{center}
  \inheritbackgroundpath[from=natoapp6c unknown land]
  \inheritbehindforegroundpath[from=natoapp6c unknown land]
}
```



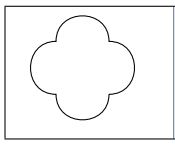
natoapp6c unknown installation

The unknown installation command. Similar to land command, but with a ‘hat’ on top. Note, NATO App6(d) makes the ‘hat’ lower part disconnected from the main symbol. I find that ugly, so we do it like NATO App6(c).

```
\pgfdeclareshape{natoapp6c unknown installation}{%
  \inheritsavedanchors[from=natoapp6c unknown land]
  \inheritanchor[from=natoapp6c unknown land]{center}
  \inheritanchor[from=natoapp6c unknown land]{inner north east}
  \inheritanchor[from=natoapp6c unknown land]{inner north west}
  \inheritanchor[from=natoapp6c unknown land]{inner south west}
  \inheritanchor[from=natoapp6c unknown land]{inner south east}
  \inheritanchor[from=natoapp6c unknown land]{north east}
  \inheritanchor[from=natoapp6c unknown land]{north west}
  \inheritanchor[from=natoapp6c unknown land]{south east}
  \inheritanchor[from=natoapp6c unknown land]{south west}
  \inheritanchor[from=natoapp6c unknown land]{north}
  \inheritanchor[from=natoapp6c unknown land]{west}
  \inheritanchor[from=natoapp6c unknown land]{east}
  \inheritanchor[from=natoapp6c unknown land]{south}
  \inheritanchor[from=natoapp6c unknown land]{upper}
  \inheritanchor[from=natoapp6c unknown land]{lower}
  \inheritanchor[from=natoapp6c unknown land]{left}
  \inheritanchor[from=natoapp6c unknown land]{right}
  \inheritanchor[from=natoapp6c unknown land]{center}
  \inheritbackgroundpath[from=natoapp6c unknown land]
  \behindforegroundpath{
    \n@to@pp@unknown@init
    \innernortheast \wg@tmpa=\pgf@x%

    \pgfpathmoveto{\pgfqpoint{\wg@tmpa}{-\wg@tmpa}}%
    \n@to@pp@unknown@right %
    \n@to@pp@unknown@top   %
    \n@to@pp@unknown@left  %
    \n@to@pp@unknown@bottom%
    \pgfusepath{stroke}
    %
    \begin{n@to@pp@stroketofill}
      \pgfpathmoveto{\pgfqpoint{\wg@tmpa}{\wg@tmpa}}%
      \n@to@pp@unknown@top   %
      %
      \northeast\wg@tmpb=\pgf@y\wg@tmpc=\pgf@y%
      \advance\wg@tmpb\n@to@pp@inst@h%
      \advance\wg@tmpb-0.05cm%
      \advance\wg@tmpc-\n@to@pp@inst@h%
      \advance\wg@tmpc-\n@to@pp@inst@h%
      %
      \pgfpathlineto{\pgfqpoint{-\wg@tmpa}{\wg@tmpb}}%
      \pgfpathlineto{\pgfqpoint{ \wg@tmpa}{\wg@tmpb}}%
      \pgfclosepath%
      \pgfusepath{clip}%
      %
      \pgfpathmoveto{\pgfqpoint{ \n@to@pp@inst@x}{\wg@tmpb}}%
      \pgfpathlineto{\pgfqpoint{-\n@to@pp@inst@x}{\wg@tmpb}}%
      \pgfpathlineto{\pgfqpoint{-\n@to@pp@inst@x}{\wg@tmpc}}%
      \pgfpathlineto{\pgfqpoint{ \n@to@pp@inst@x}{\wg@tmpc}}%
      \pgfclosepath%
      \pgfusepath{fill}%
```

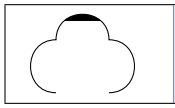
```
    \end{n@to@pp@stroketofill}
  }
}
```



natoapp6c unknown sea surface

The unknown sea surface command. Same as land command

```
\pgfdeclareshape{natoapp6c unknown sea surface}{%
  \inheritsavedanchors[from=natoapp6c unknown land]
  \inheritanchor[from=natoapp6c unknown land]{inner north east}
  \inheritanchor[from=natoapp6c unknown land]{inner north west}
  \inheritanchor[from=natoapp6c unknown land]{inner south west}
  \inheritanchor[from=natoapp6c unknown land]{inner south east}
  \inheritanchor[from=natoapp6c unknown land]{north east}
  \inheritanchor[from=natoapp6c unknown land]{north west}
  \inheritanchor[from=natoapp6c unknown land]{south east}
  \inheritanchor[from=natoapp6c unknown land]{south west}
  \inheritanchor[from=natoapp6c unknown land]{north}
  \inheritanchor[from=natoapp6c unknown land]{west}
  \inheritanchor[from=natoapp6c unknown land]{east}
  \inheritanchor[from=natoapp6c unknown land]{south}
  \inheritanchor[from=natoapp6c unknown land]{upper}
  \inheritanchor[from=natoapp6c unknown land]{lower}
  \inheritanchor[from=natoapp6c unknown land]{left}
  \inheritanchor[from=natoapp6c unknown land]{right}
  \inheritanchor[from=natoapp6c unknown land]{center}
  \inheritbackgroundpath[from=natoapp6c unknown land]
  \inheritbehindforegroundpath[from=natoapp6c unknown land]
}
```

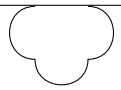


natoapp6c unknown space

The unknown space command. Similar to air command, but with a top bar.

```
\pgfdeclareshape{natoapp6c unknown space}{%
  \inheritsavedanchors[from=natoapp6c unknown air]
  \inheritanchor[from=natoapp6c unknown air]{inner north east}
  \inheritanchor[from=natoapp6c unknown air]{inner north west}
  \inheritanchor[from=natoapp6c unknown air]{inner south west}
  \inheritanchor[from=natoapp6c unknown air]{inner south east}
  \inheritanchor[from=natoapp6c unknown air]{north east}
  \inheritanchor[from=natoapp6c unknown air]{north west}
  \inheritanchor[from=natoapp6c unknown air]{south east}
  \inheritanchor[from=natoapp6c unknown air]{south west}
  \inheritanchor[from=natoapp6c unknown air]{north}
```

```
  \inheritanchor[from=natoapp6c unknown air]{west}
  \inheritanchor[from=natoapp6c unknown air]{east}
  \inheritanchor[from=natoapp6c unknown air]{south}
  \inheritanchor[from=natoapp6c unknown air]{upper}
  \inheritanchor[from=natoapp6c unknown air]{lower}
  \inheritanchor[from=natoapp6c unknown air]{left}
  \inheritanchor[from=natoapp6c unknown air]{right}
  \inheritanchor[from=natoapp6c unknown air]{center}
  \inheritbackgroundpath[from=natoapp6c unknown air]
  \behindforegroundpath{%
    \n@to@pp@unknown@init
    \innernortheast \wg@tmpa=\pgf@x%
    \begin{n@to@pp@stroketofill}
      \pgfpathmoveto{\pgfqpoint{\wg@tmpa}{-\wg@tmpa}}%
      \n@to@pp@unknown@right %
      \n@to@pp@unknown@top   %
      \n@to@pp@unknown@left  %
      \pgfusepath{stroke,clip}%
      %
      \northeast\wg@tmpa=\pgf@y\wg@tmpb=\pgf@y
      \advance\wg@tmpb-\n@to@pp@space@h
      %
      \pgfpathmoveto{\pgfqpoint{ \radius}{\wg@tmpa}}%
      \pgfpathlineto{\pgfqpoint{-\radius}{\wg@tmpa}}%
      \pgfpathlineto{\pgfqpoint{-\radius}{\wg@tmpb}}%
      \pgfpathlineto{\pgfqpoint{ \radius}{\wg@tmpb}}%
      \pgfclosepath%
      \pgfusepath{fill}%
    \end{n@to@pp@stroketofill}
  }
}
```



natoapp6c unknown sub surface

The unknown sub surface command.

```
\pgfdeclareshape{natoapp6c unknown sub surface}{%
  \inheritsavedanchors[from=natoapp6c unknown land]
  \inheritanchor[from=natoapp6c unknown land]{inner north east}
  \inheritanchor[from=natoapp6c unknown land]{inner north west}
  \inheritanchor[from=natoapp6c unknown land]{inner south west}
  \inheritanchor[from=natoapp6c unknown land]{inner south east}
  \inheritanchor[from=natoapp6c unknown land]{south east}
  \inheritanchor[from=natoapp6c unknown land]{south west}
  \inheritanchor[from=natoapp6c unknown land]{south}
  \inheritanchor[from=natoapp6c unknown land]{west}
  \inheritanchor[from=natoapp6c unknown land]{east}
  \inheritanchor[from=natoapp6c unknown land]{upper}
  \inheritanchor[from=natoapp6c unknown land]{lower}
  \inheritanchor[from=natoapp6c unknown land]{left}
  \inheritanchor[from=natoapp6c unknown land]{right}
```

```
  \inheritanchor[from=natoapp6c unknown land]{center}
  \anchor{north}{\innernortheast\pgf@x=0cm}
  \anchor{north east}{
    \northeast\wg@tmpa=\pgf@x
    \innernortheast\pgf@y=\pgf@y
    \pgf@x=\wg@tmpa}
  \anchor{north west}{
    \northeast\wg@tmpa=\pgf@x
    \innernortheast\pgf@y=\pgf@y
    \pgf@x=-\wg@tmpa}
  \backgroundpath{%
    \n@to@pp@unknown@init
    \innernortheast \wg@tmpa=\pgf@x%
    \pgfpathmoveto{\pgfqpoint{-\wg@tmpa}{\wg@tmpa}}%
    \n@to@pp@unknown@left %
    \n@to@pp@unknown@bottom   %
    \n@to@pp@unknown@right  %
    \ifn@to@pp@isclip
    \pgfpathlineto{\pgfqpoint{0cm}{\radius}}
    \pgfpathclose
    \fi
  }
  \behindforegroundpath{%
    \n@to@pp@unknown@init
    \innernortheast \wg@tmpa=\pgf@x%
    \pgfpathmoveto{\pgfqpoint{-\wg@tmpa}{\wg@tmpa}}%
    \n@to@pp@unknown@left %
    \n@to@pp@unknown@bottom   %
    \n@to@pp@unknown@right  %
    \pgfusepath{stroke}}
}
```

5.6.11 Echelons

Dimensions

```
\def\n@to@pp@e@y{.12}
\def\n@to@pp@e@yy{.24}
```

Paths as macros

```
\def\n@to@pp@e@d#1{($(#1*\n@to@pp@e@y,0)$) circle(0.09)}
\def\n@to@pp@e@b#1{%
  ($(#1*\n@to@pp@e@y,-\n@to@pp@e@y)$) -- ($(#1*\n@to@pp@e@y,\n@to@pp@e@y)$)}
\def\n@to@pp@e@x#1{%
  ($(-\n@to@pp@e@y,-\n@to@pp@e@y)+(#1*\n@to@pp@e@y,0)$)--
  ++(\n@to@pp@e@yy,\n@to@pp@e@yy)
  ($(-\n@to@pp@e@y, \n@to@pp@e@y)+(#1*\n@to@pp@e@y,0)$)--
  ++(\n@to@pp@e@yy,-\n@to@pp@e@yy)}
```

Pictures

```
\tikzset{
  pics/natoapp6c/s/echelon/.is choice,
```

```
  pics/natoapp6c/s/echelon/squad/.style={code={
      \path[draw,fill=pgfstrokecolor,pic actions]
      \foreach \o in {0}{\n@to@pp@e@d{\o}};}},
  pics/natoapp6c/s/echelon/section/.style={code={
      \path[draw,fill=pgfstrokecolor,pic actions]
      \foreach \o in {-1,1}{\n@to@pp@e@d{\o}};}},
  pics/natoapp6c/s/echelon/platoon/.style={code={
      \path[draw,fill=pgfstrokecolor,pic actions]
      \foreach \o in {-2,0,2}{\n@to@pp@e@d{\o}};}},
  pics/natoapp6c/s/echelon/company/.style={code={
      \path[draw,pic actions]
      \foreach \o in {0}{\n@to@pp@e@b{\o}};}},
  pics/natoapp6c/s/echelon/battalion/.style={code={
      \path[draw,pic actions]
      \foreach \o in {-1,1}{\n@to@pp@e@b{\o}};}},
  pics/natoapp6c/s/echelon/regiment/.style={code={
      \path[draw,pic actions]
      \foreach \o in {-2,0,2}{\n@to@pp@e@b{\o}};}},
  pics/natoapp6c/s/echelon/brigade/.style={code={
      \path[draw,pic actions]
      \foreach \o in {0}{\n@to@pp@e@x{\o}};}},
  pics/natoapp6c/s/echelon/division/.style={code={
      \path[draw,pic actions]
      \foreach \o in {-1,1}{\n@to@pp@e@x{\o}};}},
  pics/natoapp6c/s/echelon/corps/.style={code={
      \path[draw,pic actions]
      \foreach \o in {-2,0,2}{\n@to@pp@e@x{\o}};}},
  pics/natoapp6c/s/echelon/army/.style={code={
      \path[draw,pic actions]
      \foreach \o in {-3,-1,1,3}{\n@to@pp@e@x{\o}};}},
  pics/natoapp6c/s/echelon/army group/.style={code={
      \path[draw,pic actions]
      \foreach \o in {-4,-2,0,2,4}{\n@to@pp@e@x{\o}};}},
  pics/natoapp6c/s/echelon/theatre/.style={code={
      \path[draw,pic actions]
      \foreach \o in {-5,-3,-1,1,3,5}{\n@to@pp@e@x{\o}};}},
  pics/natoapp6c/s/echelon/command/.style={code={
      \path[draw,pic actions]
      (-.3,-.1) -- (-.3,.1) (-.4,  0) -- (-.2, 0)
      ( .3,-.1) -- ( .3,.1) ( .4,  0) -- ( .2, 0);}},
  pics/natoapp6c/s/echelon/dummy/.style={code={%
      \path[draw,pic actions] (M.north west) rectangle
      ($(M.north east)+(0,.1)$);}},
}
```

5.6.12 Text on symbols

```
/tikz/natoapp6c/normal text
/tikz/natoapp6c/squashed text
/tikz/natoapp6c/small text
/tikz/natoapp6c/small squashed text
```

NATO App6 does not specify any particular font for text symbols (main, modifiers, or amplifiers) but here we choose to use TEX Gyro Heros (a Gothic font, i.e., Helvetica-like).

```
\newcommand\n@to@ppfont[2][b]{%
  \fontencoding{T1}\fontfamily{qhv}\fontseries{#1}\fontsize{#2}{0}\selectfont}
\tikzset{%
  natoapp6c/text/.style={%
    shape=rectangle,%
    draw=none,%
    fill=none,%
    transform shape,%
    anchor=center},
  natoapp6c/normal text/.style={font=\n@to@ppfont{12}},
  natoapp6c/squashed text/.style={font=\n@to@ppfont[bc]{12}},
  natoapp6c/small text/.style={font=\n@to@ppfont{10}},
  natoapp6c/squashed small text/.style={font=\n@to@ppfont[bc]{10}},
}
```

`\n@to@pp@text@normal`
`\n@to@pp@text@squashed`
`\n@to@pp@text@small`
`\n@to@pp@text@smallsquashed`

These macros are short-hands for making a node at $(0, 0)$ in the local scope.

```
\newcommand\n@to@pp@text@normal[2][]  {%
  \node[natoapp6c/text,natoapp6c/normal text,#1]{#2}}
\newcommand\n@to@pp@text@squashed[2][]{%
  \node[natoapp6c/text,natoapp6c/squashed text,#1]{#2}}
\newcommand\n@to@pp@text@small[2][]   {%
  \node[natoapp6c/text,natoapp6c/small text,#1]{#2}}
\newcommand\n@to@pp@text@smallsquashed[2][]{%
  \node[natoapp6c/text,natoapp6c/squashed small text,#1]{#2}}
```

5.6.13 Text `natoapp6c` namespace

`/natoapp6c`

Here, we set up the key path `/natoapp6c`

```
\def\natoapp@report{}
\tikzset{
  /natoapp6c/.search also={/tikz},
  /natoapp6c/.cd,
}
```

Choices of faction, command, and echelon

natoapp6c/id
natoapp6c/fac
natoapp6c/cmd
natoapp6c/ech

The keys id, specfac, cmd, and ech are internal keys used to store the choice of faction, command, and echelon, respectively, in.

```
\tikzset{
  /natoapp6c/.cd,
  id/.store in=\natoapp@id,
  fac/.store in=\natoapp@fac,
  cmd/.store in=\natoapp@cmd,
  ech/.store in=\natoapp@ech,
}
```

natoapp6c/faction

Choice of ⟨*faction*⟩. This is limited to predefined values. The choice is stored in the key natoapp6c/fac.

```
\tikzset{
  /natoapp6c/.cd,
  faction/.is choice,
  faction/none/.code={\let\natoapp@fac\@undefined},
  faction/friendly/.style={fac=friendly},
  faction/friend/.style={fac=friendly},
  faction/hostile/.style={fac=hostile},
  faction/enemy/.style={fac=hostile},
  faction/neutral/.style={fac=neutral},
  faction/unknown/.style={fac=unknown},
  faction/?/.style={fac=unknown},
  faction/.initial=friendly,
}
```

natoapp6c/command

Choice of ⟨*command*⟩. This is limited to predefined values. The choice is stored in the key natoapp6c/cmd.

```
\tikzset{
  /natoapp6c/.cd,
  command/.is choice,
  command/base/.style={cmd=base},
  command/activity/.style={cmd=activity},
  command/air/.style={cmd=air},
  command/missile/.style={cmd=air},
  command/equipment/.style={cmd=equipment},
  command/installation/.style={cmd=installation},
  command/land/.style={cmd=land},
  command/sea surface/.style={cmd=sea surface},
  command/space/.style={cmd=space},
  command/sub surface/.style={cmd=sub surface},
  command/sea mine/.style={cmd=sub surface},
```

```
}
```

natoapp6c/echolon

Unit size. The choice is limited to one of the below. The choice is stored in the key `natoapp6c/ech`.

```
\tikzset{
  /natoapp6c/.cd,
  echelon/.is choice,
  echelon/none/.style={ech=},
  echelon/team/.style={ech=},
  echelon/squad/.style={ech=squad},
  echelon/section/.style={ech=section},
  echelon/platoon/.style={ech=platoon},
  echelon/company/.style={ech=company},
  echelon/battalion/.style={ech=battalion},
  echelon/regiment/.style={ech=regiment},
  echelon/brigade/.style={ech=brigade},
  echelon/division/.style={ech=division},
  echelon/corps/.style={ech=corps},
  echelon/army/.style={ech=army},
  echelon/army group/.style={ech=army group},
  echelon/theatre/.style={ech=theatre},
  echelon/command/.style={ech=command},
  echelon/dummy/.style={ech=dummy},
}
```

natoapp6c/main
natoapp6c/left
natoapp6c/right
natoapp6c/top
natoapp6c/bottom
natoapp6c/below
natoapp6c/frame

\natoapp@main
\natoapp@left
\natoapp@right
\natoapp@upper
\natoapp@lower
\natoapp@below

The various parts of the symbols. The keys `upper` and `lower` are aliases for `top` and `bottom`, respectively. The choices are stored in macros

```
\newif\ifnatoapp@decoy\natoapp@decoyfalse
\tikzset{
  /natoapp6c/.cd,
  main/.store in=\natoapp@main,   main/.initial=,%
  left/.store in=\natoapp@left,   left/.initial=,%
```

```
  right/.store in=\natoapp@right, right/.initial=,%
  upper/.store in=\natoapp@upper, upper/.initial=,%
  lower/.store in=\natoapp@lower, lower/.initial=,%
  top/.store in=\natoapp@upper,%
  bottom/.store in=\natoapp@lower,%
  below/.store in=\natoapp@below, below/.initial=,%
  frame/.store in=\natoapp@frame, frame/.initial=,%
  decoy/.is if=natoapp@decoy,%
}
```

```
/tikz/natoapp6c/main
/tikz/natoapp6c/modifiers
/tikz/natoapp6c/lower
/tikz/natoapp6c/upper
/tikz/natoapp6c/left
/tikz/natoapp6c/right
/tikz/natoapp6c/echelon
/tikz/natoapp6c/below
```

Styles used by the various parts of the symbol.

```
\tikzset{
  natoapp6c/parts/.style={draw,shape=rectangle,transform shape},
  natoapp6c/main/.style={natoapp6c/parts},
  natoapp6c/modifiers/.style={natoapp6c/parts,scale=.6},
  natoapp6c/lower/.style={natoapp6c/parts},
  natoapp6c/upper/.style={natoapp6c/parts},
  natoapp6c/left/.style={natoapp6c/parts},
  natoapp6c/right/.style={natoapp6c/parts},
  natoapp6c/echelon/.style={natoapp6c/parts},
  natoapp6c/below/.style={natoapp6c/parts}
}
```

5.6.14 The natoapp6c styles

```
/tikz/natoapp6c
```

This key sets up a node to make a NATO App6(c) symbol. The key takes a single argument which in turn must contain key–value pairs in the `/natoapp6c` (or `/tikz`) namespace(s). We set the `shape` parameter of the node, and calls the passed keys in the `/natoapp6c` namespace to set-up elements of the chit.

```
\tikzset{%
  natoapp6c/.code={%
    \pgfkeys{/tikz/transform shape,/tikz/shape=natoapp6c}
    \pgfkeys{/natoapp6c/.cd,#1}}}
```

We define a counter to set-up unique names for symbol nodes.

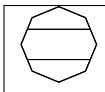
```
\newcounter{natoappid}\setcounter{natoappid}{0}
```

5.6.15 The \natoapp6c shape

\ifn@to@pp@below
\ifn@to@pp@mod

We define an \if to allow us to detect if something is rendered below the frame

```
\newif\ifn@to@pp@below\n@to@pp@belowfalse%
\newif\ifn@to@pp@mod\n@to@pp@modfalse%
```



natoapp6c

Next, we define the mother shape of NATO App6(c) nodes. This is a composite node with sub-nodes for the various parts (including the frame) of the symbol.

It is quite complex so we will go through the implementation in bits.

First, we make some saved anchors (the centre) and macros (identifier, frame type, and frame options).

```
\pgfdeclareshape{natoapp6c}{%
  \savedanchor\center{\pgf@x=0cm\pgf@y=0cm}
  \savedmacro\id{%
    \n@to@pp@dbg{3}{NATO App6(c) id (set): \meaning\natoapp@id}
    \@ifundefined{natoapp@id}{\let\natoapp@id\pgfutil@empty}{}%
    \ifx\natoapp@id\pgfutil@empty\relax%
      \wg@r@ndom@id%
      \edef\id{natoapp6c\wg@uuid}%
    \else%
      \edef\id{\natoapp@id}%
    \fi%
    \n@to@pp@dbg{3}{NATO App6(c) id: \meaning\id}}
  \savedmacro\frameshape{%
    \let\frameshape\pgfutil@empty%
    \@ifundefined{natoapp@cmd}{\def\frameshape{base}}{%
      \edef\frameshape{\natoapp@cmd}
      \@ifundefined{natoapp@fac}{\def\frameshape{base}}{%
        \edef\frameshape{\natoapp@fac\space\frameshape}}}
    \n@to@pp@dbg{3}{NATO App6(c) frame shape: \meaning\frameshape}}
  \savedmacro\frameopt{%
    \let\frameopt\pgfutil@empty%
    \@ifundefined{natoapp@frame}{}{%
      \edef\frameopt{\natoapp@frame}}
    \n@to@pp@dbg{3}{NATO App6(c) Frame options: \meaning\frameopt}%
  }
```

Then we define a number of regular anchors

```
  \anchor{center}    {\center}
```

The remaining anchors depend on the shape being used. We reference the anchors of the embedded node of the frame.

```
  \anchor{north east}{\wg@sub@nchor{M\id}{north east}}
```

```
15678   \anchor{north west}{\wg@sub@nchor{M\id}{north west}}
15679   \anchor{south east}{\wg@sub@nchor{M\id}{south east}}
15680   \anchor{south west}{\wg@sub@nchor{M\id}{south west}}
15681   \anchor{north}     {\wg@sub@nchor{M\id}{north}}
15682   \anchor{west}      {\wg@sub@nchor{M\id}{west}}
15683   \anchor{south}     {\wg@sub@nchor{M\id}{south}}
15684   \anchor{east}      {\wg@sub@nchor{M\id}{east}}
15685   \anchor{upper}     {\wg@sub@nchor{M\id}{upper}}
15686   \anchor{lower}     {\wg@sub@nchor{M\id}{lower}}
15687   \anchor{left}      {\wg@sub@nchor{M\id}{left}}
15688   \anchor{right}     {\wg@sub@nchor{M\id}{right}}
```

The next two anchors are a little funny.

```
15689   \anchor{echelon}   {%
15690     \n@to@pp@dbg{3}{NATO App6(c) get echelon anchor}%
15691     \wg@sub@nchor{M\id}{north}%
15692     \wg@tmpa=\n@to@pp@e@y cm%
15693     \advance\pgf@y\wg@tmpa%
15694   }%
15695   \anchor{below}     {%
15696     \n@to@pp@dbg{3}{NATO App6(c) get below anchor}%
15697     \wg@sub@nchor{M\id}{south}
15698     \wg@tmpa=\n@to@pp@e@yy cm%
15699     \advance\pgf@y-\wg@tmpa}
```

All right, so time to make the actual frame. Note that we do this in a 'behind' path so we can actually draw stuff. First, we flag that we're not in a modifier, nor in the 'below' part.

```
15700   \behindbackgroundpath{%
15701     \n@to@pp@dbg{3}{NATO App6(c) background path: \meaning\id
15702       ^^J  ID:      \meaning\natoapp@id
15703       ^^J  Faction: \meaning\natoapp@fac
15704       ^^J  Command: \meaning\natoapp@cmd
15705       ^^J  Echelon: \meaning\natoapp@ech
15706       ^^J  Main:    \meaning\natoapp@main
15707       ^^J  Left:    \meaning\natoapp@left
15708       ^^J  Right:   \meaning\natoapp@right
15709       ^^J  Upper:   \meaning\natoapp@upper
15710       ^^J  Lower:   \meaning\natoapp@lower
15711       ^^J  Below:   \meaning\natoapp@below
15712       ^^J  Shape:   \meaning\frameshape
15713       ^^J  Options: \meaning\frameopt}
15714     \natoapp@report
15715     \n@to@pp@modfalse
15716     \n@to@pp@belowfalse
```

If the symbol is empty, then do nothing.

```
15717     \ifx\frameshape\pgfutil@empty%
15718     \n@to@pp@dbg{2}{NATO App6(c) has no frame!}
15719     \else
```

We start a scope because we want to do some clipping here. Then, we use the frame to clip the remaining part. Note

that we do this via a node which we give the identifier `M`. Various elements of the symbol can then refer to this shape to define paths, etc.

```
    \begin{scope}
      \pgfinterruptboundingbox
      %% Clip to shape in scope
      %% \message{^^JClipping to NATO App6(c) shape}
      \n@to@pp@iscliptrue%
      \n@to@pp@dbg{2}{NATO App6(c) frame node M (clip)}
      \pgfnode{natoapp6c \frameshape}{center}{}{M}{\pgfusepath{clip}}
      \n@to@pp@isclipfalse%
```

Next, we should see if we need to fill the frame. We do that by expanding the passed `frame` key-values in a scope, and *then* get the fill colour.

```
      %% Start new scope including frame key options
      \edef\tmp@opt{[\frameopt]}
      \expandafter\scope\tmp@opt
      % Get fill color {possibly from frame key}
      \expandafter\let\expandafter\tmp@fill%
      \csname\string\color@pgffillcolor\endcsname%
```

If the fill colour is not `\relax`, then we fill the frame. Note that this is done in the background, so when we draw in the foreground we will render on top of the fill.

```
      % Check if we need to fill shape (fill colour us not \relax)
      \ifx\tmp@fill\relax\else%
      \n@to@pp@dbg{2}{NATO App6(c) frame fill}
      \pgfnode{natoapp6c \frameshape}{center}{}{}{\pgfusepath{fill}}%
      \fi%
      % End the fill scope
      \endscope%
```

Now we need to render some of the elements of the symbol. We start with the main elements. We can specify many main elements (to make composite symbols).

```
      % Render mains
      \@ifundefined{natoapp@main}{}{
        \n@to@pp@dbg{2}{NATO App6(c) mains: \meaning\natoapp@main}
        \begin{scope}[natoapp6c/main]
          \wg@pic@all{\natoapp@main}{natoapp6c/s/}{M.center}{natoapp6c/main}%
        \end{scope}}%
      % Modifiifiers flagged
```

The next thing is to render the various modifiers. We start by flagging this globally.

```
      \n@to@pp@modtrue
      \n@to@pp@dbg{2}{NATO App6(c) modifiers}
```

Below we render the lower, upper, left, and right elements. This is all done in the same way. Note that the elements positions are dictated by anchors of the frame shape (via shape identifier `M`).

```
      % Render lowers
      \@ifundefined{natoapp@lower}{}{%
        \begin{scope}%
```

```
15753           \wg@pic@all{\natoapp@lower}{natoapp6c/s/}{M.lower}{%
15754             natoapp6c/modifiers,natoapp6c/lower}%
15755         \end{scope}}%
15756       % Render uppers
15757       \@ifundefined{natoapp@upper}{}{%
15758         \begin{scope}[]
15759           \wg@pic@all{\natoapp@upper}{natoapp6c/s/}{M.upper}{%
15760             natoapp6c/modifiers,natoapp6c/upper}%
15761         \end{scope}}%
15762       % Render lefts
15763       \@ifundefined{natoapp@left}{}{%
15764         \begin{scope}[]
15765           \wg@pic@all{\natoapp@left}{natoapp6c/s/}{M.left}{%
15766             natoapp6c/modifiers,natoapp6c/left}%
15767         \end{scope}}%
15768       % Render rights
15769       \@ifundefined{natoapp@right}{}{%
15770         \begin{scope}[]
15771           \wg@pic@all{\natoapp@right}{natoapp6c/s/}{M.right}{%
15772             natoapp6c/modifiers,natoapp6c/right}%
15773         \end{scope}}%
15774       % Modifiifiers end
15775       \n@to@pp@modfalse%
15776       \endpgfinterruptboundingbox
15777     \end{scope}%
15778     \fi%
15779   }
```

That concludes rendering most of the symbol. We have not put in the echelon, below element, or drawn the frame yet. That we will do on the foreground path.

In the foreground 'behind' path we render the echelon, below element, and draw the frame.

```
15780   \behindforegroundpath{%
15781     \n@to@pp@dbg{2}{NATO App6(c) foreground path:
15782       ^^J  Echelon: \meaning\natoapp@ech
15783       ^^J  Symbol:  \meaning\frameshape
15784       ^^J  Below:   \meaning\natoapp@below
15785       ^^J  Frame:   \meaning\frameopt}
15786     %
```

We check if we have a frame. If not, stop.

```
15787     \ifx\frameshape\pgfutil@empty%
15788       \n@to@pp@dbg{2}{NATO App6(c) has no frame shape!}%
15789     \else%
```

We want to draw the rest of the symbol as a part of the frame, so we expand the `frame` options in a scope.

```
15790
15791     \edef\tmp@opt{[\frameopt]}
15792     \expandafter\scope\tmp@opt
```

First thing in this scope is to draw the actual frame. Again, this is done via a node with the right shape. Note that we label this node as M⟨*id*⟩ so we way refer to it later on.

```
    \n@to@pp@dbg{2}{NATO App6(c) inner node 'M\id' ===}
    \pgfnode{natoapp6c \frameshape}{center}{}{M\id}{\pgfusepath{stroke}}
```

If the user gave an echelon, then put that in. Note that echelons are limited to predefined values.

```
    % Put in the echelon
    \@ifundefined{natoapp@ech}{}{%
      \ifx\natoapp@ech\pgfutil@empty\else%
      \def\args{echelon=\natoapp@ech}
      \expandafter\wg@pic\args\@endwg@pic%
      {natoapp6c/s/}{$(M.north)+(0,1.2*\n@to@pp@e@y)$}{natoapp6c/echelon}
      \fi%
    }
```

If the user want something under the frame, put that in.

```
    % Put in stuff below main
    \@ifundefined{natoapp@below}{}{%
      \n@to@pp@belowtrue
      \begin{scope}
        \wg@pic@all{\natoapp@below}{natoapp6c/s/}{%
          $(M.south)+(0,-\n@to@pp@e@yy)$}{%
          natoapp6c/below}%
      \end{scope}%
      \n@to@pp@belowfalse}
```

If the `decoy` flag was set, we draw that.

```
    \ifnatoapp@decoy%
      \scope[dash pattern=on 3\pgflinewidth off 2\pgflinewidth]%
        \n@to@pp@dbg{1}{Drawing decoy modifier}%
        \wg@sub@nchor{M\id}{north east}
        \wg@tmpa=\pgf@x%
        \wg@tmpb=\pgf@y%
        \pgfpathmoveto{\pgfqpoint{\wg@tmpa}{\wg@tmpb}}%
        \wg@tmpc=\n@to@pp@e@yy cm%
        \advance\wg@tmpc\n@to@pp@e@yy cm%
        \advance\wg@tmpc\wg@tmpb%
        \pgfpathlineto{\pgfqpoint{0cm}{\wg@tmpc}}%
        \pgfpathlineto{\pgfqpoint{-\wg@tmpa}{\wg@tmpb}}%
        \pgfusepath{stroke}%
      \endscope%
    \fi%
    \endscope%
    \fi%
  }
}
```

That finished the shape for NATO App6(c) symbols. We could stop here, but for convenience we define a wrapper macro.

5.6.16 The \natoapp wrapper macro

\natoapp

This is a wrapper macro for inserting a node with a NATO App6(c) symbol in it. The syntax of the macro is

\natoapp[⟨*natoapp6c options*⟩](⟨*position*⟩)(⟨*identifier*⟩);

Note that the trailing semi-colon (;) is optional.

This macro forwards to \n@toapp.

```
\newcommand\natoapp[1][]{%
  \n@to@pp@dbg{2}{NATO App6(c) macro -> `#1'}
  \tikzset{/natoapp6c/.cd,faction=friendly,command=land}%
  \@ifnextchar({\n@toapp{#1}}{\n@toapp{#1}(0,0)}%)
}
```

\n@toapp

This macro takes care to parse the location argument — if any. It forwards to \n@to@pp.

```
\def\n@toapp#1(#2){%
  \n@to@pp@dbg{2}{NATO App6(c) second macro -> `#1', `#2'}
  \@ifnextchar({\n@to@pp{#1}{#2}}{\n@to@pp{#1}{#2}()}%)
}
```

\n@to@pp

This is the main work-horse of the wrapper. It makes a node with the shape natoapp6c passing the relevant parameters. The syntax of the macro is

```
\def\n@to@pp#1#2(#3){%
  %\let\name\pgfutil@empty%
  %\ifx|#3|\else\edef\name{(#3)}\fi%
  %\n@to@pp@dbg{3}{Arguments: #1}%
  %\edef\args{[natoapp6c={#1},transform shape] \name at (#2) {}}
  %\expandafter\node\args;%
  \node[draw,transform shape,natoapp6c={#1}] (#3) at (#2) {};%
  \@ifnextchar;{\@gobble}{}}
```

5.6.17 Macros for markings

\natoappmark

A macro for making NATO App6(c) markings.

```
\providecommand\natoappmark[2][]{%
  \tikz[scale=.25,#1]{\natoapp[faction=friendly,command=land,main=#2]}}
```

\echelonmark

```
\providecommand\echelonmark[2][]{\tikz[scale=.5,#1]{%
    \pic[scale line widths,line width=1pt] {natoapp6c/s/echelon=#2};}}
```

Some specific NATO App6(c) markers.

```
\DeclareRobustCommand\armouredmark[1][]{\natoappmark[#1]{armoured}}
\DeclareRobustCommand\infantrymark[1][]{\natoappmark[#1]{infantry}}
\DeclareRobustCommand\artillerymark[1][]{%
  \natoappmark[#1]{{[fill=pgfstrokecolor]artillery}}}
\DeclareRobustCommand\combinedmark[1][]{\natoappmark[#1]{combined arms}}
\DeclareRobustCommand\pgmark[1][]      {\natoappmark[#1]{{armoured,infantry}}}
\DeclareRobustCommand\reconnaissancemark[1][]{\natoappmark[#1]{reconnaissance}}
\DeclareRobustCommand\corpsmark[1][]{\natoappmark[#1]{,echelon=corps}}
\DeclareRobustCommand\divisionmark[1][]{\natoappmark[#1]{,echelon=division}}
\DeclareRobustCommand\brigademark[1][] {\natoappmark[#1]{,echelon=brigade}}
\DeclareRobustCommand\regimentmark[1][]{\natoappmark[#1]{,echelon=regiment}}
\DeclareRobustCommand\sofmark[1][]     {\natoappmark[#1]{{infantry,text=SOF}}}
\DeclareRobustCommand\mountaineermark[1][]{%
  \natoappmark[#1]{infantry,lower=mountain}}
\DeclareRobustCommand\airbornemark[1][]{%
  \natoappmark[#1]{infantry,lower=airborne}}
\DeclareRobustCommand\amphibiousmark[1][]{\natoappmark[#1]{,lower=amphibious}}
\DeclareRobustCommand\airassaultmark[1][]{%
  \natoappmark[#1]{infantry,upper=air assault}}
```

5.6.18 Utility macros used in the symbols

Here, we define the main symbols used when making markers. Since some of these symbols share code, we will create some regular TEX macros to hold the path definitions. This is by far the simplest way of storing just the path specifications.

\testpath

```
\def\testpath#1{\csname n@toapp@#1\endcsname}
```

Corps support for `friendly`, `hostile`, `neutral`, and `unknown` factions.

\n@toapp@corps@sup@friendly
\n@toapp@corps@sup@hostile
\n@toapp@corps@sup@neutral
\n@toapp@corps@sup@unknown

```
\def\n@toapp@corps@sup@friendly{(.75,.5)--(.5,0)--(.75,-.5)}
% (M.north east)--(M.east-.25,0)--(M.south east)}
\def\n@toapp@corps@sup@hostile{(.95,.5)--(.45,0)--(.95,-.5)}
\def\n@toapp@corps@sup@neutral{(.5,.5)--(.35,0)--(.5,-.5)}
\def\n@toapp@corps@sup@unknown{(.75,.5)--(.5,0)--(.75,-.5)}
```

Corps support, base

\n@toapp@corps@support

```
\def\n@toapp@corps@support#1{
  \ifx\n@to@pp@friendly#1\n@toapp@corps@sup@friendly%
  \else\ifx\n@to@pp@hostile#1\n@toapp@corps@sup@hostile%
  \else\ifx\n@to@pp@neutral#1\n@toapp@corps@sup@neutral%
  \else\ifx\n@to@pp@unknown#1\n@toapp@corps@sup@unknown%
  \fi\fi\fi\fi}
```

natoapp6c/s/TBD

Special placeholder for symbols To Be Done.

```
\tikzset{
  natoapp6c/s/TBD/.pic={\n@to@pp@text@normal{\color{magenta}TBD};}
}
```

5.6.19 Symbols used when defining weaponry

natoapp6c/s/weapon

```
\tikzset{
  pics/natoapp6c/s/weapon/.is choice,
  pics/natoapp6c/s/weapon/base/.style={
    code={\path [pic actions] (0,-0.2)--(0,.2);}},
  pics/natoapp6c/s/weapon/top/.style={
    code={\path [pic actions] (0,.2)--(0,.35);}},
  pics/natoapp6c/s/weapon/bottom/.style={
    code={\path [pic actions] (0,.-.35)--(0,-.2);}},
  pics/natoapp6c/s/weapon/rifle/.style={
    code={\path [pic actions] (0.2, 0.1)--(0, 0.35)--(-0.2,0.1);}},
  pics/natoapp6c/s/weapon/machine gun/.style={
    code={\path [pic actions] (0.2, -0.35)--(-0.2, -0.35);}},
  pics/natoapp6c/s/weapon/grenade launcher/.style={
    code={\path [pic actions] (0,0) circle (0.1);}},
  pics/natoapp6c/s/weapon/missile launcher/.style={
    code={%
      \path [pic actions] (0.2, 0.15)
      to[out=90,in=90,looseness=1.75] (-0.2, 0.15);}},
  pics/natoapp6c/s/weapon/non lethal/.style={
    code={\path [pic actions] (-.2,.35) -- (.2,.35);}},
  pics/natoapp6c/s/weapon/multi fire/.style={
    code={\path[pic actions] (.2,-.2)--(.2, .2) (-.2,-.2)--(-.2,0.2);}},
  pics/natoapp6c/s/weapon/air defence/.style={
    code={%
      \path[pic actions] (0.2, -0.4)
      to[out=90,in=90,looseness=1.7] (-0.2, -0.4) -- cycle;}},
  pics/natoapp6c/s/weapon/anti tank/.style={
    code={\path[pic actions]  (0.2, -0.4)--(0,-0.2)--(-0.2,-0.4);}},
```

```
  pics/natoapp6c/s/weapon/full/.style={
    code={%
      \pic[draw]{natoapp6c/s/weapon=base};
      \pic[draw]{natoapp6c/s/weapon=top};
      \pic[draw]{natoapp6c/s/weapon=bottom};}},
  pics/natoapp6c/s/weapon/.default=full
}
```

natoapp6c/s/type

(Weight) class of weapons: light, medium, heavy

```
\tikzset{
  pics/natoapp6c/s/type/.is choice,
  pics/natoapp6c/s/type/light/.style={
    code={\path [fill=pgfstrokecolor,pic actions] (-0.2, -0.12) rectangle (.2,-.08);}},
  pics/natoapp6c/s/type/medium/.style={
    code={
      \path [fill=pgfstrokecolor,pic actions]
      (-0.2, -0.12) rectangle (.2,-.08)
      (-0.2, -0.22) rectangle (.2,-.18);}},
  pics/natoapp6c/s/type/heavy/.style={
    code={
      \path [fill=pgfstrokecolor,pic actions]
      (-0.2, -0.12) rectangle (.2,-.08)
      (-0.2, -0.22) rectangle (.2,-.18)
      (-0.2, -0.32) rectangle (.2,-.28);}},
  pics/natoapp6c/s/type/vlight/.style={
    code={\path [fill=pgfstrokecolor,pic actions]
      (-.025,-0.2) rectangle (.025,.2);}},
  pics/natoapp6c/s/type/vmedium/.style={
    code={\path [fill=pgfstrokecolor,pic actions]
      (-.075,-0.2) rectangle (-.025,.2)
      ( .025, -0.2) rectangle (.075,.2);}},
  pics/natoapp6c/s/type/vheavy/.style={
    code={\path [fill=pgfstrokecolor,pic actions]
      (-.125,-0.2) rectangle (-.075,.2)
      (-.025,-0.2) rectangle ( .025,.2)
      ( .075,-0.2) rectangle ( .125,.2);}},
  pics/natoapp6c/s/type/.default=light,
}
```

5.6.20 The symbols

Next, we define all the symbols. Note that we define them all as if they are in the `main` section of the symbol, since `top`, `bottom`, and `below` symbols are automatically scaled.

natoapp6c/s/above corps support

```
\tikzset{%
```

```
  natoapp6c/s/above corps support/.pic={%
    \edef\n@toapp@path{\n@toapp@corps@support{\natoapp@fac}}
    \expandafter\path[draw] \n@toapp@path;
    \expandafter\path[draw,xscale=-1] \n@toapp@path;},
}
```

natoapp6c/s/air assault with organic lift

```
\tikzset{%
  natoapp6c/s/air assault with organic lift/.pic={%
    \ifx\n@to@pp@hostile\natoapp@fac%
    \def\n@toapp@path{(-.75,-.2)--(-.15,-.2)--(0,-.5)--(.15,-.2)--(.75,-.2)}
    \else
    \def\n@toapp@path{(-.75,-.2)--(-.1,-.2)--(0,-.325)--(.1,-.2)--(.75,-.2)}
    \fi
    \path[draw] \n@toapp@path;},
}
```

natoapp6c/s/air decoy

```
\tikzset{%
  natoapp6c/s/air decoy/.pic={%
    \pic[pic actions]{natoapp6c/s/decoy};
    \path[fill=pgfstrokecolor,pic actions] (0.4, -0.2) rectangle (-0.4, -0.15);},
}
```

natoapp6c/s/air assault

```
\tikzset{%
  natoapp6c/s/air assault/.pic={%
    \path[draw] ([shift={(150:.4)}]0,-.1)--(0,-.1)--([shift={(30:.4)}]0,-.1);},
}
```

natoapp6c/s/air defence

```
\tikzset{%
  natoapp6c/s/air defence/.pic={%
    \ifx\natoapp@fac\n@to@pp@friendly%
    \def\n@toapp@opt{[out=90,in=90,looseness=.675]}%
    \else\ifx\natoapp@fac\n@to@pp@neutral%
    \def\n@toapp@opt{[out=90,in=90,looseness=1]}%
    \else%
    \def\n@toapp@opt{[out=45,in=135,looseness=1.5]}%
    \fi\fi%
    \edef\n@toapp@path{(M.south west) to\n@toapp@opt (M.south east)}
    \path[draw] \n@toapp@path;},
```

```
}
```

natoapp6c/s/air strip

```
\tikzset{%
  natoapp6c/s/air strip/.pic={%
    \path[fill=pgfstrokecolor] (-.4,-.1) rectangle(.4,0);
    \path[rotate=45,fill=pgfstrokecolor] (-.4,0) rectangle (.4,.1);
  }
}
```

natoapp6c/s/air traffic

```
\tikzset{%
  natoapp6c/s/air traffic/.pic={
    \path[fill=pgfstrokecolor]
    (0.33,0.21)--
    (0.33, -0.21)--
    (-0.33, 0.21)--
    (-0.33,-0.21)--
    cycle;},
}
```

natoapp6c/s/airship

```
\tikzset{%
  natoapp6c/s/airship/.pic={%
    % \path (0.45, 0.175) rectangle (-0.45, -0.175);
    \path[pic actions] (0, 0) ellipse (0.45 and 0.15);
    \begin{scope}
      \clip (0, 0) ellipse (0.45 and 0.15) [reverseclip];
      \path[pic actions]
      (0.2,0)--(0.3,0.175)--(0.4,0.175)--(0.375,0)
      --(0.4,-0.175)--(0.3, -0.175)--cycle;
    \end{scope}},
}
```

natoapp6c/s/airborne

```
\tikzset{%
  natoapp6c/s/airborne/.pic={%
    \ifx\n@to@pp@neutral\natoapp@fac%
      \draw (0,-0.05) arc(0:180:0.15);
      \draw (0,-0.05) arc(180:0:0.15);
    \else%
      \draw (0,-0.05) arc(0:180:0.2);
```

```
      \draw (0,-0.05) arc(180:0:0.2);
    \fi},
}
```

natoapp6c/s/ammunition

```
\tikzset{%
  natoapp6c/s/ammunition/.pic={\path[draw]
    (0.175,-0.175)--(-0.175,-0.175)
    (0.125,-0.175)--(0.125, 0) to[out=90,in=90,looseness=2.75]
    (-0.125, 0)--(-0.125, -0.175);},
}
```

natoapp6c/s/amphibious

```
\tikzset{%
  natoapp6c/s/amphibious/.pic={
    \def\n@to@pp@tmp{0}
    \ifn@to@pp@below\def\n@to@pp@tmp{-.1}\fi
    \ifn@to@pp@mod
    \path[draw,shift={(0,\n@to@pp@tmp)}](1.21,0)
    to[out=-90,in=-90, looseness=2.25]  (1.05, 0)
    to[out= 90,in= 90, looseness=2.25]  (0.89, 0)
    to[out=-90,in=-90, looseness=2.25]  (0.73, 0)
    to[out= 90,in= 90, looseness=2.25]  (0.57, 0)
    to[out=-90,in=-90, looseness=2.25]  (0.41, 0)
    to[out= 90,in= 90, looseness=2.25]  (0.25, 0)
    to[out=-90,in=-90, looseness=2.25]  (0.08, 0)
    to[out= 90,in= 90, looseness=2.25] (-0.08, 0)
    to[out=-90,in=-90, looseness=2.25] (-0.25, 0)
    to[out= 90,in= 90, looseness=2.25] (-0.41, 0)
    to[out=-90,in=-90, looseness=2.25] (-0.57, 0)
    to[out= 90,in= 90, looseness=2.25] (-0.73, 0)
    to[out=-90,in=-90, looseness=2.25] (-0.89, 0)
    to[out= 90,in= 90, looseness=2.25] (-1.05, 0)
    to[out=-90,in=-90, looseness=2.25] (-1.21, 0)
    \else
    \path[draw,shift={(0,\n@to@pp@tmp)}](0.73, 0)
    to[out= 90,in= 90, looseness=2.25]  (0.57, 0)
    to[out=-90,in=-90, looseness=2.25]  (0.41, 0)
    to[out= 90,in= 90, looseness=2.25]  (0.25, 0)
    to[out=-90,in=-90, looseness=2.25]  (0.08, 0)
    to[out= 90,in= 90, looseness=2.25] (-0.08, 0)
    to[out=-90,in=-90, looseness=2.25] (-0.25, 0)
    to[out= 90,in= 90, looseness=2.25] (-0.41, 0)
    to[out=-90,in=-90, looseness=2.25] (-0.57, 0)
    to[out= 90,in= 90, looseness=2.25] (-0.73, 0)
    \fi
    ;
  },
```

```
}
```

natoapp6c/s/amphibious warfare ship

```
\tikzset{%
  natoapp6c/s/amphibious warfare ship/.pic={
    \pic{natoapp6c/s/warfare vessel};
    \path[draw,fill=pgfstrokecolor]
    (0.15, 0.05) --
    (0.15, 0.2) --
    (-0.15, 0.2) --
    (-0.15, 0.05) -- cycle
    (0, -0.2) rectangle (0.25, -0.175);},
}
```

natoapp6c/s/analysis

```
\tikzset{%
  natoapp6c/s/analysis/.pic={
    \path[pic actions]
      (-0.3,-0.2)--(0.3,-0.2)--(0, -0.4)--cycle (0,-0.2)--(0,0.4);},
}
```

natoapp6c/s/arrest

```
\tikzset{%
  natoapp6c/s/arrest/.pic={
    \path[pic actions] circle(0.2);
    \pic[scale=.8]{natoapp6c/s/individual};},
}
```

natoapp6c/s/artillery

```
\tikzset{%
  natoapp6c/s/artillery/.pic={
    \path[pic actions] circle(0.2);},
}
```

natoapp6c/s/anti tank anti armour

```
\tikzset{%
  natoapp6c/s/anti tank anti armour/.pic={%
    \ifx\natoapp@fac\n@to@pp@unknown%
    \path[draw,pic actions] (225:.5)--(M.north)--(315:.5);
```

```
    \else%
    \path[draw,pic actions] (M.south west)--(M.north)--(M.south east);%
    \fi},
}
```

natoapp6c/s/antenna

```
\tikzset{%
  natoapp6c/s/antenna/.pic={\path[draw]
    (0, -0.3) -- (0, 0.3) (-0.125, 0.3) -- (0, 0.2) -- (0.125, 0.3);},
}
```

natoapp6c/s/armoured

```
\tikzset{%
  natoapp6c/s/armoured/.pic={\path[draw]
    (-0.275,0.2) arc(90:270:0.2)--(0.275, -0.2) arc(270:450:0.2)--cycle;},
}
```

natoapp6c/s/armoured fighting vehicle

```
\tikzset{%
  natoapp6c/s/armoured fighting vehicle/.pic={
    \path[fill=pgfstrokecolor] (-.4,-.2) rectangle (-.3,.2) (.3,-.2) rectangle (.4,.2);
    \path[pic actions] (-.3,0) -- (0,.2) -- (.3,0) -- (0,-.2) -- cycle;},
}
```

natoapp6c/s/armoured personnel carrier

```
\tikzset{%
  natoapp6c/s/armoured personnel carrier/.pic={
    \pic[sub pic actions,draw]{natoapp6c/s/vehicle};
    \path[pic actions] (.35,.15)--(0,.3)--(-.35,.15);},
}
```

natoapp6c/s/arctic

```
\tikzset{%
  natoapp6c/s/arctic/.pic={
    \draw (-0.325,0.135) arc(180:270:0.075 and 0.15) --
       +(0.5, 0) arc(-90:0:0.075 and 0.15);},
}
```

natoapp6c/s/automobile

```
\tikzset{%
  natoapp6c/s/automobile/.pic={
    \begin{scope}
      \clip (0.2,-0.15) circle(0.05) (-0.2,-0.15) circle(0.05) [reverseclip];
      \path[pic actions]
      (0.3,   -0.15)  --
      (-0.3,  -0.15)  --
      (-0.3,   0.025) --
      (-0.1,   0.025) --
      (-0.1,   0.2)   --
      ( 0.1,   0.2)   --
      ( 0.1,   0.025) --
      ( 0.3,   0.025) -- cycle
      ( 0.075, 0.025) rectangle (-0.075, 0.175);
    \end{scope}
    \path[pic actions]
    ( 0.2, -0.15) circle (0.05)
    (-0.2, -0.15) circle (0.05);
  },
}
```

natoapp6c/s/balloon

```
\tikzset{%
 natoapp6c/s/balloon/.pic={%
   \path[pic actions] (0, 0.025) circle (0.175);
   \begin{scope}
     \clip (0, 0.025) circle (0.175) [reverseclip];
     \path[pic actions] (-0.05,0) rectangle (0.05,-0.2)--(0.05,0);
   \end{scope}},
}
```

natoapp6c/s/bar

```
\tikzset{
  natoapp6c/s/bar/.pic={
    \path[fill=pgfstrokecolor] (-.3,-.1) rectangle (.3,.1);},
}
```

natoapp6c/s/base

```
\tikzset{
  natoapp6c/s/base/.pic={
    \path[pic actions] circle(.2);
    \path[pic actions]
```

```
    (-.2,0)   -- (.2,0)
    (  0,-.2) -- (0 ,.2)
    (225:.2) -- (45:.2)
    (135:.2) -- (-45:.2);
  }
}
```

natoapp6c/s/bicycle equipped

```
\tikzset{%
  natoapp6c/s/bicycle equipped/.pic={\draw(0,0) circle(.1);},
}
```

natoapp6c/s/boat

```
\tikzset{%
  natoapp6c/s/boat/.pic={
    \path[pic actions]
    (-0.2,  -0.2)  --
    ( 0.2,  -0.2)  --
    ( 0.35,  0.05) --
    (-0.15,  0.05) --
    (-0.075, 0.2)  --
    (-0.175, 0.2)  --
    (-0.25,  0.05) --
    (-0.35,  0.05) --
    cycle;},
}
```

natoapp6c/s/booby trap

```
\tikzset{%
  natoapp6c/s/booby trap/.pic={
    \path[draw] (0, -0.2) ellipse(0.2 and 0.065);
    \begin{scope}
      \clip (0, -0.2) ellipse(0.2 and 0.065) [reverseclip];
      \path[draw] (-0.2, -0.2) -- (0, 0.2) -- (0.2, -0.2);
    \end{scope}},
}
```

natoapp6c/s/bottomed

```
\tikzset{%
  natoapp6c/s/bottomed/.pic={
    \path[draw,fill=pgfstrokecolor] (-0.33,.1) rectangle(0.33,.2);},
}
```

natoapp6c/s/bridge

```
\tikzset{%
  pics/natoapp6c/s/bridge/.is choice,
  pics/natoapp6c/s/bridge/none/.style={
    code={\path[pic actions]
      (0.35,-0.15)--(0.25,-0.05)--(-0.25,-0.05)--(-0.35,-0.15)
      (0.35, 0.15)--(0.25, 0.05)--(-0.25, 0.05)--(-0.35, 0.15);}},
  pics/natoapp6c/s/bridge/fixed/.style={
    code={\pic{natoapp6c/s/bridge};\pic{natoapp6c/s/type=vlight};}},
  pics/natoapp6c/s/bridge/folding/.style={
    code={\pic{natoapp6c/s/bridge=none};
      \path[draw] (.1,-.2) -- (-.1,-.2) -- (-.1,.2) -- (.1,.2);}},
  pics/natoapp6c/s/bridge/hollow/.style={
    code={\pic{natoapp6c/s/bridge=none};
      \path[draw] (.1,-.2) -- (-.1,-.2) -- (-.1,.2) -- (.1,.2) -- cycle;}},
  pics/natoapp6c/s/bridge/.default=none,
}
```

natoapp6c/s/capsule

```
\tikzset{%
  natoapp6c/s/capsule/.pic={
    \path[pic actions]
    ($(0.25, -0.2)!0.1!(0, 0.5)$) --
    ($(0.25, -0.2)!0.5!(0, 0.5)$) to[in=75, out=105, looseness=0.75]
    ($(0, 0.5)!0.5!(-0.25, -0.2)$) --
    ($(0, 0.5)!0.9!(-0.25, -0.2)$) to[in=285, out=255, looseness=0.55]
    cycle;},
}
```

natoapp6c/s/carrier

```
\tikzset{%
  natoapp6c/s/carrier/.pic={
    \pic{natoapp6c/s/warfare vessel};
    \path[draw,fill=pgfstrokecolor]
    (-0.15, 0.05) --
    (-0.15, 0.2)  --
    (-0.3,  0.2)  --
    (-0.3, 0.05)  -- cycle;},
}
```

natoapp6c/s/chemical biological radiological nuclear

```
\tikzset{%
  natoapp6c/s/chemical biological radiological nuclear/.pic={
    \path[draw,fill=pgfstrokecolor] (-0.29,0.1) circle(0.096) (0.29,0.1) circle(0.096);
    \path[pic actions]  (0.15,-0.2) arc(0:90:0.45 and 0.375)
    (-0.15,-0.2) arc(180:90:0.45 and 0.375);},
}
```

natoapp6c/s/civilian military cooperation

```
\tikzset{%
  natoapp6c/s/civilian military cooperation/.pic={%
    \path[draw] (.375,.2)--(-.375,.2)--(-.375,-.025)
    to[in=270, out=270, looseness=0.75] (.375,-.025)--cycle;},
}
```

natoapp6c/s/civilian police

```
\tikzset{%
  natoapp6c/s/civilian police/.pic={%
    \path[draw] (0.225, 0.2)
    to[in=270, out=270, looseness=3] (-0.225, 0.2)
    to [in=270, out=270, looseness=1.5] (0,0.2)
    to [in=270, out=270, looseness=1.5] (0.225, 0.2) -- cycle;},
}
```

natoapp6c/s/civilian telecommunications

```
\tikzset{%
  natoapp6c/s/civilian telecommunications/.pic={
    \path[draw] (0.075, -0.2){[line join=bevel] -- (0, 0.1) -- (-0.075, -0.2)}
       (0.065, -0.05) -- (-0.065, -0.05)
       (-0.325, 0.2) -- (-0.15, 0.125) -- (-0.15, 0.175) -- (0, 0.1) -- (0.15, 0.175) -- (0.15, 0.125) -- (0.3
  },
}
```

natoapp6c/s/coast guard vessel

```
\tikzset{%
  natoapp6c/s/coast guard vessel/.pic={%
    \pic[draw] {natoapp6c/s/ship};
    \path[pic actions] (0.15, 0.05) -- (0, -0.2) (0.2, 0.05)--(0.05, -0.2);},
}
```

natoapp6c/s/combat support

```
\tikzset{%
  natoapp6c/s/combat support/.pic={%
    \path[fill=pgfstrokecolor]
    (.15,.2)--(-.15,.2)--(-.15,-.05)--(0,-.2)--(.15,-.05) -- cycle;},
}
```

natoapp6c/s/combatant

```
\tikzset{%
  natoapp6c/s/combatant/.pic={%
    \begin{scope}[xshift=-4.5, yshift=-5]
      \path[pic actions]
      (0.3213,0.0534) .. controls (0.3186,0.0295)  and (0.3072,0.0136) ..
      (0.2925,0.0063) .. controls (0.2777,-0.0010) and (0.2605,0.0001) ..
      (0.2461,0.0068) .. controls (0.2317,0.0136)  and (0.2198,0.0265) ..
      (0.2163,0.0433) .. controls (0.2147,0.0513)  and (0.2150,0.0601) ..
      (0.2179,0.0694) .. controls (0.1304,0.1129)  and (0.0223,0.1961) ..
      (0.0013,0.3209) .. controls (0.0601,0.1809)  and (0.1770,0.0912) ..
      (0.3213,0.0534) -- cycle
      (0.2304,0.0633) .. controls (0.2287,0.0570)  and (0.2287,0.0513) ..
      (0.2298,0.0461) .. controls (0.2323,0.0340)  and (0.2409,0.0245) ..
      (0.2520,0.0193) .. controls (0.2630,0.0141)  and (0.2760,0.0135) ..
      (0.2864,0.0186) .. controls (0.2932,0.0220)  and (0.2992,0.0277) ..
      (0.3033,0.0370) .. controls (0.2845,0.0413)  and (0.2597,0.0498) ..
      (0.2304,0.0633) -- cycle
      (0.1785,0.1137) .. controls (0.2446,0.1612)  and (0.3061,0.2300) ..
      (0.3214,0.3209) .. controls (0.2864,0.2377)  and (0.2310,0.1723) ..
      (0.1614,0.1249)
      (0.1443,0.1138) .. controls (0.1011,0.0871)  and (0.0530,0.0670) ..
      (0.0014,0.0535) .. controls (0.0041,0.0295)  and (0.0154,0.0136) ..
      (0.0302,0.0063) .. controls (0.0449,-0.0010) and (0.0621,0.0001) ..
      (0.0765,0.0069) .. controls (0.0909,0.0137)  and (0.1028,0.0265) ..
      (0.1063,0.0433) .. controls (0.1079,0.0513)  and (0.1076,0.0602) ..
      (0.1047,0.0694) .. controls (0.1230,0.0785)  and (0.1422,0.0893) ..
      (0.1613,0.1019)
      (0.0928,0.0461) .. controls (0.0903,0.0340)  and (0.0816,0.0245) ..
      (0.0706,0.0193) .. controls (0.0596,0.0141)  and (0.0466,0.0135) ..
      (0.0362,0.0186) .. controls (0.0294,0.0220)  and (0.0234,0.0277) ..
      (0.0193,0.0370) .. controls (0.0381,0.0413)  and (0.0629,0.0498) ..
      (0.0921,0.0633) --
      (0.0921,0.0633) .. controls (0.0938,0.0570)  and (0.0938,0.0512) ..
      (0.0928,0.0461) -- cycle;
    \end{scope}
  },
}
```

natoapp6c/s/combined arms

```
\tikzset{%
  natoapp6c/s/combined arms/.pic={%
```

```
    \path[draw] pic {natoapp6c/s/armoured};
    \path[draw] (0.275, 0.2) -- (-0.275, -0.2) (0.275, -0.2) -- (-0.275, 0.2);},
}
```

natoapp6c/s/computer system

```
\tikzset{%
  natoapp6c/s/computer system/.pic={
    \path[draw,fill=pgfstrokecolor,pic actions]
    (-.3,  .28) rectangle ( .3,  .3)
    (-.3, -.18) rectangle ( .3, -.2)
    (-.3, -.18) rectangle (-.3,  .28)
    ( .3, -.18) rectangle ( .3,  .28)
    (-.3, -.3)  rectangle ( .3, -.28)
    (-.05,-.28) rectangle ( .05,-.18);},
}
```

natoapp6c/s/control

```
\tikzset{%
  natoapp6c/s/control/.pic={
    \path[pic actions]
    [{Stealth[inset=0pt,scale=0.5]}-{Stealth[inset=0pt,scale=0.5]}]
    (0, .2) -- (0, -.2);
    \path[pic actions]
    [{Stealth[inset=0pt,scale=0.5]}-{Stealth[inset=0pt,scale=0.5]}]
    (-.2, 0) -- (.2, 0);},
}
```

natoapp6c/s/convoy

```
\tikzset{%
  natoapp6c/s/convoy/.pic={
    \path[draw,fill=pgfstrokecolor]
    (0.35, 0.175) --
    (-0.35, 0.175) --
    (-0.35, -0.175) --
    (-0.2, -0.175) --
    (-0.2, 0.025) --
    (0.2, 0.025) --
    (0.2, -0.175) --
    (0.35, -0.175) -- cycle;},
}
```

natoapp6c/s/corps support

```
\tikzset{%
  natoapp6c/s/corps support/.pic={%
    \edef\n@toapp@path{\n@toapp@corps@support{\natoapp@fac}}
    \expandafter\path[draw] \n@toapp@path;},
}
```

natoapp6c/s/crime

```
\tikzset{%
  natoapp6c/s/crime/.pic={\path[draw,dashed] (-.45,.25)--(.45,-.25);},
}
```

natoapp6c/s/decoy

```
\tikzset{%
  natoapp6c/s/decoy/.pic={%
    \path[fill=pgfstrokecolor,draw,yshift=1.5]
    (0.2, 0) -- (0.4, 0.15) -- (0.4, -0.15) -- cycle
    (-0.1, 0) -- (0.1, 0.15) -- (0.1, -0.15) -- cycle
    (-0.4, 0) -- (-0.2, 0.15) -- (-0.2, -0.15) -- cycle;},
}
```

natoapp6c/s/direct communications

```
\tikzset{%
  natoapp6c/s/direct communications/.pic={
    \path[draw] (-.35,0) circle(.1) (.35,0) circle(.1);
    \pic[fill=pgfstrokecolor]{natoapp6c/s/intermodal};
  },
}
```

natoapp6c/s/direction finding

```
\tikzset{%
  natoapp6c/s/direction finding/.pic={%
    \path[draw] (-.3,.2)--(0,.4)--(.3,.2) (0,.4)--(0,-.4);},
}
```

natoapp6c/s/diving

```
\tikzset{%
  pics/natoapp6c/s/diving/.is choice,
  pics/natoapp6c/s/diving/none/.style={
    code={
```

```
      \path[pic actions] (0,0) circle(.1) (0,0) circle(.25);
      \begin{scope}
        \clip (0,0) circle(.25) [reverseclip];
        \path[pic actions] (-.3,-.1) rectangle(.3,.1)
        (0,0) -- (-45:.4) -- (-135:.4) -- cycle;
      \end{scope}}},
  pics/natoapp6c/s/diving/military/.style={
    code={
      \begin{scope}[even odd rule]
        \clip (0,0) circle(0.1)[reverseclip];
        \pic[fill=pgfstrokecolor]{natoapp6c/s/diving=none};
      \end{scope}
      \path[fill=pgfstrokecolor] (0,0) circle(0.08);
    }},
  pics/natoapp6c/s/diving/.default=none,
}
```

natoapp6c/s/drilling

```
\tikzset{%
  natoapp6c/s/drilling/.pic={\path[fill=pgfstrokecolor]
    (-0.1,-0.2) -- (0.1,-0.2) -- (0.2, 0.2) -- (-0.2, 0.2) -- cycle;},
}
```

natoapp6c/s/earthmover

```
\tikzset{%
  natoapp6c/s/earthmover/.pic={
    \pic{natoapp6c/s/tank};
    \path[pic actions] (.3,
    .3)--(.175,.35)--(-.175,.35)--(-.3,.3)
    (0,.2)--(0,.35);
  },
}
```

natoapp6c/s/electric power

```
\tikzset{%
  natoapp6c/s/electric power/.pic={
    \path[pic actions]
    (-0.05, 0)    .. controls(-0.06, 0.14) ..
    ( 0,    0.09) .. controls( 0.03, 0.06) ..
    ( 0,    0.06) .. controls(-0.03, 0.06) ..
    ( 0,    0.09) .. controls( 0.06, 0.14) ..
    (0.05, 0)
    ($(-55:0.125) + (0, 0.075)$) arc(-55:235:0.125) arc(415:360:0.05) --
    +(0, -0.08) arc(180:360:0.05035) --
    +(0,  0.08) arc(180:125:0.05) -- cycle;
```

```
  },
}
```

natoapp6c/s/electronic ranging

```
\tikzset{%
  natoapp6c/s/electronic ranging/.pic={%
    \path[draw] (135:.225) arc (135:315:.225)--cycle (0,0)--(225:-.225);},
}
```

natoapp6c/s/electronic warfare wide

```
\tikzset{%
  natoapp6c/s/electronic warfare wide/.pic={%
    % OBS
    \node[natoapp6c/text,natoapp6c/normal text] at(-.25,0){E};
    \node[natoapp6c/text,natoapp6c/normal text] at(.25,0){W};
  },
}
```

natoapp6c/s/engineer

```
\tikzset{%
  natoapp6c/s/engineer/.pic={\path[draw]
    (.4,-.2)--(.4,.2)--(-.4,.2)--(-.4,-.2) (0,.2)--(0,-.2);},
}
```

natoapp6c/s/enhanced location reporting system

```
\tikzset{%
  natoapp6c/s/enhanced location reporting system/.pic={\path[draw]
    (0, -0.3) -- (0, 0.3) (-0.2, -.3) -- (0, 0.-.1) -- (0.2, -.3);},
}
```

natoapp6c/s/environmental protection

```
\tikzset{%
  natoapp6c/s/environmental protection/.pic={%
    \path[draw] (0, 0.2)
    -- (0.1, 0.05)
    -- (0.05, 0.05)
    -- (0.15, -0.05)
    -- (0.1, -0.05)
    -- (0.2, -0.15)
```

```
    -- (0.15, -0.15)
    -- (0.05, -0.15)
    -- (0.05, -0.2)
    -- (-0.05, -0.2)
    -- (-0.05, -0.15)
    -- (-0.2, -0.15)
    -- (-0.1, -0.05)
    -- (-0.15, -0.05)
    -- (-0.05, 0.05)
    -- (-0.1, 0.05)
    -- cycle;},
}
```

natoapp6c/s/explosion

```
\tikzset{%
  natoapp6c/s/explosion/.pic={%
    \node [shape=rectangle,
    starburst,
    draw,
    minimum width=0.9cm,
    minimum height=0.9cm,
    starburst point height=0.25cm,
    starburst points=12] {};},
}
```

natoapp6c/s/finance

```
\tikzset{%
  natoapp6c/s/finance/.pic={%
    \path[draw] (-.3,-.25) rectangle(.3,0)
    (-.3,0) -- ++(60:.28) -- ([shift=(120:.28)].3,0) -- (.3,0);},
}
```

natoapp6c/s/fishing vessel

```
\tikzset{%
  natoapp6c/s/fishing vessel/.pic={
    \path[pic actions]
      (-0.15, -0.2)  --
      ( 0.15, -0.2)  --
      ( 0.25, 0.025) --
      (-0.05, 0.025) --
      (-0.05, 0.125) --
      (-0.2,  0.125) --
      (-0.2,  0.025) --
      (-0.25, 0.025) -- cycle
      (0.025, 0.025) -- (0.025, 0.2)
```

```
16467       (0.025, 0.025) -- +(45:0.2);},
16468 }
```

natoapp6c/s/fire protection

```
16469 \tikzset{%
16470   natoapp6c/s/fire protection/.pic={%
16471     \path[fill=pgfstrokecolor] (0,0) circle(.2)
16472       (0,0) -- (60:.3) -- (120:.3) -- cycle
16473       (0,0) -- (-30:.3) -- (30:.3) -- cycle
16474       (0,0) -- (150:.3) -- (210:.3) -- cycle
16475       (0,0) -- (240:.3) -- (300:.3) -- cycle;
16476   },
16477 }
```

natoapp6c/s/fixed and rotary wing

```
16478 \tikzset{%
16479   natoapp6c/s/fixed and rotary wing/.pic={%
16480       \path[xscale=.45,yscale=.75,pic actions] pic {natoapp6c/s/fixed wing};
16481       \path[yscale=.45,xscale=.7,rotate=90, pic actions] pic {
16482         natoapp6c/s/rotary wing};
16483     },
16484 }
```

natoapp6c/s/fixed wing

```
16485 \tikzset{%
16486   natoapp6c/s/fixed wing/.pic={
16487     \path[pic actions]
16488       (-0.36,0.125) arc (77:275:0.075 and 0.125) -- (0,0) -- cycle
16489       ( 0.36,0.125) arc (-275:-77:-0.075 and 0.125) -- (0,0)
16490       --cycle;},
16491 }
```

natoapp6c/s/flame thrower

```
16492 \tikzset{%
16493   natoapp6c/s/flame thrower/.pic={
16494     \path[pic actions]
16495     (-0.1, -0.4) -- (-0.1, 0.3) to[out=90,in=90,looseness=2]
16496     (0.1, 0.3) -- (0.1, 0.275);},
16497 }
```

natoapp6c/s/floating

```
\tikzset{%
  natoapp6c/s/floating/.pic={
    \path[draw]
    (-0.5,0.100) --
    (-0.417,0.242) --
    (-0.333,0.100) --
    (-0.250,0.242) --
    (-0.167,0.100) --
    (-0.083,0.242) --
    (0.0,0.100) --
    (0.083,0.242) --
    (0.167,0.100) --
    (0.250,0.242) --
    (0.333,0.100) --
    (0.417,0.242) --
    (0.5,0.100);},
  pics/natoapp6c/s/surfaced/.style=natoapp6c/s/floating,
}
```

natoapp6c/s/food

```
\tikzset{%
  natoapp6c/s/food/.pic={
    \path[pic actions]
    (0.075, 0.2) to[out=210, in=150, looseness=1]
    (0.075, -0.2) to[out=180, in=180, looseness=1.5]
    (0.075, 0.2) -- cycle;},
}
```

natoapp6c/s/fuel

```
\tikzset{%
  natoapp6c/s/fuel/.pic={
    \path[draw] (0,0) -- (135:.3) -- (45:.3) -- cycle (0,0) -- (0,-.3);},
}
```

natoapp6c/s/grenade launcher

```
\tikzset{%
  pics/natoapp6c/s/grenade launcher/.is choice,%
  pics/natoapp6c/s/grenade launcher/none/.style={%
    code={%
      \pic[draw]{natoapp6c/s/rifle};
      \pic[draw]{natoapp6c/s/weapon=grenade launcher};}},%
  pics/natoapp6c/s/grenade launcher/non lethal/.style={
```

```
    code={%
      \pic[draw]{natoapp6c/s/non lethal weapon};
      \pic[draw]{natoapp6c/s/weapon=grenade launcher};}},
  pics/natoapp6c/s/grenade launcher/.default=none,
}
```

natoapp6c/s/graffiti

```
\tikzset{%
  natoapp6c/s/graffiti/.pic={
    \path[pic actions]
    (0.05, 0.2)
    arc (90:270:0.05)
    arc (450:270:0.05)
    arc (90:270:0.05)
    arc (450:270:0.05)
    (-0.05, 0.2)
    arc (90:270:0.05)
    arc (450:270:0.05)
    arc (90:270:0.05)
    arc (450:270:0.05);},
}
```

natoapp6c/s/group

```
\tikzset{%
  natoapp6c/s/group/.pic={
    \path(-.23,.05) pic [draw,scale=.8] {natoapp6c/s/individual};
    \path(0,-.05)   pic [draw,scale=.8] {natoapp6c/s/individual};
    \path(.23,.05)  pic [draw,scale=.8] {natoapp6c/s/individual};},
}
```

natoapp6c/s/gun

```
\tikzset{%
  pics/natoapp6c/s/gun/.is choice,
  pics/natoapp6c/s/gun/base/.style={
    code={
      \pic[draw]{natoapp6c/s/weapon=base};
      \pic[draw]{natoapp6c/s/weapon=top};
      \pic[draw]{natoapp6c/s/weapon=multi fire};}},
  pics/natoapp6c/s/gun/air defence/.style={
    code={
      \pic[draw]{natoapp6c/s/gun/base};
      \pic[draw]{natoapp6c/s/weapon=air defence};}},
  pics/natoapp6c/s/gun/anti tank/.style={
    code={
      \pic[draw]{natoapp6c/s/gun/base};
```

```
16573       \pic[draw]{natoapp6c/s/weapon/anti tank};}},
16574   pics/natoapp6c/s/gun/direct/.style={
16575     code={
16576       \pic[draw]{natoapp6c/s/gun/base};
16577       \pic[draw]{natoapp6c/s/weapon=bottom};}},
16578   pics/natoapp6c/s/gun/recoilless/.style={
16579     code={
16580       \pic[draw]{natoapp6c/s/rifle};
16581       \pic[yshift=-4,draw]{natoapp6c/s/weapon=multi fire};}},
16582   pics/natoapp6c/s/gun/.default=direct,
16583 }
```

natoapp6c/s/headquarters

```
16584 \tikzset{%
16585   natoapp6c/s/headquarters/.pic={
16586     \path[pic actions] (M.north west) -- ++(0,-.3) --
16587       ([shift=(-90:.3)]M.north east) -- (M.north east) -- cycle;},
16588 }
```

natoapp6c/s/house

```
16589 \tikzset{%
16590   natoapp6c/s/house/.pic={
16591     \path[pic actions]
16592     (-.125,-.175) rectangle (.125,.075)
16593     (-.167,.075) -- (0,.225) -- (.167,.075) -- cycle;},
16594 }
```

natoapp6c/s/howitzer

```
16595 \tikzset{%
16596   natoapp6c/s/howitzer/.pic={
16597     \pic[draw]{natoapp6c/s/weapon=base};
16598     \pic[draw]{natoapp6c/s/weapon=top};
16599     \pic[draw]{natoapp6c/s/weapon=multi fire};
16600     \pic[yshift=-8,draw]{natoapp6c/s/weapon=grenade launcher};
16601   },
16602 }
```

natoapp6c/s/in position

```
16603 \tikzset{%
16604   natoapp6c/s/in position/.pic={
16605     \path[draw,fill=pgfstrokecolor]
16606     (-.3,-.01) rectangle (-.2,.01) (.2,-.01) rectangle (.3,.01);},
```

```
}
```

natoapp6c/s/individual

```
\tikzset{%
  natoapp6c/s/individual/.pic={
    \path[pic actions]
      (0,.08) -- (0,-.3) (-.15,0) -- (.15,0) (0,.18) circle(.1);},
}
```

natoapp6c/s/infantry

```
\tikzset{%
  natoapp6c/s/infantry/.pic={
    \path[draw] (-.75,.5) -- (.75,-.5) (-.75,-.5) -- (.75,.5);},
}
```

natoapp6c/s/intermodal

```
\tikzset{%
  natoapp6c/s/intermodal/.pic={
    \path[pic actions]
    ( 0.15,  0.025) --
    (-0.15,  0.025) --
    (-0.15,  0.075) --
    (-0.25,  0)     --
    (-0.15, -0.075) --
    (-0.15, -0.025) --
    ( 0.15, -0.025) --
    ( 0.15, -0.075) --
    ( 0.25,  0)     --
    ( 0.15,  0.075) -- cycle;},
}
```

natoapp6c/s/jagged wave

```
\tikzset{%
  natoapp6c/s/jagged wave/.pic={
    \draw (0.3,  -0.05) --
          (0.2,   0.05) --
          (0.1,  -0.05) --
          (0,     0.05) --
          (-0.1, -0.05) --
          (-0.2,  0.05) --
          (-0.3, -0.05);},
}
```

natoapp6c/s/jam

```
\tikzset{%
  natoapp6c/s/jam/.pic={%
    \path[draw]
    (0.75, 0)
    to[out=90, in=90, looseness=2.25] ( 0.65, 0)
    to[out=-90,in=-90,looseness=2.25] ( 0.55, 0)
    to[out=90, in=90, looseness=2.25] ( 0.45, 0)
    to[out=-90,in=-90,looseness=2.25] ( 0.35, 0)
    to[out=90, in=90, looseness=2.25] ( 0.25, 0)
    to[out=-90,in=-90,looseness=2.25] ( 0.15, 0)
    to[out=90, in=90, looseness=2.25] ( 0.05, 0)
    to[out=-90,in=-90,looseness=2.25] (-0.05, 0)
    to[out=90, in=90, looseness=2.25] (-0.15, 0)
    to[out=-90,in=-90,looseness=2.25] (-0.25, 0)
    to[out=90, in=90, looseness=2.25] (-0.35, 0)
    to[out=-90,in=-90,looseness=2.25] (-0.45, 0)
    to[out=90, in=90, looseness=2.25] (-0.55, 0)
    to[out=-90,in=-90,looseness=2.25] (-0.65, 0)
    to[out=90, in=90, looseness=2.25] (-0.75, 0)
    ;},
}
```

natoapp6c/s/jamming

```
\tikzset{%
  natoapp6c/s/jamming/.pic={%
    \path(0,.4) pic {natoapp6c/s/jam} (0,.26) pic {natoapp6c/s/jam};},
}
```

natoapp6c/s/jetski

```
\tikzset{%
  natoapp6c/s/jetski/.pic={
    \path[pic actions]
    ( 0.3, -0.2)  --
    (-0.3, -0.2)  --
    (-0.35,-0.1)  --
    (-0.1,  0.2)  --
    ( 0,    0.2)  --
    ( 0,    0.1)  --
    (-0.05, 0.1)  --
    (-0.1, -0.05) --
    ( 0.3, -0.05) --
    ( 0.3, -0.2)  -- cycle;
},
}
```

natoapp6c/s/killing

```
\tikzset{%
  natoapp6c/s/killing/.pic={\path[draw] (-.45,.25)--(.45,-.25);},
}
```

natoapp6c/s/labour

```
\tikzset{%
  natoapp6c/s/labour/.pic={%
    \path[draw] (-.15,.2) -- (.15,.2) (0,.2) -- (0,0)
    (-.15,0) -- ++(300:.3) -- ++(60:.3) -- cycle;},
}
```

natoapp6c/s/land mine

```
\tikzset{%
  pics/natoapp6c/s/land mine/.is choice,
  pics/natoapp6c/s/land mine/personnel/.style={
    code={\pic[fill=pgfstrokecolor]{natoapp6c/s/land mine=none};
      \path[pic actions] (135:0.35) -- (0, 0) -- (45:0.35);}},
  pics/natoapp6c/s/land mine/tank/.style={
    code={\pic[fill=pgfstrokecolor]{natoapp6c/s/land mine=none};}},
  pics/natoapp6c/s/land mine/none/.style={
    code={\path[pic actions] (0,0) circle(0.25);}},
  pics/natoapp6c/s/land mine/.default=none,
}
```

natoapp6c/s/land missile

```
\tikzset{%
  natoapp6c/s/land missile/.pic={\pic{natoapp6c/s/missile launcher};},
}
```

natoapp6c/s/laser

```
\tikzset{%
  natoapp6c/s/laser/.pic={
    \path[draw,line join=round,line cap=round,pic actions]
    ( 0.1, -0.25)   --
    (-0.1, -0.225)  --
    ( 0.1, -0.2)    --
    (-0.1, -0.175)  --
    ( 0.1, -0.15)   --
```

```
    ( 0,   -0.1375) --
    ( 0,   -0.0125) --
    (-0.1,  0)      --
    ( 0.1,  0.025)  --
    (-0.1,  0.05)   --
    ( 0.1,  0.075)  --
    ( 0,    0.0875) --
    ( 0,    0.25)
    ( 0.1,  0.2)  --
    ( 0,    0.25) --
    (-0.1, 0.2);},
}
```

natoapp6c/s/launcher

```
\tikzset{%
  natoapp6c/s/launcher/.pic={
    \path[draw] (-.3,-.2) -- (.3,.2) -- (.3,-.2);},
}
```

natoapp6c/s/laundry

```
\tikzset{%
  natoapp6c/s/laundry/.pic={%
    \path[draw] (0,-.3) -- (0,.1)
    (0,.1) -- ++(150:.25)
    (0,.1) -- ++(180:.2)
    (0,.1) -- ++(210:.25);},
}
```

natoapp6c/s/machine gun

```
\tikzset{%
  natoapp6c/s/machine gun/.pic={%
    \pic[draw]{natoapp6c/s/rifle};
    \pic[draw]{natoapp6c/s/weapon=machine gun};},
}
```

natoapp6c/s/main gun

```
\tikzset{%
  natoapp6c/s/main gun/.pic={
    \path[pic actions] (M.north west) -- ++(.25,0) --
      ([shift=(0:.25)]M.south west) -- (M.south west) -- cycle;},
}
```

natoapp6c/s/maintenance

```
\tikzset{%
  natoapp6c/s/maintenance/.pic={
    \path[fill=pgfstrokecolor]
    (-.38,.25)
    to[out=0,in=90,looseness=1.5] (-.2,.05) -- (.2,.05)
    to [out=90,in=180,looseness=1.5] (.38,.25) --  ++(0,-.08)
    to [out=180,in=90,looseness=1.5] (.28,0)
    to [out=-90,in=180,looseness=1.5] (.38,-.17) -- ++(0,-.08)
    to [out=180,in=-90,looseness=1.5] (.2,-.05) -- (-.2,-.05)
    to [out=-90,in=0,looseness=1.5] (-.38,-.25) -- ++(0,.08)
    to [out=0,in=-90,looseness=1.5] (-.28,0)
    to [out=90,in=0,looseness=1.5] (-.38,.17) -- cycle;
  },
}
```

natoapp6c/s/medic

```
\tikzset{%
  natoapp6c/s/medic/.pic={
    \path[pic actions]
      (-0.075,-0.2)
      --(0.075,-.2)
      --(.075,-.075)
      --(.2,-.075)
      --(.2,.075)
      --(.075,.075)
      --(.075,.2)
      --(-0.075,.2)
      --(-0.075,.075)
      --(-.2,.075)
      --(-.2,-.075)
      --(-.075,-.075)
      --cycle;},
}
```

natoapp6c/s/medical

```
\tikzset{%
  natoapp6c/s/medical/.pic={\path[draw] (-1,0) -- (1,0) (0,-1) -- (0,1);},
}
```

natoapp6c/s/medical treatment

```
\tikzset{%
  natoapp6c/s/medical treatment/.pic={
    \path[draw] (0,0) pic {natoapp6c/s/medical}
    ([xscale=.5,shift={(0,-.2)}]M.west) -- ([xscale=.5,shift={(0,.2)}]M.west)
    ([xscale=.5,shift={(0,-.2)}]M.east) -- ([xscale=.5,shift={(0,.2)}]M.east);},
}
```

natoapp6c/s/mine

```
\tikzset{%
  natoapp6c/s/mine/.pic={
    \path[fill=pgfstrokecolor,draw] (0,0) ellipse(.2 and .15)
    (0,0) -- ++(60:.3)
    (0,0) -- ++(90:.3)
    (0,0) -- ++(120:.3)
    (0,0) -- ++(240:.3)
    (0,0) -- ++(270:.3)
    (0,0) -- ++(300:.3)
    ;},
}
```

natoapp6c/s/mine clearing equipment

```
\tikzset{%
  natoapp6c/s/mine clearing equipment/.pic={
    \path[pic actions]
    (0, 0.2) -- (0, 0) -- (0.35, -0.2) -- (-0.35, -0.2) -- (0, 0);},
}
```

natoapp6c/s/mine warfare vessel

```
\tikzset{%
  natoapp6c/s/mine warfare vessel/.pic={%
    \pic[scale=.8,fill=pgfstrokecolor,yshift=2.5]{natoapp6c/s/sea mine=top half};
    \pic          {natoapp6c/s/warfare vessel};
  },
}
```

natoapp6c/s/missile

```
\tikzset{%
  natoapp6c/s/missile/.pic={%
    \path[pic actions,draw]
      (0, 0.3)
      -- (-0.05, 0.2)
      -- (-0.05, -0.2)
```

```
      -- (-0.125,-0.3)
      -- (-0.125,-0.4)
      -- (0, -0.265)
      -- (0.125,-0.4)
      -- (0.125,-0.3)
      -- (0.05,-0.2)
      -- (0.05,0.2)
      -- cycle;},
}
```

natoapp6c/s/missile launcher

```
\tikzset{%
  pics/natoapp6c/s/missile launcher/.is choice,
  pics/natoapp6c/s/missile launcher/base/.style={
    code={
      \pic[draw]{natoapp6c/s/weapon=base};
      \pic[draw]{natoapp6c/s/weapon=top};
      \pic[draw]{natoapp6c/s/weapon=multi fire};
      \pic[draw]{natoapp6c/s/weapon=missile launcher};}},
  pics/natoapp6c/s/missile launcher/none/.style={
    code={
      \pic[draw]{natoapp6c/s/missile launcher=base};
      \path[pic actions] (-.2,-.2)--(-.2,-.35) (.2,-.2)--(.2,-.35);}},
  pics/natoapp6c/s/missile launcher/air defence/.style={
    code={
      \pic[draw]{natoapp6c/s/missile launcher=none};
      \pic[draw]{natoapp6c/s/weapon=air defence};}},
  pics/natoapp6c/s/missile launcher/anti tank/.style={
    code={
      \pic[draw]{natoapp6c/s/missile launcher=base};
      \pic[draw]{natoapp6c/s/weapon=anti tank};}},
  pics/natoapp6c/s/missile launcher/surface to surface/.style={
    code={%
      \pic[draw]{natoapp6c/s/missile launcher=none};
      \pic[draw]{natoapp6c/s/weapon=bottom};
      \pic[draw]{natoapp6c/s/weapon=machine gun};
    }},
  pics/natoapp6c/s/missile launcher/.default=none,
}
```

natoapp6c/s/mobile advisor and support

```
\tikzset{%
  natoapp6c/s/mobile advisor and support/.pic={
    \path[draw] (-.35,0) circle(.1) (.35,0) circle(.1);
    \path[draw,fill=pgfstrokecolor,pic actions]
    ( 0.15,  0.025) --
    (-0.25,  0.025) --
    (-0.25, -0.025) --
```

```
    ( 0.15, -0.025) --
    ( 0.15, -0.075) --
    ( 0.25,  0)     --
    ( 0.15,  0.075) -- cycle;},
}
```

natoapp6c/s/moored

```
\tikzset{%
  natoapp6c/s/moored/.pic={
    \path[draw] (0,.2) -- (0,-.05) (-.3,-.05) -- (.3,-.05);},
}
```

natoapp6c/s/mortar

```
\tikzset{%
  natoapp6c/s/mortar/.pic={
    \path[draw] (0,-.15) circle(.05) (0,.-.1) -- (0,.2)
    ([shift=(225:.1)]0,.2) -- (0,.2) -- ([shift=(-45:.1)]0,.2);},
}
```

natoapp6c/s/motorized

```
\tikzset{%
  natoapp6c/s/motorized/.pic={\path[draw] (M.north) -- (M.south);},
  pics/natoapp6c/s/motorised/.style={natoapp6c/s/motorized},
}
```

natoapp6c/s/mortuary affairs

```
\tikzset{%
  natoapp6c/s/mortuary affairs/.pic={
    \path[draw] (-.1,-.2) rectangle (.1,.2)
      (0,-.17) -- (0,.17) (-.07,.1) -- (.07,.1);},
}
```

natoapp6c/s/mountain

```
\tikzset{%
  natoapp6c/s/mountain/.pic={
    \path[draw,fill=pgfstrokecolor] (0,.2) -- ++(-60:.7) -- ++(180:.7) -- cycle;
  },
}
```

natoapp6c/s/naval

```
\tikzset{%
  natoapp6c/s/naval/.pic={
      \def\arrow{(0,0) -- (-.02,0) -- ++(60:.04) -- ++(-60:.04) -- cycle}
      \begin{scope}[pic actions]
        \path[draw]
        (0,.13) circle (.08) (-.2,.04) -- (.2,.04) (0,.04)
        -- (0,-.25) (210:.25) arc (210:340:.25);
        \path[draw,shift=(210:.25),rotate=30] \arrow;
        \path[draw,shift=(340:.25),rotate=-30] \arrow;
      \end{scope}},
}
```

natoapp6c/s/navigation

```
\tikzset{%
  natoapp6c/s/navigation/.pic={
    \path[draw]
    (.17,-.2) -- (0,.2) -- (-.17,-.2)
    ($(-180:.17)+(0,.05)$) arc[radius=.17,start angle=-180,end angle=0];},
}
```

natoapp6c/s/navy task

```
\tikzset{%
  natoapp6c/s/navy task/.pic={
    \path[pic actions]
      (-0.25, -0.2) -- (-0.25, 0.1) -- (-0.15, 0.2)
      ( 0.25, -0.2) -- ( 0.25, 0.1) -- ( 0.15, 0.2);},
}
```

natoapp6c/s/non combatant

```
\tikzset{%
  natoapp6c/s/non combatant/.pic={
    \path[draw,fill=pgfstrokecolor]
    (-0.25, -0.2) --
    (-0.25, 0.05) --
    (-0.15, 0.05) --
    (-0.15, 0.2)  --
    (0.15, 0.2)   --
    (0.15, 0.05)  --
    (0.25, 0.05)  --
    (0.25, -0.2)  -- cycle;},
}
```

natoapp6c/s/non lethal weapon

```
\tikzset{%
  natoapp6c/s/non lethal weapon/.pic={%
    \pic[draw]{natoapp6c/s/weapon};%
    \pic[draw]{natoapp6c/s/weapon=non lethal};},
}
```

natoapp6c/s/nuclear

```
\tikzset{%
  natoapp6c/s/nuclear/.pic={
    \path[fill=pgfstrokecolor,pic actions] (0,0) circle(.05)
    (0:  .3) arc(0  :  60:.3) -- (  60:.1) arc(  60: 0:  .1) -- cycle
    (180:.3) arc(180: 120:.3) -- ( 120:.1) arc( 120: 180:.1) -- cycle
    (-60:.3) arc(-60:-120:.3) -- (-120:.1) arc(-120:-60: .1) -- cycle;
  },
}
```

natoapp6c/s/observer

```
\tikzset{%
  natoapp6c/s/observer/.pic={
    \path[pic actions] (0.25,-.2)--(-.25,-.2)--(0,.2)--cycle;},
}
```

natoapp6c/s/orbiter shuttle

```
\tikzset{%
  natoapp6c/s/orbiter shuttle/.pic={
    \path[pic actions]
    ($(0, 0.3)!0.35!(0.125, -0.15)$) --
    (0.125, -0.15) -- (-0.125, -0.15) --
    ($(-0.125, -0.15)!0.65!(0, 0.3)$)
    to[in=105, out=75] cycle
    (0, -0.20) -- (0, -0.15); },
}
```

natoapp6c/s/ordnance

```
\tikzset{%
  natoapp6c/s/ordnance/.pic={
    \path[draw] (0,0) ellipse(.2 and .15);
    \begin{scope}
```

```
      \clip (0,0) ellipse(.2 and .15) [reverseclip];
      \path[draw] (0,0) -- ++(50:.3)
      (0,0) -- ++(70:.3)
      (0,0) -- ++(110:.3)
      (0,0) -- ++(130:.3)
      ;
    \end{scope}},
}
```

natoapp6c/s/organisation

```
\tikzset{%
  pics/natoapp6c/s/organisation/.style={natoapp6c/s/group},
}
```

natoapp6c/s/over snow

```
\tikzset{%
  natoapp6c/s/over snow/.pic={
    \ifn@to@pp@below%
      \draw ([shift={(-.15,.15)}]M.south west) to[in=180, out=270]
      ++(.15,-.15) -- (M.south east);
    \else%
      \draw ([shift={(.3,.1)}]M.west) to[in=180, out=-90]
        ([shift={(.5,-.1)}]M.west) --
        ([shift={(-.3,-.1)}]M.east);
    \fi},
}
```

natoapp6c/s/pack animal

```
\tikzset{%
  natoapp6c/s/pack animal/.pic={
    \def\n@to@pp@tmp{0}
    \ifn@to@pp@below\def\n@to@pp@tmp{-.15}\fi
    \path[draw,shift={(0,\n@to@pp@tmp)}]
    (-.3,-.15) -- (-.15,.15) -- (0,-.15) -- (.15,.15) -- (.3,-.15);},
}
```

natoapp6c/s/patrol

```
\tikzset{%
  natoapp6c/s/patrol/.pic={
    \pic{natoapp6c/s/warfare vessel};
    \path[draw,fill=pgfstrokecolor] (0.125, 0) -- (0, 0.2) -- (-0.125, 0) -- cycle;},
}
```

natoapp6c/s/patrolling

```
\tikzset{%
  natoapp6c/s/patrolling/.pic={
    % OBS
    \path[draw]
    (0.25, 0.05) -- (-0.05, 0.05) -- (0.05, -0.05) -- (-0.4, -0.05)
    (-0.3, 0) -- (-0.4, -0.05) -- (-0.3, -0.1)
    node [natoapp6c/text,natoapp6c/small text,
    scale=.5,anchor=west,inner sep=0] at (0.25, 0.05) {P};
  },
}
```

natoapp6c/s/physician

```
\tikzset{%
  natoapp6c/s/physician/.pic={
    \pic{natoapp6c/s/medical};
    \path[draw] (0.1, 0.05) -- (-0.1, 0.05);},
}
```

natoapp6c/s/pipeline

```
\tikzset{%
  natoapp6c/s/pipeline/.pic={
    \path[draw] (-.15,-.15) rectangle (.15,.15)
    (-.3,.1) -- (-.15,.1) (-.3,-.1) -- (-.15,-.1)
    (.3,.1) -- (.15,.1) (.3,-.1) -- (.15,-.1)
    (-.05,.15) rectangle (.05,.25) (-.1,.25) rectangle (.1,.30);},
}
```

natoapp6c/s/poisoning

```
\tikzset{%
  natoapp6c/s/poisoning/.pic={
    \path[pic actions] (0, 0.055) circle (0.145)
    (0.3, 0) -- (-0.3, -0.2)
    (-0.3, 0) -- (0.3, -0.2);},
}
```

natoapp6c/s/postal

```
\tikzset{%
  natoapp6c/s/postal/.pic={
```

```
    \path[draw] (-.25,.25) -- (.08,.25)
    to [out=-90,in=120,looseness=1] (.25,-.25)
    to [out=150,in=-90,looseness=1] (-.25,.25);
  },
}
```

natoapp6c/s/printed media

```
\tikzset{%
  natoapp6c/s/printed media/.pic={
    \path[pic actions] (0.2, 0) -- (-0.2, 0)
    (0, 0.1) circle (0.085)
    (0, -0.1) circle (0.085);},
}
```

natoapp6c/s/psychological

```
\tikzset{%
  natoapp6c/s/psychological/.pic={
    \path[pic actions] (-.25,.15) -- (-.1,.15) -- (.1,.25)
      -- ++(0,-.5) -- (-.1,-.15) -- (-.25,-.15) -- cycle
      (.1,.15) -- (.25,.15)
      (.1,.05) -- (.25,.05)
      (.1,-.05) -- (.25,-.05)
      (.1,-.15) -- (.25,-.15);},
}
```

natoapp6c/s/quarry

```
\tikzset{%
  natoapp6c/s/quarry/.pic={
    \path[draw] (-.2,-.2) -- (.18,.18) (.2,-.2) -- (-.18,.18)
      (25:.255) arc(25:65:.255)
      (115:.255) arc(115:155:.255);
      %([shift={(115:.08)}]-.1,.1) arc (115:155:.08)
      %([shift={(70:.08)}].1,.1) arc (70:110:.08);
    },
}
```

natoapp6c/s/quartermaster

```
\tikzset{%
  natoapp6c/s/quartermaster/.pic={
    \path[draw] (-.4,.1) -- (.1,.1) (.25,.1) circle(.15)
      (-.3,.1) -- (-.3,-.15) (-.15,.1) -- (-.15,-.15)
      (-.3,-.08) -- (-.15,-.08);},
```

```
}
```

natoapp6c/s/radar

```
\tikzset{%
  natoapp6c/s/radar/.pic={%
    \path[draw] (-.2,.2) arc (150:300:.25) (-.24,.01) -- (0,.2) --
    (0,0) -- (.2,.2);},
}
```

natoapp6c/s/radio

```
\tikzset{%
  natoapp6c/s/radio/.pic={%
    \path[draw] (-.2,.2) -- (-.13,.25) -- (-.07,.2) -- (0,.25) --
    (.07,.2) -- (.13,.25) -- (.2,.2) (0,.25) -- (0,-.05) (0,-.15) circle(.1);},
}
```

natoapp6c/s/radio relay

```
\tikzset{%
  natoapp6c/s/radio relay/.pic={%
    \path[draw] (-.2,.25) -- (.2,.25) (0,.25) -- (0,-.05) (0,-.15) circle(.1);},
}
```

natoapp6c/s/radio relay line of sight

```
\tikzset{%
  natoapp6c/s/radio relay line of sight/.pic={%
    \path[draw] (0,0) circle(.2);
    \path[fill=pgfstrokecolor] (0,0) -- (45:.2) arc(45:-45:.2) -- cycle;
    \path[fill=pgfstrokecolor] (0,0) -- (135:.2) arc(135:225:.2) -- cycle;},
}
```

natoapp6c/s/radio teletype

```
\tikzset{%
  natoapp6c/s/radio teletype/.pic={%
    \path[draw] (-.2,.25) -- (.2,.25) (-.15,.18) -- (.15,.18)
                (0,.25) -- (0,-.25)
                ([shift=(30:.1)]0,-.15) arc(30:330:.1);},
}
```

natoapp6c/s/railroad

```
\tikzset{%
  natoapp6c/s/railroad/.pic={%
    \ifn@to@pp@below%
      \path[pic actions] (M.south west) -- (M.south east)
        ([shift={(.08,-0.08)}]M.south west) circle(.08)
        ([shift={(.24,-0.08)}]M.south west) circle(.08)
        ([shift={(-.08,-0.08)}]M.south east) circle(.08)
        ([shift={(-.24,-0.08)}]M.south east) circle(.08);
    \else
      \path[pic actions]  (-.45,.08) -- (.45,.08)
        (-.37,0) circle(0.08)
        (-.21,0) circle(0.08)
        (.21,0) circle(0.08)
        (.37,0) circle(0.08);
    \fi
   },
}
```

natoapp6c/s/reconnaissance

```
\tikzset{%
  natoapp6c/s/reconnaissance/.pic={%
    \path[draw] (M.north east)--(M.south west);},
}
```

natoapp6c/s/recovery unmanned systems

```
\tikzset{%
  natoapp6c/s/recovery unmanned systems/.pic={%
    \path[draw] (-.5,.15) to [out=-80,in=180] (0,-.15) to
    [out=0,in=260] (.5,.15);},
}
```

natoapp6c/s/rifle

```
\tikzset{%
  natoapp6c/s/rifle/.pic={%
    \pic[draw]{natoapp6c/s/weapon=full};
    \pic[draw]{natoapp6c/s/weapon=rifle};},
}
```

natoapp6c/s/rising

```
\tikzset{%
  natoapp6c/s/rising/.pic={
    \path[draw,fill=pgfstrokecolor] (0, 0.2) -- (0, -0.167)
    (0.1, -0.2) -- (-0.1, -0.2) -- (0, 0.0);},
}
```

natoapp6c/s/riverine

```
\tikzset{%
  natoapp6c/s/riverine/.pic={%
    \ifn@to@pp@below%
      \path[pic actions] (M.south west)
        to [out=-90,in=-90,looseness=.5] (M.south east) -- cycle;
    \else%
      \path[pic actions] (-.5,.15) to [out=-80,in=180] (0,-.15) to
      [out=0,in=260] (.5,.15) -- cycle;
    \fi},
}
```

natoapp6c/s/rocket launcher

```
\tikzset{%
  pics/natoapp6c/s/rocket launcher/.is choice,
  pics/natoapp6c/s/rocket launcher/base/.style={
    code={
      \pic[draw]{natoapp6c/s/weapon=base};
      \pic[draw]{natoapp6c/s/weapon=rifle};
      \pic[yshift=-4,draw]{natoapp6c/s/weapon=rifle};
    }},
  pics/natoapp6c/s/rocket launcher/anti tank/.style={
    code={
      \pic[draw]{natoapp6c/s/rocket launcher=base};
      \pic[draw]{natoapp6c/s/weapon=anti tank};
    }},
  pics/natoapp6c/s/rocket launcher/single/.style={
    code={
      \pic[draw]{natoapp6c/s/rocket launcher=base};
      \pic[draw]{natoapp6c/s/weapon=bottom};}},
  pics/natoapp6c/s/rocket launcher/multiple/.style={
    code={
      \pic[draw]{natoapp6c/s/rocket launcher=single};
      \pic[yshift=-6,draw]{natoapp6c/s/weapon=multi fire};}},
  pics/natoapp6c/s/rocket launcher/single head/.style={
    code={%
      \pic[yshift=4,draw]{natoapp6c/s/weapon=rifle};}},
  pics/natoapp6c/s/rocket launcher/multiple head/.style={
    code={
      \pic[yshift=-4,draw]{natoapp6c/s/weapon=rifle};
      \pic[yshift=-6,draw]{natoapp6c/s/weapon=rifle};
    }},
```

```
  pics/natoapp6c/s/rocket launcher/.default=single,
}
```

natoapp6c/s/rotary wing

```
\tikzset{%
  natoapp6c/s/rotary wing/.pic={
    \path[pic actions]
      (0.44, 0.15) -- (0.44, -0.15) -- (-0.44, 0.15) -- (-0.44, -0.15) --
      cycle;},
}
```

natoapp6c/s/runway

```
\tikzset{%
  natoapp6c/s/runway/.pic={%
    \path[draw] (-.3,-.15) -- (.3,-.15) (-.2,-.2) -- (.2,.2);},
}
```

natoapp6c/s/sailing boat

```
\tikzset{%
  natoapp6c/s/sailing boat/.pic={%
    \path[draw]
    (-0.15, -0.2)  --
    ( 0.15, -0.2)   --
    ( 0.25, -0.025) --
    (-0.25, -0.025) -- cycle
    ( 0,    -0.025) -- (0, 0.2)
    (0.025,  0)     -- (0.025, 0.19) -- (0.225, 0) -- cycle;},
}
```

natoapp6c/s/satellite

```
\tikzset{%
  pics/natoapp6c/s/satellite/.is choice,
  pics/natoapp6c/s/satellite/none/.style={
    code={
      \iftikz@mode@fill
      \def\n@to@pp@next{\path[draw,fill=pgfstrokecolor,pic actions]}
      \else
      \def\n@to@pp@next{\path[pic actions]}
      \fi
      \n@to@pp@next
      ( 0.45,  0.075) rectangle ( 0.15,  -0.075)
      ( 0.075, 0.075) rectangle (-0.075, -0.075)
```

```
      (-0.45,  0.075) rectangle (-0.15,  -0.075)
      ( 0.15,  0) -- (0.075, 0)
      (-0.15,  0) -- (-0.075, 0);
    }},
  pics/natoapp6c/s/satellite/astronomical/.style={
    code={
      \begingroup\tikz@picmode
        \pic{natoapp6c/s/satellite=none};
      \endgroup
      \path[pic actions]
      (0.04, 0.075) rectangle (-0.04, 0.2)
      (0.02, -0.075) rectangle (-0.02, -0.2);}},
  pics/natoapp6c/s/satellite/bio/.style={
    code={
      \begingroup\tikz@picmode
      \pic[yshift=-1]{natoapp6c/s/satellite=none};
      \endgroup
      \path[pic actions]
      (-0.075, 0.13) circle (0.07)
      ($(-0.075, 0.13) + (60:0.07)$) --
      ++(-30:0.22) -- ++(0, -0.025) -- (-0.005, 0.13) -- cycle;
    }},
  pics/natoapp6c/s/satellite/communications/.style={
    code={
      \begingroup\tikz@picmode
      \pic[yshift=-1]{natoapp6c/s/satellite=none};
      \endgroup
      \path[pic actions]
      (0, 0.075) -- (0, 0.125)
      (0, 0.125) arc (270:340:0.25 and 0.1)
      (0, 0.125) arc (270:200:0.25 and 0.1);
    }},
 pics/natoapp6c/s/satellite/navigation/.style={
    code={
      \begingroup\tikz@picmode
      \pic[yshift=-3.75,scale=.9]{natoapp6c/s/satellite=none};
      \endgroup
      \pic[scale=.5,yshift=3.5]{natoapp6c/s/navigation};
    }},
  pics/natoapp6c/s/satellite/earth observing/.style={
    code={
      \begingroup\tikz@picmode
      \pic[yshift=3.75, scale=0.9]{natoapp6c/s/satellite=none};
      \endgroup
      \path[pic actions]
      (0, 0.065) -- +(315:0.125)
      (0, 0.065) -- +(225:0.125)
      (0, -0.12) circle (0.08);
    }},
  pics/natoapp6c/s/satellite/tether/.style={
    code={
      \begingroup\tikz@picmode
      \pic[yshift=-3.75, scale=0.9]{natoapp6c/s/satellite=none};
```

```
      \endgroup
      \path[pic actions]
      (0, -0.066) -- +(30:0.3)
      (0, -0.066) +(30:0.375) circle(0.075);
    }},
  pics/natoapp6c/s/satellite/small/.style={
    code={
      \begingroup\tikz@picmode
      \pic[scale=0.6]{natoapp6c/s/satellite=none};
      \endgroup
      \path[pic actions]
      (0.05,  0.2)  -- ( 0,   0.1) -- (-0.05,  0.2)
      (0.05, -0.2)  -- ( 0,  -0.1) -- (-0.05, -0.2)
      (-0.4,  0.05) -- (-0.3, 0)   -- (-0.4,  -0.05)
      ( 0.4,  0.05) -- ( 0.3, 0)   -- ( 0.4,  -0.05);
    }},
  pics/natoapp6c/s/satellite/reconnaissance/.style={
    code={
      \pic[yshift=-1,fill=pgfstrokecolor]{natoapp6c/s/satellite=none};
      \path[pic actions]
      (-0.075, -0.05) -- +(250:0.1)
      (-0.025, -0.05) -- +(260:0.1)
      ( 0.025, -0.05) -- +(280:0.1)
      ( 0.075, -0.05) -- +(290:0.1);
    }},
  pics/natoapp6c/s/satellite/.default=none,
}
```

natoapp6c/s/sea mine

```
\tikzset{%
  pics/natoapp6c/s/sea mine/.is choice,
  pics/natoapp6c/s/sea mine/top half/.style={
    code={\path[draw,join=bevel,pic actions]
      (.2,0) arc(0:35:.2 and .175) --
      (42:.34 and .3) -- (48:.34 and .3) --
      % ($(45:.1) + (40:.2)$) -- ($(45:.1)+(50:.2)$) --
      (55:.2 and .175) arc(50:75:.2 and .175) --
      (80:.26 and .23) -- (100:.26 and .23) --
      (105:.2 and .175) arc(100:125:.2 and .175) --
      (132:.34 and .3) -- (138:.34 and .3) --
      %($(135:.1)+(130:.2)$) -- ($(135:.1)+(140:.2)$) --
      (145:.2 and .175) arc(145:180:.2 and .175);
    }},
  pics/natoapp6c/s/sea mine/bottom half/.style={
    code={
      \path[pic actions] (.2,0) arc(0:-180:.2);}},
  pics/natoapp6c/s/sea mine/full/.style={
    code={
      \pic[fill=pgfstrokecolor]{natoapp6c/s/sea mine/top half};
      \pic[fill=pgfstrokecolor]{natoapp6c/s/sea mine/bottom half};}},
  pics/natoapp6c/s/sea mine/neutralised/.style={
```

```
    code={
      \begin{scope}[even odd rule]
        \clip [rotate=42]  (-.4,-.015) rectangle (.4,.015) [reverseclip];
        \clip [rotate=-42] (-.4,-.015) rectangle (.4,.015) [reverseclip];
        \pic {natoapp6c/s/sea mine=full};
      \end{scope}
    }},
  pics/natoapp6c/s/sea mine/neutralized/.style=natoapp6c/s/sea mine/neutralised,
  pics/natoapp6c/s/sea mine/.default=full,
}
```

natoapp6c/s/seabed installation

```
\tikzset{%
  natoapp6c/s/seabed installation/.pic={%
    \path[pic actions]
    (-0.25, -0.2)   --
    ( 0.25, -0.2)   --
    ( 0.25, -0.075) --
    ( 0.05, -0.075) --
    ( 0.05,  0.025) --
    (-0.125, 0.025) --
    (-0.125, 0.2)   --
    (-0.25,  0.2)   -- cycle;},
}
```

natoapp6c/s/search

```
\tikzset{%
  natoapp6c/s/search/.pic={%
    \path[draw] (-.3,-.2)--(0,-.4)--(.3,-.2) (0,.4)--(0,-.4);},
}
```

natoapp6c/s/searching

```
\tikzset{%
  natoapp6c/s/searching/.pic={%
    \path[pic actions]
    (-0.4, 0)
    arc (180:0:0.1)
    arc (180:360:0.1)
    arc (180:0:0.1)
    arc (180:270:0.1) -- +(0.1, 0)
    (0.3, -0.05) -- (0.4, -0.1) -- (0.3, -0.15);},
}
```

natoapp6c/s/semi trailer truck

```
\tikzset{%
  natoapp6c/s/semi trailer truck/.pic={
    \pic[scale=.75,xshift=-2,draw]{natoapp6c/s/utility vehicle};
    \path[pic actions] (0.21, -0.025) -- (0.35, -0.025)
    (0.35, 0.05) -- (0.35, -0.1);},
}
```

natoapp6c/s/sensor

```
\tikzset{%
  natoapp6c/s/sensor/.pic={%
    \path[fill=pgfstrokecolor] (-.3,0) arc (270:360:.3) arc (180:270:.3) arc
    (90:180:.3) arc (0:90:.3);},
}
```

natoapp6c/s/ship

```
\tikzset{%
  natoapp6c/s/ship/.pic={%
    \path[pic actions]
    (-0.2, -0.2)  --
    ( 0.2, -0.2)  --
    ( 0.35, 0.05) --
    ( 0.15, 0.05) --
    ( 0.15, 0.2)  --
    (-0.15, 0.2)  --
    (-0.15, 0.05) --
    (-0.35, 0.05) --
    cycle;},
}
```

natoapp6c/s/signal

```
\tikzset{%
  natoapp6c/s/signal/.pic={%
    \path[draw] (M.north west) -- (0,-.1) -- (0,.1) -- (M.south east);},
}
```

natoapp6c/s/signals intelligence

```
\tikzset{%
  natoapp6c/s/signals intelligence/.pic={%
    \path[draw] (-.2,.2) -- (-.13,.25) -- (-.07,.2) -- (0,.25) --
```

```
17352     (.07,.2) -- (.13,.25) -- (.2,.2) (0,.25) -- (0,-.2);},
17353 }
```

natoapp6c/s/ski

```
17354 \tikzset{%
17355   natoapp6c/s/ski/.pic={
17356     \path[draw] (-.15,-.15) -- (.1,.2) (.15,-.15) -- (-.1,.2)
17357       (-.1,-.2) -- (-.2,-.1)
17358       (.1,-.2) -- (.2,-.1);
17359     },
17360 }
```

natoapp6c/s/sled

```
17361 \tikzset{%
17362   natoapp6c/s/sled/.pic={
17363     \ifn@to@pp@below%
17364       \draw ([shift={(-.15,.15)}]M.south west) to[in=180, out=-90]
17365         ++(.15,-.15) -- (M.south east) to[in=-90, out=0]
17366         ([shift={(.15,.15)}]M.south east);
17367     \else%
17368       \draw ([shift={(.3,.1)}]M.west) to[in=180, out=-90]
17369         ([shift={(.5,-.1)}]M.west) --
17370         ([shift={(-.5,-.1)}]M.east) to[in=-90, out=0]
17371         ([shift={(-.3,.1)}]M.east);
17372     \fi
17373     },
17374 }
```

natoapp6c/s/small squashed text

```
17375 \tikzset{%
17376   pics/natoapp6c/s/small squashed text/.style={
17377     code={\n@to@pp@text@smallsquashed{#1};}},
17378 }
```

natoapp6c/s/small text

```
17379 \tikzset{%
17380   pics/natoapp6c/s/small text/.style={code={\n@to@pp@text@small{#1};}},
17381 }
```

natoapp6c/s/sniper

```
\tikzset{%
  natoapp6c/s/sniper/.pic={%
    \path[draw] (-.2,.2)--(-.05,.2) (.05,.2)--(.2,.2) (0,.15)--(0,-.2);},
}
```

natoapp6c/s/space station

```
\tikzset{%
  natoapp6c/s/space station/.pic={
    \path[join=bevel,pic actions]
    (-80:.15 and .06) -- (0.025, 0.175) arc(0:180:0.025) -- (-100:.15 and .06)
    ($(80:.25 and 0.1)+(0,-.0125)$) arc(80:-260:.25 and .1) --
    (-260:.15 and .06)              arc (-260:80:.15 and .06) -- cycle
    (-82:.25 and .1) -- (0.025, -0.175) arc(360:180:0.025) -- (-98:.25 and .1);
  },
}
```

natoapp6c/s/squashed text

```
\tikzset{%
  pics/natoapp6c/s/squashed text/.style={code={\n@to@pp@text@squashed{#1};}},
}
```

natoapp6c/s/submarine

```
\tikzset{%
  natoapp6c/s/submarine/.pic={
    \path[fill=pgfstrokecolor,pic actions]
    (0.4, 0) --
    (0.25, 0.15) --
    (-0.25, 0.15) --
    (-0.4, 0) --
    (-0.25, -0.15) --
    (0.25, -0.15) -- cycle;},
}
```

natoapp6c/s/submersible

```
\tikzset{%
  natoapp6c/s/submersible/.pic={
    \path[pic actions]
    ($(0, -0.05) + (106.6:0.35 and 0.15)$)
    arc (106.6:433.4:0.35 and 0.15) |- (0, 0.2) -| cycle;
  },
}
```

natoapp6c/s/supply

```
\tikzset{%
  natoapp6c/s/supply/.pic={
    \path[pic actions]
    ($(M.east)-(0,.25)$)--($(M.west)-(0,.25)$);},
}
```

natoapp6c/s/surface combatant

```
\tikzset{%
  natoapp6c/s/surface combatant/.pic={
    \pic {natoapp6c/s/warfare vessel};
    \path[draw,fill=pgfstrokecolor]
    (0.12,0.05) --
    (0.12,0.14) --
    (0.06,0.14) --
    (0.06,0.2) --
    (0.24,0.2) --
    (0.24,0.272) --
    (0.06,0.272) --
    (0.06,0.35) --
    (-0.06,0.35) --
    (-0.06,0.272) --
    (-0.24,0.272) --
    (-0.24,0.2) --
    (-0.06,0.2) --
    (-0.06,0.14) --
    (-0.12,0.14) --
    (-0.12,0.05) -- cycle;},
}
```

natoapp6c/s/survey

```
\tikzset{%
  natoapp6c/s/survey/.pic={
    \path[draw,fill=pgfstrokecolor,pic actions]
    (0, -0.1) -- (0, 0.195) -- (0.25, 0.0475) -- cycle;
    \path[pic actions] (0.1, -0.2) -- (0, -0.1) -- (-0.1, -0.2);},
}
```

natoapp6c/s/tactical satellite

```
\tikzset{%
  natoapp6c/s/tactical satellite/.pic={
    \path[fill=pgfstrokecolor,draw]
```

```
    (-.3,-.2) rectangle(-.15,.2)
    (.15,-.2) rectangle( .3,.2)
    (-.075,-.15) rectangle (.075,.15)
    (-.15,0) -- (.15,0)
    (0,-.15) -- (0,-.3);
    \path[draw] (-.2,-.35) to [out=40,in=140,looseness=1] (.2,-.35);},
}
```

natoapp6c/s/tank

```
\tikzset{%
  natoapp6c/s/tank/.pic={%
    \pic[draw]{natoapp6c/s/vehicle};
    \path[pic actions] ( 0.35,  0.2) -- (-0.35,  0.2);},
}
```

natoapp6c/s/text

```
\tikzset{%
  pics/natoapp6c/s/text/.style={code={%
      \n@to@pp@dbg{3}{Text: `#1'}%
      \n@to@pp@text@normal{#1};}},
}
```

natoapp6c/s/topographic

```
\tikzset{%
  natoapp6c/s/topographic/.pic={
    \path[draw] (0,.05) -- (0,.2)
       (0,.05) -- (-.1,-.2)
       (0,.05) -- (.1,-.2)
       (-30:.15) arc[radius=.15,start angle=-30,end angle=-150];},
}
```

natoapp6c/s/torpedo

```
\tikzset{%
  natoapp6c/s/torpedo/.pic={
    \path[draw,fill=pgfstrokecolor,pic actions]
    (-0.35,  0) --
    (-0.3,   0.075) --
    ( 0.25,  0.075) --
    ( 0.35, -0.075) --
    ( 0.35,  0.075) --
    ( 0.25, -0.075) --
    (-0.3,  -0.075) -- cycle;},
```

```
}
```

natoapp6c/s/towed

```
\tikzset{%
  natoapp6c/s/towed/.pic={
    \ifn@to@pp@below%
      \path[pic actions] (M.south east) -- (M.south west)
      ([shift={(.08,0)}]M.south east) circle(.08)
      ([shift={(-.08,0)}]M.south west) circle(.08);
    \else%
      \path[draw] (-.32,0) -- (.32,0) (-.4,0) circle(.08) (.4,0) circle(.08);%
    \fi},
}
```

natoapp6c/s/tracked

```
\tikzset{%
  natoapp6c/s/tracked/.pic={
    \ifn@to@pp@below%
      \path[pic actions]
      ([shift={(.08,-.16)}]M.south west)
      arc [radius=.08,start angle=-90,end angle=-270]
      -- ([shift={(-.08,0)}]M.south east)
      arc [radius=.08,start angle=90,end angle=-90]
      -- cycle;
    \else%
      \path[pic actions]
      (-.3,-.1) arc [radius=.1,start angle=-90,end angle=-270]
      -- (.3,.1) arc [radius=.1,start angle=90,end angle=-90]
      -- cycle;
    \fi},
}
```

natoapp6c/s/train locomotive

```
\tikzset{%
  natoapp6c/s/train locomotive/.pic={
    \path[pic actions]
    (.35,-.3)--(-.35,-.3)--(-.35,.3)--(0,.3)--(0,0)--(0.35, 0)--cycle;},
}
```

natoapp6c/s/transportation

```
\tikzset{%
  natoapp6c/s/transportation/.pic={
```

```
    \path[pic actions] (0,0) circle(.2)
    (180:.2) --   (0:.2)
    (225:.2) --  (45:.2)
    (270:.2) --  (90:.2)
    (315:.2) -- (135:.2) ;},
}
```

natoapp6c/s/unexploded ordnance

```
\tikzset{%
  natoapp6c/s/unexploded ordnance/.pic={
    \begin{scope}[transparency group=knockout]
      \path[draw,fill=pgfstrokecolor,pic actions] (0,0) circle(.2);
      \pic[opacity=0]{natoapp6c/s/small squashed text=UXO};
    \end{scope}},
}
```

natoapp6c/s/unmanned

```
\tikzset{%
  natoapp6c/s/unmanned/.pic={
    \path[pic actions]
      (0,-0.1)
      --(0.45,0.05)
      --(0.45,0.1)
      --(0,0.025)
      --(-0.45,0.1)
      --(-0.45,0.05)
      --cycle;},
}
```

natoapp6c/s/utility vehicle

```
\tikzset{%
  natoapp6c/s/utility vehicle/.pic={%
    \pic[draw]{natoapp6c/s/vehicle};
    \path[pic actions]
    (0.35, 0.3) to[in=-90, out=-90, looseness=1] (-0.35, 0.3); },
}
```

natoapp6c/s/vehicle

```
\tikzset{%
  natoapp6c/s/vehicle/.pic={
    \path[pic actions]
    (-0.35,  0.2) -- (-0.35, -0.2) -- ( 0.35, -0.2) -- ( 0.35, 0.2)
```

```
    (-0.35, -0.2) -- (-0.35, -0.3)
    (0.35,  -0.2) -- ( 0.35, -0.3)
    (-0.35,  0.2) -- (-0.35,  0.3)
    (0.35,   0.2) -- ( 0.35,  0.3);}
}
```

natoapp6c/s/video imagery

```
\tikzset{%
  natoapp6c/s/video imagery/.pic={
    \path[pic actions]
    (-0.4, 0.2) -- (-0.4, -0.2) -- (0.05, -0.2) -- (0.2, 0.2) -- cycle
    (0.075, -0.15) -- (0.4, -0.15)
    (0.16, 0.1) -- (0.4, 0.1);
    \path[draw,fill=pgfstrokecolor,pic actions](0.38,-.2) rectangle (0.42,.15);},
}
```

natoapp6c/s/warfare vessel

```
\tikzset{%
  natoapp6c/s/warfare vessel/.pic={
    \path[draw,fill=pgfstrokecolor] (0, -0.2) -- (0.3, 0.05) -- (-0.3, 0.05) -- cycle;},
}
```

natoapp6c/s/water

```
\tikzset{%
  natoapp6c/s/water/.pic={
    \path[pic actions]
    (-0.3, 0.05) -- (0, 0.05) to[in=90, out=0] (0.3, -0.2)
    (0, 0.05) -- (0, 0.2)
    (0.075, 0.2) -- (-0.075, 0.2);},
}
```

natoapp6c/s/wheeled

```
\tikzset{%
  pics/natoapp6c/s/wheeled/.is choice,
  pics/natoapp6c/s/wheeled/and tracked/.style={
    code={
      \ifn@to@pp@below%
        \path[pic actions]
          ([shift={(.4,-.16)}]M.south west)
          arc [radius=.08,start angle=-90,end angle=-270]
          -- ([shift={(-.08,0)}]M.south east)
          arc [radius=.08,start angle=90,end angle=-90]
```

```
          -- cycle
          ([shift={(.08,-.08)}]M.south west) circle(.08);
      \else%
        \path[pic actions]
        (-.1,-.08) arc [radius=.08,start angle=-90,end angle=-270]
        -- (.32,.08) arc [radius=.08,start angle=90,end angle=-90]
        -- cycle
        (-.4,0) circle(0.08);
      \fi}},
  pics/natoapp6c/s/wheeled/limited/.style={
    code={
      \ifn@to@pp@below%
        \path[pic actions] (M.south west) -- (M.south east)
           ([shift={(.08,-.08)}]M.south west) circle(.08)
           ([shift={(-.08,-.08)}]M.south east) circle(.08);
      \else
        \path[pic actions] (-.4,.08) -- (.4,.08)
          (-.32,0) circle(0.08) (.32,0) circle(0.08);
     \fi}},
  pics/natoapp6c/s/wheeled/cross country/.style={
    code={\pic{natoapp6c/s/wheeled=limited};
      \ifn@to@pp@below%
        \path[pic actions] ([shift={(0,-.08)}]M.south) circle(.08);
      \else
        \path[pic actions] (0,0) circle(0.08);
     \fi}},
  pics/natoapp6c/s/wheeled/semi/.style={
     code={\pic{natoapp6c/s/wheeled=limited};
      \ifn@to@pp@below%
        \path[pic actions] ([shift={(.24,-.08)}]M.south west) circle(.08);
      \else
        \path[pic actions] (-.16,0) circle(0.08);
     \fi}},
  pics/natoapp6c/s/wheeled/.default=limited,
}
```

5.6.21 Some extra MIL-STD symbols

Extra NATO App6(c) symbol (from MIL-STD)

natoapp6c/s/prison

```
\tikzset{%
  natoapp6c/s/prison/.pic={
    \path[pic actions] (-.3,-.3)rectangle(.3,.3)
    (-.23,-.30)--(-.23, .3)
    ( .23,-.30)--( .23, .3)
    (-.08,-.30)--(-.08,-.2)
    (-.08,-.15) circle (.05)
    (-.08,-.1) --(-.08, .3)
    ( .08,-.30)--( .08,-.2)
```

```
    ( .08,-.15) circle (.05)
    ( .08,-.1) --( .08, .3)
    (0,.15) circle(.07 and .1);
  },
}
```

\n@to@pp@s@ll

A list of all defined symbols

```
\def\n@to@pp@s@ll{
  weapon=base,
  weapon=top,
  weapon=bottom,
  weapon=rifle,
  weapon=machine gun,
  weapon=grenade launcher,
  weapon=missile launcher,
  weapon=non lethal,
  weapon=multi fire,
  weapon=air defence,
  weapon=anti tank,
  weapon=full,
  weapon,
  type=light,
  type=medium,
  type=heavy,
  type=vlight,
  type=vmedium,
  type=vheavy,
  type,
  above corps support,
  air assault with organic lift,
  air decoy,
  air assault,
  air defence,
  air strip,
  air traffic,
  airship,
  airborne,
  ammunition,
  amphibious,
  amphibious warfare ship,
  analysis,
  arrest,
  artillery,
  anti tank anti armour,
  antenna,
  armoured,
  armoured fighting vehicle,
  armoured personnel carrier,
  arctic,
  automobile,
  balloon,
```

```
bar,
base,
bicycle equipped,
boat,
booby trap,
bottomed,
bridge=none,
bridge=fixed,
bridge=folding,
bridge=hollow,
bridge,
capsule,
carrier,
chemical biological radiological nuclear,
civilian military cooperation,
civilian police,
civilian telecommunications,
coast guard vessel,
combat support,
combatant,
combined arms,
computer system,
control,
convoy,
corps support,
crime,
decoy,
direct communications,
direction finding,
diving=none,
diving=military,
diving,
drilling,
earthmover,
electric power,
electronic ranging,
electronic warfare wide,
engineer,
enhanced location reporting system,
environmental protection,
explosion,
finance,
fishing vessel,
fire protection,
fixed and rotary wing,
fixed wing,
flame thrower,
floating,
surfaced,
food,
fuel,
grenade launcher=none,
grenade launcher=non lethal,
```

```
17732  grenade launcher,
17733  graffiti,
17734  group,
17735  gun=base,
17736  gun=air defence,
17737  gun=anti tank,
17738  gun=direct,
17739  gun=recoilless,
17740  gun,
17741  headquarters,
17742  house,
17743  howitzer,
17744  in position,
17745  individual,
17746  infantry,
17747  intermodal,
17748  jagged wave,
17749  jam,
17750  jamming,
17751  jetski,
17752  killing,
17753  labour,
17754  land mine=personnel,
17755  land mine=tank,
17756  land mine=none,
17757  land mine,
17758  land missile,
17759  laser,
17760  launcher,
17761  laundry,
17762  machine gun,
17763  main gun,
17764  maintenance,
17765  medic,
17766  medical,
17767  medical treatment,
17768  mine,
17769  mine clearing equipment,
17770  mine warfare vessel,
17771  missile,
17772  missile launcher=base,
17773  missile launcher=none,
17774  missile launcher=air defence,
17775  missile launcher=anti tank,
17776  missile launcher=surface to surface,
17777  missile launcher,
17778  mobile advisor and support,
17779  moored,
17780  mortar,
17781  motorized,
17782  mortuary affairs,
17783  mountain,
17784  naval,
```

```
17785  navigation,
17786  navy task,
17787  non combatant,
17788  non lethal weapon,
17789  nuclear,
17790  observer,
17791  orbiter shuttle,
17792  ordnance,
17793  organisation,
17794  over snow,
17795  pack animal,
17796  patrol,
17797  patrolling,
17798  physician,
17799  pipeline,
17800  poisoning,
17801  postal,
17802  printed media,
17803  psychological,
17804  quarry,
17805  quartermaster,
17806  radar,
17807  radio,
17808  radio relay,
17809  radio relay line of sight,
17810  radio teletype,
17811  railroad,
17812  reconnaissance,
17813  recovery unmanned systems,
17814  rifle,
17815  rising,
17816  riverine,
17817  rocket launcher=base,
17818  rocket launcher=anti tank,
17819  rocket launcher=single,
17820  rocket launcher=multiple,
17821  rocket launcher=single head,
17822  rocket launcher=multiple head,
17823  rocket launcher,
17824  rotary wing,
17825  runway,
17826  sailing boat,
17827  satellite=none,
17828  satellite=astronomical,
17829  satellite=bio,
17830  satellite=communications,
17831  satellite=navigation,
17832  satellite=earth observing,
17833  satellite=tether,
17834  satellite=small,
17835  satellite=reconnaissance,
17836  satellite,
17837  sea mine=top half,
```

```
  sea mine=bottom half,
  sea mine=full,
  sea mine=neutralised,
  sea mine=neutralized,
  sea mine,
  seabed installation,
  search,
  searching,
  semi trailer truck,
  sensor,
  ship,
  signal,
  signals intelligence,
  ski,
  sled,
  small squashed text=TXT,
  small text=TXT,
  sniper,
  space station,
  squashed text=TXT,
  submarine,
  submersible,
  supply,
  surface combatant,
  survey,
  tactical satellite,
  tank,
  text=TXT,
  topographic,
  torpedo,
  towed,
  tracked,
  train locomotive,
  transportation,
  unexploded ordnance,
  unmanned,
  utility vehicle,
  vehicle,
  video imagery,
  warfare vessel,
  water,
  wheeled=and tracked,
  wheeled=limited,
  wheeled=cross country,
  wheeled=semi,
  wheeled
}
```

A Generate draft VASSAL module

We can use the code you wrote for your game pieces (counters, maps, tables), to generate a draft VASSAL module. To that end, use the document class wgexport, and some simple macros to export your graphics to a single PDF. A

provided Python script then processes this to generate the draft VASSAL module.

The generated VASSAL module is not the final thing, but it is a good start.

A.1 Example

Suppose we have defined counters and markers like

```
allied 1 id      axis 1 ad     out of supply
allied 2 ad      axis 2 ad     game turn
allied 3 abid    axis 3 ic
```

via Tikz styles. Also assume that we have macros

```
\board   \oob    \charts   \front
```

which produces tikzpictures to the board, OOBs, charts, and cover, respectively. All this is defined in our package `mygame`. Of course that we have our rules in the file `game.pdf`.

We prepare a simple LaTeX source file

```
\documentclass{wgexport}
\usepackage{mygame}
\begin{document}
\begin{imagelist}  %% Records image meta info
  \chitimages{{%
     {allied 1 id,allied 2 ad,allied 3 abid}/Allied,%
     {axis 1 ad,axis 2 ad,axis 3 ic}/Axis,%
     {out of supply, game turn}/Markers}}
  \info{Board}{board}{} \board
  \info{OOB}{oob}{}     \oob
  \info{Charts}{chart}{}\chart
  \info{Cover}{front}{} \front
\end{imagelist}
\end{document}
```

When we run LaTeX on this, we will get a PDF where each page is a separate image and the page is cropped to image. *In addition* we will get a CSV (comma-separated-values) file `export.csv` which contains some meta information about each page. In particular, it identifies the name of each page, the category, and sub category of the image.

For chits, the name of the image is the style name (e.g., `game turn`). For other images, it is the first argument to `\info` above.

The category is for chits is always `counter`. For other images, it is the second argument to the `\info` macro (e.g., `board`).

The category of an image is important later on when we generate the VASSAL module. Recognised categories are

- `counter` for counter images. Such an image will trigger the creation of a VASSAL game piece.
- `board` for board images. Images of this kind will result in VASSAL board (or Map) elements.

- `oob` for Order of Battle tables. This will also result in a VASSAL map being created, but one that is displayed as a pop-up and with a rectangular grid. This is useful for placing units in an Order of Battle chart.
- `chart` for charts. These images will be made VASSAL charts — i.e., pop-up windows which contains some graphics for the players reference.
- `front` for the cover image. This will become the module splash image. Only one such image (the first) will be used.

Other categories may be used, and the corresponding image will be added to the VASSAL module. However, they will no be processed in any specific way.

The *sub-category* is mainly used for counters. Above, we gave the sub-categories `Allied`, `Axis`, and `Markers`. The sub-categories will help to identify the factions of the game, and counter prototypes will be made for each category. The sub-categories of `board`, `charts`, `oob`, and `front` has no or little effect.

One we have processed the file above to generate our PDF (Say `export.pdf`), then we can process it (and the CSV file) with a Python script to make our draft VASSAL module

```
export.py export.pdf export.csv -o Game.vmod -t Game -v 0.1 \
    -d "My game" -r rules.pdf
```

This will generate the draft module `Game.vmod`. Note that we add the rules (`-r rules.pdf`) to the module so that the module is complete.

Once the module has been generated, one can open it in the VASSAL editor and further customise it. For example, the grids used in the boards needs to be adjusted, and one may want to make initial set-ups or add all counters to the OOB.

Of course, running the Python script will overwrite all changes, so perhaps it is a good idea to work on a copy of the output file.

Index

Numbers written in italic refer to the page where the corresponding entry is described; numbers underlined refer to the code line of the definition; numbers in roman refer to the code lines where the entry is used.

A

B

C

D

E

F

G

H

I

O

P

R

S

T

U

V

W

X

Z