Heptahexaflexagons

There are four variations to the 7 faced hexaflexagons. Of course, as with all hexaflexagons, there are mirror versions. So the 4 heptahexaflexagons have 4 mirror foldings. You can make these by folding the flexagons in the opposite direction. For example, instead of folding all the G triangles together, fold them apart. It is interesting to fold up the mirrors to all the flexagons to see the variations in the face patterns. Try it.

A an example, an interesting experiment is to fold up mirror versions of my B & C heptahexaflexagon variation. If the weekday folding pattern is folded backwards to produce the mirror folding, the result ends up with no faces with all weekdays, and two faces of several arrangement of triangles that have all the same letters (Bs and Ds) from the letter folding variation. If the letter variation is folded backwards, there are no faces with all the same letters, but two faces with all the same weekdays (Tuesdays and Thursdays). The G face which was the same (the only face that is the same in the two variations) in both regular foldings becomes split in both of the symmetric foldings. The surprise in this is that when folding the symmetric to one variation, two faces will show up from the regular opposite variation. You will also notice that these faces that show up in alternate mirror foldings of the B & C heptahexaflexagon variation have triangles that are not adjacent in the frieze code (template). Higher order flexagons have more and more faces created from non-adjacent triangles and also more and more frieze patterns that will fold up into flexagons with unique Tuckerman traverses.

It is interesting to look deeper at the higher order flexagons with duplicate foldings from a single frieze. There is an octahexaflexagon that has a frieze with 3 duplicate foldings, a nonahexaflexagon with a frieze that has 6 duplicate foldings and one dekahexaflexagon has a frieze that has 12 duplicate foldings. I have been considering some ideas for creating unique patterns for these frieze codes. I suspect there are many interesting properties for these flexagons and also some v-flexing possibilities. As long as the mobius half twists in the different foldings are the same direction, it should be possible to v-flex between them. I do not know how hard it would be to prove this. I also do not know how to determine what the least number of v-flexes it would take to flex from one folding to another.

Two final notes; If you are following my Tuckerman traverse diagrams, they will work when the flexagon is repetitively flexed from one of the sides. You will have to experiment to find the correct side. Also note that all my templates use vector graphics for the lettering and triangles. So, in Adobe Reader, be sure to set the page for landscape and click on "fit to print area". If you have access to a color printer that will print 11x14, and you click on "fit to print area" you will get a nice size flexagon. It is also possible to print them even bigger if you have a color printer that will print even larger pages.