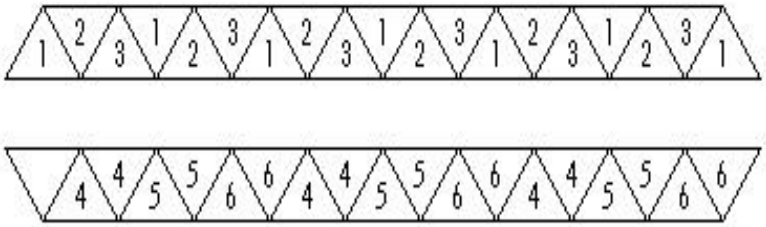
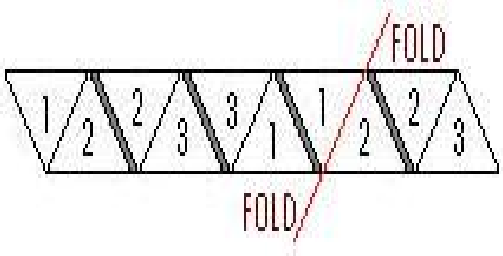
How to make a hexahexaflexigon

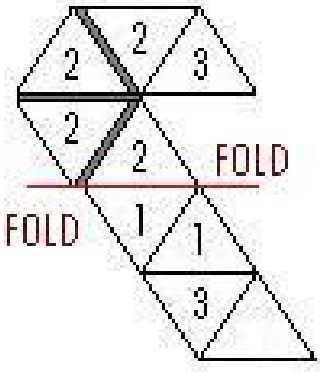
Step 1: Fold it into nineteen triangular sections with 60 degree angles at the corners. It's really not that hard. After you get the first fold, the rest you can do by folding the paper back over itself, but remember: there MUST be sharp corners on this.



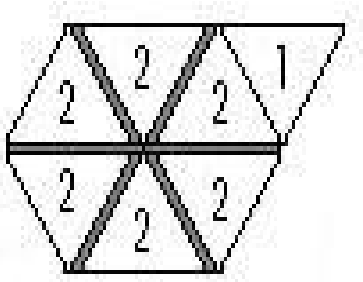
Step 2: Fold the strip of paper so that the 4's touch the 4's next to them, the 5's tough the 5's, and the 6's touch the 6's. It should look like the below figure. Fold left side back and down along the "FOLD FOLD" line.



Step 3: The figure should look like the one below now. Fold the bottom back and down on the "FOLD FOLD" line.



Step 4: “Weave” the end tab over the original end labeled with a 3. The paper will now look like the figure below. Fold the single flap back and paste it to the triangle behind it. You now have a hexahexaflexigon!



1. It is possible to rotate a hexagon around its center so each corner will move to the location of some other corner. How many times does the smallest such rotation need to be repeated before it gets back to its original position. Call this rotation R.
2. How many lines of symmetry do you see in a hexagon? Are there different types of such lines? Call the ½ rotation about one of the longest such lines rotation L. If this line is horizontal and the hexagon is moved so that corners move to the position of previous corners, the horizontal line will still be a long line of symmetry. Rotation will always rotate about the horizontal line.
3. How does rotation R followed by rotation L compare to rotation L followed by rotation R?
4. Call the ½ rotation about a shortest line of symmetry next to the long line S. What is the result of rotation S followed by rotation L? What about rotation L followed by rotation S?
5. Let 3R represent the result of doing R three times, and let L+R represent the result of the L rotation followed by the R rotation. What is the result of 5R+L+R?
6. How many sides does a hexagon have? How many colors would you use to color each face of a hexagon?
7. How many faces does a paper triangle have – how many colors would you use to color each face a different color? How many equilateral triangles fit in the “nice” configuration in a hexagon?
8. When one constructs a trihexaflexigon, one starts with 10 triangles. How many faces of triangles are there to color, if each face can be colored with its own color?
9. When one triangle is pasted on top of a second triangle, how many faces are covered by paste so they can no longer be colored?
10. How many non-paste triangle faces are available on the trihexaflexigon? Given that six fit on each side of the hexagon, what is the most hexagon faces you can color with each hexagonal face getting one color?
11. What happens with the hexahexaflexigon? What is the most number of hexagon faces that you can color? Can you find this many faces, or will some of them always be hidden?
12. Have someone show you how to flex a flexigon. What happens when you do the same flex move three times in a row?
13. Make a diagram indicating all possible flexes from each configuration together with arrows pointing to the configuration after each flex. Is it enough to know the color on the front to know the state of the hexahexaflexigon?