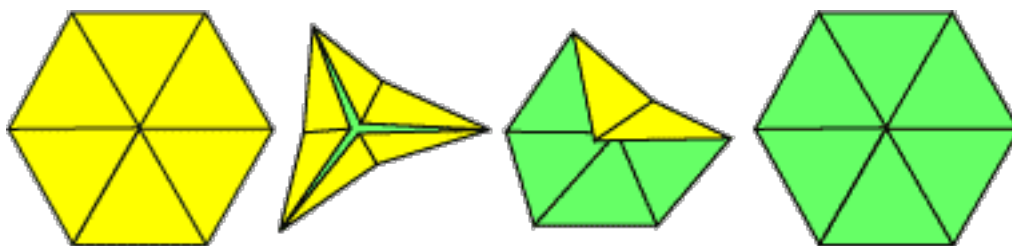


# CREATIVITY IN MATH WITH HEXAFLEXAGONS



# CREATIVITY IN MATH WITH HEXAFLEXAGONS

Hexa- 6 sided

Flexa- flexible/foldable

Gons- shapes

*Hexaflexagons go way back.*

*The discovery of the first flexagon, a trihexaflexagon, is credited to the British student Arthur H. Stone, who was studying at Princeton University in the U.S.A. in 1939. His new paper in the United States would not fit in his English binder so he cut off the ends of the paper and began folding them into different shapes.<sup>[3]</sup> One of these formed a trihexaflexagon. Stone's colleagues Bryant Tuckerman, Richard Feynman, and John Tukey became interested in the idea and formed the Princeton Flexagon Committee. Tuckerman worked out a topological method, called the Tuckerman traverse, for revealing all the faces of a flexagon.*

*Flexagons were introduced to the general public by the recreational mathematician Martin Gardner in 1956 in the first Mathematical Games column which he wrote for Scientific American magazine. In 1974, the magician Doug Henning included a construct-your-own hexaflexagon with the original cast recording of his Broadway show The Magic Show.*

*To learn more about hexaflexagons and watch a demonstration try watching viHart at [www.youtube.com/watch?v=VVlegSt8Ik](http://www.youtube.com/watch?v=VVlegSt8Ik). She is a well known YouTuber that focuses on recreational mathematics. Her videos are artistic, funny, and informative. She has many about hexaflexagons.*

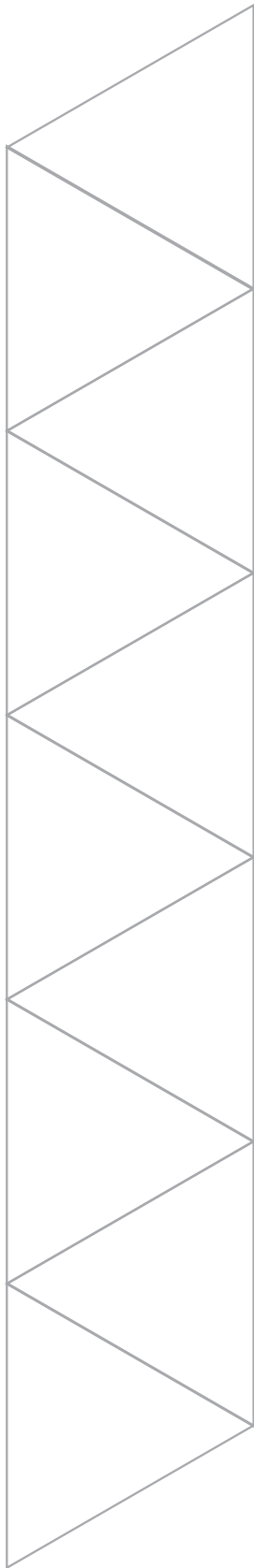
*Directions:*

- 1) Choose which type of flexagon you would like to do: a trihexaflexagon (simpler) or a hexahexaflexagon (harder). We recommend that you start with the simpler one and if you can make it correctly than try the harder one.*
- 2) Start by cutting out the template provided. We could make you measure it out...but that we will save for another day.*
- 3) Carefully crease and fold (forward and backward) on every line—to get it nice and flexy. If you chose the hexahexaflexagon you will have to glue the two strips together first.*
- 4) Number or color the sides like you see in the illustrations.*
- 5) Fold by following the directions below.*
- 6) If you mess up with the folding—undo it and try again and again. Think of what you can do in order to learn how to fold it right. Persevere.*

*\*\*Trihexaflexagon is on the page to the right.*

*\*\*Hexahexaflexagon is on the back.*

*\*\*Templates should be on loose leaf inside the folder.*



# SIMPLE INSTRUCTIONS FOR FOLDING A TRIHEXAFLEXAGON

1. CUT OUT THE BLANK TEMPLATE AT THE LEFT, AND CREASE EACH OF THE LINES.

2. ORIENT THE TEMPLATE AS SHOWN:



3. WRITE NUMBERS ON IT, EXACTLY AS SHOWN, WITH THE NUMBERS TILTED WHERE SHOWN:



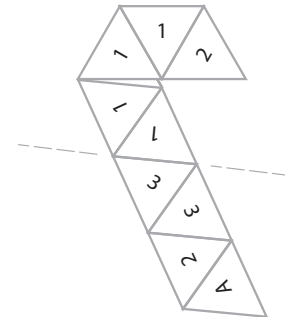
4. FLIP THE TEMPLATE OVER FROM TOP TO BOTTOM, SO THE TRIANGLE AT THE LEFT (WITH THE 3 ON IT) STAYS TO THE LEFT. LABEL THE SECOND SIDE AS SHOWN:



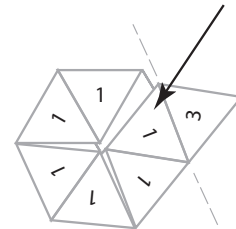
5. TURN THE TEMPLATE BACK TO THE FRONT AND FOLD IT ONCE AS SHOWN. THE LEFT SIDE SHOULD GO **BEHIND** THE RIGHT SIDE, AS SHOWN IN THE ILLUSTRATION IN STEP 6:



6. FOLD THE BOTTOM PART OF THE STRIP UP AND **AWAY** FROM YOU, AS SHOWN. BE SURE THE NUMBERS LOOK LIKE THE ILLUSTRATION AT THE RIGHT. NOTE THAT THE "1" FACE GOES **IN FRONT OF** THE "2" FACE. (SEE ARROW BELOW). THE FLEXAGON SHOULD NOW LOOK LIKE THE LAST ILLUSTRATION BELOW. **IT SHOULD NOW HAVE ALL "1" S SHOWING, AND ONE TAB WITH A "3"!!**



7. **LAST STEP:** FOLD TAB 3 **AWAY** FROM YOU. IT HAS A LETTER "A" ON BACK. GLUE OR TAPE FACE "A" TO FACE "B" IN BACK, AND YOU HAVE A TRIHEXAFLEXAGON!





## Hexahexaflexagon Instructions

### Printing a blank flexagon

Print blank flexagon pattern on one sheet of paper, single-sided. Cut out strips. Assemble the flexagon. Decorate after assembly.

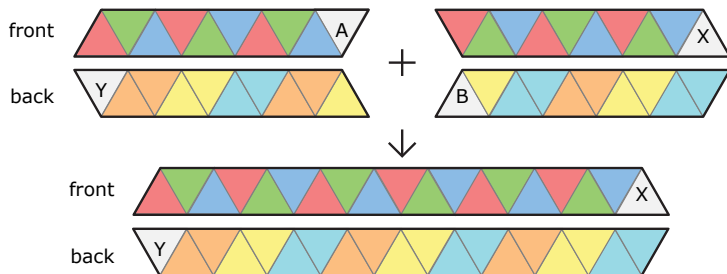
### Printing a decorated flexagon

Print front and back patterns on one sheet of paper, double-sided. If not aligned, adjust paper feeder and print again. Cut out strips.

If unable to align double-sided printing, print front and back patterns on two sheets, single-sided. Cut out strips and glue back-to-back.

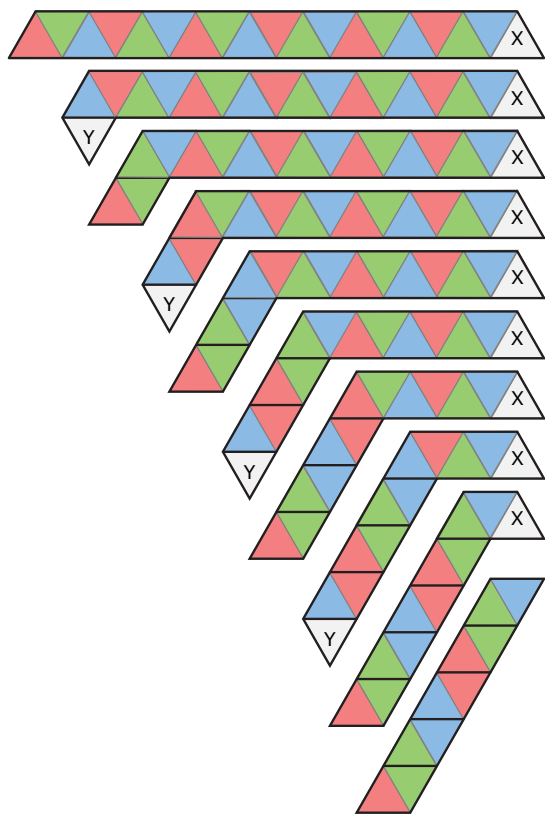
### Assembly

1. Glue tab A to tab B to make one long strip with 19 triangles (18 + 1 glue tab).



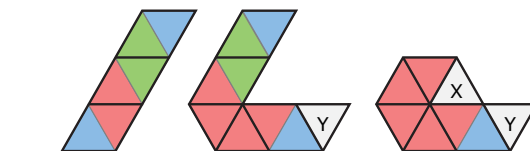
A hexahexaflexagon is shaped like a hexagon and has six faces.

2. Fold to make a rolled-up strip.



Rolled-up strip

3. Fold the rolled-up strip to make a hexagon.



Fold and tuck end. Glue tab X to tab Y.

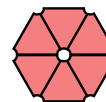


front



back

Completed flexagon



You may want to clip all corners to make it easier to flex.

### Flexing

Expose new faces by flexing. Try to find all six faces.

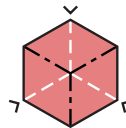
Hold the flexagon in two hands, looking down at the top face.

Push three corners down and in to make three valley folds.

At the same time pinch to make three mountain folds.

Push the valleys together until they touch.

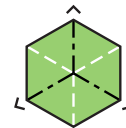
Then open the center like a flower blossoming.



Push three corners down and in



Push together



Open new face

Search the web for hexaflexagon videos showing how to flex.

In some positions you will not be able to open the center.

When this happens, back up and try a different flex.