

# Flexagons



Flex your mathematics by folding this multi-layered card.

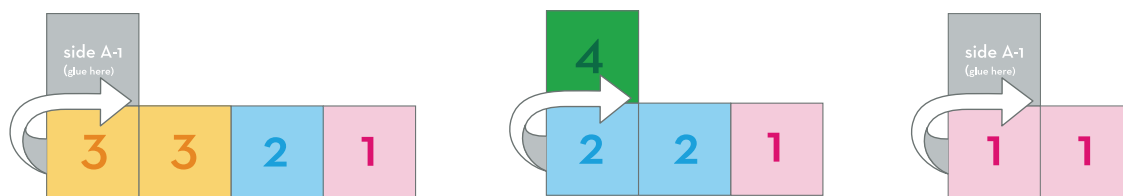
BY LAURIE COUGHLIN

Invented by Arthur H. Stone in 1939, flexagons are mathematical, multi-layered objects composed of folded paper strips. They usually take the form of a square or hexagon, and there are several variations on the type of flexing and number of faces. When a flexagon is flexed, a new face is revealed. Flexing is similar to folding, but it's not a static motion where there is a beginning and ending point; it's a fluid and continuous forward and backward motion. For our project, we're going to create a standard square flexagon, known as a tetraflexagon, which will reveal 2 new faces.

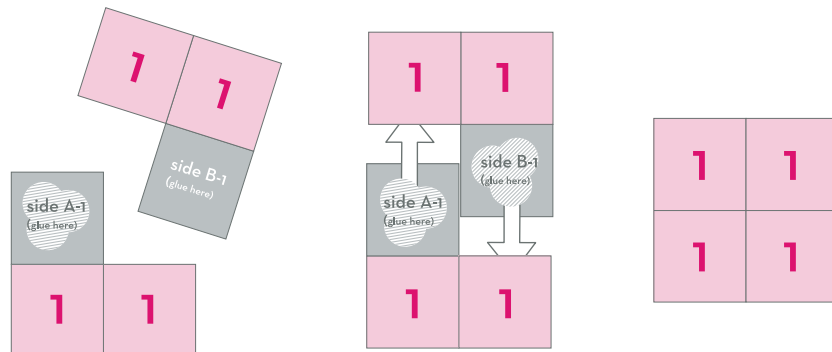
**YOU WILL NEED:** Scissors, glue stick, this magazine (or paper and a printer)

## TO MAKE THE FLEXAGON

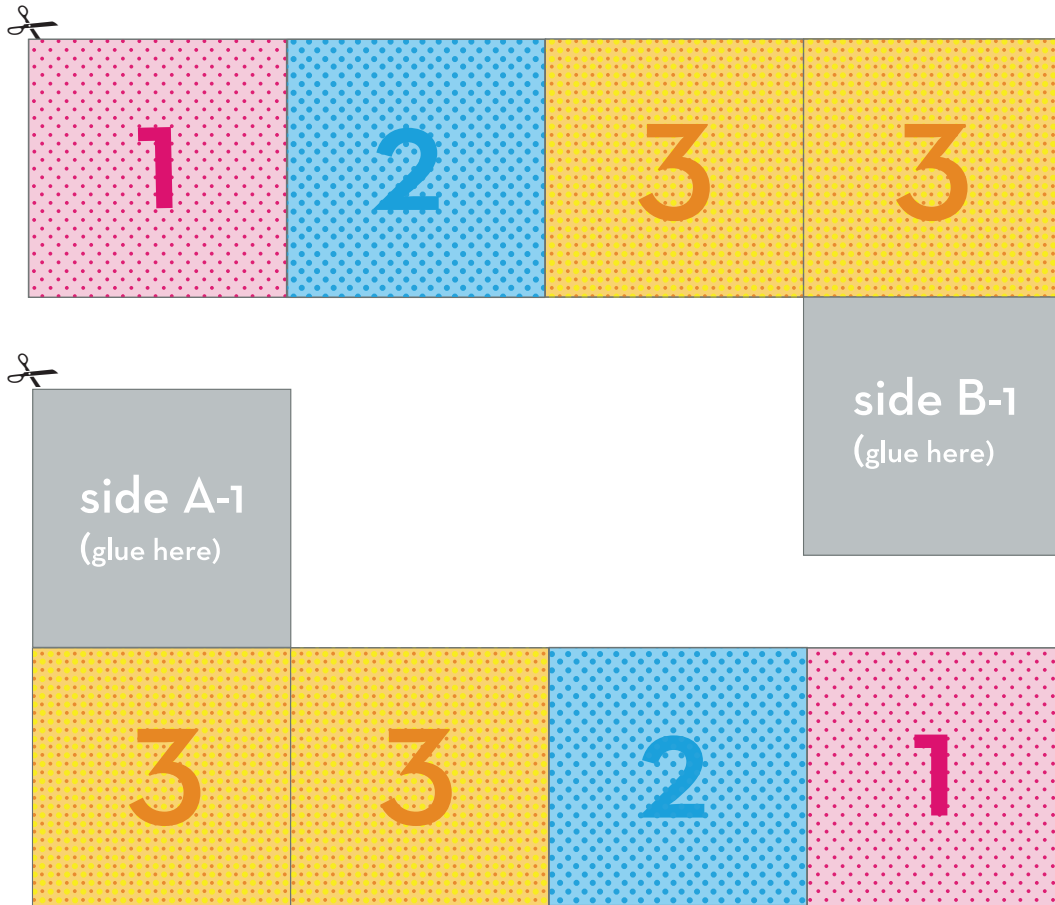
1. First, cut out both of the L-shaped strips on the opposite page. Note that they're double-sided. (If you'd rather not chop up your magazine, you can go to [craftzine.com/05/flexagon](http://craftzine.com/05/flexagon) and print the same images from there, then glue the sides together, back to back, to match the magazine.)
2. Next, lay them horizontally, so that the tallest side is on your left. (The text on side B-1 will be upside down.)
3. Starting from the left, fold over to the right. Repeat.
4. Repeat Step 3 with second strip.



5. Add glue to gray A-1 and B-1 tabs.
6. Line up tabs A-1 with A-2 and tabs B-1 and B-2. Press firmly on each square. Wait 2 minutes before attempting to flex your flexagon.



Illustrations by Laurie Coughlin

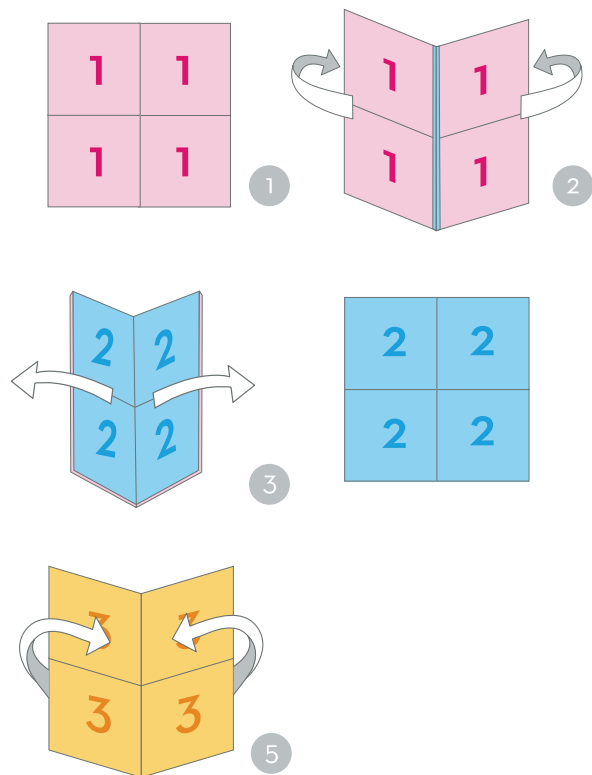


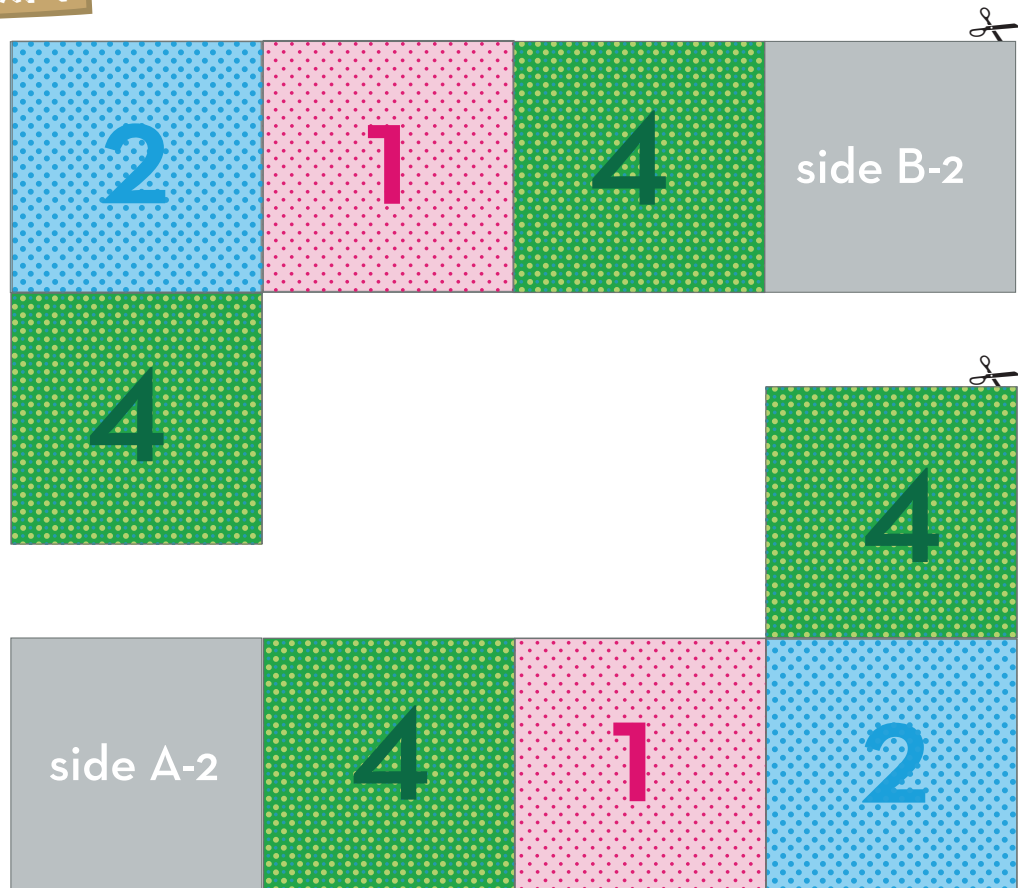
## TO FLEX YOUR FLEXAGON

Remember that this is a fluid, rotating motion.

1. Begin with face 1 (pink) facing you.
2. Push both the right and left sides downward. The profile should look like a mountain peak.
3. The first new face, face 2 (blue), will be revealed from the center of the flexagon; with your thumbs, open it up like a book.
4. Repeat Step 2 to reveal face 3 (yellow, second new face).
5. Return to face 1 by reversing the fluid movement. You will be flexing the outside edges toward the center. The profile should look like a V-shape.

**NOTE: A second method of returning to the starting point is by flipping the flexagon over so that face 4 is facing you and flexing it twice. Then flip it over once more and face 1 will be facing you.**





## FLEXAGON HISTORY

In 1939, Arthur H. Stone, a Princeton University graduate, was folding strips of paper for his amusement when he created the first flexagon. But it was not until 14 years later that the general public took notice of this fun, mathematical paper-folding puzzle. In 1956, Martin Gardner wrote an article on flexagons, which was published in *Scientific American* magazine. Since then, every generation has rediscovered this wonderful paper object.

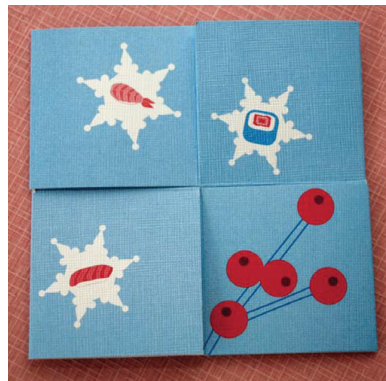
### RESOURCES:

History: [eighthsquare.com/flexhistory.html](http://eighthsquare.com/flexhistory.html)

*The Magic of Flexagons: Paper Curiosities to Cut Out & Make* by David Mitchell

*Hexaflexagons and Other Mathematical Diversions: The First Scientific American Book of Puzzles and Games* by Martin Gardner

*Flexagons Inside Out* by Les Pook



The author's flexagon card illustrates the passing of time while catching snowflakes in your mouth. The third face reveals a penguin pretending that snowflakes are a tasty sushi treat.



Laurie Coughlin is the designer and owner of Motormouthpress, LLC, a stationery and greeting card company that specializes in food themes and cards that double as mementos. Check out her Penguin Flexagon card at [motormouthpress.com](http://motormouthpress.com).