

Fold-and-Cut Challenge

Create your own Betsy Ross Flag

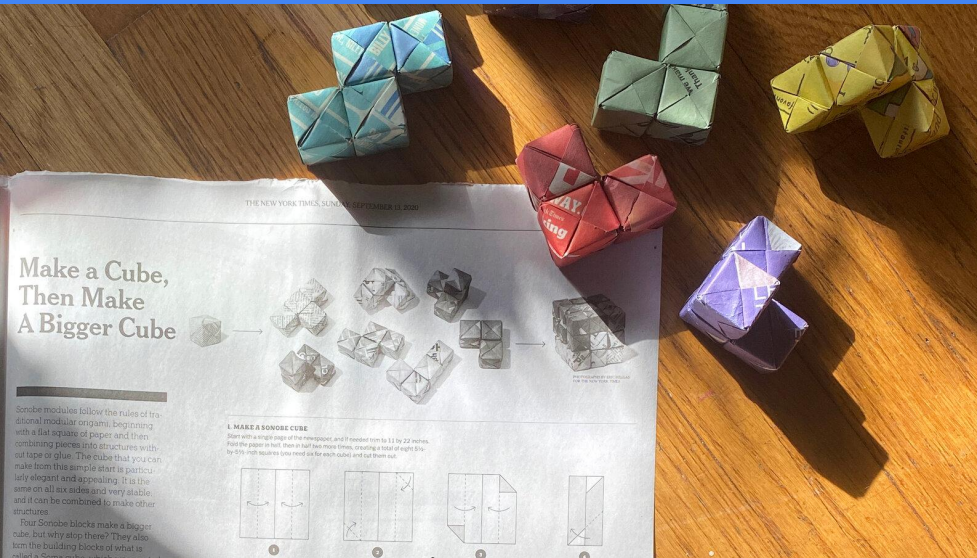
By Nancy Blachman, Founder JRMF



www.barrsinsurance.com/know-betsy-ross/

The New York Times

At Home Section - Craft Column



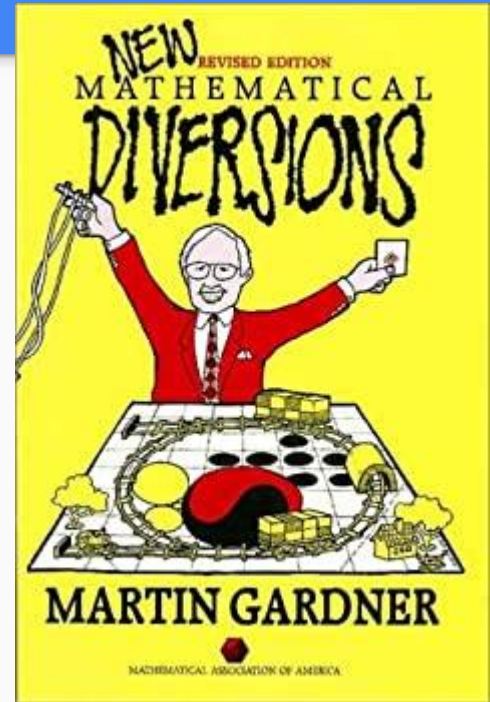
Top a Present With a Newsprint Bow

www.nytimes.com/2020/12/05/at-home/wrapping-activity.html

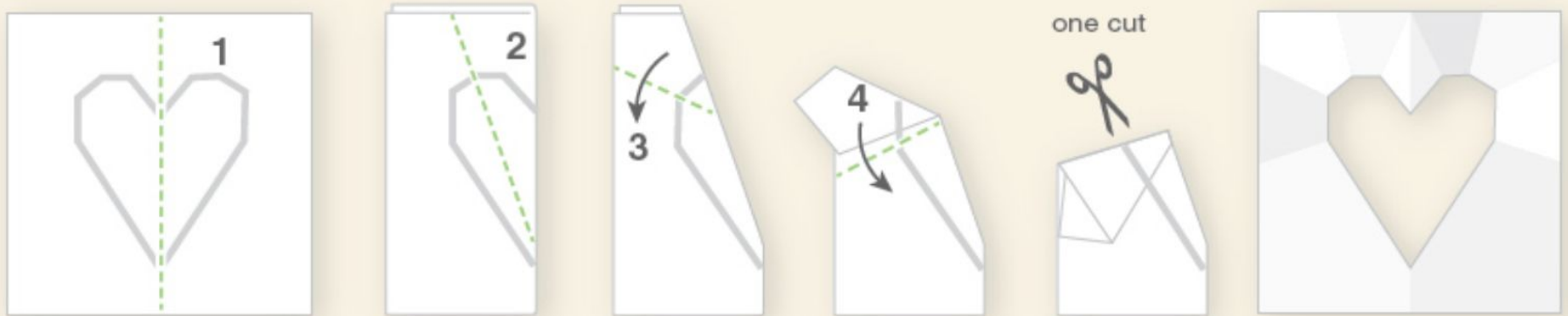
“A ... class of paper-cutting recreation, more familiar to magicians than mathematicians, involves

- folding a sheet of paper several times,
- giving it a single straight cut,
- then opening [it] up to reveal a regular geometric figure ...”

—*New Mathematical Diversions* by Martin Gardner

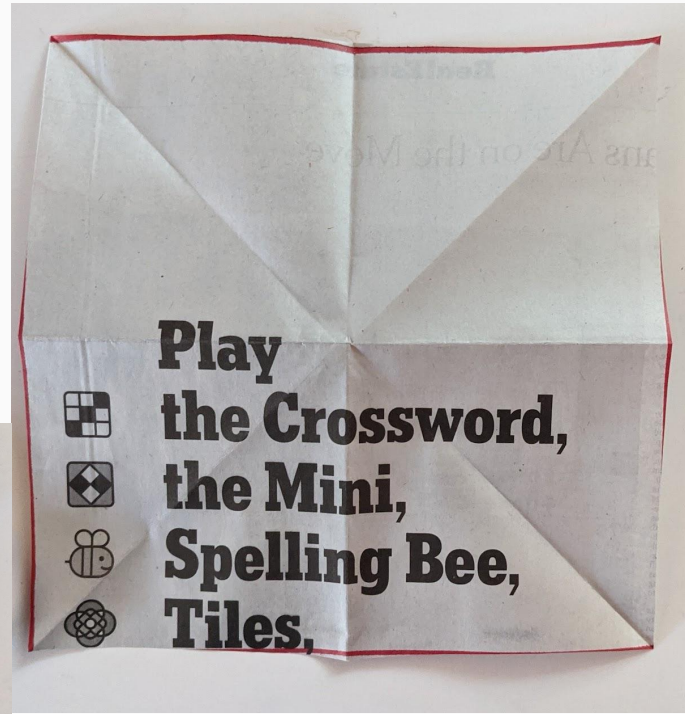
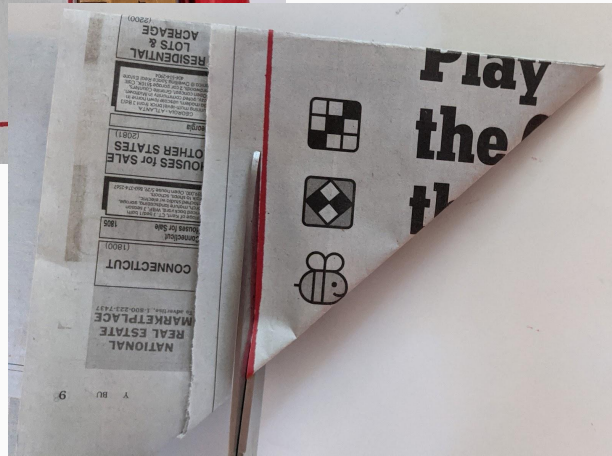


One-Cut Magic by Erik Demaine



Puzzles and tricks from Martin Gardner inspire math and science.

My Craft for the At Home Section of *The New York Times*





According to Legend, George Washington asked Betsy Ross to ...

sew a flag with 6-pointed stars, thinking that 5-pointed stars would be too difficult.

But Betsy Ross was an expert fold-and-cut puzzle solver!

By folding a piece of fabric, she was able to produce a symmetric five-pointed star with a single cut.

Series of Challenges

(not necessarily in order of difficulty)

Square

Rectangle

Isosceles Triangle

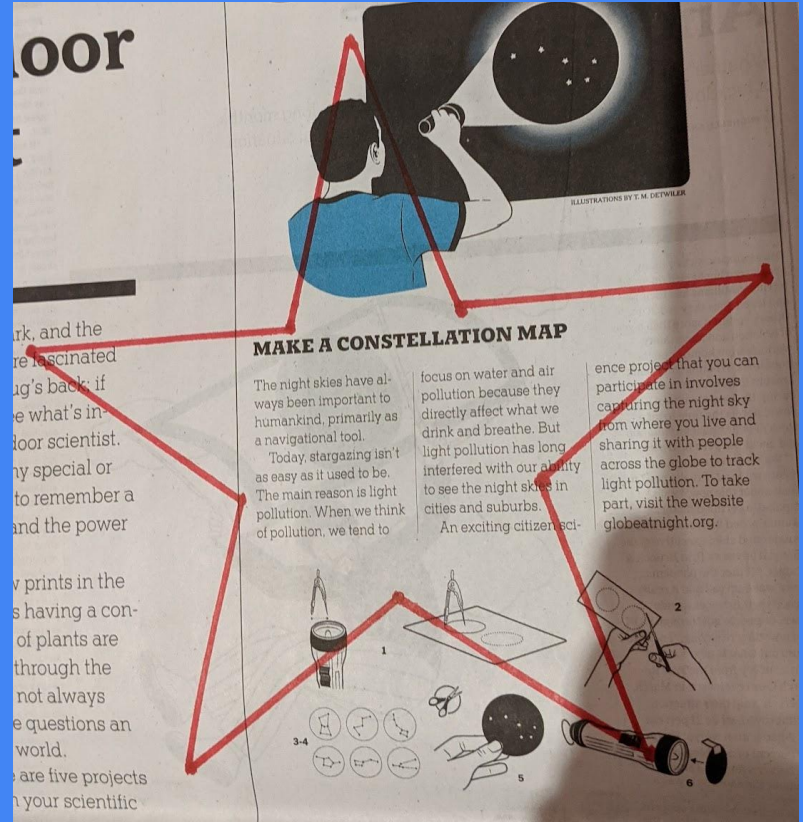
Trapezoid

Right Triangle

Square within a Square

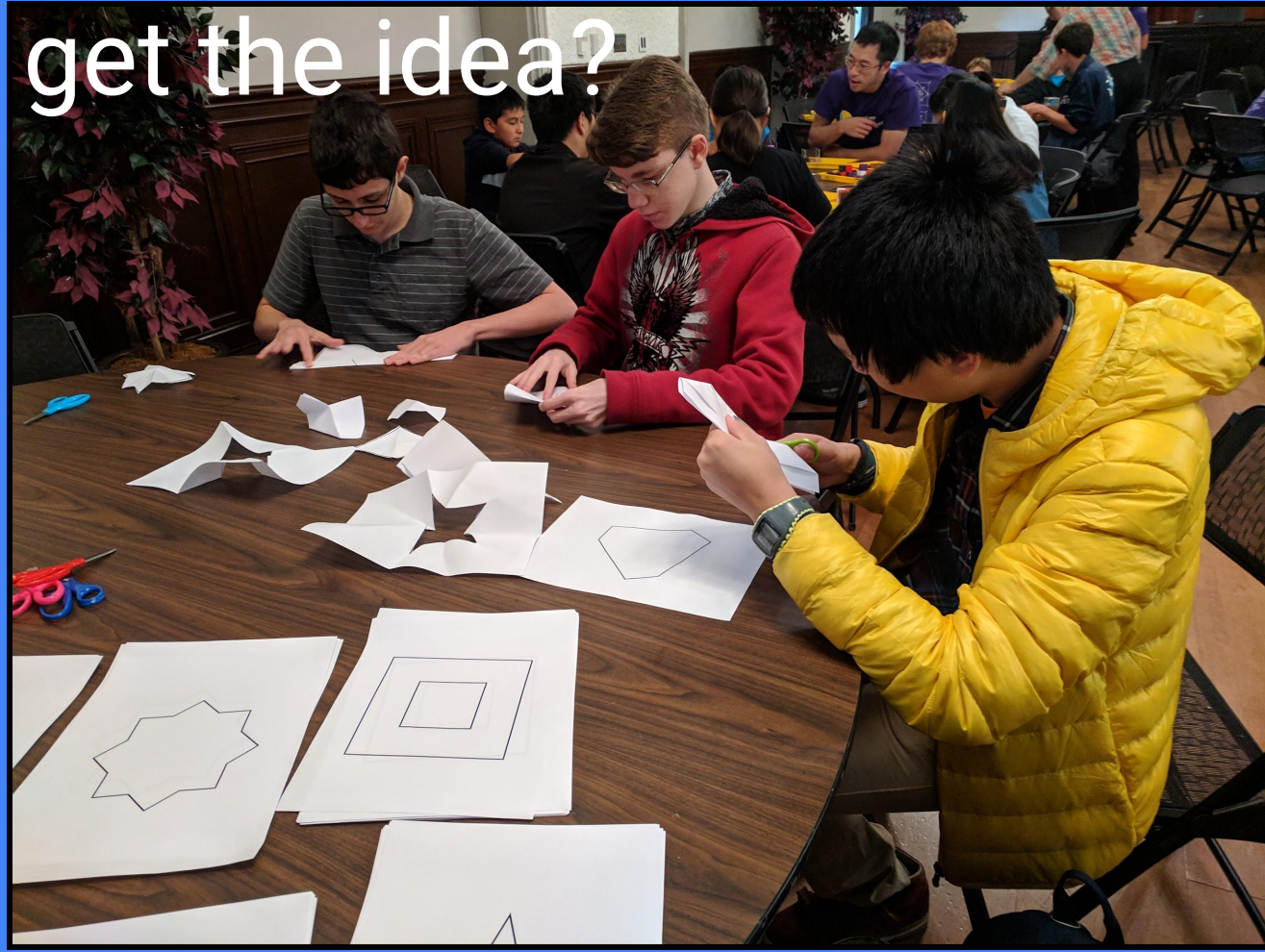
6-pointed Star

5-pointed Star



Where did I get the idea?

David Klein,
SF Math Circles,
led a
Cut-and-Fold
Challenge at
JRMF at UCB
in 2018



JRMF Fold-and-Cut Challenge Booklet #10

jrnf.org/activities/fold-and-cut

Book 10

Julia Robinson
Mathematics Festival[®]

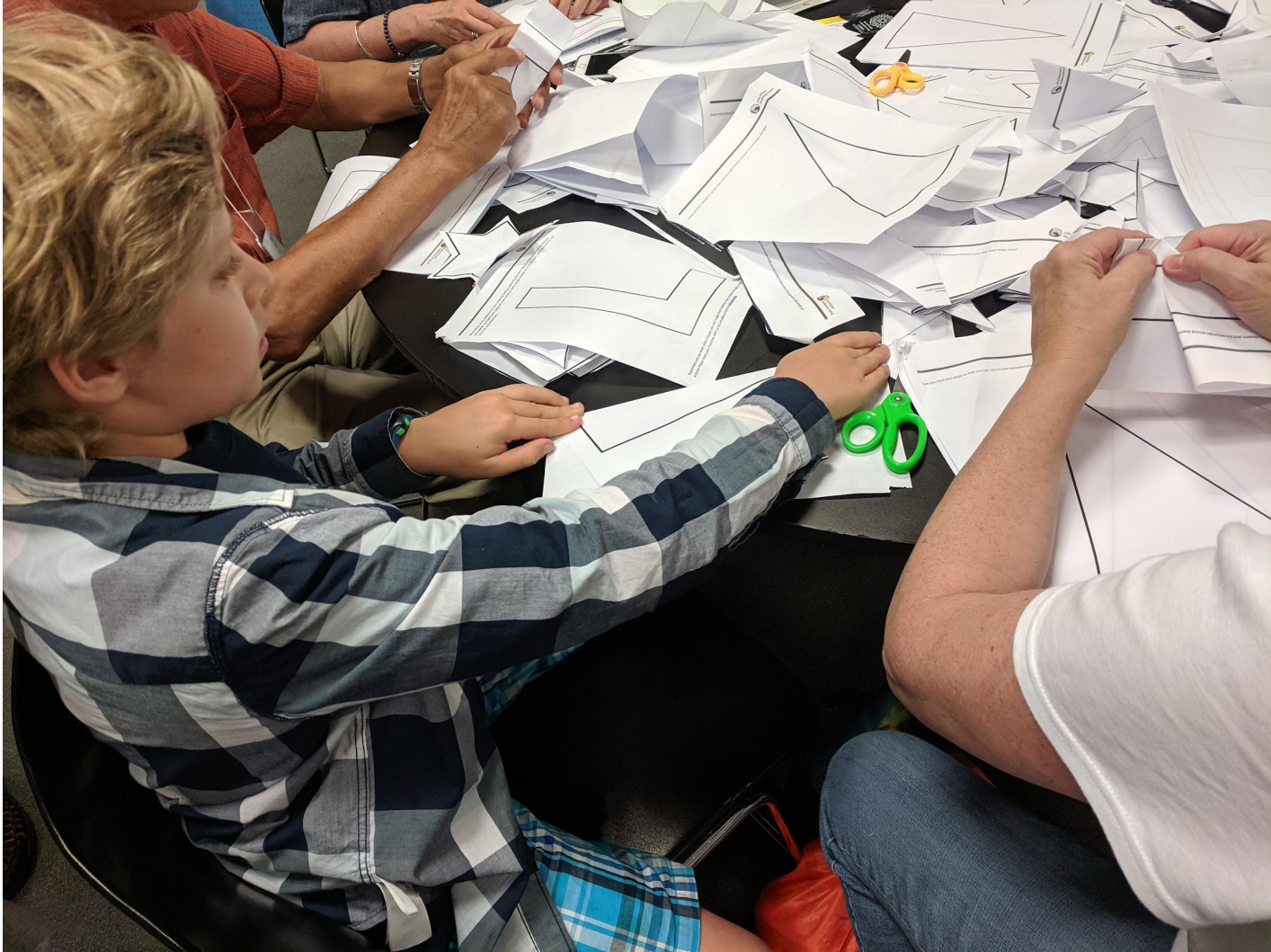
Fold-and-Cut Challenge

Julia Robinson
(1919 - 1985)

Festival activities are designed to open doors to higher mathematics for students in grades K-12. Visit www.JRMF.org for more information about Julia Robinson Mathematics Festivals.

Children and Adults

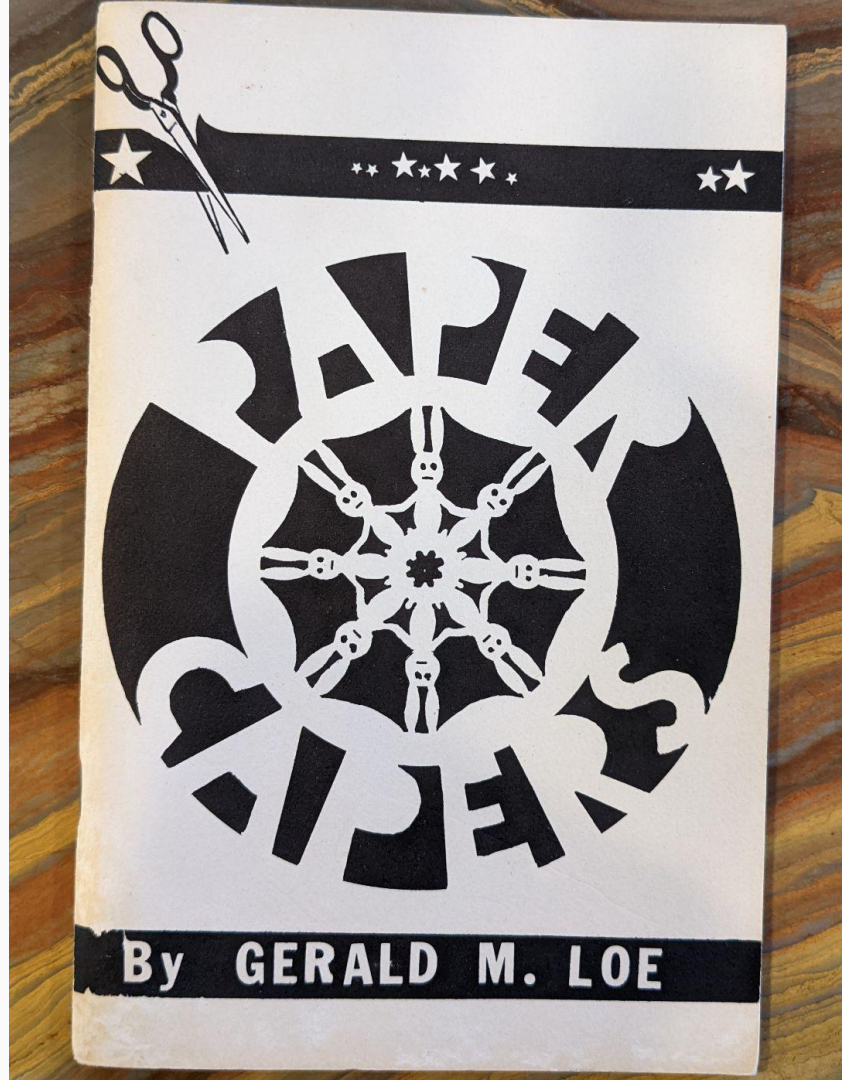
- Eagerly experiment
- Collaborate
- Make discoveries

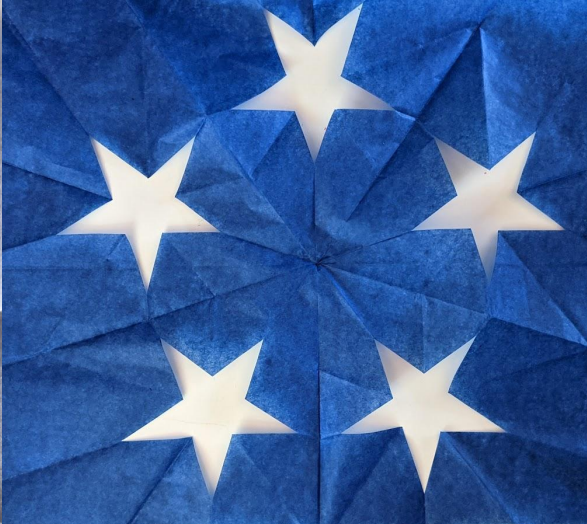


What are the benefits
of cutting shapes with
a single straight cut?

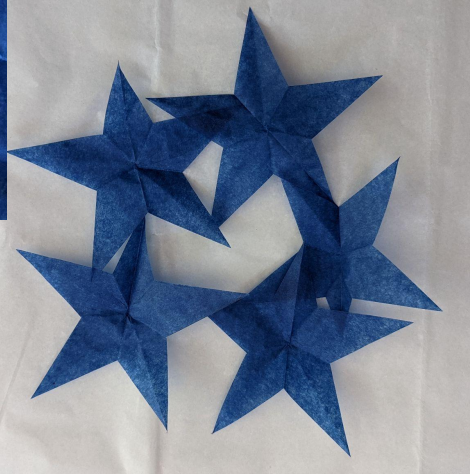
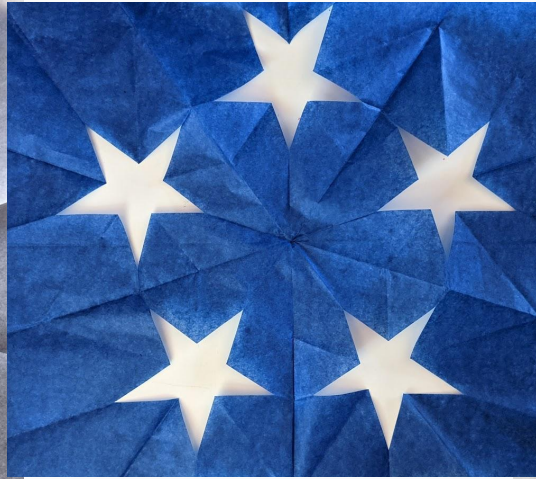
Paper Capers
by
Gerald M. Loe

Copyright
1955 &
still available
used and from
magicinc.net
(hopefully)





**“Your patriotic-theme craft project is pretty cool
... but I can’t think of a use I’d have
for it in anything I oversee.” –Will Shortz**



Create your own Betsy Ross Flag

from O. This gives us figure 133. Crease AD and all other folds tightly. A sheet of thin acetate plastic (such as is used for making the triangles) adds in smoothing out the folds.

Now fold corner C down along AO to form Figure 134, then fold D up along AC to make figure 135. The cut is marked at 18 degrees from AC, along the line indicated. Note the dimensions shown. These should be adhered to quite closely. If the cut is made too close to the center A, the stars will appear too much out of proportion due to the thickness of the paper.

If cut too far out from A, the stars will run together too closely and the center section will fall out. Figure 136 shows the completed paper.

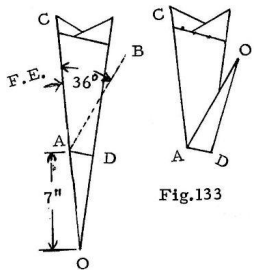


Fig.132

Fig.133

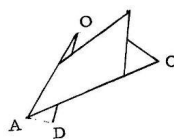


Fig.134

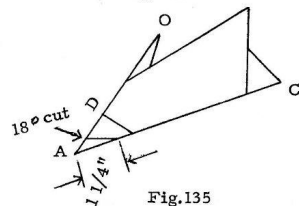


Fig.135

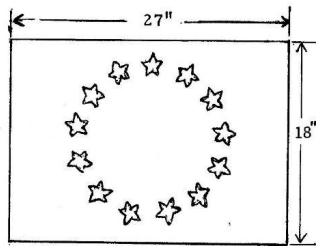


Fig.136

Figure 137 shows the dimensions of the flag used by the writer. This one was made of Upson Board (can be bought in any lumber yard) in two pieces, which are shown placed together in the drawing.

They are bolted together with braces across the back, one at the top and one at the bottom. It is painted with Moore's Sani-Flat Oil Paint. Their Deep Color Bright Red is the perfect paint for this purpose. Flat paint is used to prevent glaring reflections which detract from the effect. A simple easel is made to stand the flag on.

When preparing for the performance, fold the paper beforehand and keep it pressed. To save time in presentation, you may wish to leave it folded. If not, then open it just before the show, so it will be easy to refold.

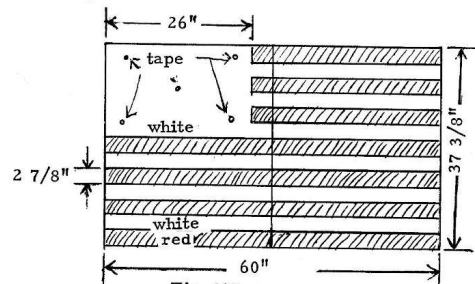


Fig. 137

E. Ring of Hearts. This makes a nice effect for around St. Valentine's Day. Let us make a ring of five hearts for illustrative purposes. Start with a 20x20" sheet of tissue and make the 5-pointed star fold. Lay out the heart diagram shown in figure 48 as indicated in figure 138, along the outer folded edge of the paper.

Fold alternately back and forth along the fold lines, and keep it pressed flat until ready for use, to facilitate refolding.

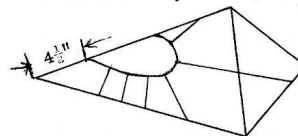
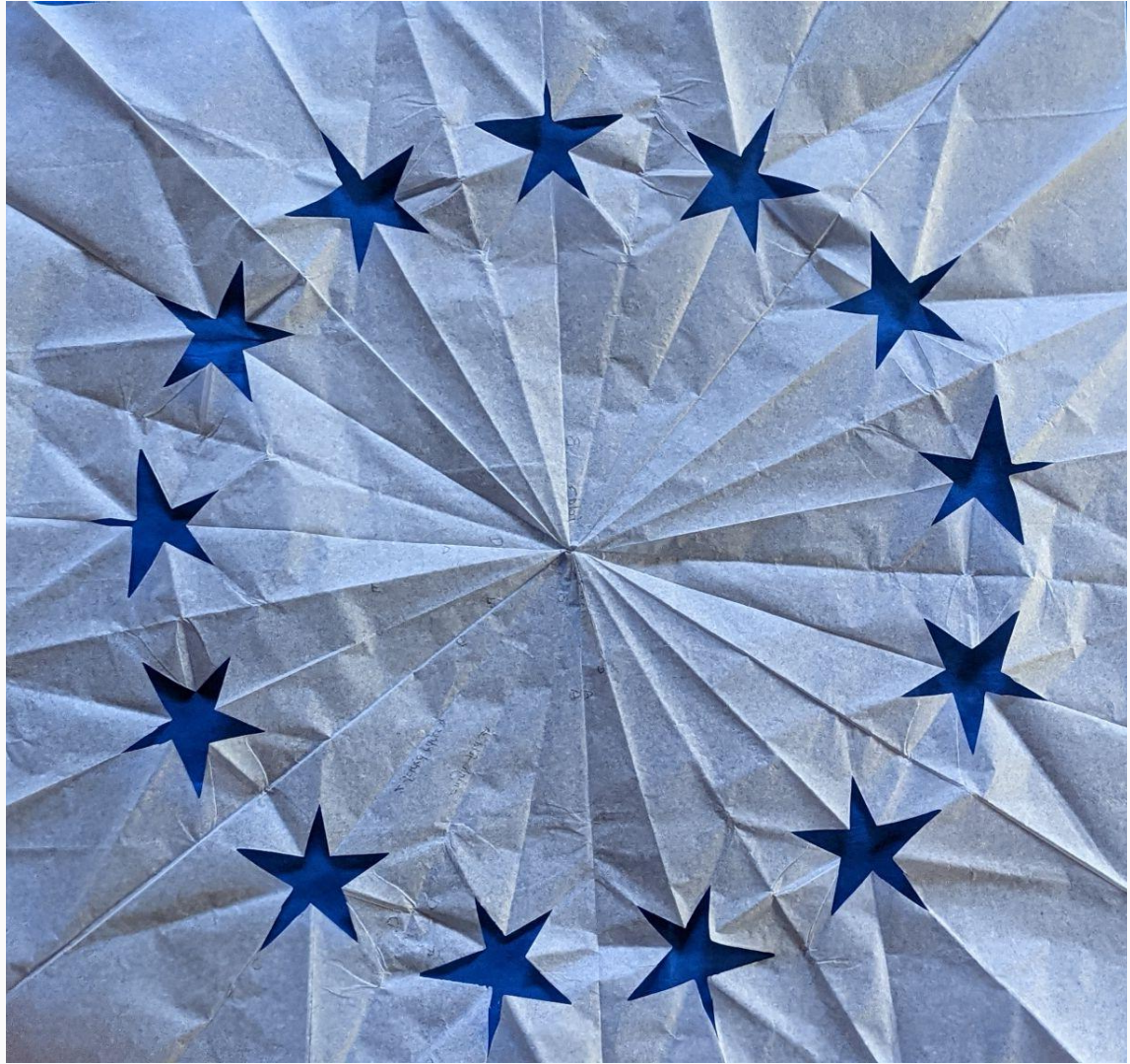


Fig.138

“That’s wow!

I’m afraid
I have no
outlet with
which to
present
this, tho.”
–Will Shortz





With Society Reopening, the At Home Section is Closing May 30, 2021

It was disappointed but I
created other opportunities
to share this activity
and article.

[**Fold-And-Cut YouTube**](#)

&

**The Joint Math
Meeting!**

JRMF

Fold-and-Cut Challenges

www.jrmf.org/activities/fold-and-cut-flag



bit.ly/JRMF-Fold-Cut



EVENTS

PUZZLES & GAMES

NEWS

GET INVOLVED

ABOUT

STORE

♥ DONATE

BOOKLET

Fold-and-Cut-Flag

How many stars can you make with a single cut?

Linked Resources

↓ Fold-and-Cut-Flags





Have fun!

Please share with me
Fold-and-Cut challenges
and/or creations.

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