



Yoshimoto Cube explorations

Dave Brill

Ann Arbor, Michigan, USA

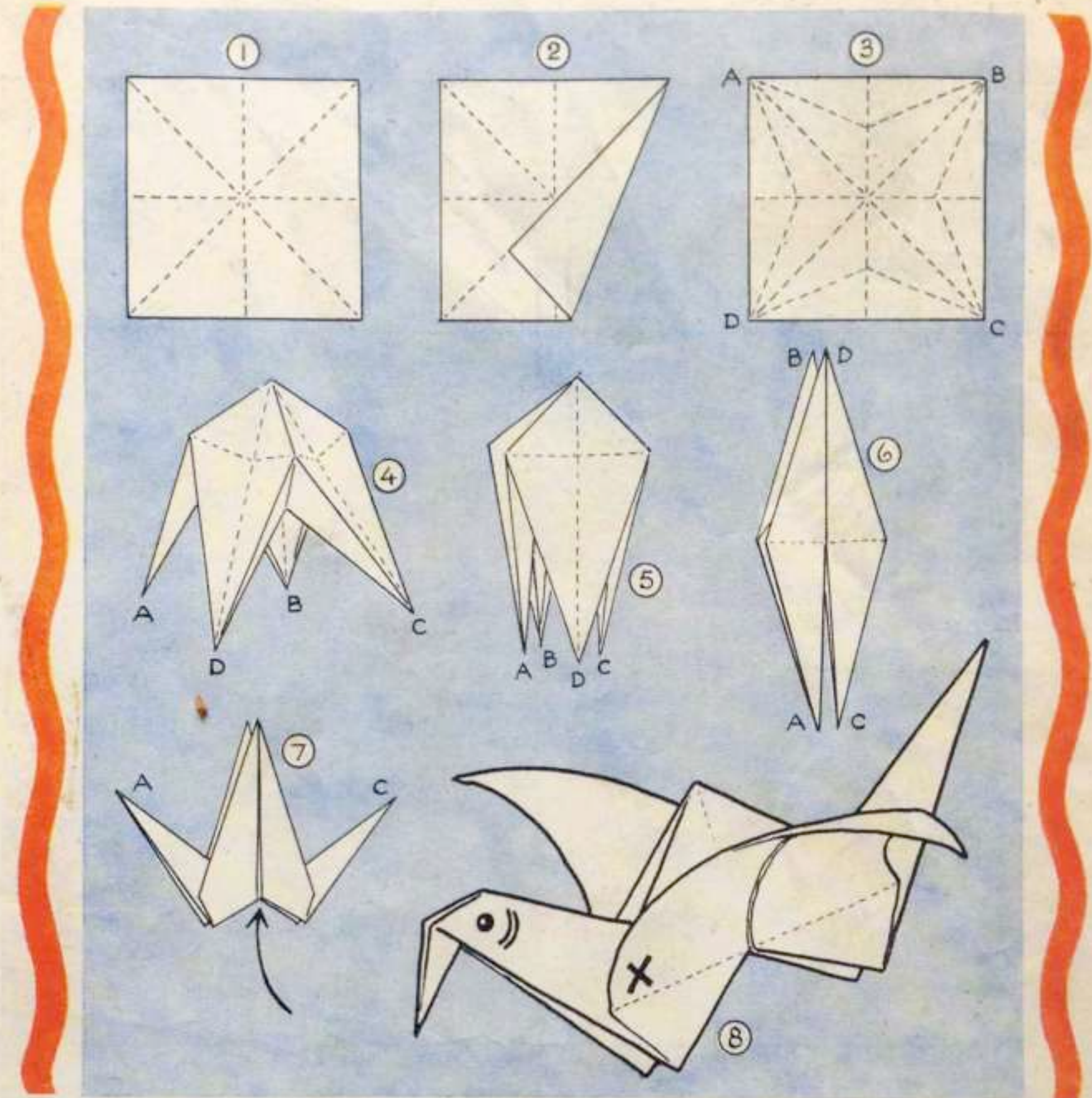
CFC 6

May 14-17, 2026

Moving Origami

- ❖ Fun to fold
- ❖ Fun to play with

HOW TO MAKE A PAPER BIRD



Do you know how to make a bird like the one that flew in at Rupert's window? No? Well, take a perfectly square piece of paper and fold it from corner to corner each way. Then turn it over and fold it from side to side as in (1). Next lay each side against a middle line (2) but press the fold only half-way along from the corner. Do this all round until the pattern of the folds looks like (3). Now press the four side panels under and, working by the folds you have made, gently bring the corners together as in (4) and (5). When A, B, C and D are tight together press everything firmly into its new position.

Next lift the opposing flaps B and D. These will be the wings (6). Now comes a tricky bit as you lift A and C to a half-way position as shown in (7). The folds at the point marked by an arrow must be neat and careful, and the paper must not tear. For the finishing touches fold down the tip of A to form the beak and draw in an eye. Lastly, take each wing and gently bend it outwards into a curve as in (8) (this is necessary or the bird won't "work").

To make it flap its wings hold the bird at the point marked X (not lower) and gently pull its tail.

I'm afraid it won't quite fly by itself unless you can find Rupert's Conjuror and get some of his magic paper!

Star Frisbee

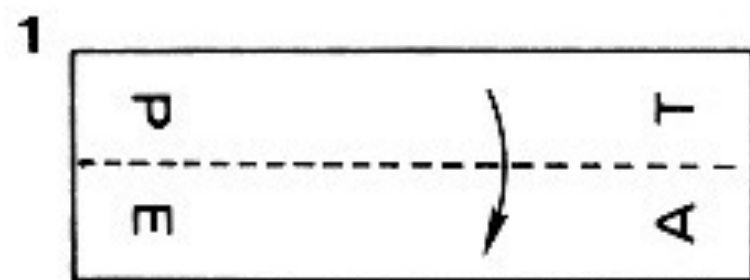
(Robert Neale, US)



Magic doors (after George Jarshaur)



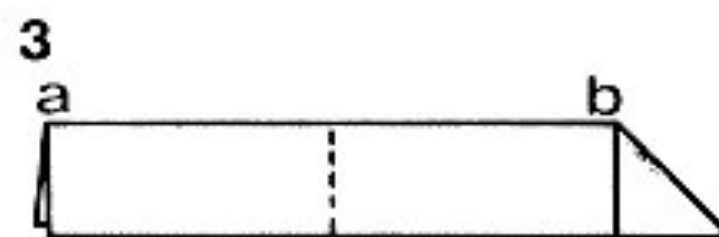
COLLECTED BY JOHN SMITH



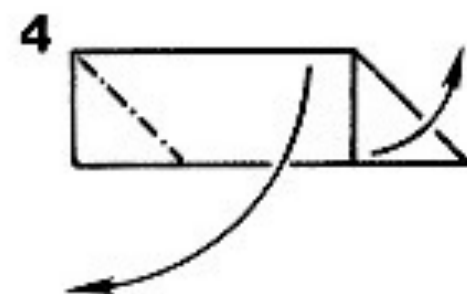
Begin with a 3 x 1 rectangle, lettered on the white side as shown. Valley fold lengthwise.



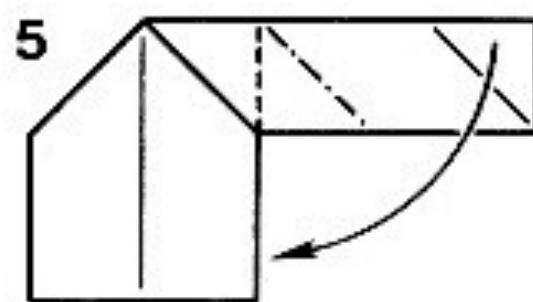
Valley fold right hand corner at 45°.



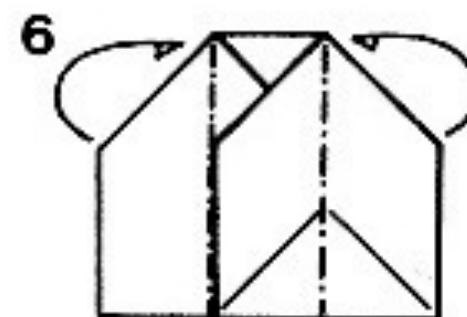
Valley fold a to b.



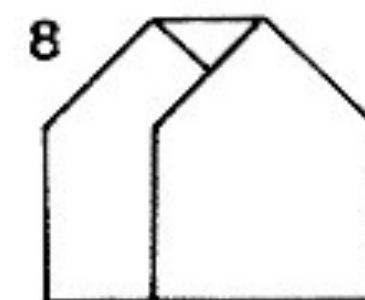
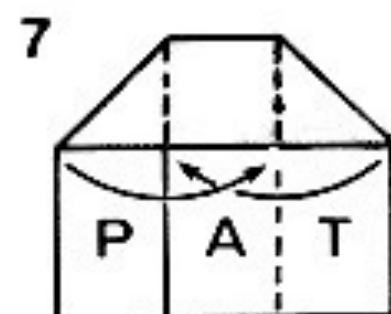
Lift and squash flap. Unfold right hand triangle.



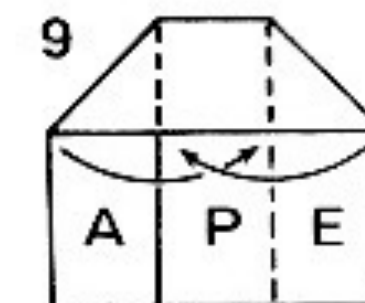
Lift and squash right hand flap.



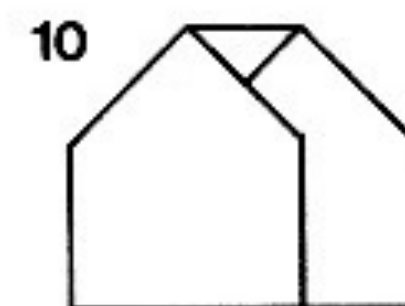
Rotate right hand flap behind, followed by left hand flap.....



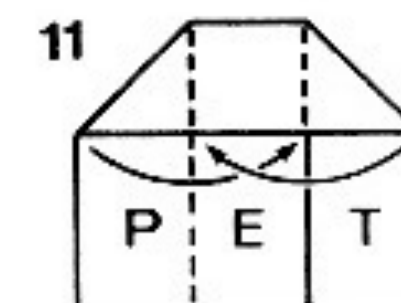
Turn over.....



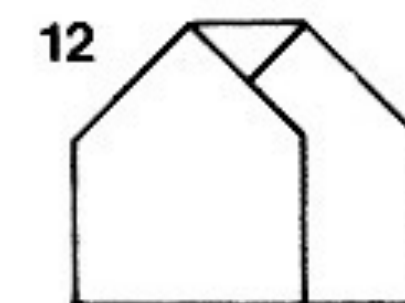
.....to reveal APE. Close right hand door, then left....



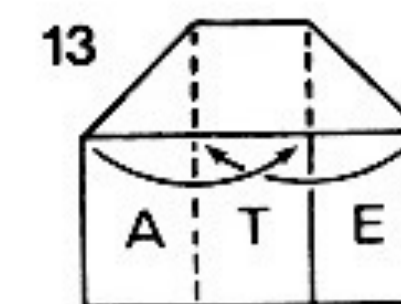
Turn over.....



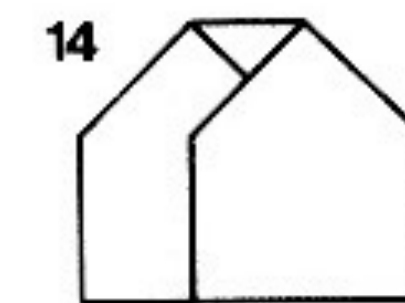
.....to reveal PET. Close right hand door, then left....



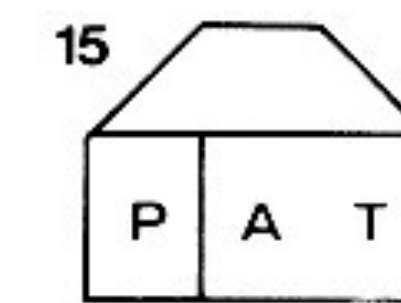
Turn over.....



.....to reveal ATE. Close left hand door, then right...



Turn over.....



.....to reveal PAT again.

Curlicue (*Assia Brill, Russia/UK*)

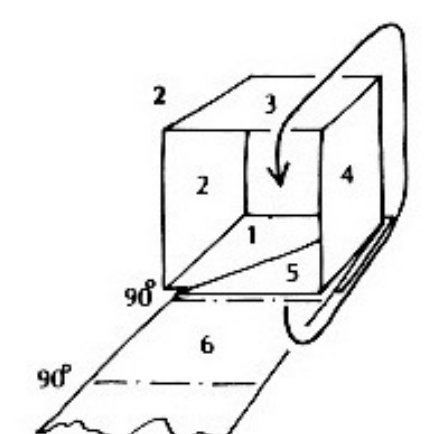
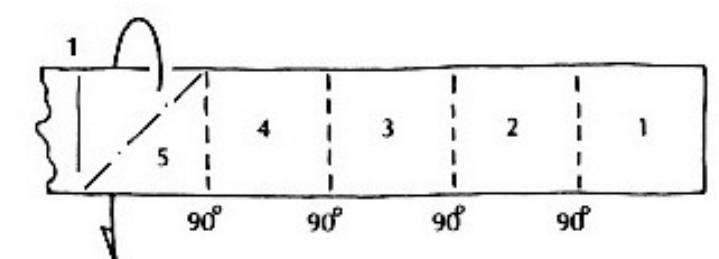
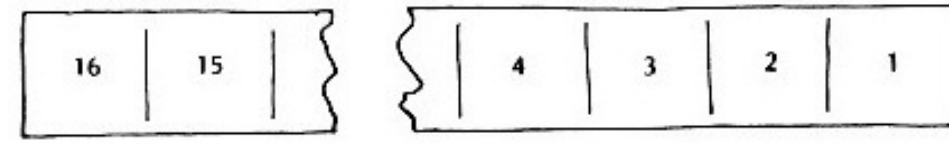


Flexicube (Rev Philip Noble, Scotland) 1971

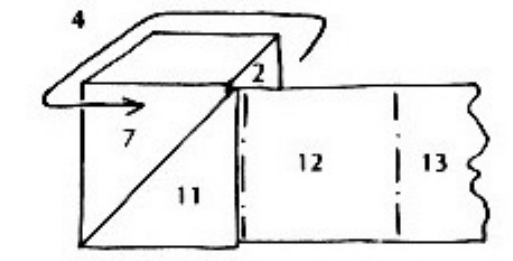
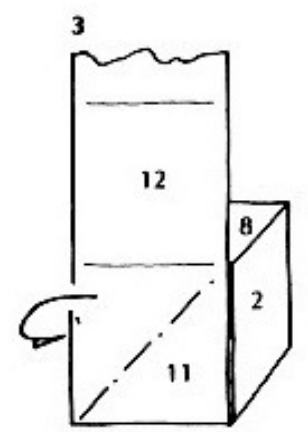


FLEXICUBE - Philip Noble

Begin with a 16×1 rectangle, numbered and creased as follows:

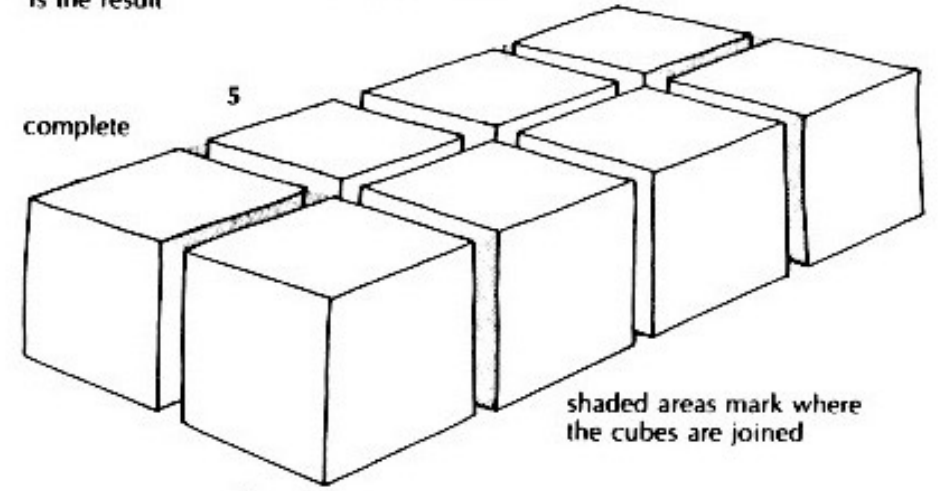


wrap 6 to 11 around the cube



12 is fed under 2
13 goes over 9
14 is fed under 4
15 goes over 7/11
16 is fed under 2
This locks the cube

Begin with a 130×1 strip of paper and make a cube with 16 squares to one side of the centre of the strip. At the other side of the centre, make another cube which is the mirror image of the first. Continue away from the centre on either side, making pairs of mirror image cubes. Feed the loose tabs at the ends of the strip into adjacent cubes to lock the flexagon. Here is the result



A simpler alternative is to make 8, 17×1 cubes and feed the loose tab formed by the additional 17th square into an adjacent cube to lock them together. Eight cubes made from wood, metal etc. can also be used if taped together.

Flexing

The sequence is obvious so I won't draw it up.

Flexicube patent 1967

- ❖ W Bock-Greissau
- ❖ "Body of variable form composed of a plurality of hingedly connected orthogonal prisms no less than 6"
- ❖ Patent lodged 1967
- ❖ Patent granted 1970

Dec. 29, 1970

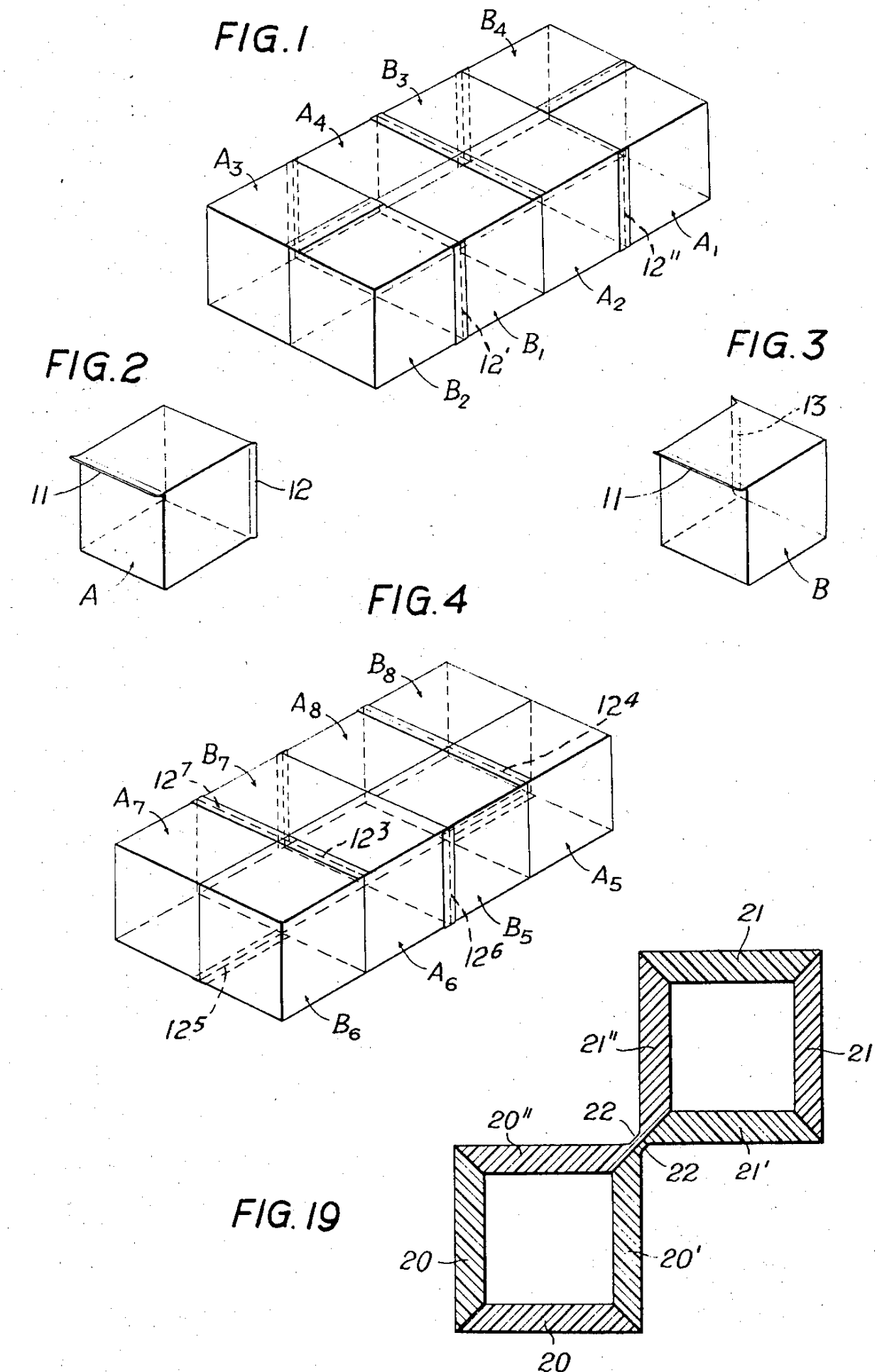
W. BOCK-GREISSAU

3,550,310

BODY OF VARIABLE FORM COMPOSED OF A PLURALITY OF HINGEDLY
CONNECTED ORTHOGONAL PRISMS NO LESS THAN SIX

Filed Dec. 26, 1967

3 Sheets-Sheet 1



Attorney:
Wolfgang Bock-Greissau
By *[Signature]*
Attorney

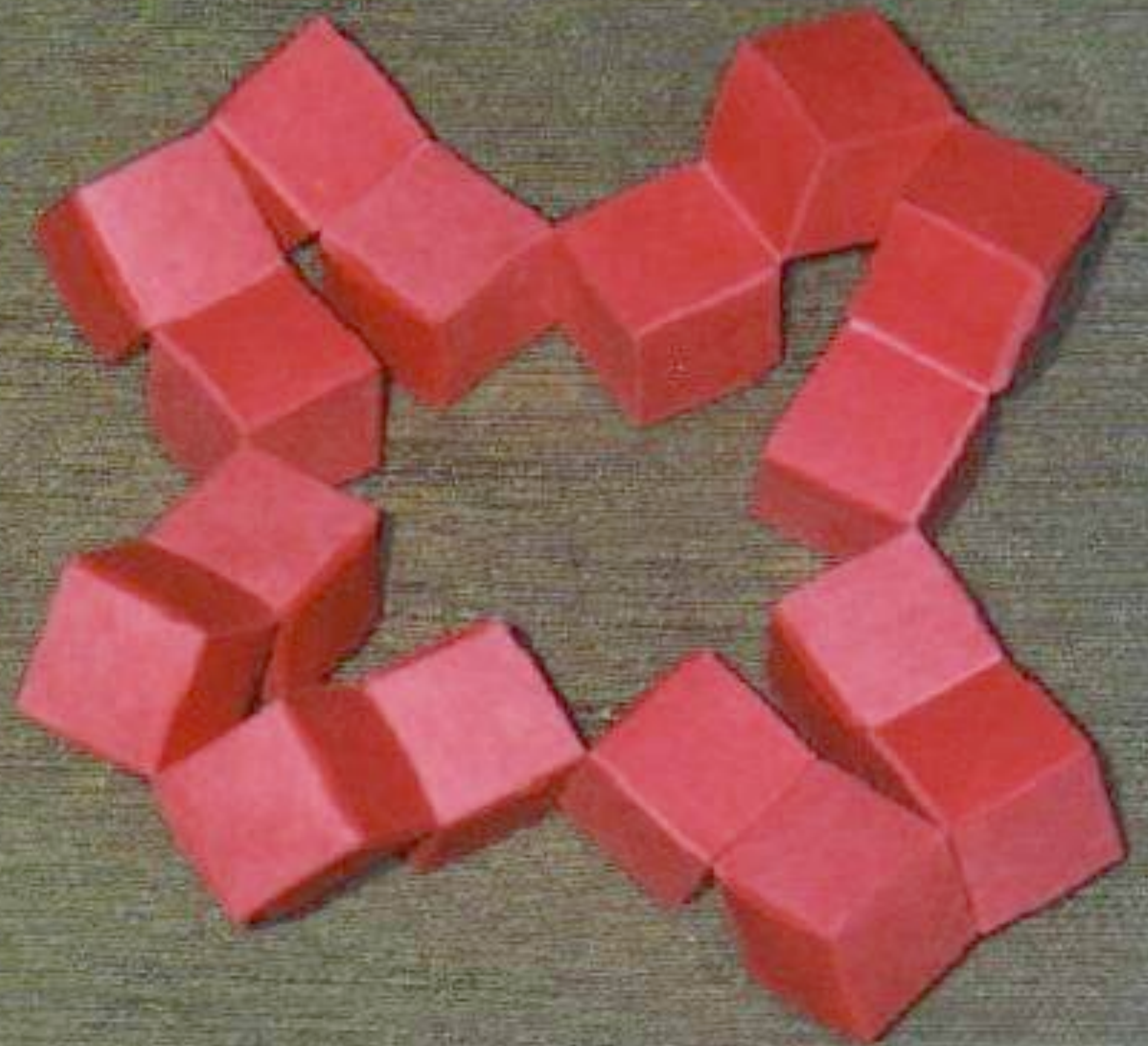
Promotional Flexicube



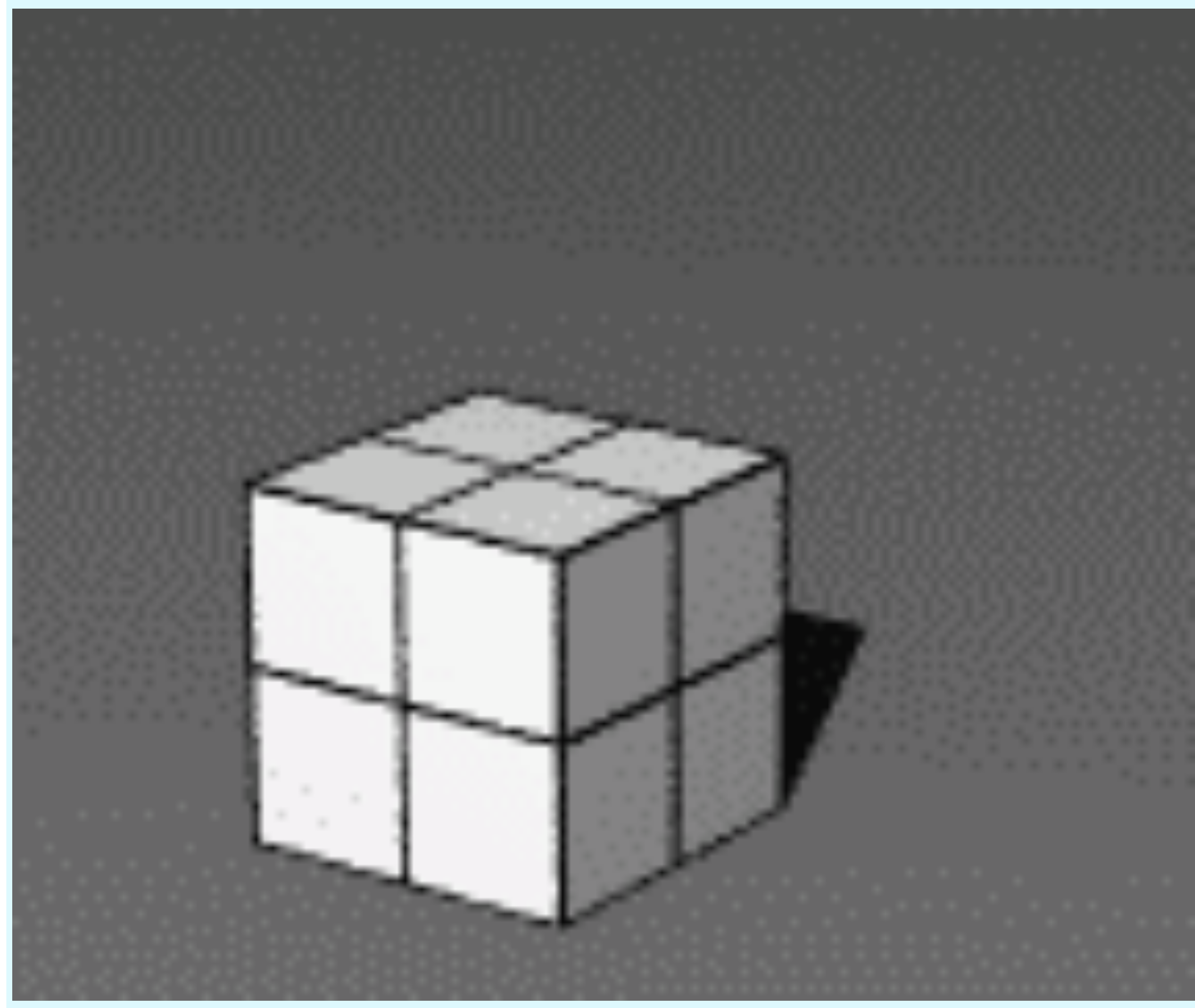
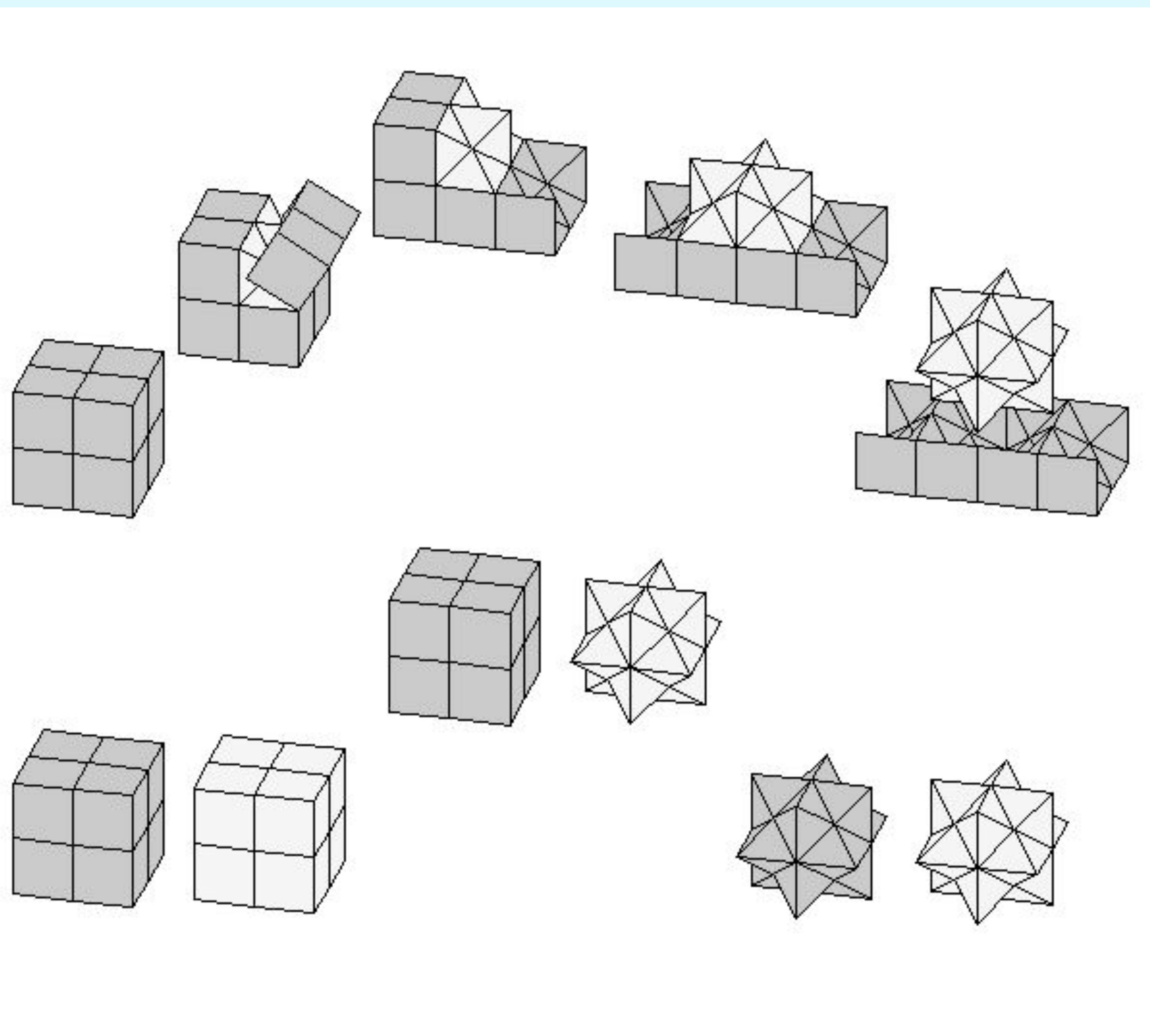
Magic Can



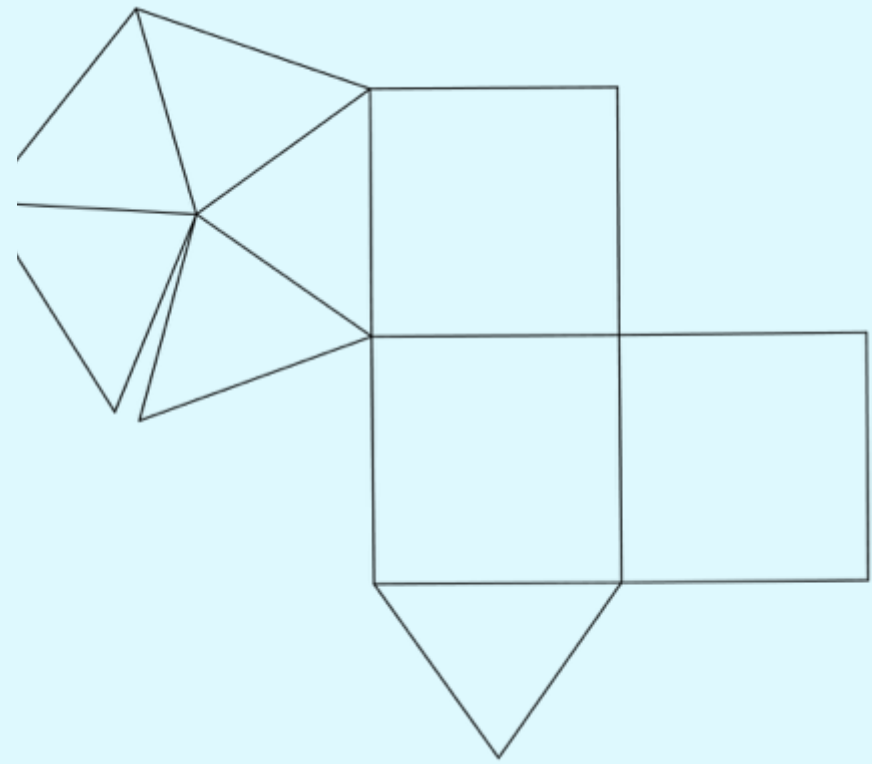
Double Flexicube (Roberto Gretter, Italy) 2009?



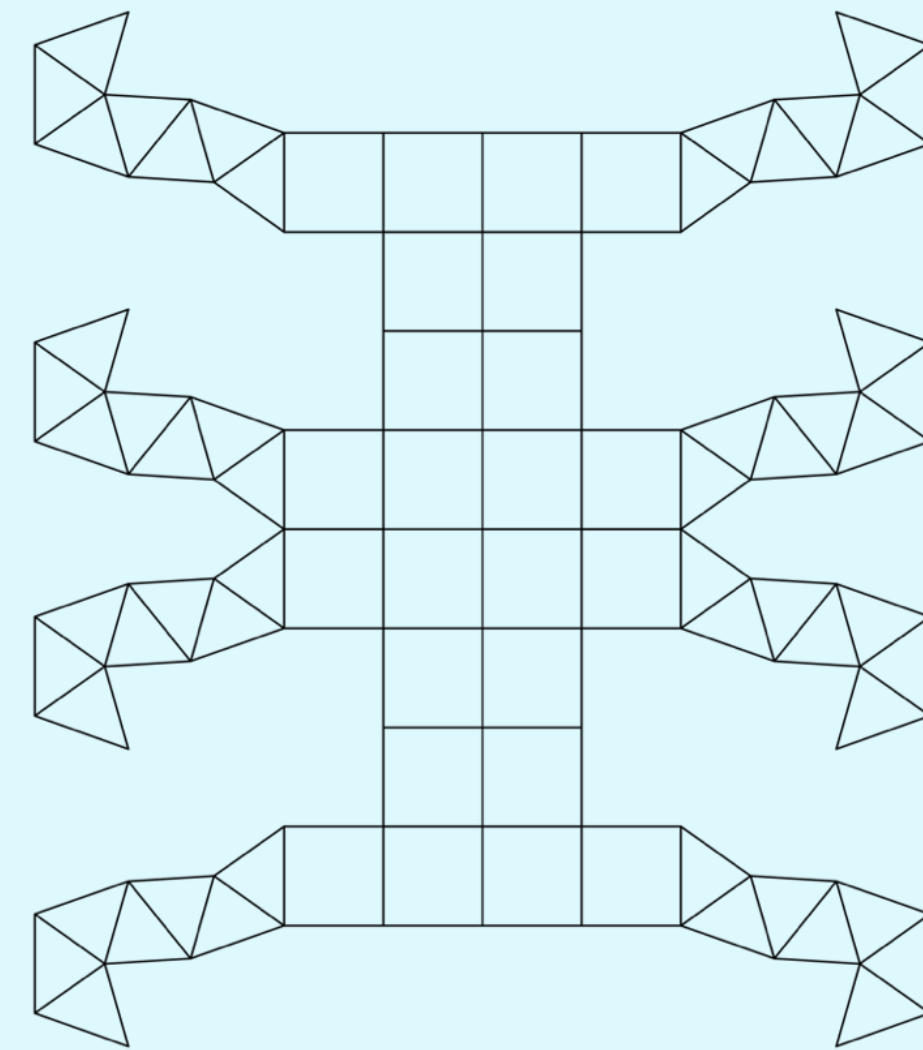
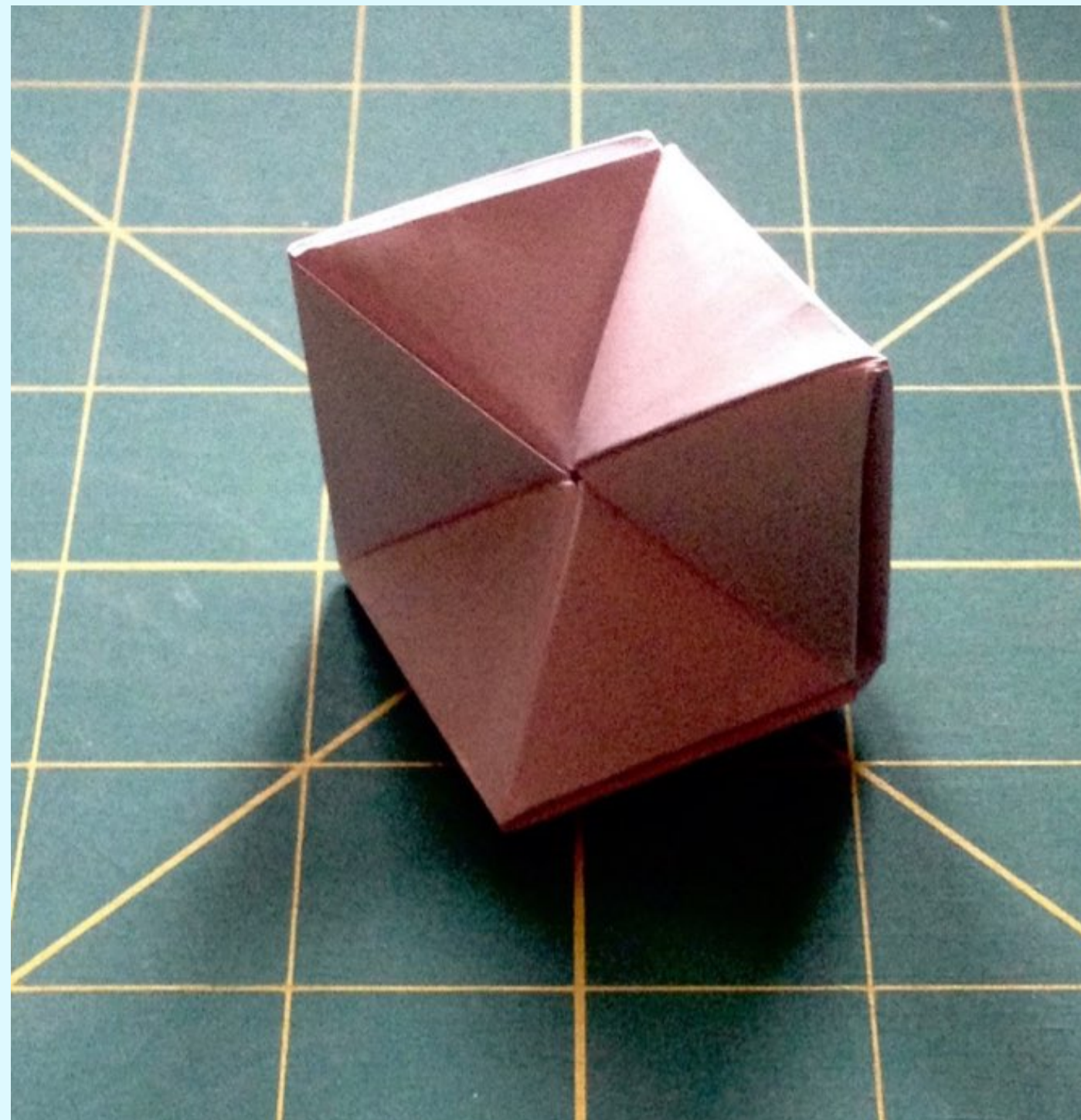
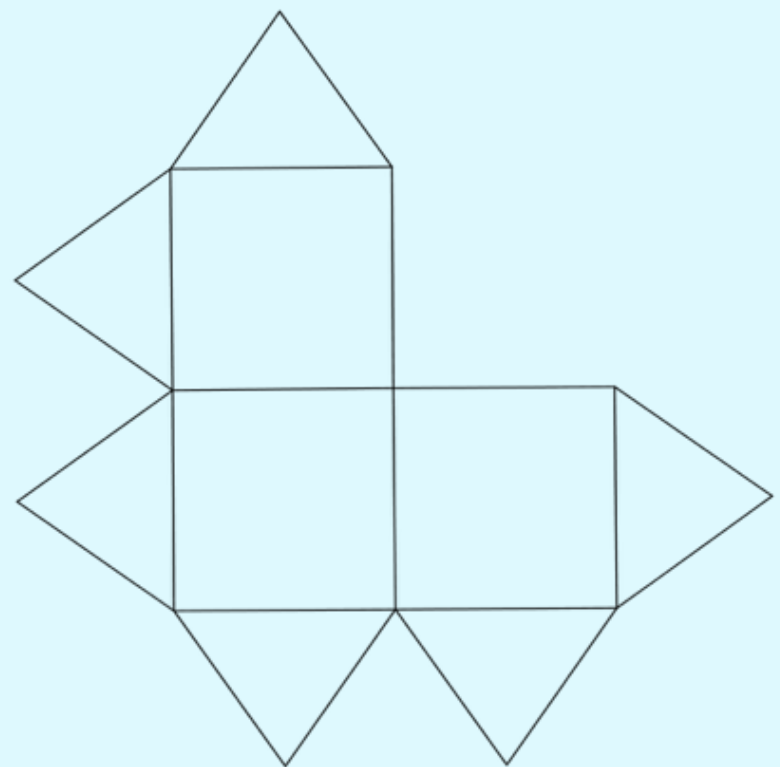
Papercraft toy collected by Paul Jackson (1980's)



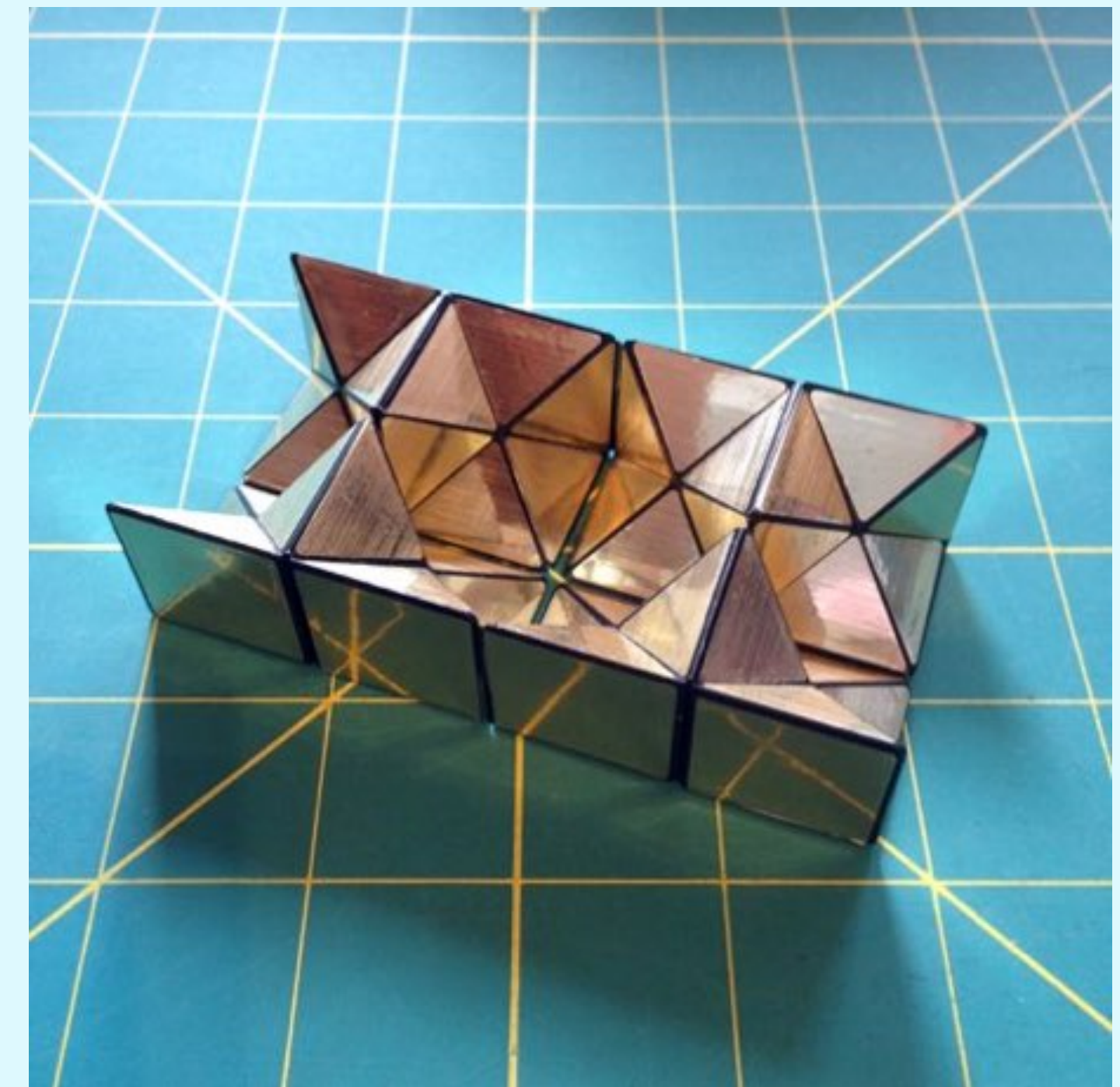
Papercraft nets



Both of these form
half a cube, ie one
element



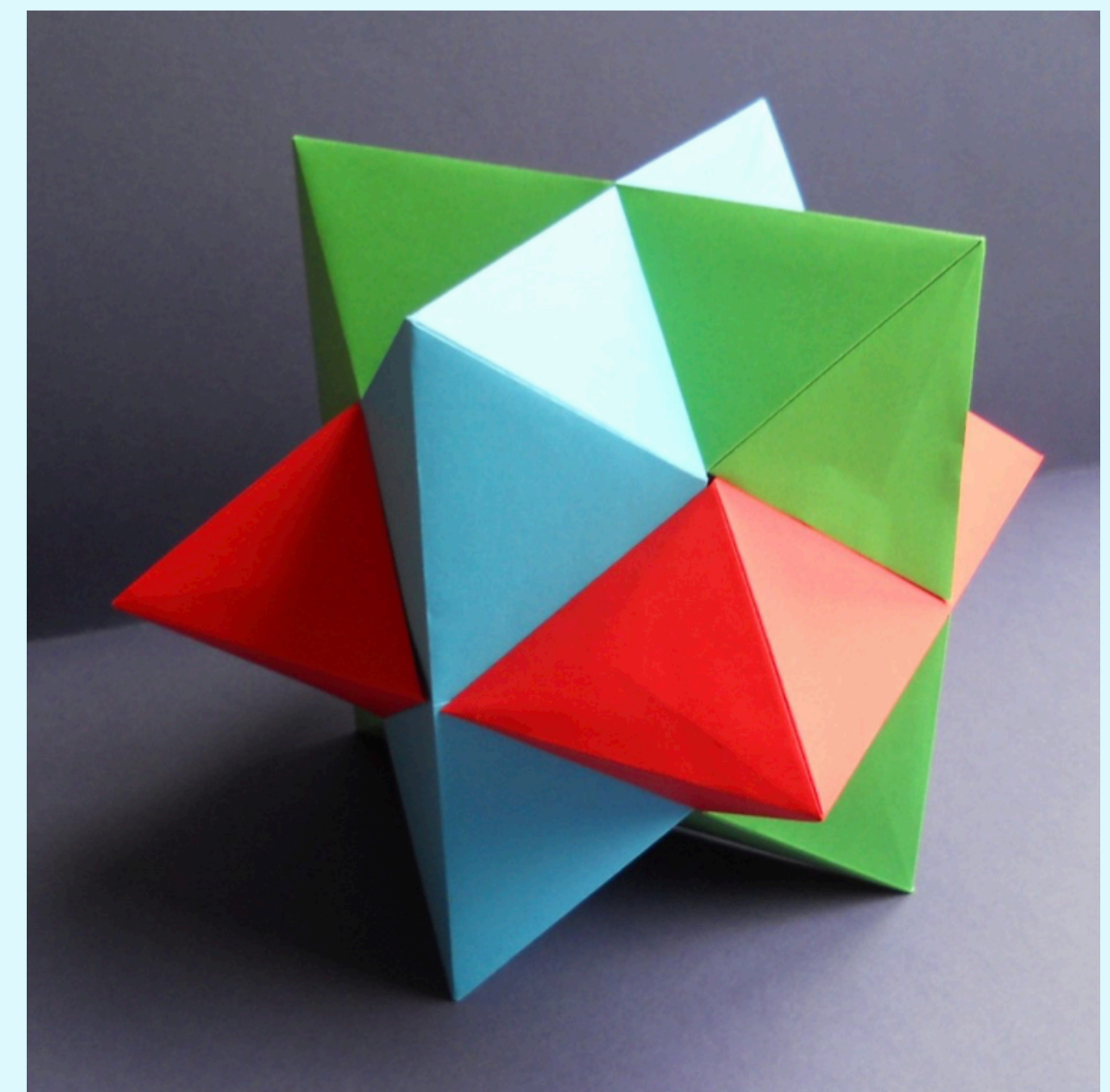
One half of the
construction



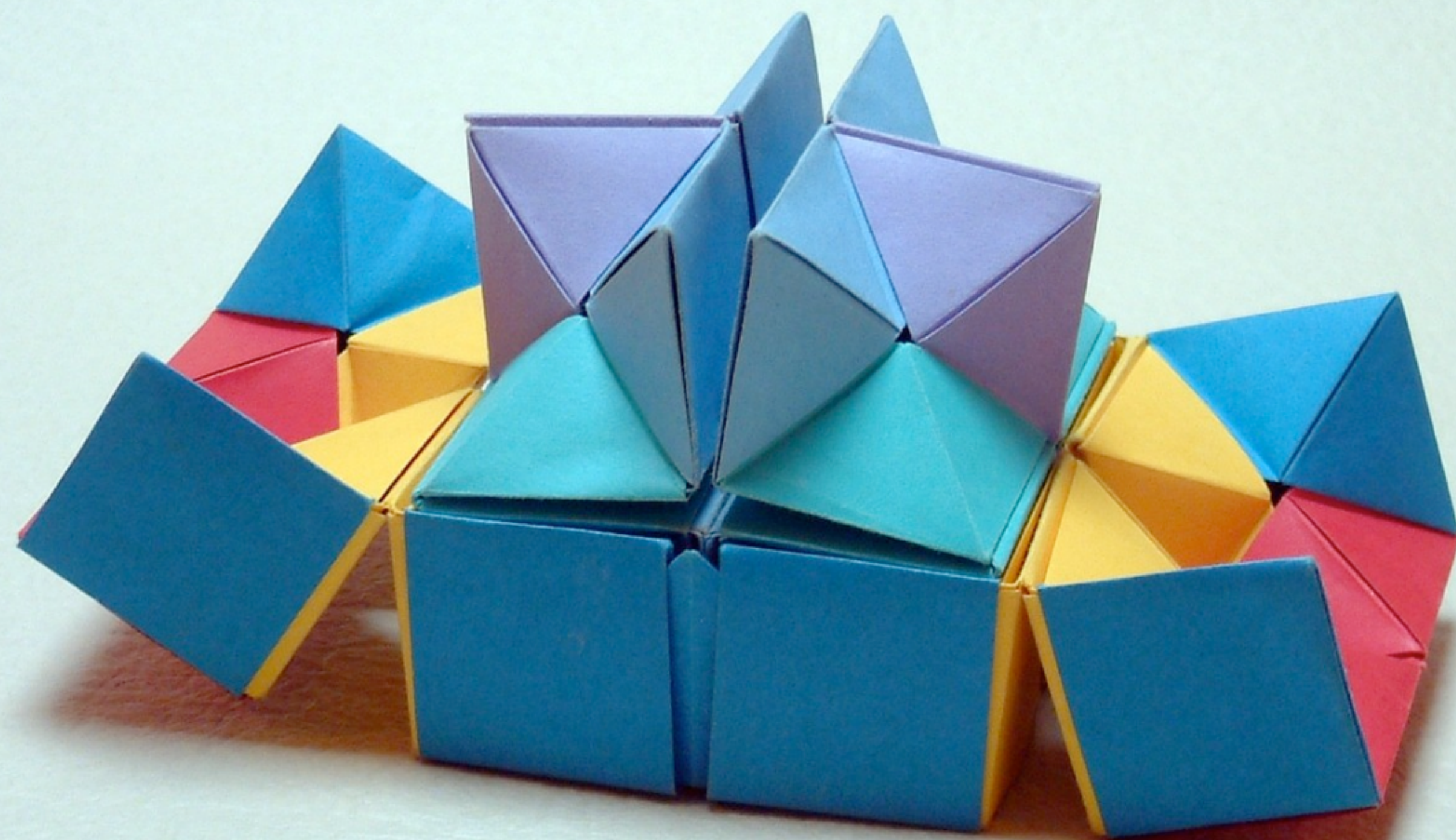
Could I make Paul's flexicube/stars in origami?

Clues:

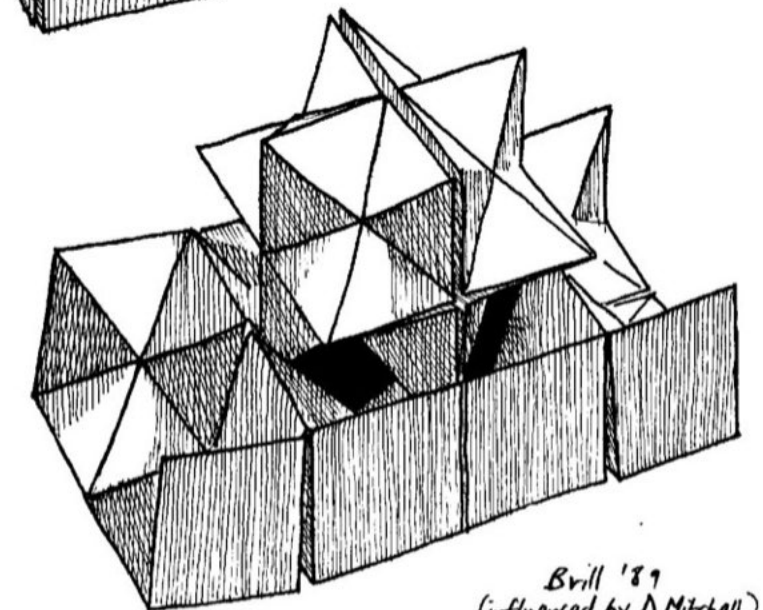
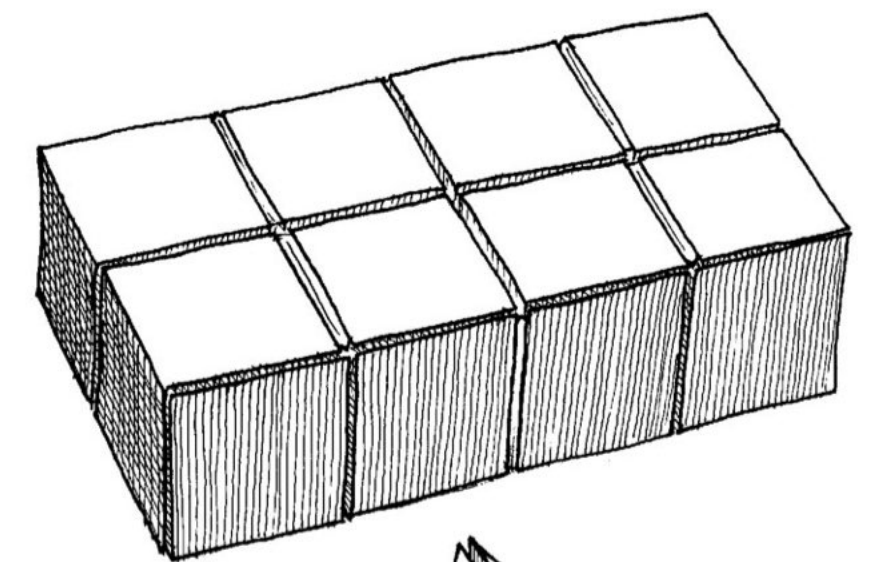
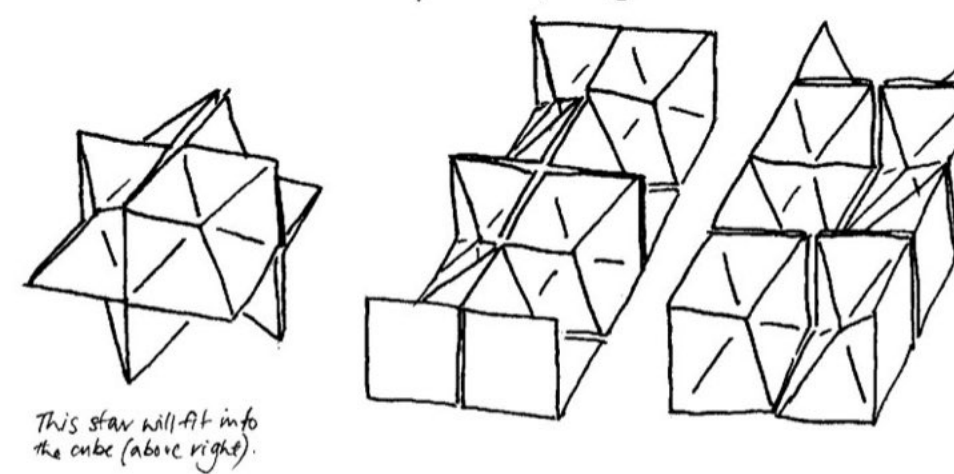
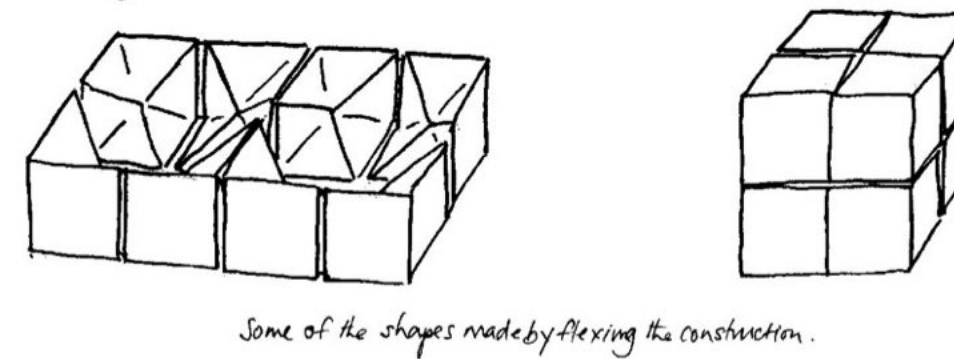
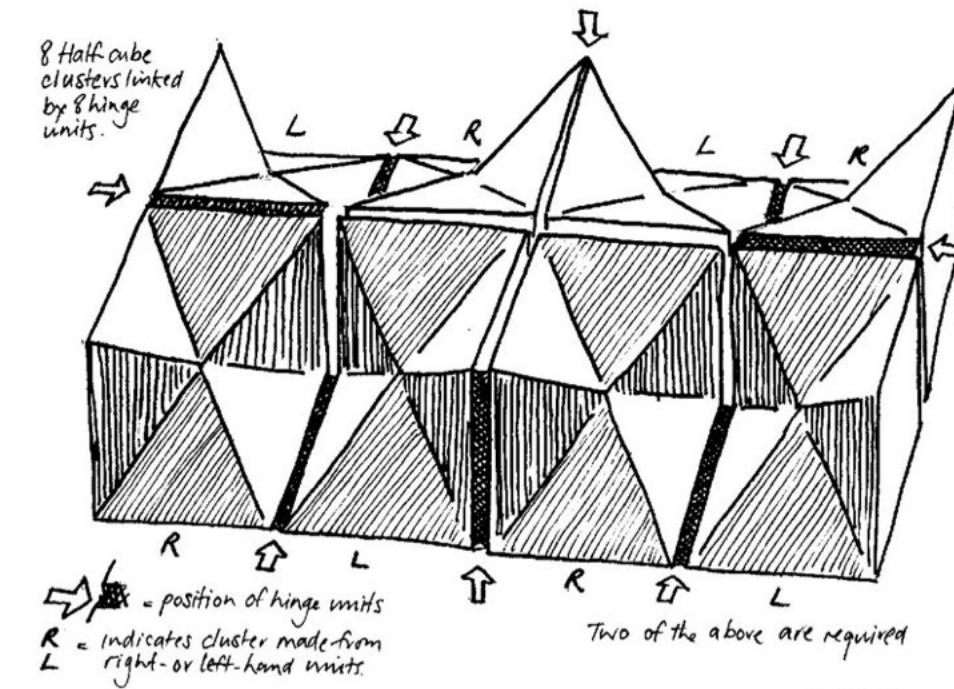
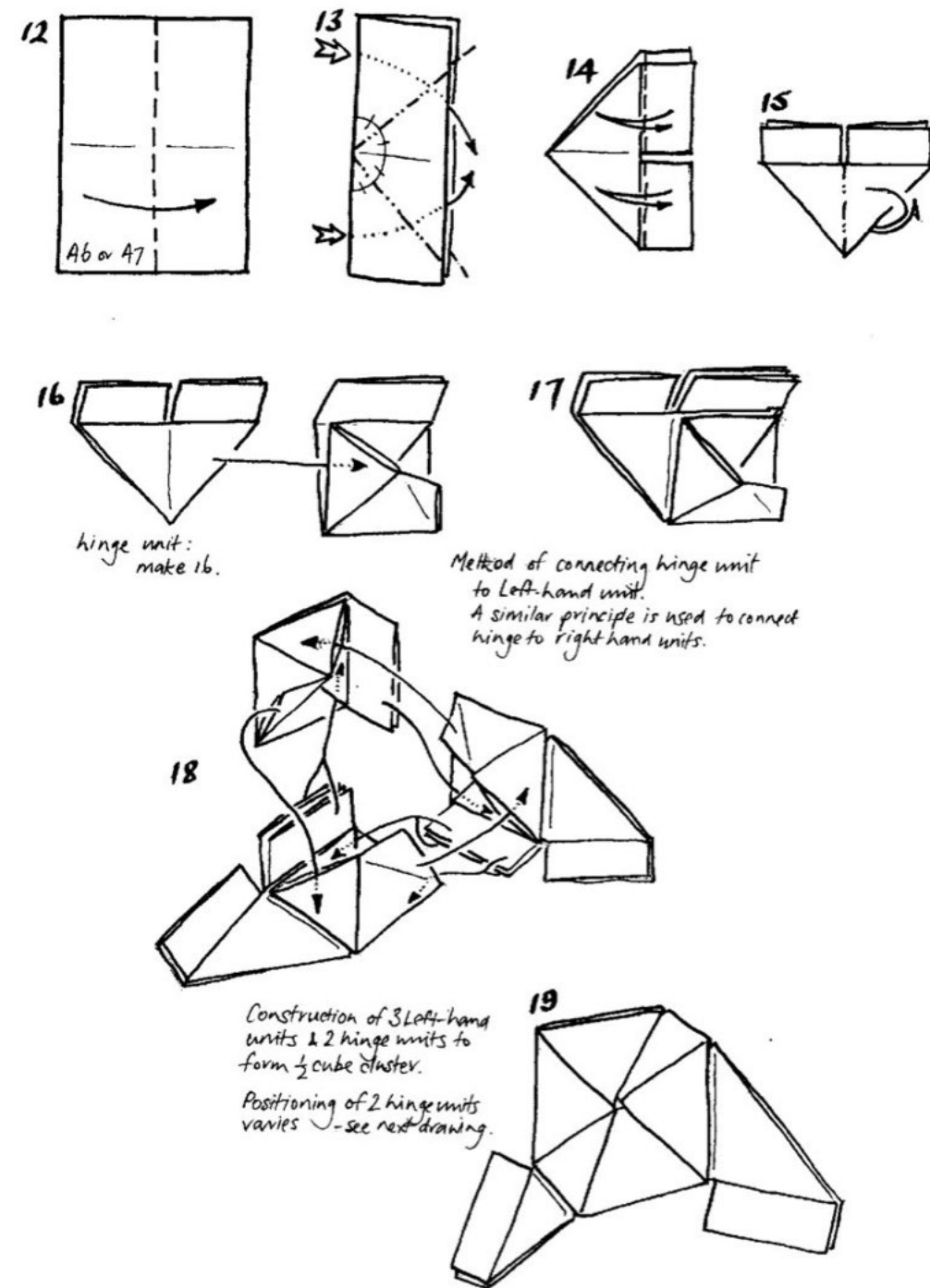
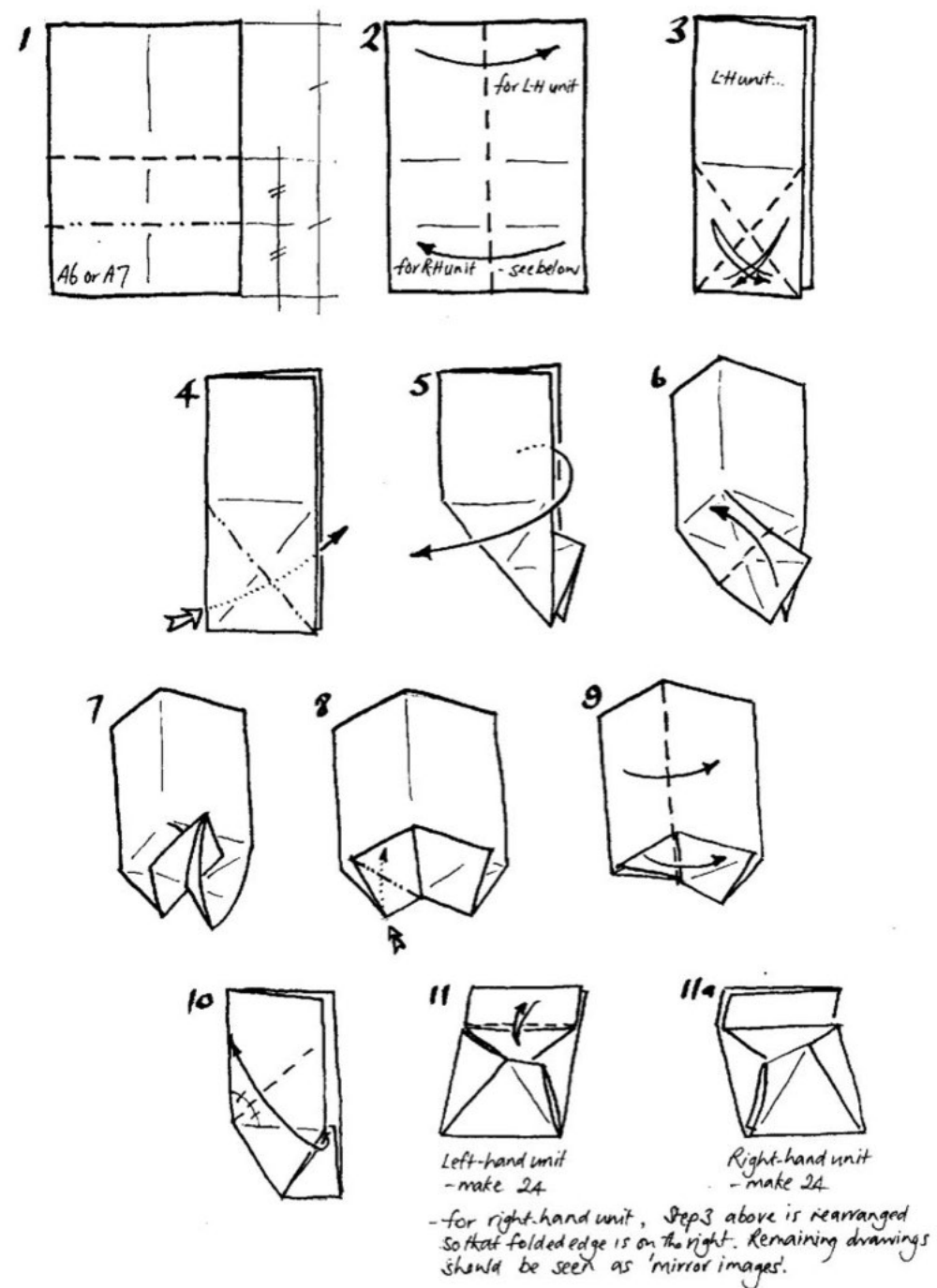
- ❖ Wooden Star Puzzle: Stellated Rhombic Dodecahedron
- ❖ Dave Mitchell's 6 piece Stellated Rhombic Dodecahedron



Double Star Flexicube (1989)



Diagrams for Double Star Flexicube 1989



Yoshimoto Cube



Naoki Yoshimoto

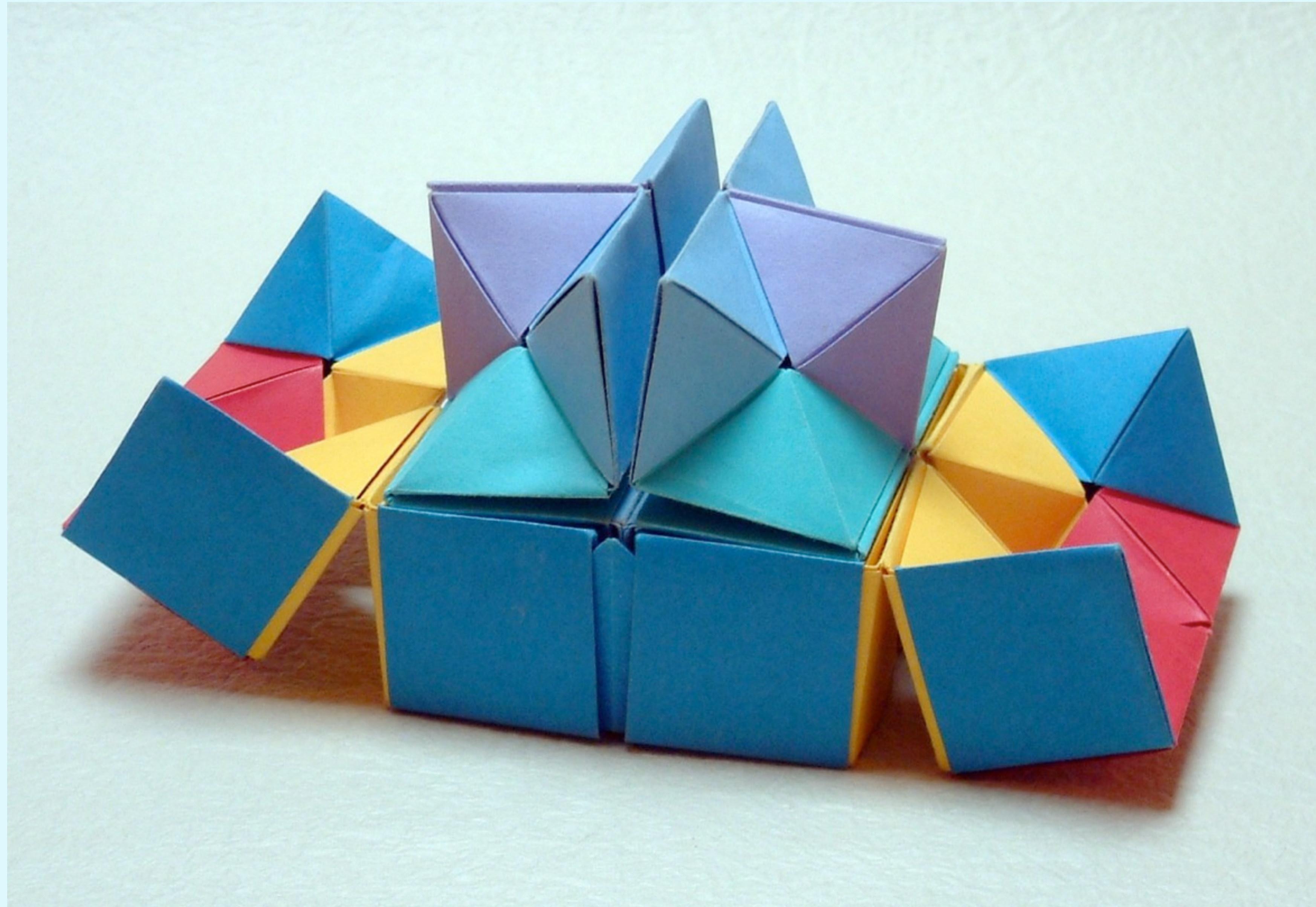
Naoki Yoshimoto (born 1940) designed the Yoshimoto Cube, a design in MoMA's collection. The idea was born in the process of dividing a cube into equal parts and investigating the laws of shape and space. In 1972, he exhibited the cube at a solo exhibition of his work, and after that it was decided to produce and sell it as the Yoshimoto cube No. 1, 2, and 3. In 1981, an Asahi newspaper reporter gave the Yoshimoto Cube as a souvenir to a MoMA curator when he visited New York. The curator took an interest in it, and it became part of the Museum's collection in 1982.

Problems

- ❖ fragile
- ❖ too many units

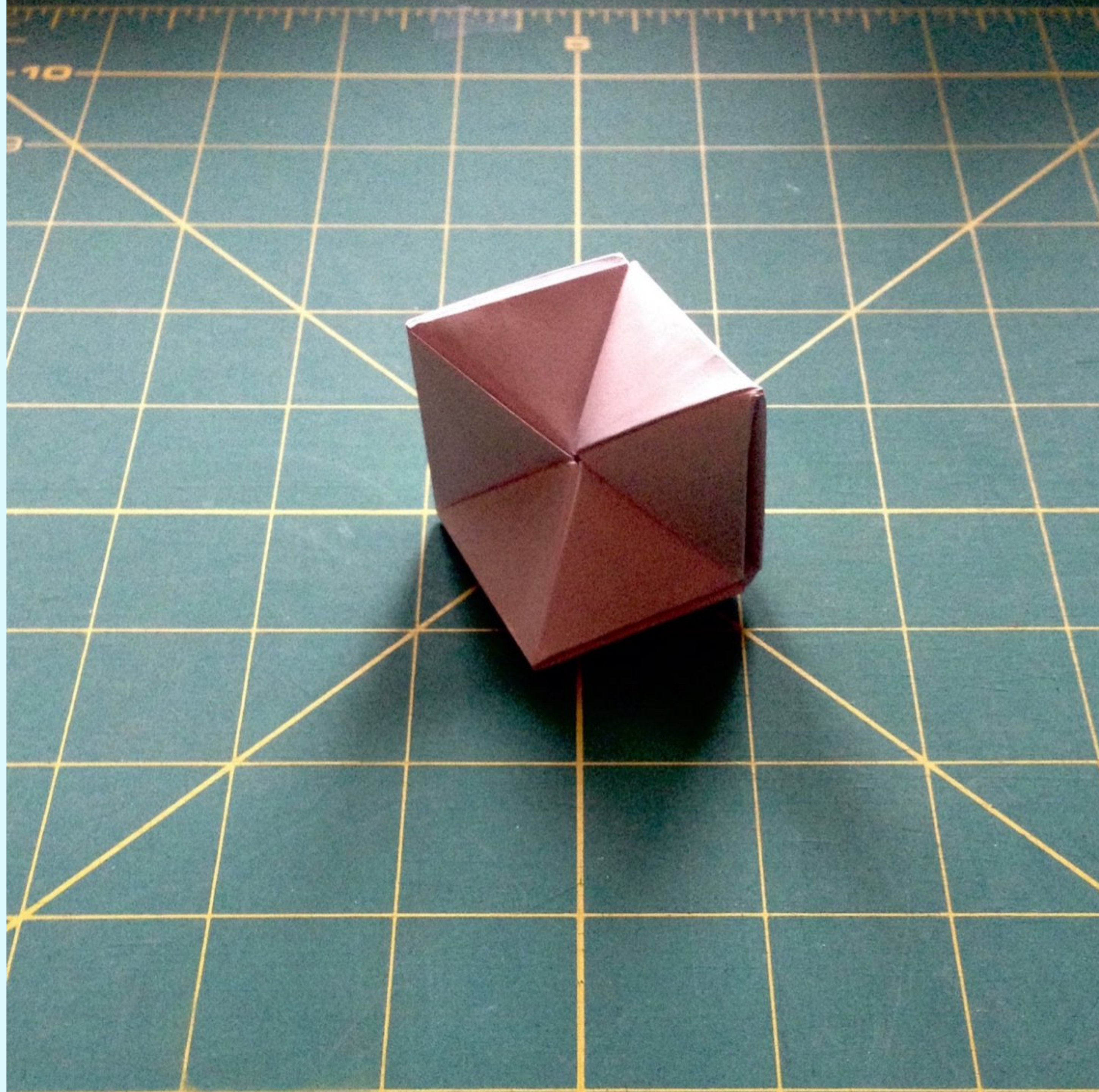
Solutions?

- ❖ strengthen unit?
- ❖ fewer units?

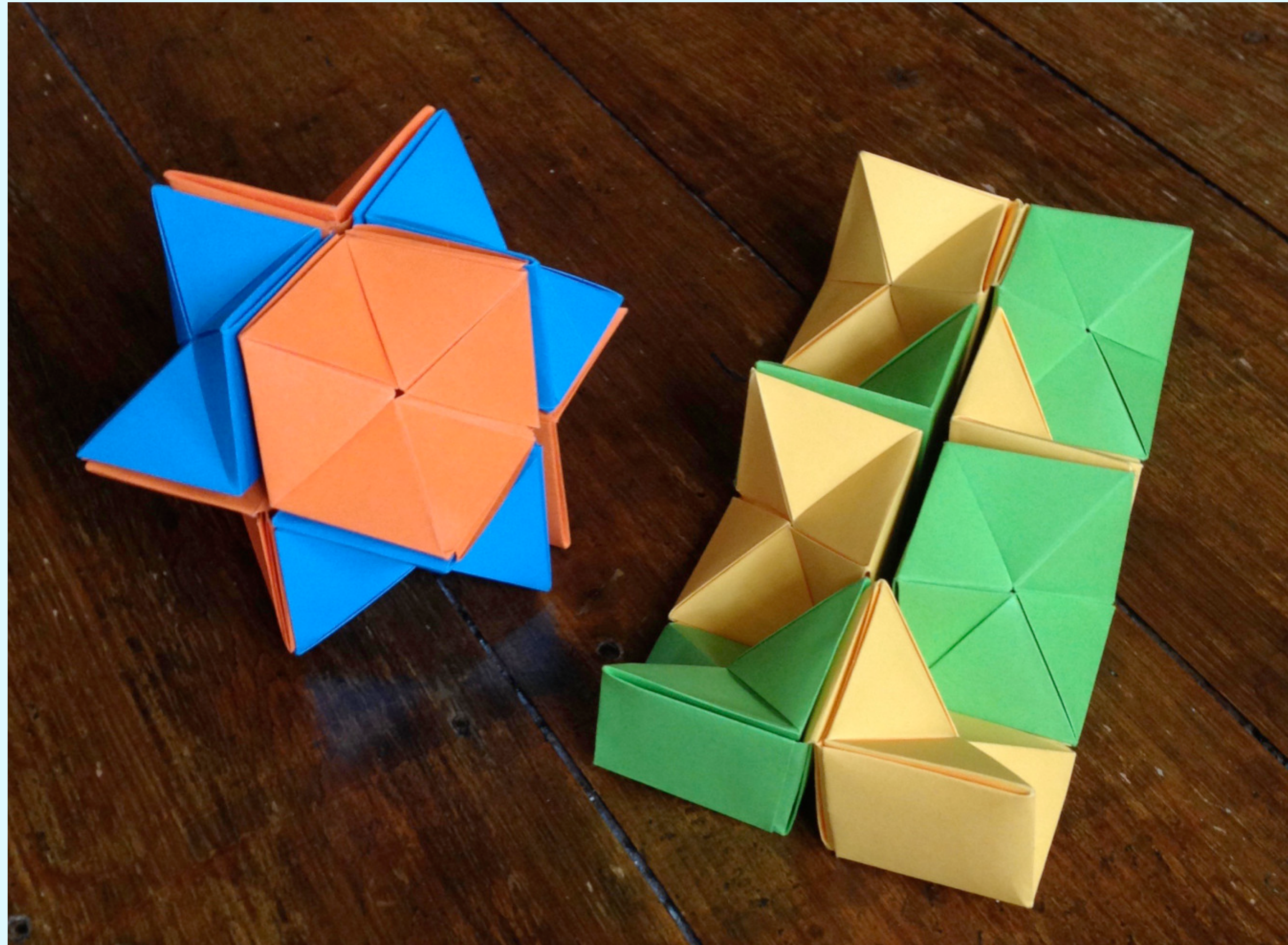


Single sheet element?

- ❖ strong ✓
- ❖ odd rectangle ✗
- ❖ difficult ✗



Yoshimoto Cube single sheet elements

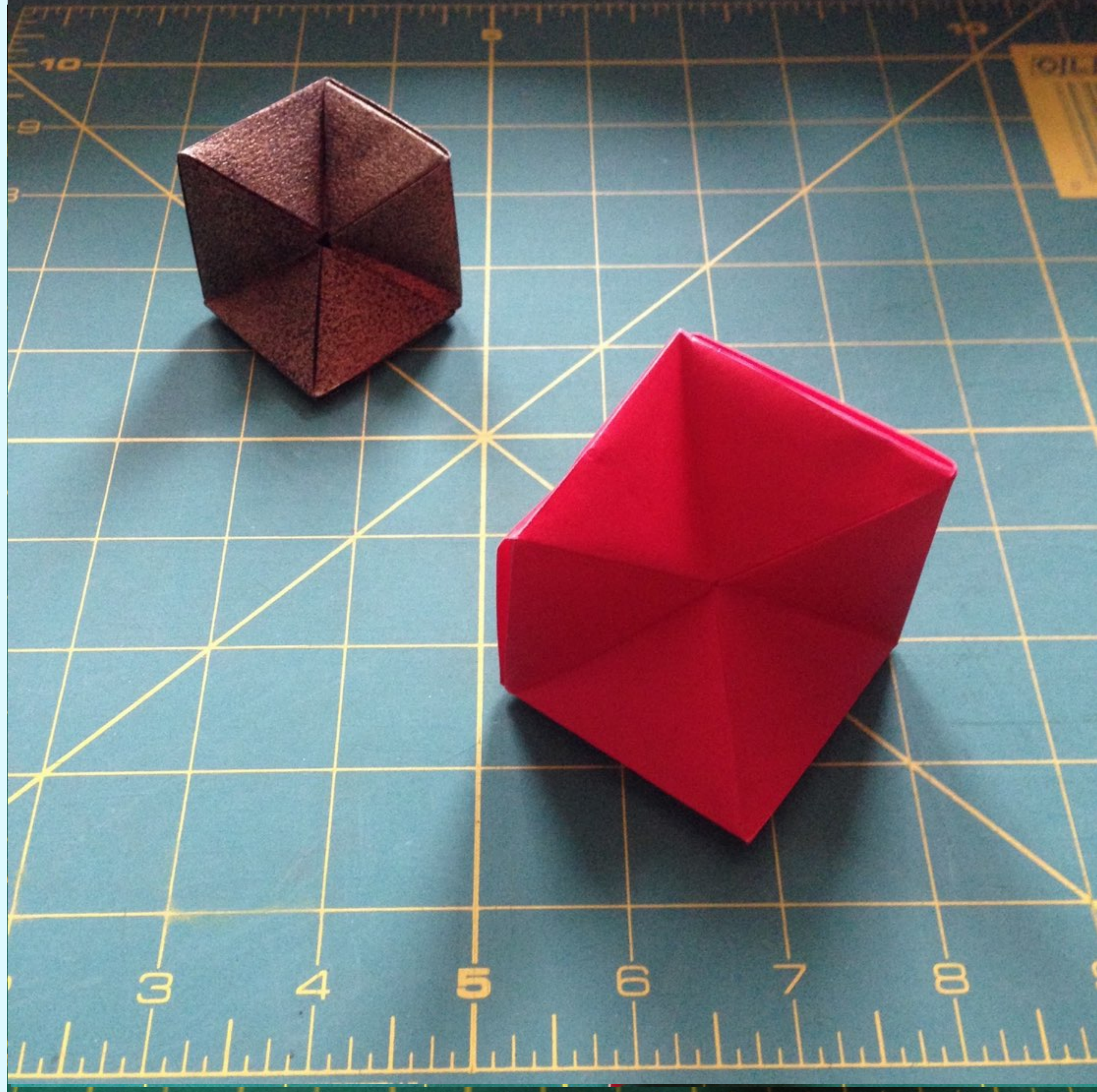


Stronger element

❖ 1989: A6

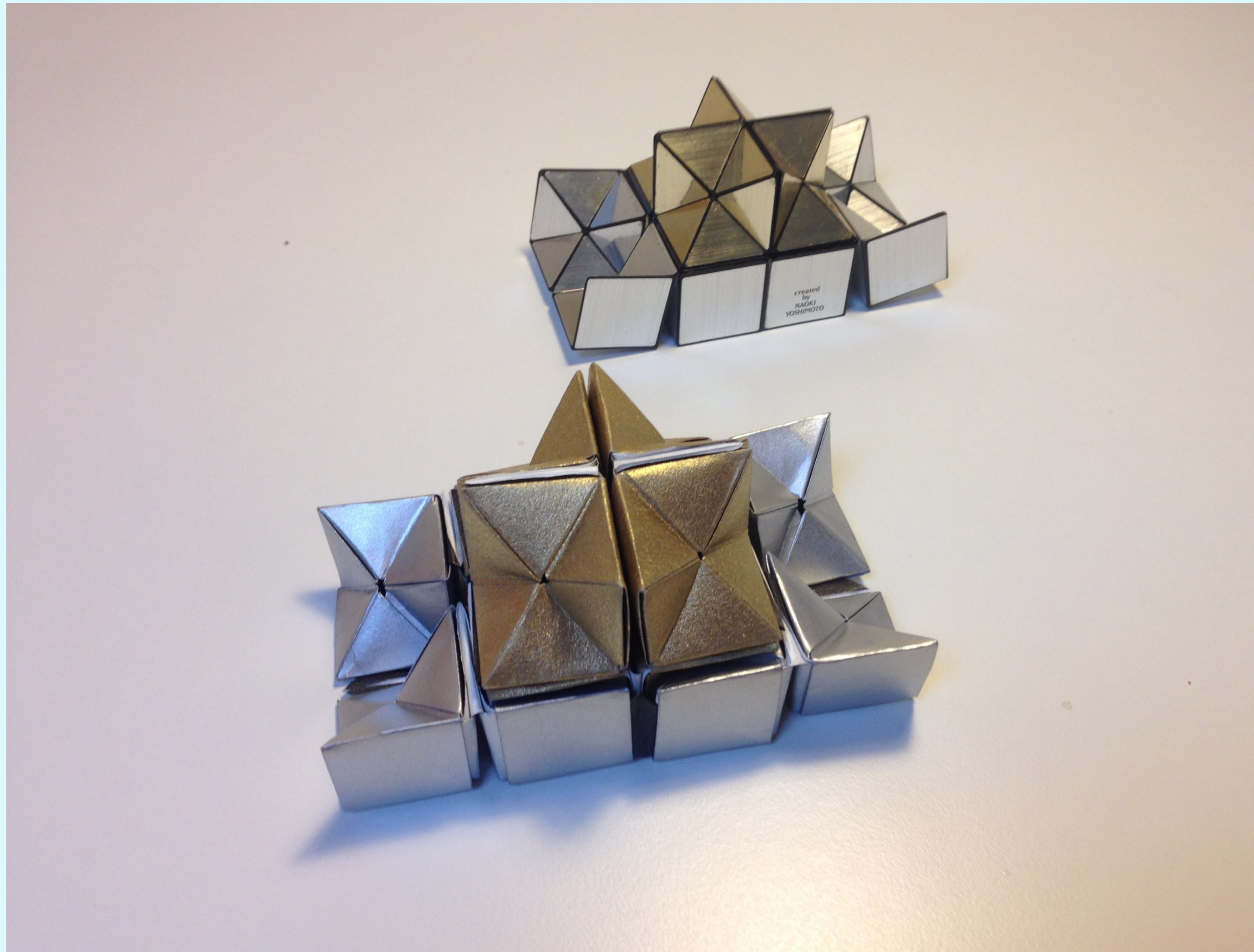
❖ 2015: Square

Three units connect
to form one element
(half a cube)



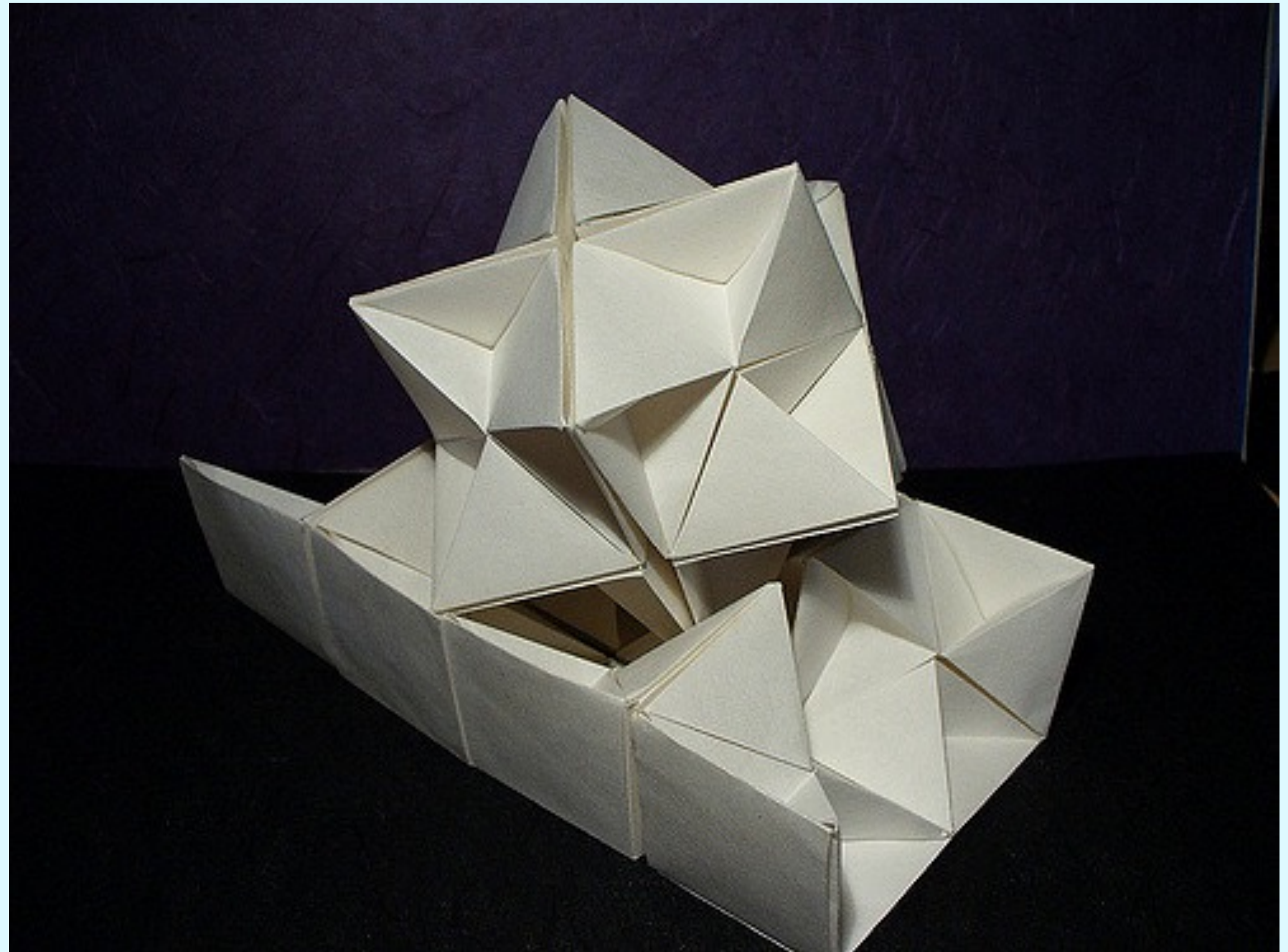
Yoshimoto Cube replica

Uses elements made
from 3 squares



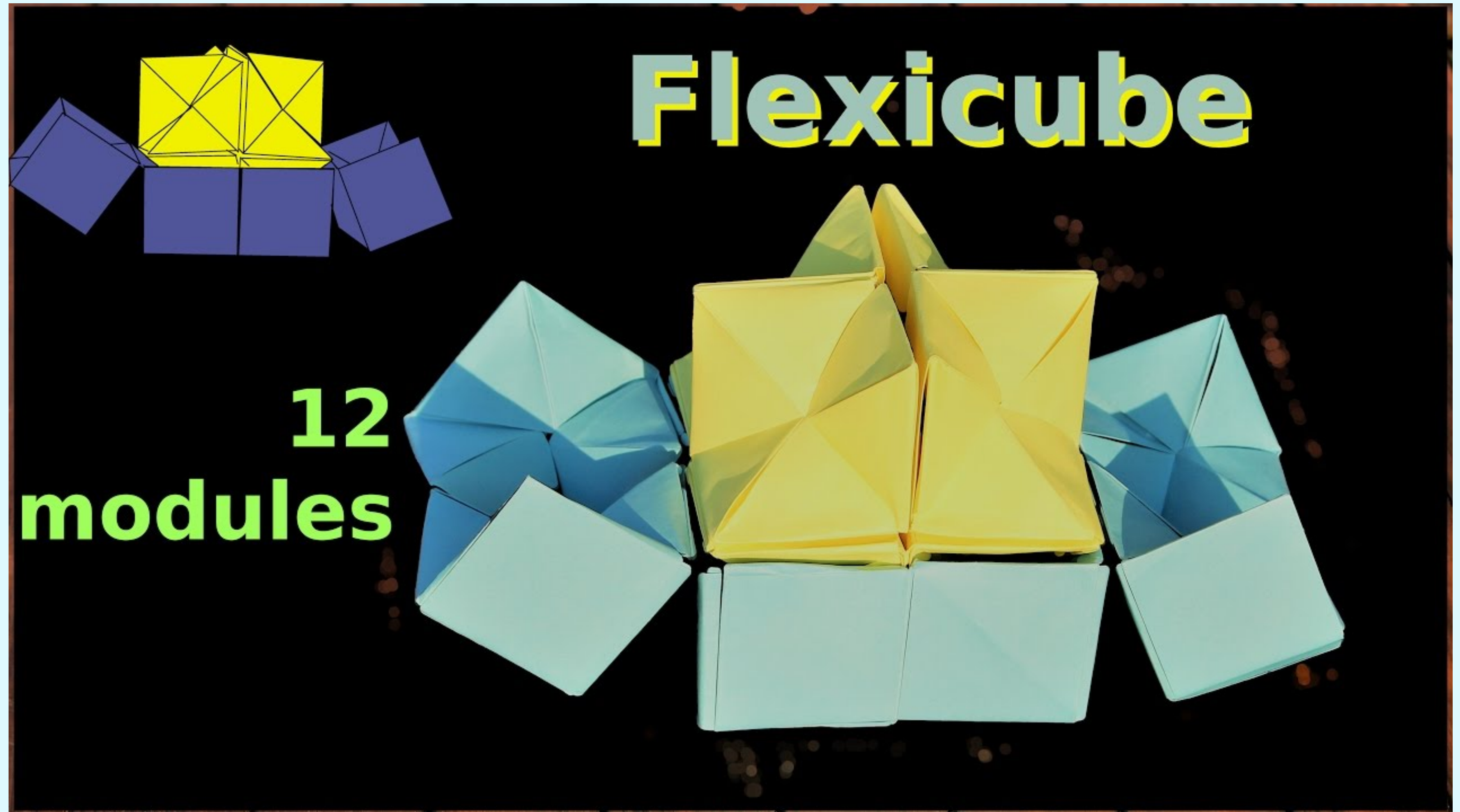
Yoshimoto cube by *Alessandro Beber* (Italy)

- ❖ 2 long strips,
4 x 450 cm each



Yoshimoto cube by Olga Amimon (Russia/Japan)

- ❖ 24 strips
55x10cm





THE YOSHIMOTO CUBE

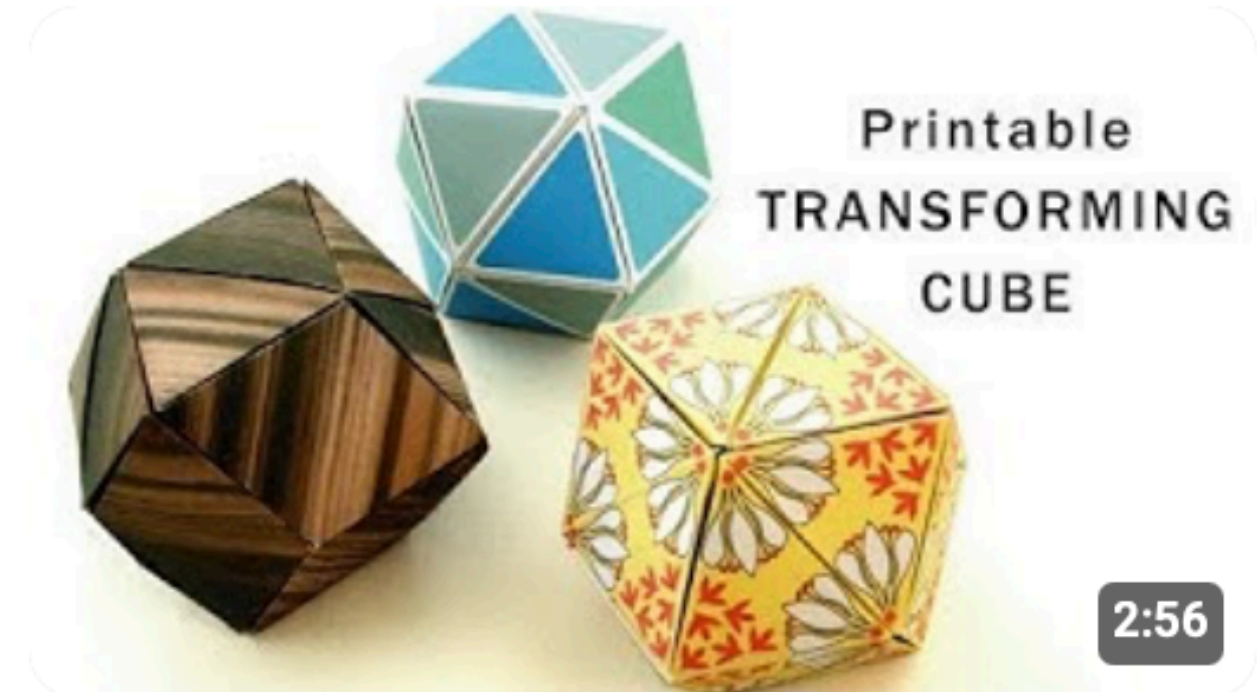
Yoshimoto cubes by Sweet Paper (Japan)



Origami Transforming Cube Jr.
161k views • 8 years ago



吉本キューブNo.2【折り紙】 Origami Yoshimoto Cube#2
85k views • 9 years ago



Printable Origami Transforming Cubes
101k views • 9 years ago



Origami Transforming Cube
466k views • 9 years ago



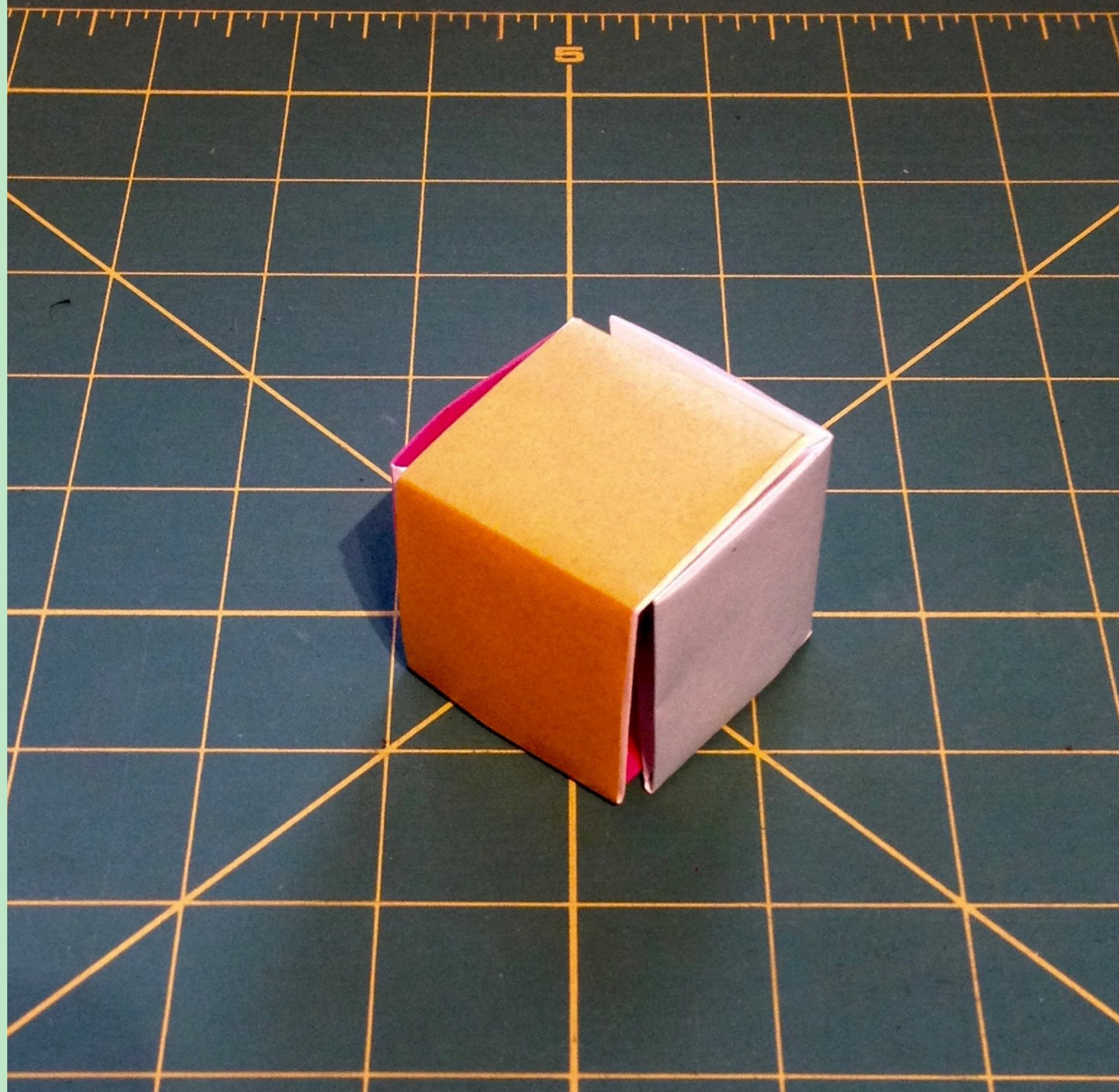
吉本キューブ【折り紙】 Origami Yoshimoto Cube
356k views • 9 years ago



フォトフレーム 作り方【折り紙方式】 Origami Photo Frame
165k views • 9 years ago

New ideas

- ❖ one-third of a cube



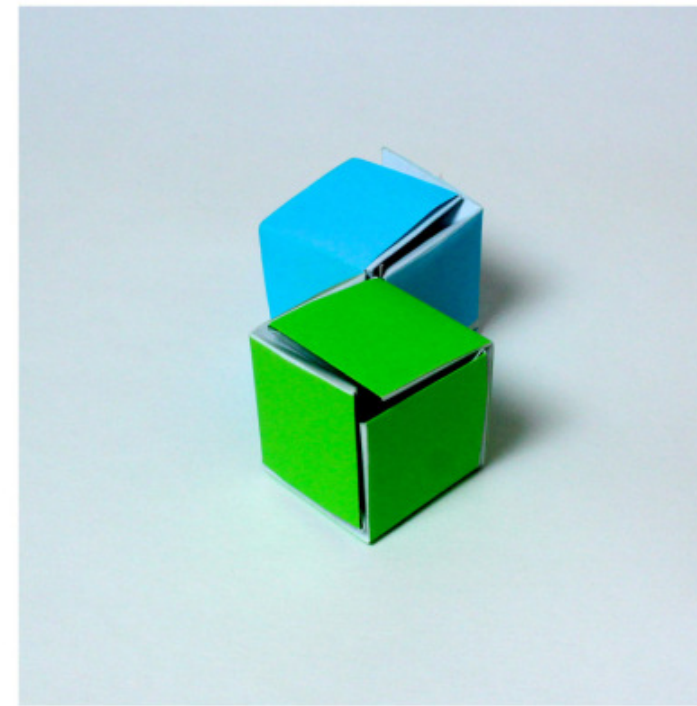
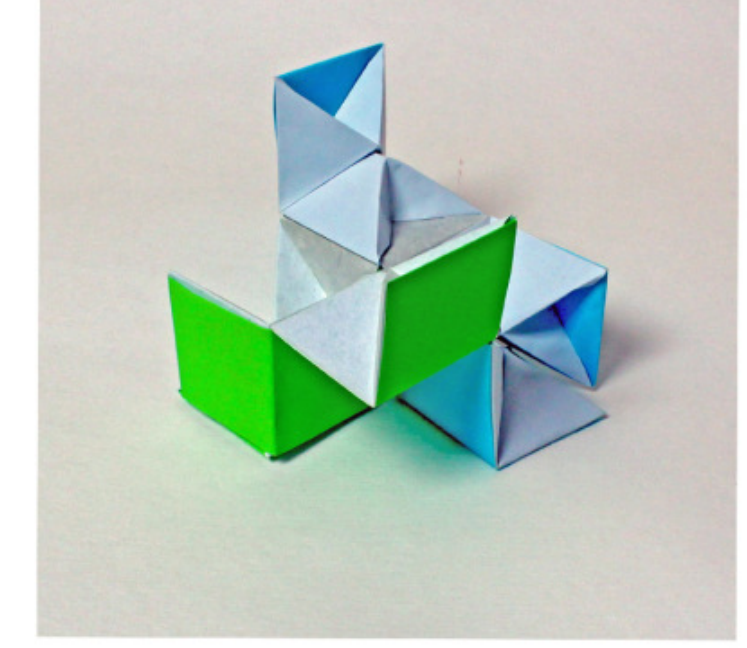
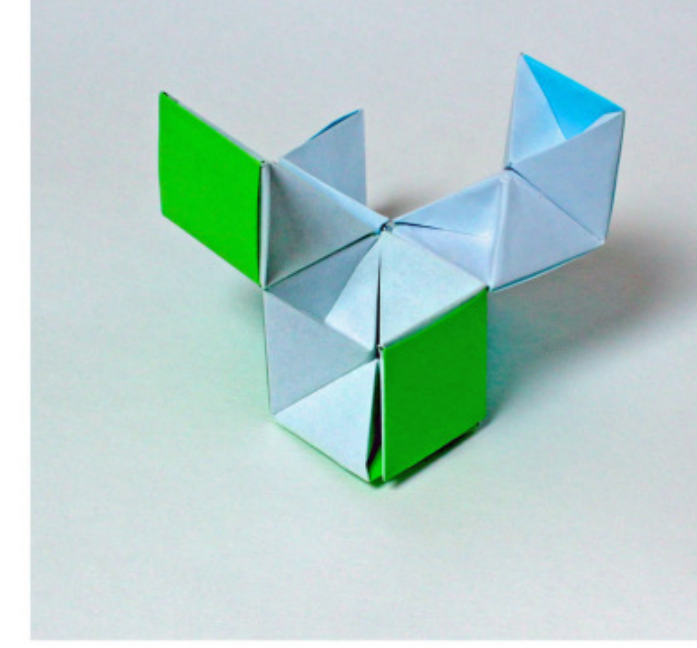
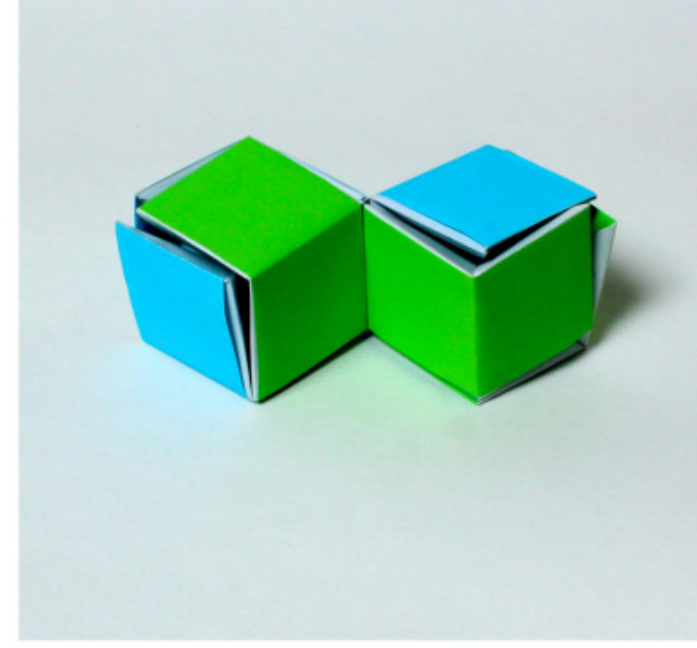
Brillik Cubes

- ❖ 2, 3 and 4 cubes
- ❖ hinged together
- ❖ make colour changing puzzles

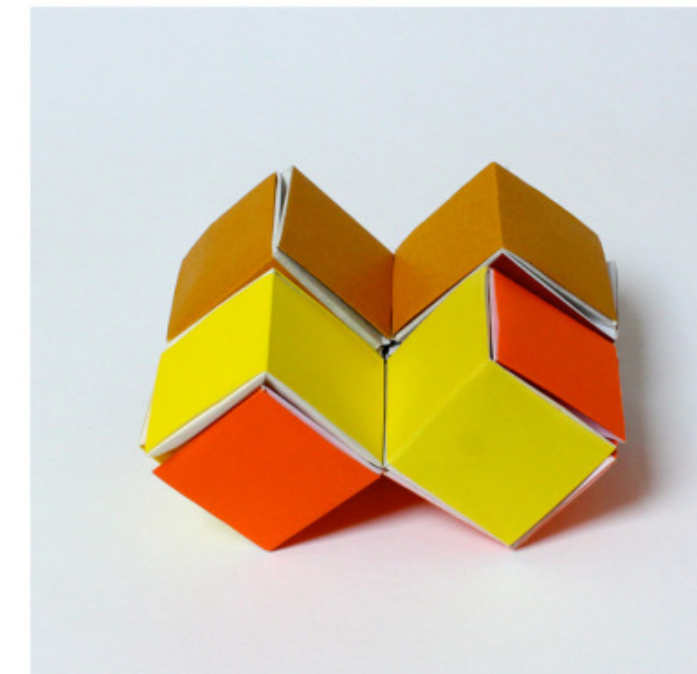
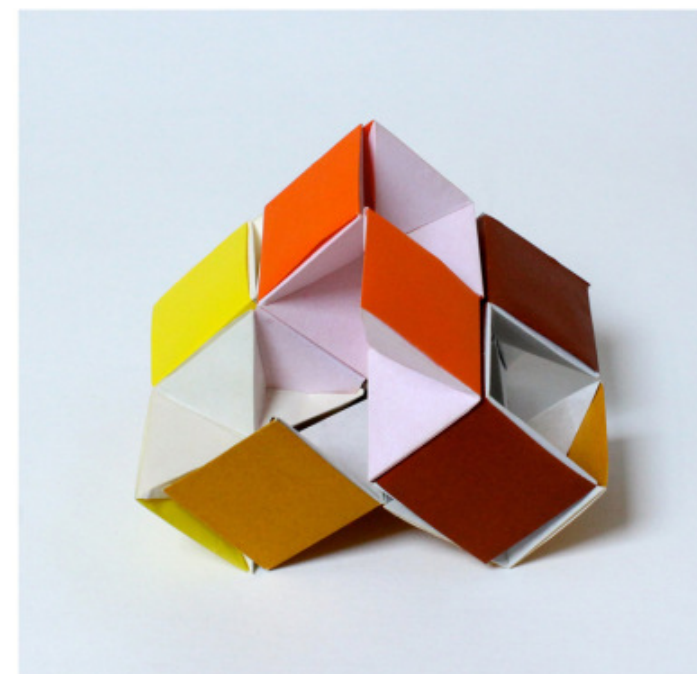
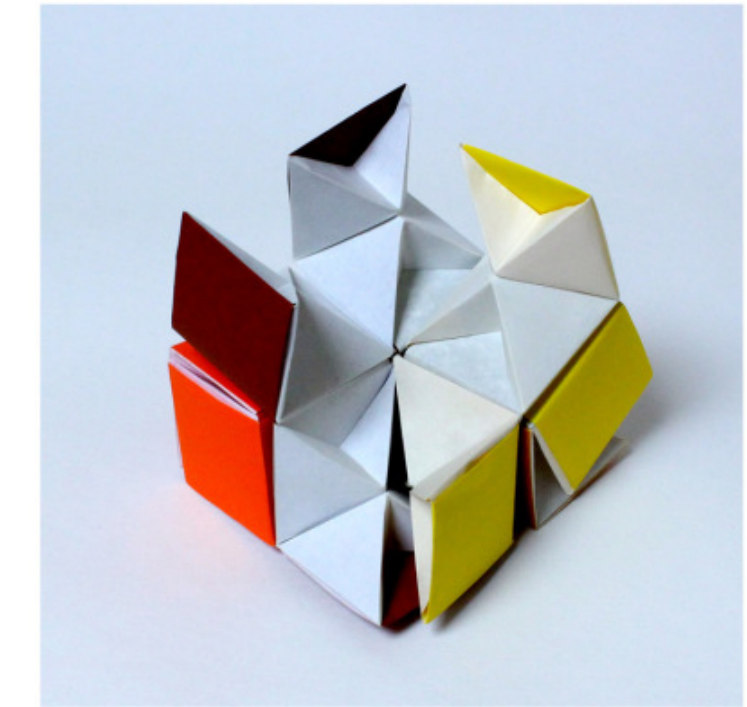
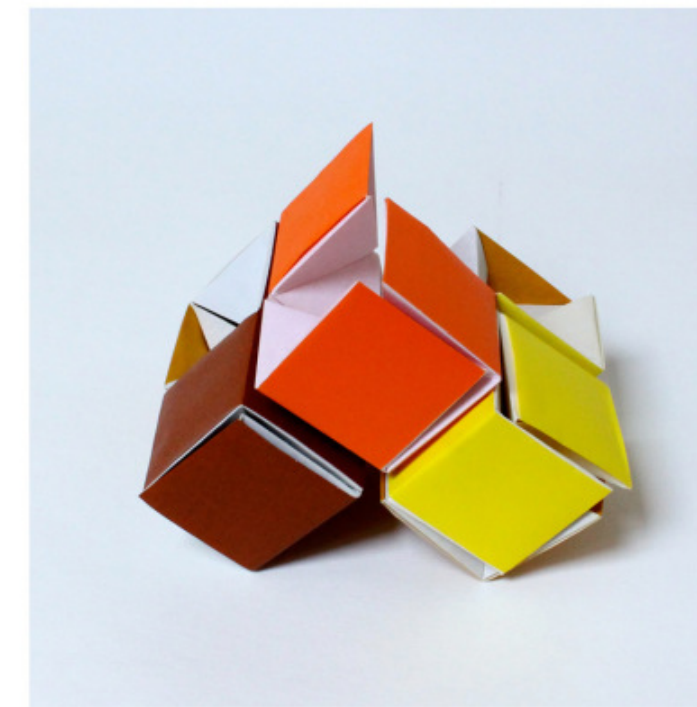
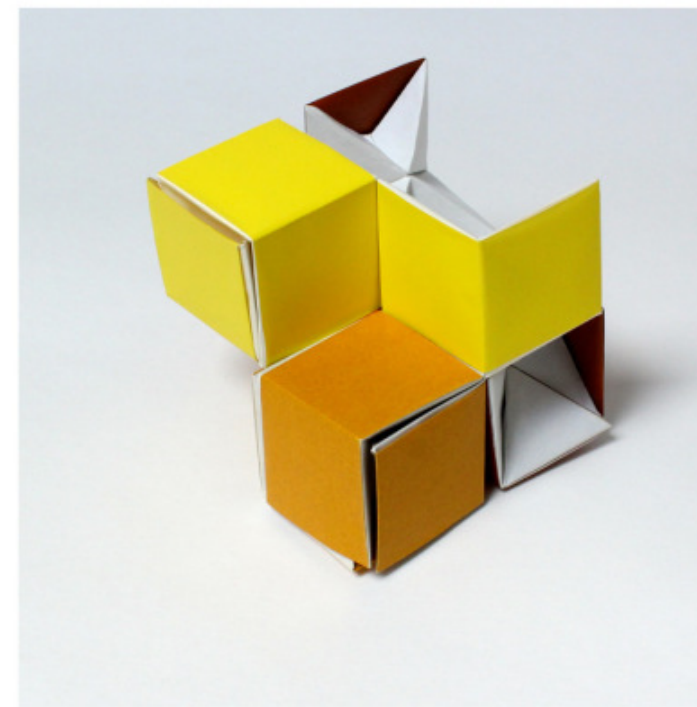


Brillik Cubes

2 and 4 cube possibilities



Brillik Cubes
transformations

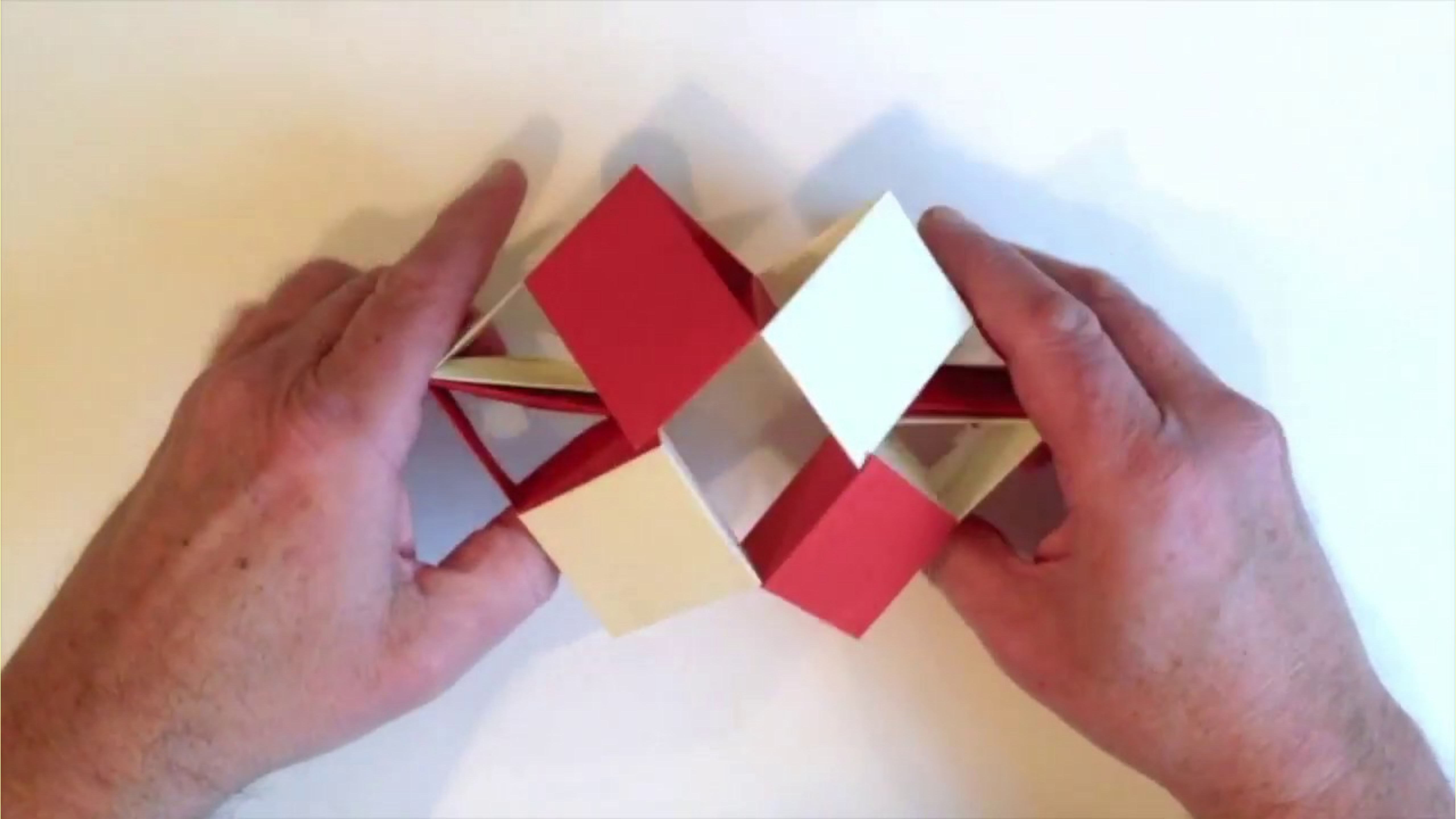


Paper Transformer

- ❖ from Youtube, creator unknown
- ❖ cut and taped
- ❖ inspiration for...

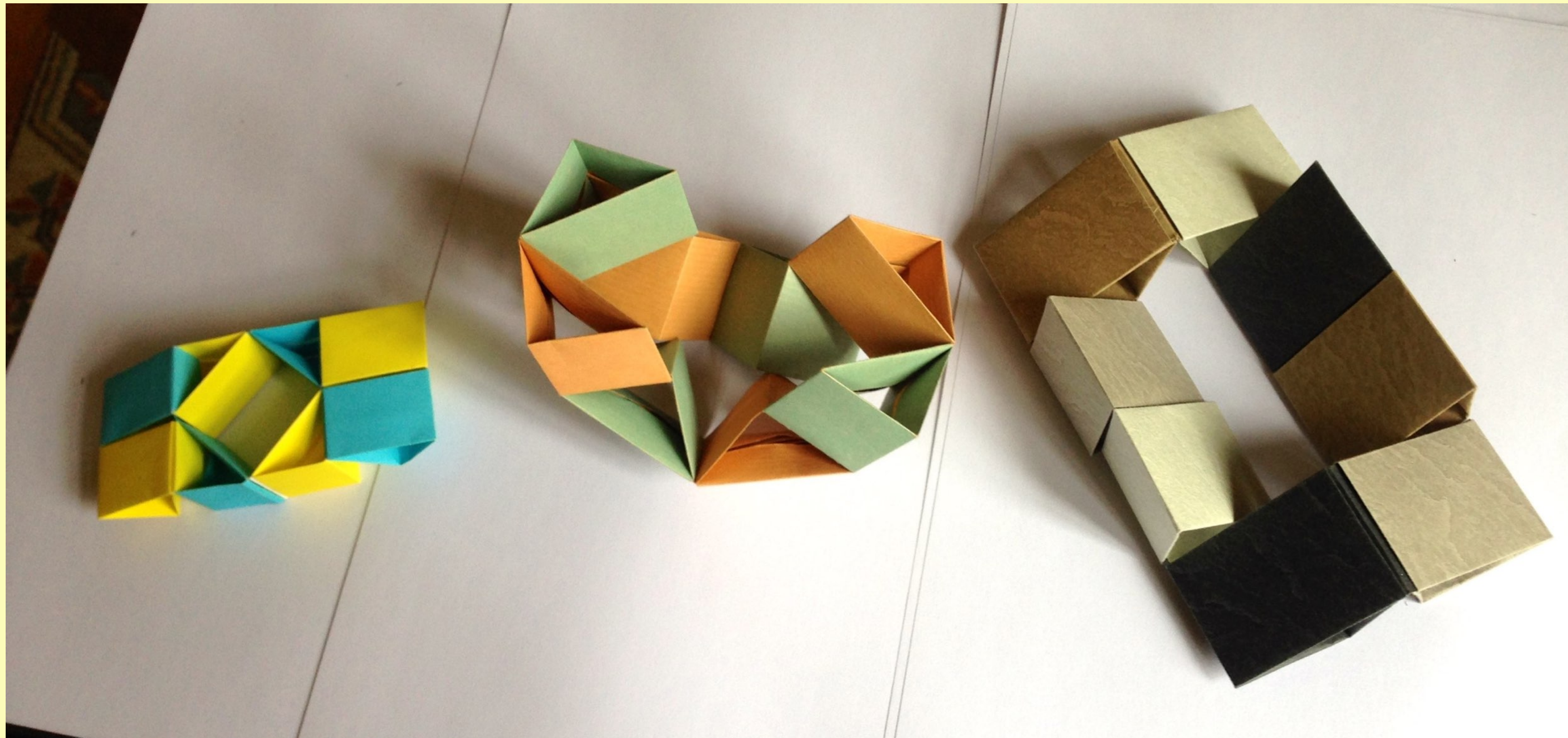
A hand is shown holding a green grid paper transformer against a wooden background. The transformer is a rectangular piece of paper with a grid pattern, divided into a 3x3 grid of squares. The text "Unbelievable Paper Transformer" is overlaid on the image in a white, sans-serif font.

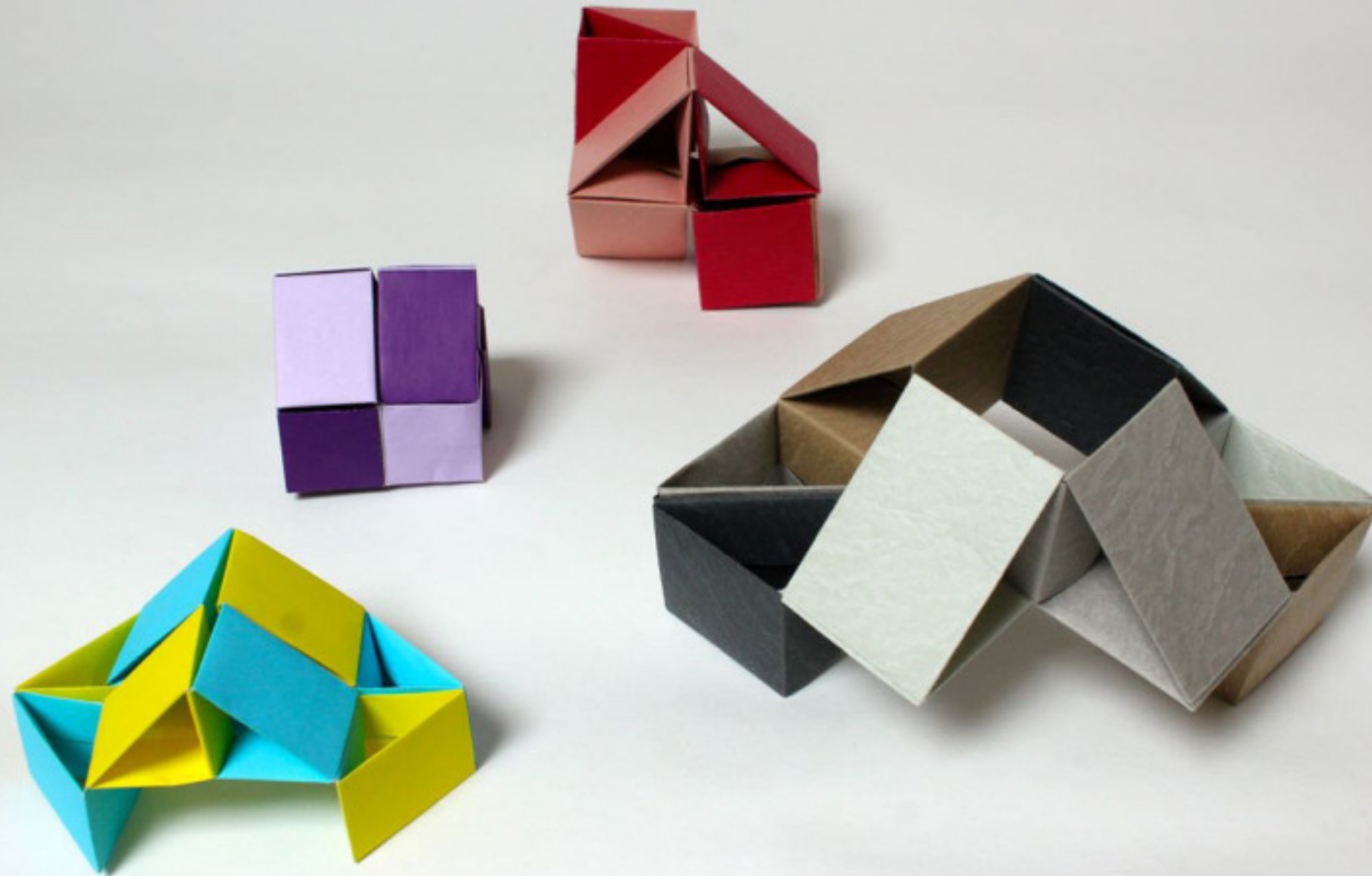
Unbelievable Paper Transformer



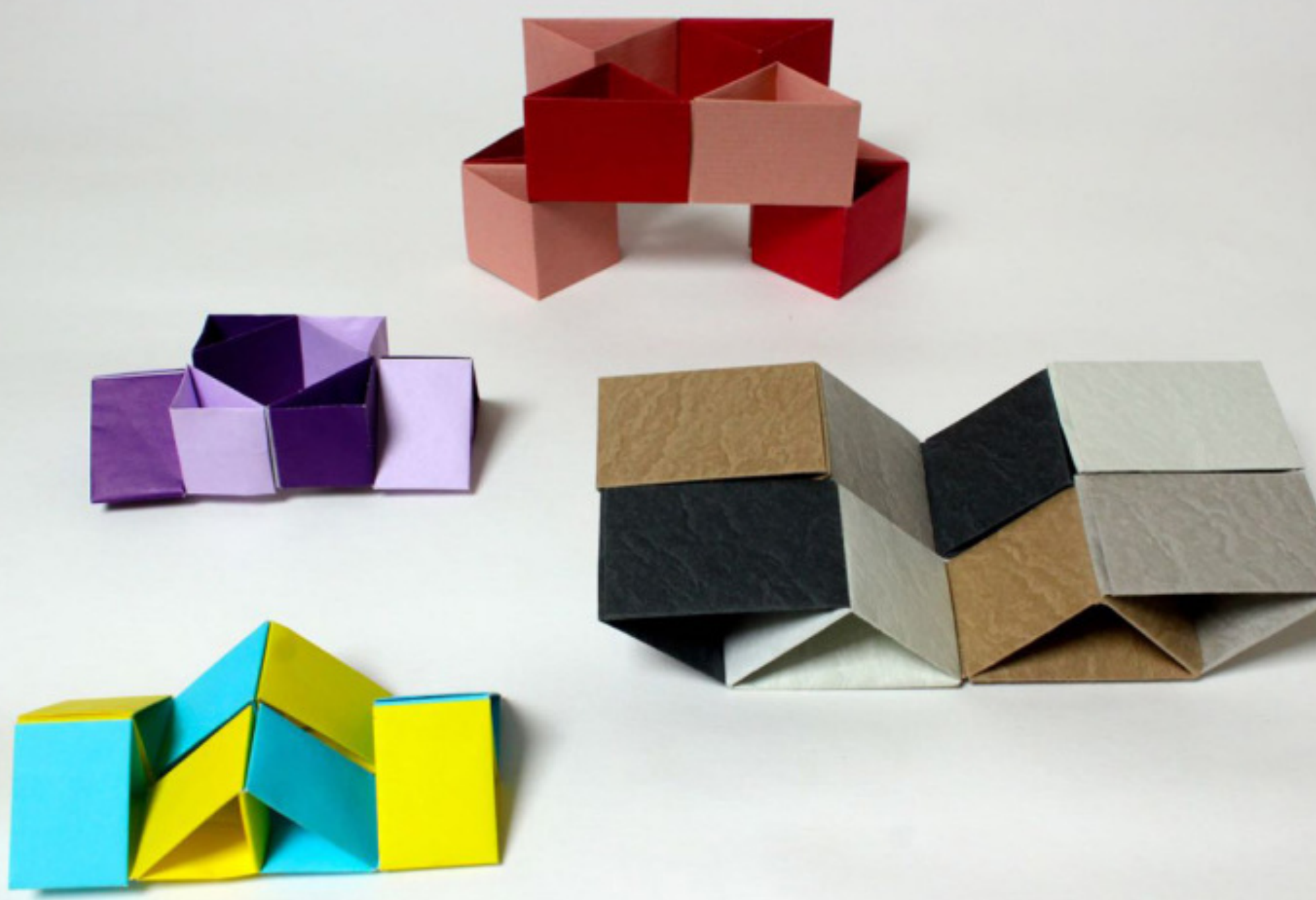
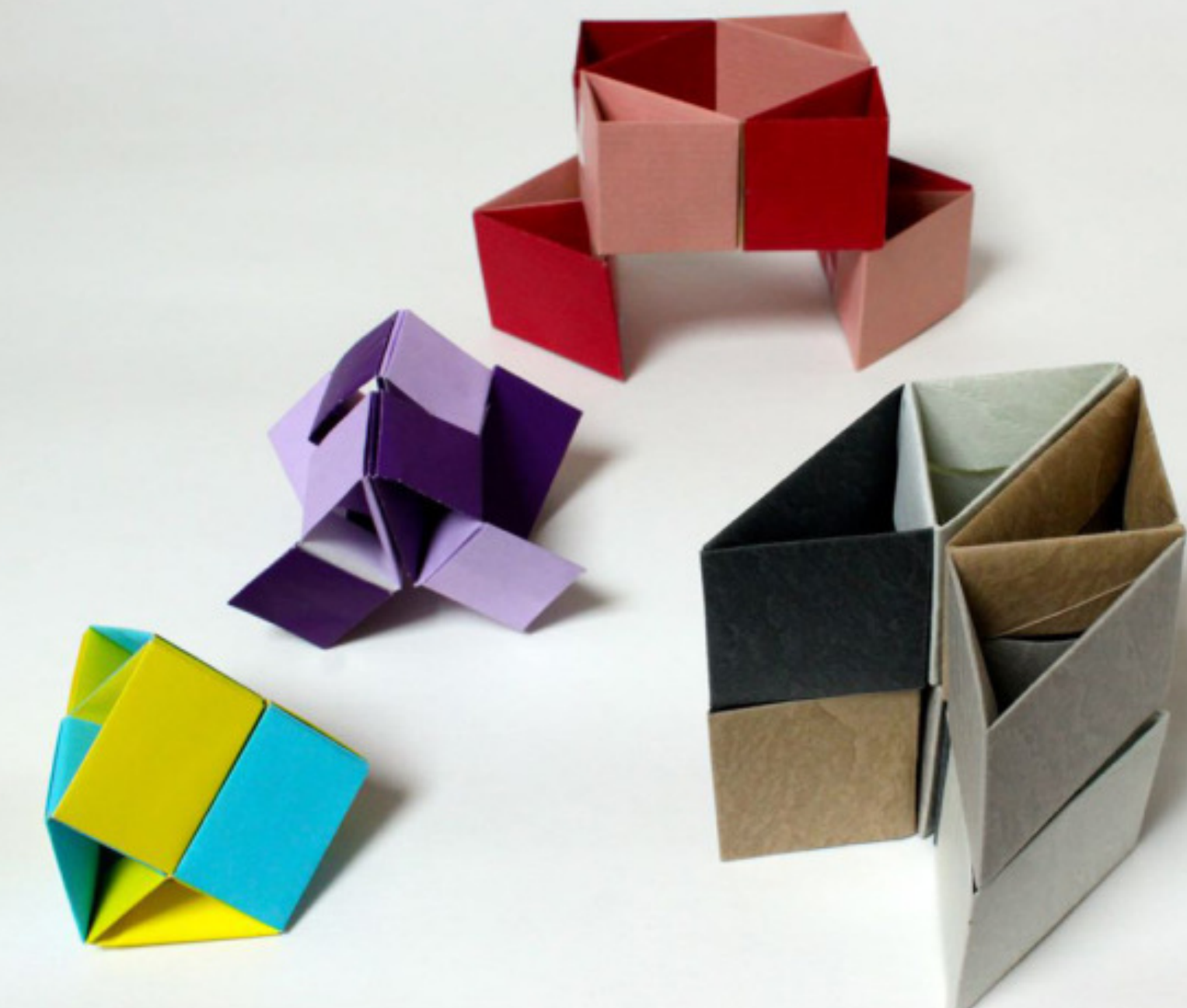
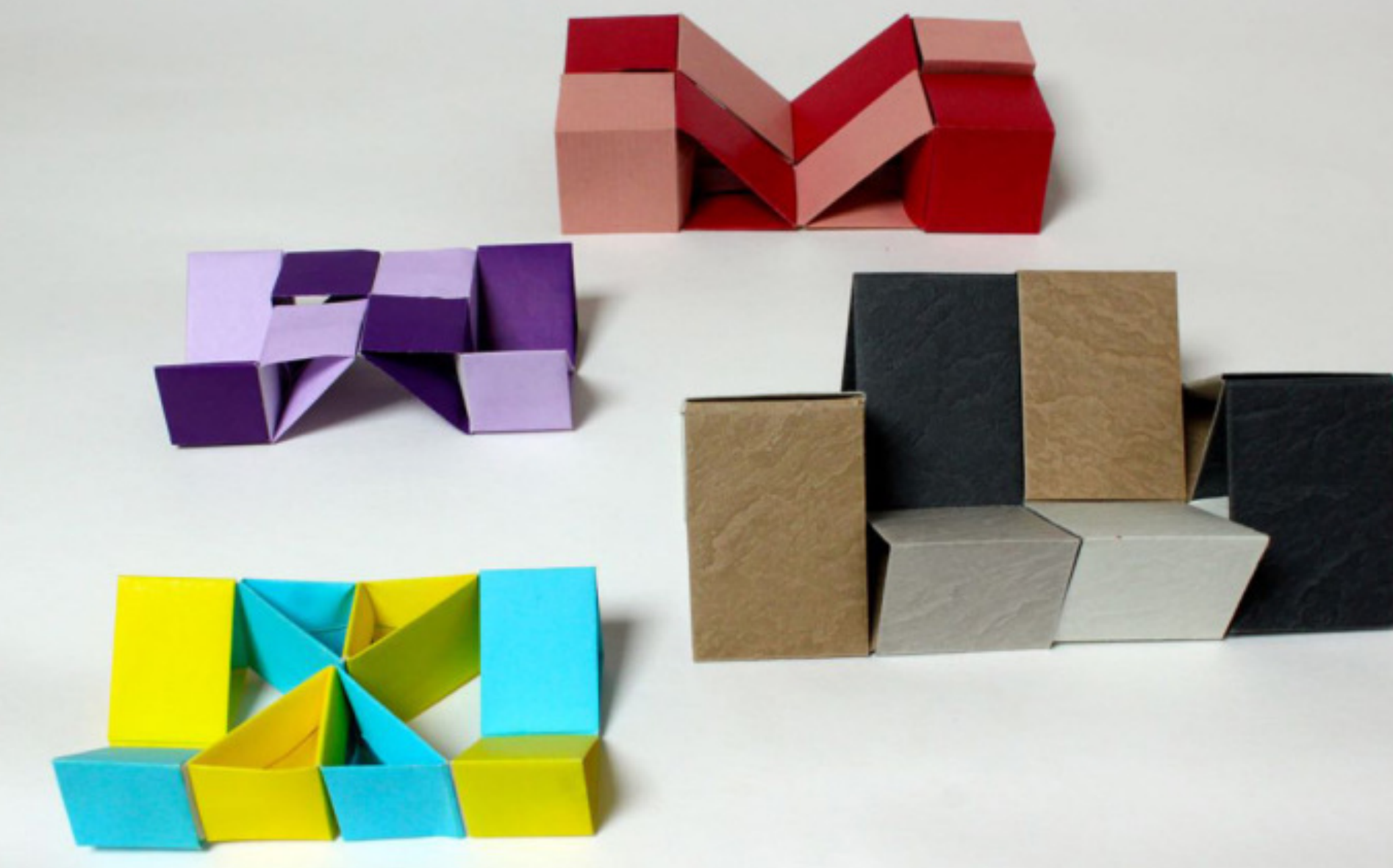
Triangle Flexicube possibilities

- ❖ Several relative orientations of units
- ❖ flexicube hinge positions should be maintained
- ❖ asymmetrical orientations possible



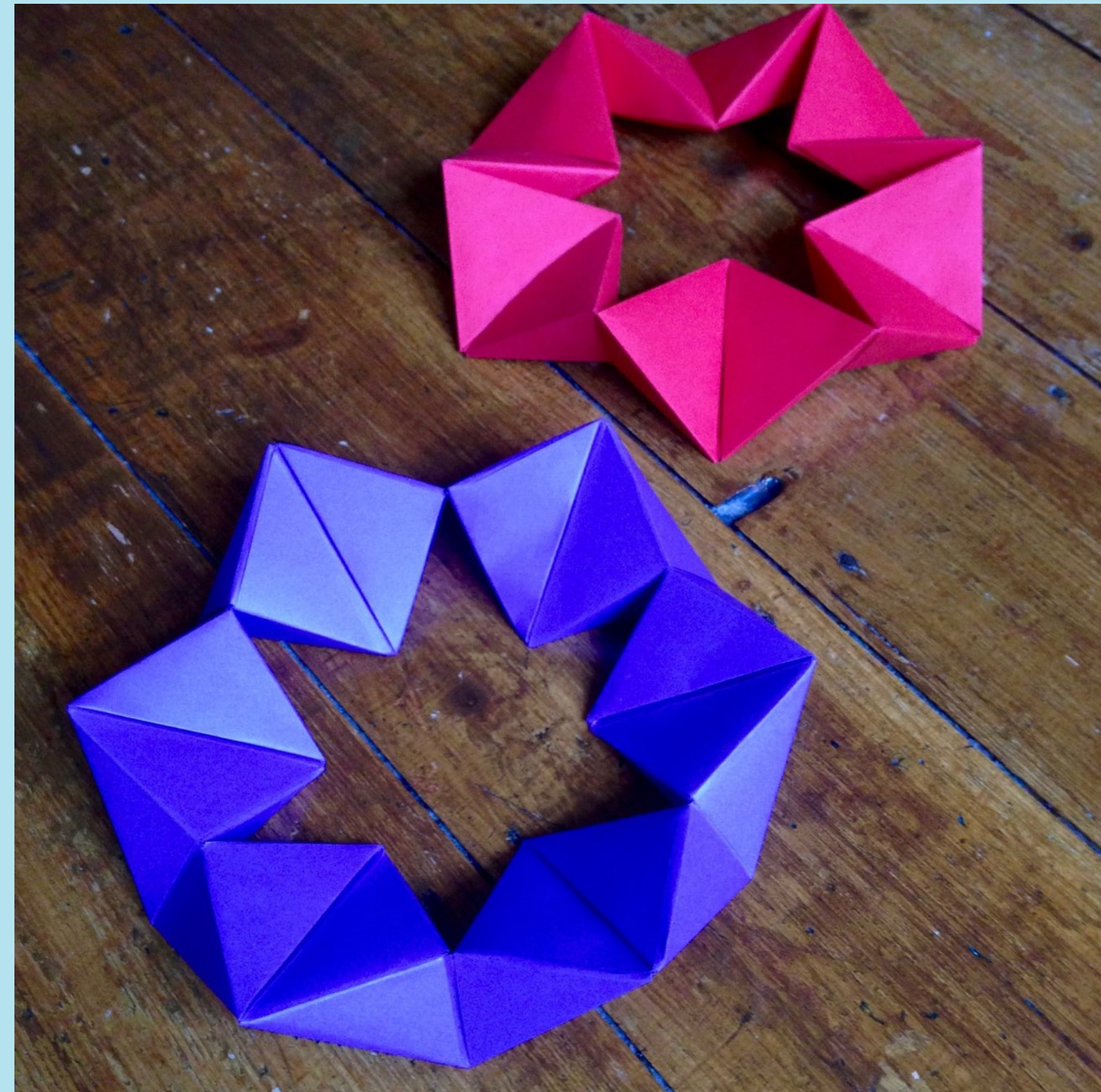


Triangle Flexicube Variations



Yoshimoto Cube 2

- ❖ First attempts
- ❖ half of A4 x 6



Yoshimoto Cube 3

by Hans Dybkjaer (Denmark)

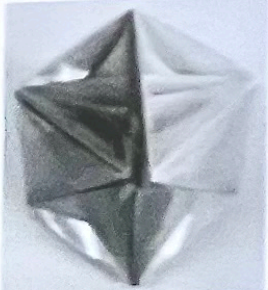
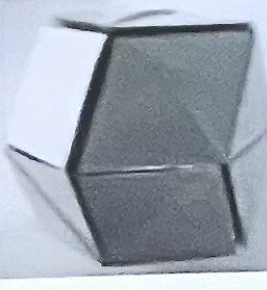
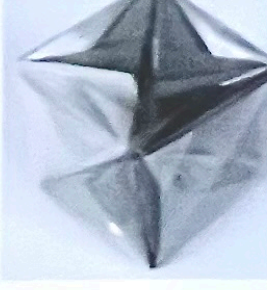
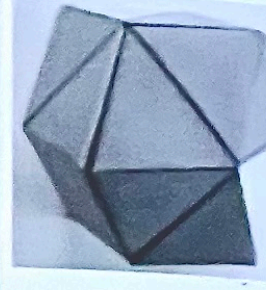

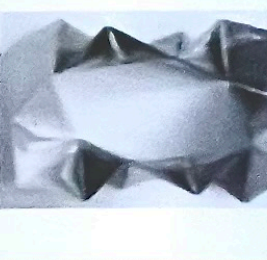
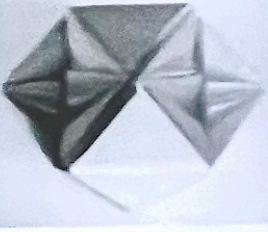


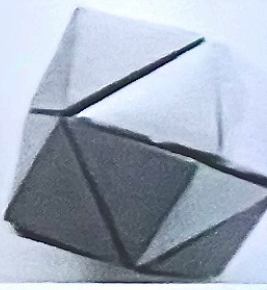
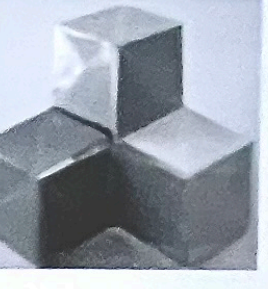
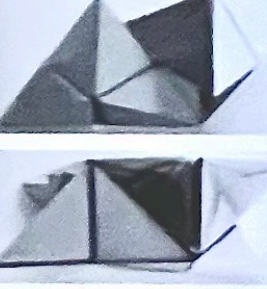
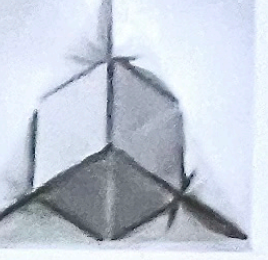
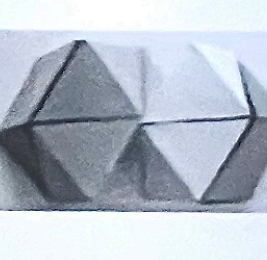
12 x A7 units plus connectors

A-cube, aka Yoshimoto cube no. 3

Origami design and diagram: Hans Dybkjær (hans@papirfoldning.dk)

Naoki Yoshimoto designed 3 cubes in the early seventies. David Brill has diagrammed cubes no. 1 and 2 as origami. Here is cube no. 3. The diagrams show the traditional, symmetric version. There is also an asymmetric version, actually two as it is rotationally symmetric. Can you find it? The table below shows some of the constellations of each.

The mathematical properties and proof that there is exactly 1 symmetric solution and two asymmetric is provided in Hans Dybkjær: Euler Tours and Origami Cycles, in *Symmetry: Culture and Science*, conference 2016, journal 2017.

Symmetric version		Asymmetric version	
			
	Chain, nice and hexagonal.		Chain, elongated rectangularish and with twisting sides.
	Folds into compact half dodecahedron ...		Folds into asymmetric half dodecahedron ...
	... two of which lie together to form one compact dodecahedron.		... two of which packs together in one compact dodecahedron.
	Illusion, not tiling as the visible corners are not 90 degrees.		Another twisted form. Packs into long columns of cubes.
	Forms beautiful, symmetric shapes.		Forms beautiful, twisted shapes.

What next|?

- ❖ Yoshimoto Cube 2 now done
- ❖ Yoshimoto Cube 3 now done
- ❖be inspired!



Postscript: Yoshimoto Cube Great No 1



Post-Postscript (14 May 2026) Beth's Brillik Cube discovery

