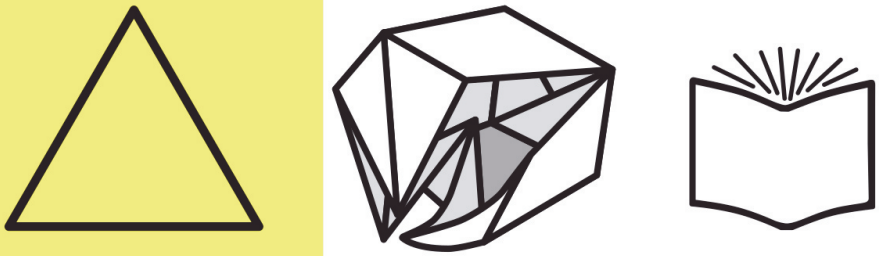
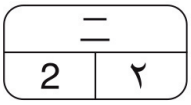
三角折り紙の本



Triangle Origami Book

William Zicker

Sometimes inefficiency in a part of a system makes the whole system more effective.



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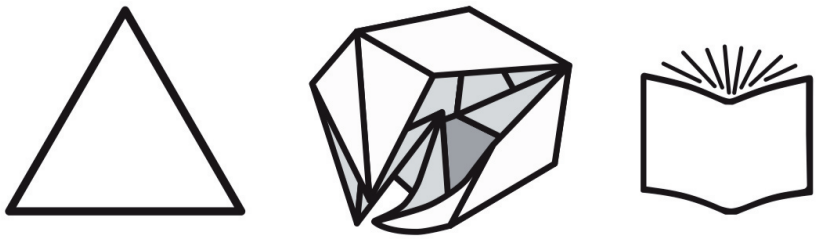

Triangle Origami Book

folding paper in creative and useful ways
inspired by triangles

with Diagrams and Commentary including several
Original Designs
by William Zicker

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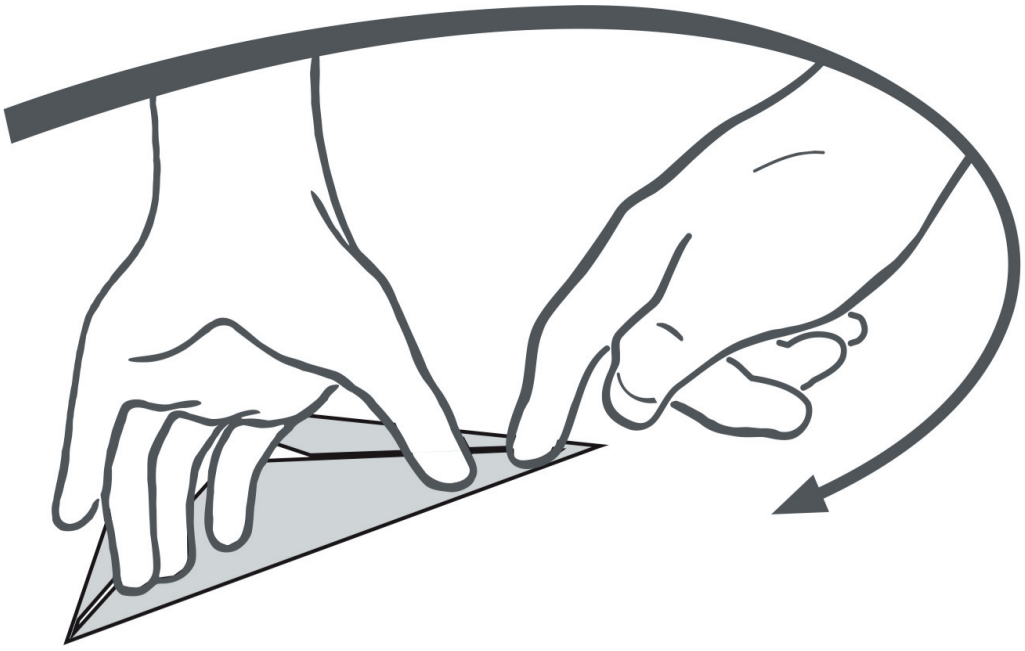
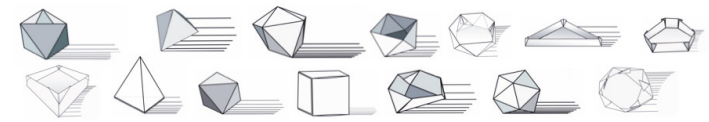
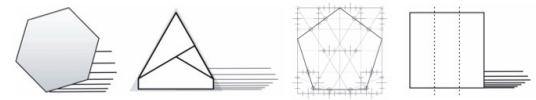
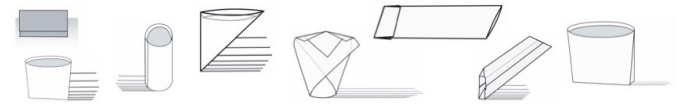
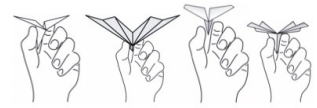






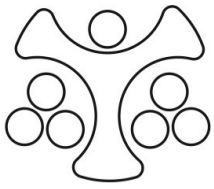




Exodus
"he that gathered much had nothing over, and he that gathered little had no lack"

Proverbs
"Labour not to be rich:
cease from thine own wisdom"

Luke
"But rather seek ye the kingdom of God; and all these things shall be added unto you."



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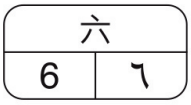


Introduction

Twisting a shape in three dimensions from a two dimensional sheet of paper seemed easy enough. The more you fold and unfold the paper the more pliant it becomes, more like fabric. This makes it easier to shape. However, it becomes less repeatable, less measured.

Took a few hours, but the twisting of paper fabric resulted in an interesting little pyramid. It seemed like there was some pattern to the way the paper wrapped in on itself. After an additional few hours a successful reverse engineering revealed a complete set of folds in a symmetrical and repeatable pattern.

While it would be reasonable to assume this took place during the initial lockdowns during the COVID-19 crisis, in fact it began three years earlier.

In 2017, I was over four years into development of a new material, a stable suspension of starch and water.

Origami presented a possible way to fold biodegradable paper packaging. An interesting little pyramid turned into an

original origami design.

Initially I thought photographs or my own style of diagram would be sufficient. Upon seeking to share the design with the origami community at large, it was made clear to me the importance of diagrams using a shared standard set of symbols, in at least a generally recognizable format.

Origami diagramming also presented complexities. The process of folding a design is one thing. Clear presentation of those steps in a visual manner requires designing two dimensional drawings of three dimensional forms, not necessarily photorealistic or accurately scaled. Instead, and I am only a novice with no formal training, it seems the objective is to communicate the actions and transformations taking place.

Learning about the standard Yoshizawa–Randlett system of diagramming allowed me to directly craft the visual presentation, making nuanced and subjective design decisions.

The designs presented share a common

thread, the triangle. Some are obviously based on a single equilateral triangle, while others are inspired by or incorporate some aspect of the process of folding a triangular form.

While we're on the topic of two dimensional geometric shapes, hexagons are going to be the next big thing - they'll be in all the stores in a few years. Actually I was saying that a few years back, and it seems now to be true. In 2017 hexagons were not easy to find in arts and crafts stores. This interesting shape, built of triangles, presented a fun opportunity for original designs.

As they were uncommon in things one could buy, I took on the challenge to develop origami designs incorporating hexagons.

Mathematics is the direct path to determine the largest equilateral hexagon that can be drawn inside a square. Working through a process of guessing and folding, unfolding and tweaking, a pattern gradually emerged. My trial and error folding had arrived at the same conclusion as basic geometry. Of course, the geometry didn't show the path from folding the paper in half, and certain of

the halves in half again, and the hidden symmetry of my Maximal Hexagon from Square design.

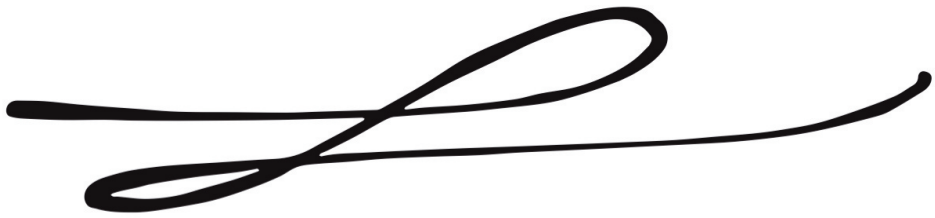
Shuzo Fujimoto of Japan (1922-2015) engineered many original designs including a direct alternative to the present original design. Where his design calculated an angled crease to begin defining the edges of the hexagon, I stumbled upon a combination of perpendicular and parallel folds halfway between previously defined points. Folding things in half and in half again seems an elegant and accurate method for defining where folds should be made. Perhaps others will find this slightly different approach interesting.

Even pentagons can be defined as intersections of X and Y at intervals of halves. Talk about not obvious, this one barely made any sense at all. Sometimes it's easier to create new things without the tools and methods that arrived at old things. Geometry arrived at old ways of folding an equilateral pentagon from a square. Building on my strengths, I took the path that avoided math and instead searched blindly for some pattern in half and half

again grid lines. Took some time, and required some concentration to remember why seemingly arbitrary intersections in the grid were circled. Running through the sketches a few times eventually saw the diagram begin to make sense.

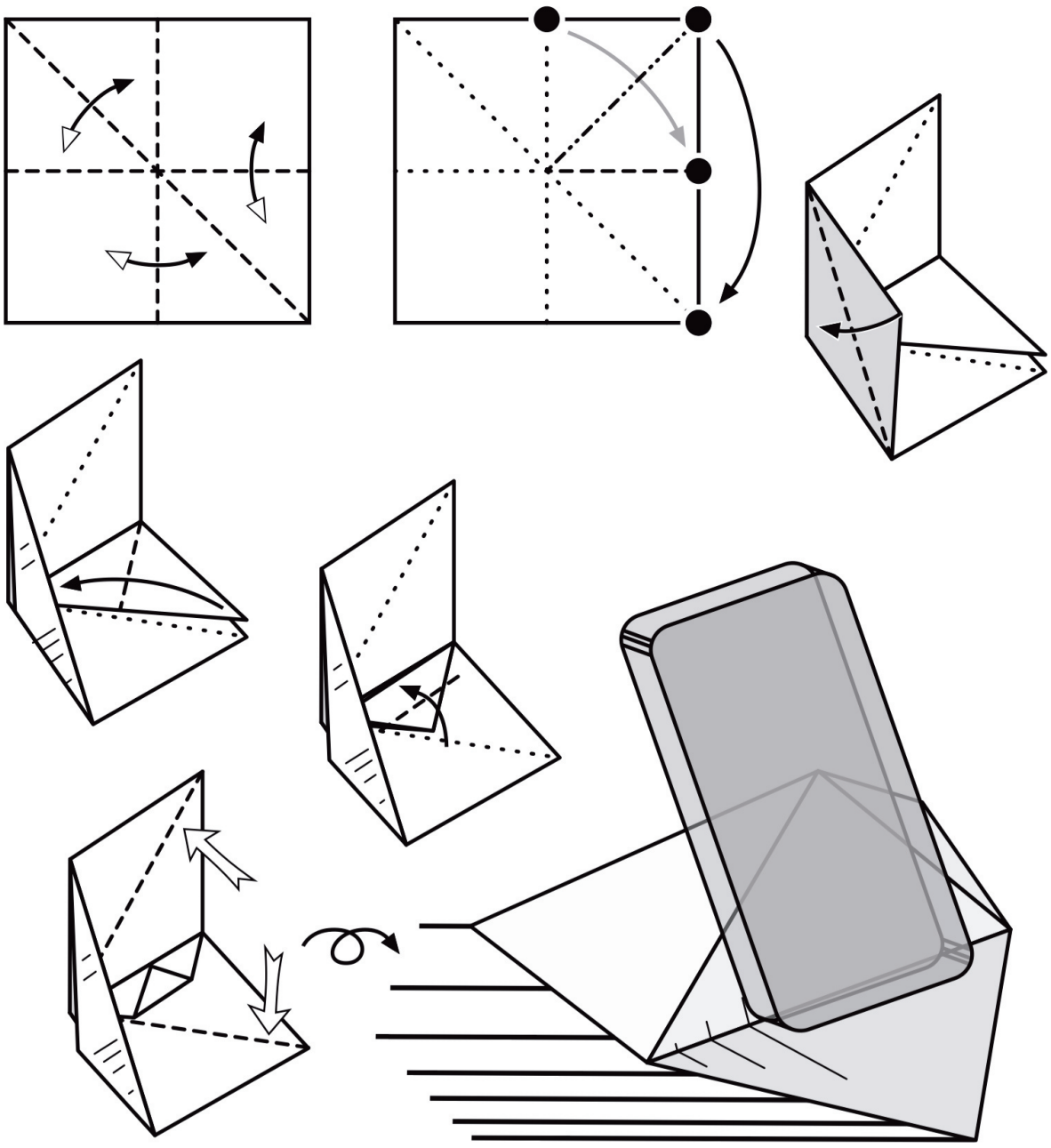
While other ways may get similar results, the Pentagon with Error Correction builds an accurate regular pentagon that starts with folding a square of paper in half, with subsequent steps equally straightforward.

I'm starting to see patterns in all this geometry.



Je n'ai fait celle-ci plus longue que parce que je n'ai pas eu le loisir de la faire plus courte.
Blaise Pascal
Provincial Letters: Letter XVI, 4 December, 1656.
I only made this one longer because I didn't have the time to make it shorter.

37 | Fast Phone Stand from Square



In this original origami design, I accomplish the goal of my previous phone stand designs using a square instead of a rectangle, and fewer folds.

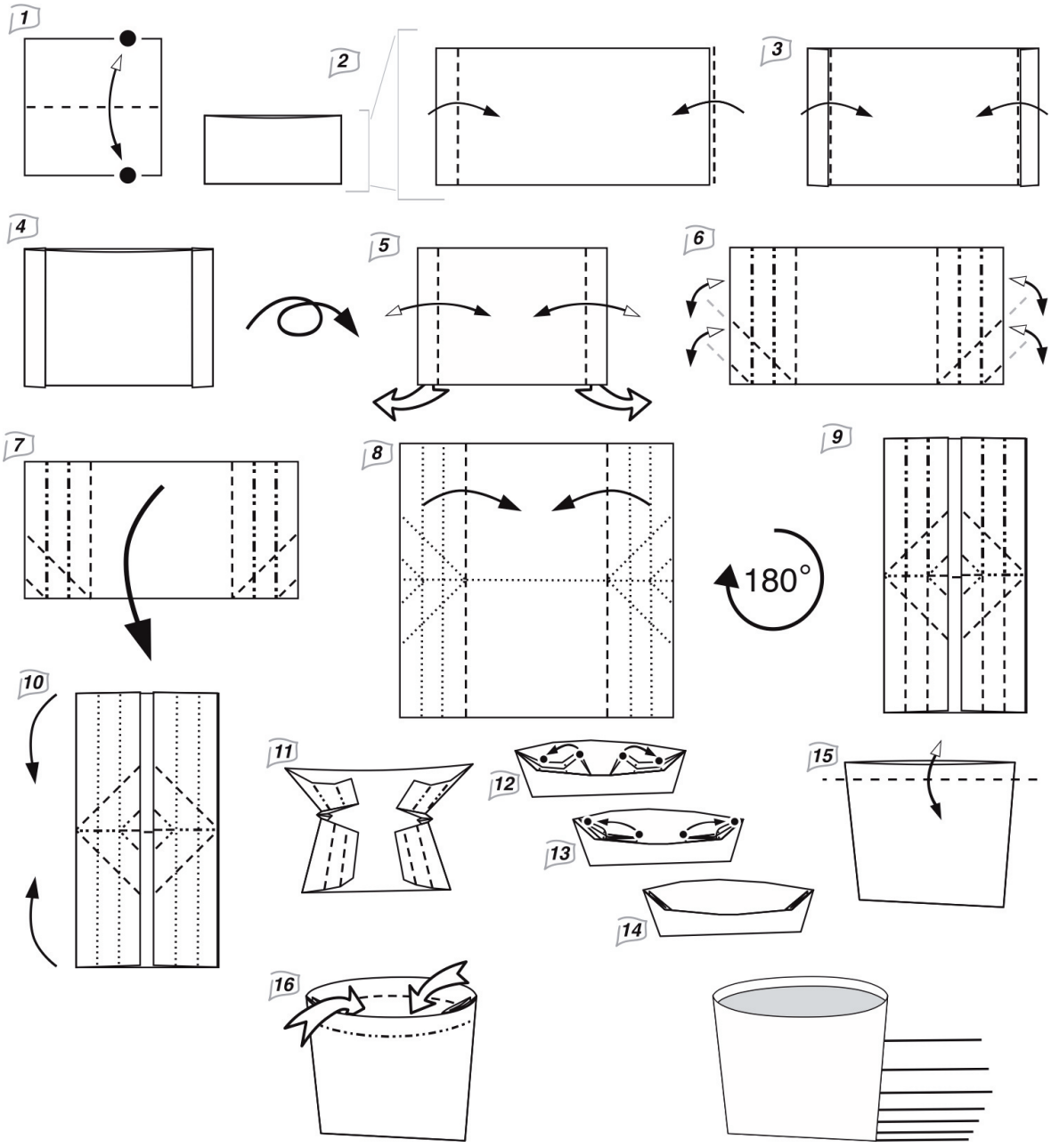
Here is efficiency of time and materials, elegance of form and function.

In the third figure, the pleat is shown folded, and the adjacent panel is folded to make the tab on which the bottom of the phone will rest.

The last set of figures shows the pleat folded onto itself to keep it from unfolding.

While this has a large footprint and other imperfections, the design is highly optimized for speed of assembly and is effective for supporting any phone.

27 | Inside Out Envelope



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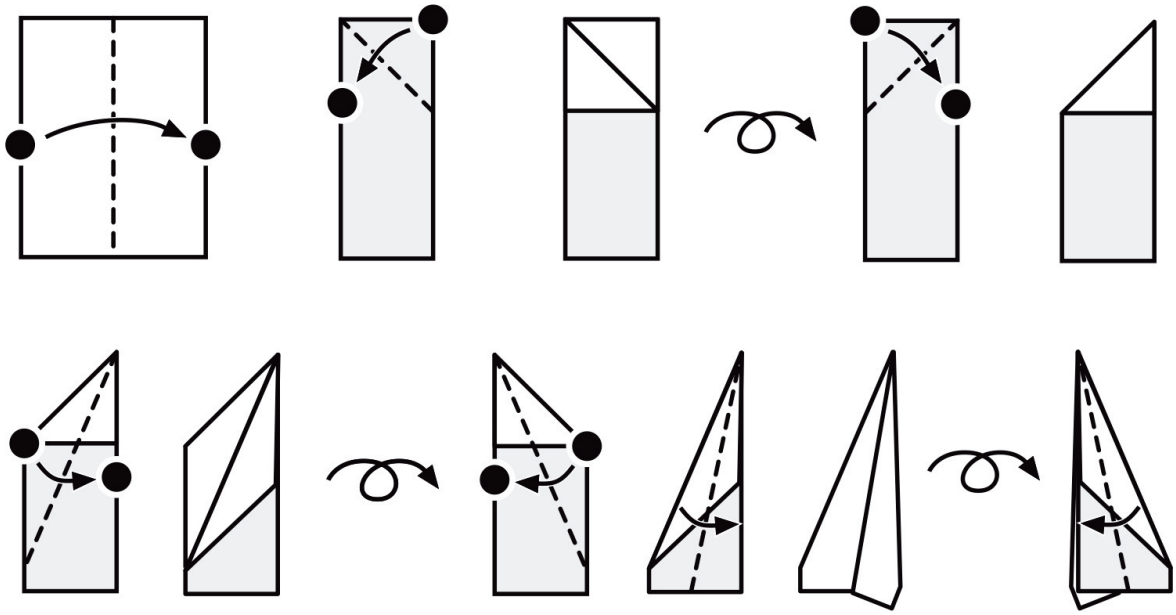
Issue 82, May–June 2024

Folds, and in particular interlocking folds, are required to create a three dimensional object from a substantially two dimensional piece of paper.

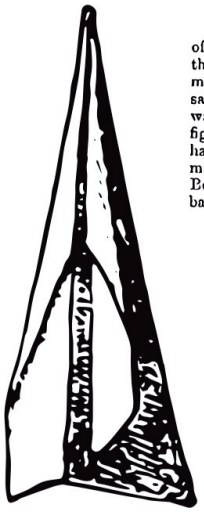
The object of this design was to turn an otherwise simple design for a bag or envelope inside out. All of the functional folds are put inside the envelope, keeping the faces of the envelope clean.

There are many variations possible on the theme presented in this diagram.

43 | Traditional Paper Dart



THE PAPER DART.



To form this dart you must take an oblong piece of paper, and fold it down the middle lengthwise; then double each of the lower corners up to the middle crease, and fold the doubled paper over to the same mark; you must now turn each folded side outwards, and your dart will resemble the annexed figure. The paper dart when thrown from the hand rarely hits the object aimed at, as it generally makes a graceful curve in passing through the air. Boys sometimes amuse themselves by fighting sham battles with these harmless weapons.

1859.

A traditional design, this is the paper airplane my grandmother taught me, my introduction to paper folding.

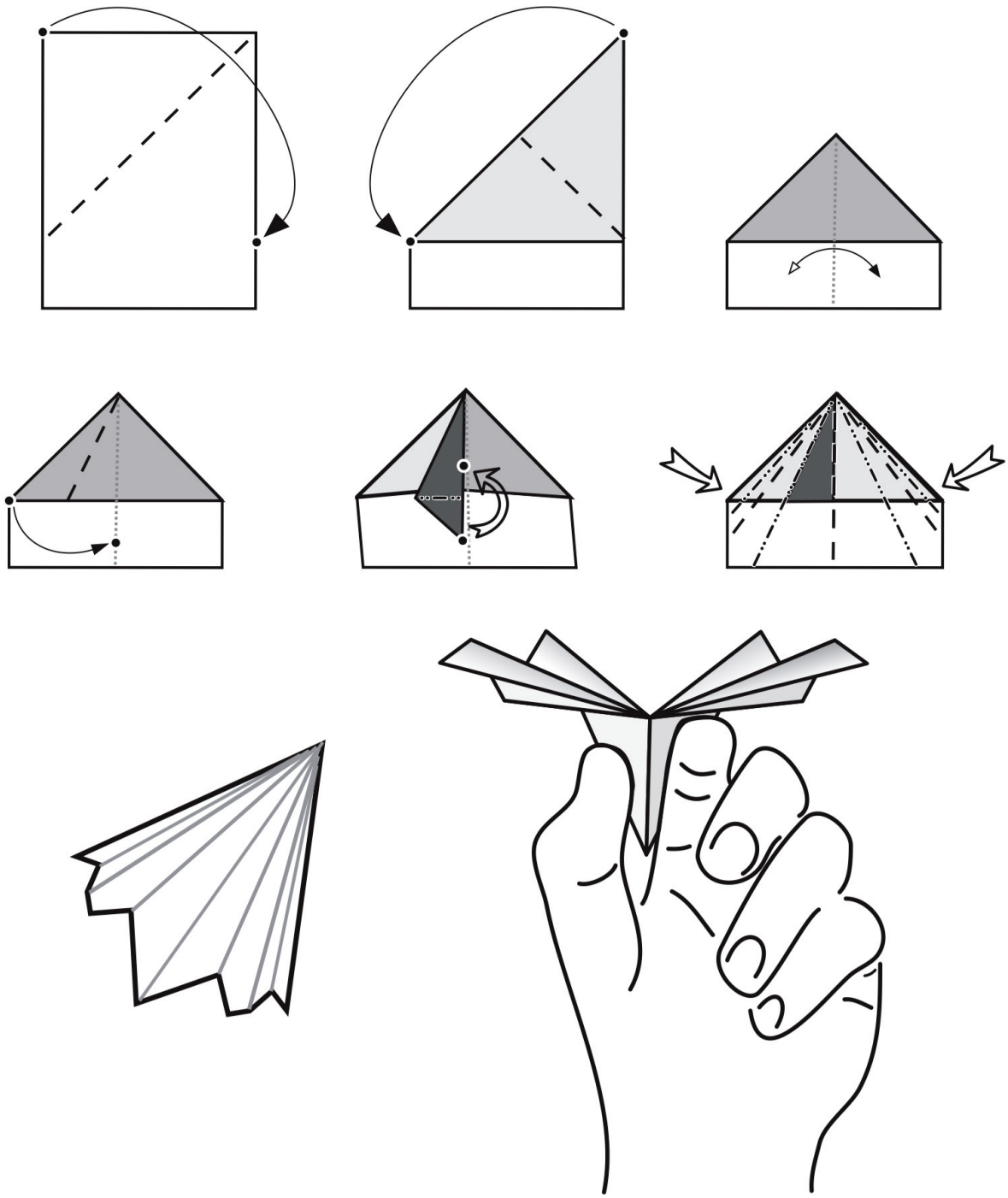
The first known illustration and description of how to make this appears to be in the book "Games and Sports for Young Boys," published 1859 in London by Routledge, Warne, and Routledge.

This basic design was understood by readers to be a projectile, that would be thrown at targets.

It was some time before this dart became a paper airplane.

George Cayley (1773-1857) is noted to have first described the fundamentals of modern aircraft design in 1799, and built a glider that carried a person in 1849. With all of the pioneering work being done around this time in the area of aviation research and development, it is fitting that a toy like this would become popular.

13 | Paper Airplane from Rectangle



Published:
Pacific Coast OrigamiUSA
Conference 2023
Page 11

Sitting at the dining room table with my grandmother, in the hangar working on the next paper airplane, we would always have staples in the Swingline Tot 50 and there was always a roll of 3M Scotch magic tape.

When I was home or at school, I did not have this reliable resource. This was at least in part my motivation - design a paper airplane that requires no fasteners or tape, and can be folded using standard Letter or A4 size paper, or any paper with roughly 4:3 proportions.

In 2009, I published my first book, Fluffy the Vulture (ISBN 9780615266879). First in a series of three children's books, eight languages are presented in parallel. This paper airplane was shared as a promotional item for the books. The "V" shape of this design mimics the wings of Fluffy the Vulture.

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"Approximately 95% of the ⟦estimated 597,000⟧ deaths ⟦from malaria worldwide in 2023⟧ occurred in the WHO African Region, where many at risk still lack access to the services they need to prevent, detect and treat the disease." United Nations, World Health Organization, World malaria report 2024

"⟦Appropriate technology is⟧ small scale, energy efficient, environmentally sound, labor intensive, and controlled by the local community ⟦and⟧ must be simple enough to be maintained by the people using it." Field Guide to Appropriate Technology, Academic Press, 2003

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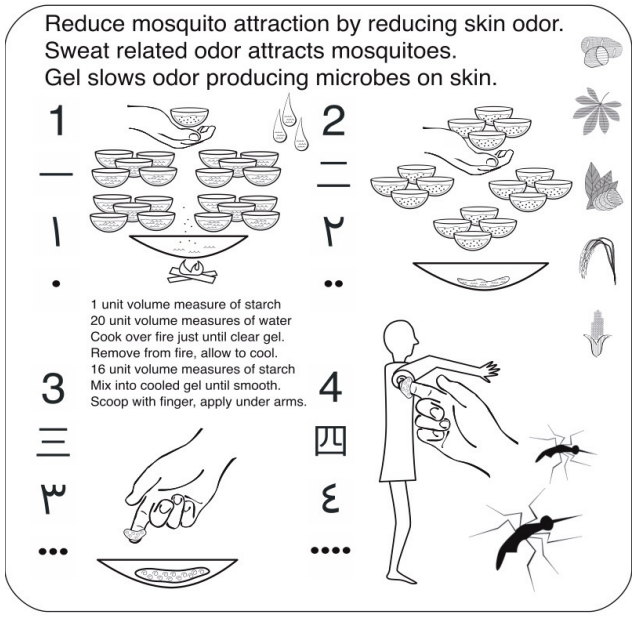

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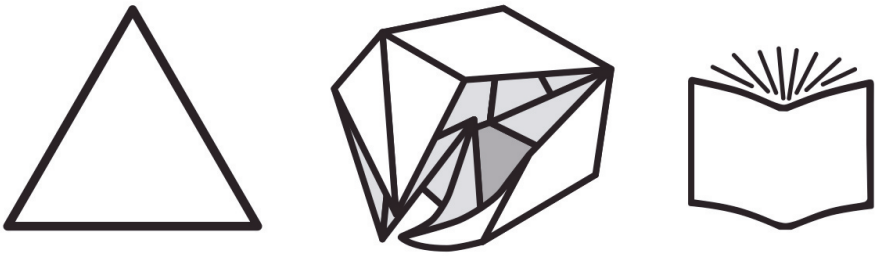
Paper Folding with Triangles



Stories, insights and helpful hints are presented alongside original designs and diagrams.
Enjoy the fruit of decades of iterative design inspired by triangles.
Unforgiving reams of crumpled paper now long recycled helped build the simple yet useful designs herein opened.
Three arrows and three lines allow the reader to understand as the author walks along the gently folding path of these useful paper objects.
Packages, planes, phone stands and decor.

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