

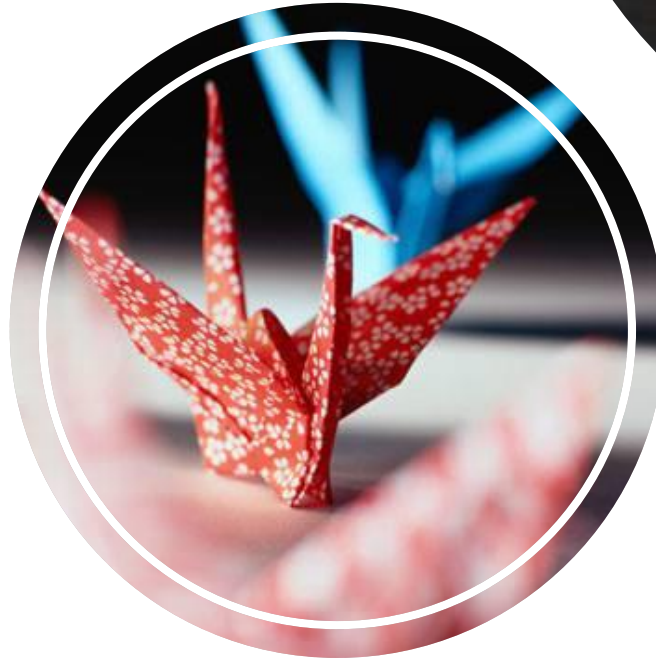
WHEN MATH DATES WITH ORIGAMI

The connection between mathematics and paper folding



WHAT IS ORIGAMI

- One sheet
- No cuts
- Folding only (no curve creases)





, Opus 363," by Robert J. Lang © R



HISTORY OF ORIGAMI

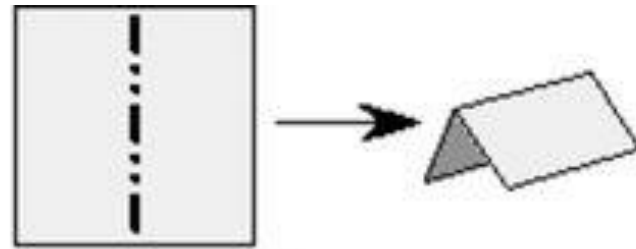
Japanese words “oru-kami”

Akira Yoshizawa – created a common language of modern origami (1954)

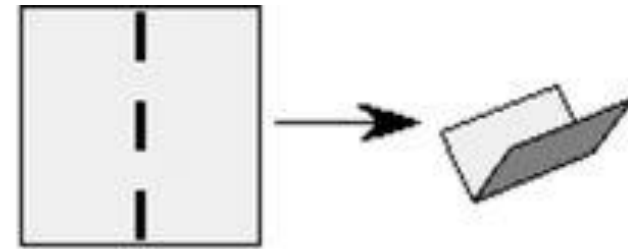
Jun Maekawa – started the 1st wave of origami revolution by using very conscious design decisions instead of random “inventions” (1986)

Satoshi Kamiya – started the 2nd wave of origami revolution by implementing crease patterning into origami, known as origami tessellation (2000)

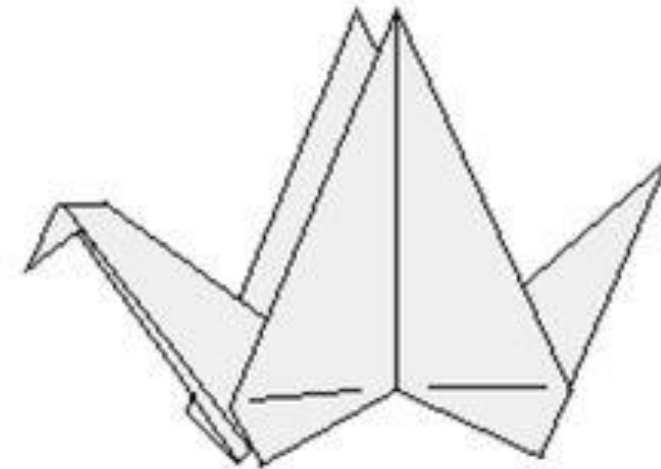
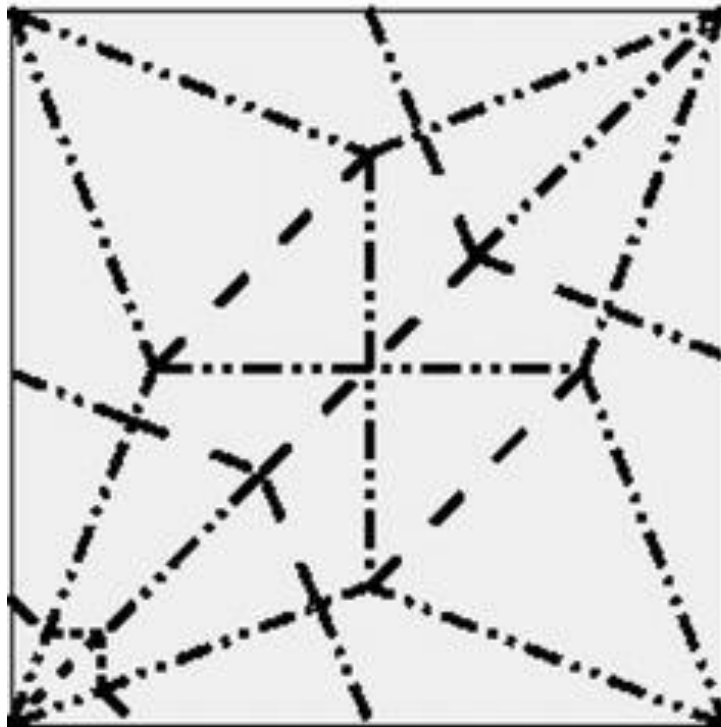


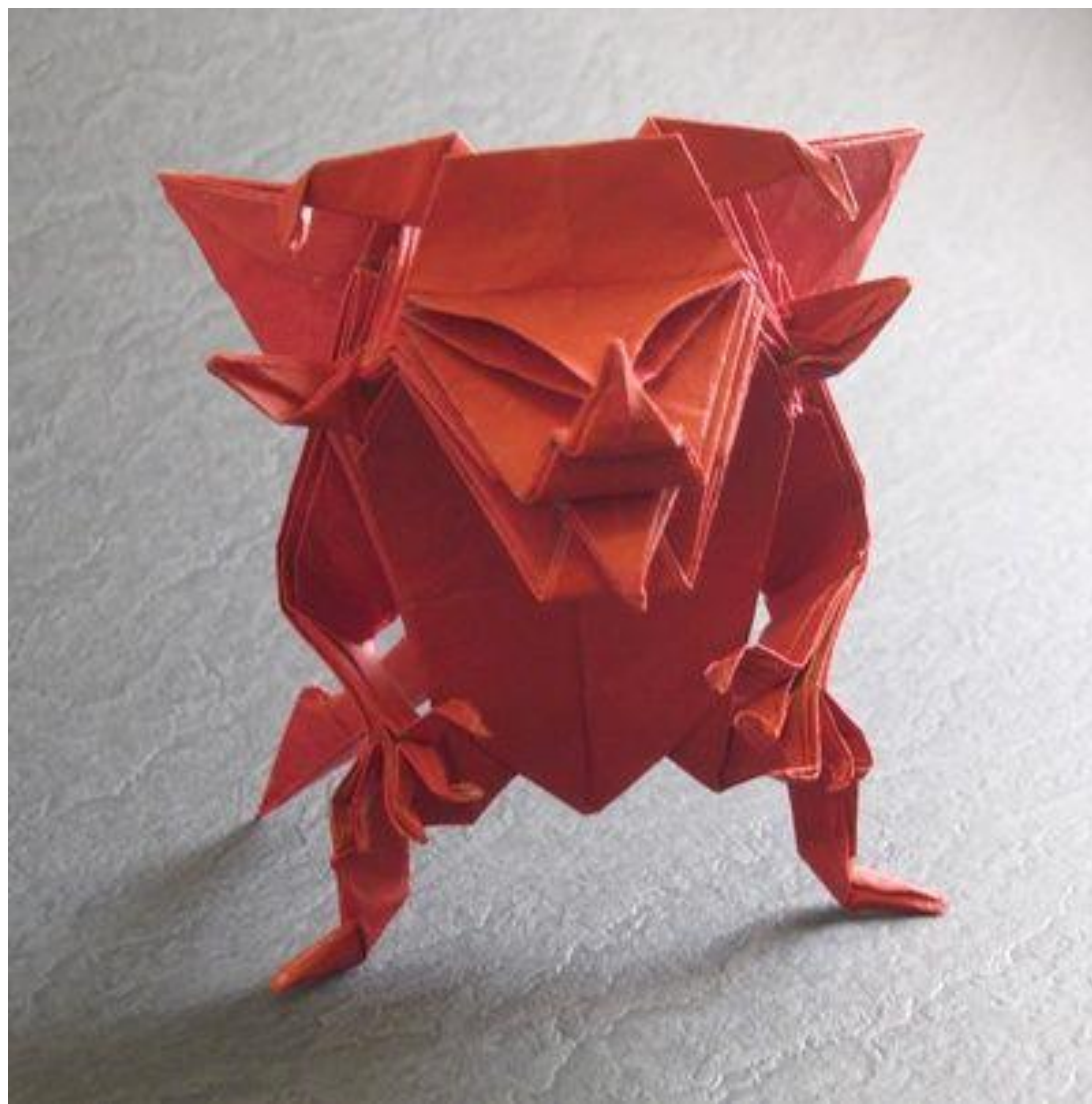


mountain crease



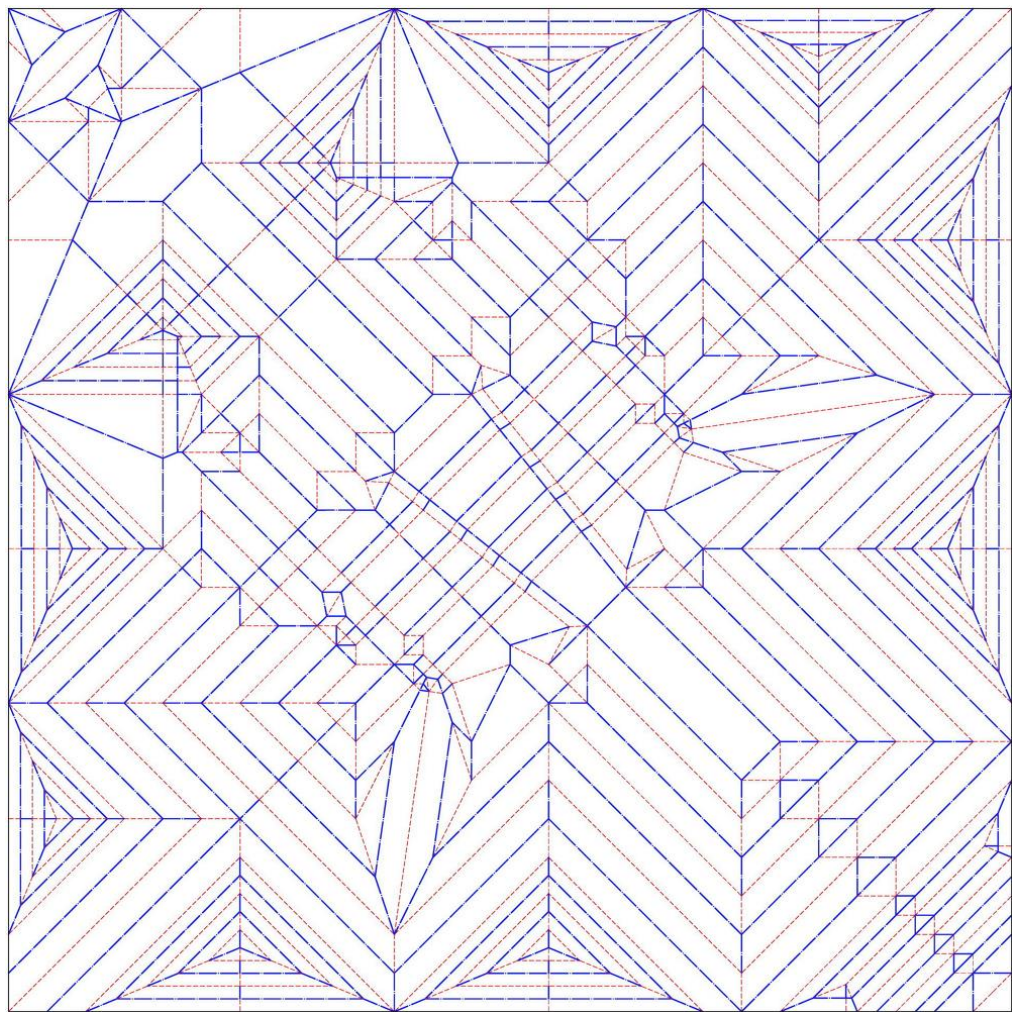
valley crease





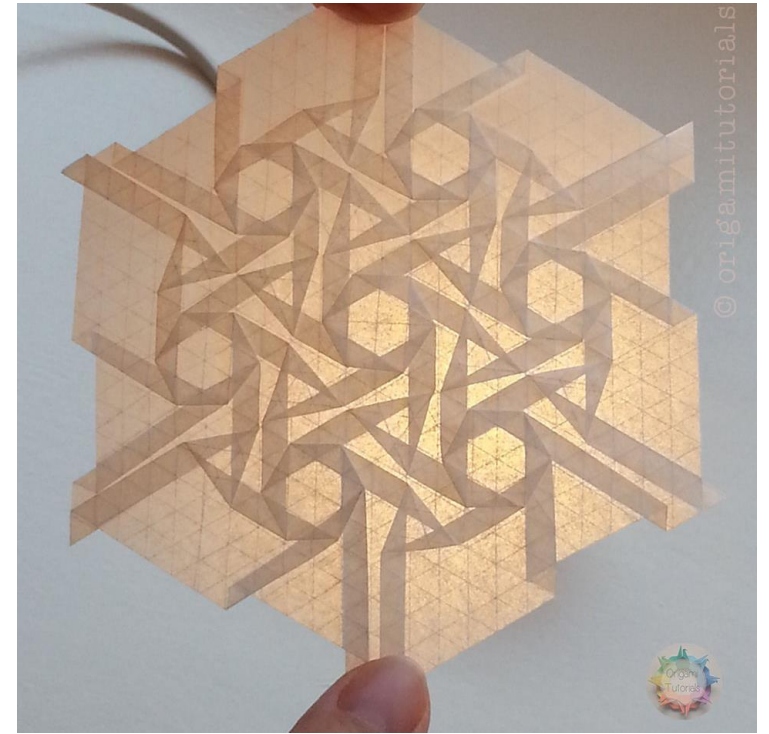
Demon, by Jun Maekawa





Wasp, by Satoshi Kamiya





ORIGAMI TESSELLATIONS





MODERN APPROACH TO ORIGAMI

BASIC RULES OF ORIGAMI DESIGNS

- Two-colorability
- (Maekawa's Theorem) The number of mountain and valley folds at each vertex
- (Kawasaki's Theorem) The angle sums
- A sheet can never penetrate a fold



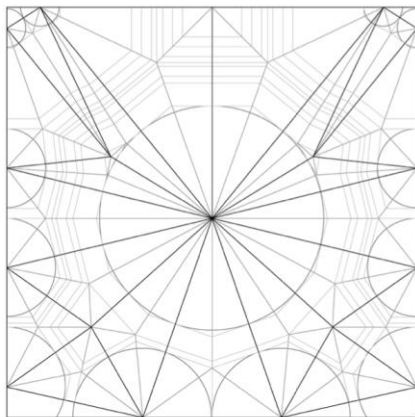
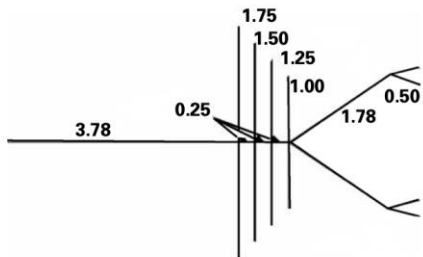
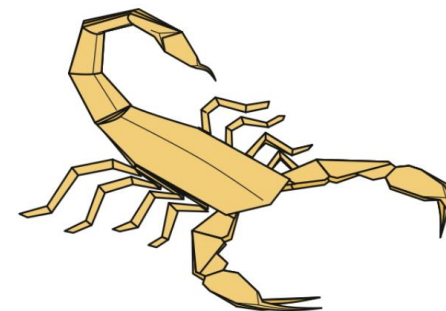
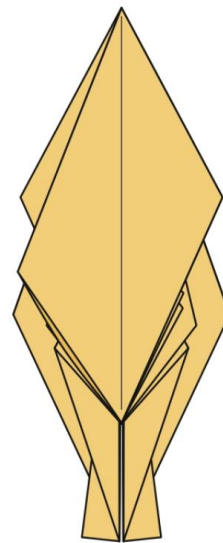
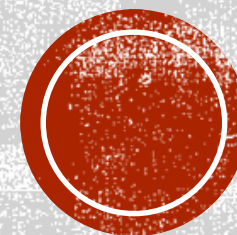


Figure 1. TreeMaker sequence. Starting from a user-provided stick figure (above left), Robert Lang's TreeMaker algorithm produces an "optimal" crease pattern (above) for folding into a complex model (left)—in this case a scorpion.



COMPUTER'S ROLE IN ORIGAMI



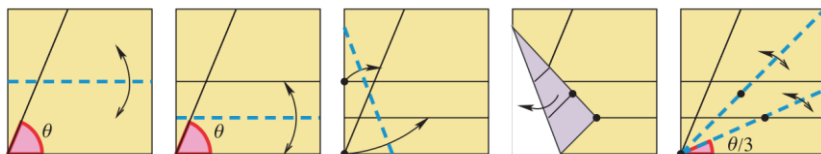
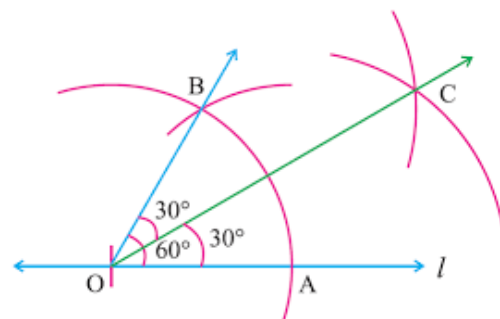
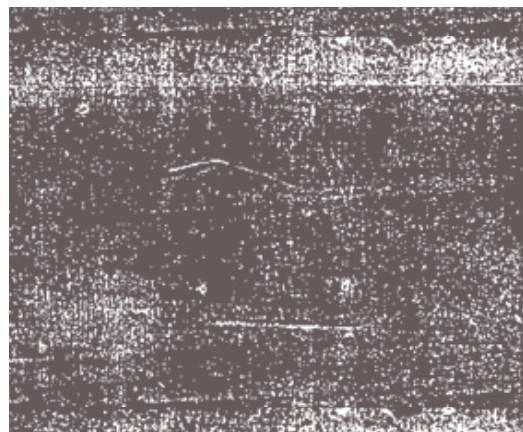
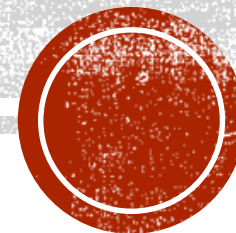
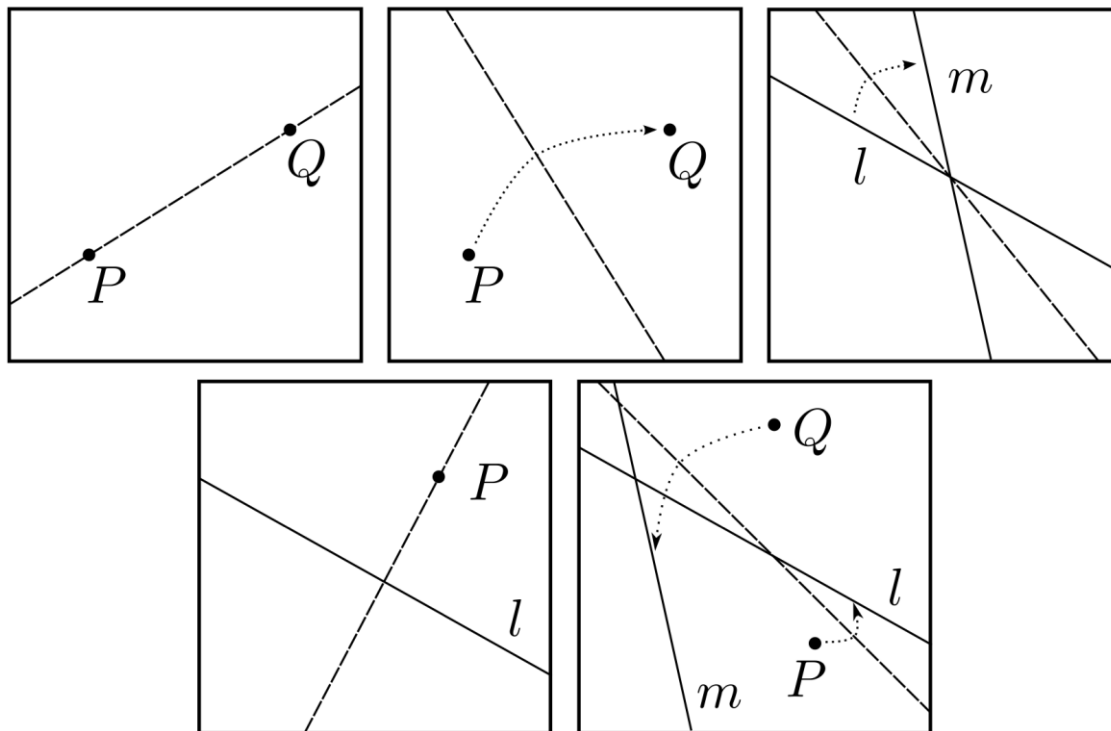


Figure 19.1. Abe's method for trisecting an acute angle using origami.



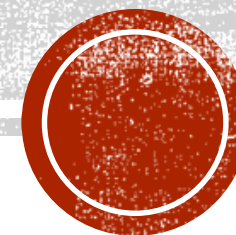
ORIGAMI VS. STRAIGHTEDGE & COMPASS





THE FIVE BASIC ORIGAMI MOVES

AXIOMS OF ORIGAMI



QUESTIONS / DISCUSSIONS
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