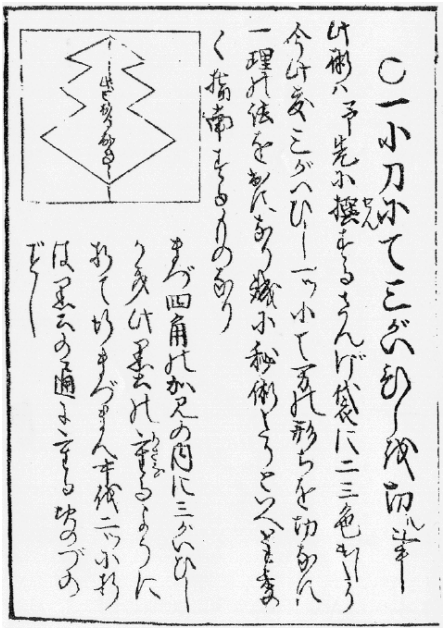
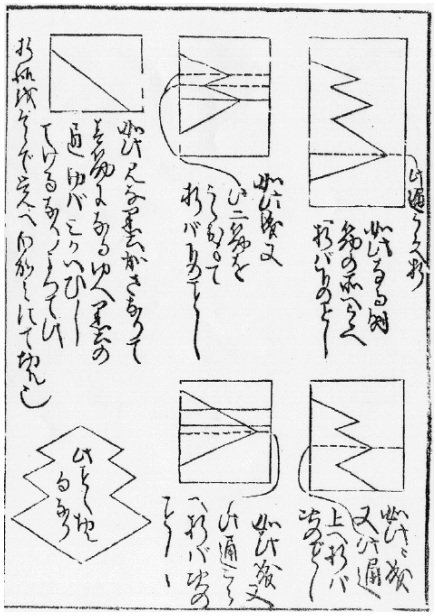
Fold & Cut Theorem – Cut any shape from only one cut

History of Fold & Cut

Kan Chu Sen's Wakoku Chiyekurabe

The first published reference to folding and cutting of which we are aware is a Japanese book, *Wakoku Chiyekurabe* (Mathematical Contests), by Kan Chu Sen, published in 1721. This book contains a variety of problems for testing mathematical intelligence. One of the problems asks to fold a rectangular piece of paper flat and make one complete straight cut, so as to make a typical Japanese crest called sangaibisi, which translates to ``three folded rhombics.'' The author gives a solution that consists of a sequence of simple folds, each of which folds along a line. Here are scanned images of the relevant pages in the book:





The **fold-and-cut theorem** states that **any shape with straight sides** can be cut from a single sheet of paper by folding it flat and **making a single straight complete cut.**[1]

To accomplish this we have four steps.

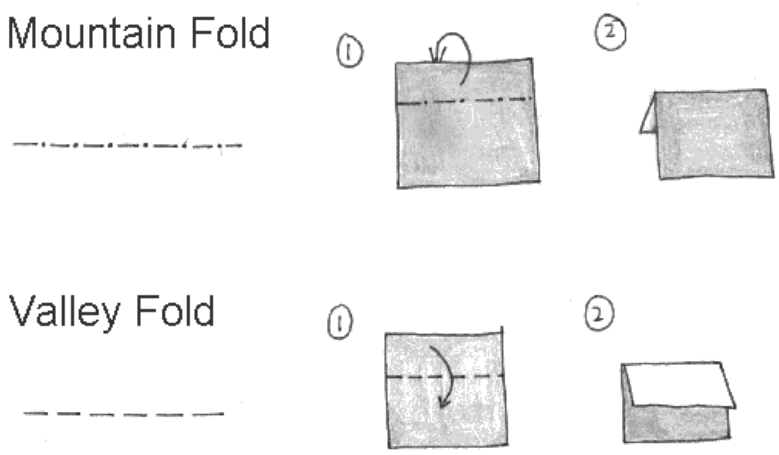
1. Take a piece of paper.
2. Fold it flat.
3. Make one complete straight cut.
4. Unfold the pieces.

Let's cut out a square from a sheet of paper.

Try a rectangle.

Paper Holding

There are two types of holds.



http://www.fishgoth.com/origami/basics2.html

What is a big idea behind the Fold & Cut Theorem?

References

Erik Demaine's Folding and Unfolding: The Fold-and-Cut Problem
http://erikdemaine.org/foldcut/

Fold and Cut Theorem - Dr Katie Steckles
https://www.youtube.com/watch?v=G8SoJ530JAs

Dr Katie Steckles: Fold and Cut introductory demonstration
https://www.youtube.com/watch?v=GKzl0_6NKJ8

https://www.youtube.com/watch?v=ZREp1mAPKTM