

Math in a Box

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In this talk I describe a paper folding geometric construction and the math behind it, presented as a sequence of exercises for use in schools. Origami illustrates and advances the project as a whole. The focus is, first, math (that is, “why?”) and, second, engineering (or “how?”).

With this construction (Figure 1), one can, in theory, fold, among other things, the square root of any integer. In passing, a new method is discovered for dividing paper into an integer number of same-size pieces. The project touches on self-similarity, iteration, ordered sets, series, the Pythagorean theorem, algebra, and fractals (e.g., Figure 2).

Though straightforward, this construction has not been described before. The origami box used here has appeared several times in the context of math education, though it has not been used like this before. Elementary school students can do the paper folding described here. In general, no paper folding expertise is required. High school students can do the formal math in its entirety. Paper folding helps young scholars understand more math than they have the formal background for.

For a number of years I have worked with students in the Seattle public schools, several schools per year, the same students once per week for the entire year, folding paper and thereby thinking about math. My aim is to restore to the curriculum what has been lost, namely, the fun. This exercise is one of the 35-odd projects we might do in any one-year.

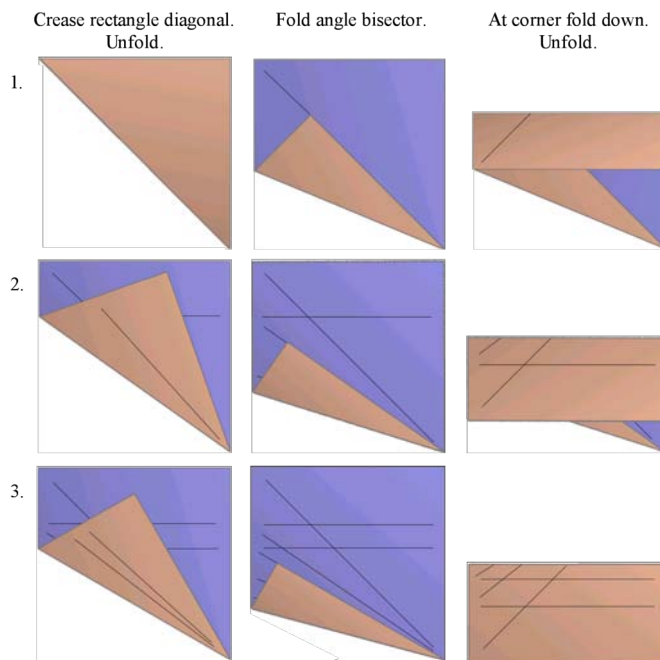


Figure 1. The first three iterations of the construction.

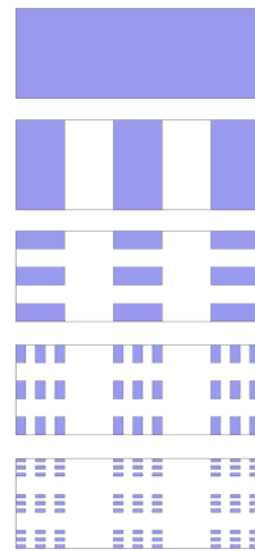


Figure 2. A fractal of the plain but important Cantor Set type, facilitated by the fourth iteration of the construction.