

Marin Math Circle – Elementary Group
Feb. 15, 2012

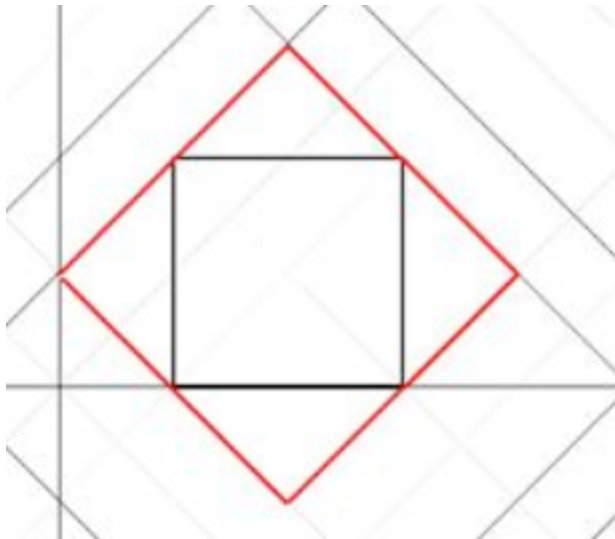
Class discussion:

1. Take a paper square. Fold it to obtain a square made of 2 layers of paper (use a large 4x4 square in the attached handout bend-squares.pdf)

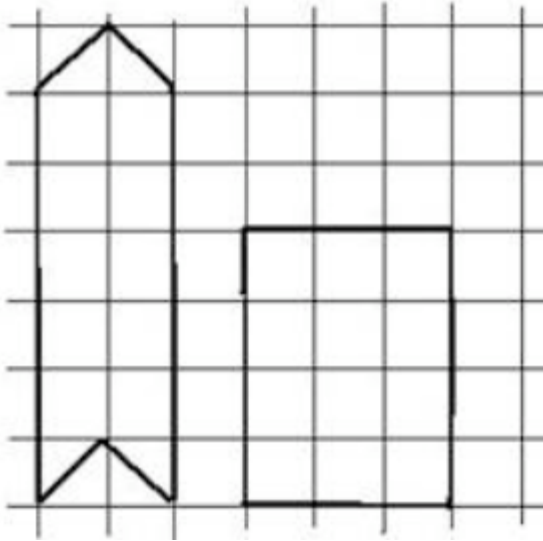
We discussed the relative "size" of these squares. Given a choice between 2 pieces of cake sized as the small square, and 1 piece sized as the large square, what would a hungry mathematician choose? We made guesses. On the board we drew a big square with bend lines and mid-lines and counted how many small triangles fit in the big square (8), and in the small square (4). After counting triangles, we came to conclusion that eating two small cakes was same as eating one big cake.

2. On the handout draw a square that is twice the area of the bold square (use the second picture on the handout bend-squares.pdf, with a bold square in the middle of it)

Solution:



3. We discussed what it means that the geometrical figures are the same (congruent) or what it means that they have the same area. The figures on the picture below have the same area, but they are not congruent.



4. We discussed the possibility to cut a quadrilateral into 2, 3 parts by one straight line. **Convex, non-convex** and non-convex polygons. Draw a line along the side of the polygon. Can this line break this polygon in 2, 3 ... pieces? If so, the polygon is non-convex, otherwise it is convex.

5. We drew stars by prolonging the sides of the 7-gon and 9-gon (use the attached handout). One can find two stars on each of the 7-gon and 9-gon.

Homework:

1. Cut the pentagon into 5 pieces by a straight line.
2. Finish drawing 7-gon and 9-gon stars (use the attached handout).
3. What is the maximal number of pieces one can get by cutting a non-convex 20-gon by a straight line.

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