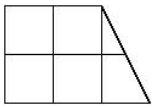
MATH 64091
Jenya Soprunova, KSU

Dissections

Problem 1. Cut the following shape into three pieces and rearrange the pieces to get a square. (You do not have to cut along the lines and it is allowed to turn the pieces over.)



Problem 2. Can you fold a 2 by 2 square so that it can be cut into four 1 by 1 squares by a single cut?

Problem 3. Cut a square into five rectangles so that no two of them share an entire side. (It's okay if two rectangles share parts of their sides or if a side of one rectangle is a part of a side of another rectangle.)

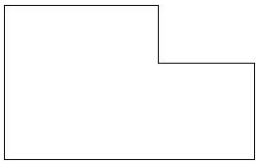
Problem 4. Cut an equilateral triangle into four smaller triangles so that no two of them share an entire side. (It's okay if two triangles share parts of their sides or if a side of one triangle is a part of a side of another triangle.)

Problem 5. Is it possible to cut a square into a few obtuse triangles? If possible, show how and explain why the triangles you get are obtuse.

Problem 6. Cut a 3 by 9 rectangle into eight squares.

Problem 7. Cut a triangle into three parts that can be rearranged to get a rectangle. (It's okay to turn the parts over.) Explain how this works for a general triangle.

Problem 8. Consider the following shape which is a union of two squares.



Cut this shape into three pieces which can be rearranged to get a square. Hint: If the first square has side a and the second has side b, what is the side of the new square?

Problem 9. Cut a square into squares of two sizes so that there is the same number of smaller and larger squares.

Problem 10. You need to cut the shape below along the grid lines into congruent pieces. What is the possible number of pieces one can get?