

Patty Paper Geometry on the Go!

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The complete presentation will be posted at

www.sabinin.info/conferences.html

Remember to label everything you make. Do not use the edge of the paper as a guiding tool. Once you make a fold, you may color the crease.

Problem 1:

- a). Draw a line segment AB. Find its midpoint by folding only.

- b). Draw a line a parallel to AB.

- c) Draw a line b perpendicular to AB.

Problem 2:

Draw an angle on your paper.
Construct its bisector.

(An angle bisector is a ray that cuts the angle exactly in half, making two congruent angles.)

Problem 3:

For each construction in parts A-E, start with a freshly drawn segment AB on a clean piece of patty paper. Then construct the following shapes:

- A) an isosceles triangle with your segment AB as one of the two equal sides;
- B) an isosceles triangle whose base is your segment;
- C) a square starting with a segment which is a side of the square;

- D) an equilateral triangle starting with a segment which is one of the sides of the triangle;
- E) A square with the initial segment one of the diagonals of the square;
- F) Draw a segment AC. This segment is one of the diagonals of a parallelogram. The other diagonal BD is $\frac{1}{2}$ the length of diagonal AC. One of the angles between the diagonals is 60° . Construct the parallelogram.

Problem 4: Parallel Lines and a Transversal

Draw two parallel lines L_1 and L_2 . Make another line L_3 that intersects both of these lines. Label all the angles with letters a - h.

- a) What do you notice?
- b) Write three conjectures and prove them with patty paper. [Hint: You may choose to use more than one piece of patty paper to help with the proofs.]

Problem 5: A little bit of Algebra

1. Make a fold parallel to one of the sides (try not to make the fold in the middle). You have split one of the sides into two lengths: label the lengths M and N .

2. Make another fold (perpendicular to the first) to get two squares and two rectangles. Label all the lengths that you see.

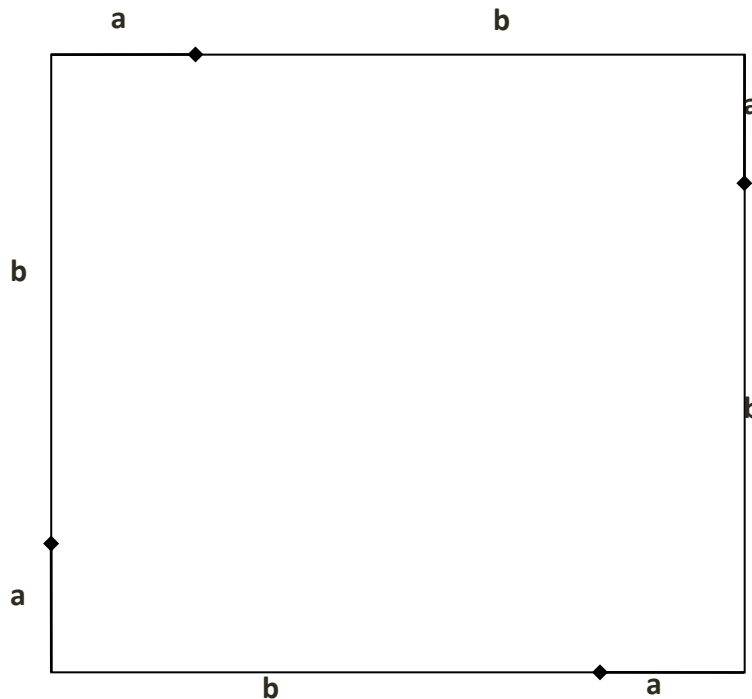
a) Can you write the area of the patty paper in terms of M and N ?

b) Can you write the area in another way, but still in terms of M and N ?

What rule have you just proved?

Problem 6: Another Theorem

Take a piece of Patty Paper and make a mark on each of the sides as you see in the diagram below. Label the lengths a and b .



- a) Fold in each of the corners to the marks to make four congruent triangles and label their hypotenuses as c .
- b) Can you write the area of the patty paper in terms of a , b and c ?
- c) Can you write the area in another way, but still in terms of a , b and c ?

What rule have you just proved?

Exploring the Pythagorean Theorem

- a) Show 1 unit, 2 units, $\sqrt{2}$ units, $\sqrt{5}$ units, $2\sqrt{2}$ units on your piece of Patty Paper.
- b) Construct a square with $1/4$ the area of the patty paper. What are its dimensions?
- c) Construct a square with $1/2$ the area of the patty paper. What are its dimensions?

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