

## MATH 6, ASSIGNMENT 18

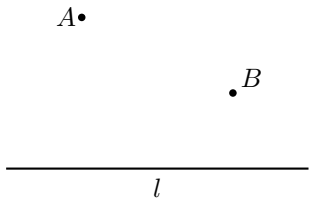
### CONSTRUCTIONS: RULER AND COMPASS, ORIGAMI...

Today we discussed a quite different approach to geometric constructions: paper folding, or origami. Instead of using ruler and compass, we would be folding pieces of paper, starting with a square (or a rectangle). Attached pictures show how one can construct various figures such as equilateral triangles.

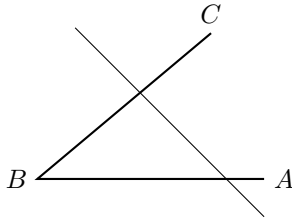
### HOMEWORK

In the homework, the words “construct” or “find” mean “construct using ruler and compass”.

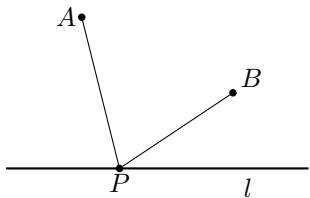
1. How can you find the point on the railroad (line  $l$  in the figure below) which would be at equal distance from two villages (points  $A, B$  in the figure below)? [Hint: if this point is at equal distance from  $A, B$ , then one can draw a circle with center at this point which would go through  $A, B...$ ]



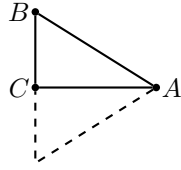
2. Given an angle  $\angle ABC$  and a line  $l$  intersecting both sides of this angle, find a point  $P$  on  $l$  which would be at equal distance from the two sides of the angle (i.e., the two perpendiculars dropped from  $P$  to the sides of the angle would have the same length)



3. Given a triangle  $ABC$ , construct inside it a point which would be at equal distance from all three vertices of the triangle.
4. The figure below shows two villages  $A$  and  $B$ . A horseman starts at village  $A$ , goes to the river (line  $l$  in the figure) to let the horse drink, then goes to village  $B$ . How should he choose the point  $P$  on the river to make his trip as short as possible?



5. Given a square sheet of paper, find its center by folding.
6. Given a paper triangle, find the center of inscribed circle by folding.
7. (a) Let  $ABC$  be a right triangle in which one of the legs is exactly  $1/2$  of the hypotenuse:  $BC = \frac{1}{2}AB$ . What are the angles of such a triangle? (Hint: if you put two such triangles together, as indicated by the dotted line, what triangle do we get?)



7. By folding construct a triangle from a rectangle, see <https://nrich.maths.org/5372>

8. By folding construct a hexagon from a rectangle, see <https://origami-resource-center.com/hexagon-from-a-rectangle/>

9. The figure to the right shows a rectangle divided into several pieces. Which of the two rectangles, A or B, has larger area?

