Math 5
Fall 2013

Name: ________________________________
HW #9.

Due on Friday, November 8.

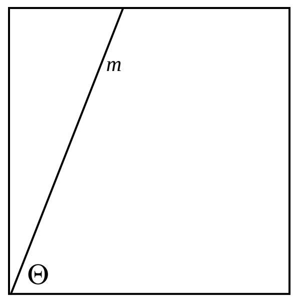
1) Using the Huzita-Hatori axioms, take a line segment and divide it into thirds. And then verify (theoretically) that indeed you have divided it into thirds. (You will want to use properties of similar triangles.)

2) Given the following construction that uses the Husita-Hatori axioms to trisect an angle (that is divide it into thirds without using a protractor), verify that indeed these angles are thirds. Again, you will want to use properties of similar triangles and corresponding angles.

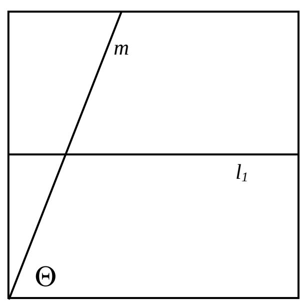
Project #3

Trisecting an angle with Origami

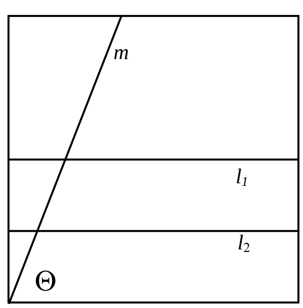
- Take a square piece of Origami paper.
- Fold a line *m* from the lower-left corner going up at some angle, Θ.



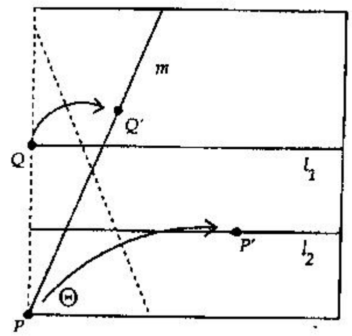
- Construct line l_1 by folding the paper in half from top to bottom and unfold.



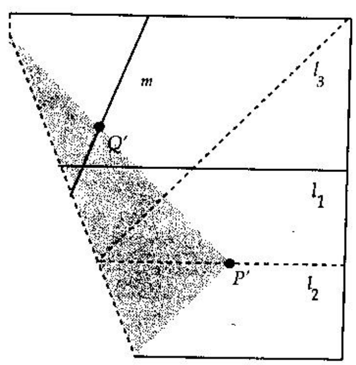
- Construct the line l_2 by folding the bottom ¼ crease line.



- Let P be the lower left corner vertex of the square, and let Q be the intersection of l_1 with the left edge of the square.
- Then make a fold that places point P onto line l_2 at P' **and at the same time** places point Q onto line m at Q'. (You will have to curl the paper over, line up the points and then flatten.)



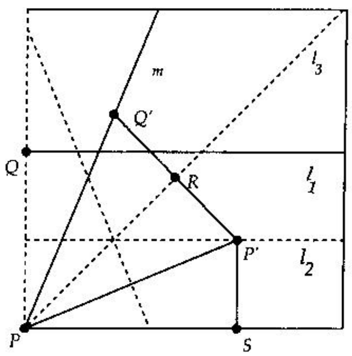
- Leaving the paper folded, fold the paper once again, along the folded-over portion of l_2. This will create crease line l_3.



- Unfold everything. Show that if we extend l_3 then it will hit the lower-left corner, P.

- Fold the bottom side of the square up to l_3 (the crease line is a bisector of the angle between l_3 and the bottom side of the paper). Note that the point P' lies on the new crease line.

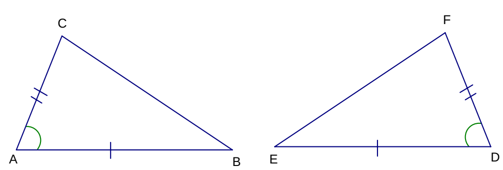
- Show that the preceding construction actually does give an angle that is 1/3 the angle Θ, by showing that the three triangles Δ*PQ'R*, Δ*PP'R*, and Δ*PP'S* are congruent (see figure below).



Side-Angle-Side (SAS) Congruence: When two triangles have any pair of corresponding sides and their included angles congruent, the triangles are congruent.

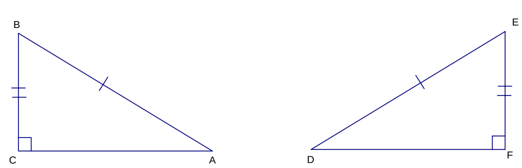
Congruent sides ≡ sides with the same length

Congruent angles ≡ angles with same measure



SAS Congruence: $\Delta ABC \cong \Delta DEF$

Hypotenuse-Leg Theorem: Any two right triangles that have a congruent hypotenuse and a corresponding, congruent leg are congruent triangles.



Hypotenuse-Leg Theorem: $\Delta ABC \cong \Delta DEF$