Sec 2.7 Geometry – Locus of Points & Triangle Centers

1. Anna is stuck out on a swimming dock in the lake. If the picture below is a scale drawing, how far must she swim to get to shore (convert using the scale provided)?

![Scale Drawing of Dock and Shore](image)

2. Measure the distance (cm) from the point to the line in each of the following problems
   a. 
   b. 

3. Describe how you attempted to measure the distance from a point to a line?

   ________________________________________________________________
   ________________________________________________________________

Locus of Points.

1. Mrs. and Mr. Scitamehtam were looking to purchase a new house. The map below shows where both of the two work. They both wish to be completely fair to each other in selecting a new house that is equal in distance from each of their respective places of work. Using a ruler or other construction utility can you show all such possible locations.

![Map showing Mr. and Mrs. Scitamehtam's places of employment](image)
DEFINITIONS:
1. **MEDIAN** of a triangle: All triangle's have 3 medians. Each median is a segment with one endpoint on the midpoint of a side of a triangle and the other endpoint at the opposite vertex of the triangle.

2. **ALTITUDE** of a triangle: All triangle's have 3 altitudes. Each altitude is a line that passes through a vertex of the triangle and is perpendicular to the opposite side.

CONSTRUCTIONS:
1. **Construct** all 3 medians of the triangle below using either a straight edge & compass or a MIRA

2. **Construct** all 3 altitudes of the triangle below using either a compass compass and straight edge or a mira
3. **Construct all 3 perpendicular bisectors** of each side of the triangle below using either a compass and straight edge or a mira.

4. Construct all 3 **angle bisectors** of the triangle below using either a compass and straight edge or a mira.

Each one of these constructions should create a common center of a triangle.

1. **Circumcenter**: Is the center of a circle that perfectly passes through each vertex.
2. **Incenter**: Is the center of largest possible circle that still completely fits inside the circle.
3. **Centroid**: Is the center that is the center of gravity of the triangle (balancing point) and there is a constant ratio between the distance from the centroid to the midpoint and centroid to the vertex.
4. **Orthocenter**: Is the fourth common center but has no unique properties other than it is on the EULER line.

**CAN YOU GUESS WHICH CENTER IS WHICH?**
(Hint: LOOK at the **BOLD** letters in each prompt.)
Additional information about the Common Triangle Centers...

It is the **CENTROID** created by the **MEDIANS**.

If you wanted to balance a cut out of this triangle on one finger, you would hold the triangle at the centroid. It represents the center of gravity.

It is the **INCENTER** created by the **ANGLE BISECTORS**.

It is the point that all sides are equidistant from and the center of a circle that is circumscribed by the triangle.

It is the **ORTHOCENTER** and it is created by the **ALTITUDES** of the triangle.

The only additional interesting fact about the orthocenter is that it is a point on Euler’s Line (the line also includes the Centroid and Circumcenter).

It is the **CIRCUMCENTER** and it is created by the **PERPENDICULAR BISECTORS**.

It is the point that is equidistant from all of the triangle’s vertices and the center of a circle that circumscribes the triangle.
There are some interesting uses of some of the common triangle centers. Identify which center would be best for each situation.

1. A person wishes to make a triangular table with a single post holding up the table. Which triangle center should the post connect to that would help keep the table the most balanced and stable?

2. A person has a triangular piece of scrap ornate fabric. The person wants to create a circular table cloth. Which center might help her cut out the biggest possible circle from the fabric?

3. The space shuttle is monitoring 3 GPS satellites and has positioned itself so that it is equidistant from each of the satellites. Which triangle center might have helped the pilot determine this particular location?