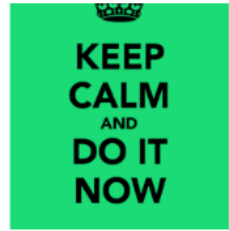


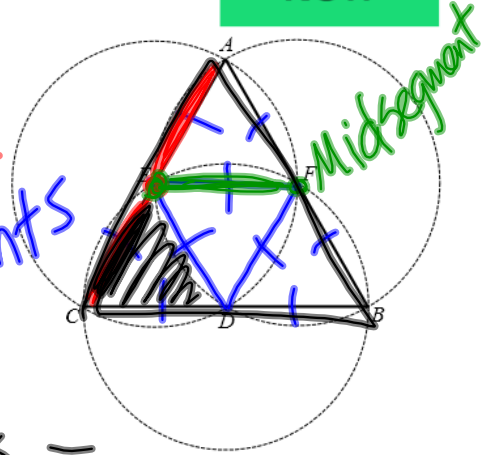
Name: \_\_\_\_\_ Date: \_\_\_\_\_  
 Geometry A U6D2 Bisectors



1) In the following figure, circles have been constructed so that the endpoints of the diameter of each circle coincide with the endpoints of each segment of the equilateral triangle.

a. What is special about points  $D$ ,  $E$ , and  $F$ ? Explain how this can be confirmed with the use of a compass.

*E, F, & D exactly in center of their segment*  
*Midpoints*



b. Draw  $\overline{DE}$ ,  $\overline{EF}$ , and  $\overline{FD}$ . What kind of triangle must  $\triangle DEF$  be?

*equilateral b/c all sides =*

c. What is special about the four triangles within  $\triangle ABC$ ?

*All  $\cong$  (congruent)*

d. How many times greater is the area of  $\triangle ABC$  than the area of  $\triangle CDE$ ?

*4x bigger* *1:4* *Sides 1:2*

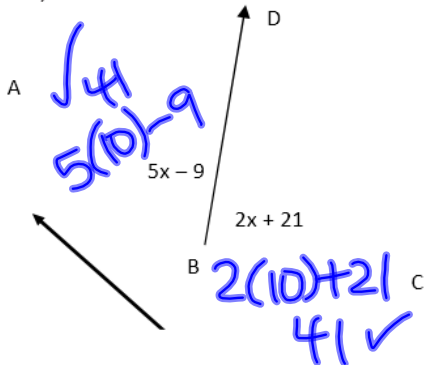
2) Write the definition of an angle bisector:

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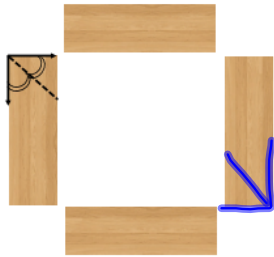
3) What value of  $x$  would cause  $\overline{BD}$  to bisect  $\angle ABC$  below?



$$5x - 9 = 2x + 21$$

$$x = 10$$

In order to make a wooden frame, you must bisect the right angled corners. Then glue the pieces together.



4) What would be the degrees of each of the bisected angles?

45°

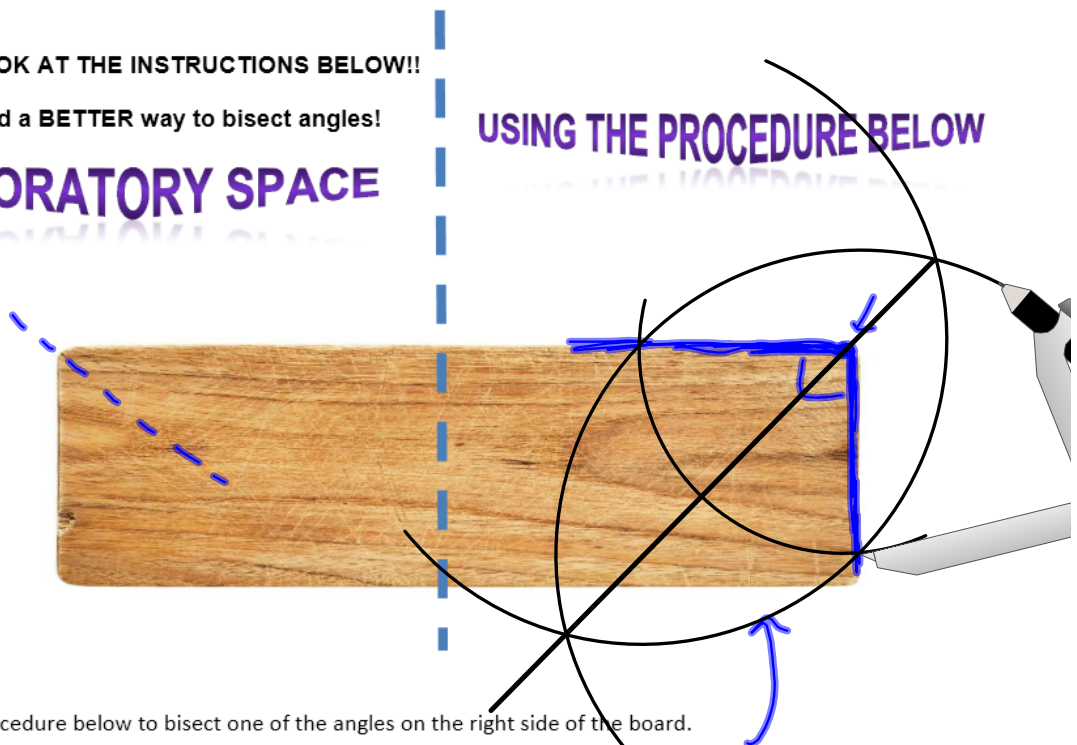
5) Using your compass and straightedge, explore a way to bisect an angle of the wooden board

DO NOT LOOK AT THE INSTRUCTIONS BELOW!!

You may find a **BETTER** way to bisect angles!

**EXPLORATORY SPACE**

**USING THE PROCEDURE BELOW**



6) Use the procedure below to bisect one of the angles on the right side of the board.

1st) Put the point of your compass on the vertex of the angle & swing an arc that intersects both angle sides.

2nd) Clearly label each of those intersections with a point on the 2 points of intersection.

3rd) Set your compass to the distance between those points of intersection.

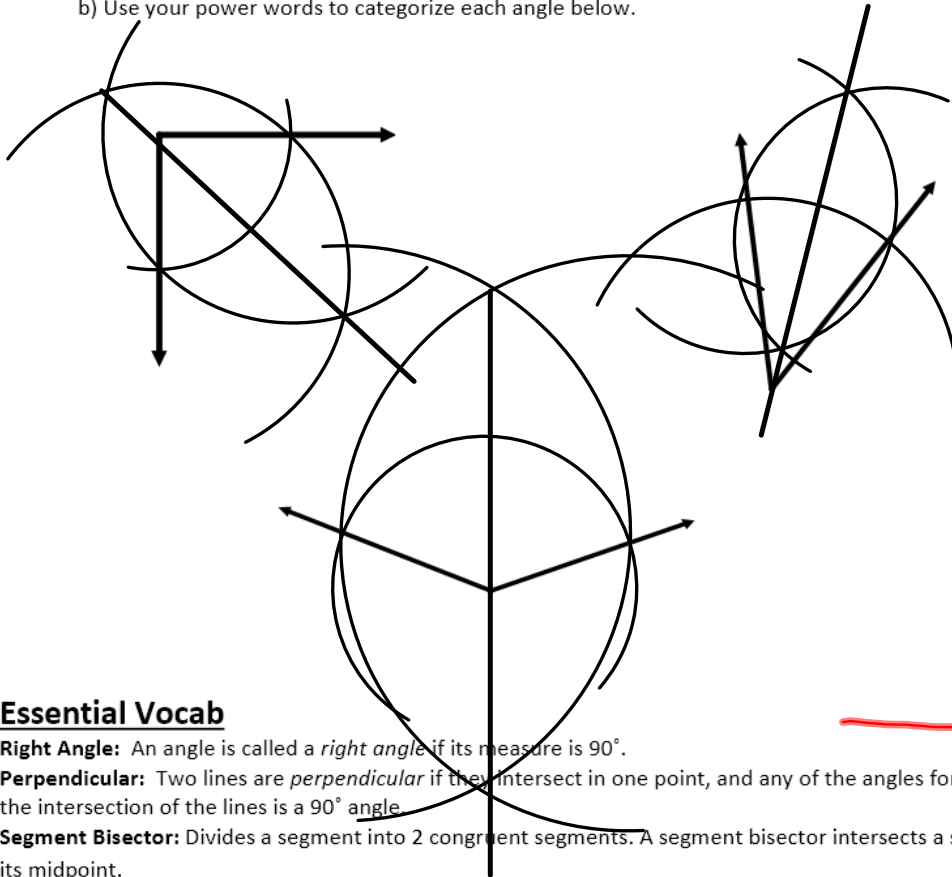
4th) With the point of the compass on each intersection point swing arcs that intersect each other twice.

5th) Create a line with your straight edge that goes through each arc intersections.

6th) This line should bisect the given angle and go through the angles vertex.

7) a) Bisect each angle below using your compass & straight edge.

b) Use your power words to categorize each angle below.

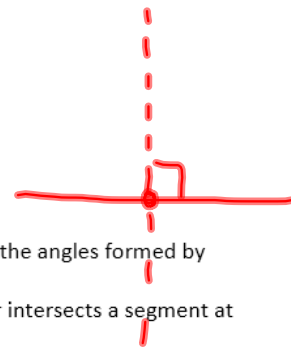


**Essential Vocab**

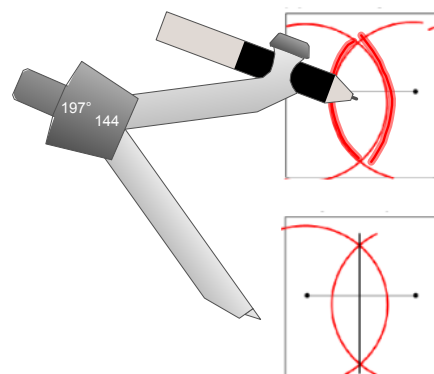
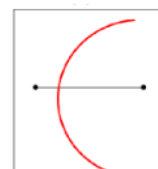
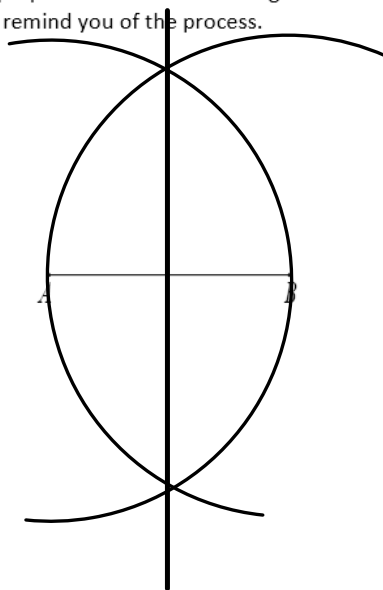
**Right Angle:** An angle is called a *right angle* if its measure is  $90^\circ$ .

**Perpendicular:** Two lines are *perpendicular* if they intersect in one point, and any of the angles formed by the intersection of the lines is a  $90^\circ$  angle.

**Segment Bisector:** Divides a segment into 2 congruent segments. A segment bisector intersects a segment at its midpoint.



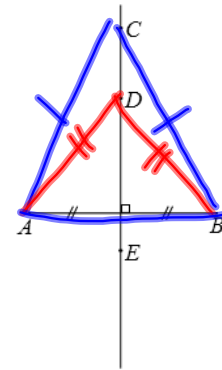
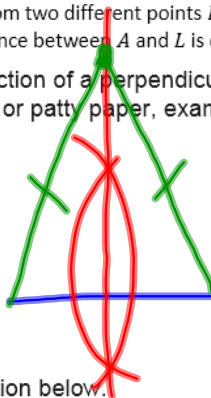
8) We will now watch a video on how to construct a **perpendicular bisector of a line segment** using a compass and straightedge. Follow along with the video to create a perpendicular bisector of segment AB. You may want to make some notes in words to remind you of the process.



**Equidistant:** A point  $A$  is said to be *equidistant* from two different points  $B$  and  $C$  if  $AB = AC$ . A point  $A$  is said to be *equidistant* from a point  $B$  and a line  $L$  if the distance between  $A$  and  $L$  is equal to  $AB$ .

Now that you are familiar with the construction of a perpendicular bisector, we must make one last observation. Using your compass, string, or patty paper, examine the following pairs of segments:

- I.  $\overline{AC}, \overline{BC}$
- II.  $\overline{AD}, \overline{BD}$
- III.  $\overline{AE}, \overline{BE}$

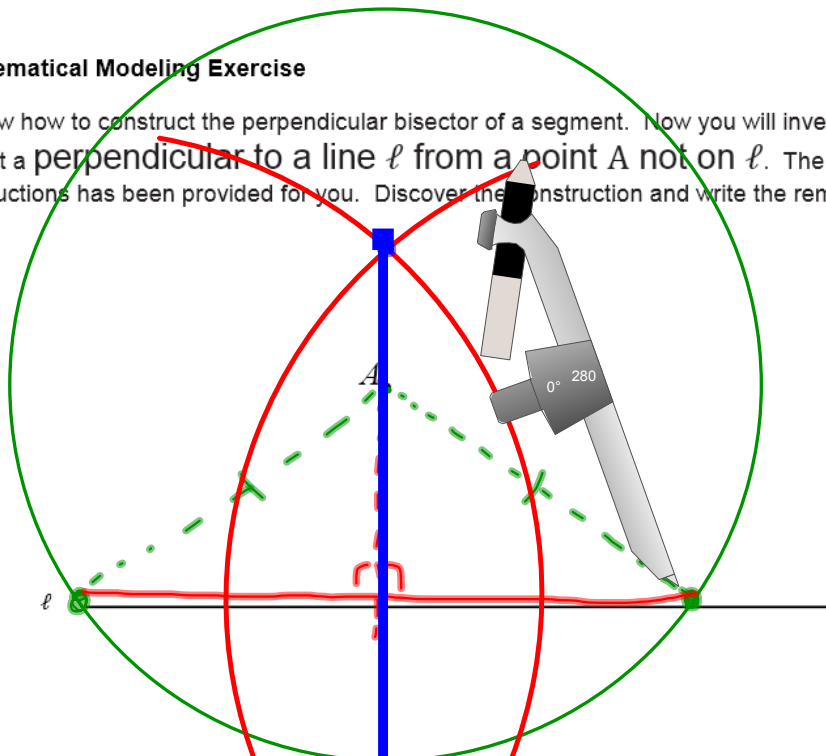


Based on your findings, fill in the observation below.

**Observation:** Any point on the perpendicular bisector of a line segment is equidistant from the endpoints of the line segment.

**9) Mathematical Modeling Exercise**

You know how to construct the perpendicular bisector of a segment. Now you will investigate how to construct a perpendicular to a line  $\ell$  from a point  $A$  not on  $\ell$ . The first step of the instructions has been provided for you. Discover the construction and write the remaining steps.



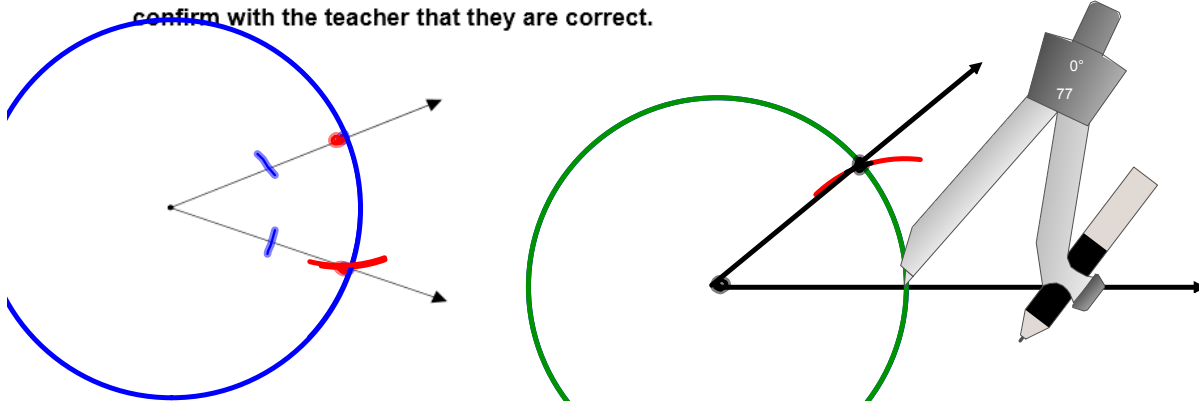
**Step 1.** Draw circle  $A$  so that the circle intersects line  $\ell$  in two points.

**Step 2:** Set compass to more than  $\frac{1}{2}$  the distance between points.

**Step 3:** Swing arcs that hit twice

**Step 4:** Make line through those intersections

10) Let's investigate how to **copy an angle**. Work with a partner to put the steps in order. Use the steps to copy the angle below. Before you write the steps below confirm with the teacher that they are correct.



1. Use compass, point on vertex, arc hit sides 2x
2. Measure dist of intersection circle/sides
3. Create arbitrary ray
4. Copy the circle on the ray
5. Copy measurement
- 6.

11) Using a compass and straightedge, bisect each.

