

Geometer Sketchpad Lab  
Angle Inscribed in a Semicircle

1. **Construct a circle with center O.**

Label the center O and the point on the circle C.

2. **Construct a diameter of circle O.**

Use the line tool to construct a line containing points O and C. Find the other point of intersection between the line and circle O. Label this point A. Now, use the segment tool to construct AC. Hide the line you constructed. AC should still be visible.

Question: How do you know that AC is a diameter of the circle?

3. **Construct an angle inscribed in a semicircle.**

Select point O and move your circle so that AC appears to be horizontal. Select a point on circle O and move it so that it is “above” AC. Label this point B. Construct ABC. Hide circle O. You now should have a semicircle with points A,B, and C. Construct AB and BC.

4. **Finding measurements of angles.**

- a. Construct BO, AO, and CO.
- b. Find the measures of BO, AO, and CO.
- c. Question: Why are the measurements all the same?

- d. Find the measures of  $\angle ABO$  and  $\angle BAO$ .
- e. Question: Why are these measurements the same?

- f. Calculate  $\angle ABO + \angle BAO$ .
- g. Find the measurement of  $\angle BOC$ .
- h. Question: Why is the measure of  $\angle BOC$  the same as  $\angle ABO + \angle BAO$ ?

5. **Finding measurements of arcs.**

- a. Construct two points on the semicircle. One point between A and B and the other between B and C. Label them D and E respectively.

- b. Construct  $\angle ADB$  and  $\angle BEC$ .
- c. Find the measure of arc  $BEC$ .
- d. Question: Why is  $\angle BEC = \angle BOC$ ?

6. **Drawing some conclusions.**

- a. Move  $D$  so that it is very close to  $A$ , and  $E$  so that it is very close to  $C$ . Now, move  $B$  along the semicircle to verify that the above relationships hold no matter how the angle is inscribed in the semicircle.
- b. Show that in general  $\angle ABO = \angle BEC$ .

7. **More on arcs and angles.**

- a. Find the measure of arc  $ADB$ .
- b. What does the measure of  $\angle AOB$  have to be?
- c. Find the measure of  $\angle AOB$  to verify.
- d. Find the measures of  $\angle BCO$  and  $\angle CBO$ .
- e. Question: Why are the measures the same?
  
- f. Find  $\angle BCO + \angle CBO$ .
- g. Question: Why is this sum equal to  $\angle ADB$ ?
  
- h. Show that in general  $\angle CBO = \angle ADB$ .

8. **A few more conclusions.**

- a. Find  $\angle ABO + \angle CBO$ .
- b. Calculate  $\angle ADB + \angle BEC$ .

c. Question: Why is the result from b not surprising?

d. Show that in general  $\angle ABO + \angle CBO = (1/2)(\angle BEC + \angle ADB) = 90^\circ$

9. **Proof**

Construct a proof in paragraph form using all the information gained from this lab. All the details have been discovered, it is just up to you to organize them into a formal proof.