

Name \_\_\_\_\_ Date \_\_\_\_\_ Period \_\_\_\_\_

## Student Exploration Worksheet: Inscribing Angles

**Key Terms:** Inscribed Angle, Intercepted Arc, Cyclic Quadrilateral, Inscribed Quadrilateral, Diameter, Chord, Semicircle

**In this activity, you will explore the relationship between inscribed angles and intercepted arcs.**

1. In the Gizmo, with Inscribed angle 1 selected, observe the angle in the circle.

- a. Name the angle in the circle. \_\_\_\_\_
  1. Notice that the vertex is on the circle and the sides of the angle are chords of the circle. This angle is an inscribed angle.
- b. Click on "Click to measure angles" and use the interactive protractor to measure  $\angle BAC$ . What is  $m\angle BAC$ ? \_\_\_\_\_
- c. Click on "Click to measure arc measure" and use the interactive arc measure rulers to measure  $\widehat{BC}$ . Notice here that arcs are measured in degrees.
  1. What is  $m\widehat{BC}$ ? \_\_\_\_\_
  2. How does  $m\widehat{BC}$  compare to  $m\angle BAC$ ?  
\_\_\_\_\_

d. Drag the points on the circle to explore other inscribed angles and intercepted arcs. Watch  $m\widehat{BC}$  and  $m\angle BAC$  as you drag the points. Make a conjecture about the mathematical relationship between the measure of an inscribed angle and the measure of the intercepted arc.

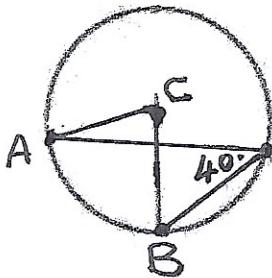
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- e. If the measure of the intercepted arc is  $143^\circ$ , what is the measure of the inscribed angle? \_\_\_\_\_
- f. If  $m\angle CAB = 37.5^\circ$ , find  $m\widehat{CB}$ . \_\_\_\_\_

### Practice Problems



1. Find the measure of Arc  $\widehat{AB}$  \_\_\_\_\_
2. Find the measure of Angle  $C$  \_\_\_\_\_

2. With Inscribed angle 1 selected and arc measure rulers and protractors turned on, click on *Show diameter*.
- Drag B and C so that they attach to the endpoints of the diameter. Use the protractor to measure  $\angle A$ . What is  $m\angle A$ ? \_\_\_\_\_
  - Vary  $\angle A$  by dragging A, while B and C remain on the endpoints of the diameter. What is the measure of  $\angle A$ ? \_\_\_\_\_
  - Use the arc measure ruler to measure the arc intercepted by the diameter. Notice that a diameter divides a circle into two semicircles.
    - What is the measure of that arc? \_\_\_\_\_
    - What is the number of degrees in a circle? \_\_\_\_\_
  - Make a conjecture about the measure of an angle inscribed in a semicircle. Does this conjecture agree with your earlier conjecture about inscribed angles and intercepted arcs? Explain why or why not.

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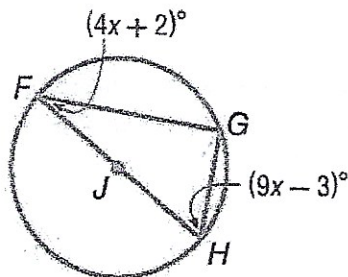


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**Practice Problem – Find the Value of X.**



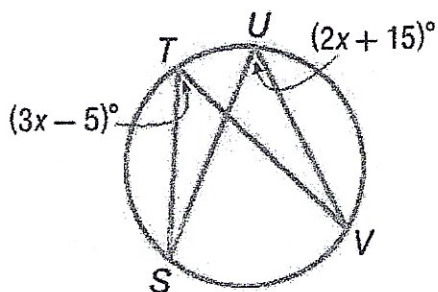
**Inscribed Angles and Inscribed Quadrilaterals**

In this activity, you will experiment with two inscribed angles and also inscribed quadrilaterals, and see how they relate to the measures of the arcs they intercept.

- With Inscribed angle 1 selected and protractors turned on, turn off "Show diameter" and turn off "arc measure rulers." Turn on "Inscribed angle 2."
  - Name the two inscribed angles in this circle.
    - \_\_\_\_\_
    - \_\_\_\_\_
  - Drag the endpoints of the angles so B snaps onto E and C snaps onto F. Place points A and D near each other but not on top of each other. You now have two different angles that intercept the same arcs.
    - What do you hypothesize is true about  $m\angle BAC$  and  $m\angle EDF$ ?  
\_\_\_\_\_

- c. Measure  $\angle BAC$  and  $\angle EDF$  to test your hypothesis. Drag  $\angle A$  and  $\angle D$  to form new angles with the same intercepted arcs. What do you find?
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- d. Drag  $\angle A$  so that A is on the opposite side of the circle from D, while the endpoints of angle  $\angle A$  remain on points E and F. Compare  $m\angle A$  and  $m\angle D$ .
- Describe the relationship between  $\angle A$  and  $\angle D$ . Hint: Examine the sum of the measures.
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**Practice Problem – Find the Value of X.**



- With protractors clicked on, select Inscribed quadrilateral. Turn off Inscribed angle 1 and Inscribed angle 2.
  - Drag the vertices of quadrilateral  $GHIJ$  to make a quadrilateral that is not a square. Measure the angles. What are the measures of the four angles of the quadrilateral?

G = \_\_\_\_\_

H = \_\_\_\_\_

I = \_\_\_\_\_

J = \_\_\_\_\_

- What is the relationship between  $\angle G$  and  $\angle I$ ? \_\_\_\_\_
  - Between  $\angle H$  and  $\angle J$ ? \_\_\_\_\_
  - How would you state this relationship in a general way? Explain how this relates to something you learned earlier in this activity.

**Practice Problem**

Quadrilateral  $WXYZ$  is inscribed in  $\odot V$ . Find  $m\angle X$  and  $m\angle Y$ .

