



# Circles—Angles and Arcs

## Student Activity

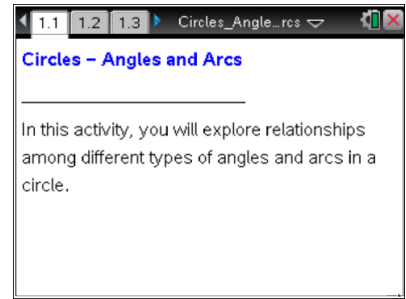


Name \_\_\_\_\_

Class \_\_\_\_\_

Open the TI-Nspire document *Circles\_Angles\_and\_Arcs.tns*.

A circle is the set of all points in a plane that are equidistant from a given point in the plane. Circles, angles, and arcs have many interesting characteristics. In this activity, you will explore relationships among different types of angles and arcs in a circle.



Move to page 1.2.

1. Drag point *A* or point *C*. Describe the changes that occur in the figure as you drag the point.
2. Angle *AOC* is called a central angle. Why do you think this is so?

An angle intercepts an arc of a circle if each endpoint of the arc is on a different ray of the angle and the other points of the arc are in the interior of the angle.

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As you move point *A* or point *C*, the central angle  $\angle AOC$  intercepts a minor arc *AC*. The measure of the minor arc equals the measure of the central angle. The larger remaining arc, *ABC*, is called a major arc.

3. a. Move point *A* or point *C* to help you complete the table.

$\angle AOC$	arc <i>AC</i>	arc <i>ABC</i>	arc <i>AC</i> + arc <i>ABC</i>
50°	50°		
100°			
		250°	
(Choose an angle.)			



- b. What is true about the measure of arc  $AC$  + arc  $ABC$ , the sum of the measures of the minor and major arcs?
4. In a circle, the measure of a central angle  $\angle AOC$  is  $n^\circ$ .
- a. What is the measure of the minor arc that is intercepted by the central angle? How do you know?
- b. What is the measure of the major arc? How do you know?

### Move to page 1.4.

5. Angle  $ABC$  is called an inscribed angle because  $\overline{BA}$  and  $\overline{BC}$  are chords of the circle and vertex  $B$  is on the circle. Drag point  $B$  around the circle.
- a. As point  $B$  is moved around the circle, what do you notice about the measure of  $\angle ABC$ ?
- b. Why does  $m\angle ABC$  change when point  $B$  is moved from one arc to the other? Explain your reasoning.
- c. Move point  $A$  or point  $C$  until  $\angle ABC$  is a right angle. What is special about the arc and  $\overline{AC}$ ?

### Move to page 1.5.

Angle  $ABC$  intercepts arc  $AC$ . Drag point  $D$  to various locations outside the circle, on the circle, inside the circle, and at the center  $O$ .

6. Place point  $D$  on the circle so that  $\angle ADC$  intercepts the same arc as  $\angle ABC$ .
- a. What do you notice about the measures of  $\angle ABC$  and  $\angle ADC$ ?



- b. What happens to the angles if you move point  $A$  or point  $C$ ?
7. Place point  $D$  at the center of the circle. Move point  $A$  and point  $C$  so that  $\angle ADC$  intercepts the same arc as  $\angle ABC$ .
- a. What is the relationship between the measures of inscribed  $\angle ABC$  and central  $\angle ADC$ ?
- b. What happens to the angles if you move point  $A$  or point  $C$ ?
8. Leona said, “Since a central angle can never measure more than  $180^\circ$ , I know an inscribed angle can never measure more than  $90^\circ$ .” Do you agree or disagree? Why?
9. Place point  $D$  on the circle so that  $ABCD$  is a quadrilateral.
- a. What do you notice about the sum of the measures of  $\angle ABC$  and  $\angle ADC$ ? Check with a classmate to compare.
- b. What do you notice about the sum of the measures of the angles if you move point  $A$  or point  $C$ ?
- c. What do you notice about arcs  $ABC$  and  $ADC$ ?
- d. How does the relationship between arcs  $ABC$  and  $ADC$  explain the sum of the measures of inscribed  $\angle ABC$  and  $\angle ADC$ ?