Objective 1  Find Measures of Angles Formed by Chords, Secants, and Tangents

A(n) ________ angle is an angle whose vertex is the center of a circle. Its measure is the same as its associated arc.

A(n) ________ angle has a vertex on the circle and the sides of that angle are chords of the circle.

Angle Measure—Lines Intersecting Inside a Circle

The measure of an angle formed by two lines that intersect inside a circle is half the sum of the measures of the intercepted arcs.

\[ m \angle 1 = \frac{1}{2} (x^\circ + y^\circ) \]

Angle Measure—Lines Intersecting Outside a Circle

The measure of an angle formed by two lines that intersect outside a circle is half the difference of the measures of the intercepted arcs.

\[ m \angle 1 = \frac{1}{2} (x^\circ - y^\circ) \]

A(n) ________ is a line that intersects a circle in 2 points.

A(n) ________ is a line that intersects a circle in 1 point.
Section 12.4 Additional Angle Measures and Segment Lengths

Work Video Exercise 1 with me.

1. Find the value of the variable.

Pause and work Video Exercise 2.

2. Find the value of each variable.

Play and check.

Work Video Exercise 3 with me.

3. A photo is being taken of a cylindrical silo. The camera is positioned at the vertex of a 35° angle formed by tangents to the silo. Find the measure of the arc along the silo that will be in the photograph.
Objective 2   Find the Lengths of Segments Associated with Circles

Segment Products—Inside or Outside a Circle

For a circle and a point not on the circle, the product of the lengths of the two segments from the point to the circle is constant along any line through the point and circle.

\[ a \cdot b = c \cdot d \]

\[ w(w + x) = y(y + z) \]

\[ y(y + z) = t^2 \]

Study the movements below to see that for each case, the factors on one side of the equation are one line’s segment lengths from \( P \) to the circle.

\[ \text{length 1} \cdot \text{length 2} = \text{length 3} \cdot \text{length 4} \]

\[ \text{factor} \cdot \text{factor} = \text{factor} \cdot \text{factor} \]

Work Video Exercise 4 with me.

4. Find the value of the variable. If the answer is not a whole number, round to the nearest tenth.
Pause and work Video Exercise 5.

5. Find the value of the variable. If the answer is not a whole number, round to the nearest tenth.

Play and check.