## 12-1 Tangent Lines

### Quick Review

A **tangent** to a circle is a line that intersects the circle at exactly one point. The radius to that point is perpendicular to the tangent. From any point outside a circle, you can draw two segments tangent to a circle. Those segments are congruent.

### Example
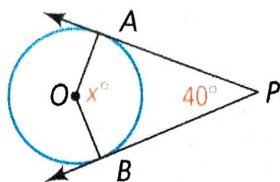
$\overrightarrow{PA}$ and $\overrightarrow{PB}$ are tangents. Find $x$.

The radii are perpendicular to the tangents. Add the angle measures of the quadrilateral:

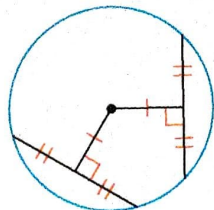$$x + 90 + 90 + 40 = 360$$
$$x + 220 = 360$$
$$x = 140$$

## 12-2 Chords and Arcs

### Quick Review

A **chord** is a segment whose endpoints are on a circle. Congruent chords are equidistant from the center. A diameter that bisects a chord that is not a diameter is perpendicular to the chord. The perpendicular bisector of a chord contains the center of the circle.
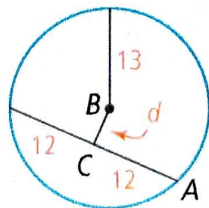
### Example

**What is the value of $d$?**

Since the chord is bisected, $m\angle ACB = 90$. The radius is 13 units. So an auxiliary segment from $A$ to $B$ is 13 units. Use the Pythagorean Theorem.
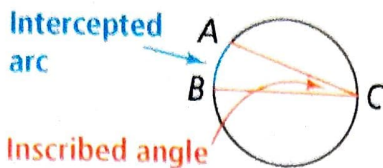
$$d^2 + 12^2 = 13^2$$
$$d^2 = 25$$
$$d = 5$$

# 12-3 Inscribed Angles

## Quick Review

An **inscribed angle** has its vertex on a circle and its sides are chords. An **intercepted arc** has its endpoints on the sides of an inscribed angle, and its other points in the interior of the angle. The measure of an inscribed angle is half the measure of its intercepted arc.

Intercepted arc

Inscribed angle

## Example

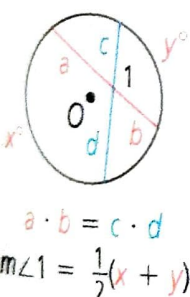What is $m\,\widehat{PS}$? What is $m\angle R$?

The $m\angle Q = 60$ is half of $m\,\widehat{PS}$, so $m\,\widehat{PS} = 120$. $\angle R$ intercepts the same arc as $\angle Q$, so $m\angle R = 60$.

60°
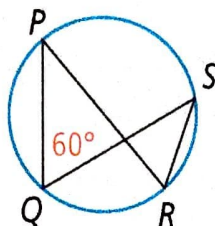
# 12-4 Angle Measures and Segment Leng

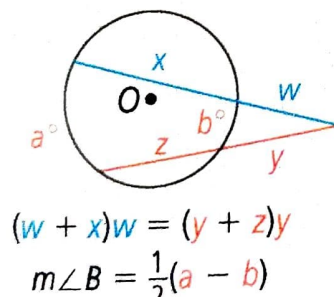## Quick Review

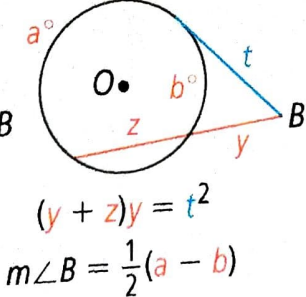A **secant** is a line that intersects a circle at two points. The following relationships are true:

$a \cdot b = c \cdot d$

$m\angle 1 = \frac{1}{2}(x + y)$

$(w + x)w = (y + z)y$

$m\angle B = \frac{1}{2}(a - b)$
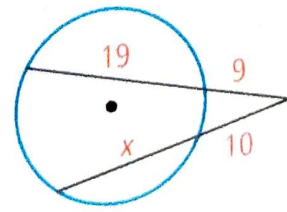
$(y + z)y = t^2$

$m\angle B = \frac{1}{2}(a - b)$

## Example

What is the value of $x$?

$(x + 10)10 = (19 + 9)9$

$10x + 100 = 252$
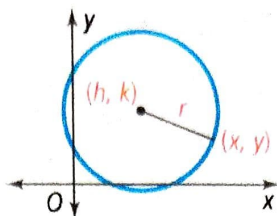
$x = 15.2$

19  9

$x$  10

# 12-5 Circles in the Coordinate Plane

## Quick Review

The **standard form of an equation of a circle** with center $(h, k)$ and radius $r$ is

$$(x - h)^2 + (y - k)^2 = r^2.$$

## Example

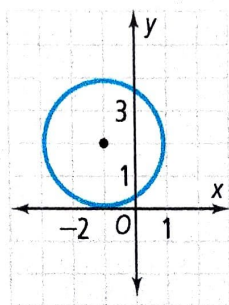**Write the standard equation of the circle shown.**

The center is $(-1, 2)$. The radius is 2.

The equation of the circle is

$$(x - (-1))^2 + (y - 2)^2 = 2^2$$
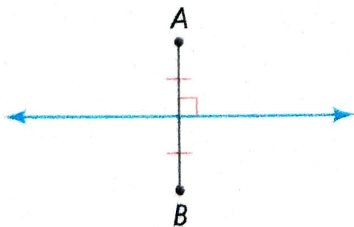
or

$$(x + 1)^2 + (y - 2)^2 = 4.$$

# 12-6 Locus: A Set of Points

## Quick Review

A **locus** is a set of points that satisfies a stated condition.

## Example

**Sketch and describe the locus of points in a plane equidistant from points $A$ and $B$.**

The locus is the perpendicular bisector of $\overline{AB}$.