6.7 Tangent Lines of Circles

SWBAT solve for unknown variables using theorems about tangent lines of circles.

Tangent to a Circle Ex: (AB)	A line in the plane of the circle that intersects the circle in exactly one point. *Ex: Segment AB is a tangent to Circle O.*	
Point of Tangency	The point where a circle and a tangent intersect. *Ex: Point P is a point of tangency on Circle O.*	

Tangent Theorem 1:	**Converse Theorem 1:**
If a line is tangent to a circle, then it is perpendicular to the radius draw to the point of tangency.	If a line is perpendicular to the radius of a circle at its endpoint on a circle, then the line is tangent to the circle.
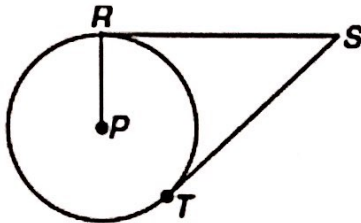
Example: If RS is tangent, then PR $\perp$ RS.
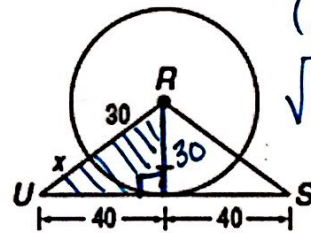
Example 1: Find the measure of x.

a)
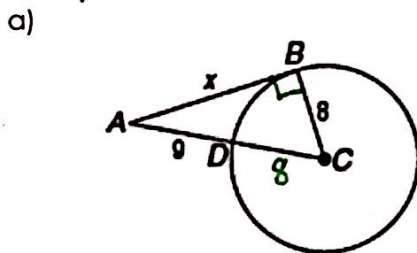
$$a^2 + b^2 = c^2$$
$$x^2 + 8^2 = 17^2$$
$$x^2 + 64 = 289$$
$$-64 \quad -64$$
$$\overline{x^2 = 225}$$
$$\boxed{x = 15}$$

b)
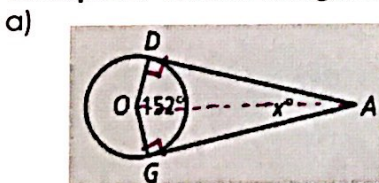
* **Other method is** *
to factor
$$(x+30)^2 = 40^2 + 30^2$$
$$\sqrt{(x+30)^2} = \sqrt{2500}$$
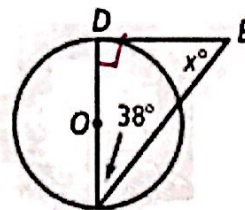$$x+30 = 50$$
$$-30 \qquad -30$$
$$\boxed{x = 20}$$

Example 2: Find x. All segments that appear tangent are tangent to Circle O.
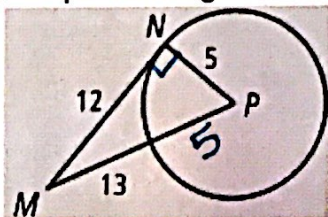
a)

$$90 + 90 + 152 + x = 360$$
$$180 + 152 + x = 360$$
$$\boxed{x = 28°}$$

b)

$$180 - 90 - 38 = x$$
$$\boxed{x = 52°}$$

Example 3: Is segment MN tangent to Circle O at P? Explain.

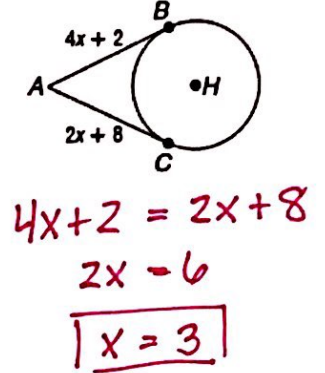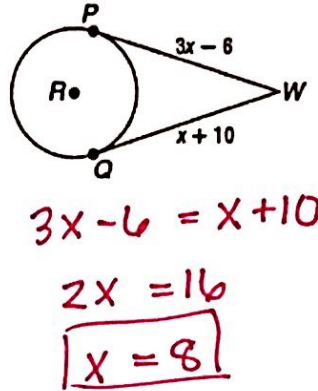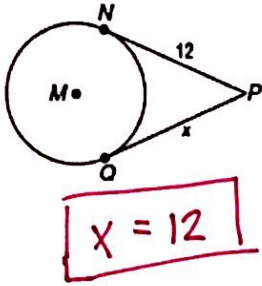$$12^2 + 5^2 = (13+5)^2$$
$$144 + 25 = 18^2$$
$$169 \neq 324$$

Nope!

Example 4: Solve for x.

$x = 12$

$3x - 6 = x + 10$

$2x = 16$

$x = 8$

$4x + 2 = 2x + 8$

$2x = 6$

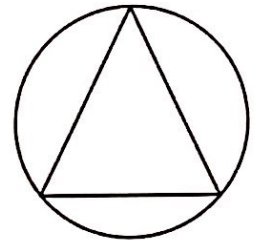$x = 3$

Circumscribed vs. Inscribed

| To **circumscribe** is when you draw a figure around another, touching it at points as "outside" possible.	To **inscribe** is to draw a figure within another so that the inner figure lies entirely within the boundary of the "inside" outer.
Ex: The circle is circumscribed about the triangle.	**Ex:** The triangle is inscribed in the circle.

| Tangent Theorem 3: (Circumscribed Polygons) | When a polygon is circumscribed about a circle, all of the sides of the polygon are tangent to the circle. |
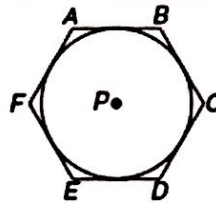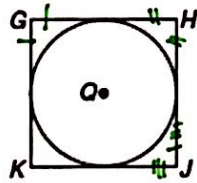
Example 5: Triangle ABC is circumscribed about ⊙O. Find the perimeter of triangle ABC.
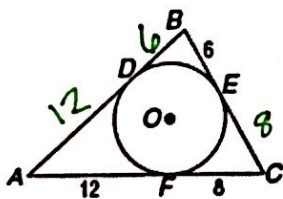
$(12 + 6) + (6 + 8) + (12 + 8)$

$= 52$

You Try! Find x. Assume that segments that appear to be tangent are tangent.

a)

square

$x = 16$

b)

$6 + 4 = 10$

c)

$x = 8$

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