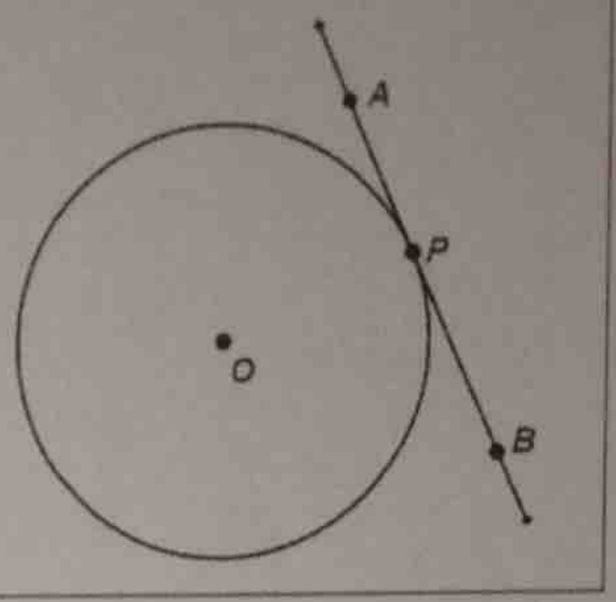
Math 3

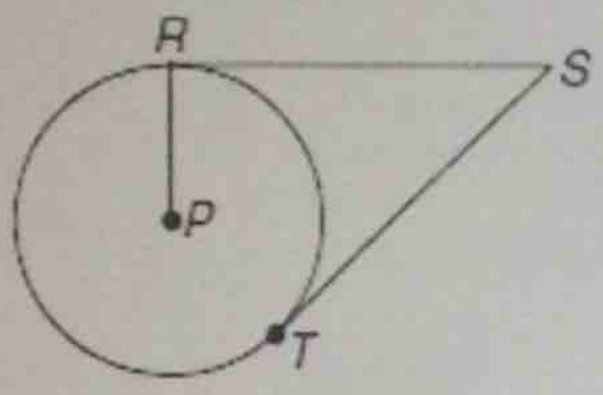
8.1 Tangent Lines of Circles

Unit 8

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.*	

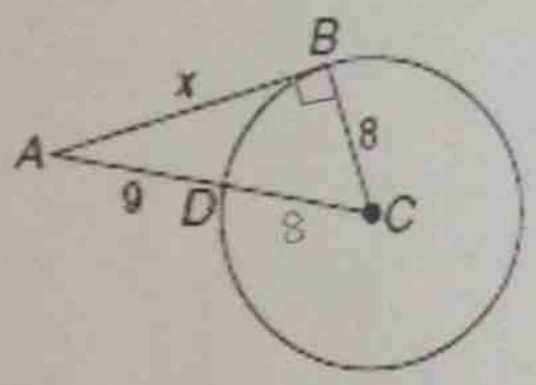
Tangent Theorem 1:	Converse Theorem 1:
If a line is tangent to a circle, then it is perpendicular to the radius drawn to the point of tangency.	If a line is perpendicular to the radius of a circle at its endpoint on a circle, then the line is tangent to the circle.



Example: If RS is tangent, then PR $\perp$ RS.

Example 1: Find the measure of x.

a)

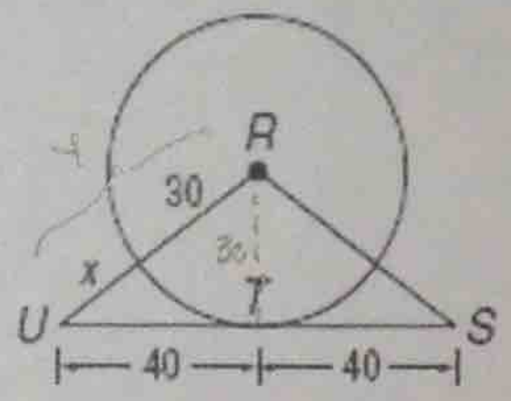


$x^2 + 8 = 17$

$x^2 = 225$

$x = 15$

b)



$30^2 + 40^2 = y^2$

$2500 = y^2$

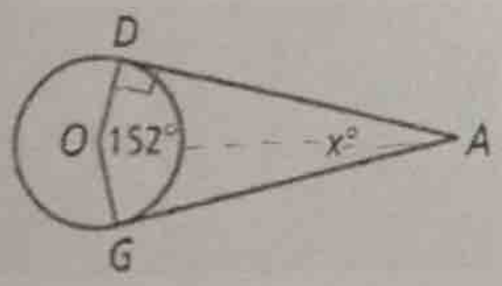
$y = 50$

$50 - 30 = x$

$x = 20$

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

a)

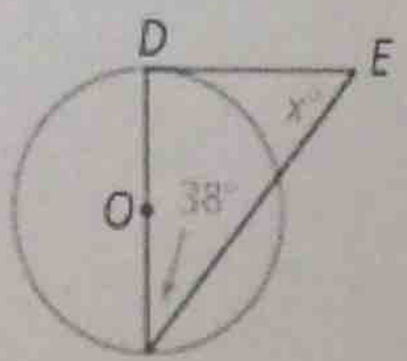


$90 + 76 + \frac{1}{2}x = 180$

$\frac{1}{2}x = 14$

$x = 28°$

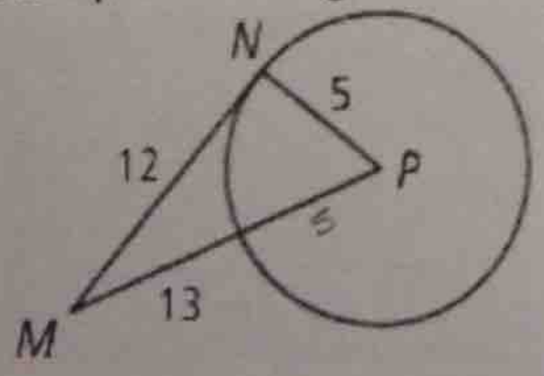
b)



$x + 38 + 90 = 180$

$x = 52°$

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



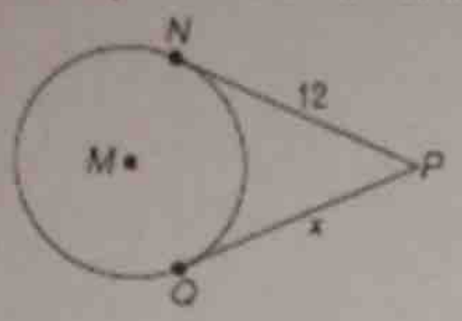
$5^2 + 12^2 = 18^2$

$169 \neq 324$

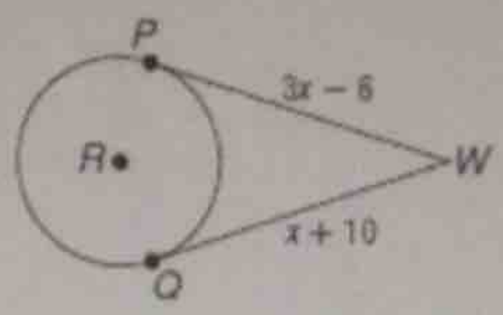
No, it is not tangent. Tangent lines make 90° $\angle$s, which create 90° $\triangle$'s. These should satisfy the pythagorean Theorem, which it does not.

Tangent Theorem 2: *If two tangent segments to a circle share a common endpoint outside the circle, then the two segments are congruent.*

Example 4: Solve for x.



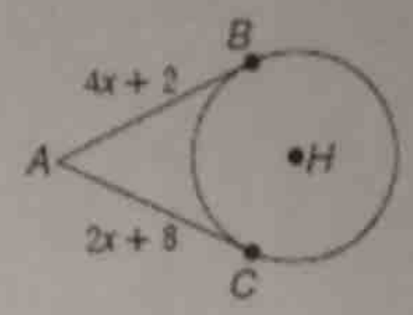
$x = 12$



$3x - 6 = x + 10$

$2x = 16$

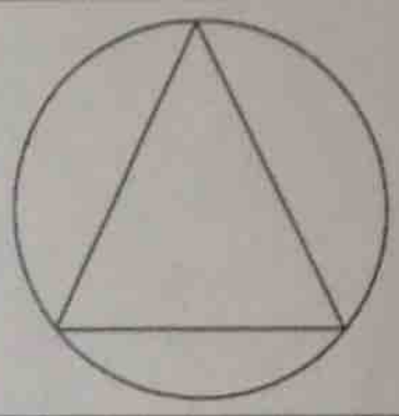
$x = 8$



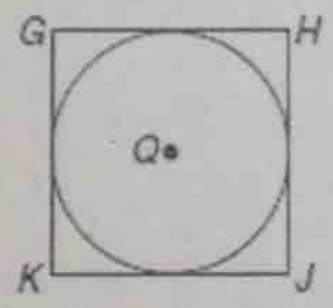
$4x + 2 = 2x + 8$

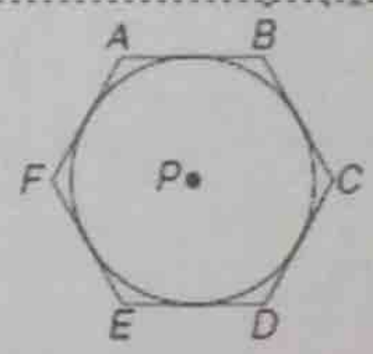
$2x = 6$

$x = 3$

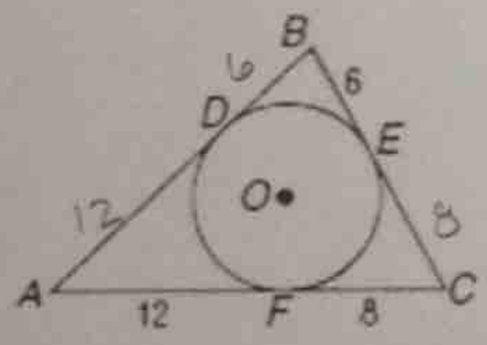
Circumscribed vs. Inscribed		
To ***circumscribe*** is when you draw a figure around another, touching it at points as possible.	To ***inscribe*** is to draw a figure within another so that the inner figure lies entirely within the boundary of the outer.	
Ex: *The circle is circumscribed about the triangle.*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

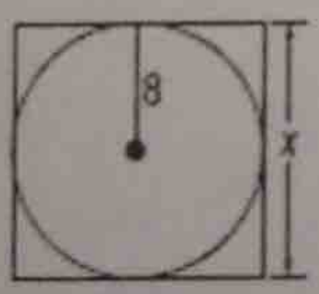


$P = 24 + 12 + 16$

$P = 52$ units

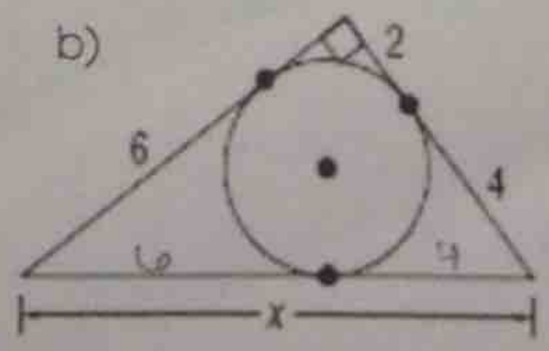
You Try! Find x. Assume that segments that appear to be tangent are tangent.

a)



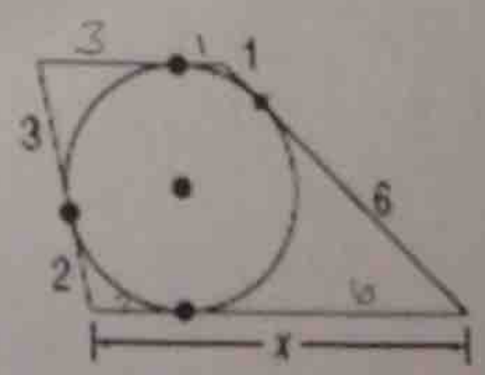
$x = 16$

b)



$x = 10$

c)



$x = 8$