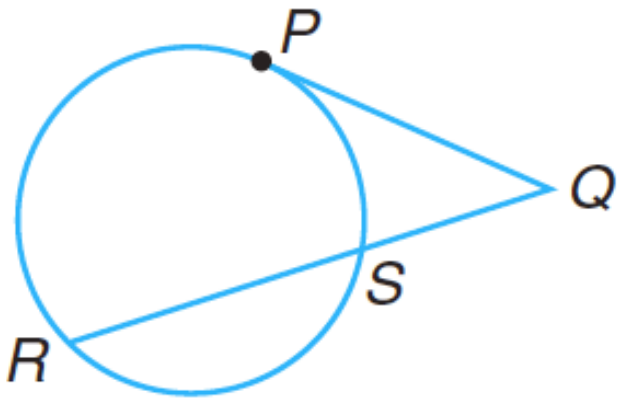
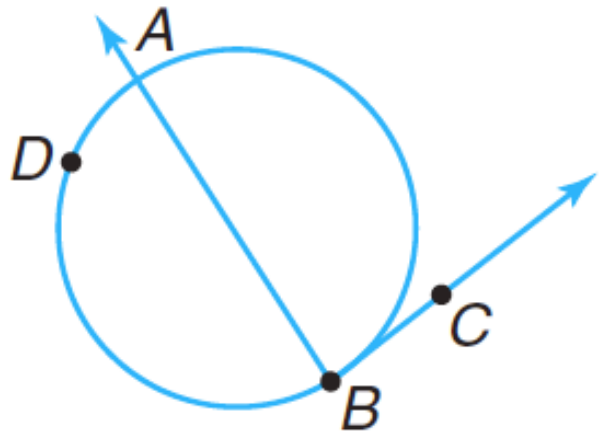
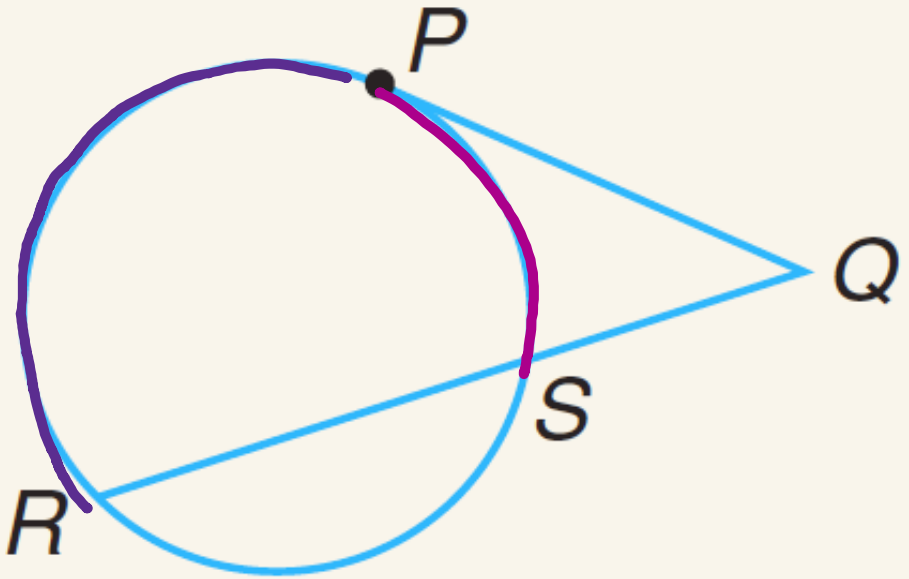
14.4- SECANT TANGENT ANGLES

Secant-Tangent Angles

- Secant-Tangent Angles are formed when a secant segment and a tangent intersect.

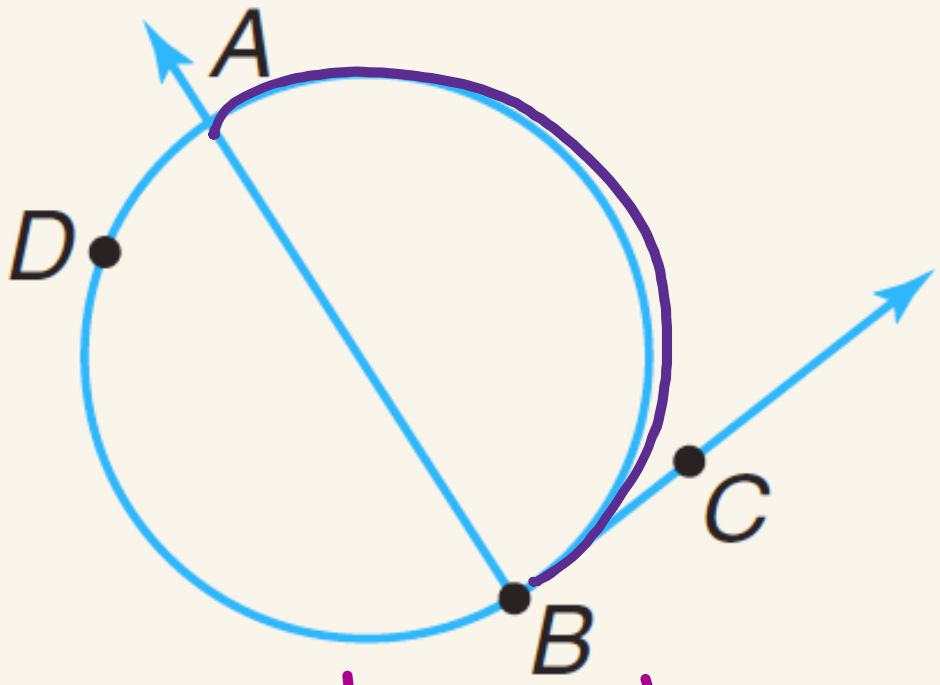
Case 1 Vertex Outside the Circle	Case 2 Vertex On the Circle
	
Secant-tangent angle PQR intercepts $\overset{\frown}{PR}$ and $\overset{\frown}{PS}$.	Secant-tangent angle ABC intercepts $\overset{\frown}{AB}$.

Secant-Tangent Angle-Arc Relationships



Same relationship as when two secants meet outside the circle.

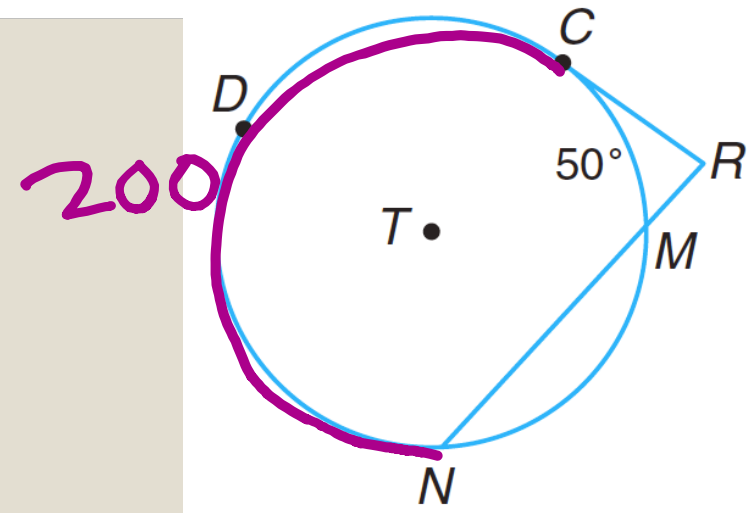
$$m\angle PQR = \frac{m\widehat{PR} - m\widehat{PS}}{2}$$



Same relationship as inscribed angles.

$$m\angle ABC = \frac{m\widehat{AB}}{2}$$

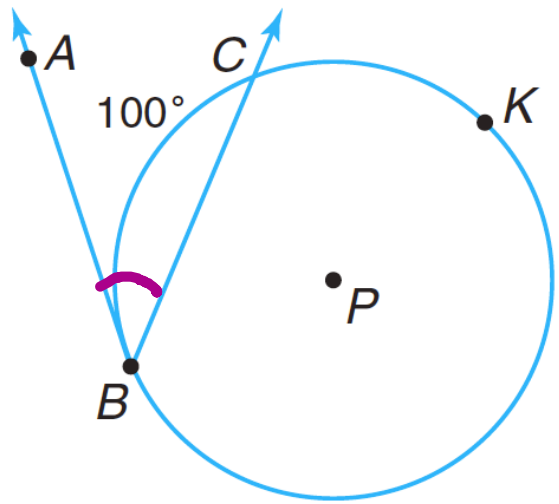
$\overline{CR}$ is tangent to $\odot T$ at C. If $m\overset{\frown}{CDN} = 200$, find $m\angle R$.



$m\angle R = \frac{m\overset{\frown}{CDN} - m\overset{\frown}{MC}}{2}$

$m\angle R = \frac{200 - 50}{2} = 75°$

$\overrightarrow{BA}$ is tangent to $\odot P$ at B. Find $m\angle ABC$.



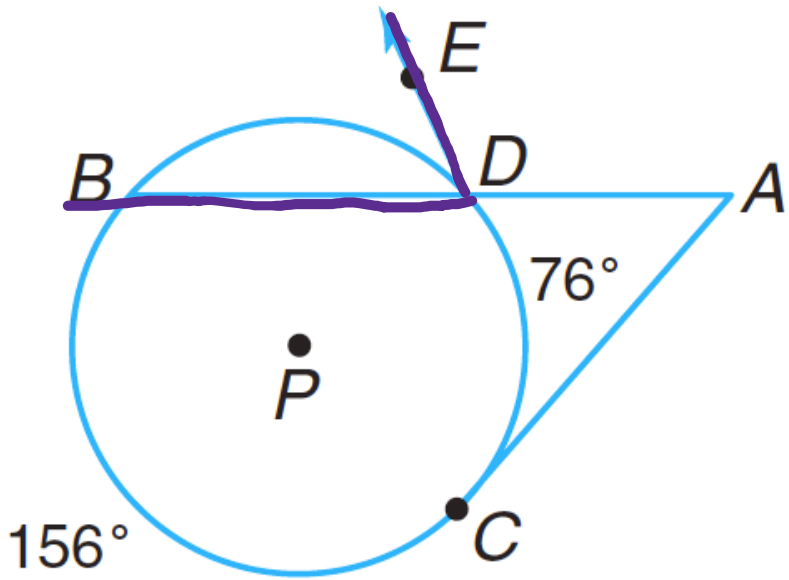
$m\angle ABC = \frac{m\overset{\frown}{BC}}{2}$

$m\angle ABC = \frac{100}{2} = 50°$

$\overline{AC}$ is tangent to $\odot P$ at C and $\overrightarrow{DE}$ is tangent to $\odot P$ at D.

a. Find $m\angle A$.

b. Find $m\angle BDE$.



a) vertex is outside the circle.

$$m\angle A = \frac{m\overset{\frown}{BC} - m\overset{\frown}{DC}}{2}$$

$$m\angle A = \frac{156 - 76}{2} = 40°$$

b) on the circle

$$m\angle BDF = \frac{m\overset{\frown}{BD}}{2}$$

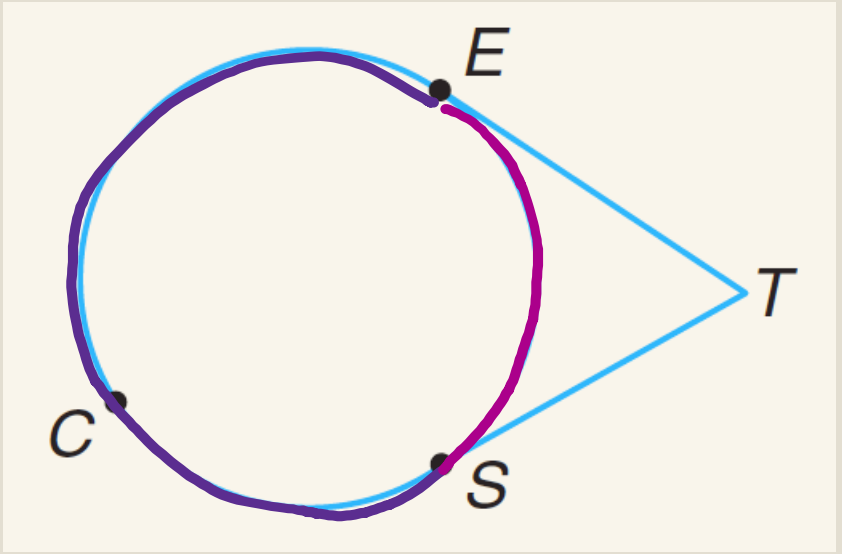
$$m\overset{\frown}{BD} = 360 - 156 - 76 = 128$$

$$m\angle BDF = \frac{128}{2} = 64°$$

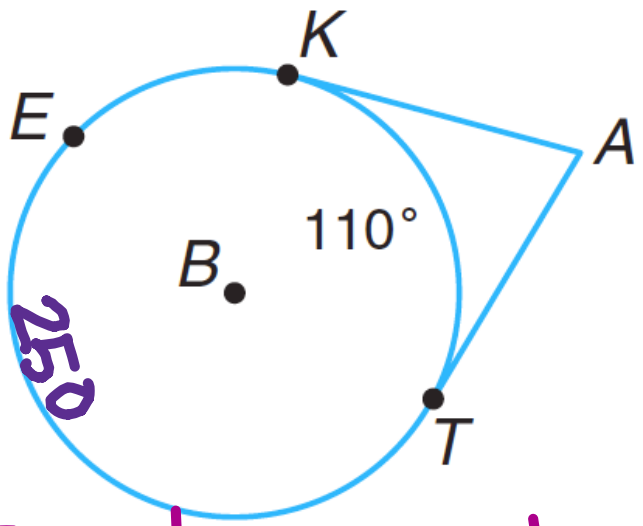
Tangent-Tangent Angles

- Tangent-Tangent Angles are formed when two tangents intersect.

$$m\angle ETS = \frac{m\widehat{ECS} - m\widehat{ES}}{2}$$



Find $m\angle A$.



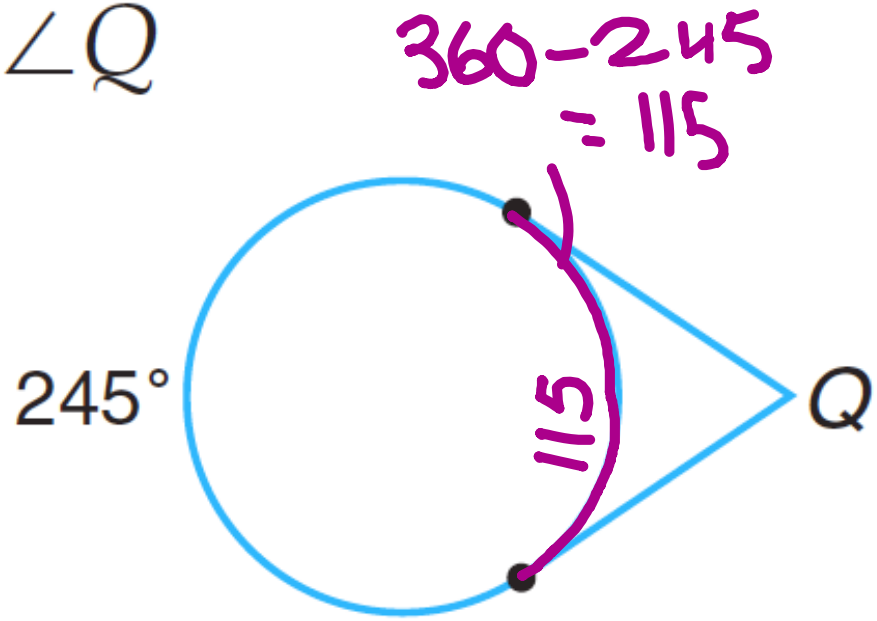
$m\overset{\frown}{KET} = 360 - 110$

Angle is outside the circle

$m\angle A = \frac{m\overset{\frown}{KET} - m\overset{\frown}{KT}}{2}$

$m\angle A = \frac{250 - 110}{2} = 70°$

$\angle Q$



$m\angle Q = \frac{245 - 115}{2}$

$m\angle Q = 65°$

Recap

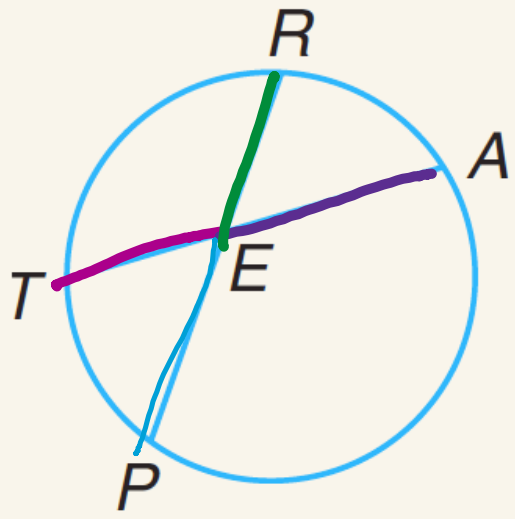
- Secant-tangent angles are formed when a secant and a tangent intersect on or outside a circle.
- There is a relationship between the angle measures and the measures of the intercepted arcs (see previous slide for equations).

Recap

- Fill in the angle and Arc Relationships in Circles table

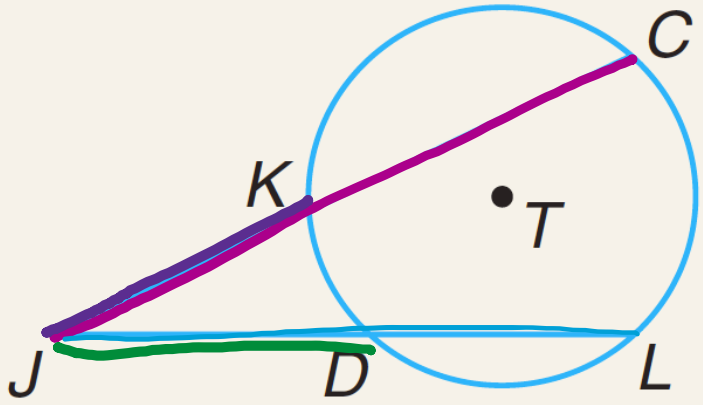
14.5- SEGMENT MEASURES

Segment Measures Relationships

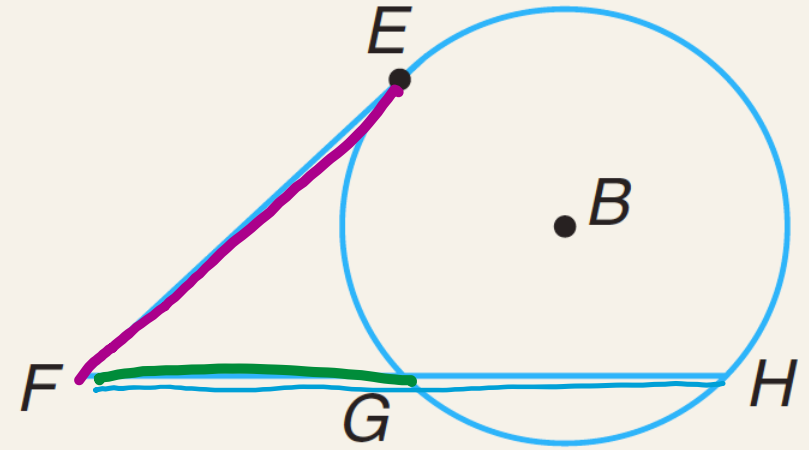


$$TE \cdot EA = RE \cdot EP$$

ET • EA = ER • EP

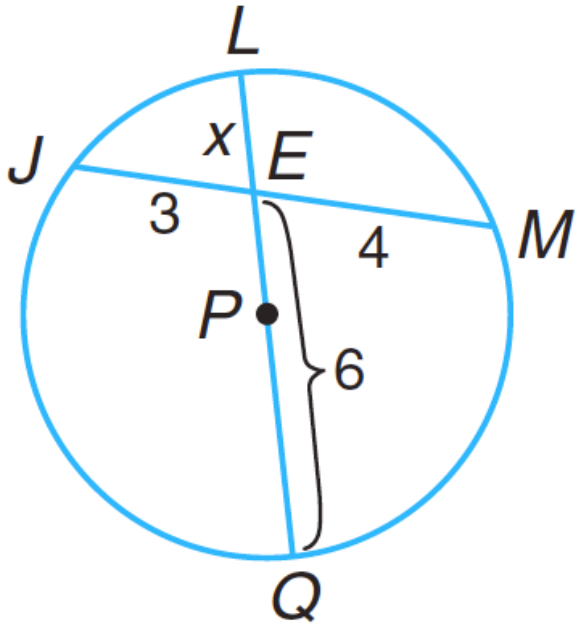


$$JC \cdot JK = JL \cdot JD$$



$$(FE)^2 = FH \cdot FG$$

In $\odot P$, find the value of x.



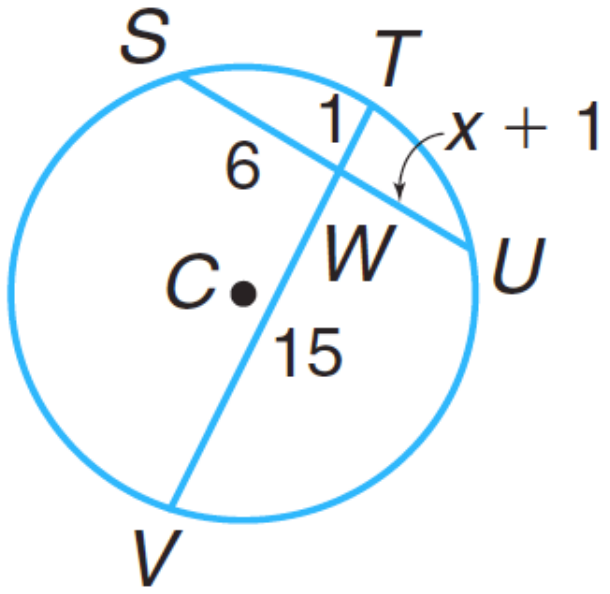
$EJ \cdot EM = EL \cdot EQ$

$3 \cdot 4 = x \cdot 6$

$12 = 6x$

$2 = x$

In $\odot C$, find UW.



$WT \cdot WV = WS \cdot WU$

$1 \cdot 15 = 6(x+1)$

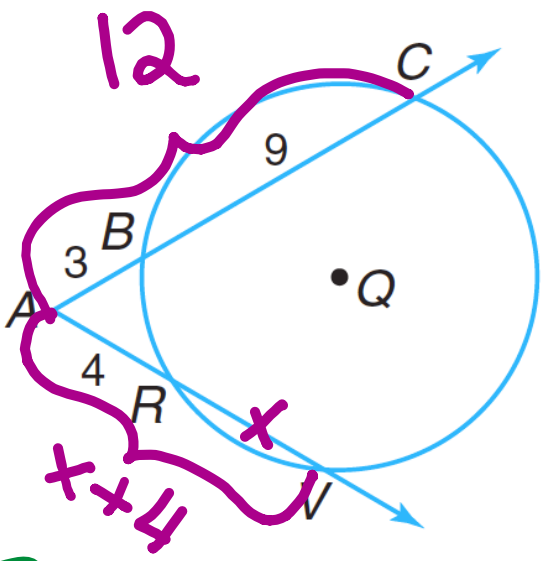
$15 = 6x + 6$

$-6 \quad -6$

$9 = 6x$

$1.5 = x$

Find AV and RV.



$AB \cdot AC = AR \cdot RV$

$3 \cdot 12 = 4(x+4)$

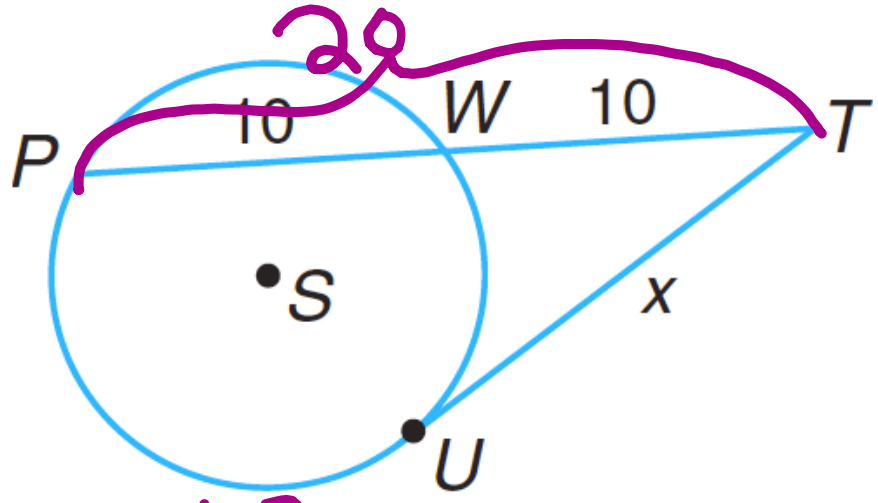
$36 = 4x + 16$

$20 = 4x$

$5 = x$

$RV = 5 \quad AV = 9$

Find the value of x to the nearest tenth.



$TU^2 = TW \cdot TP$

$x^2 = 10 \cdot 20$

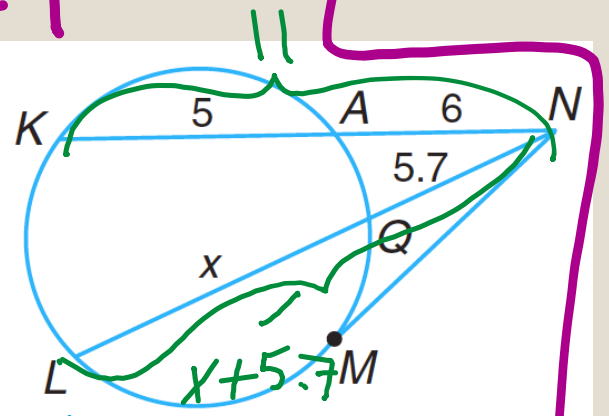
$x^2 = 200$

$x = \sqrt{200} = 2\sqrt{10}$

$= 14.1$

b. Find the value of x to the nearest tenth.

c. Find MN to the nearest tenth.



b) $6(11) = 5.7(x+5.7)$

$66 = 5.7x + 32.49$

$33.51 = 5.7x$

$5.88 = x$

$MN^2 = 6(11)$

$MN^2 = 66$

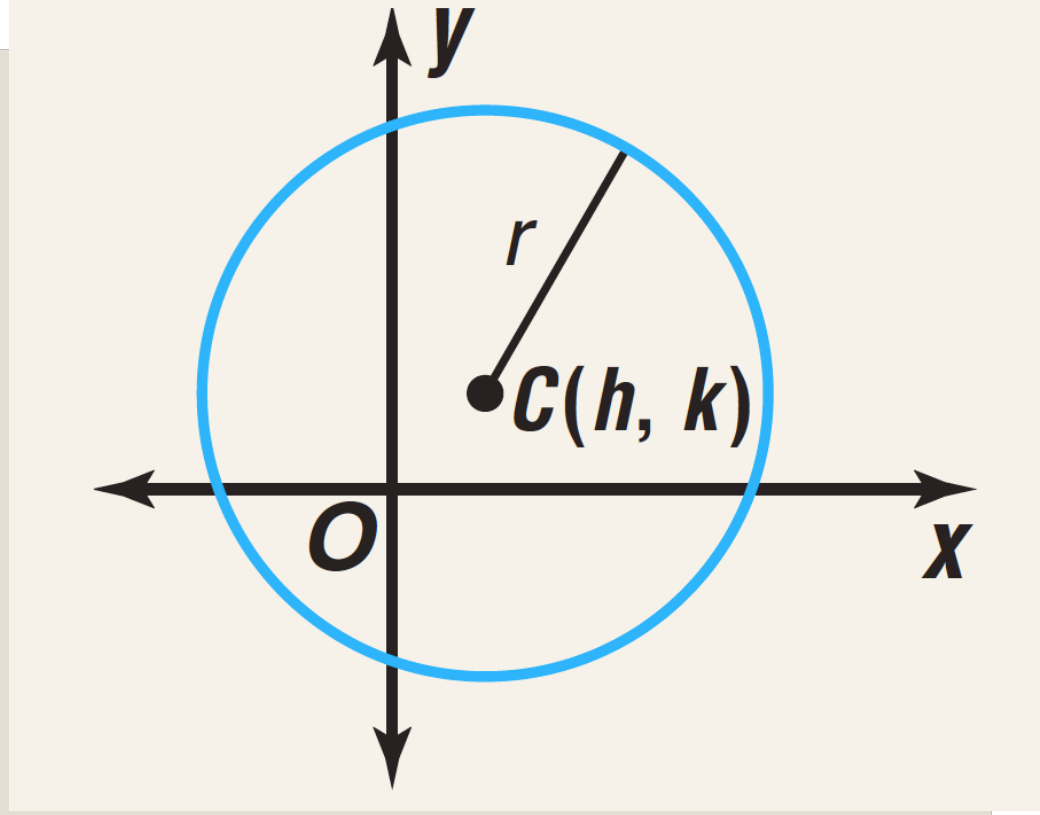
$MN = \sqrt{66} = 8.12$

Recap

- There are relationships between the measures of segments created when secants and tangents intersect in or outside a circle.
- See previous slide for equations.

14.6- EQUATIONS OF CIRCLES

Equation of a circle



coordinates of the center

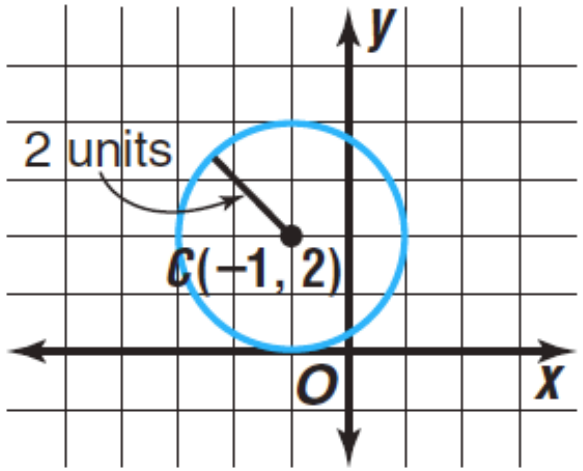
$$(x-h)^2+(y-k)^2=r^2$$

x-coordinate of center

y-coordinate of center

radius

Write an equation of a circle with center $C(-1, 2)$ and a radius of 2 units.



$h = -1$

$k = 2$

$r = 2$

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

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

Write an equation of a circle with center at $(3, -2)$ and a diameter of 8 units. $r = 4$ $h = 3$ $k = -2$

$(x-3)^2 + (y-(-2))^2 = 4^2$

$(x-3)^2 + (y+2)^2 = 16$

Find the coordinates of the center and the measure of the radius of a circle whose equation is $x^2 + \left(y - \frac{3}{4}\right)^2 = \frac{25}{4}$.

$(x-0)^2+(y-\frac{3}{4})^2=\frac{25}{4}$

$h=0$

$k=\frac{3}{4}$

$r=\sqrt{\frac{25}{4}}=\frac{5}{2}=2,5$

$C(0,\frac{3}{4})$ $r=2,5$

$(x-7)^2+(y+5)^2=4$

$h=7$

$k=-5$

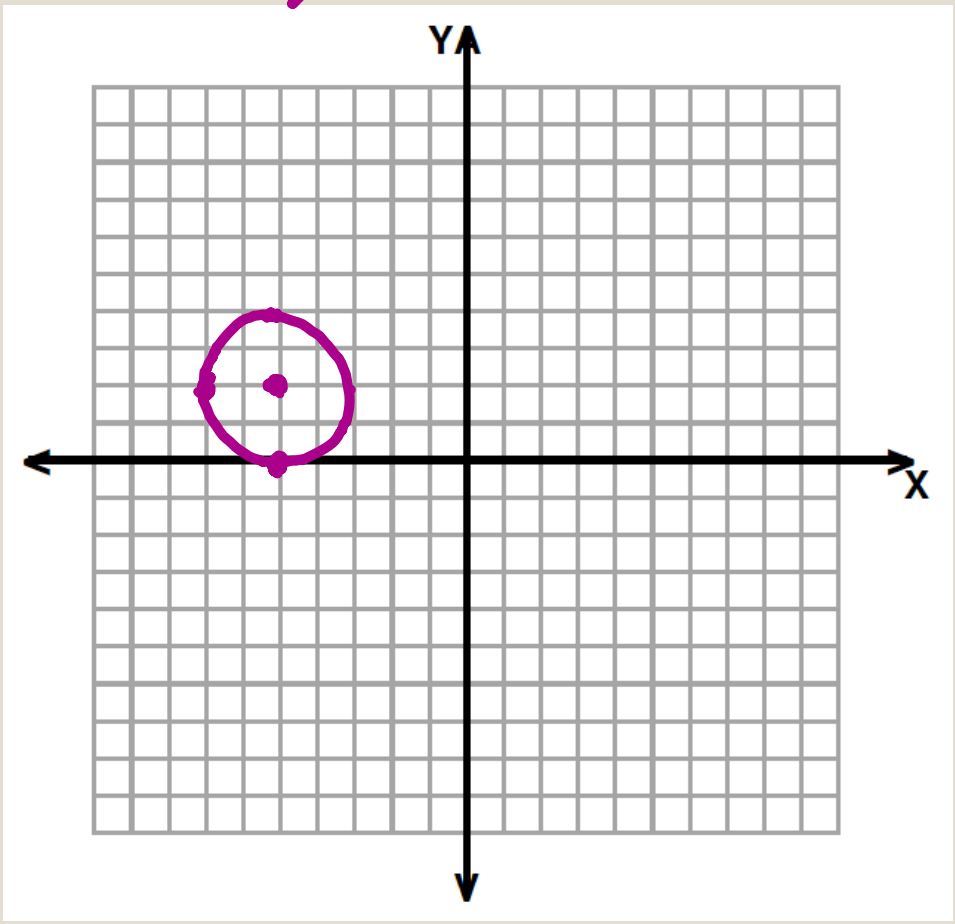
$r=\sqrt{4}=2$

$C(7,-5)$ $r=2$

Graph each equation on a coordinate plane.

26. $(x + 5)^2 + (y - 2)^2 = 4$

C(-5,2) r=2



27. $x^2 + (y - 3)^2 = 16$

C(0,3) r=4