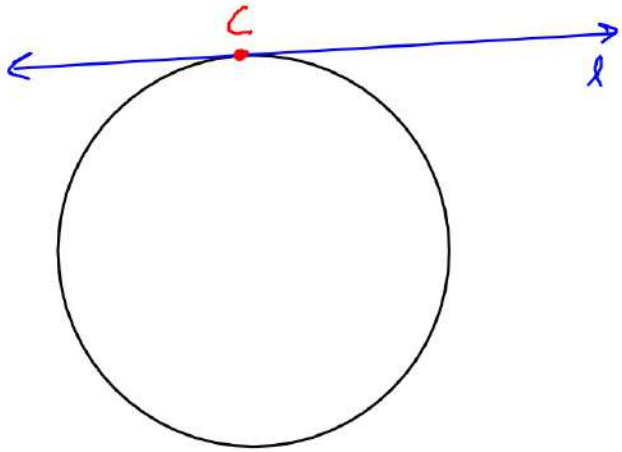
# Tangents to a Circle

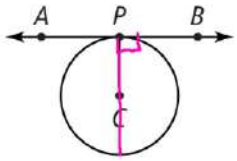
A tangent to a circle is a line in a plane of the circle that intersects the circle in exactly one point. That point is the point of tangency.



**Theorem**

If $\overleftrightarrow{AB}$ is tangent to $\odot C$ at $P$, then $\overleftrightarrow{AB}$ is perpendicular to $\overline{CP}$.

**If...**

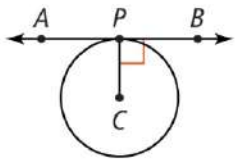



**Then...** $\overleftrightarrow{AB} \perp \overline{CP}$

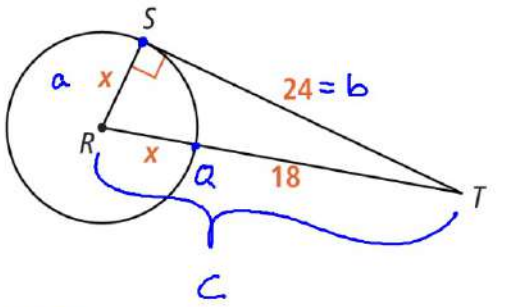
**Converse**

If $\overleftrightarrow{AB}$ is perpendicular to radius $\overline{CP}$ at $P$, then $\overleftrightarrow{AB}$ is tangent to $\odot C$.

**If...**



**B. Segment *ST* is tangent to ⊙*R*. What is the radius of ⊙*R*?**




$a^2+b^2=c^2$

$(x)^2+(24)^2=(x+18)^2$

$x^2+576=(x+18)(x+18)$

$(x+18)(x+18)$ $\quad 4^2=$

$x^2+18x+18x+324$ $\quad 9^2$

$x^2+576=x^2+36x+324$

$-x^2 \qquad -x^2$

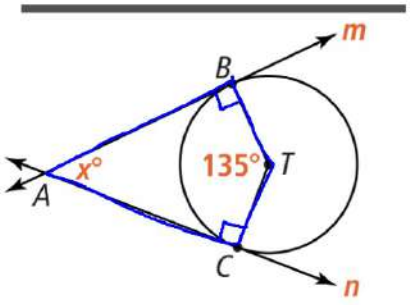
$576=36x+324$

$-324 \qquad -324$

$\frac{252}{36}=\frac{36x}{36}$

$x=7$

**C. Line $m$ is tangent to $\odot T$ at $B$, and line $n$ is tangent to $\odot T$ at $C$. What is the value of $x$?**




**SOLUTION**

$90 + 90 + 135 + x = 360$

$x = 45°$

**2.** Use $\odot N$.

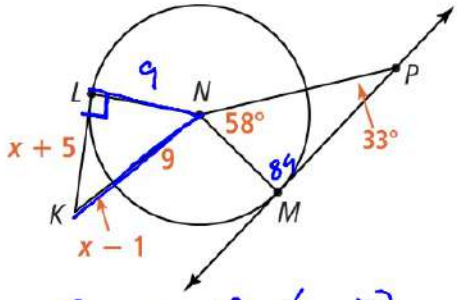
**a.** Is $\overleftrightarrow{MP}$ tangent to $\odot N$? Explain.

No, $\angle NMP$ is not a Right $\angle$.

CHECK ANSWER

**b.** If $\overline{LK}$ is tangent to $\odot N$ at $L$, what is $KN$?

$KN = 15$




$(LN)^2 + (LK)^2 = (KN)^2$

$9^2 + (x+5)^2 = (x+8)^2$

$81 + (x+5)(x+5) = (x+8)(x+8)$

$81 + x^2 + 10x + 25 = x^2 + 16x + 64$

$x^2 + 10x + 106 = x^2 + 16x + 64$

$-x^2 \qquad -x^2$

$10x + 106 = 16x + 64$

$-10x \qquad -10x$

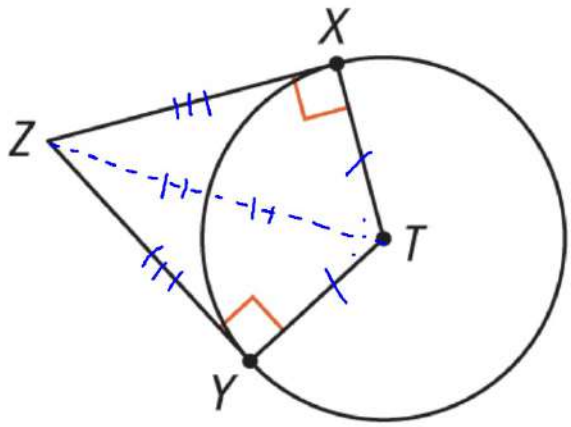
$106 = 6x + 64$

$-64 \qquad -64$

$\frac{42}{6} = \frac{6x}{6}$

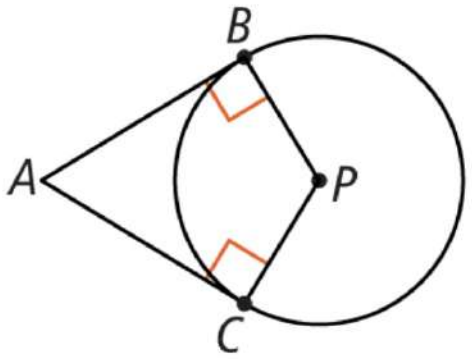
$x = 7$

$\overline{YZ}$ and $\overline{XZ}$ are tangent to the circle. What is the relationship between $\overline{YZ}$ and $\overline{XZ}$?



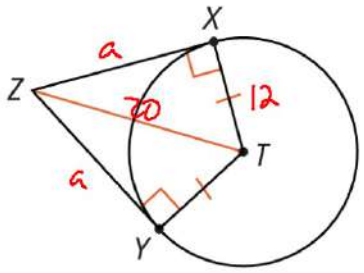
If two segments with a common endpoint exterior to a circle are tangent to the circle, then the segments are congruent.

**If...**




**Then...** $\overline{AB} \cong \overline{AC}$

**3.** If $TX = 12$ and $TZ = 20$, what are $XZ$ and $YZ$?




Enter your answer

$XZ^2 + XT^2 = TZ^2$

$XZ^2 + 12^2 = 20^2$

$XZ^2 + 144 = 400$

$XZ^2 = 256$

$XZ = 16$

$ZX = ZY = 16$

**A satellite requires a line of sight for communication. Between the ground stations farthest from the satellite, what is the amount of time needed for a signal to go from one station up to the satellite, and then down to the other station?**