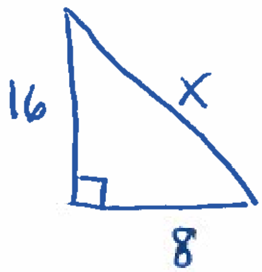
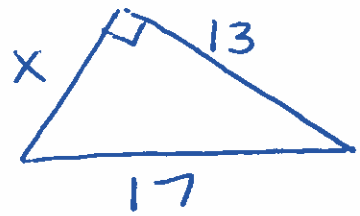
12-1 Tangent Lines

$a^2+b^2=c^2$ OR
$\swarrow$ $leg^2+leg^2=hyp^2$

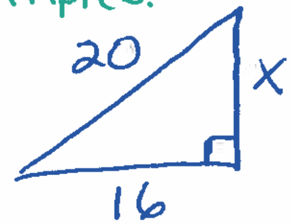
you need to use pythagorean theorem in this section. (It helps if you remember your triples.)

① 

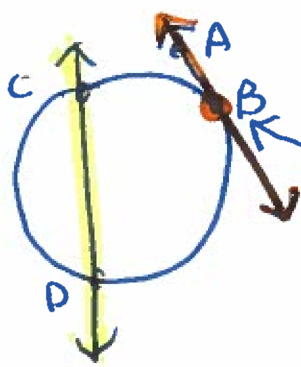
$8^2+16^2=x^2$
$64+256=x^2$
$\sqrt{320}=\sqrt{x^2}$
$\sqrt{64}\cdot\sqrt{5}=x$
$\boxed{8\sqrt{5}=x}$

② 

$x^2+13^2=17^2$
$x^2+169=289$
$\quad -169 \quad -169$
$\sqrt{x^2}=\sqrt{120}$
$x=\sqrt{4}\cdot\sqrt{30}$
$\boxed{x=2\sqrt{30}}$

③ 

↑
this one is a Pythagorean Triple
16, ___, 20
$\boxed{x=12}$

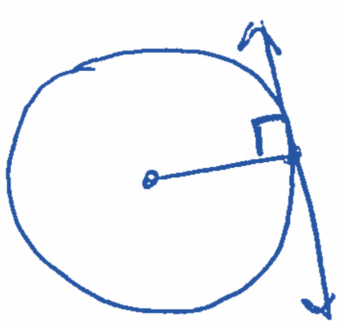


A **tangent** to a circle is a line that intersects a circle in 1 point.

Point of Tangency (Point B): the point where a circle and the tangent line intersect.

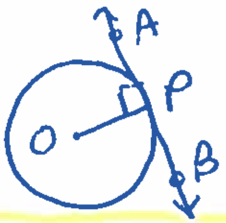
A **secant** to a circle is a line that intersects a circle twice.

Thm 12-1 Any tangent line is perpendicular to the radius drawn at the point of tangency.

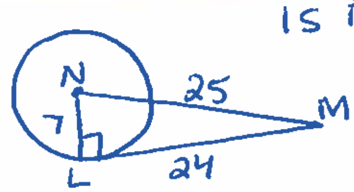


Thm 12-2 If a line in the plane of a circle is perpendicular, $\perp$, to a radius at its endpoint on the circle, then the line is tangent to the $\odot$.

If $\overleftrightarrow{AB} \perp \overline{OP}$, then $\overleftrightarrow{AB}$ is tangent to $\odot O$.



ex



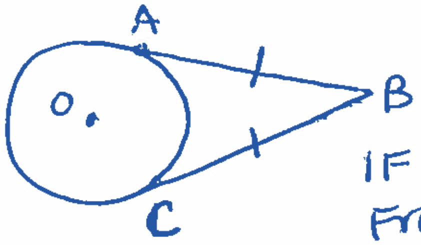
is $\overline{ML}$ tangent to $\odot N$ at L?

If you can show $\triangle NLM$ is a right $\triangle$ by pyt. thm, then you can show $\angle L$ is $90°$.

$7^2 + 24^2 = 25^2$

$625 = 625$ ✓ yes by the converse of Pyt. Thm.

Thm 12-3

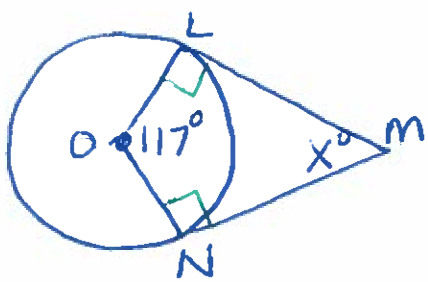


If 2 segments are tangent to a circle from an outside point, then the 2 are $\cong$.

$\overline{AB} \cong \overline{BC}$.

Examples:

1.



$\overline{ML}$ and $\overline{MN}$ are tangent to $\odot O$.
Find the value of x

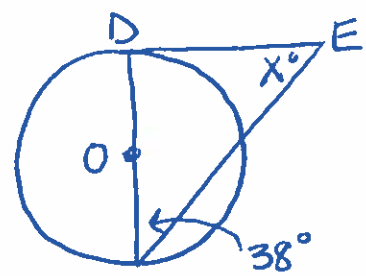
Since they are tangent you can mark $\angle OLM$ and $\angle ONM$ as $90°$

There $360°$ in a quadrilateral

so $x = 360 - 117° - 90° - 90°$

$\boxed{x = 63°}$

2.



$\overline{ED}$ is tangent to $\odot O$.

$\therefore \angle EDO = 90°$

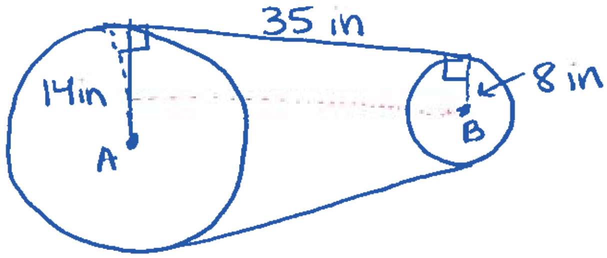
so $x = 180° - 90° - 38°$

$\boxed{x = 52°}$

12.1 p. 2

Example #3

Find the distance between the centers of the pulleys.



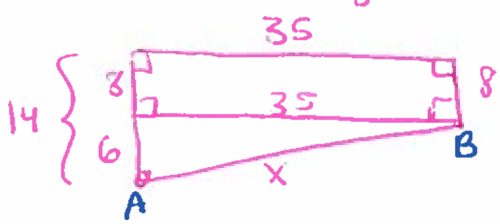
use pyt. thm.

$6^2 + 35^2 = AB^2$

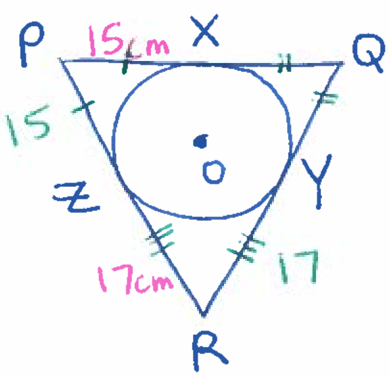
$\sqrt{1261} = \sqrt{AB^2}$

$35.5 = AB$

Draw in the line for a rectangle.



Example #4



⊙O is inscribed in $\triangle PQR$.
[redacted] the perimeter of $\triangle PQR$ is 88cm.
Find QY.

$\cancel{P = PQ + QR + PR}$

$88 = 15 + 15 + 17 + 17 + QX + QY$

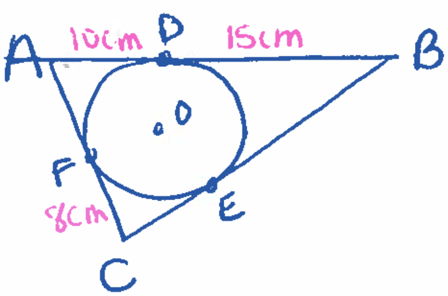
$88 = 64 + QX + QY$

$-64 \quad -64$

$\frac{24}{2} = \frac{QX + QY}{2}$

$12 = QX$ and QY

Example #5



⊙O is inscribed in $\triangle ABC$.
Find the perimeter of $\triangle ABC$.

$\overline{AD} \cong \overline{AF}$

$\overline{DB} \cong \overline{BE}$

$\overline{FC} \cong \overline{CE}$

$P = 10 + 10 + 15 + 15 + 8 + 8$

$P = 66cm$