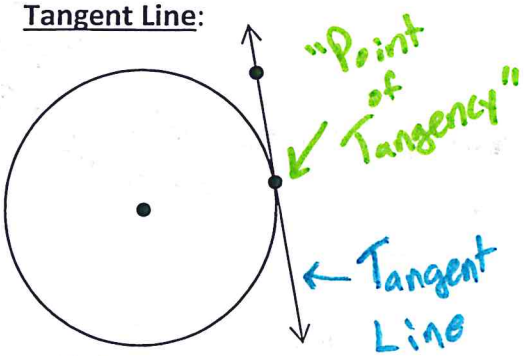
Tangent Lines

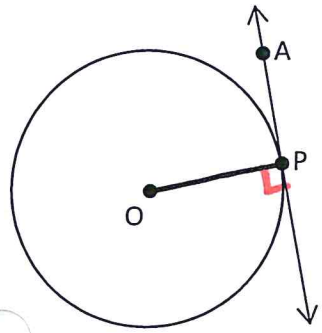
Tangent Line:



A line that intersects the circle at exactly one point.

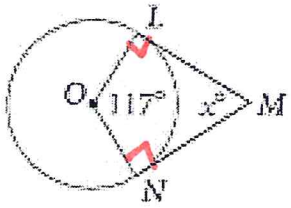
Theorem 12-1:

If a line is tangent to the circle, then the tangent line is perpendicular to the radius drawn to the tangent point.



"If tangent, then perpendicular."
(Radius & Tangent Line)

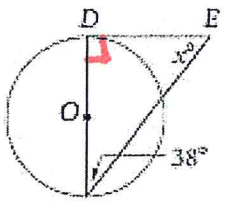
Example 1: $\overline{ML}$ and $\overline{MN}$ are tangent to circle O. Find the value of x.



$117^\circ + 90^\circ + 90^\circ + x^\circ = 360^\circ$

$x = 63^\circ$

Example 2: $\overline{ED}$ is tangent to circle O. Find x.

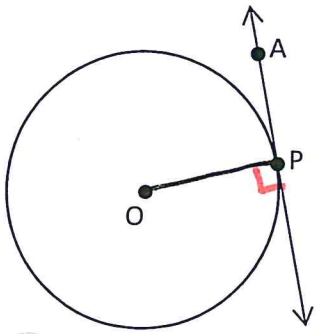


$x = 180 - 90 - 38$

$x = 52^\circ$

Is it a tangent line?

Theorem 12-2: If a line is perpendicular to a radius with its endpoint on the circle, then the line is tangent to the circle.



"If perpendicular, then tangent."

Example 3: Is $\overline{ML}$ tangent to circle N at L? Explain.

Use Pythag. Thm. to prove $\angle NLM = 90^\circ$.

If $a^2 + b^2 = c^2$, then its 90°, which means perpendicular, therefore tangent.

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

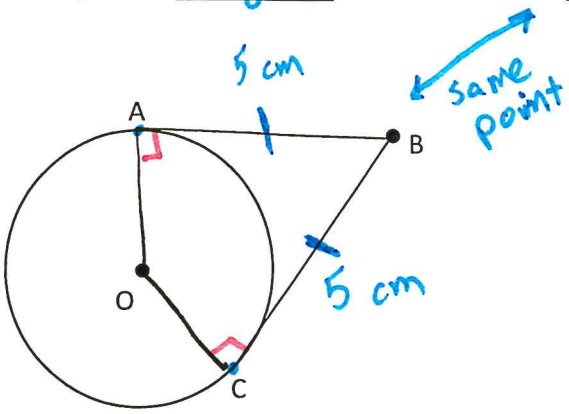
$49 + 576 = 625$

$625 = 625$ ✓

Yes, it is tangent.

Theorem 12-3:

The two segments tangent to a circle from a point outside the circle are congruent.

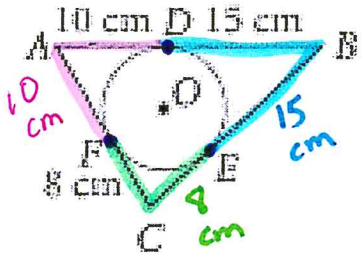


$\overline{BA} \cong \overline{BC}$

Inside, but edges are tangent.

D, E & F are all tangent pts.

Example 4: Circle O is inscribed in Triangle ABC. Find the perimeter of Triangle ABC.



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

P = 66 cm

Other applications:

A dirt bike chain fits tightly around two gears. The chain and gears form a figure like the one shown below. Find the distance between the centers of the gears. (Hint: We need to form a right triangle and use Pythag. Thm.)