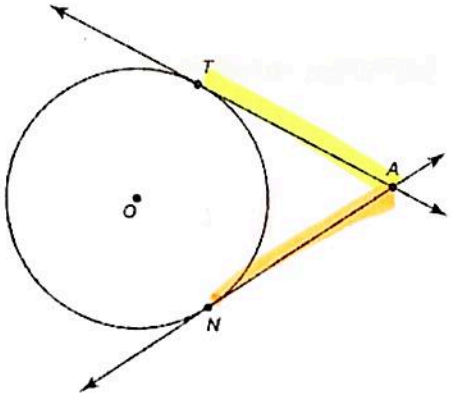
PAP Geometry Notes
Chapter 11 - Circles

Name: Coach C's Notes

11.5 – Tangents and Secants

** A **tangent** is a line that intersects a circle at exactly *one point*. **

A **tangent segment** is a line segment formed by connecting a point outside of the circle to the point of tangency.



**name the tangent segments associated with circle O.

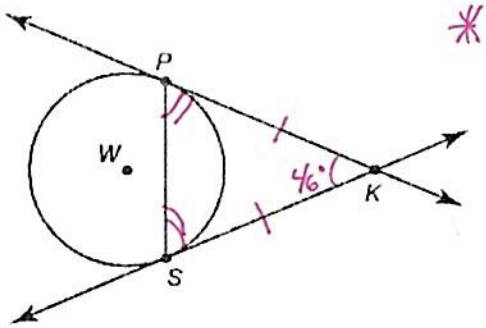
$\overline{AT}$ and $\overline{AN}$

The **Tangent Segment Theorem** states that if two tangent segments are drawn from the same point on the exterior of a circle, then the tangent segments are congruent.

**What can you conclude from circle O?

$\overline{AT} \cong \overline{AN}$

Example 1:
In the figure, $\overleftrightarrow{KP}$ *and* $\overleftrightarrow{KS}$ are tangent to circle W and $\angle PKS = 46°$. Calculate $m\angle KPS$.



* $\overline{KP}$ and $\overline{KS}$ are tangent segments and are $\cong$

→ isosceles $\triangle$

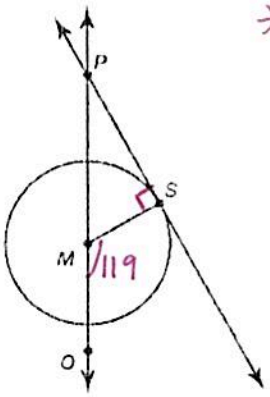
$46 + 2x = 180$

$2x = 134$

$x = 67°$

$\angle KPS = 67°$

Example 2:
In the figure, $\overleftrightarrow{PS}$ is tangent to circle M and $\angle SMO = 119°$. Calculate $m\angle MPS$.



* radius and tangent are $\perp$

$180 - 119 = 61$

$\angle SMP = 61°$

$61 + 90 + x = 180$

$x = 29°$

$\angle MPS = 29°$

** A **secant** is a line that intersects a circle at exactly *two points*. **

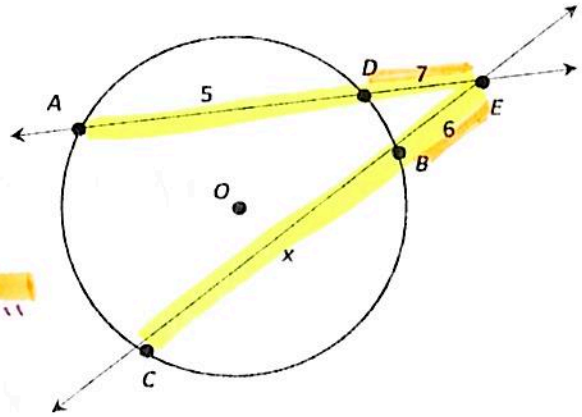
A **secant segment** is a line segment formed when two secants intersect outside a circle. A secant segment begins at the point at which the two segments intersect, continues into the circle, and ends at the point at which the secant exits the circle.
**name the secant segments associated with with circle O.

$\overline{EA}$ and $\overline{EC}$

An **external secant segment** is the portion of each segment that lies on the outside of the circle. It begins at the point at which the two segments intersect and ends at the point where the secant enters the circle.
**name the external secant segments associated with with circle O.

$\overline{ED}$ and $\overline{EB}$

The **Secant Segment Theorem** states that if two secants intersect in the exterior of a circle, then the product of the lengths of the secant segment and its external secant segment is equal to the product of the lengths of the second secant segment and its external secant segment.



Find x. (Secant segment)(ext. secant segment) = " "

$(EA)(ED) = (EC)(EB)$

$(12)(7) = (6+x)(6)$

$84 = 36 + 6x \qquad 6x = 48 \qquad \boxed{x = 8}$

The **Secant Tangent Theorem** states that if a tangent and a secant intersect in the exterior of a circle, then the product of the lengths of the secant segment and its external secant segment is equal to the square of the length of the tangent segment.

Find x.

(Secant segment)(ext. secant segment) = (tangent segment)^2

$(PT)(PA) = (PS)^2$

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

$36 = x^2$

$\boxed{x = 6}$