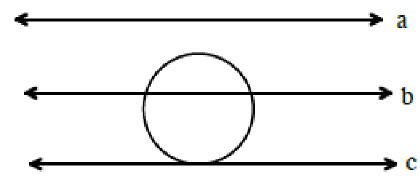
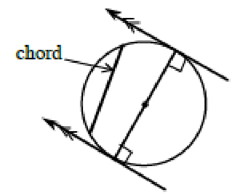
TANGENTS, SECANTS, AND CHORDS #19

The figure at right shows a circle with three lines lying on a flat surface. Line a does not intersect the circle at all. Line b intersects the circle in two points and is called a **SECANT**. Line c intersects the circle in only one point and is called a **TANGENT** to the circle.



TANGENT/RADIUS THEOREMS:

1. Any tangent of a circle is perpendicular to a radius of the circle at their point of intersection.
2. Any pair of tangents drawn at the endpoints of a diameter are parallel to each other.



A **CHORD** of a circle is a line segment with its endpoints on the circle.

DIAMETER/CHORD THEOREMS:

1. If a diameter bisects a chord, then it is perpendicular to the chord.
2. If a diameter is perpendicular to a chord, then it bisects the chord.

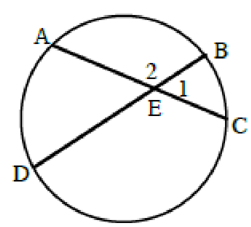
ANGLE-CHORD-SECANT THEOREMS:

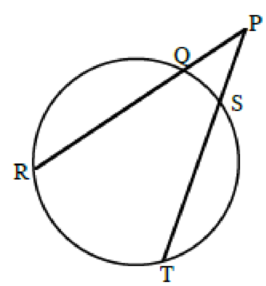
$m\angle 1 = \frac{1}{2}(m\overset{\frown}{AD} + m\overset{\frown}{BC})$

$AE \cdot EC = DE \cdot EB$

$m\angle P = \frac{1}{2}(m\overset{\frown}{RT} - m\overset{\frown}{QS})$

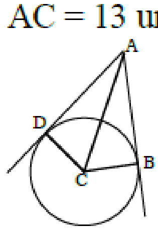
$PQ \cdot PR = PS \cdot PT$





Example 1

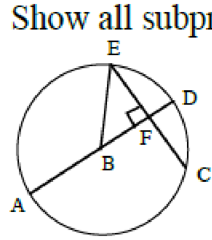
If the radius of the circle is 5 units and AC = 13 units, find AD and AB.



$\overline{AD} \perp \overline{CD}$ and $\overline{AB} \perp \overline{CD}$ by Tangent/Radius Theorem, so $(AD)^2 + (CD)^2 = (AC)^2$ or $(AD)^2 + (5)^2 = (13)^2$. So AD = 12 and $\overline{AB} \cong \overline{AD}$ so AB = 12.

Example 2

In ⊙B, EC = 8 and AB = 5. Find BF. Show all subproblems.



The diameter is perpendicular to the chord, therefore it bisects the chord, so EF = 4. $\overline{AB}$ is a radius and AB = 5. $\overline{EB}$ is a radius, so EB = 5. Use the Pythagorean Theorem to find BF: $BF^2 + 4^2 = 5^2$, BF = 3.