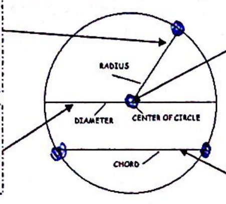
Math 3 **6.8 Chords & Arcs of Circles** Unit 6

SWBAT solve for unknown variables using theorems about chords and arcs of circles.

Any segment with endpoints that are the center and a point on the circle is a radius.

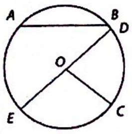
The given point is called the center. This point names the circle.



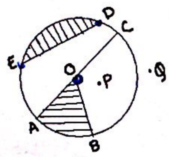
A chord that passes through the center is a diameter of a circle.

Any segment with endpoints that are on a circle is called a chord.

Example 1: Name the circle, a radius, a chord, and a diameter of the circle.

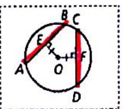
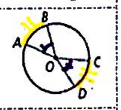
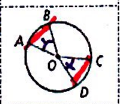
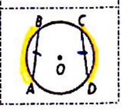


Circle: ⊙O
Radius: $\overline{OC}$
Chord: $\overline{BA}$
Diameter: $\overline{EO}$



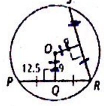
Circle: ⊙O
Radius: $\overline{OB}$
Chord: $\overline{OE}$
Diameter: $\overline{AC}$

Since a diameter is composed of two radii, then **d = 2r** and **r = d/2**

Theorem 1:	Converse Theorem 1:	
Within a circle or in congruent circles, chords equidistant from the center or centers are congruent. If $OE = OF$, then $\overline{AB} \cong \overline{CD}$.	Within a circle or in congruent circles, congruent chords are equidistant from the center (or centers). If $\overline{AB} \cong \overline{CD}$, then $OE = OF$.	
Theorem 2:	**Converse Theorem 2:**	
Within a circle or in congruent circles, congruent central angles have congruent arcs. If $\angle AOB \cong \angle COD$, then $\widehat{AB} \cong \widehat{CD}$.	Within a circle or in congruent circles, congruent arcs have congruent central angles. If $\widehat{AB} \cong \widehat{CD}$, then $\angle AOB \cong \angle COD$.	
Theorem 3:	**Converse Theorem 3:**	
Within a circle or in congruent circles, congruent central angles have congruent chords. If $\angle AOB \cong \angle COD$, then $\overline{AB} \cong \overline{CD}$.	Within a circle or in congruent circles, congruent chords have congruent central angles. If $\overline{AB} \cong \overline{CD}$, then $\angle AOB \cong \angle COD$.	
Theorem 4:	**Converse Theorem 4:**	
Within a circle or in congruent circles, congruent chords have congruent arcs. If $\overline{AB} \cong \overline{CD}$, then $\widehat{AB} \cong \widehat{CD}$.	Within a circle or in congruent circles, congruent arcs have congruent chords. If $\widehat{AB} \cong \widehat{CD}$, then $\overline{AB} \cong \overline{CD}$.	

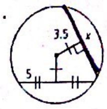
Example 2: The following chords are equidistant from the center of the circle.

a) What is the length of RS?

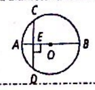
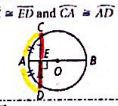
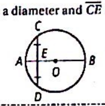
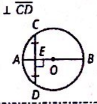
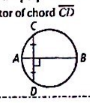
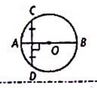


$12.5 + 12.5 = 25$

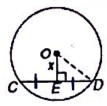
b) Solve for x.

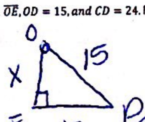


$5 + 5 = 10$

Theorem 5:	If ...	Then ...
In a circle, if a diameter is perpendicular to a chord, then it bisects the chord and its arc.	$\overline{AB}$ is a diameter and $\overline{AB} \perp \overline{CD}$ 	$\overline{CE} \cong \overline{ED}$ and $\widehat{CA} \cong \widehat{AD}$ 
Theorem 6:	**If ...**	**Then ...**
☆ opposite of #5 In a circle, if a diameter bisects a chord that is not a diameter, then it is perpendicular to the chord.	$\overline{AB}$ is a diameter and $\overline{CE} \cong \overline{ED}$ 	$\overline{AB} \perp \overline{CD}$ 
Theorem 7:	**If ...**	**Then ...**
In a circle, the perpendicular bisector of a chord contains the center of the circle.	$\overline{AB}$ is the perpendicular bisector of chord $\overline{CD}$ 	$\overline{AB}$ contains the center of ⊙O 

Example 3: In ⊙O, $\overline{CD} \perp \overline{OE}$, $OD = 15$, and $CD = 24$. Find x.

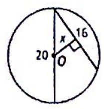




$x^2 + 12^2 = 15^2$

$x = 9$

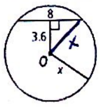
Example 4: Find the value of x to the nearest tenth.



$x = 6$

You Try! Find the value of x to the nearest tenth.

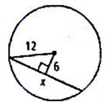
a)



$(3.6)^2 + (4)^2 = x^2$

$x = 5.4$

b)



$x = 20.8$