Lesson 12.2 Warm Up (Clickers)

1. What is the surface area of a cylinder that has a diameter of 12 inches?

2. What is a tangent line?

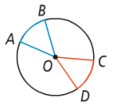
Lesson 12.2 Chords & Arcs

The following are numerous theorems that relate to circles. It is not necessary to memorize the theorems, but most of them should make sense. Remember, if it is a theorem, there is a proof proving it to be true.

Theorem 12-4 and Its Converse

Theorem
Within a circle or in congruent circles, congruent central angles have congruent arcs.

Converse
Within a circle or in congruent circles, congruent arcs have congruent central angles.



If $\angle AOB \cong \angle COD$, then $\overset{\frown}{AB} \cong \overset{\frown}{CD}$.
If $\overset{\frown}{AB} \cong \overset{\frown}{CD}$, then $\angle AOB \cong \angle COD$.

Theorem 12-5 and Its Converse

Theorem
Within a circle or in congruent circles, congruent central angles have congruent chords.

Converse
Within a circle or in congruent circles, congruent chords have congruent central angles.

If $\angle AOB \cong \angle COD$, then $\overline{AB} \cong \overline{CD}$.
If $\overline{AB} \cong \overline{CD}$, then $\angle AOB \cong \angle COD$.

You will prove Theorem 12-5 and its converse in Exercises 20 and 36.

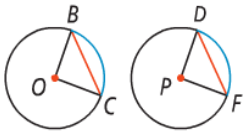
Theorem 12-6 and Its Converse

Theorem
Within a circle or in congruent circles, congruent chords have congruent arcs.

Converse
Within a circle or in congruent circles, congruent arcs have congruent chords.

If $\overline{AB} \cong \overline{CD}$, then $\overset{\frown}{AB} \cong \overset{\frown}{CD}$.
If $\overset{\frown}{AB} \cong \overset{\frown}{CD}$, then $\overline{AB} \cong \overline{CD}$.

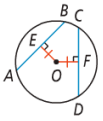
Ex. In the diagram, circle O is congruent to circle P. Given that BC is congruent to DF, what can you conclude?



Theorem 12-7 and Its Converse

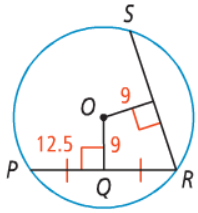
Theorem
Within a circle or in congruent circles, chords equidistant from the center or centers are congruent.

Converse
Within a circle or in congruent circles, congruent chords are equidistant from the center (or centers).

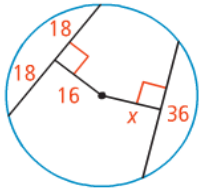


If $OE = OF$, then $\overline{AB} \cong \overline{CD}$.
If $\overline{AB} \cong \overline{CD}$, then $OE = OF$.

Ex. What is the length of RS in circle O?



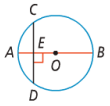
1 What is the value of x?



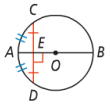
Theorem 12-8

Theorem
In a circle, if a diameter is perpendicular to a chord, then it bisects the chord and its arc.

If . . .
$\overline{AB}$ is a diameter and $\overline{AB} \perp \overline{CD}$



Then . . .
$\overline{CE} \cong \overline{ED}$ and $\overset{\frown}{CA} \cong \overset{\frown}{AD}$

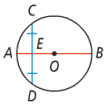


You will prove Theorem 12-8 in Exercise 22.

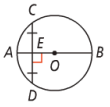
Theorem 12-9

Theorem
In a circle, if a diameter bisects a chord (that is not a diameter), then it is perpendicular to the chord.

If . . .
$\overline{AB}$ is a diameter and $\overline{CE} \cong \overline{ED}$



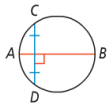
Then . . .
$\overline{AB} \perp \overline{CD}$



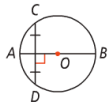
Theorem 12-10

Theorem
In a circle, the perpendicular bisector of a chord contains the center of the circle.

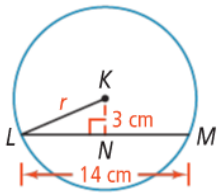
If . . .
$\overline{AB}$ is the perpendicular bisector of chord $\overline{CD}$



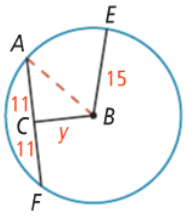
Then . . .
$\overline{AB}$ contains the center of $\odot O$



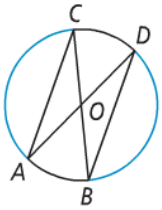
Ex. What is the value of r to the nearest tenth?



2 What is the value of y? Round to the nearest tenth.



3 In circle O, arc CD = 50 and CA = BD. What is the measure of arc AB?



4 In circle O, arc CD = 50 and CA = BD. What is true of arcs CA and BD?