Name: ___________________________

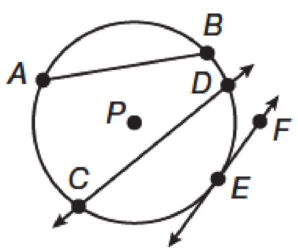
Geometry Lesson 43

Date: ___________________________

Objective: TSW identify and use chords, secants, and tangents.

Period: _________________________

The diameter and radius of a circle are two special segments that can be used to find properties of a circle. There are three more special segments common to every circle. They are chords, secants, and tangents.



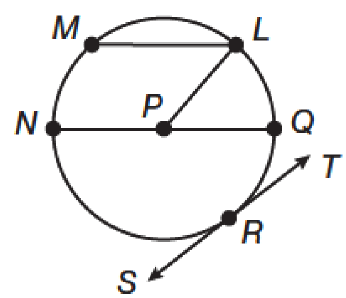
_________________ - A line segment whose endpoints lie on a circle. In the diagram, $\overline{AB}$ and $\overline{CD}$ are chords of $\odot P$.

____________________ of a Circle - A line that intersects a circle at two points. In the diagram, $\overleftrightarrow{CD}$ is a secant of $\odot P$.

_________________________ of a Circle - A line in the same plane as the circle that intersects the circle at exactly one point, called a point of tangency. *E* is a point of tangency on $\odot P$, and $\overleftrightarrow{EF}$ is a tangent line.

Example 1 Identifying Lines and Segments that Intersect Circles

Use the figure at right to answer parts a, b, and c.



a. Identify three radii and a diameter.

SOLUTION

b. Identify two chords.

SOLUTION

c. Name a tangent to the circle and identify the point of tangency.

SOLUTION

These special segments can be used to find unknown lengths in circles with the help of the theorems presented in this lesson.

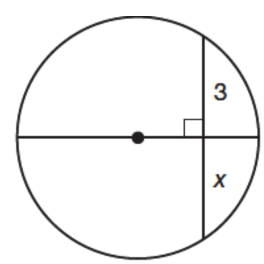
Theorem 43-1 - If a diameter is perpendicular to a chord, then it bisects the chord and its arcs.

Theorem 43-2 - If a diameter bisects a chord other than another diameter, then it is perpendicular to the chord.

Example 2 Finding Unknowns Using Chord-Diameter Relationships

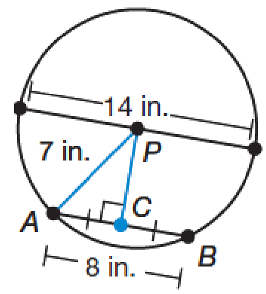
a. Find the length of *x*.

SOLUTION



b. Find m∠*ORP*.
SOLUTION

c. The circle shown has a diameter of 14 inches. Chord $\overline{AB}$ is 8 inches long. How far is $\overline{AB}$ from the center of the circle, to the nearest hundredth of an inch?
SOLUTION

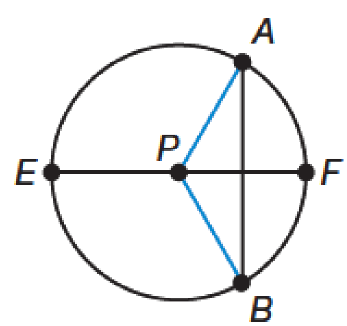


In fact, any segment that is a perpendicular bisector of a chord is also a diameter of the circle. This leads to Theorem 43-3.

Theorem 43-3 The perpendicular bisector of a chord contains the center of the circle.

Every diameter passes through the center of the circle, so another way of stating Theorem 43-3 is that the perpendicular bisector of a chord is also a diameter or a line containing the diameter.

Example 3 Proving the Perpendicular Bisector of a Chord Contains the Center
Given: $\overline{EF}$ is the perpendicular bisector of $\overline{AB}$.
Prove: $\overline{EF}$ passes through the center of ⊙*P*.
SOLUTION



Statements Reasons

1.
2.
3.

4.

One final property of chords is that all chords that lie the same distance from the center of the circle must be the same length, as stated in Theorem 43-4.

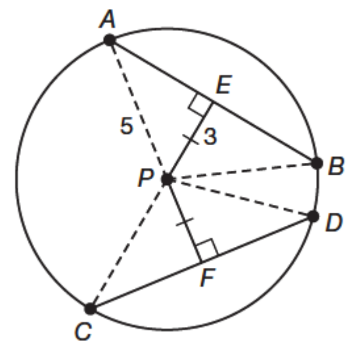
Theorem 43-4 - In a circle or congruent circles:

- **Chords equidistant from the center are congruent.**
- **Congruent chords are equidistant from the center of the circle.**

Example 4 Applying Properties of Congruent Chords

Find *CD*, if *AP* = 5 units and *PE* = 3 units.

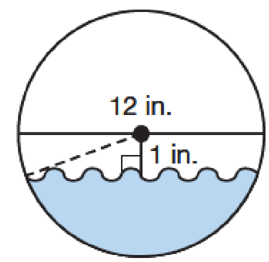
SOLUTION



Example 5 Application: Plumbing

Two identical circular pipes have diameters of 12 inches. Water is flowing 1 inch below the center of both pipes. What can be concluded about the width of the water surface in both pipes? Calculate the width.

SOLUTION



You Try!!!!!!

a.Identify each line or segment that intersects the circle.

b.Determine the value of *a*.

c.Determine the value of *x*.