

LESSON
10.1**Study Guide**

For use with pages 650–658

GOAL Use properties of a tangent to a circle.**Vocabulary**

A **circle** is the set of all points in a plane that are equidistant from a given point called the **center** of the circle.

A **radius** is a segment whose endpoints are the center and any point on the circle.

A **chord** is a segment whose endpoints are on a circle.

A **diameter** is a chord that contains the center of the circle.

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

A **tangent** is a line in the plane of a circle that intersects the circle in exactly one point, the point of tangency.

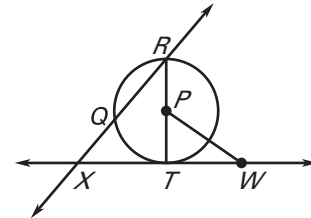
Theorem 10.1: In a plane, a line is tangent to a circle if and only if the line is perpendicular to a radius of the circle at its endpoint on the circle.

Theorem 10.2: Tangent segments from a common external point are congruent.

EXAMPLE 1 Identify special segments and lines

Tell whether the line, ray, or segment is best described as a **radius**, **chord**, **diameter**, **secant**, or **tangent** of $\odot P$.

- | | |
|--------------------|--------------------------|
| a. \overline{RT} | b. \overrightarrow{WT} |
| c. \overline{PT} | d. \overrightarrow{RQ} |

**Solution**

- \overline{RT} is a diameter because it is a chord that contains the center P .
- \overrightarrow{WT} is a tangent ray because it is contained in a line that intersects the circle in only one point.
- \overline{PT} is a radius because P is the center and T is a point on the circle.
- \overrightarrow{RQ} is a secant because it is a line that intersects the circle in two points.

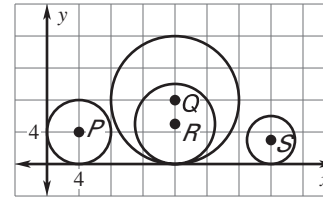
Exercises for Example 1

- Using the diagram in Example 1, what word best describes \overline{QR} ? \overline{PR} ?
- Using the diagram in Example 1, name a tangent.

LESSON
10.1**Study Guide** *continued*
For use with pages 650–658**EXAMPLE 2** Find lengths in circles in a coordinate plane

Use the diagram to find the given lengths.

- a. Diameter of $\odot P$ b. Diameter of $\odot Q$
c. Radius of $\odot P$ d. Radius of $\odot Q$

**Solution**

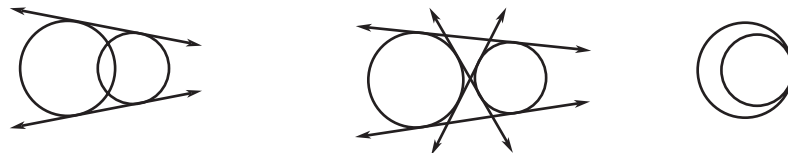
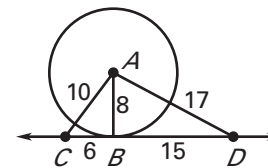
- a. The diameter of $\odot P$ is 8 units. b. The diameter of $\odot Q$ is 16 units.
c. The radius of $\odot P$ is 4 units. d. The radius of $\odot Q$ is 8 units.

EXAMPLE 3 Draw common tangents

Tell how many common tangents the circles have and draw them.

**Solution**

- a. 2 common tangents b. 4 common tangents c. 1 common tangent

**EXAMPLE 4** Verify a tangent to a circleIf \overline{AB} is a radius of $\odot A$, show \overline{BC} is tangent to $\odot A$.**Solution**Using the Converse of the Pythagorean Theorem,
 $6^2 + 8^2 = 10^2$, so $\triangle ABC$ is a right triangle and $\overline{AB} \perp \overline{BC}$.Because \overline{BC} is perpendicular to a radius of $\odot A$ at its endpoint
on $\odot A$, by Theorem 10.1, \overline{BC} is a tangent to $\odot A$.**Exercises for Examples 2, 3, and 4**

3. Use the diagram in Example 2 to find the diameter and radius of $\odot R$ and $\odot S$.

Tell how many common tangents the circles have and draw them.



7. Using the diagram in Example 4, is \overline{BD} tangent to $\odot A$?