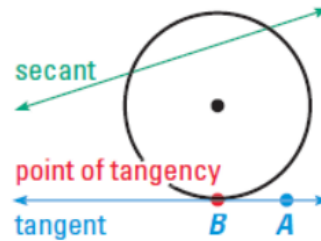
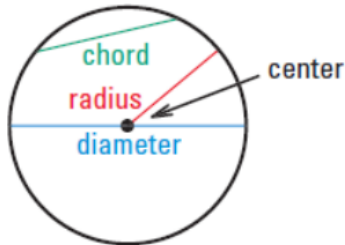


Geometry

14.1 Tangents and Circle Vocab

Vocab: circle, center, radius, chord, diameter, secant, tangent



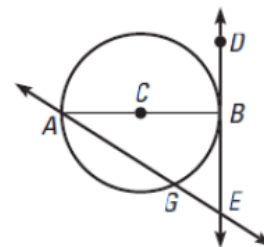
A circle whose center is point P is called "circle P" and can be written as

$\odot P$

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 $\odot C$.

- a. \overline{AC} *radius* b. \overline{AB} *diameter*
 c. \overrightarrow{DE} *tangent* d. \overleftrightarrow{AE} *secant*

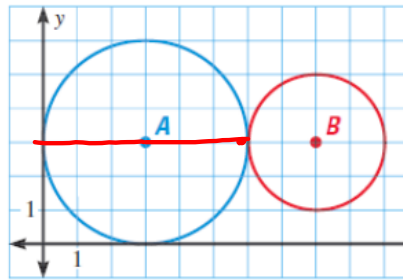


RADIUS AND DIAMETER The words *radius* and *diameter* are used for lengths as well as segments. For a given circle, think of *a radius* and *a diameter* as segments and *the radius* and *the diameter* as lengths.

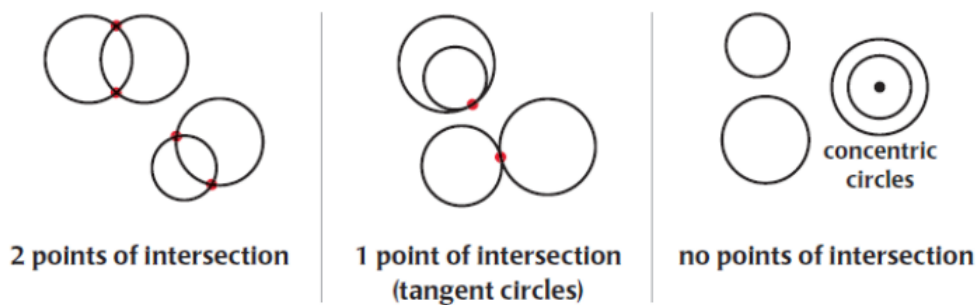
EXAMPLE 2 Find lengths in circles in a coordinate plane

Use the diagram to find the given lengths.

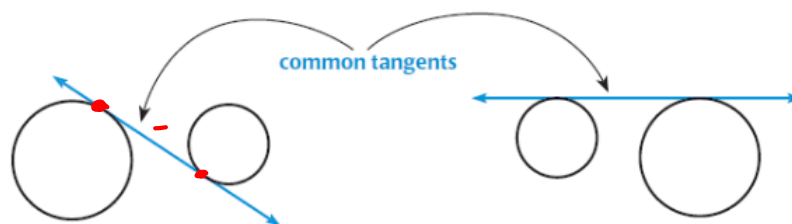
- a. Radius of $\odot A$ **3**
- b. Diameter of $\odot A$ **6**
- c. Radius of $\odot B$ **2**
- d. Diameter of $\odot B$ **4**



COPLANAR CIRCLES Two circles can intersect in two points, one point, or no points. Coplanar circles that intersect in one point are called *tangent circles*. Coplanar circles that have a common center are called *concentric*.

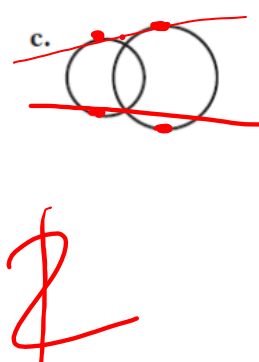
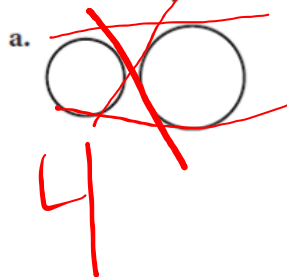


COMMON TANGENTS A line, ray, or segment that is tangent to two coplanar circles is called a *common tangent*.



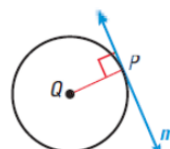
EXAMPLE 3 Draw common tangents

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



THEOREM

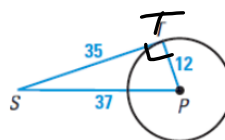
In a plane, a line is tangent to a circle if and only if the line is perpendicular to a radius of the circle at its endpoint on the circle.



Line m is tangent to $\odot Q$ if and only if $m \perp \overline{QP}$.

EXAMPLE 4 Verify a tangent to a circle

In the diagram, \overline{PT} is a radius of $\odot P$.
Is \overline{ST} tangent to $\odot P$?



$$c^2 = a^2 + b^2$$

$$37^2 = 12^2 + 35^2$$

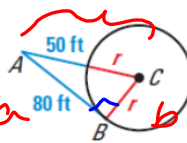
$$1369 = 144 + 1225$$

$$1369 = \sqrt{1369}$$

yes \overline{ST} is tangent to $\odot P$

EXAMPLE 5**Find the radius of a circle** $50 + r$

In the diagram, B is a point of tangency. Find the radius r of $\odot C$.



$$a^2 + b^2 = c^2$$

$$80^2 + r^2 = (50 + r)^2$$

$$6400 + r^2 = (50 + r)(50 + r)$$

$$\begin{array}{r} 50 \ 50 \\ \hline 50 \ 50 \\ \hline r \ 50 \\ \hline r \cdot r \end{array}$$

$$2500 + 50r + 50r + r^2$$

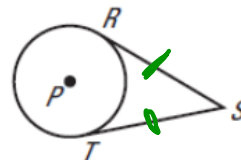
$$\begin{array}{r} 6400 + r^2 \\ -2500 \quad -r^2 \\ \hline 3900 \end{array} = \begin{array}{r} 2500 + 100r + r^2 \\ -2500 \quad -r^2 \\ \hline 100r \end{array}$$

$$\frac{3900}{100} = \frac{100r}{100}$$

$$r = 39 \text{ ft}$$

THEOREM

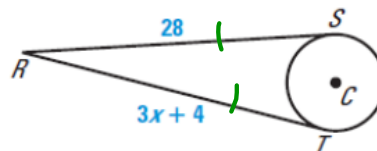
Tangent segments from a common external point are congruent.



If \overline{SR} and \overline{ST} are tangent segments, then $\overline{SR} \cong \overline{ST}$.

EXAMPLE 6**Find the radius of a circle**

\overline{RS} is tangent to $\odot C$ at S and \overline{RT} is tangent to $\odot C$ at T . Find the value of x .



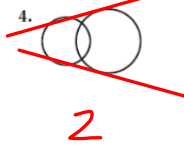
$$3x + 4 = 28$$

$$3x = 24$$

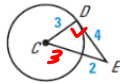
$$x = 8$$

Try this:

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



7. Is \overline{DE} tangent to $\odot C$?

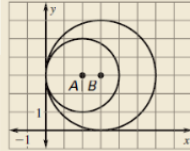


$$3^2 + 4^2 = 5^2$$

$$9 + 16 = 25$$

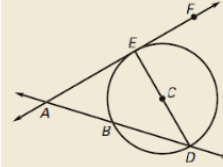
Yes

Use the diagram to find the given lengths.



- a. Radius of $\odot B$ 3
- b. Diameter of $\odot A$ 4
- c. Radius of $\odot A$ 2
- d. Diameter of $\odot B$ 6

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



- a. \overline{DC}
- b. \overline{BD}
- c. \overline{DE}
- d. \overline{AE}

- a) radius
- b) secant
- c) diameter
- d) tangent

Homework

Worksheet