6.1 Use Properties of Tangents

Georgia Performance Standard(s)

MM2G3a, MM2G3d

Your Notes

Goal • Use properties of a tangent to a circle.

VOCABULARY

Circle

Center

Radius

Chord

Diameter

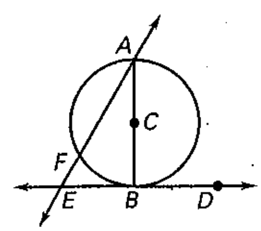
Secant

Tangent

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 ⊙C.

a. $\overline{BC}$ **b.** $\overleftrightarrow{EA}$ **c.** $\overrightarrow{DE}$



Solution

a. $\overline{BC}$ is a ________ because C is the center and B is a point on the circle.

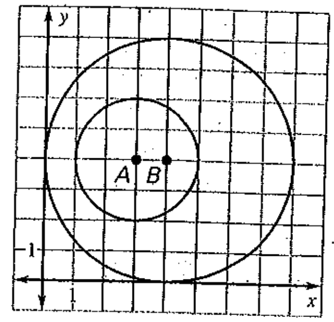
b. $\overleftrightarrow{EA}$ is a ________ because it is a line that intersects the circle in two points.

c. $\overrightarrow{DE}$ is a ________ ray because it is contained in a line that intersects the circle in exactly one point.

Your Notes

Example 2 *Find lengths in circles in a coordinate plane*

Use the diagram to find the given lengths.



a. Radius of ⊙A

b. Diameter of ⊙A

c. Radius of ⊙B

d. Diameter of ⊙B

Solution

a. The radius of ⊙A is ___ units.

b. The diameter of ⊙A is ___ units.

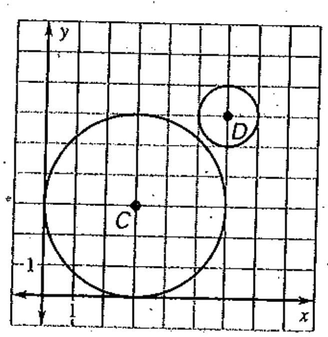
c. The radius of ⊙B is ___ units.

d. The diameter of ⊙B is ___ units.

Checkpoint **Complete the following exercises.**

1. In Example 1, tell whether $\overline{AB}$ is best described as a *radius, chord, diameter, secant,* or *tangent. Explain.*

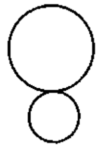
2. Use the diagram to find (a) the radius of ⊙C and (b) the diameter of ⊙D.

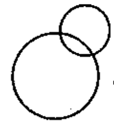


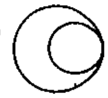
Your Notes

Example 3 *Draw common tangents*

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

a. 

b. 

c. 

Solution

a. ___ common tangent(s)

b. ___ common tangent(s)

c. ___ common tangent(s)

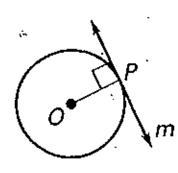
Checkpoint Tell how many common tangents the circles have and draw them.

3. 

4. 

THEOREM 6.1

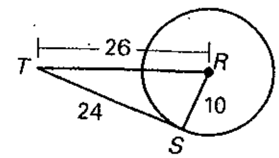
In a plane, a line is tangent to a circle if and only if the line is ______________ to a radius of the circle at its endpoint on the circle.



Your Notes

Example 4 *Verify a tangent to a circle*

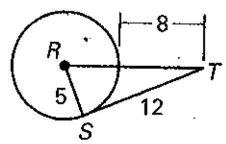
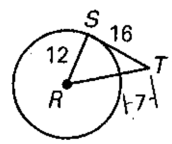
In the diagram, $\overline{RS}$ is a radius of $\odot R$. Is $\overline{ST}$ tangent to $\odot R$?



Solution

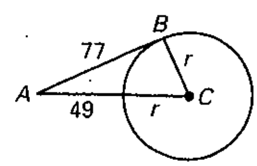
Use the Converse of the Pythagorean Theorem. Because $10^2 + 24^2 = 26^2$, $\triangle RST$ is a ____________ and $\overline{RS} \perp$ ____ . So, ____ is perpendicular to a radius of $\odot R$ at its endpoint on $\odot R$. By ____________, $\overline{ST}$ is ________ to $\odot R$.

✔ ***Checkpoint*** **$\overline{RS}$ is a radius of $\odot R$. Is $\overline{ST}$ tangent to $\odot R$?**

5. 	**6.** 

Example 5 *Find the radius of a circle*

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



Solution

You know from Theorem 6.1 that $\overline{AB} \perp \overline{BC}$, so $\triangle ABC$ is a ____________. You can use the Pythagorean Theorem.

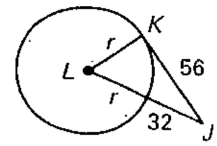
$AC^2 = BC^2 + AB^2$	**Pythagorean Theorem**
$(r + 49)^2 = r^2 + 77^2$	**Substitute.**
$r^2 +$ ____ $r +$ ____ $= r^2 +$ ____	**Multiply.**
____ $r =$ ____	**Subtract from each side.**
$r =$ ____	**Divide each side by ____.**

The radius of $\odot C$ is ____.

Your Notes

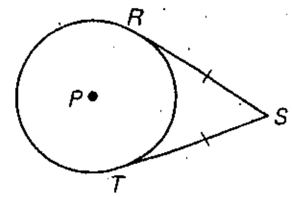
✔ *Checkpoint* **Complete the following exercise.**

7. In the diagram, K is a point of tangency. Find the radius r of $\odot L$.



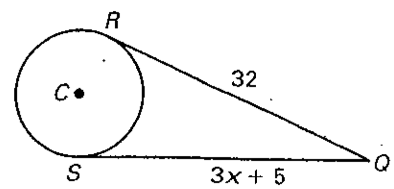
THEOREM 6.2

Tangent segments from a common external point are ____________.



Example 6 ***Use properties of tangents***

$\overline{QR}$ is tangent to $\odot C$ at R and $\overline{QS}$ is tangent to $\odot C$ at S. Find the value of x.



Solution

$QR = QS$	**Tangent segments from a common external point are ____________.**
____ = ________	**Substitute.**
____ $= x$	**Solve for x.**