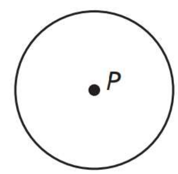
10.1 Lines and segments that intersect circles

Tuesday, September 5, 2017 1:18 PM

What You Will Learn

- Identify special segments and lines.
- Draw and identify common tangents.
- Use properties of tangents.

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 circle with center P is called "circle P" and can be written as $\odot P$.



circle P, or $\odot P$

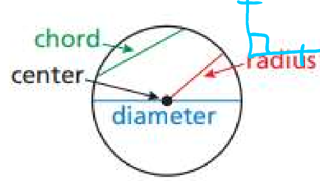
$\overleftrightarrow{AB}$

$\odot P$

Lines and Segments That Intersect Circles

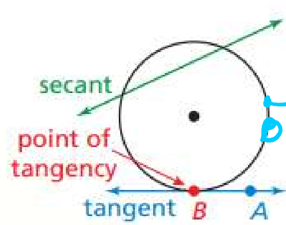
A segment whose endpoints are the center and any point on a circle is a **radius**.

A **chord** is a segment whose endpoints are on a circle. A **diameter** is a chord that contains the center of the circle.



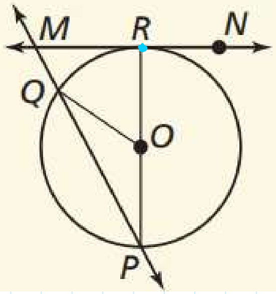
A **secant** is a line that intersects a circle in two points.

A **tangent** is a line in the plane of a circle that intersects the circle in exactly one point, the **point of tangency**. The *tangent ray* $\overrightarrow{AB}$ and the *tangent segment* $\overline{AB}$ are also called tangents.



not tangent

Tell whether the line, ray, or segment is best described as a *radius*, *chord*, *diameter*, *secant*, or *tangent* of ⊙*O*.

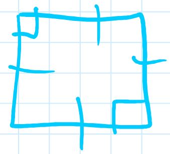


a. $\overline{PR}$ diameter, chord

b. $\overleftrightarrow{MN}$ tangent

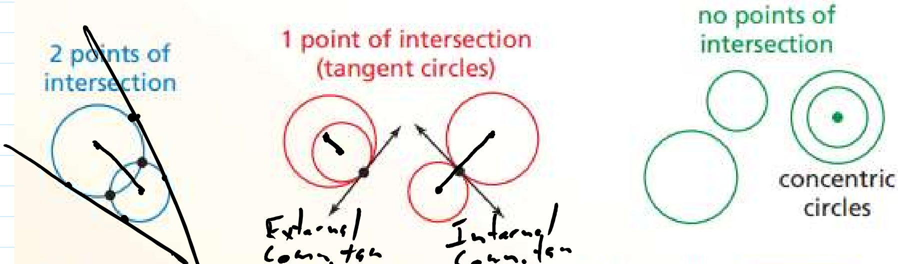
c. $\overleftrightarrow{PQ}$ secant

d. $\overline{QO}$ radius



Coplanar Circles and Common Tangents

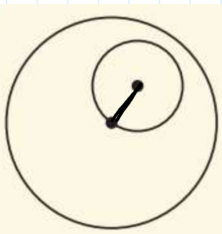
In a plane, two circles can intersect in two points, one point, or no points. Coplanar circles that intersect in one point are called **tangent circles**. Coplanar circles that have a common center are called **concentric circles**.



A line or segment that is tangent to two coplanar circles is called a **common tangent**. A *common internal tangent* intersects the segment that joins the centers of the two circles. A *common external tangent* does not intersect the segment that joins the centers of the two circles.

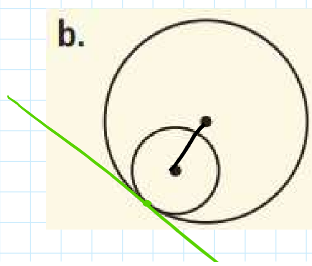
Tell how many common tangents the circles have. Draw them, and list how many are internal and how many are external.

a.

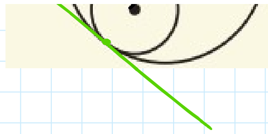


No comm tan

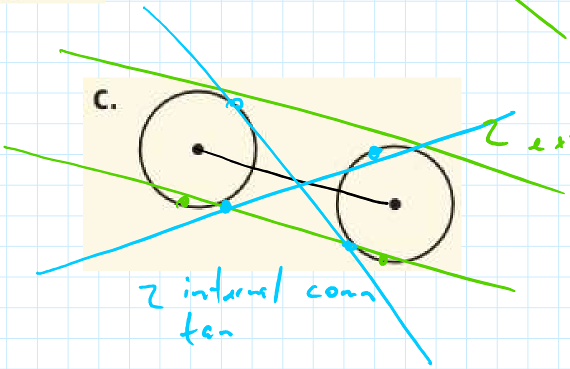
b.



1 comm tan external



c.

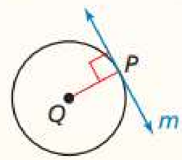


2 external com tan

2 internal com tan

Theorem 10.1 Tangent Line to Circle 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.

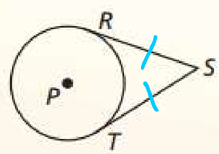


Line m is tangent to $\odot Q$ if and only if $m \perp \overline{QP}$.

Proof Ex. 47, p. 536

Theorem 10.2 External Tangent Congruence Theorem

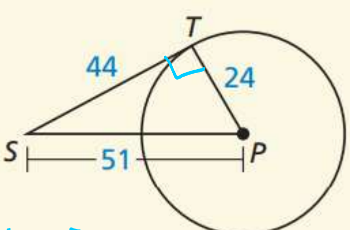
Tangent segments from a common external point are congruent.



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

Proof Ex. 46, p. 536

Is $\overline{ST}$ tangent to $\odot P$?



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

$44^2+24^2=51^2$

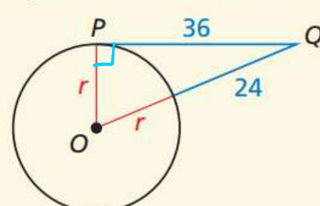
$1936+576=2601$

$2512 \neq 2601$

∴ Not tangent

1936
576
2512

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



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

$36^2+r^2=(24+r)^2$

FOIL

$(24+r)^2=(24+r)(24+r)$

$576+24r+24r+r^2$

$576+48r+r^2$

$1296+r^2 = \cancel{576}+48r+r^2$

$-576 \quad \cancel{-576}$

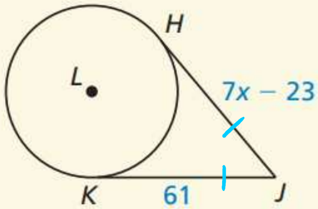
$720+\cancel{r^2} = 48r+\cancel{r^2}$

$\cancel{-r^2} \quad \cancel{-r^2}$

$720=48r$

$\boxed{r=15}$

$\overline{JH}$ is tangent to $\odot L$ at H, and $\overline{JK}$ is tangent to $\odot L$ at K. Find the value of x.



$7x - 23 = 61$

$+23 \quad +23$

$\frac{7x}{7} = \frac{84}{7}$

$\boxed{x = 12}$

Practice *sec 10.1* **pg. 534: 5-18A, 19-25EO, 29, 31**
