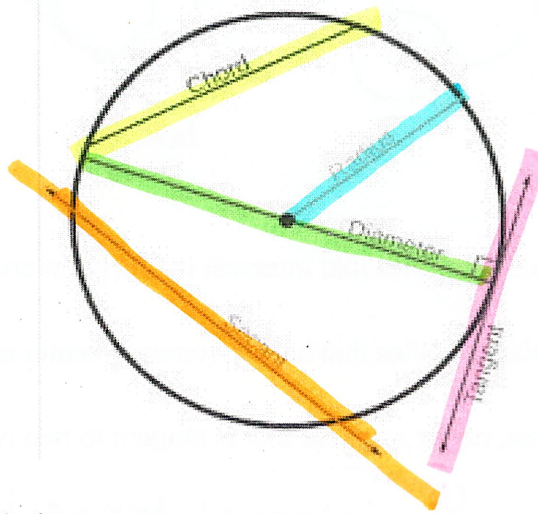
Chapter 10.1: Use Properties of Tangents

Goal: To be able to identify chords, tangents, secants, radii and diameters of circles and use properties of a tangent to a circle.

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 segment whose endpoints are the center and any point on the 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 intersect the circle in exactly one point, called the point of tangency.

$\perp$ to the radius

Example #1: Tell whether the line or segment is <u>best</u> described as a chord, a secant, a tangent, a diameter, or a radius of $\odot C$.

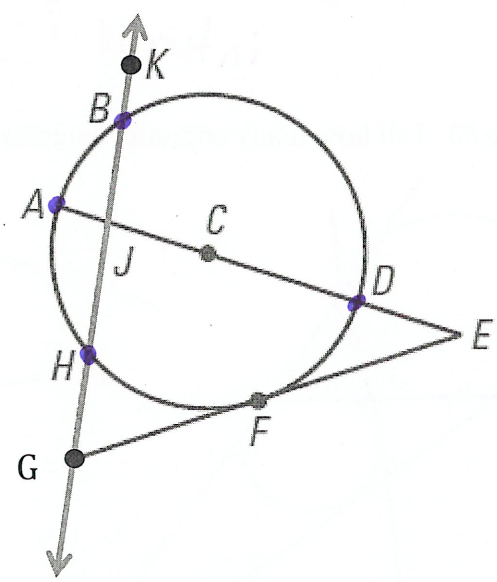
a. $\overline{AD}$ diameter

b. $\overline{CD}$ radius

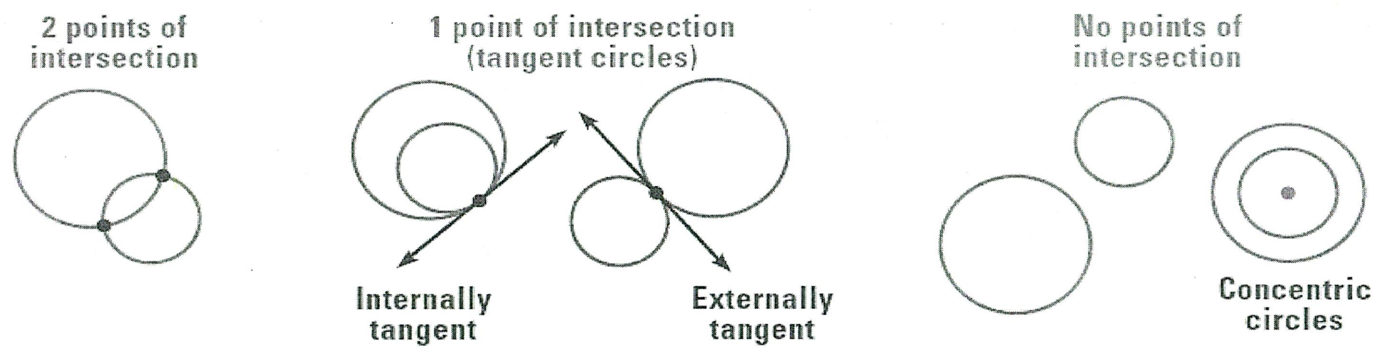
c. $\overleftrightarrow{EG}$ tangent

d. $\overline{HB}$ chord

e. $\overleftrightarrow{GK}$ secant



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___.

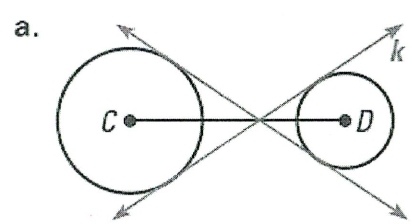
Coplanar circles that have a common center are called ___concentric___.

A line, ray or segment that is tangent to two coplanar circles is called ___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.

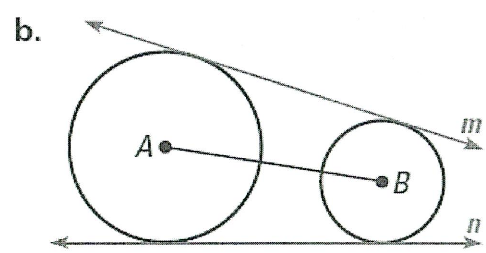
Example #2: Tell whether the common tangents are internal or external.

a.



internal

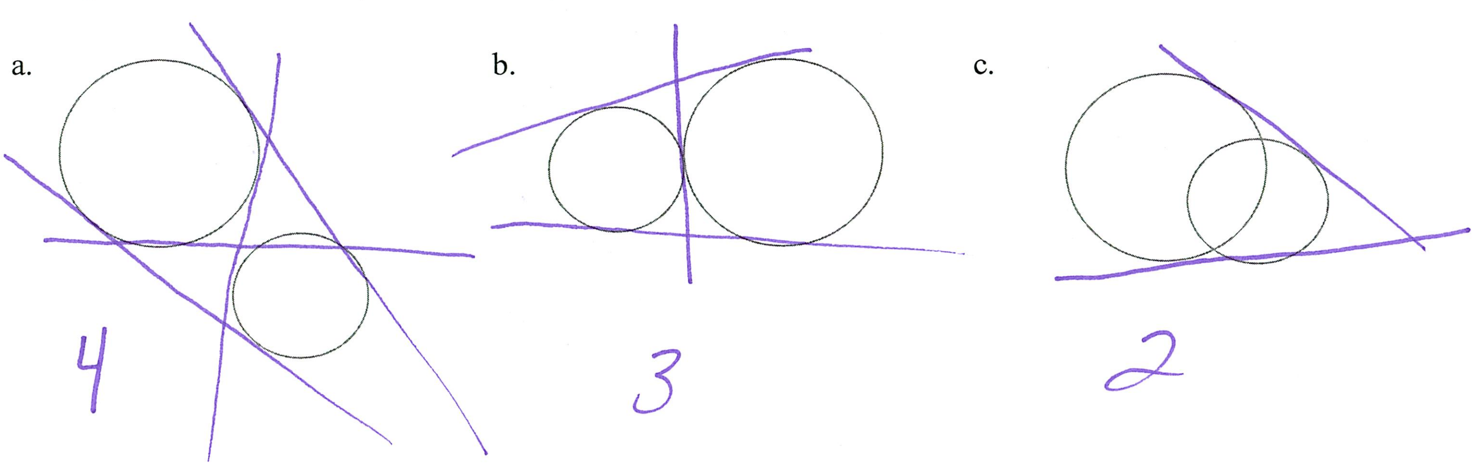
b.



external

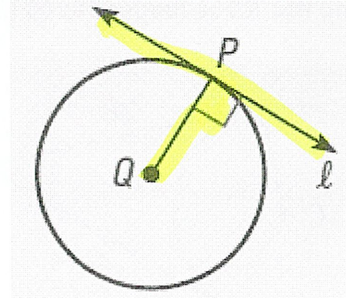
Example #3: Tell how many common tangents the circles have and draw them.

a. b. c.

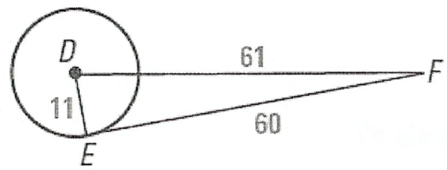


Theorem 10.1

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.



Example #4: Verify that $\overleftrightarrow{EF}$ is tangent to $\odot D$



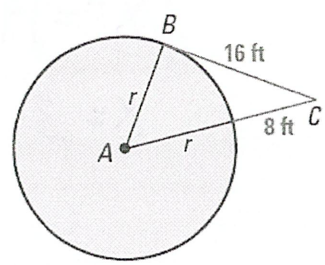
Use Pythagorean thm

$11^2 + 60^2 = 61^2$

$121 + 3600 = 3721$

$3721 = 3721$ ✓

Example #5: You are standing at C, 8 feet from a grain silo. The distance from you to a point of tangency on the tank is 16 feet. What is the radius of the silo?



$(r+8)(r+8)$

$r^2 + 8r + 8r + 64$

$r^2 + 16^2 = (r+8)^2$

$\cancel{r^2} + 256 = \cancel{r^2} + 16r + 64$

$-\cancel{r^2} \quad -64 \quad -\cancel{r^2} \quad -64$

$192 = 16r$

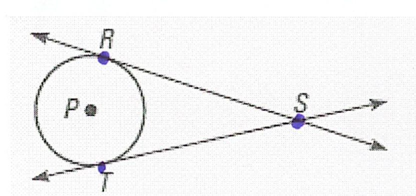
$\frac{192}{16} = \frac{16r}{16}$

$\boxed{12 = r}$

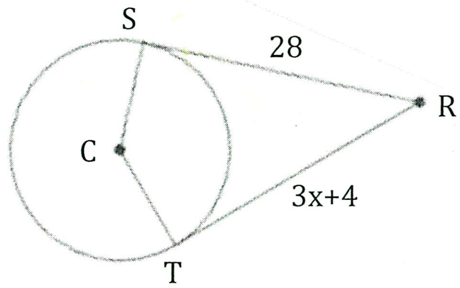
Theorem 10.2

Tangent segments from a common external point are congruent.

$\overline{RS} \cong \overline{TS}$



Example #6: $\overline{RS}$ is tangent to $\odot C$ at S and $\overline{RS}$ is tangent to $\odot C$ at T. Find the value of x

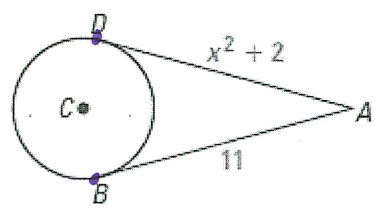


$$3x + 4 = 28$$
$$-4 \quad -4$$
$$\frac{3x}{3} = \frac{24}{3}$$
$$x = 8$$

Example #7:

$\overleftrightarrow{AB}$ is tangent to $\odot C$ at B.
$\overleftrightarrow{AD}$ is tangent to $\odot C$ at D.

Find the value of x.



$$x^2 + 2 = 11$$
$$-2 \quad -2$$
$$\sqrt{x^2} = \sqrt{9}$$
$$x = 3$$

Hw: pg 655-656

1, 3-13, 15-19, 22, 24, 26-29