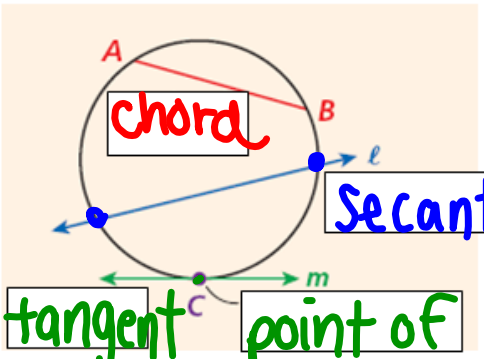
Class Notes 4: **Lines That Intersect Circles**

Lines & Segments that Intersect Circles

- A chord is a segment whose endpoints lie on a circle.
- A secant is a line that intersects a circle at 2 points.
- A tangent is a line in the same plane as a circle that intersects it at exactly 1 point.



Example 1: Identifying Lines and Segments that Intersect Circles

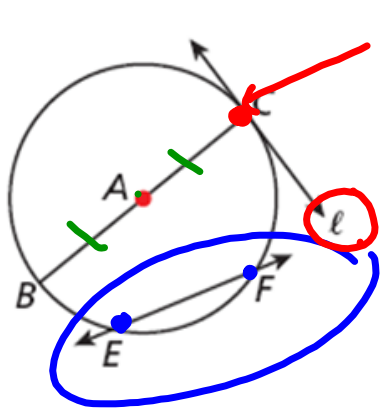
Chords: $\overline{BC}$, $\overline{EF}$ (seg)

Tangent: ℓ

Radii: $\overline{AC}$, $\overline{AB}$

Secant: $\overleftrightarrow{EF}$

Diameter: $\overline{BC}$ (chord)



pt. of tangency

⊙A

"circle A"

TRY IT!

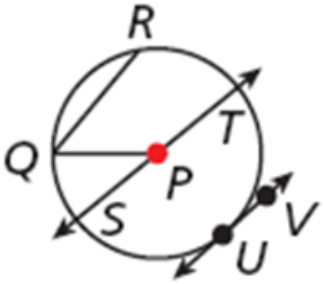
Chords:

Tangent:

Radii:

Secant:

Diameter:



⊙P

Pairs of Circles

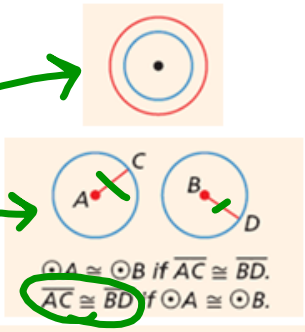
Match the following pairs of circles with their corresponding picture and give a quick definition in your own words:

- **CONGRUENT CIRCLES**

Two circles are congruent if and only if they have congruent radii

- **CONCENTRIC CIRCLES**

Coplanar circles with the same center



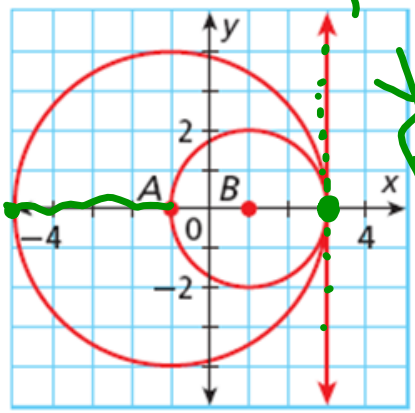
- **TANGENT CIRCLES**

Two coplanar circles that intersect at exactly 1 point

Example 2: Identifying Tangents of Circles

Find the length of each radius. Identify the point of tangency and write the equation of the tangent line at this point.

- Radius of Circle A: 4
- Radius of Circle B: 2
- Point of Tangency: (3,0)
- Equation of Tangent Line: X=3



tangent
Y=?
X=?

***Think about it**: How do you know if the equation of a tangent line that is an axis should be written as "x =" or "y ="?*

TRY IT!

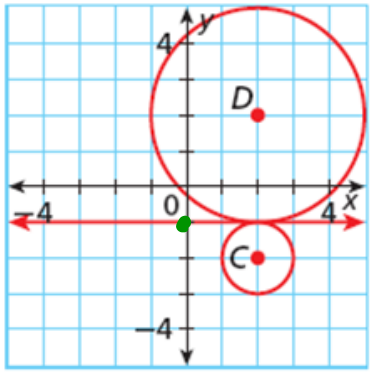
Find the length of each radius. Identify the point of tangency and write the equation of the tangent line at this point.

Radius of Circle D: 3

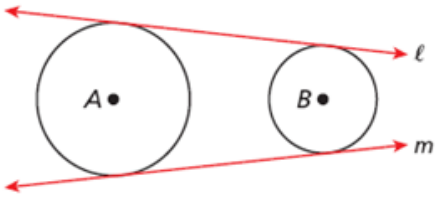
Radius of Circle C: 1

Point of Tangency: (2, -1)

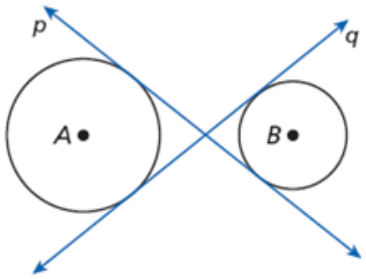
Equation of Tangent Line: y = -1



A **common tangent** is a line that is tangent to two circles.

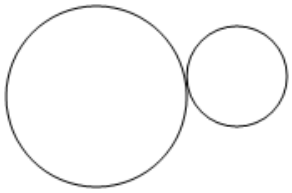


Lines ℓ and m are common external tangents to $\odot A$ and $\odot B$.



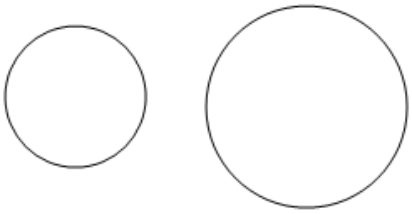
Lines p and q are common internal tangents to $\odot A$ and $\odot B$.

How many common tangents do the following tangent circles have?

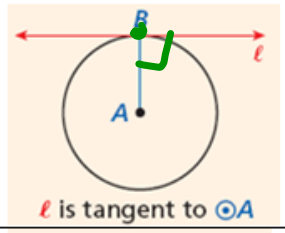
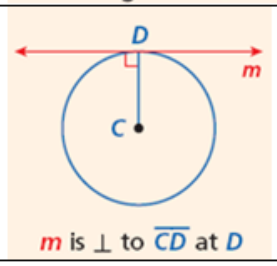


Try It!

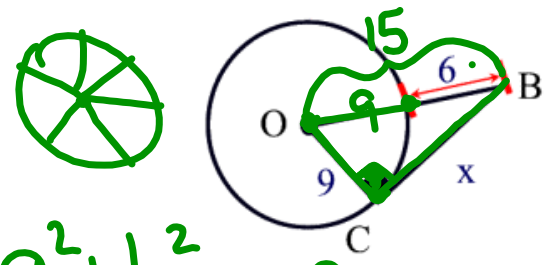
How many common tangents do the following circles have?



Tangent Theorems

Theorem	Hypothesis	Conclusion
A line tangent to a circle → line ⊥ to radius		$\overline{AB} \perp \ell$ (⊥ → Rt ∠'s)
A line ⊥ to a radius → line tangent to circle		

Example 3: Tangent Theorem



$\overline{CB}$ tangent.
Find x.

Choose:

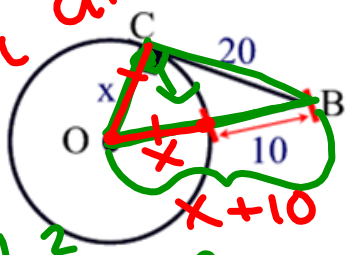
- ○ 15
- ○ 14
- ● 12
- ○ 9

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

$9^2+x^2=15^2$

Try It!

all radii are ≅



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

$20^2+x^2=(x+10)^2$

$400+x^2=(x+10)(x+10)$

$400+x^2=x^2+10x+10x+100$

$-100 \quad -x^2 \quad -x^2 \quad -100$

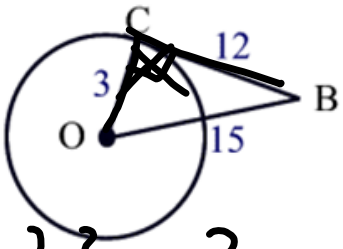
$300=20x$

$\overline{CB}$ tangent.

Find x.

Choose:

- 5
- 10
- 12
- 15 (selected)



In the diagram at the left, is $\overline{CB}$ a tangent?

($OB = 15$)

$3^2+12^2 \stackrel{?}{=} 15^2$

$9+144 \neq 225$

No