

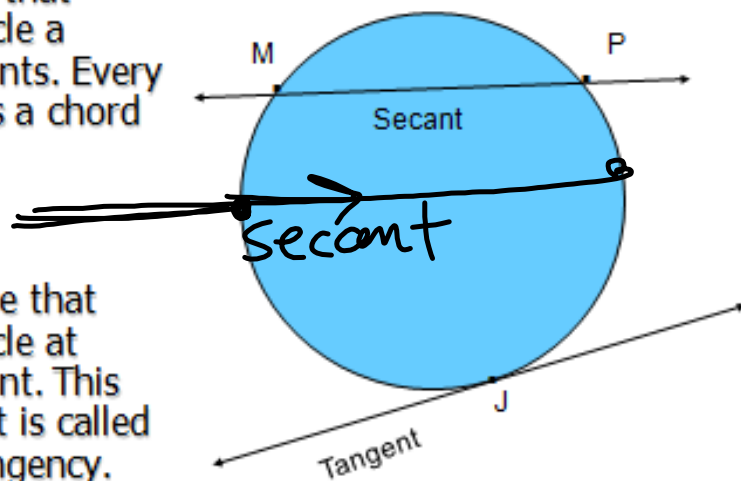
## Starter

- 1) State the equation of a circle.
- 2) What is the center of the circle?
- 3) Write the equation of a circle with center  $(5, 2)$  and radius 9.
- 4) Given  $(x - 3)^2 + (y + 2)^2 = 144$ , what is the center of the circle and what is the radius?

## 10.4 Secants and Tangents

### Definitions

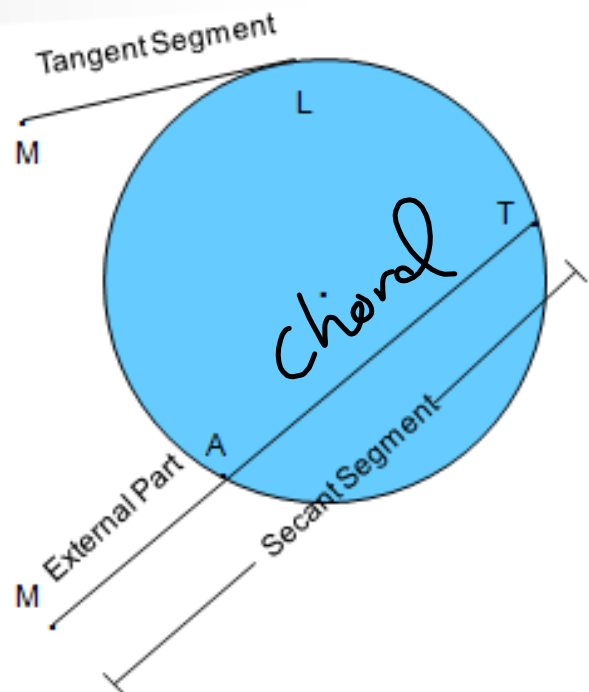
- **Secant**- a line that intersects a circle at exactly two points. Every secant contains a chord of the circle.



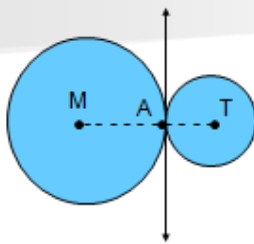
- **Tangent**- a line that intersects a circle at exactly one point. This point of contact is called the point of tangency.

## Definitions Con't

- **Tangent Segment**- Part of a tangent line between the point of contact and a point outside the circle.
- **Secant Segment**- Part a secant line that joins a point outside the circle to the farther intersection point of the secant and the circle.
- **External Part** of a secant segment- the part of a secant line that joins the outside point to the nearer intersection point.

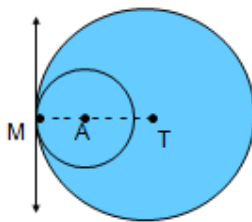


### Definitions Con't



> **Tangent Circles**- circles that intersect each other at exactly one point.

> **Externally Tangent Circles**- each of the tangent circles lies outside the other.



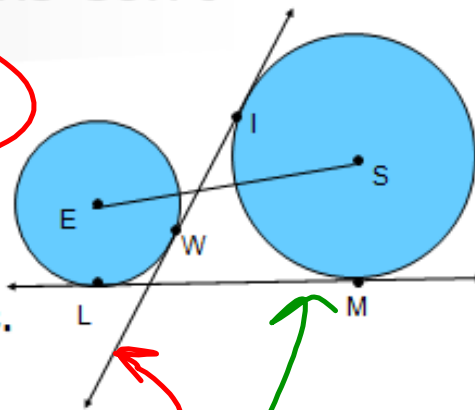
> **Internally Tangent Circles**- one of the tangent circles lies inside the other.

### Definitions Con't

➤ **Common Tangent**- a line tangent to two circles.

➤ **Common Internal Tangent**- the tangent lies between the circles.  
(  $\overline{WI}$  )

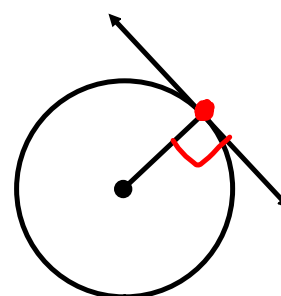
➤ **Common External Tangent**- the tangent is not between the circles.  
(  $\overline{LM}$  )



## Postulates & Theorems

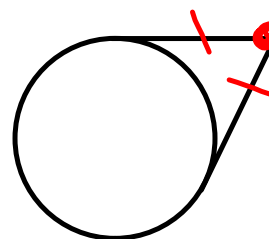
- Postulates

- A tangent line is perpendicular to the radius drawn to the point of contact.
- If a line is perpendicular to a radius at its outer endpoint then it is tangent to the circle.



- Theorems

- If two tangent segments are drawn to a circle from an exterior point, then those segments are congruent.

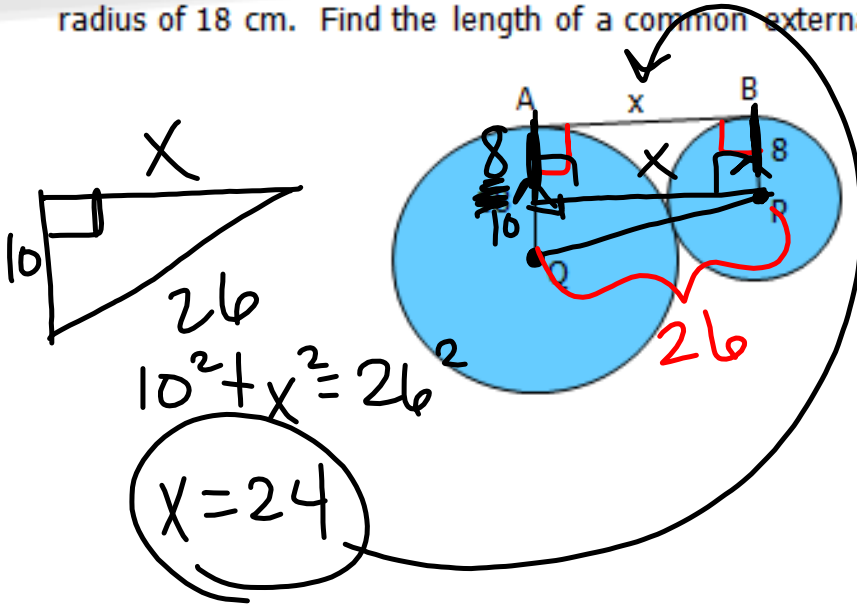


## Common Tangent Procedure

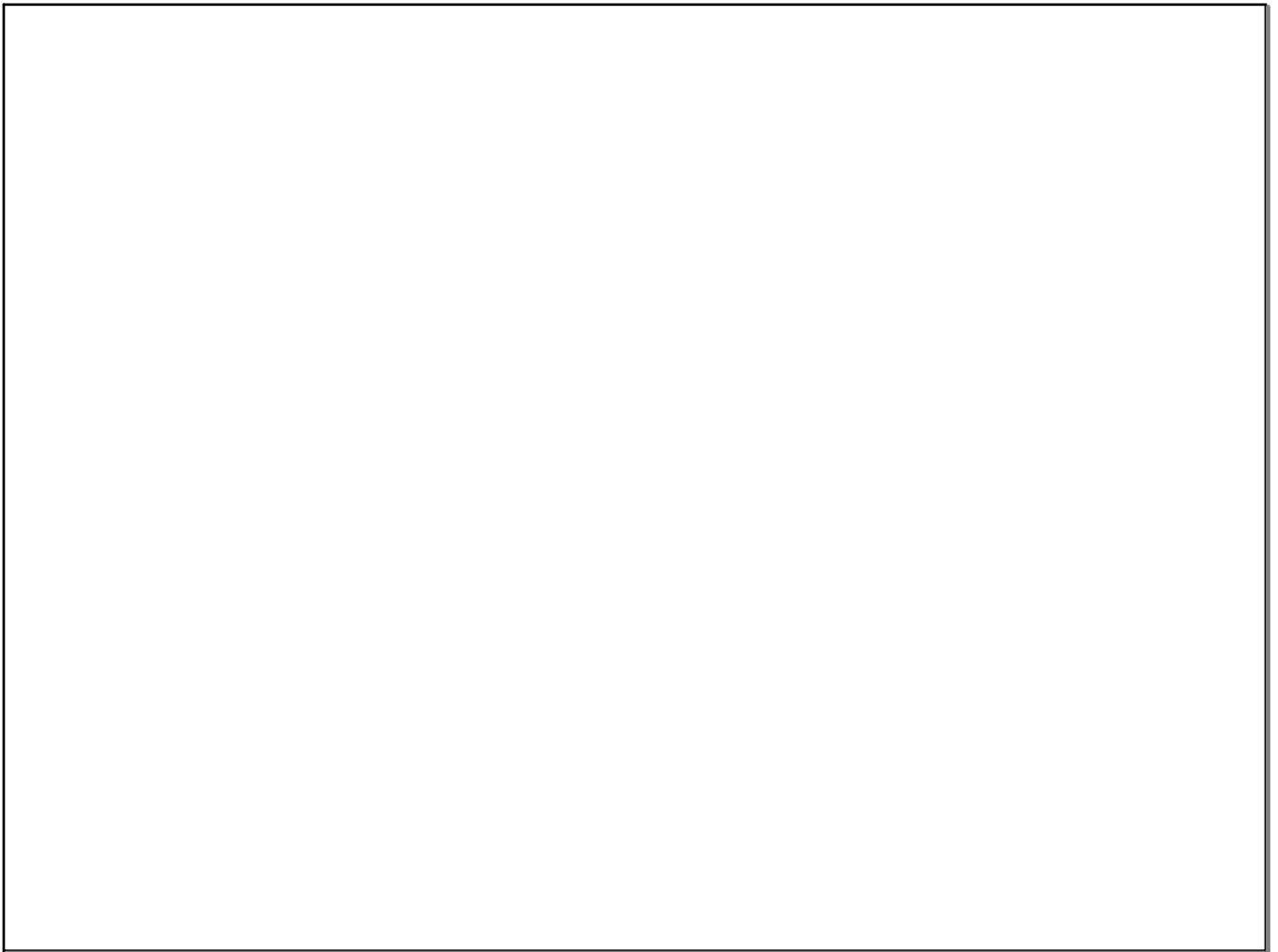
- 1) Draw the segment joining the centers.
- 2) Draw the radii to the points of contact.
- 3) Through the center of the smaller circle, draw a line parallel to the common tangent.
- 4) Observe that this line will intersect the radius of the larger circle (extended if necessary) to form a rectangle and a right triangle.
- 5) Use the Pythagorean Theorem and properties of a rectangle.

## Sample Problems

A circle with a radius of 8 cm is externally tangent to a circle with a radius of 18 cm. Find the length of a common external tangent.





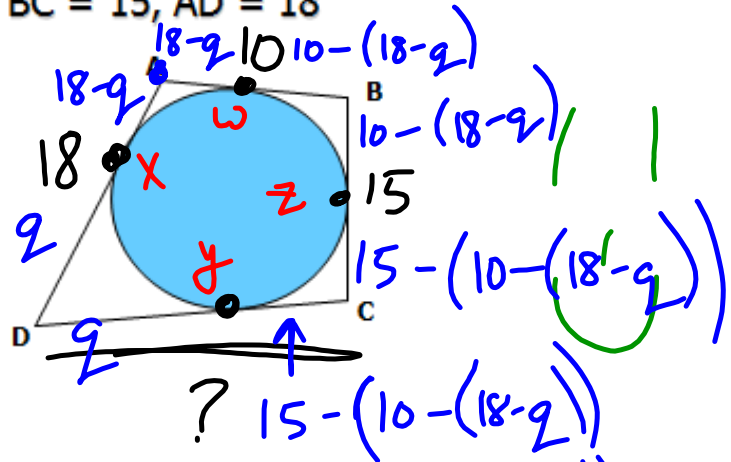


### Sample Problems

(05617)

- A walk-around problem:
- Given: Each side of ABCD is tangent to the circle.  $AB = 10$ ,  $BC = 15$ ,  $AD = 18$
- Find:  $CD$

$10 - 18 - q$   
 vs.  
 $10 - (18 - q)$   
 $10 - 18 + q$

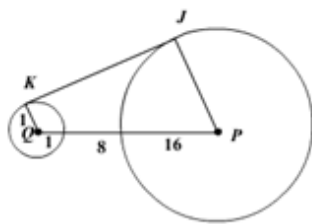


$$\begin{aligned}
 DC &= q + 15 - (10 - (18 - q)) \\
 &= q + 15 - (10 - 18 + q) \\
 &= \cancel{q} + 15 - 10 + 18 \cancel{-q}
 \end{aligned}$$

**CD = 23**

## Practice Problems

#1



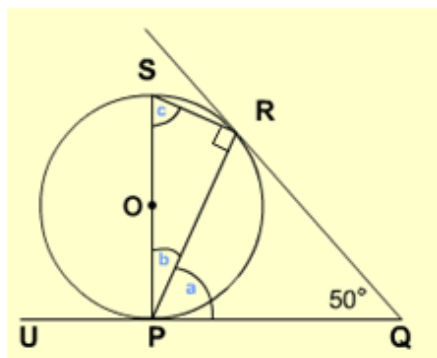
JK is tangent to circles Q & P.

Find: JK

★  
JK = 20

#2

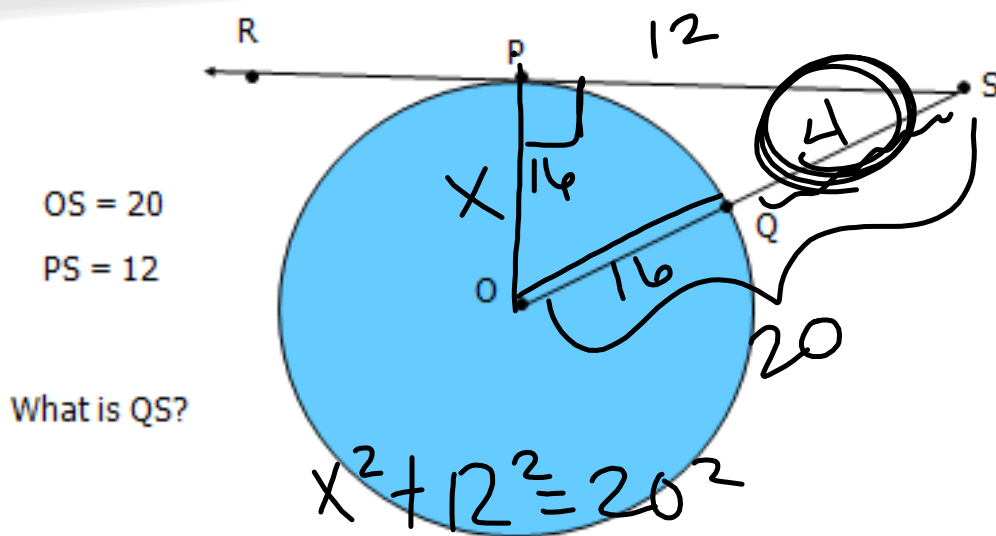
Find:  $m\angle a$ , b, and c.



★  
 $m\angle a = 65$ ;  $m\angle b = 25$ ;  $m\angle c = 65$

# Practice Problems

#4



$$x = 16$$

Classwork/Homework

p. 463 #1, 2, 5, 10, 13, 14, 16

STUDY INDEX CARDS!!!!

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