Accelerated Geometry **Name** _______________________________
Chapter 10 – Section 4: Secants and Tangents **Date** _______________________________

After this lesson, you should be able to:

- Identify secant and tangent lines
- Identify secant and tangent segments
- Distinguish between two types of tangent circles
- Recognize common internal and common external tangents

Given: Circle X.

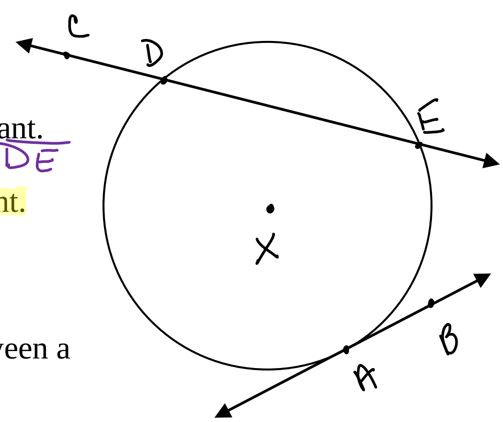
<u>Definitions</u>

1. Secant – a line that intersects a circle at exactly two points. $\overleftrightarrow{CE}$ or $\overleftrightarrow{DE}$

    a. Every secant contains a chord of the circle.

    b. Name the secant in the diagram.

    c. Name the chord that is contained in the above secant. $\overline{DE}$



2. Tangent – a line that intersects a circle at ***exactly*** one point.

    a. Name the tangent in the diagram. $\overleftrightarrow{AB}$

    b. The ***point of tangency*** is the point of contact between a tangent and a circle.

    c. Name the point of tangency in the diagram. A

3. Tangent segment – the part of the tangent line between the point of contact and a point outside the circle.

    a. Name the tangent segment in the diagram. $\overline{AB}$

4. Secant segment – the part of a secant line that joins a point outside the circle to the farther intersection point of the secant and the circle.

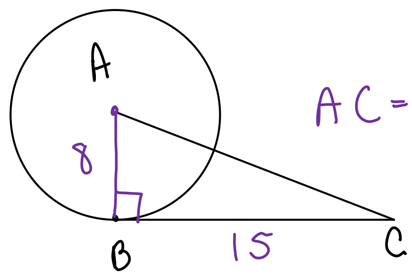
    a. Name the secant segment in the diagram. $\overline{CE}$

5. External part of a secant segment – the part of a secant line that joins the outside point to the nearer intersection point.

    a. Name the external part of a secant segment in the diagram. $\overline{CD}$

Postulate: A tangent line is perpendicular to the radius drawn to the point of tangency.

6. The radius of circle A is 8 cm. Tangent segment $\overline{BC}$ is 15 cm long. Find the length of $\overline{AC}$.

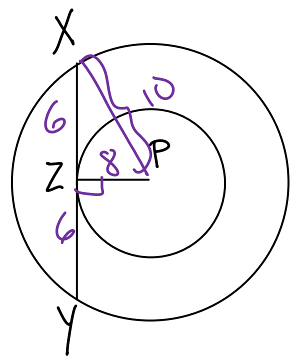


AC = 17cm

converse

Postulate: If a line is perpendicular to a radius at its outer endpoint, then it tangent to the circle.

7. Concentric circles with radii 8 and 10 have center P. $\overline{XY} \perp \overline{ZP}$. Find $\overline{XY}$.



XY = 12

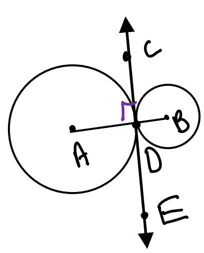
8. Tangent circles - intersect each other at exactly one point.

   a. Two circles are ***externally tangent*** if each of the tangent circles lies outside the other.

   b. Circle A and circle B are externally tangent. Name their point of tangency. D

   c. What must be true about $\overline{AB}$ and $\overleftrightarrow{CE}$? $\perp$

   d. $\overleftrightarrow{CE}$ is a ***common internal tangent*** because it lies between the circles.

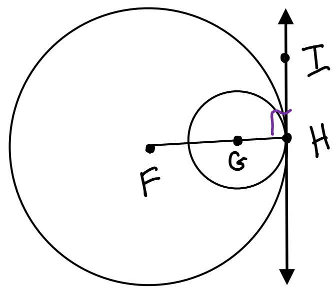


e. Two circles are ***internally tangent*** if one of the tangent circles lies inside the other.

f. Circle F and circle G are internally tangent. Name their point of tangency. H

g. What must be true about $\overline{FH}$ and $\overleftrightarrow{IH}$? $\perp$

h. $\overleftrightarrow{IH}$ is a ***common external tangent*** because it is not between the circles.



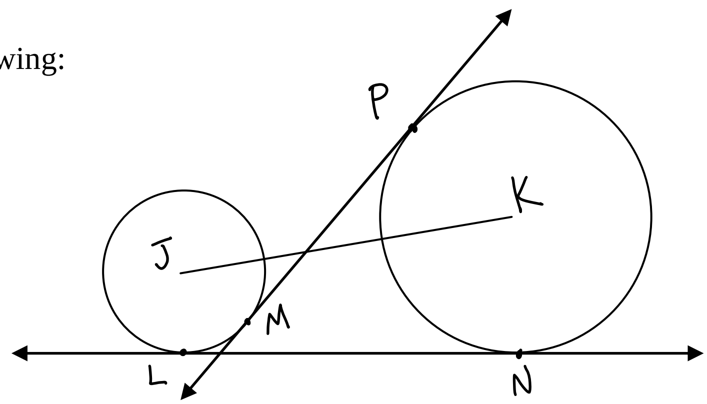
9. Given circle J and circle K, name the following:

in between the ⊙s

a. common internal tangent $\overleftrightarrow{MP}$

b. common external tangent $\overleftrightarrow{LN}$

c. line of centers $\overline{JK}$



10. Given: $\overrightarrow{BA}$ and $\overrightarrow{BC}$ are tangent to circle X. What can you prove about $\overline{BA}$ and $\overline{BC}$?

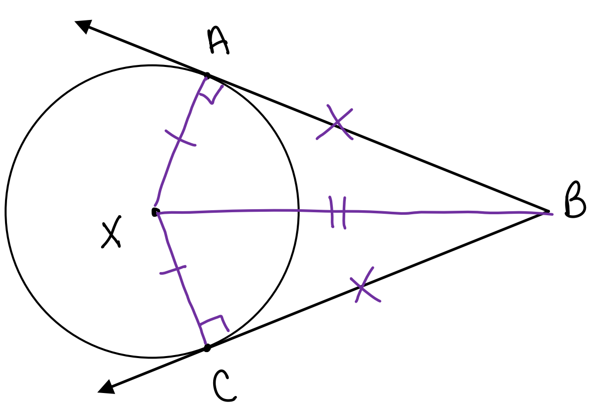
Draw radii → $\overline{XA} \perp \overline{AB}$, $\overline{XC} \perp \overline{CB}$

Draw $\overline{XB}$

$\overline{XB} \cong \overline{XB}$

$\triangle XAB \cong \triangle XCB$ by Rt $\triangle$ HL

$\overline{AB} \cong \overline{BC}$ If $\triangle$s $\cong$, corr parts $\cong$



Two-Tangent Theorem: If two segments from the same exterior point are tangent to a circle, then those segments are congruent.

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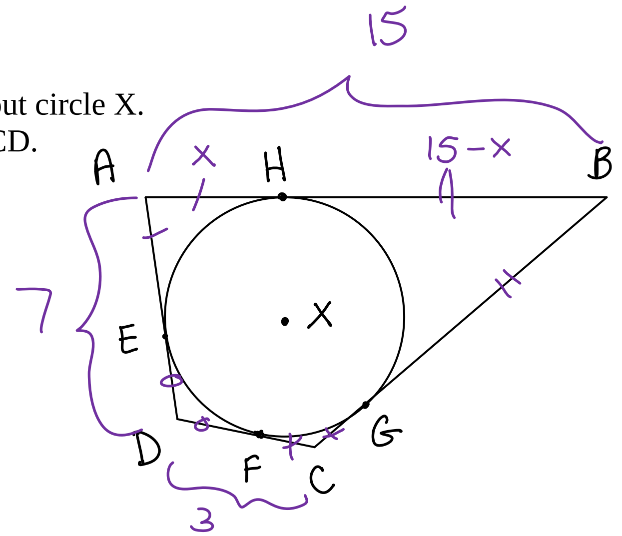
Two-Tangent Theorem: If two segments from the same exterior point are tangent to a circle, than those segments are congruent.

11. Walk around problem

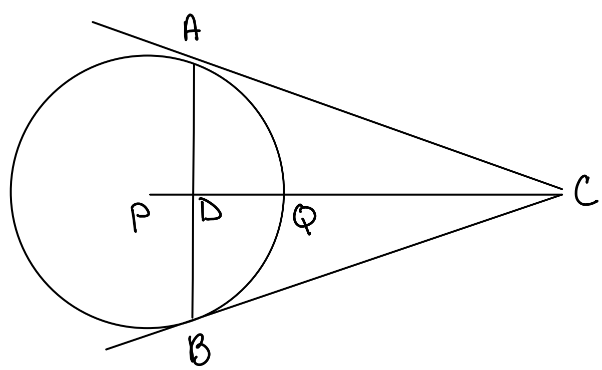
    Given: Polygon ABCD is ***circumscribed*** about circle X.
    Circle X is ***inscribed*** in polygon ABCD.
    AB = 15, AD = 7, DC = 3

    Find BC.

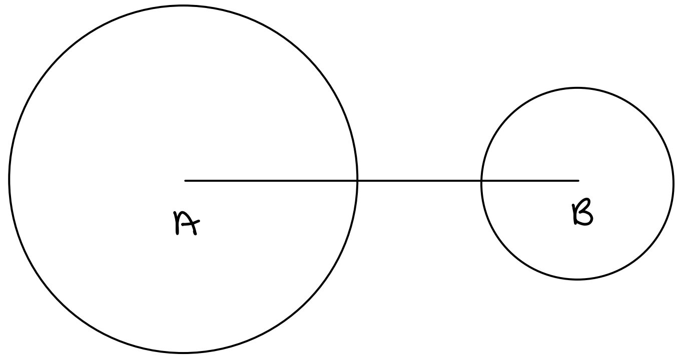


12. Given: Circle P, tangents $\overline{AC}$ and $\overline{BC}$, points of tangency A and B, $m\overset{\frown}{BQ} = 60$, AB = 24, $\overline{AB} \perp \overline{PC}$.

    Find the radius of the circle.



13. The centers of two circles of radii 11 cm and 6 cm are 13 cm apart. Find the length of a common external tangent.



Common-Tangent Procedure

This procedure works for both common internal and common external tangents.

a. Draw the segment joining the centers.
b. Draw the radii to the points of contact.
c. Through the center of the smaller circle, draw a line parallel to the common tangent. This line will intersect the radius of the larger circle (you may need to extend the radius) to forma rectangle and a right triangle.
d. Use the Pythagorean Theorem and properties of a rectangle.