

Accelerated Geometry
Chapter 10 – Section 4: Secants and Tangents

Name _____
Date _____

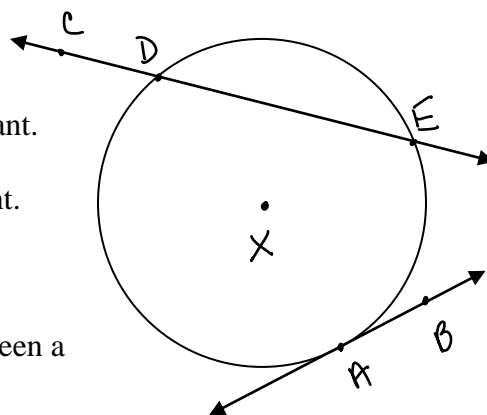
After this lesson, you should be able to:

- 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.

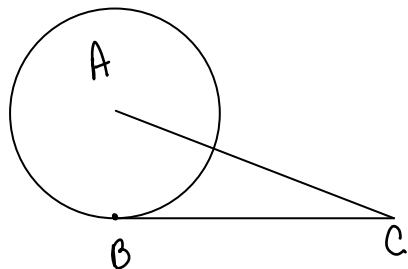
Definitions

1. Secant – a line that intersects a circle at exactly two points.
 - 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.
2. Tangent – a line that intersects a circle at **exactly** one point.
 - a. Name the tangent in the diagram.
 - 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.
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.
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.
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.



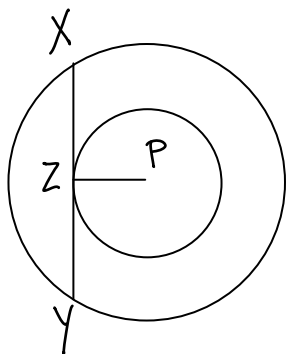
Postulate: A tangent line is perpendicular to the radius drawn to the point of tangency.

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

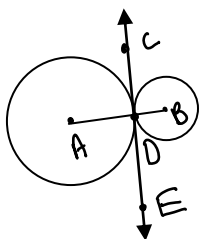


Postulate: If a line is perpendicular to a radius at its outer endpoint, then it is tangent to the circle.

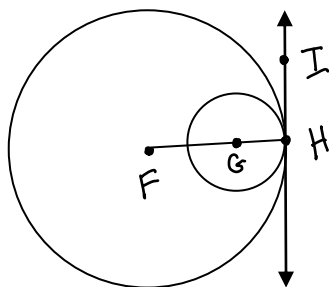
7. Concentric circles with radii 8 and 10 have center P. $\overline{XY} \perp \overline{ZP}$. Find \overline{XY} .



8. Tangent circles - intersect each other at exactly one point.
- Two circles are **externally tangent** if each of the tangent circles lies outside the other.
 - Circle A and circle B are externally tangent. Name their point of tangency.
 - What must be true about \overline{AB} and \overline{CE} ?
 - \overline{CE} is a **common internal tangent** because it lies between the circles.

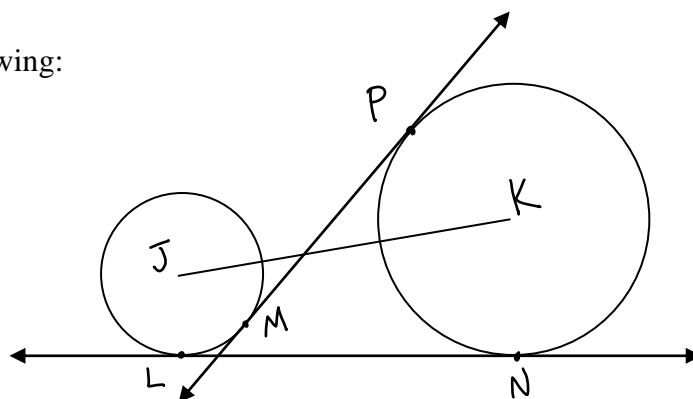


- e. Two circles are **internally tangent** if one of the tangent circles lies inside the other.
- f. Circle F and circle G are internally tangent. Name their point of tangency.
- g. What must be true about \overline{FH} and \overline{IH} ?
- h. \overline{IH} is a **common external tangent** because it is not between the circles.

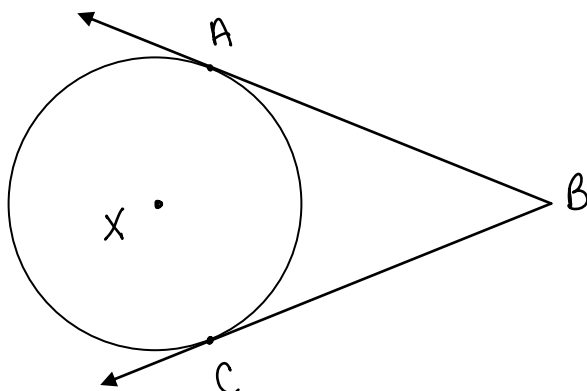


9. Given circle J and circle K, name the following:

- a. common internal tangent
- b. common external tangent
- c. line of centers



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



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

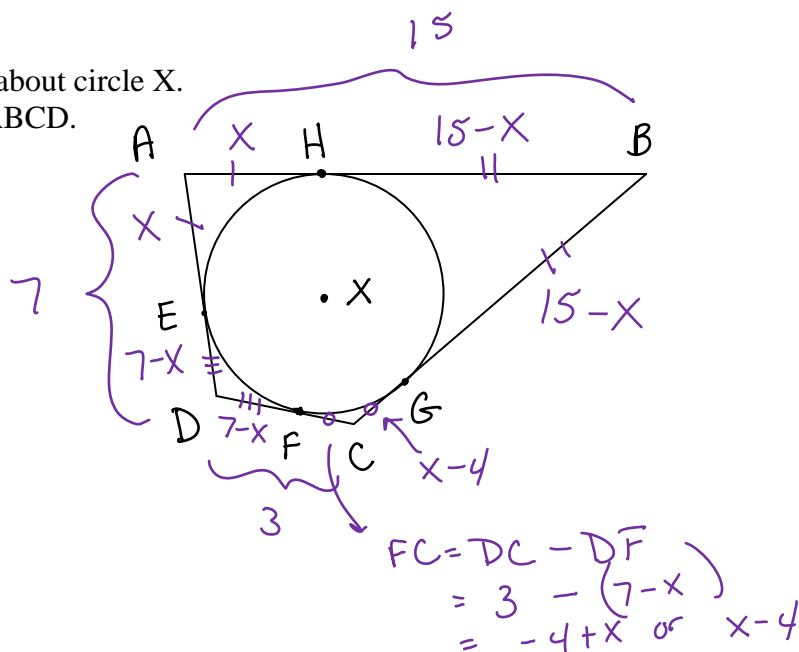
Two-Tangent Theorem: If two segments from the same exterior point are tangent to a circle, then those segments are congruent.

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

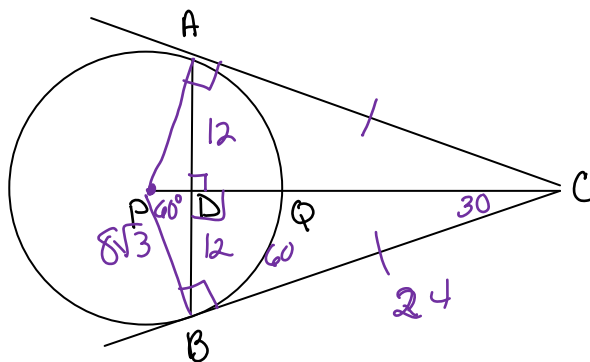
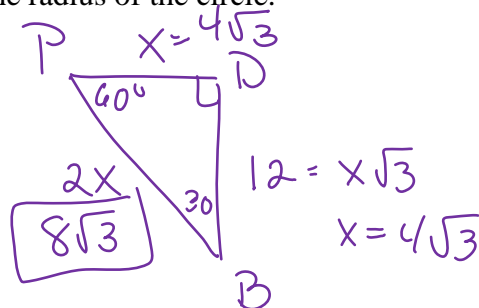
Find BC.

$$\begin{aligned} BC &= CG + GB \\ &= x - 4 + 15 - x \\ &= \boxed{11} \end{aligned}$$

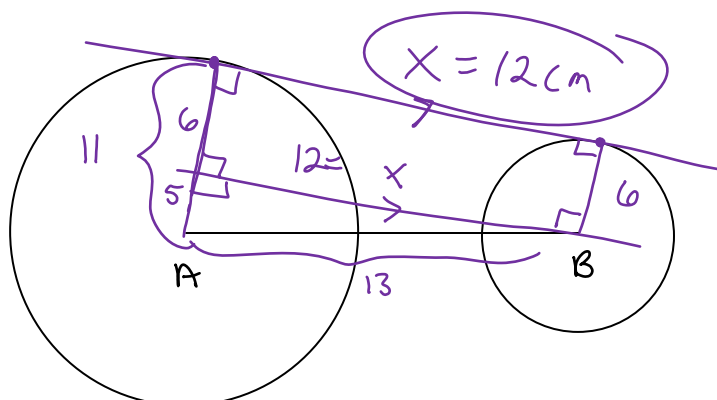


12. Given: Circle P, tangents \overline{AC} and \overline{BC} , points of tangency A and B, $m\angle BQ = 60^\circ$, AB = 24,
 $\overline{AB} \perp \overline{PC}$.

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.

- Draw the segment joining the centers.
- Draw the radii to the points of contact.
- 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 form a rectangle and a right triangle.
- Use the Pythagorean Theorem and properties of a rectangle.