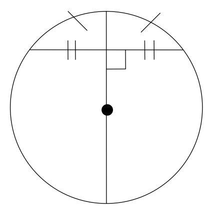
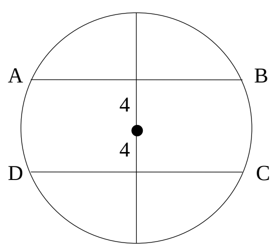
Theorem 6.3.1: If a line is drawn through the center of a circle perpendicular to a chord, then it bisects the chord and the arc.

Theorem 6.3.3: If a line through the center of a circle bisects a chord other than the diameter, then it is perpendicular.

Theorem 6.3.3: The perpendicular bisector of a chord contains the center of a circle.



In a circle (or in congruent circles), two chords are congruent if and only if they are equidistant from the center.



$\overline{AB} \cong \overline{DC}$

Example 1:

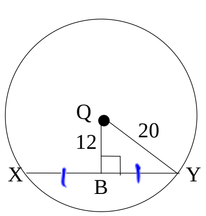
XY = 32

$12^2 + BY^2 = 20^2$

$144 + BY^2 = 400$

$BY^2 = 256$

$BY = 16$



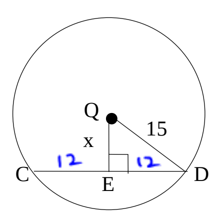
$XY = 2(BY)$

$= 2(16)$

$= 32$

x = 9

CD=24



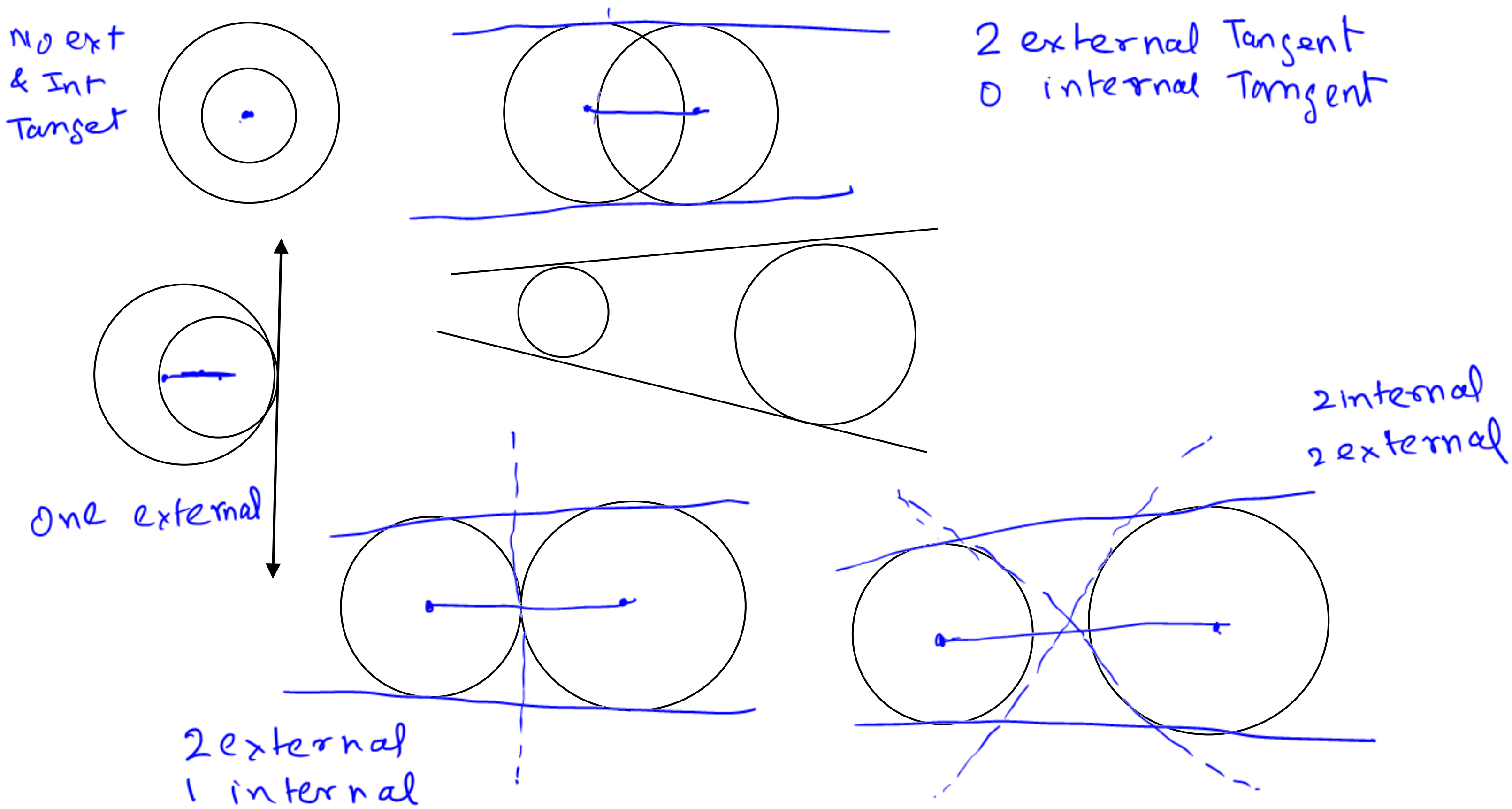
$x^2 + 12^2 = 15^2$

$x^2 + 144 = 225$

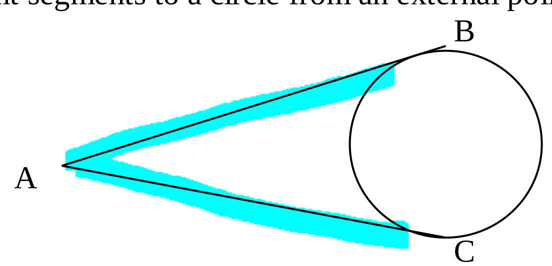
$x^2 = 81$

$x = 9$

Definition: For two circles with different centers, the line of centers is the line that containing the centers of both circles. If a common tangent does not intersect the line segment joining the centers, it is a common external tangent. If a common tangent for two circles does intersect the line of the centers for these circles, it is a common internal tangent. Pages 290-291

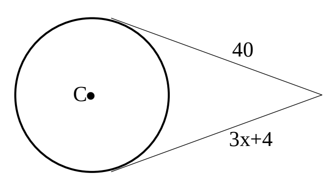


Theorem 6.3.4: The tangent segments to a circle from an external point are congruent.



$AB = AC$

Example 2: Solve for x

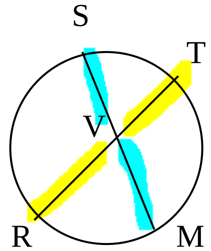


$3x + 4 = 40$

$3x = 36$

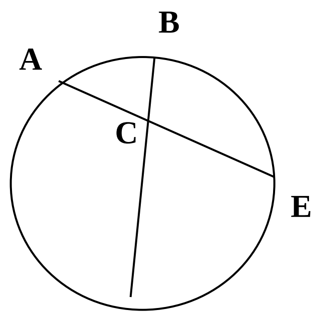
$x = 12$

Theorem: 6.3.5: If two chords intersect within the circle , then the product of the lengths of the segments(parts) of one chord is equal to the product of the lengths of the segments of the other chords.



(SV)(VM) = (RV)(VT)

Example 3:



$(AC)(CE) = (BC)(CD)$

a. If AC = 4, CE =5 and BC =2 , find CD.

$4 \cdot 5 = 2 \cdot CD$

$20 = 2 \cdot CD \Rightarrow 10 = CD$

b. If AC = x + 1, CE = x− 1, BC= 3 and CD = 3, solve for x

$(x+1)(x-1) = 3 \cdot 3$

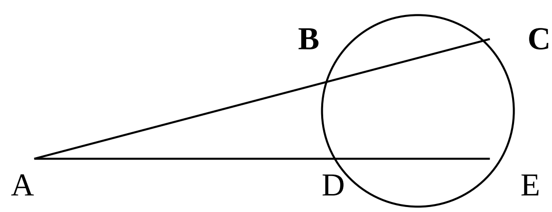
$(a^2 - b^2 = (a+b)(a-b))$

$x^2 - 1 = 9$

$x^2 = 10$

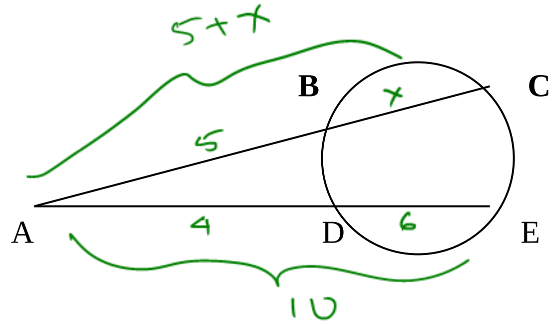
$x = \sqrt{10}$

Theorem 6.3.6: If two secant segments are drawn to a circle from am external point, then the products of the length s of each secant with external segment are equal.



(AC)(AB) = (AE)(AD)

Example 4: Find the value of x:



$(AC)(AB) = (AE)(AD)$

a. If AE = 8, AD = 3, , AB = 2 and AC = x

$(x)(2) = (8)(3)$

$2x = 24$

$x = 12$

b. If BC = x, AB = 5, AD = 4 and DE = 6

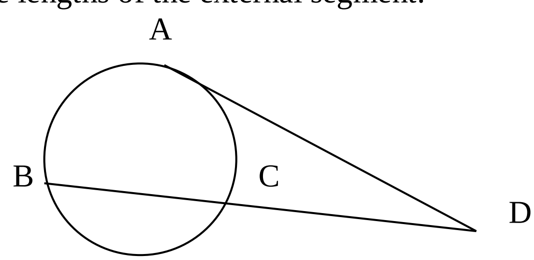
$(5+x)(5) = (10)(4)$

$25 + 5x = 40$

$5x = 15$

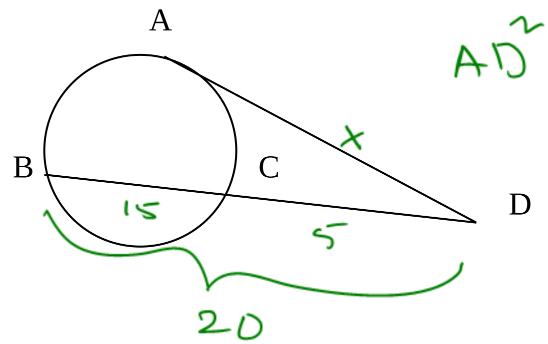
$x = 3$

Theorem 6.3.7: If a tangent segment and a secant segment are drawn to a circle from an external point then, the square of the segment of the length of the tangent equals the product of the lengths of the secant with the lengths of the external segment.



$$(\mathbf{AD})^2 = (\mathbf{BD})(\mathbf{CD})$$

Example 5: Find the value for x:



$AD^2 = (BD)(CD)$

a. AD = 8, BD = 16 and CD = x.

$8^2 = 16 \cdot x$

$64 = 16x$

$4 = x$

b. AD = x, BC = 15 and CD = 5

$x^2 = (20) \cdot 5$

$x^2 = 100 \Rightarrow x = 10$

c. AD = 12, CD = x and BC = 7