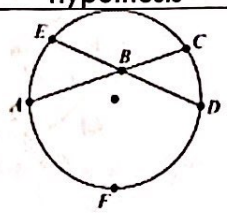
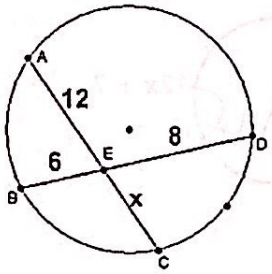
Day 8 – Segment Lengths (In and Out of a Circle) – Notes

Learning Target: Use properties of secants and tangents to solve problems.

Name	Theorem	Hypothesis	Conclusion
Segment Chord Theorem	If two chords in a circle intersect, then the product of the lengths of the segments of one chord is equal to the product of the lengths of the segments of the second chord.		$EB \cdot BD = CB \cdot BA$

Example: Find x.

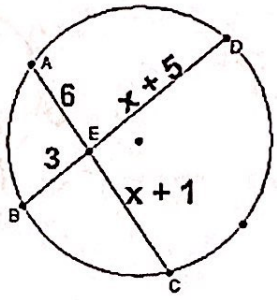


$12 \cdot x = 8 \cdot 6$

$12x = 48$

$\boxed{x = 4}$

Example: Find x.



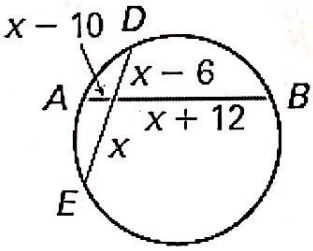
$3(x+5) = 6(x+1)$

$3x + 15 = 6x + 6$

$9 = 3x$

$\boxed{3 = x}$

Example: Find x.



$x(x-6) = (x-10)(x+12)$

$x^2 - 6x = x^2 - 10x + 12x - 120$

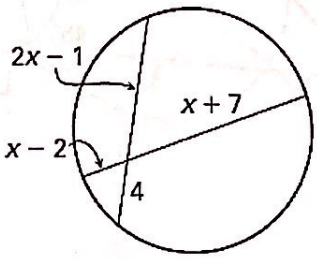
$x^2 - 6x = x^2 + 2x - 120$

$-6x = 2x - 120$

$-8x = -120$

$\boxed{x = 15}$

Example: Find x.



$(x-2)(x+7) = 4(2x-1)$

$x^2 + 7x - 2x - 14 = 8x - 4$

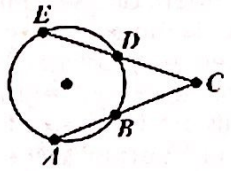
$x^2 + 5x - 14 = 8x - 4$

$x^2 - 3x - 10 = 0$

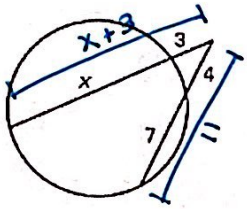
$(x+2)(x-5) = 0$

$x + 2 = 0$ $\quad x - 5 = 0$

$\cancel{x = -2}$ $\quad \boxed{x = 5}$

Secant Segment Theorem	If two secant segments intersect in the exterior of a circle, then the product of the lengths of the secant segment and its external secant segment is equal to the product of the lengths of the second secant segment and its external secant segment.		$EC \cdot DC = AC \cdot CB$

Example: Find x.



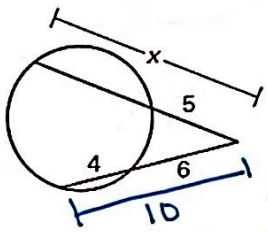
$3(x+3) = 4(11)$

$3x + 9 = 44$

$3x = 35$

$x = \frac{35}{3}$ or 11.67

Example: Find x.

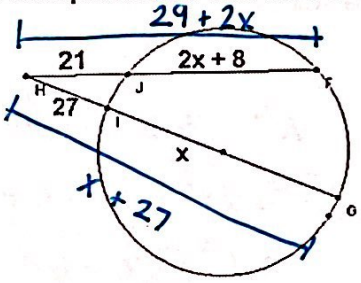


$5(x) = 6(10)$

$5x = 60$

$x = 12$

Example: Find x and then JF.



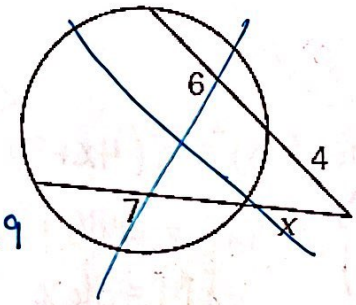
$21(29 + 2x) = 27(x + 27)$

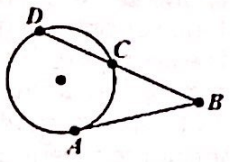
$609 + 42x = 27x + 729$

$15x = 120$

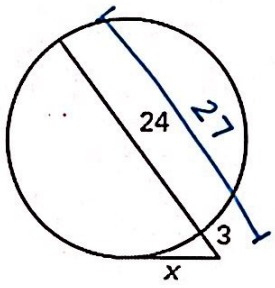
$x = 8$

Example: Find x.



Secant Tangent Theorem	If a tangent and secant intersect in the exterior of a circle, then the product of the lengths of the secant segment and its external secant segment is equal to the square of the length of the tangent segment.		$(AB)^2 = BC \cdot BD$

Example: Find x.

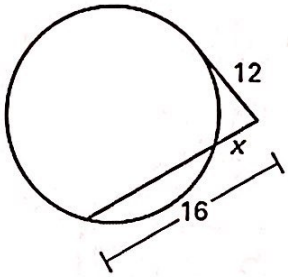


$x^2 = 3(27)$

$x^2 = 81$

$x = 9$ & ~~$x = -9$~~

Example: Find x.

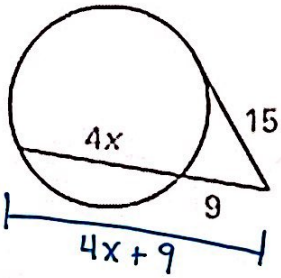


$(12)^2 = x(16)$

$144 = 16x$

$x = 9$

Example: Find x.



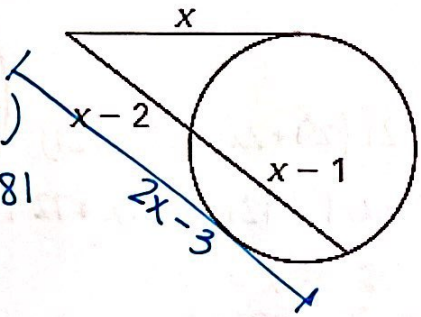
$(15)^2 = 9(4x+9)$

$225 = 36x + 81$

$144 = 36x$

$x = 4$

Example: Find all possible values of x.



$x^2 = (x-2)(2x-3)$

$x^2 = 2x^2 - 3x - 4x + 6$

$0 = x^2 - 7x + 6$

$0 = (x-6)(x-1)$

$x - 6 = 0$ $\quad$ $x - 1 = 0$

$x = 6$ $\quad$ ~~$x = 1$~~

If I substitute x=1 in for x-1, it would produce a segment length of 0, which does not make sense