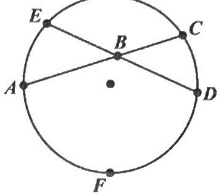
Segment Lengths (In and Out of a Circle)

Name	Theorem	Hypothesis	Conclusion
Segment Chord Theorem	If two chords in a circle interest, 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.		$\overline{EB} \cdot \overline{BD} = \overline{AB} \cdot \overline{BC}$

Product of Pieces = Product of Pieces

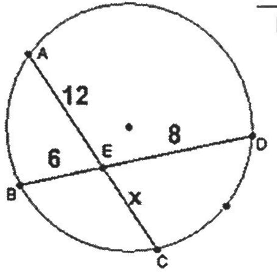
POP = POP

Example: Find x.

$12(x) = 6(8)$

$\frac{12x}{12} = \frac{48}{12}$

$\boxed{x = 4}$



$12(4) = 6(8)$

$48 = 48$

Example: Find x.

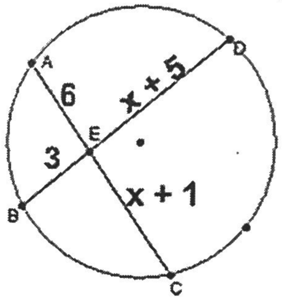
$6(x+1) = 3(x+5)$

$6x+6 = 3x+15$

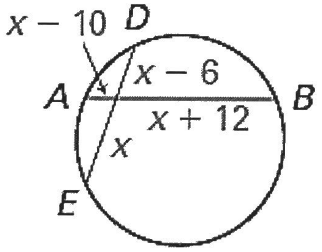
$-3x \quad -6$

$3x = 9$

$\boxed{x = 3}$



Example: Find x.



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

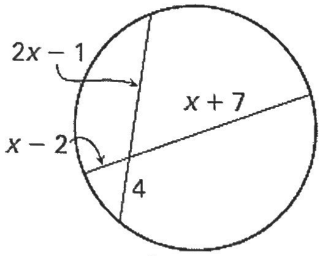
$\cancel{x^2}+2x-120 = \cancel{x^2}-6x$

$2x-120 = -6x$

$-120 = -8x$

$\boxed{15 = x}$

Example: Find x.



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

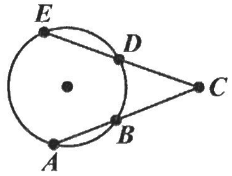
$8x-4 = x^2+5x-14$

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

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

$x-5=0 \quad \boxed{x = 5}$

$x+2=0 \quad \cancel{x=-2}$

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.		$\overline{CD}(\overline{EC}) = \overline{CB}(\overline{CA})$

Outside • Whole = Outside • Whole

OW = OW

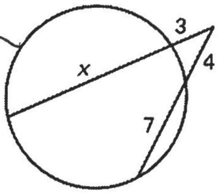
Example: Find x.

$3(x+3) = 4(\overset{11}{\cancel{7+4}})$

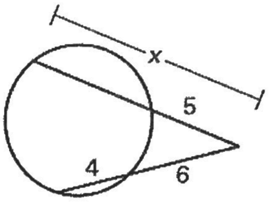
$3x+9 = 44$

$3x = 44$

$\boxed{x \approx 14.7}$



Example: Find x.



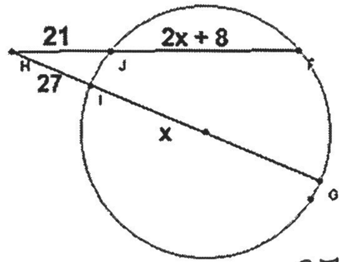
$6(6+4) = 5(x)$

$6(10) = 5(x)$

$60 = 5x$

$\boxed{12 = x}$

Example: Find x and then JF.



$27(27+x) = 21(21+2x+8)$

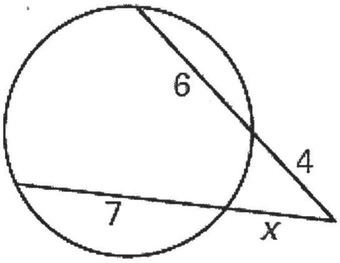
$27(27+x) = 21(29+2x)$

$729+27x = 609+42x$

$120 = 15x$

$\boxed{8 = x}$

Example: Find x.

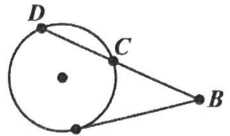


$4(4+6) = x(x+7)$

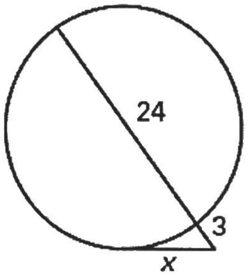
$4(10) = x^2+7x$

$0 = x^2+7x-40$

$(x$

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.	 OW = OW	$(AB)^2 = (BC)(BD)$ (outside)(whole)

Example: Find x.



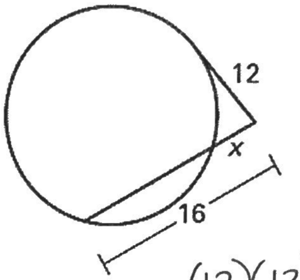
$(x)(x) = 3(3+24)$

$x^2 = 81$

$x^2 = \pm 9$

$\boxed{x = 9}$

Example: Find x.

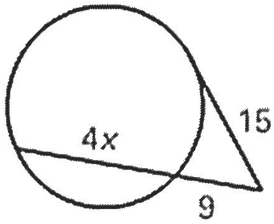


$(12)(12) = x(16)$

$144 = 16x$

$\boxed{9 = x}$

Example: Find x.



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

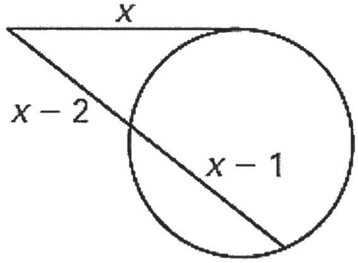
$225 = 81 + 36x$

$144 = 36x$

$\boxed{4 = x}$

omit

Example: Find all possible values of x.



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

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

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

$-x$

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

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

$x = 6, 1$

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