Name: Date: Period: 4

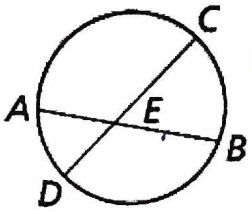
Using Segments of Chords, Tangents, and Secants

Learning Objective IWBAT apply theorems about lengths of chords and secants in ⊙s.

When two chords intersect in the interior of a circle, each chord is divided into segments that are called segments of the chord.

Segments of Chords Theorem

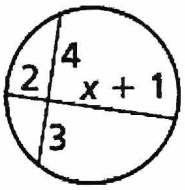
If two chords intersect in the interior of a circle, then the product of the lengths of the segments of one chord is = to the product of the lengths of the segments of the other chord.



$(AE)(EB) = (CE)(DE)$

Examples:

1. Find the value of x.

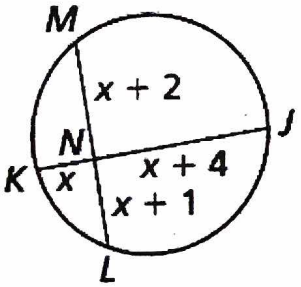


$(4)(3) = (2)(x+1)$

$12 = 2x + 2$

$10 = 2x \rightarrow \boxed{x = 5}$

2. Find ML and JK.



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

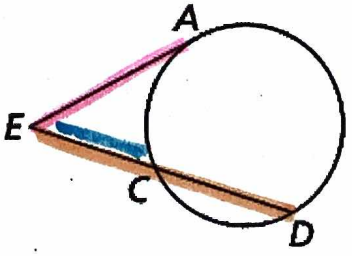
$x^2 + 4x = x^2 + 3x + 2$

$\boxed{x = 2}$

Tangent Segment: A tangent segment is a segment that is tangent to a circle at an endpoint. ($\overline{EA}$)

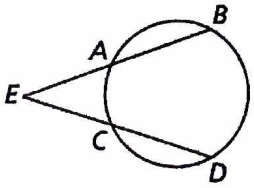
Secant Segment: A secant segment is a segment that contains a chord of a circle and has exactly one endpoint outside the circle. ($\overline{ED}$)

External Segment: The part of a secant segment that is outside the circle is called an external segment. ($\overline{EC}$)



Segments of Secants Theorem

If two secants share the same endpoint outside a circle, then the product of the lengths of one secant segment and its external segment equals the product of the lengths of the other secant segment and its external segment.

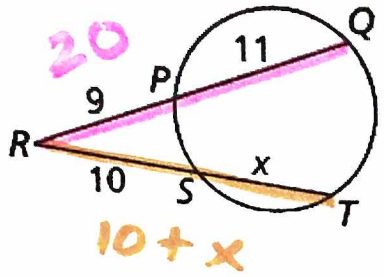


$W \cdot O = W \cdot O$

$(EB)(EA) = (ED)(EC)$

Examples:

3. Find the value of x.



$W \cdot O = W \cdot O$

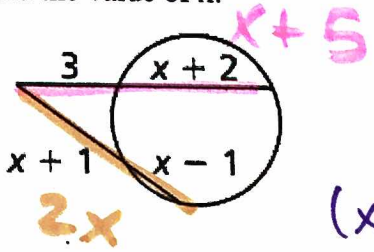
$(20)(9) = (10+x)(10)$

$180 = 100 + 10x$

$80 = 10x$

$\boxed{8 = x}$

4. Find the value of x.



$W \cdot O = W \cdot O$

$(x+5)(3) = (2x)(x+1)$

$3x+15 = 2x^2+2x$

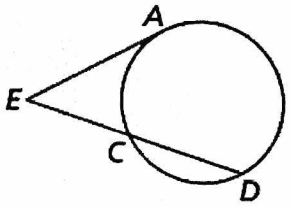
$2x^2 - x - 15 = 0$

$(2x+5)(x-3) = 0$

$\boxed{x = 3}$ or $x = -\frac{5}{2}$

Segments of Secants and Tangents Theorem

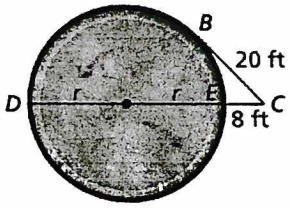
If a secant segment and a tangent segment share an endpoint outside a circle, then the product of the lengths of the secant segment and its external segment equals the square of the length of the tangent segment.



$W \cdot O = t^2$

Examples:

5. Find the radius of the aquarium tank.



$W \cdot O = t^2$

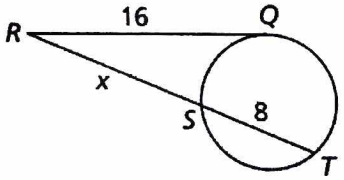
$(2r+8)(8) = 20^2$

$16r + 64 = 400$

$r = 21$

$\boxed{21 \text{ ft}}$

6. Find RS.



$W \cdot O = t^2$

$(x+8)(x) = 16^2$

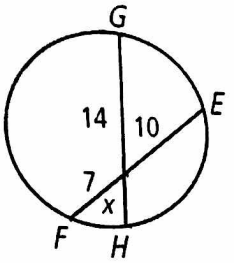
$x^2 + 8x + 16 = 256 + 16$

$(x+4)(x+4) = 272$

$x + 4 = \pm\sqrt{272}$

$x = -4 \pm 4\sqrt{17}$ → $\boxed{x = -4 + 4\sqrt{17}}$

7. Find x.

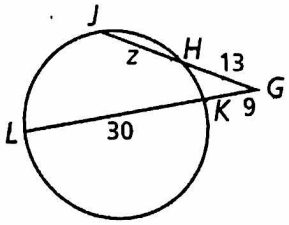


$(7)(10) = (14)(x)$

$70 = 14x$

$\boxed{x = 5}$

8. Find JG.



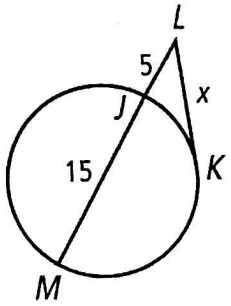
$W \cdot O = W \cdot O$

$(13+z)(13) = (39)(9)$

$169 + 13z = 351 \rightarrow 13z = 182 \rightarrow z = 14$

$\boxed{JG = 27}$

9. Find x.



&

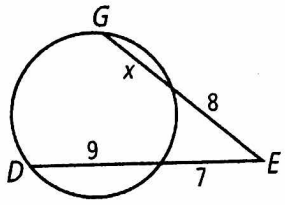
$W \cdot O = t^2$

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

$100 = x^2$

$x = \pm 10 \rightarrow \boxed{x = 10}$

10. Find GE.



$W \cdot O = W \cdot O$

$(8+x)(8) = (16)(7)$

$64 + 8x = 112$

$8x = 48$

$x = 6$

$\boxed{GE = 14}$