Name: Date: Period: 3

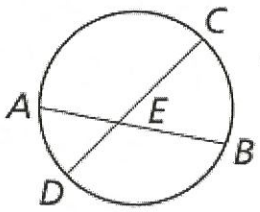
Using Segments of Chords, Tangents, and Secants

Lesson Objective INBAT use segments of chords, tangents, and secants

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

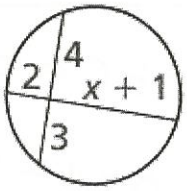
If two chords intersect in the interior of a circle, then the product of the lengths of the segments of one chord is = to the product of the lengths of the segments of the other chord.



$EA \cdot EB = EC \cdot ED$

Examples:

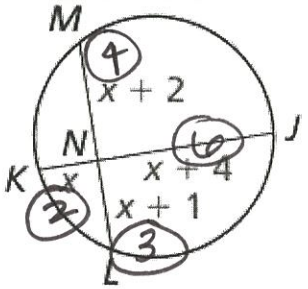
1. Find the value of x.



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

$X = 5$

2. Find ML and JK.



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

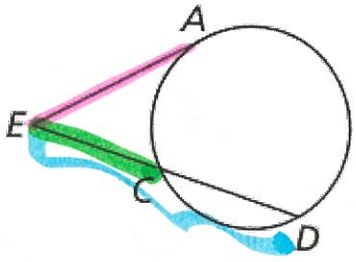
$x^2 + 3x + 2 = x^2 + 4x$

$x = 2 \rightarrow$ ML = 7, JK = 8

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

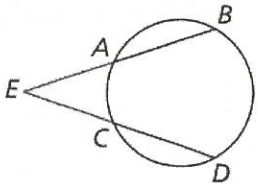
Secant Segment: A secant segment is a segment that contains a chord of a circle and has exactly one endpoint outside the circle. $\overline{ED}$

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.



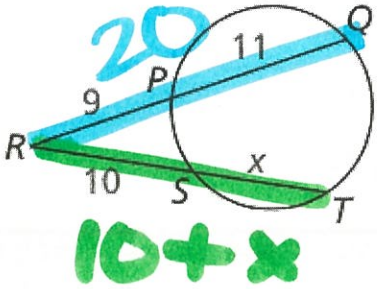
$EB \cdot EA = ED \cdot EC$

whole · outside = whole · outside

" W · O = W · O "

Examples:

3. Find the value of x.



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

$x = 8$

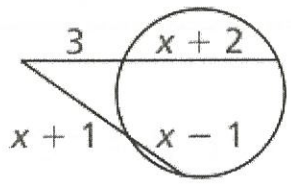
Solving Quadratics

$ax^2+bx+c=0$

① factor + zero product prop.

② $x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$

4. Find the value of x.



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

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

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

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

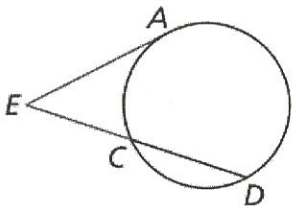
$(2x+5)(x-3)=0$

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

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

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.

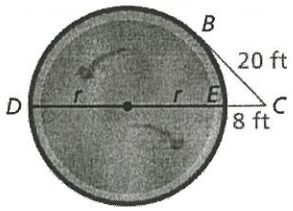


$ED \cdot EC = EA^2$

"$W \cdot O = t^2$"

Examples:

5. Find the radius of the aquarium tank.



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

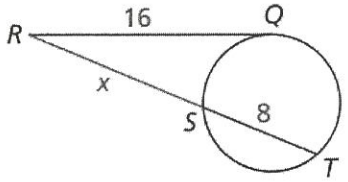
$(8+2r)(8) = 400$

$64+16r = 400$

$16r = 336$

$r = 21$

6. Find RS.



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

$x^2+8x = 256$

$x^2+8x-256=0$

$x = \frac{-(8) \pm \sqrt{(8)^2-4(1)(-256)}}{2(1)}$

$x = \frac{-8 \pm \sqrt{1088}}{2}$

$x = \frac{-8 \pm 8\sqrt{17}}{2}$

$x = -4 \pm 4\sqrt{17}$

$x = -4+4\sqrt{17} \approx 12.49$