

6.10 Angle Measures and Segment Lengths

OB3: Apply the rules and theorems of segments to solve for unknowns.

<p>Theorem 1: The measure of an angle formed by two lines that intersect inside a circle is half the sum of the measures of the intercepted arcs.</p> <p>$m\angle 1 = \frac{1}{2}(x + y)$ inside = add</p>	<p>Theorem 2: The measure of an angle formed by two lines that intersect outside a circle is half the difference of the measures of the intercepted arcs.</p> <p>$m\angle 1 = \frac{1}{2}(x - y)$ outside = subtract</p>
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Example 1: Find each measure.

a) $m\angle 1$

$m\angle 1 = \frac{1}{2}(40 + 52) = 46^\circ$

b) $m\angle 5$

$m\angle 5 = \frac{1}{2}(130 - 110) = 10^\circ$

$180 - 110 = 70$

c) $m\angle 1$

$m\angle 1 = \frac{1}{2}(140 - 80) = 30^\circ$

Example 2: Find the following angles.

a) $m\angle MPN$

$m\angle 1 = \frac{1}{2}(34 - 18) = 8^\circ$

b) $m\angle 1$

$m\angle 1 = 20^\circ$

c) $m\angle 1$

$m\angle 1 = \frac{1}{2}(110 - 70) = 20^\circ$

You Try! Find the following angles.

a) x

$x = 25^\circ$

b) x

$x = 15^\circ$

c) Arc CAB

arc CAB = 180 degrees

Theorem 3:

For a given point and circle, the product of the lengths of the two segments from the point to the circle is constant along any line through the point and the circle.

<p>Chords</p> <p>$a \cdot b = c \cdot d$</p>	<p>Secant Lines</p> <p>$(w + x)w = (y + z)y$</p>	<p>Secant & Tangent</p> <p>$(y + z)y = 1^2$</p>
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Example 4: Find the value of the variable in $\odot O$.

a)

$6 \cdot 8 = 7 \cdot y$
 $y = 5$

b)

$15 \cdot 8 = 2 \cdot z$
 $z = 60$

c)

$6.5 \cdot 3 = 7 \cdot m$
 $m = 2.823$

You Try! What is the value of the variable to the nearest tenth?

$14(y) = (7+y)y$
 $12 = 7+y$
 $y = 5$

$24(8) = z^2$
 $\sqrt{192} = z$
 $z = 13.856$

$21 = 6.5m$
 $m = 3.23$

Algebra Find the value of each variable using the given chord, secant, and tangent lengths. If the answer is not a whole number, round to the nearest tenth.

15.

$20 \cdot 2 = 6 \cdot y$
 $y = 6.67$

16.

$15 \cdot 4 = 26 \cdot 20$
 $60 = 520$ (No solution)

17.

$11 \cdot 13 = 20 \cdot c$
 $c = 7.175$

18.

$6 \cdot 1 = 1 \cdot 3$ (No solution)

19.

$x \cdot 5 = 15 \cdot 1$
 $x = 3$

20.

$9 \cdot 5 = x \cdot 7$
 $x = 6.43$