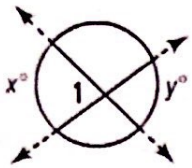
Math 3

Unit 6 Angle Measures and Segment Lengths

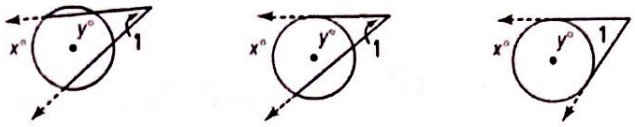
OBJ: Apply the rules and theorems of segments to solve for unknowns.

Theorem 1:	Theorem 2:
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.	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.



$m\angle 1 = \frac{1}{2}(x + y)$

its arc + other arc

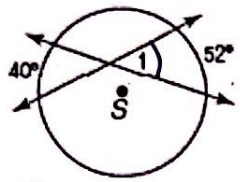


$m\angle 1 = \frac{1}{2}(x - y)$

big arc − little arc

Example 1: Find each measure.

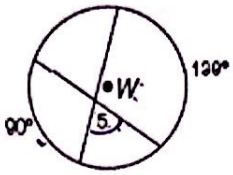
a) $m\angle 1$



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

$m\angle 1 = 46°$

b) $m\angle 5$



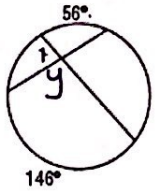
$w = \frac{1}{2}(120 + 90)$

$w = 105$

$m\angle 5 = 180 - 105$

$m\angle 5 = 75°$

c) $m\angle 1$



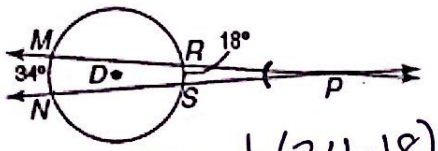
$y = \frac{1}{2}(146 + 56$

$y = 101$

$180 - 101 = m\angle 1 = 79°$

Example 2: Find the following angles.

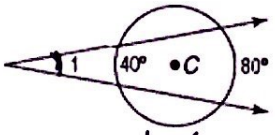
a) $m\angle MPN$



$m\angle MPN = \frac{1}{2}(34 - 18)$

$m\angle MPN = 8°$

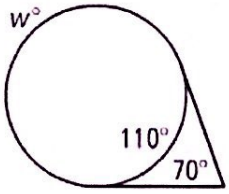
b) $m\angle 1$



$m\angle 1 = \frac{1}{2}(80 - 40)$

$m\angle 1 = 20°$

c)



$360 - 110 = 250$

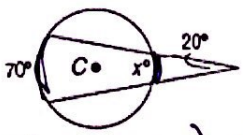
$2 \cdot 70 = \frac{1}{2}(w - 110) \cdot 2$

$140 = w - 110$

$w = 250°$

You try! Find the following angles.

a. x



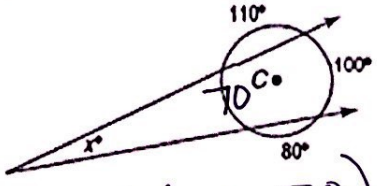
$2 \cdot 20 = \frac{1}{2}(70 - x) \cdot 2$

$40 = 70 - x$

$-30 = -x$

$x = 30°$

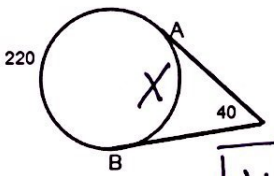
b) x



$x = \frac{1}{2}(100 - 70)$

$x = 15°$

c) Arc AB

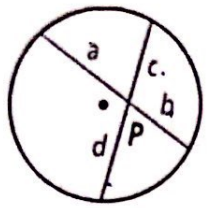


$360 - 220 = 140°$

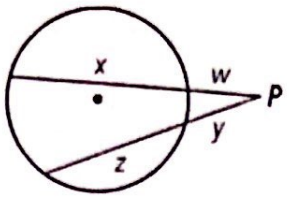
$40 = \frac{1}{2}(220 - X)$

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.

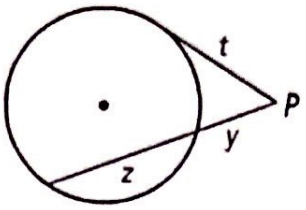


$a \cdot b = c \cdot d$



$(w + x)w = (y + z)y$

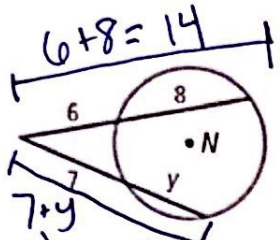
whole · outside = whole · outside



$(y + z)y = t^2$

Example 4: Find the value of the variable in each circle.

a)

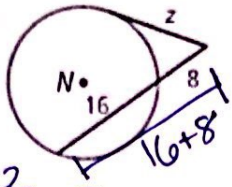


$6(14) = 7(7+y)$

$84 = 49 + 7y$

$y = 5$

b)

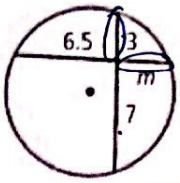


$z^2 = 8 \cdot 24$

$\sqrt{z^2} = \sqrt{192}$

$z = 8\sqrt{3}$

c)



$3 \cdot 7 = 6.5m$

$m = 3.23$

192

12 16

3 4 4 4

2 2 2 2 2 2

2·2·2·2·2·3

$2 \cdot 2 \cdot 2\sqrt{3}$

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

$x = 5.4$

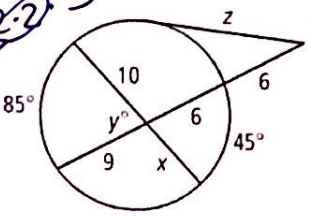
$y = 65°$

$z = 3\sqrt{14}$

$y = \frac{1}{2}(85 + 45)$

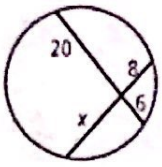
$10x = 6.9$

$z^2 = 6(21)$



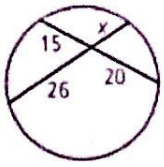
Algebra Find the value of each variable using the given chord, secant, and tangent lengths. If the answer is not a whole number, round to the nearest tenth. ◀ See Problem 3.

15.



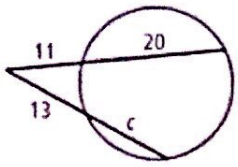
$x = 15$

16.



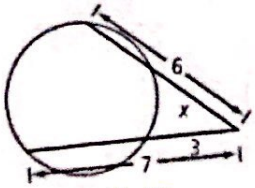
$x = 11.538$

17.



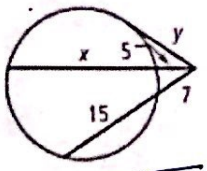
$c = 13.231$

18.



$x = 3.5$

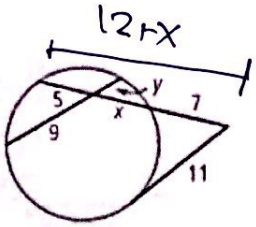
19.



$y = \sqrt{154}$

$x = 25.8$

20.



$x = 5.286$

$y = 2.937$