

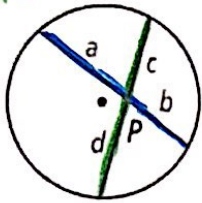
6.7 Segment Lengths

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

Theorem 1:

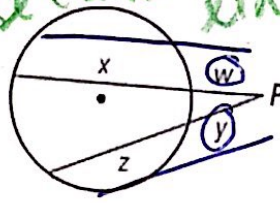
For a given point and circle, the product of the lengths of the two segments from the point to the circle is constant along any line through the point and the circle.

Chords



$$a \cdot b = c \cdot d$$

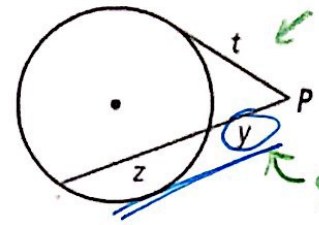
2 secant lines



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

(whole length)(outside)

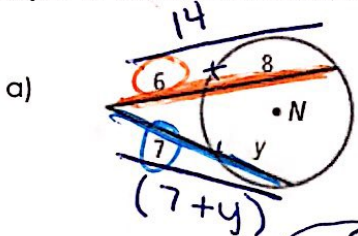
tangent



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

Secant

Example 4: Find the value of the variable in $\odot O$.

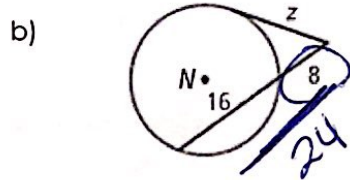


$$14(6) = (7+y)7$$

$$84 = 49 + 7y$$

$$\begin{array}{r} 84 \\ -49 \\ \hline 35 = 7y \\ \hline 5 = y \end{array}$$

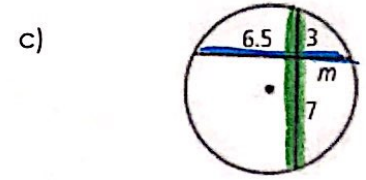
$y = 5$



$$24(8) = z^2$$

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

$13.86 = z$



$$(3)(7) = (6.5)m$$

$$\frac{21}{6.5} = \frac{6.5m}{6.5}$$

$m = 3.23$

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

$$9(6) = 10x$$

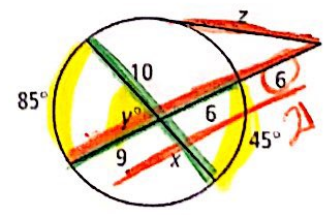
$$\frac{54}{10} = \frac{10x}{10}$$

$x = 5.4$

$$21(6) = z^2$$

$$\sqrt{126} = \sqrt{z^2}$$

$z = 11.22$



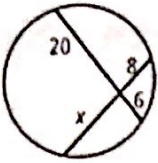
$$\frac{1}{2}(85 + 45) = y$$

$$\frac{1}{2}(130) = y$$

$y = 65^\circ$

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

15.



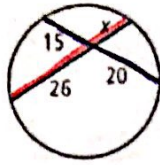
$$a \cdot b = c \cdot d$$

$$(20)(6) = (x)(8)$$

$$\frac{120}{8} = \frac{8x}{8}$$

$$x = 15$$

16.

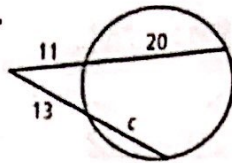


$$(26)(x) = (20)(15)$$

$$\frac{26x}{26} = \frac{300}{26}$$

$$x = 11.54$$

17.



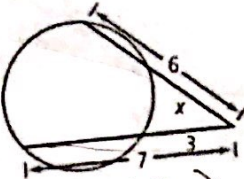
$$31(11) = (3+c)13$$

$$341 = 169 + 13c$$

$$\begin{array}{r} 341 \\ -169 \\ \hline 172 = 13c \\ \frac{172}{13} = \frac{13c}{13} \\ 13.23 = c \end{array}$$

$$c = 13.23$$

18.

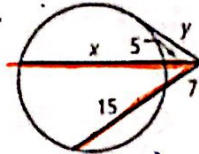


$$(7)(3) = 6(x)$$

$$21 = 6x$$

$$x = 3.5$$

19.



$$(x+5)(5) = (15+7)(7)$$

$$5x + 25 = 154$$

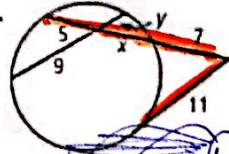
$$-25 \quad x = 25.8$$

$$5x = 129$$

$$(25.8+5)(5) = y^2$$

$$y = 12.41$$

20.



$$(5+x+7)(7) = 11^2$$

$$7x + 49 + 35 = 121$$

$$7x + 84 = 121$$

$$-84 \quad -84$$

$$7x = 37$$

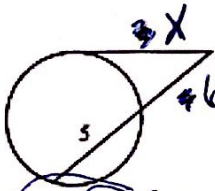
$$x = 5.24$$

$$19(7) = (5)(5.29)$$

$$\frac{133}{9} = \frac{26.45}{9}$$

$$y = 2.94$$

21.



$$(6+5)6 = x^2$$

$$36 + 30 = x^2$$

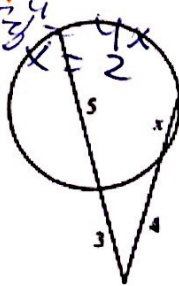
$$\sqrt{66} = \sqrt{x^2}$$

$$x = 8.12$$

22.

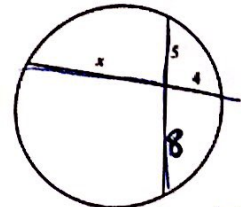
$$3(5+3) = (1+x)4$$

$$3(8) = 16 + 4x$$



$$x = 2$$

23.



$$(5)(8) = (x)(4)$$

$$\frac{40}{4} = \frac{4x}{4}$$

$$x = 10$$