

# 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.

$a \cdot b = c \cdot d$

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

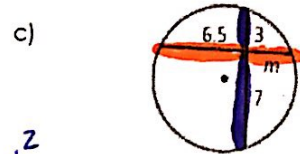
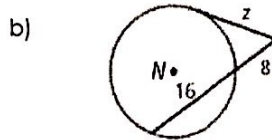
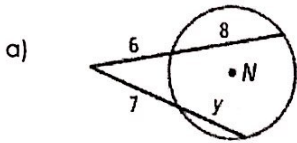
$(y + z)y = t^2$

Sections of the same chord should be multiplied

whole (outside) = whole (outside)

whole (outside) = tangent<sup>2</sup>

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



whole (outside) = whole (outside)

$$(6+8)6 = (7+y)7$$

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

$$84 = (7+y)7$$

$$12 = 7+y$$

$y = 5$

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

$$10x = 9(6)$$

$$10x = 54$$

$x = 5.4$

$$(9+6+6)6 = z^2$$

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

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

$z = 11.2$

whole (outside) = tangent<sup>2</sup>

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

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

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

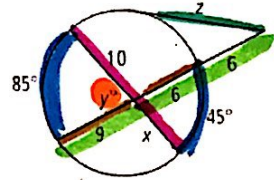
$z = 13.86$

$$3(7) = 6.5m$$

$$21 = 6.5m$$

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

$m = 3.23$



z - length

x - length

y - angle

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

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

$y = 65^\circ$