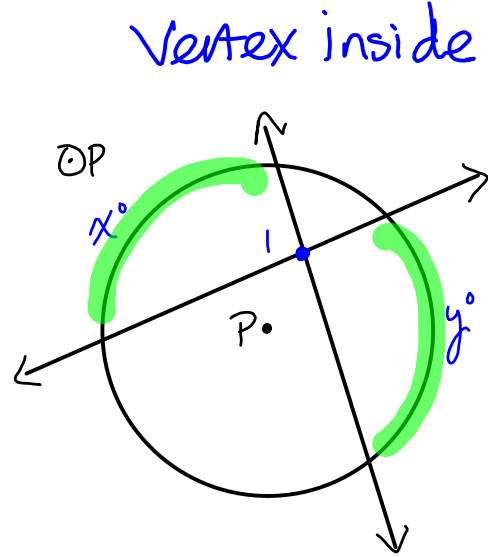


# 12.4 Angle Measures

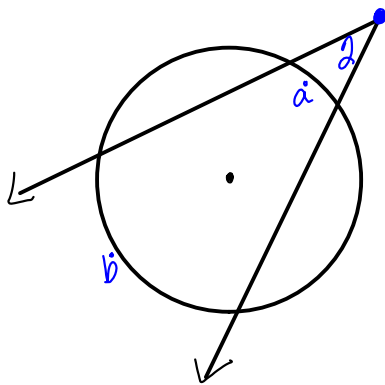
Secant: line, segment, or ray that intersects a circle at 2 points.

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

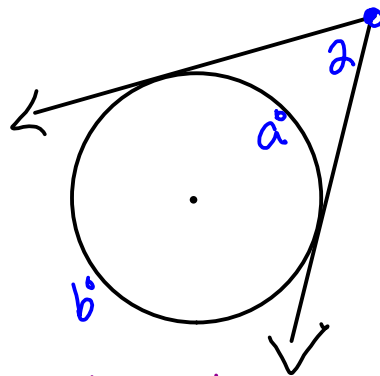
$$m\angle \theta = \frac{1}{2}(\widehat{big} + \widehat{sm})$$



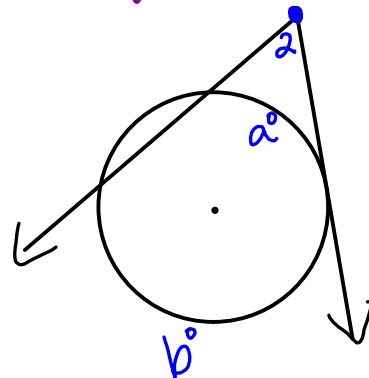
$$m\angle \theta = \frac{1}{2}(\widehat{big} - \widehat{sm}) \text{ Vertex Outside}$$



2 secants

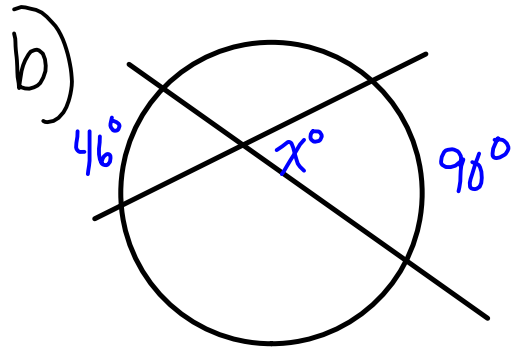
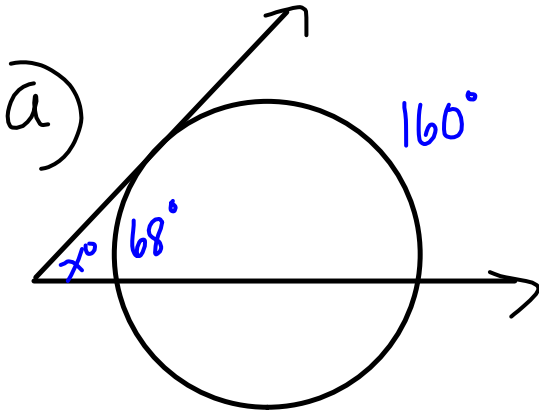


2 tangents

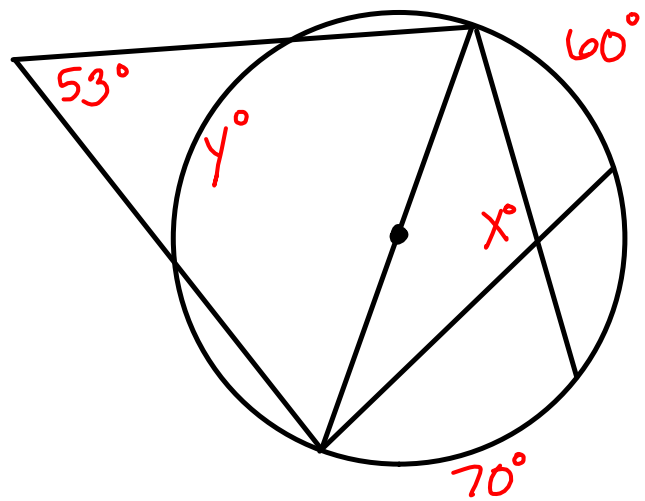


tangent & secant

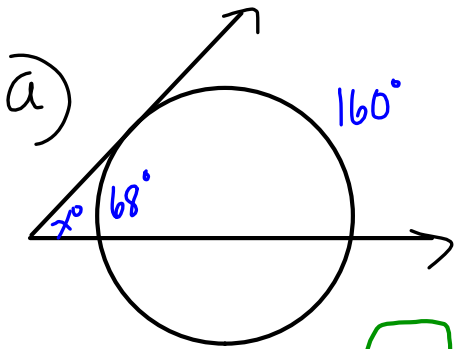
Ex 1 | solve for x.



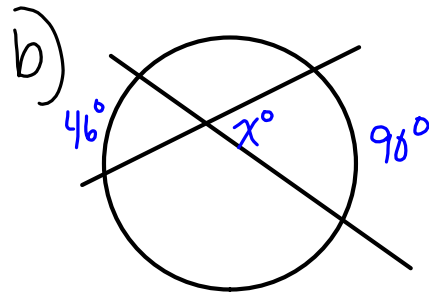
Ex 2 | Find the values of x and y.



Ex 1 | solve for x.



$$\angle x = \frac{1}{2}(160 - 68) = 46^\circ$$



$$\angle x = \frac{1}{2}(90 + 46) = 68^\circ$$

Ex 2 | Find the values of x and y.

finding y

the vertex, ( $\angle$ ) is outside

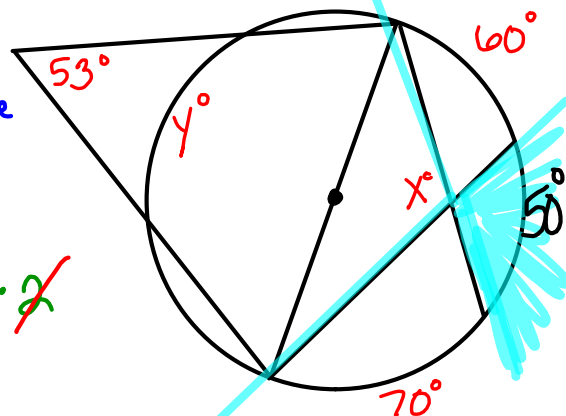
$$m\angle\theta = \frac{1}{2}(\widehat{Big} - \widehat{Sm})$$

$$2 \cdot 53^\circ = \frac{1}{2}(180 - y) \cdot 2$$

$$106 = 180 - y$$

$$-74 = -y$$

$$y = 74^\circ$$



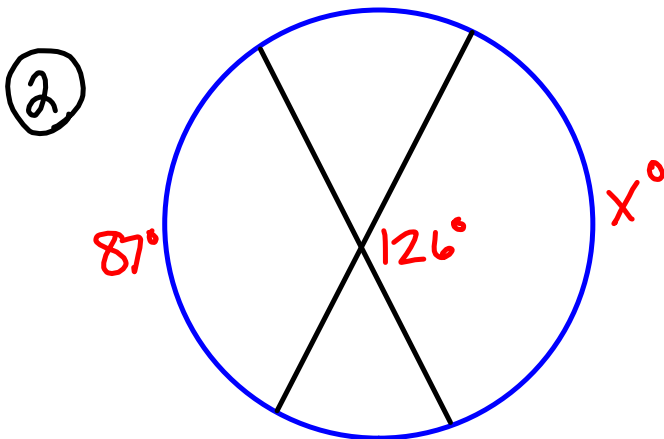
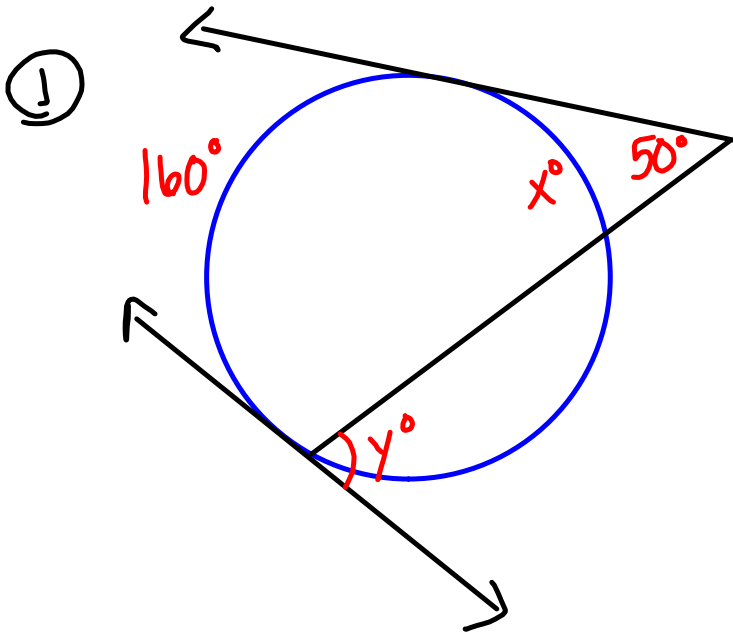
finding x (vertex ins)

$$m\angle\theta = \frac{1}{2}(\widehat{Big} + \widehat{Sm})$$

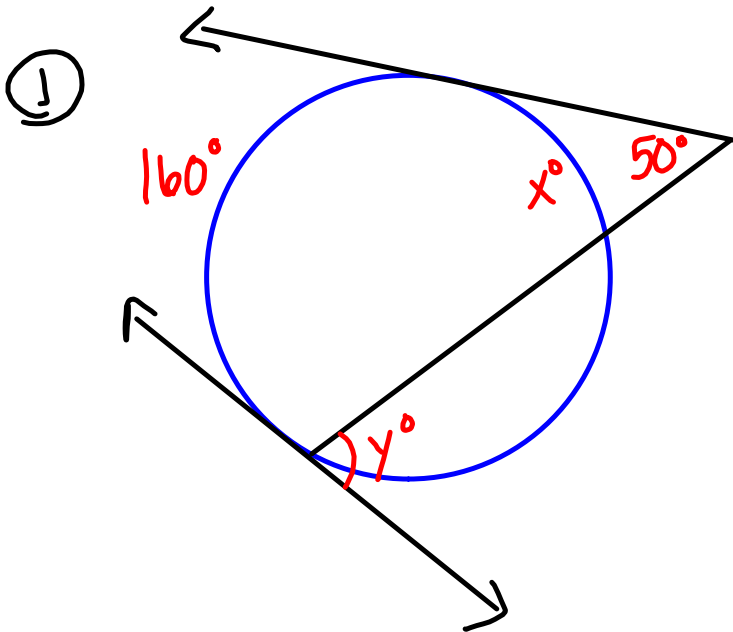
$$x = \frac{1}{2}(180 + 50)$$

$$x = 115^\circ$$

Practice: Solve for the given variables.



Practice: Solve for the given variables.



$$50^\circ = \frac{1}{2}(160 - x)$$

$$100 = 160 - x$$

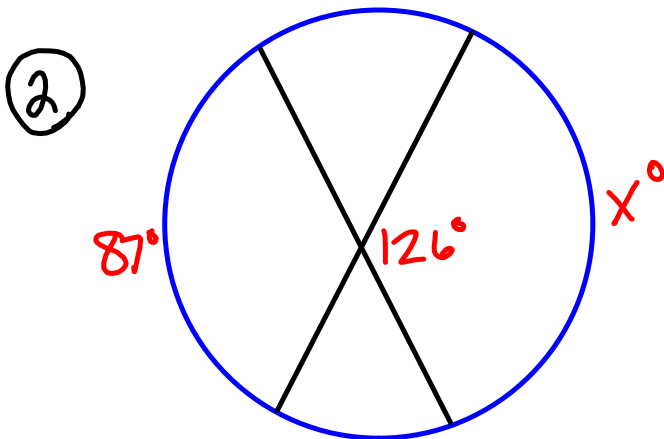
$$-60 = -x$$

$$x = 60$$

$$\angle y = \frac{1}{2} \text{arc}$$

$$\angle y = \frac{1}{2}(360 - 160 - 60)$$

$$\angle y = \frac{1}{2}(140) = 70^\circ$$



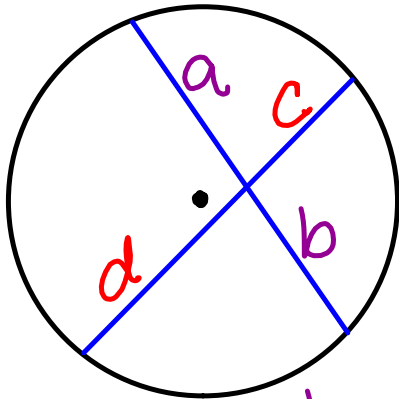
$$126^\circ = \frac{1}{2}(x + 87)$$

$$252 = x + 87$$

$$165^\circ = x$$

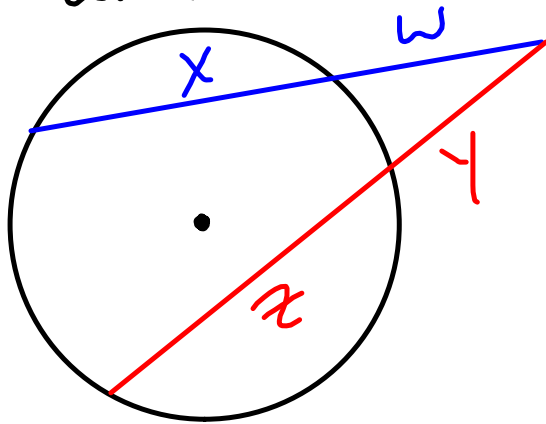
# 12.4 Segment lengths

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



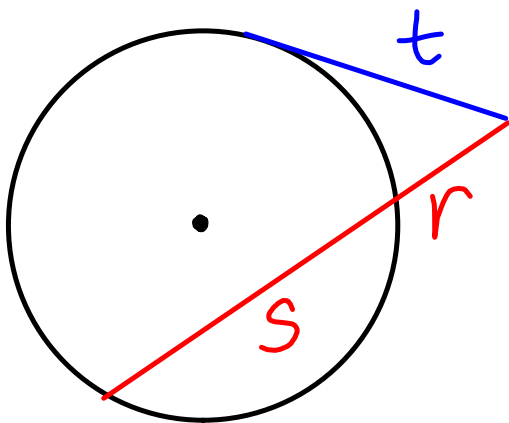
2 chords

Whole  $\cdot$  outside = whole  $\cdot$  outside



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

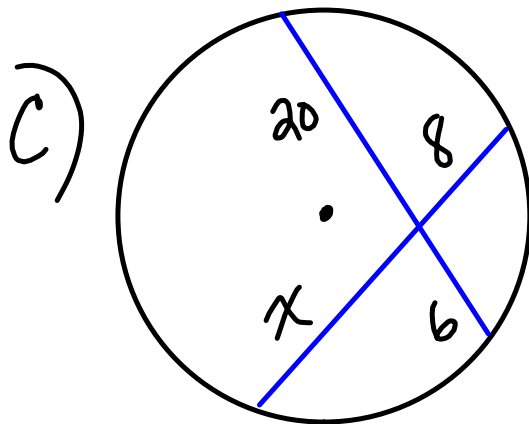
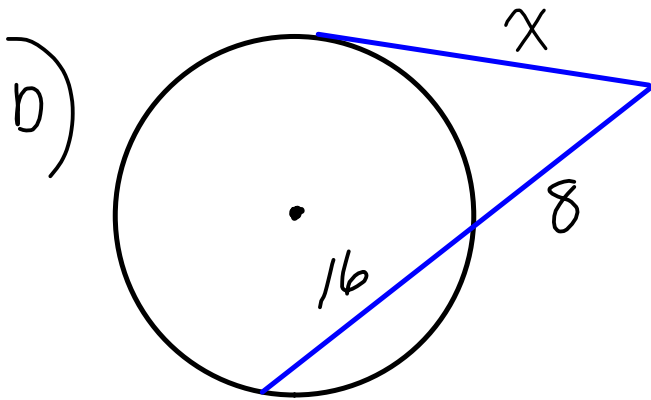
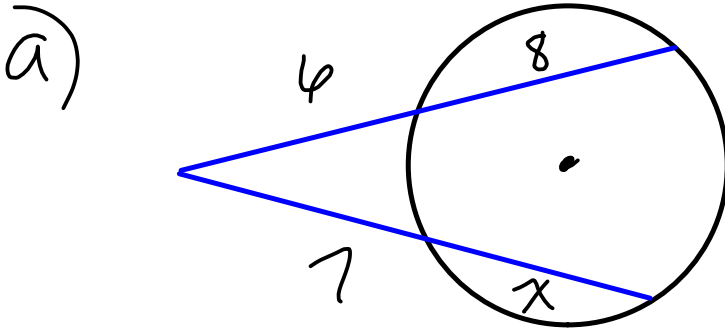
2 secants



$$t^2 = (s+r)r$$

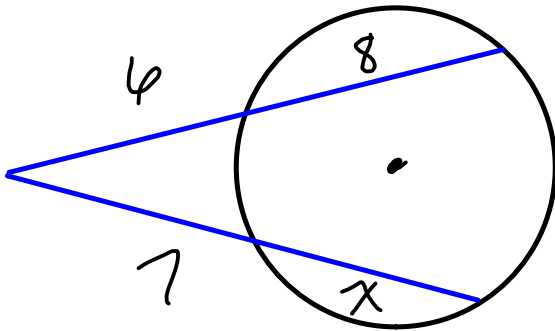
Secant & tangent

Ex 1 Find the value of  $x$ .



Ex 1 Find the value of  $x$ .

a)



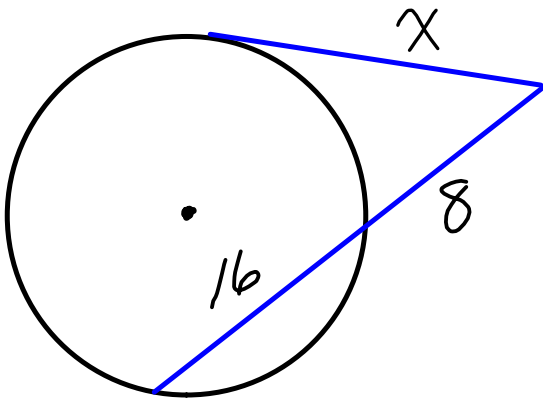
$$(6+8)6 = (7+x)7$$

$$\frac{84}{7} = \frac{(7+x) \cdot 7}{7}$$

$$12 = 7+x$$

$$\boxed{5 = x}$$

b)



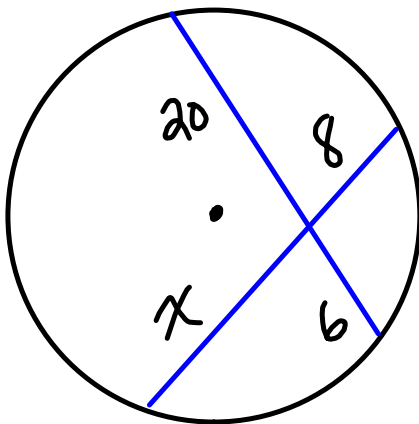
$$x^2 = (16+8)8$$

$$x^2 = 192$$

$$x = \sqrt{192}$$

$$\boxed{x = 13.8}$$

c)



$$8x = 20 \cdot 6$$

$$x = \frac{20 \cdot 6}{8}$$

$$\boxed{x = 15}$$



Ex 2 | Find the values of  $x$  and  $y$ .

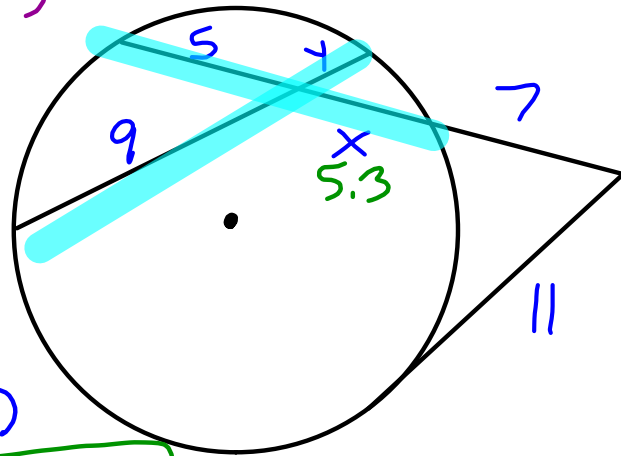
Find  $x$  (secant/tangent)

$$11^2 = (12+x)7$$

$$121 = 84 + 7x$$

$$37 = 7x$$

$$5.3 = x$$

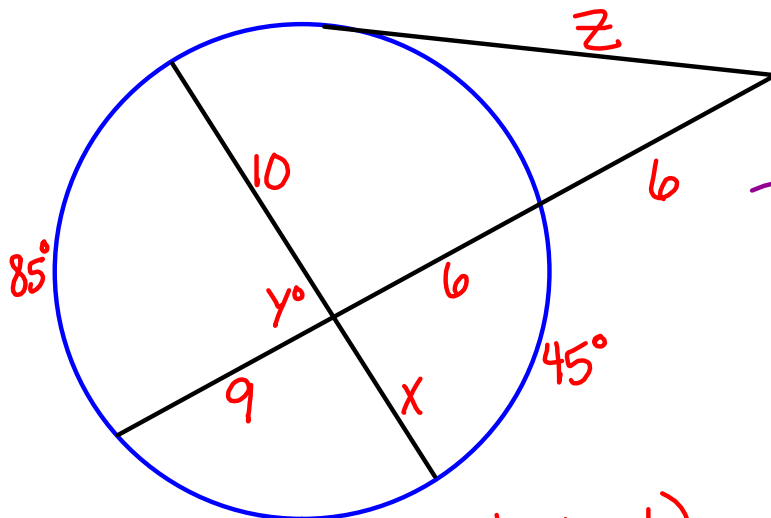


Find  $y$  (two chords)

$$\frac{(5.3)(5)}{9} = y$$

$$y = 2.9$$

Practice: Find the values of  $x$ ,  $y$ ,  $z$ .



Find  $x$  (2 chords)

$$10x = 6(9)$$

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

$$x = 5.4$$

Find  $y$  (angle vertex inside)

$$m\angle = \frac{1}{2}(\text{arc} + \text{arc})$$

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

$$y = 65^\circ$$

Find  $z$  (tang/sec)

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

$$z^2 = 126$$

$$z = 11.2$$