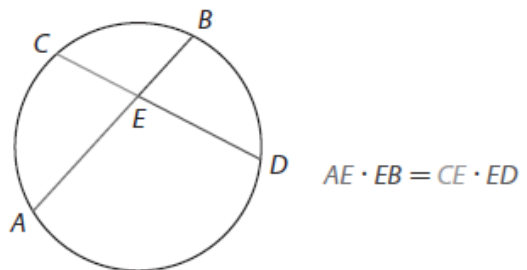


## 15.4 Segment Relationships in Circles

What are the relationships between the segments in circles?

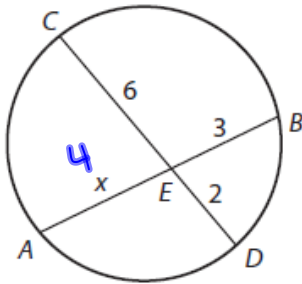
### Chord-Chord Product Theorem

If two chords intersect inside a circle, then the products of the lengths of the segments of the chords are equal.



Find the value of  $x$  and the length of each chord. pg. 817

1.



$$x \cdot 3 = 6 \cdot 2$$

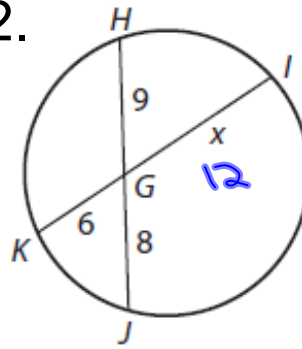
$$\frac{3x}{3} = \frac{12}{3}$$

$$AB = 7$$

$$OC = 8$$

$$x = 4$$

2.



$$6 \cdot x = 8 \cdot 9$$

$$\frac{6x}{6} = \frac{72}{6}$$

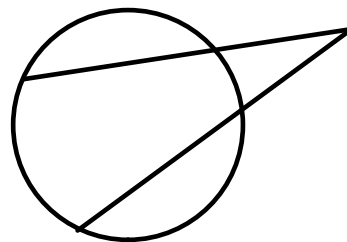
$$18 = KI$$

$$17 = JH$$

$$x = 12$$

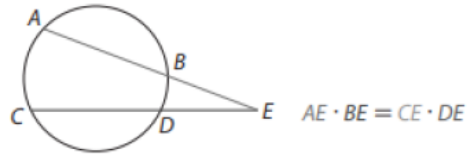
**Secant**- any line that intersects a circle at exactly 2 points

**Secant segment**- part of a secant line with at least one point on the circle



### Secant-Secant Product Theorem

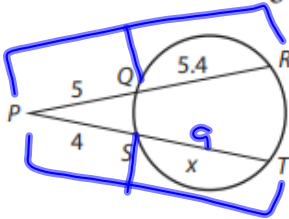
If two secants intersect in the exterior of a circle, then the product of the lengths of one secant segment and its external segment equals the product of the lengths of the other secant segment and its external segment.



Find the value of  $x$  and the length of each secant segment.

pg. 819

6.



$$PT \cdot PS = PR \cdot PQ$$

$$(x+4) \cdot 4 = (5+5.4) \cdot 5$$

$$4x + 16 = 52$$

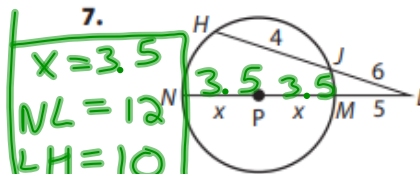
$$\begin{array}{r} 4x + 16 = 52 \\ -16 \quad -16 \\ \hline 4x = 36 \\ \frac{4x}{4} = \frac{36}{4} \end{array}$$

$$(10.4) \cdot 5$$

$$\text{PR} = 10.4$$

$$\text{TP} = 13$$

7.



$$x = 3.5$$

$$NL = 12$$

$$LH = 10$$

$$NL \cdot ML = HL \cdot JL$$

$$(x+x+5) \cdot 5 = (4+6) \cdot 6$$

$$(2x+5) \cdot 5 = (10) \cdot 6$$

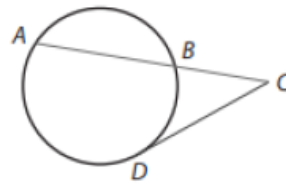
$$10x + 25 = 60$$

$$\begin{array}{r} 10x + 25 = 60 \\ -25 \quad -25 \\ \hline 10x = 35 \\ \frac{10x}{10} = \frac{35}{10} \end{array}$$

$$x = 3.5$$

### Secant-Tangent Product Theorem

If a secant and a tangent intersect in the exterior of a circle, then the product of the lengths of the secant segment and its external segment equals the length of the tangent segment squared.



$$AC \cdot BC = DC^2$$

Find the value of  $x$  (pg 820)

$$BD \cdot BC = AB^2$$

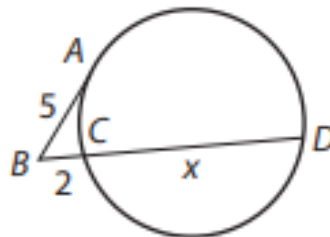
$$(x+2) \cdot 2 = 5^2$$

$$2x+4 = 25$$

$$\begin{array}{r} -4 \quad -4 \\ \hline 2x = 21 \end{array}$$

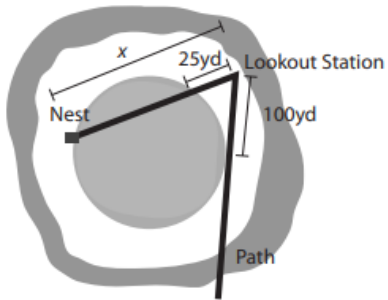
$$\frac{2x}{2} = \frac{21}{2}$$

$$x = 10.5$$



Find the value of  $x$ .

9. On a bird-watching trip, you travel along a path tangent to a circular pond to a lookout station that faces a hawk's nest. Given the measurements in the diagram on your bird-watching map, how far is the nest from the lookout station?



$$x \cdot 25 = 100^2$$
$$\frac{25x}{25} = \frac{10,000}{25}$$
$$x = 400$$

### Home work

pg. 810-811  
#8, 12-15

pg. 823-825  
#5, 6, 10, 11, 13-15