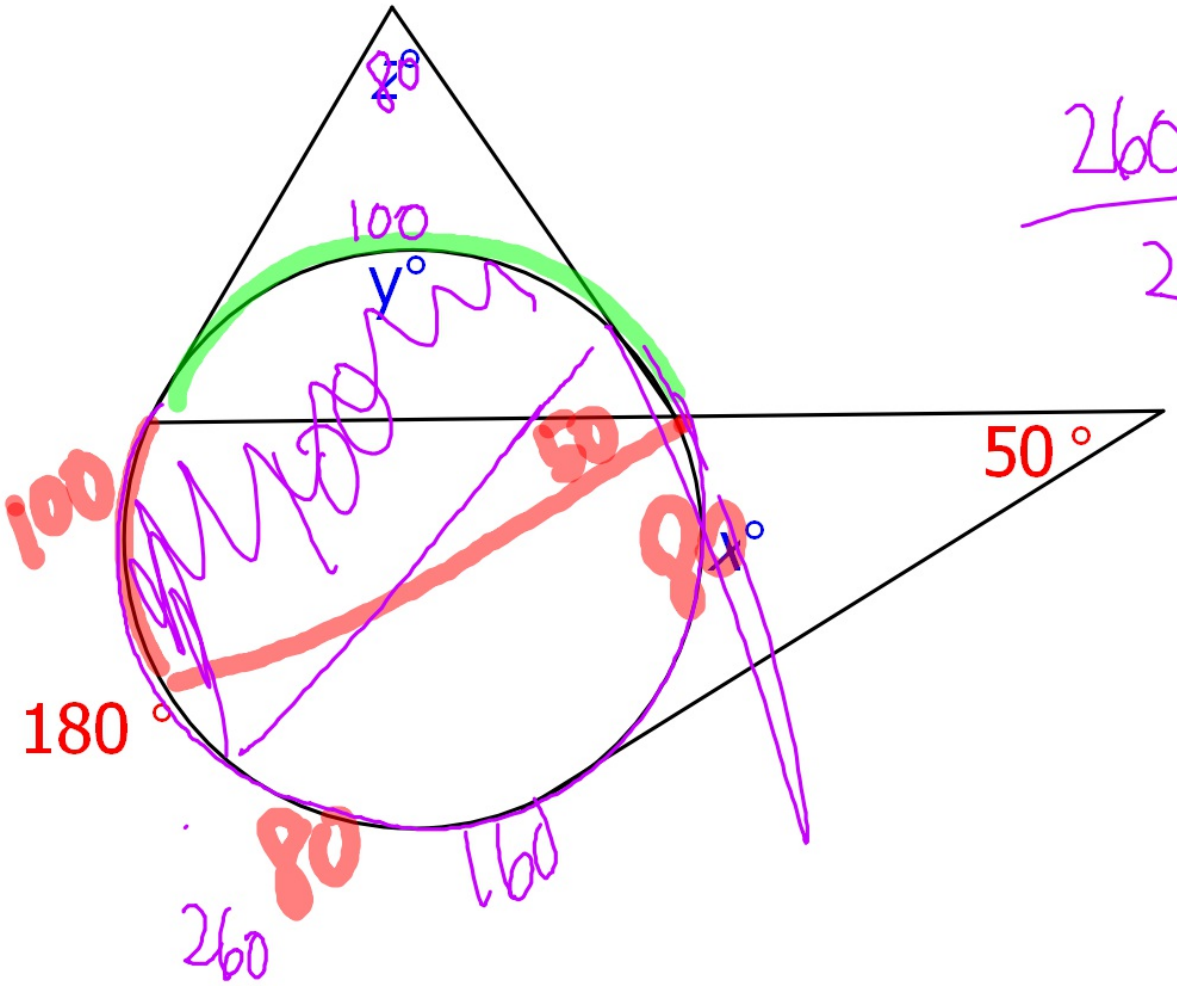


$$\frac{260-100}{2}$$

SECTION 9.7: CIRCLES & LENGTHS OF SEGMENTS

Standards:

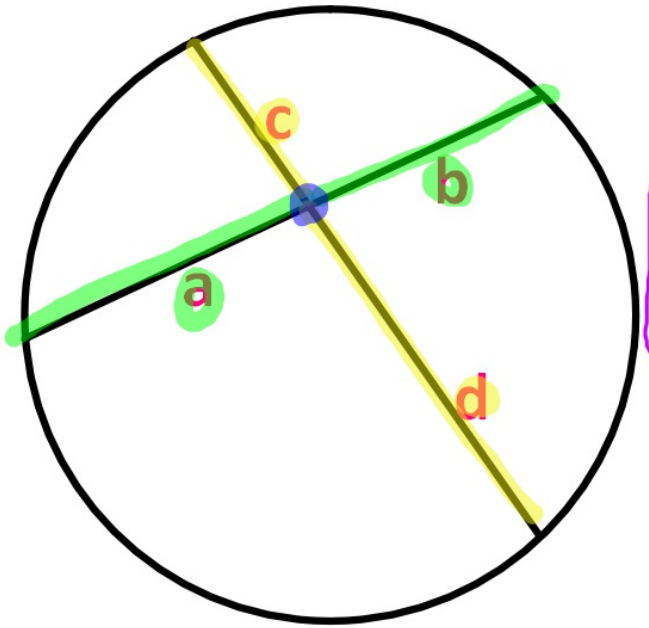
7.0 - Students prove and use theorems involving the properties of parallel lines cut by a transversal, the properties of quadrilaterals, and the properties of circles.

17.0 - Students prove theorems by using coordinate geometry, including the midpoint of a line segment, the distance formula, and various forms of equations of lines and circles.

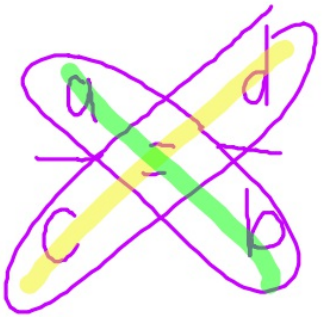
21.0 - Students prove and solve problems regarding relationships among chords, secants, tangents, inscribed angles, and inscribed and circumscribed polygons of circles.

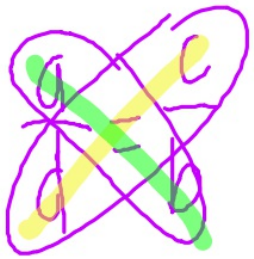
THEOREM

When 2 chords intersect inside a circle, the product of the segments of one chord equals the product of the segments of the other chord.



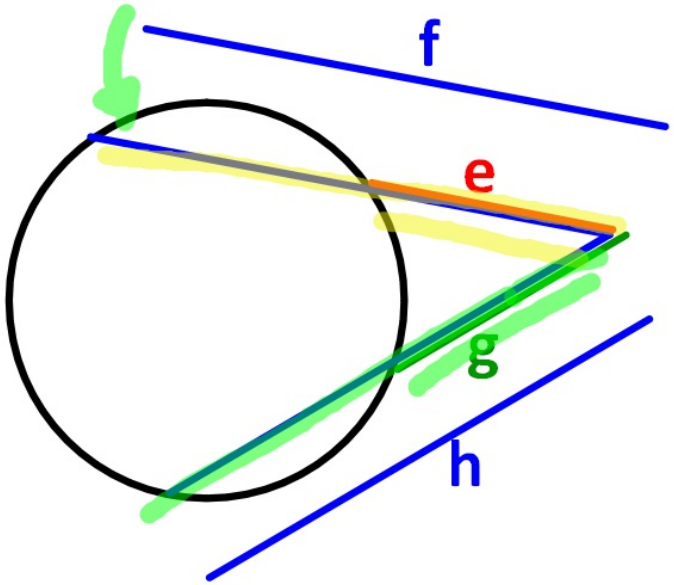
$$a \cdot b = c \cdot d$$





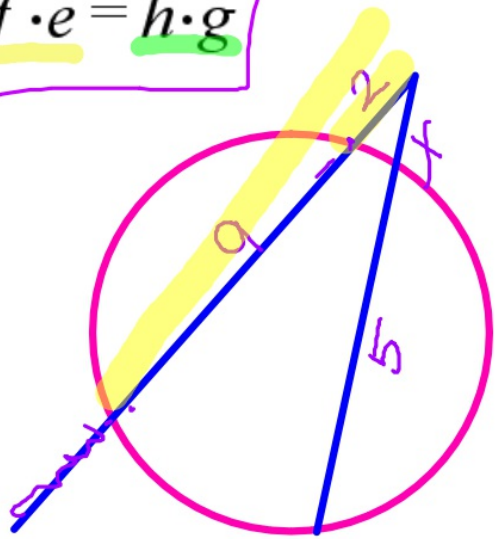
THEOREM

When 2 secant segments are drawn to a circle from an external point, the product of one secant segment and its external segment = the product of the other secant segment and its external segment.



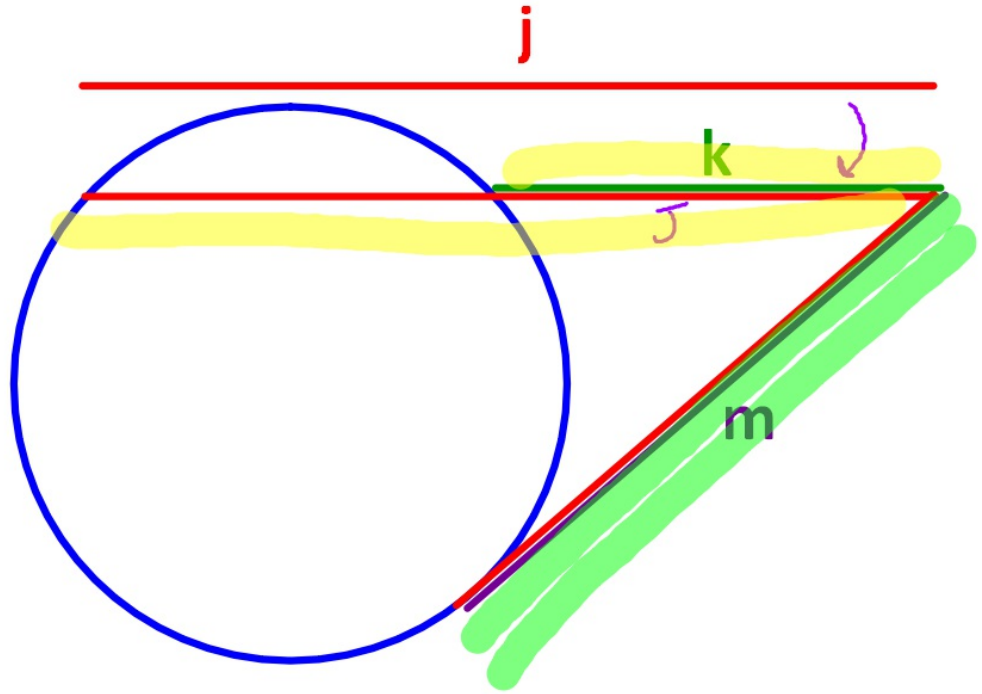
$$f \cdot e = h \cdot g$$

$$(2)(9+2)=(5+x)(x)$$



THEOREM

When a secant segment and a tangent segment are drawn to a circle from an external point, the product of the secant segment and its external segment = the square of the tangent segment.

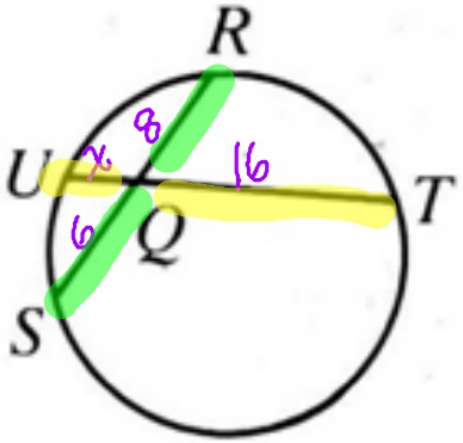


$$j \cdot k = m^2$$

sec(whole) • sec(outside) = tan • tan
or
$\tan^2$

1) If $RQ = 8$, $QS = 6$, and $TQ = 16$, then

✦ $QU =$ 3 .

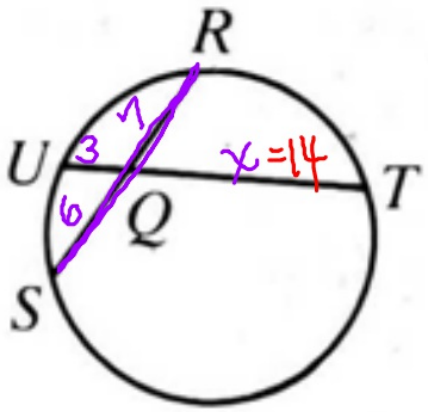


$6 \cdot 8 = 16 \cdot x$

$3 = x$

2) If $RS = 13$, $RQ = 7$, and $QU = 3$, then

✦ $TQ =$ **14** .

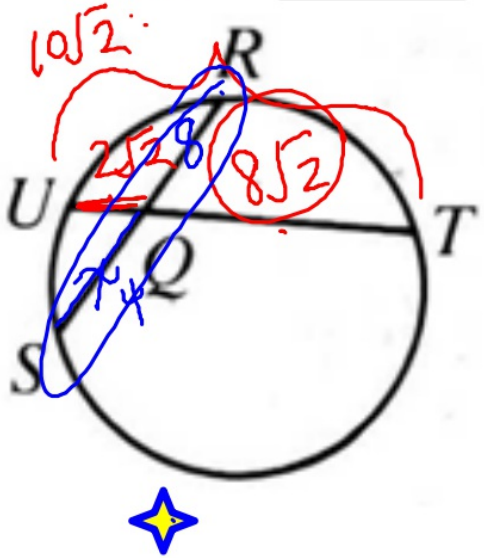


$7 \cdot 6 = 3 \cdot x$

$\frac{42}{3} = \frac{3x}{3}$

$14 = x$

3) If $TU = 10\sqrt{2}$, $QU = 2\sqrt{2}$, and $RQ = 8$, then $RS =$ **12** .

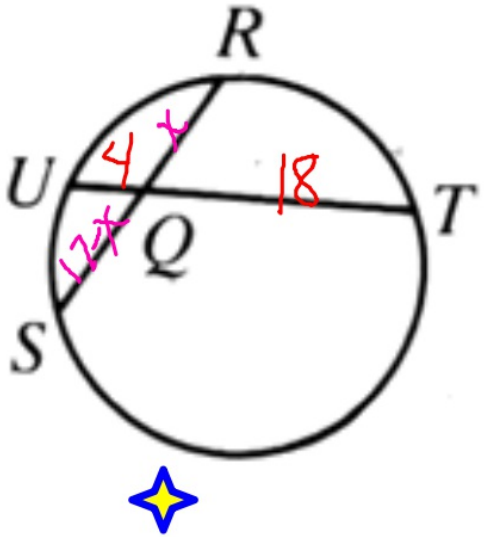


$8x = (2\sqrt{2})(8\sqrt{2})$

$\frac{8x}{8} = \frac{16 \cdot 2}{8}$

$x = 4$

3) If RQ = ?? , TQ = 18 , and QU = 4 then RS = 17



$(17-x)(x) = 4 \cdot 18$

$17x - x^2 = 72$

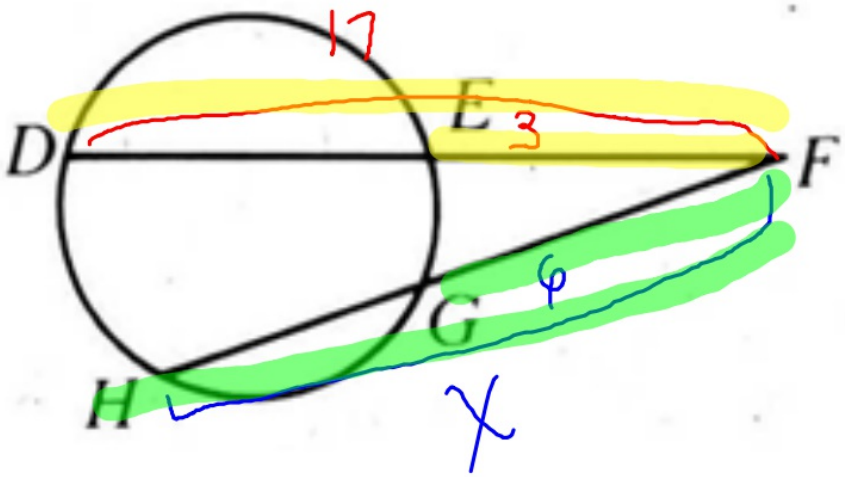
$0 = x^2 - 17x + 72$

$(x-9)(x-8)$

$x = 9$ or 8

5) If $DF = 17$, $EF = 3$, and $GF = 6$, then

✦ $HF =$ 8.5 .

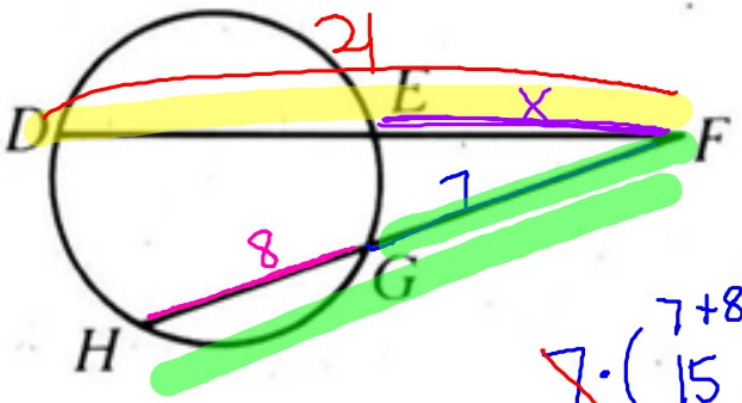


$\frac{(3)(17)}{3} = \frac{6 \cdot X}{3}$

$17 = 2X$

$8.5 = X$

6) If $HG = 8$, $GF = 7$, and $DF = 21$, then $EF =$ _____.



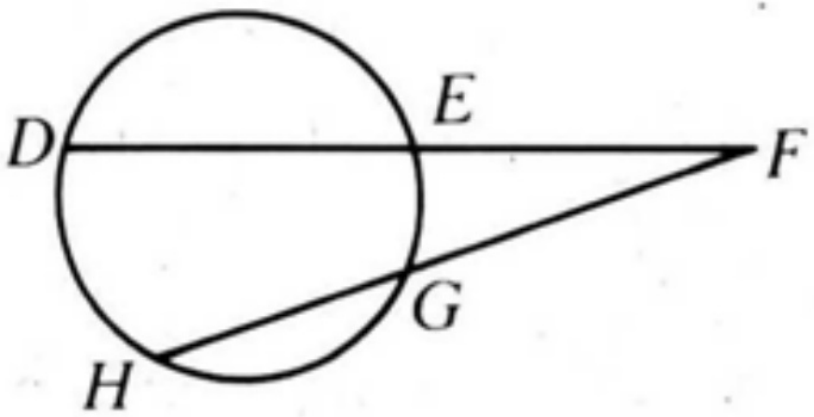
$7 \cdot \binom{7+8}{15} = 21x$

$15 = 3x$

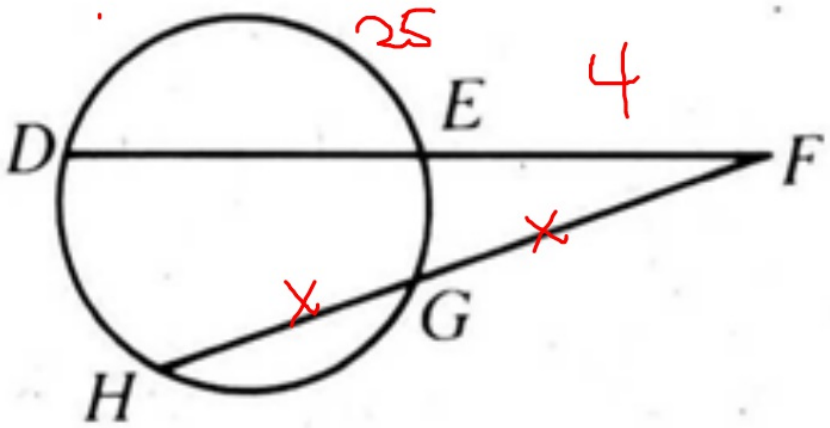
$5 = x$

7) If $GF = 8$, $HG = 10$, and $DE = 18$, then

$EF =$ 6 .



8) If $DF = 25$, $EF = 4$, and $HG = GF = x$, then $x =$ $5\sqrt{2}$.



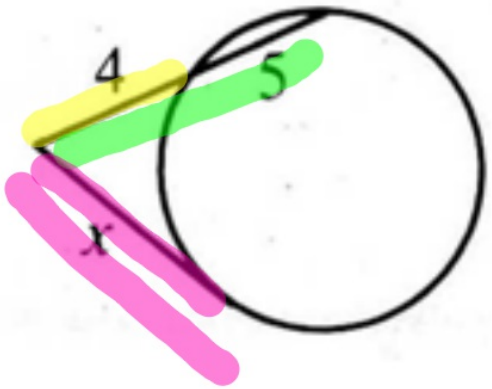
$4 \cdot 25 = x(2x)$

$100 = 2x^2$

$\sqrt{50} = \sqrt{x^2}$

$5\sqrt{2} = x$

9)



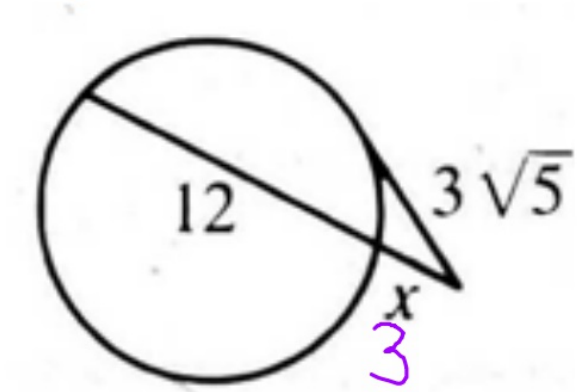
$(4+5)$

$x^2 = 4 \cdot 9$

$x^2 = 36$

$x = 6$

10)



$(3\sqrt{5})(3\sqrt{5}) = x(x+12)$

$9 \cdot 5 = x^2 + 12x$

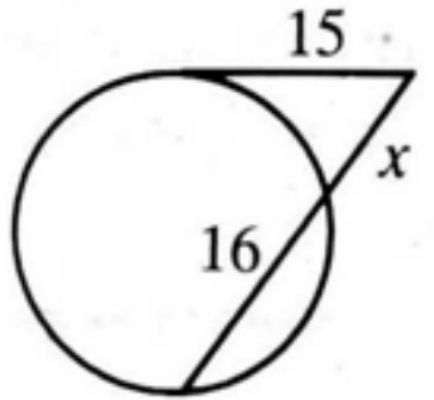
$0 = x^2 + 12 - 45$

$0 = (x+15)(x-3)$

$x = -15$ or 3

✦ 3

11)



✦ 9

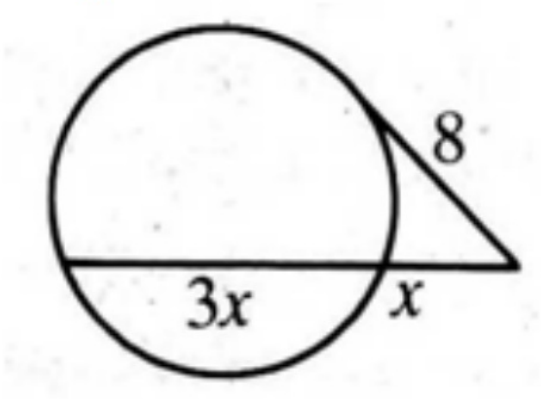
$15^2 = x(x+16)$

$225 = x^2 + 16x$

$0 = x^2 + 16x - 225$

$(x+25)(x-9)$

12)



4

sec/sec

(ext)(sec) = (ext)(sec)

tan/sec

(ext)(whole) = (ext)(sec)

tan · tan

Classroom Exercises

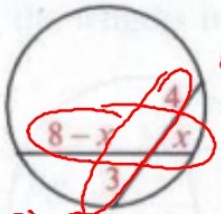
Chords, secants, and tangents are shown. State the equation you would use to find the value of x. Then solve for x.

1.

$3x = 24$

$x = 8$

2.



$4 \cdot 3 = (8-x)x$

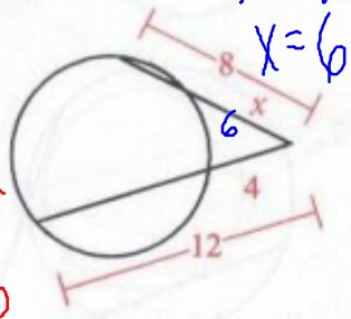
$12 = 8x - x^2$

$x^2 - 8x + 12 = 0$

$(x-6)(x-2) = 0$

(6)(2)

3.

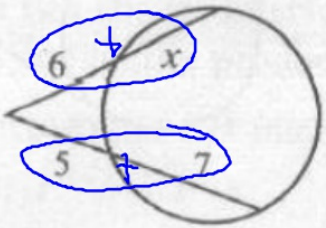


$8x = 48$

$x = 6$

Chords, secants, and tangents are shown. State the equation you would use to find the value of x. Then solve for x.

4.



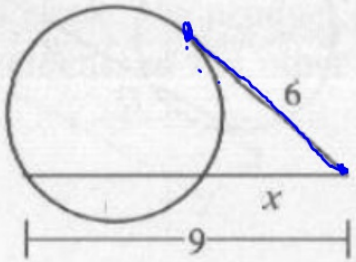
$6(6+x) = 5 \cdot 12$

$36 + 6x = 60$

$-36 \quad -36$

$6x = 24$

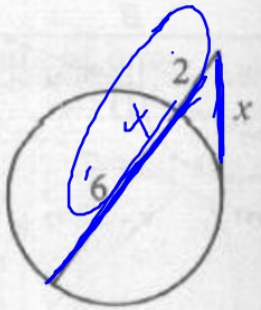
5.



$6 \cdot 6 = x \cdot 9$

$36 = 9x$

6.



$x^2 = 2(8)$

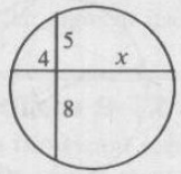
$\sqrt{x^2} = \sqrt{16}$

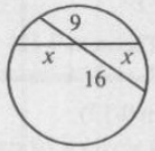
$x = 4$

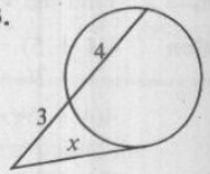
- Pg. 363 (CE): # 1-6

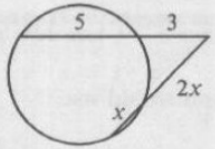
Written Exercises

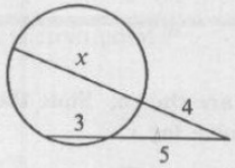
Chords, secants, and tangents are shown. Find the value of x.

1. 

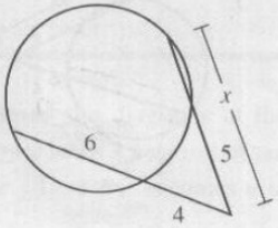
2. 

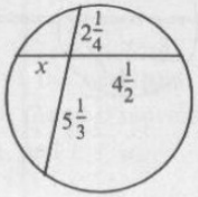
3. 

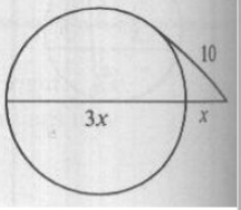
4. 

5. 

6. 

7. 

8. 

9. 

HW 12.7(9.7)

- Pg. 364 (WE): #1-9, 13-20

Chords $\overline{AB}$ and $\overline{CD}$ intersect at P. Find the lengths indicate

Example $AP = 5;\ BP = 4;\ CD = 12;\ CP =$?

Solution Let $CP = x$. Then $DP = 12 - x$.

$x(12 - x) = 5 \cdot 4$

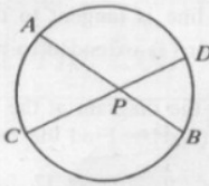
$12x - x^2 = 20$

$x^2 - 12x + 20 = 0$

$(x - 2)(x - 10) = 0$

$x = 2$ or $x = 10$

$CP = 2$ or 10



13. $AP = 6;\ BP = 8;\ CD = 16;\ DP =$?
14. $CD = 10;\ CP = 6;\ AB = 11;\ AP =$?
15. $AB = 12;\ CP = 9;\ DP = 4;\ BP =$?
16. $AP = 6;\ BP = 5;\ CP = 3 \cdot DP;\ DP =$?

$\overline{PT}$ is tangent to the circle. Find the lengths indicated.

17. $PT = 6;\ PB = 3;\ AB =$?
18. $PT = 12;\ CD = 18;\ PC =$?
19. $PD = 5;\ CD = 7;\ AB = 11;\ PB =$?
20. $PB = AB = 5;\ PD = 4;\ PT =$? and $PC =$?