10.7 Notes

Key

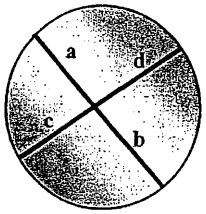
1)

Analytic Geometry
Chapter 10.7

Secant and Tangent Segment Measures

2)

Type 1: Two chords intersect INSIDE the circle

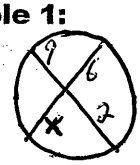


ab = cd

part • part = part • part

3)

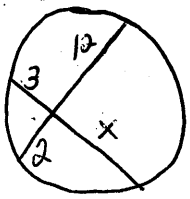
Example 1:



$6x = 9(2)$

$6x = 18$

$\boxed{x = 3}$

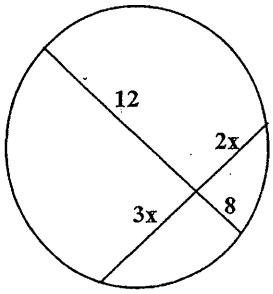


$3x = 24$

$\boxed{x = 8}$

4)

Example 2: Find x



$3x(2x) = 8(12)$

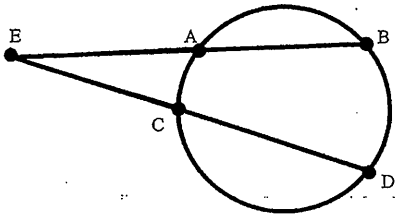
$6x^2 = 96$

$x^2 = 16$

$\boxed{x = 4}$

5)

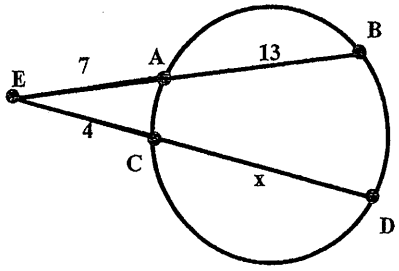
Type 2: Two secants intersect OUTSIDE the circle



EA * EB = EC * ED
outside • whole = outside • whole

6)

Example 3:



$7(20) = 4(4 + x)$

$140 = 16 + 4x$

$124 = 4x$

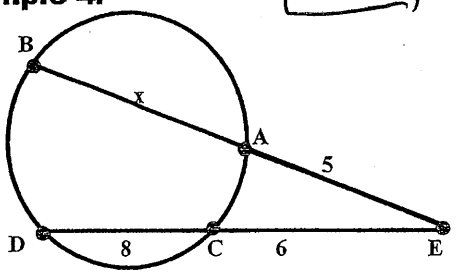
$\boxed{x = 31}$

7) $5(5+x)=6(14)$

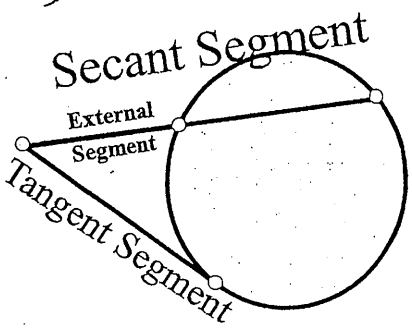
$25+5x=84$

$5x=59$ $\boxed{x=11.8}$

Example 4:



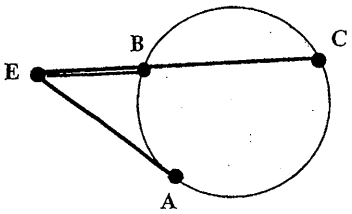
8)



Notice that on the tangent segment, the **outside is the whole!**

9)

Type 2 (with a twist): Secant and Tangent

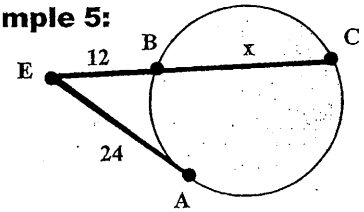


outside • whole = outside • whole

$$EA^2 = EB * EC$$

10)

Example 5:



outside • whole = outside • whole

$12(x+12)=24^2$

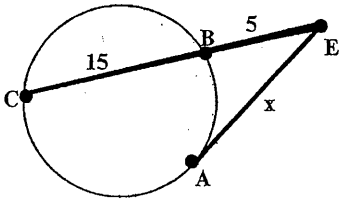
$12x+144=576$

$12x=432$

$\boxed{x=36}$

11)

Example 6:



outside • whole = outside • whole

$x^2=5(20)$

$x^2=100$

$\boxed{x=10}$

12)

What you should know by now...

part • part = part • part

outside • whole = outside • whole

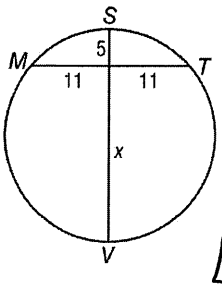
NAME _____ DATE _____ PERIOD _____

10-7 Practice
Special Segments in a Circle

Recall Rules: 1) part * part = part * part
2) outside * whole = outside * whole

Find *x*. Assume that segments that appear to be tangent are tangent. Round to the nearest tenth if necessary.

1.

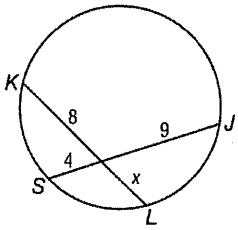


$5x = 11(11)$

$x = \frac{121}{5}$

$\boxed{x = 24.2}$

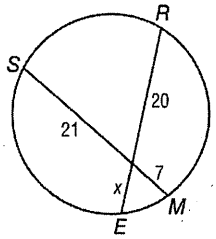
2.



$8x = 36$

$\boxed{x = 4.5}$

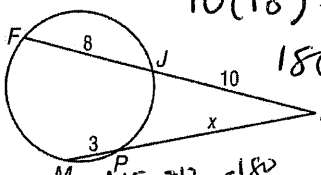
3.



$20x = 7(21)$

$\boxed{x = 7.35}$

4.



$10(18) = x(x+3)$

$180 = x^2 + 3x$

$x^2 + 3x - 180 = 0$

$(x+15)(x-12)$

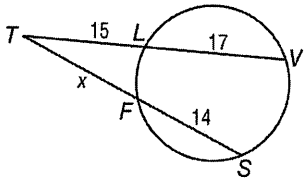
$x = -15, 12$

$\boxed{x = 12}$

$x^2 - 15x + 12x - 180$ $\quad +15 \times -12 = -180$

$x(x-15) + 12(x-15)$ $\quad 15 + -12 = +3$

5.



$x(x+14) = 15(15+17)$

$x^2 + 14x = 480$

$x^2 + 14x - 480 = 0$

$x^2 + 30x - 16x - 480 = 0$

$x(x+30) - 16(x+30)$

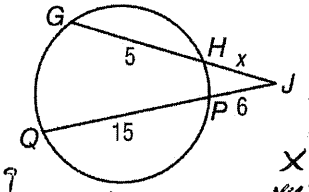
$(x-16)(x+30) = 0$

$\boxed{x = 16}$

$30 \times -16 = -480$

$30 + -16 = 14$

6.



$x(x+5) = 6(21)$

$x^2 + 5x = 126$

$x^2 + 5x - 126 = 0$

$x^2 + 14x - 9x - 126 = 0$

$x(x+14) - 9(x+14) = 0$

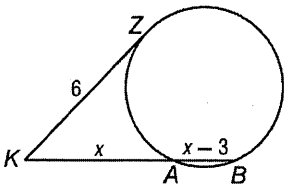
$(x-9)(x+14) = 0$

$\boxed{x = 9}$

$14 \times -9 = -126$

$14 + -9 = 5$

7.



$x(x+x-3) = 6^2$

$x(2x-3) = 36$

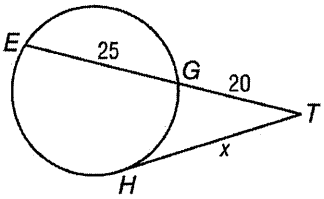
$2x^2 - 3x = 36$

$2x^2 - 3x - 36 = 0$

$-x = -72$

$-1 = -3$

8.

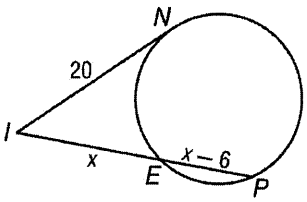


$x^2 = 20(45)$

$x^2 = 900$

$\boxed{x = 30}$

9.



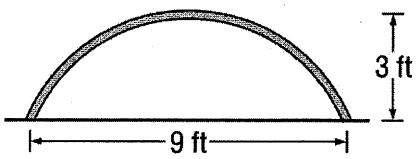
$x(x+x-6) = 20^2$

$x(2x-6) = 20^2$

$2x^2 - 6x - 400 = 0$

$x^2 - 3x - 200 = 0$

10. CONSTRUCTION An arch over an apartment entrance is 3 feet high and 9 feet wide. Find the radius of the circle containing the arc of the arch.

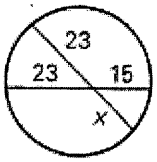


NAME _____ DATE _____ PERIOD _____

Recall Rules: 1) part * part = part * part
2) outside * whole = outside * whole

Find the value of *x*.

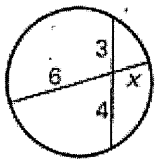
11.



$23x = 23(15)$

$\boxed{x = 15}$

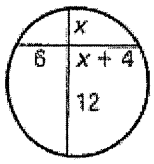
12.



$3(4) = 6x$

$\boxed{2 = x}$

13.



$12x = 6(x+4)$

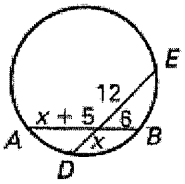
$12x = 6x + 24$

$6x = 24$

$\boxed{x = 4}$

Find *AB* and *DE*.

14.



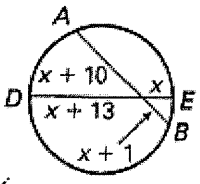
$12x = 6(x+5)$

$12x = 6x + 30$

$6x = 30$

$\boxed{x = 5}$

15.



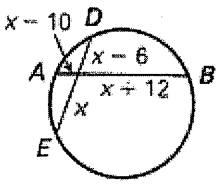
$x(x+13) = (x+1)(x+10)$

$x^2 + 13x = x^2 + 11x + 10$

$2x = 10$

$\boxed{x = 5}$

16.



$x(x-10) = (x-6)(x+12)$

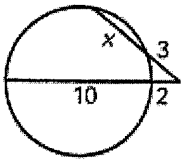
$x^2 - 10x = x^2 + 6x - 72$

$-16x = -72$

$\boxed{x = 4.5}$

Find the value of *x*.

17.



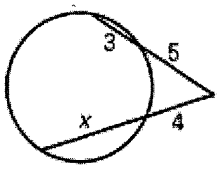
$3(3+x) = 2(12)$

$9 + 3x = 24$

$3x = 15$

$\boxed{x = 5}$

18.



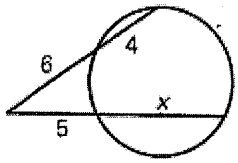
$5(8) = 4(x+4)$

$40 = 4x + 16$

$24 = 4x$

$\boxed{6 = x}$

19.



$6(10) = 5(x+5)$

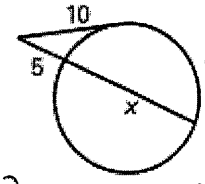
$60 = 5x + 25$

$35 = 5x$

$\boxed{x = 7}$

Find the value of *x*.

13.



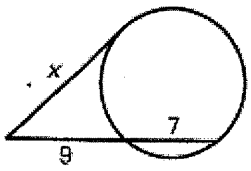
$10^2 = 5(x+5)$

$100 = 5x + 25$

$75 = 5x$

$\boxed{15 = x}$

14.

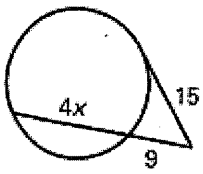


$x^2 = 9(7+9)$

$x^2 = 144$

$\boxed{x = 12}$

15.



$9(4x+9) = 15^2$

$36x + 81 = 225$

$36x = 144$

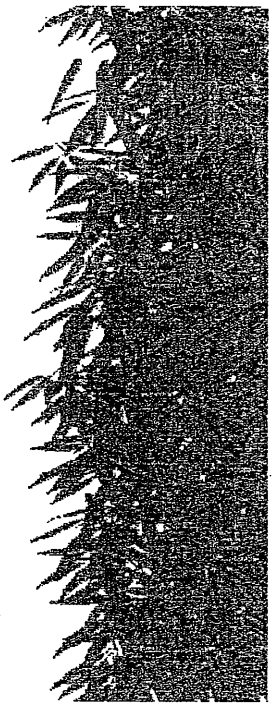
$\boxed{x = 4}$

Key

1)

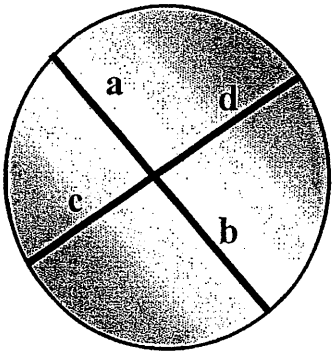
Analytic Geometry
Chapter 10.7

Secant and Tangent Segment Measures



2)

Type 1: Two chords intersect INSIDE the circle

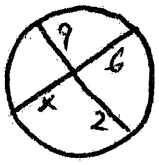


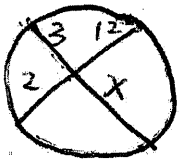
ab = cd

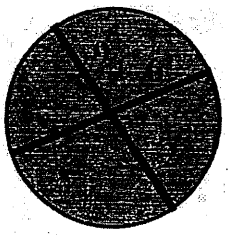
part • part = part • part

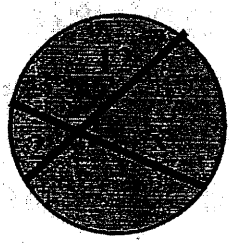
3)

Example 1:









$6(x) = 9(2)$

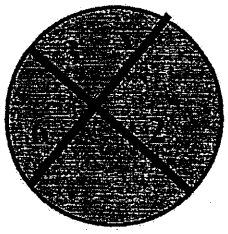
$\frac{6x}{6} = \frac{18}{6}$

$\boxed{x = 3}$

$3(x) = (12)(2)$

$\frac{3x}{3} = \frac{24}{3}$

$\boxed{x = 8}$



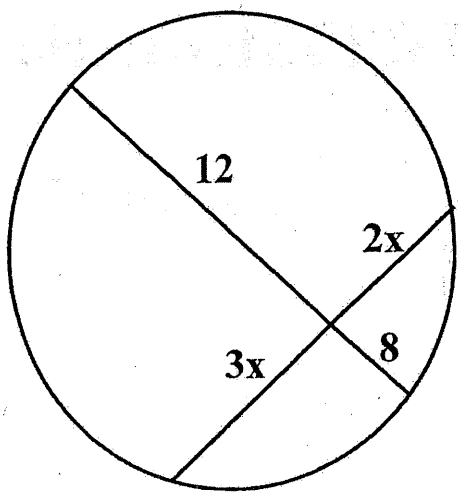
$6(x) = 3(2)$

$6x = 6$

$\boxed{x = 1}$

4)

Example 2: Find x



$(3x)(2x) = 12(8)$

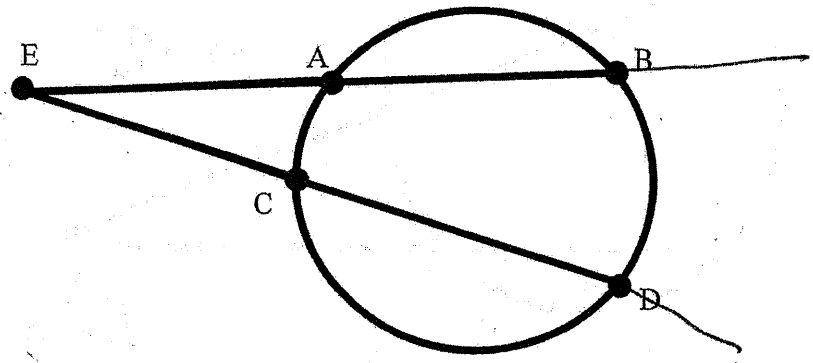
$\frac{6x^2}{6} = \frac{96}{6}$

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

$\boxed{x = 4}$

5)

Type 2: Two secants intersect OUTSIDE the circle

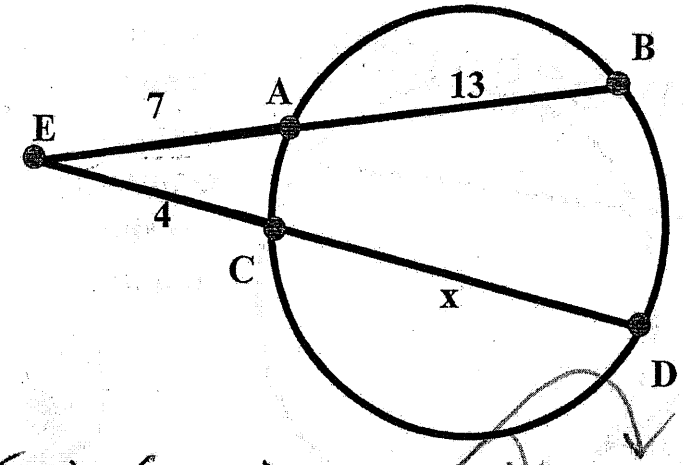


EA * EB = EC * ED

outside • whole = outside • whole

6)

Example 3:



$(7)(7+13) = 4(x+4)$

$7(20) = 4x+16$

$140 = 4x+16$

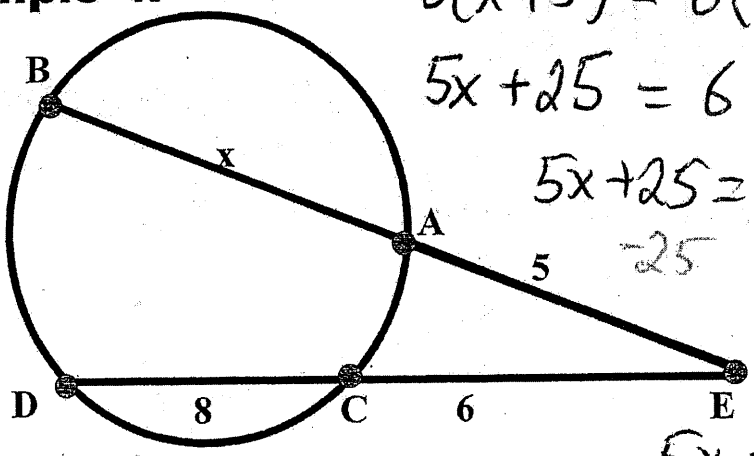
$-16 \qquad -16$

$\frac{124}{4} = \frac{4x}{4}$

$\boxed{x=31}$

7)

Example 4:



(outside)(whole) = (outside)(whole)

$5(x+5) = 6(6+8)$

$5x + 25 = 6(14)$

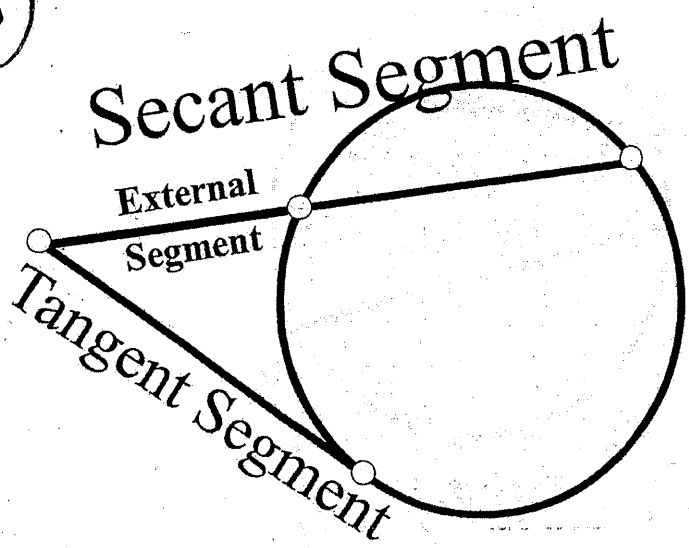
$5x + 25 = 84$

$-25 \quad -25$

$\frac{5x}{5} = \frac{59}{5}$

$\boxed{x = 11.8}$

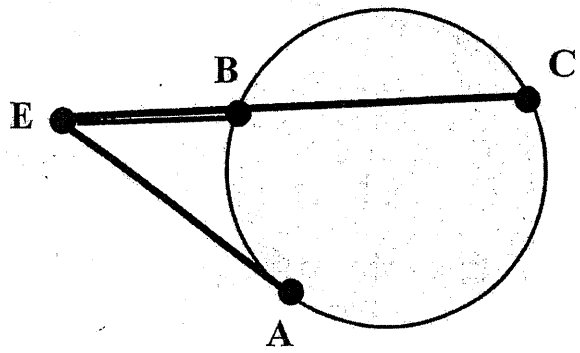
8)



Notice that on the tangent segment, the **outside is the whole!**

9)

Type 2 (with a twist): Secant and Tangent

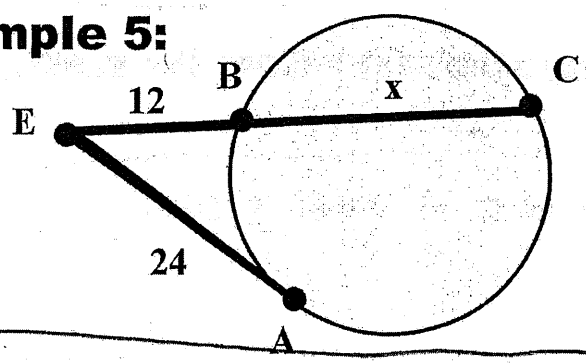


outside • whole = outside • whole

$$EA^2 = EB * EC$$

10)

Example 5:



outside • whole = outside • whole

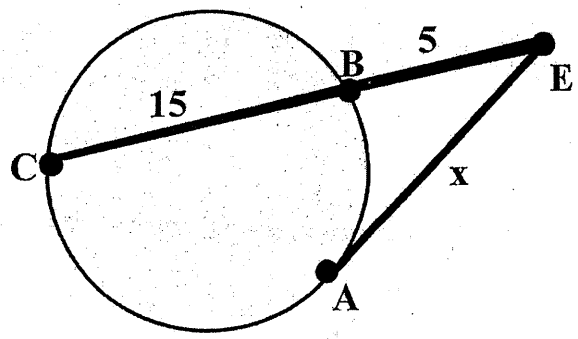
$12(x+12) = 24(24)$

$12x + 144 = 576$

$12x = 432$

$\boxed{x = 36}$

11) **Example 6:**



outside • whole = outside • whole

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

$5(20) = x^2$

12) $\sqrt{100} = \sqrt{x^2}$ $\boxed{x=10}$

What you should know by now...

part • part = part • part

outside • whole = outside • whole