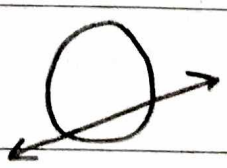
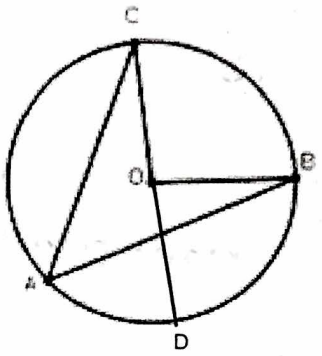
Lessons 43-47 Vocabulary Words

Name	Definition	Picture/Example
Radius	• Segment with one endpoint on circle + one endpoint in center - distance from center to any point on circle	
Diameter	• Segment passes through center w/ both endpoints on circle - distance across circle	
Semicircle	• arc formed by a diameter - measure is exactly 180°	
Minor Arc	• arc formed by central angle whose measure is less than 180°	
Major Arc	• remaining arc left over from a minor arc. whose measure is greater than 180° but less than 360°	
Central Angle	angle formed by two radii in the circle - vertex is center	
Chord	Segments with endpoints on circle	
Point of Tangency	point where the tangent touches the circle	
Tangent	line that intersects a circle at one distinct point	
Inscribed Angle	angle formed by two chords - vertex on circle	
Intercepted Arc	part of arc formed by inscribed angle	
Secant	line that intersects a circle at two distinct points (passes through circle)	

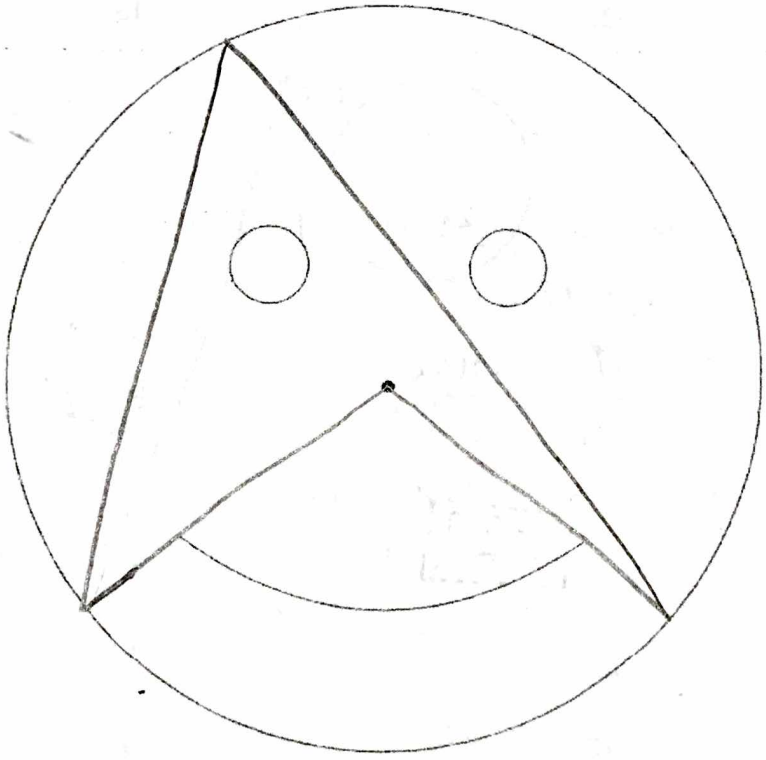
GEOMETRY NOTES
LESSON 43: Angles and Arcs

EXAMPLES: Use the diagram to respond to the following statements:

1. Name a central angle. $\angle COB$, $\angle BOD$
2. Name a minor arc. $\overset{\frown}{CB}$, $\overset{\frown}{BD}$, $\overset{\frown}{DA}$, $\overset{\frown}{AC}$
3. Name a major arc. $\overset{\frown}{CAB}$ $\overset{\frown}{BAD}$
4. Name a semi-circle. $\overset{\frown}{CBD}$, $\overset{\frown}{CAD}$
5. Name an inscribed angle. $\angle CAB$
6. Name an intercepted arc. $\overset{\frown}{CB}$



EXPLORATION: Central Angle, Minor Arc, Major Arc, Intercepted Arc, and Inscribed Angle Relationships



Based on your exploration, determine the relationships below:

CENTRAL ANGLE = minor arc

MAJOR ARC = 360 - minor arc

SEMI-CIRCLE = 180°

INSCRIBED ANGLE = $\frac{1}{2}$ ° intercepted arc

INTERCEPTED ARC= 2 ° inscribed angle

GEOMETRY NOTES

LESSON 43: Angles and Arcs

EXAMPLES: Name and find the measure of each arc of circle C.

7. arc *AD* $\overset{\frown}{AD}$

120° minor arc

8. arc *ADB* $\overset{\frown}{ADB}$

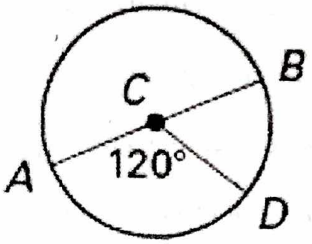
180° semicircle

9. arc *DBA* $\overset{\frown}{DBA}$

360 − 120 = 240° major circle

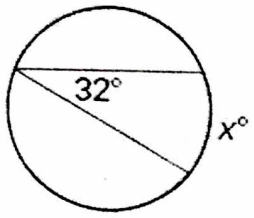
10. arc *BD* $\overset{\frown}{BD}$

60° minor arc



EXAMPLES: Find the value of x.

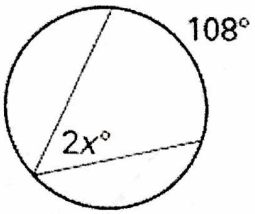
11.



$X = 32 \cdot 2$

$\boxed{X = 64}$

12.

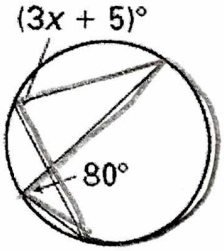


$2(2x) = 108$

$4x = 108$

$\boxed{X = 27}$

13.



$2(3x+5) = 160$

$6x + 10 = 160$

$6x = 150$

$\boxed{X = 25}$

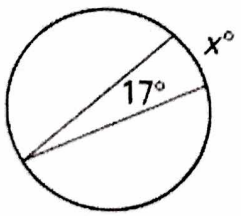
$3x + 5 = 80$

$3x = 75$

$x = 25$

YOU TRY:

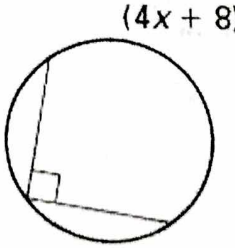
14.



$X = 2 \cdot 17$

$\boxed{X = 34}$

15.



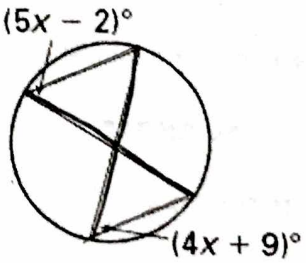
$2 \cdot 90 = 4x + 8$

$180 = 4x + 8$

$172 = 4x$

$\boxed{X = 43}$

16.



$5x - 2 = 4x + 9$

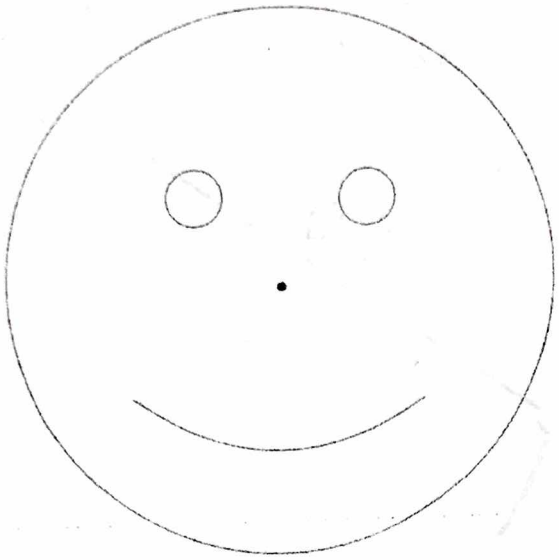
$x - 2 = 9$

$\boxed{X = 11}$

GEOMETRY NOTES

LESSON 44: Inscribed Quadrilaterals

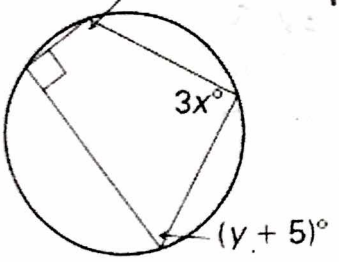
EXPLORATION: Inscribed Quadrilaterals



For any inscribed quadrilateral the opposite **angles are** supplementary.

EXAMPLES: Find the value of each variable.

17.



$90+3x=180$

$3x=90$

$\boxed{x=3}$

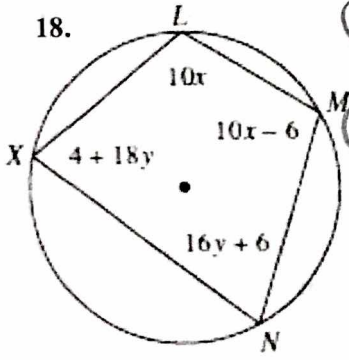
$2y-3+y+5=180$

$3y+2=180$

$3y=178$

$\boxed{y=59.\overline{3}}$

18.



① $10x+16y+6=180$

$10x+16y=174$

② $10x-6+18y+4=180$

$10x+18y-2=180$

$10x+18y=182$

$10x+16y=174$

$-(10x+18y=182)$

$10x+16y=174$

$-10x-18y=-182$

$-2y=-8$

$\boxed{y=4}$

$10x+16(4)+6=180$

$10x+64+6=180$

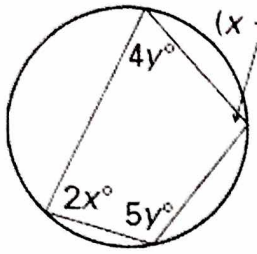
$10x+70=180$

$10x=110$

$\boxed{x=11}$

YOU TRY:

19.



$2x+x+12=180$

$3x+12=180$

$3x=168$

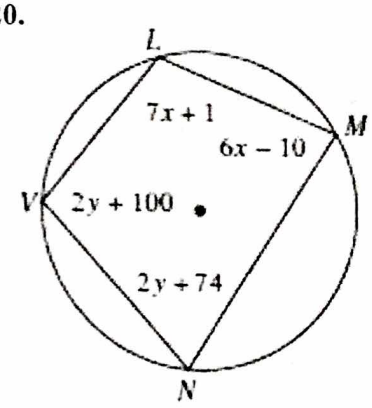
$\boxed{x=56}$

$5y+4y=180$

$9y=180$

$\boxed{y=20}$

20.



① $7x+1+2y+74=180$

$7x+2y+75=180$

$7x+2y=105$

② $6x-10+2y+100=180$

$6x+2y+90=180$

$6x+2y=90$

$7x+2y=105$

$-(6x+2y=90)$

$7x+2y=105$

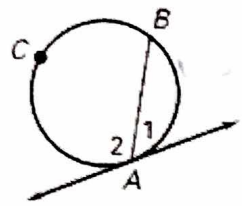
$-6x-2y=-90$

$\boxed{x=15}$

GEOMETRY NOTES

LESSON 45: Angle Relationships in Circles

ANGLE "ON" CIRCLE (Angles formed when a tangent and a chord intersect at a point on the circle):

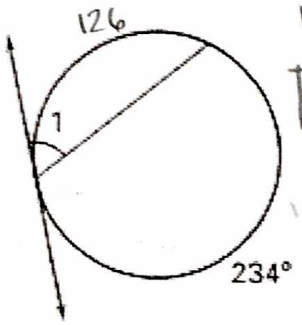


The measure of the angle is half of the intercepted arc

$\angle 1 = \frac{1}{2}(\overset{\frown}{AB})$ $\angle 2 = \frac{1}{2}(\overset{\frown}{BCA})$

EXAMPLES: Find the measure of the indicated arc or angle.

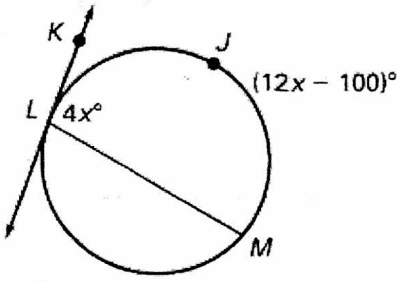
1. $m\angle 1$



$m\angle 1 = \frac{1}{2} \cdot 126$

$\boxed{m\angle 1 = 63°}$

2. $m\angle KLM$



$4x = \frac{1}{2}(12x - 100)$

$4x = 6x - 50$

$-2x = -50$

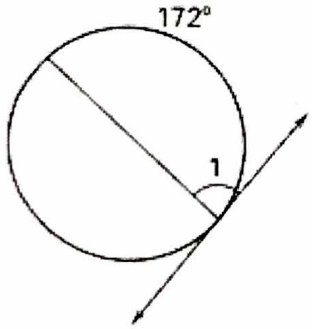
$x = 25$

$m\angle KLM = 4 \cdot 25$

$\boxed{m\angle KLM = 100°}$

YOU TRY:

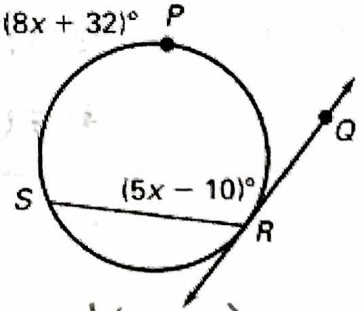
3. $m\angle 1$



$\angle 1 = \frac{1}{2} \cdot 172$

$\boxed{\angle 1 = 86°}$

4. $m\angle QRS$



$5x - 10 = \frac{1}{2}(8x + 32)$

$5x - 10 = 4x + 16$

$x - 10 = 16$

$x = 26$

$m\angle QRS = 5(26) - 10$

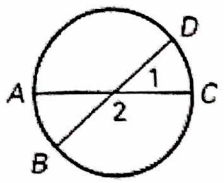
$m\angle QRS = 130 - 10$

$\boxed{m\angle QRS = 120°}$

GEOMETRY NOTES

LESSON 45: Angle Relationships in Circles

ANGLE "INSIDE" CIRCLE (Angles formed when two chords intersect at point inside the circle):

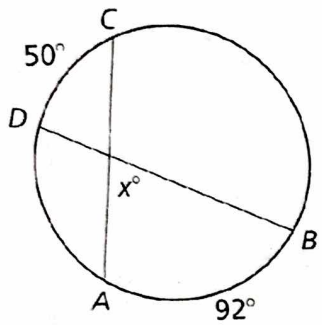


$\angle 1 = \frac{1}{2}(\overset{\frown}{CD} + \overset{\frown}{AB})$

$\angle 2 = \frac{1}{2}(\overset{\frown}{BC} + \overset{\frown}{AD})$

EXAMPLES: Find the value of the variable.

5.

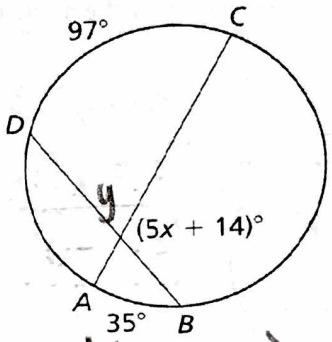


$x = \frac{1}{2}(50+92)$

$x = \frac{1}{2}(142)$

$\boxed{x=71}$

6.



$y = \frac{1}{2}(97+35)$

$y = \frac{1}{2}(132)$

$y = 66$

$5x+14+66=180$

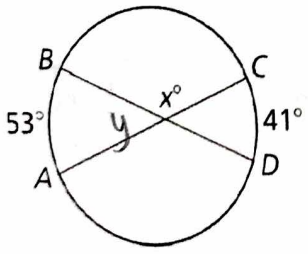
$5x+80=180$

$5x=100$

$\boxed{x=20}$

YOU TRY:

7.



$y = \frac{1}{2}(53+41)$

$y = \frac{1}{2}(94)$

$y = 47$

$x+47=180$

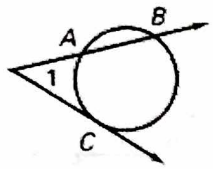
$\boxed{x=133}$

GEOMETRY NOTES

LESSON 45: Angle Relationships in Circles

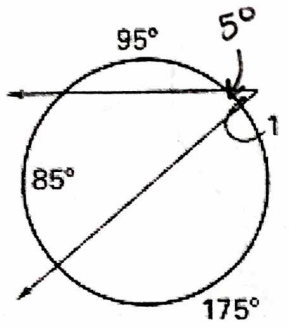
ANGLE "OUTSIDE" CIRCLE (Angles formed from two tangent lines or two secant lines intersect <u>outside</u> the circle):

$\angle 1 = \frac{1}{2}(\overset{\frown}{BC} - \overset{\frown}{AC})$



EXAMPLES: Find the value of the angle or the variable.

8. $m\angle 1$

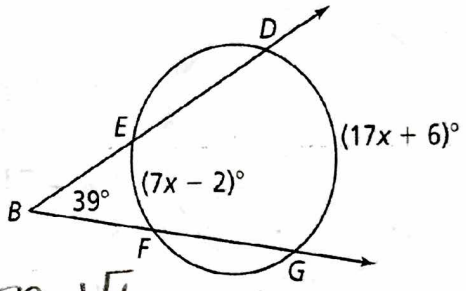


$\angle 1 = \frac{1}{2}(85-5)$

$\angle 1 = \frac{1}{2}(80)$

$\boxed{\angle 1 = 40°}$

9.



$39 = \frac{1}{2}[(17x+6)-(7x-2)]$

$39 = \frac{1}{2}(10x+8)$

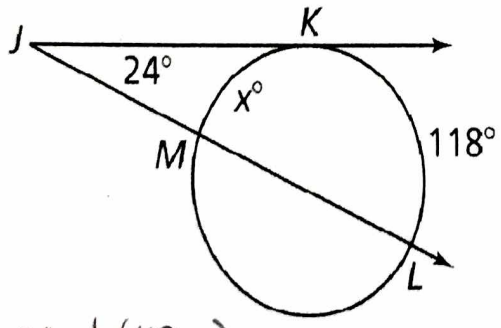
$39 = 5x+4$

$35 = 5x$

$\boxed{x=7}$

YOU TRY:

10.



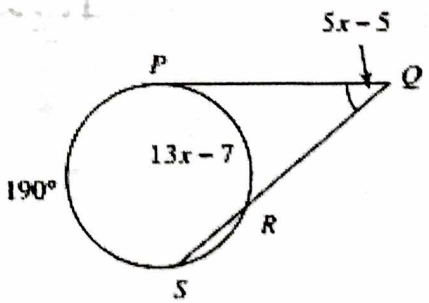
$24 = \frac{1}{2}(118-x)$

$48 = 118-x$

$-70 = -x$

$\boxed{x=70}$

11.



$5x-5 = \frac{1}{2}(190-(13x-7))$

$5x-5 = \frac{1}{2}(-13x+197)$

$2(5x-5) = -13x+197$

$10x-10 = -13x+197$

$23x = 207$

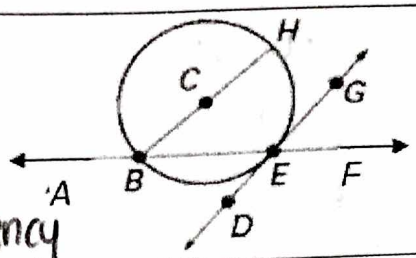
$\boxed{x=9}$

GEOMETRY NOTES

LESSON 46: Parts of a Circle and Tangents to Circle

EXAMPLES: Identify each segment.

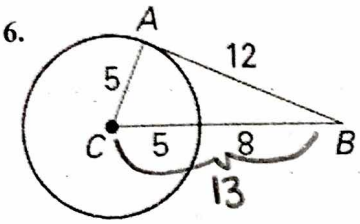
1. $\overline{DG}$ tangent
2. $\overline{BE}$ chord
3. $\overline{AF}$ secant
4. $\overline{BH}$ diameter
5. $\overline{CH}$ radius
6. E point of tangency



If a line is tangent to a circle, then it is perpendicular to the radius drawn to the point of tangency.

EXAMPLES: Tell whether AB is tangent to circle C. Explain your reasoning.

6.



$5^2+12^2=13^2$

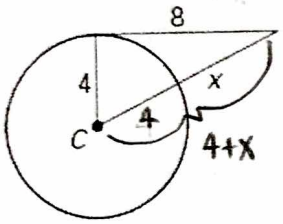
$25+144=169$

$169=169$ ✓

tangent

EXAMPLES: Find the value of x. Assume that the segments that appear to be tangent are tangent.

7.



$4^2+8^2=(x+4)^2$

$16+64=x^2+8x+16$

$80=x^2+8x+16$

$0=x^2+8x-64$

$x=\frac{-8\pm\sqrt{8^2-4(1)(-64)}}{2}$

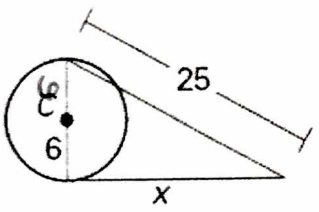
$x=\frac{-8\pm\sqrt{64+256}}{2}$

$x=\frac{-4\pm\sqrt{320}}{2}$

$x=4.94$ OR $x=-12.94$

YOU TRY:

8.



$12^2+x^2=25^2$

$144+x^2=625$

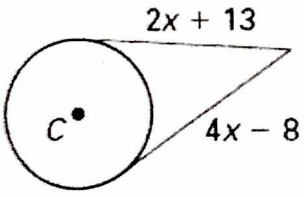
$x^2=481$

$x=21.93$

If two tangent lines intersect outside, then they are congruent.

EXAMPLES: Find the value of x

9.



$2x+13=4x-8$

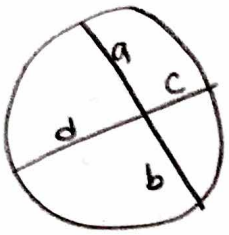
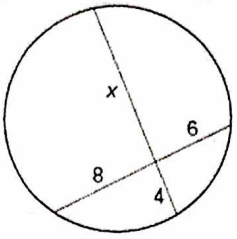
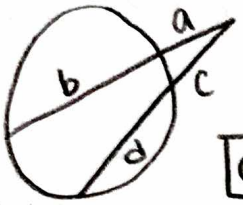
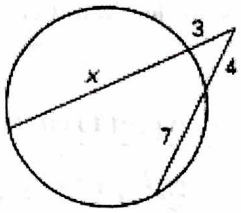
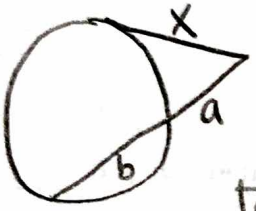
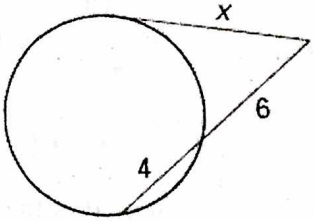
$13=2x-8$

$21=2x$

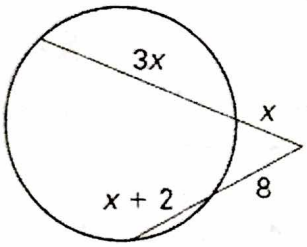
$x=10.5$

GEOMETRY NOTES

LESSON 47: Segment Lengths in Circles

Finding Segment Lengths in Circles	Examples
1.  2 chords $ab=cd$ part · part	1.  $4x=6\cdot8$ $4x=48$ $x=12$
2.  2 secants $a(a+b)=c(c+d)$ outside · whole	2.  $3(3+x)=4\cdot11$ $9+3x=44$ $3x=35$ $x=11.\overline{6}$
3.  tangent + secant $x\cdot x=a(a+b)$ outside · whole	3.  $x\cdot x=6\cdot10$ $x^2=60$ $x=\sqrt{60}$ $x=7.75$

EXAMPLES: Find x.

4. 

$x(4x)=8(x+10)$

$4x^2=8x+80$

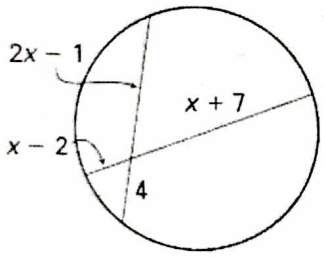
$0=4x^2-8x-80$

$x=\frac{+8\pm\sqrt{(-8)^2-4(4)(-80)}}{8}$

$x=\frac{8\pm\sqrt{1344}}{8}$

$x=1\pm4.58$

$x=5.58$ OR $x=-3.58$

5. 

$4(2x-1)=(x-2)(x+7)$

$8x-4=x^2+5x-14$

$0=x^2-3x-10$

$0=(x-5)(x+2)$

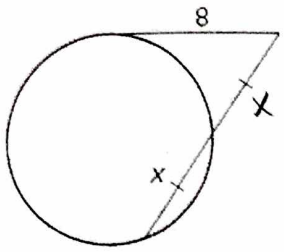
$0=x-5$ $\quad 0=x+2$

$x=5$ $\quad x=-2$

GEOMETRY NOTES

LESSON 47: Segment Lengths in Circles

6.



$8 \cdot 8 = x(2x)$

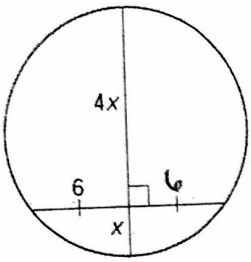
$64 = 2x^2$

$x^2 = 32$

$\boxed{x = 5.66}$

YOU TRY:

7.



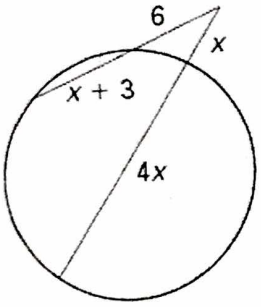
$4x \cdot x = 6 \cdot 6$

$4x^2 = 36$

$x^2 = 9$

$\boxed{x = 3}$

8.



$6(x+9) = x(5x)$

$6x + 54 = 5x^2$

$0 = 5x^2 - 6x - 54$

$x = \frac{6 \pm \sqrt{(-6)^2 - 4(5)(-54)}}{10}$

$x = \frac{6 \pm \sqrt{1116}}{10}$

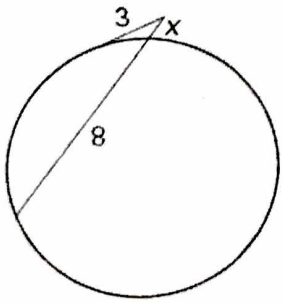
$x = 0.6 \pm 3.34$

$\boxed{x = 3.94}$

OR

$x = -3.34$

9.



$3 \cdot 3 = x(x+8)$

$9 = x^2 + 8x$

$0 = x^2 + 8x - 9$

$0 = (x+9)(x-1)$

$0 = x + 9$ $\quad 0 = x - 1$

$x = -9$ $\quad \boxed{x = 1}$