

Geometry

3 – Circles and Angles

Homework

Name: \_\_\_\_\_ Date: \_\_\_\_\_

**Central Angles Homework**

1. Identify and name each of the following. Be sure to use the correct notation.

a. Two different central angles  $\angle AOC, \angle AOD$

b. A minor arc  $\widehat{DC}$

c. A major arc  $\widehat{CDA}$

d. A semicircle  $\widehat{BCD}$

e. Two different chords  $\overline{BE}, \overline{BA}$

f. The central angle subtended by  $\widehat{AD}$   $\angle AOD$

Find each measure.

2.  $m\widehat{LK}$  30,  $m\widehat{IK}$  150

3.  $m\widehat{QS}$  125,  $m\widehat{QT}$  227

4.  $m\widehat{HG}$  107,  $m\widehat{FEH}$  203

5.  $m\widehat{EF}$  70,  $m\widehat{CEA}$  200

6.  $\angle QPR$  125

$4x+25 = 5x$   
 $x = 25$   
 $4(25)+25$

7.  $\angle UTW$  102,  $m\widehat{UV}$  92

$180 - 78 = 102$   
 $4x+2+x = 102$   
 $5x = 100$   
 $x = 20$

<https://www.mathopenref.com/arccentralangletheorem.html>



**Formulas to Memorize:**

Angles and Arc Measures

- $CENTRAL\ angle = arc$

- $INSCRIBED\ angle = \frac{arc}{2}$  or  $2(INSCRIBED\ angle) = arc$

- $angle = \frac{arc+arc}{2}$  (vertex is INTERIOR) or  $2(angle) = arc\ 1 + arc\ 2$

- $angle = \frac{arc-arc}{2}$  (vertex is EXTERIOR) or  $2(angle) = Big\ Arc - Small\ Arc$

Chord, Secant and Tangent Lengths

- $part \cdot part = part \cdot part$
- $outside \cdot whole = outside \cdot whole$
- $tangent^2 = outside \cdot whole$
- $tangent = tangent$

**Formulas on the Formula Sheet:**

- Circumference of a Circle:  $C = 2\pi$  or  $C = \pi d$
- Area of a Circle:  $A = \pi r^2$
- $arc\ length = \frac{2\pi r\theta}{360}$
- $sector\ area = \frac{\pi r^2\theta}{360}$
- Volume of a Cylinder:  $V = \pi r^2 h$
- Volume of a Cone:  $V = \frac{1}{3} B h$
- Volume of a Sphere:  $V = \frac{4}{3} \pi r^3$
- Volume of a Pyramid:  $V = \frac{1}{3} B h$
- Surface Area of a Sphere:  $SA = 4\pi r^2$
- Pythagorean Theorem:  $a^2 + b^2 = c^2$
- Equation of a Circle:  $(x - h)^2 + (y - k)^2 = r^2$

This diagram shows two ladders leaning against a building. Each ladder is leaning at an angle of  $70^\circ$ .

- The length of the short ladder is 8 ft.
- The base of the longer ladder is 5 feet further from the base of the building than the base of the short ladder is.

What is the length, to the nearest foot, of the long ladder?

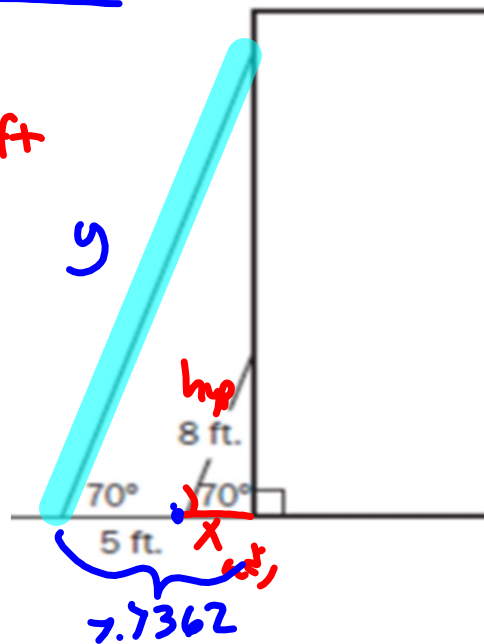
$$\cos(70) = \frac{x}{8}$$

$$x = 8 \cos(70) = 2.7362 \text{ ft}$$

$$\cos(70) = \frac{7.7362}{y}$$

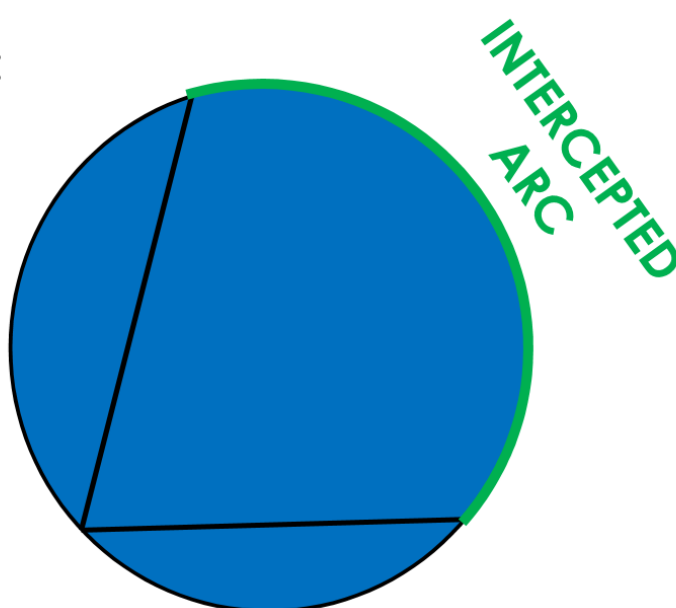
$$y = \frac{7.7362}{\cos(70)}$$

$$y = 22.619 \approx \textcircled{23 \text{ ft}}$$

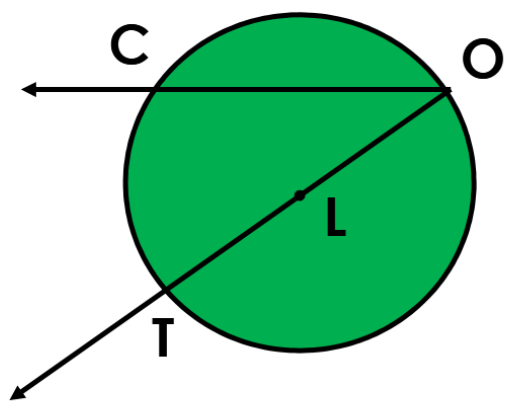


## Inscribed Angles

An angle whose vertex is on the circle and whose sides are chords of the circle



Ex 1.



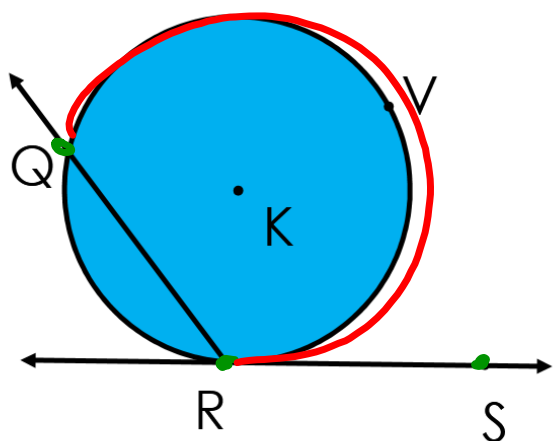
Name the inscribed angle.

$\angle COT$   
or  $\angle COL$

Name the intercepted arc for the angle.

$\overset{\frown}{CT}$

Ex 2.

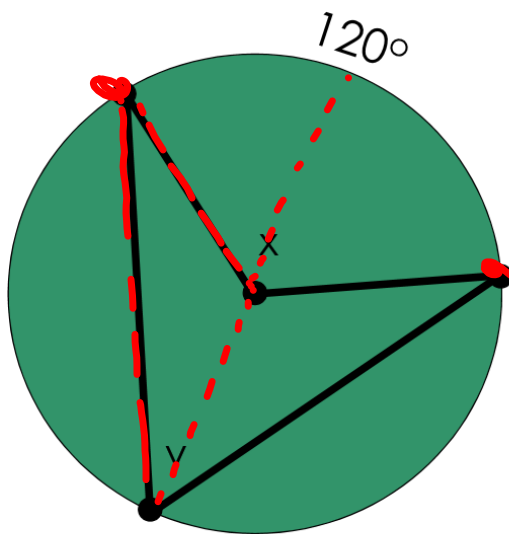


Name the inscribed angle.

$\angle QRS$

Name the intercepted arc for the angle.

$\overset{\frown}{QVR}$



What type of angle is angle x?

Central angle

What is the measure of angle x?

120°

What type of angle is angle y?

Inscribed angle

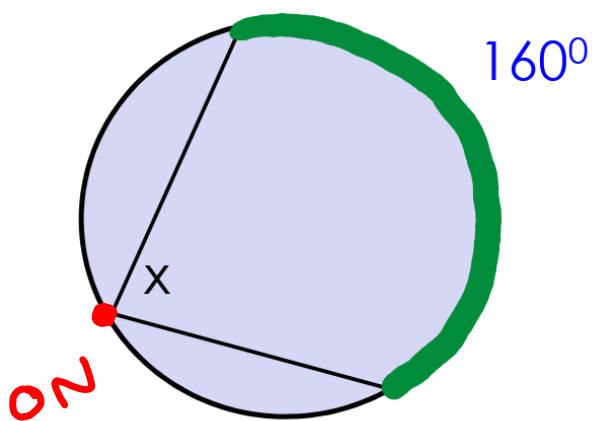
What is the measure of angle y?

60°

The measure of the  
intercepted arc is  
double the measure of  
the inscribed angle!!



Ex 3. Find the measure of angle x.



$$\angle on = \frac{\widehat{\text{arc}}}{2}$$

$$x = \frac{160^\circ}{2}$$

$$\underline{x = 80^\circ}$$

## Examples

4. If  $m\widehat{JK} = 80^\circ$ , find  $m\angle JMK$ .

$40^\circ$

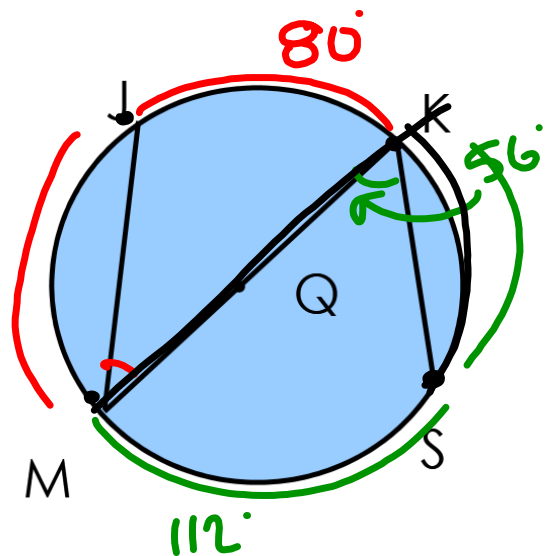
5. If  $m\angle MKS = 56^\circ$ , find  $m\widehat{MS}$ .

$112^\circ$

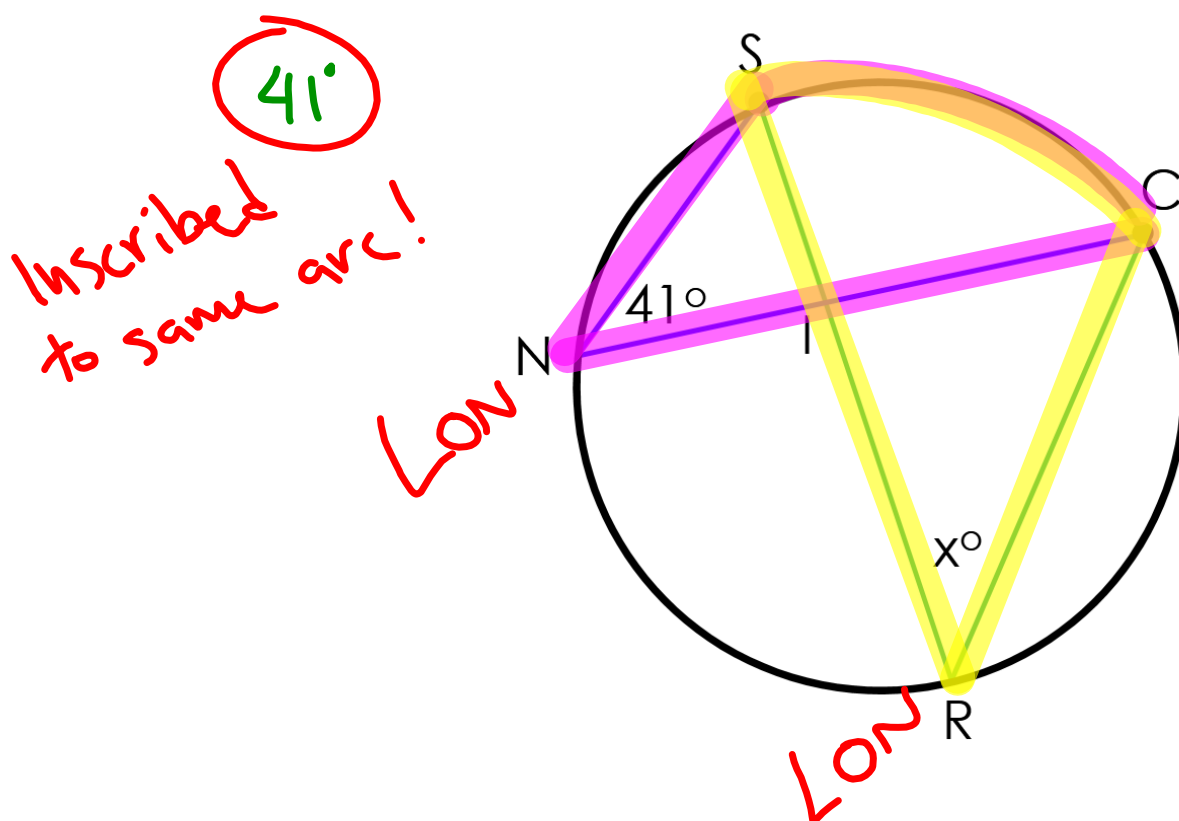
6. If  $\overline{MK}$  is a diameter, find  $m\widehat{KS}$  and  $m\widehat{JM}$ .

$68^\circ$

$100^\circ$



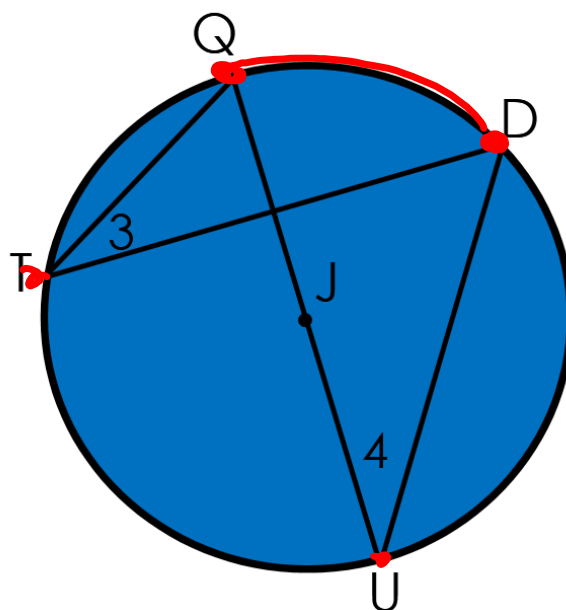
Ex 7. If  $m\angle INS = 41^\circ$ , what is the  $m\angle CRI$ ?



## Example 8

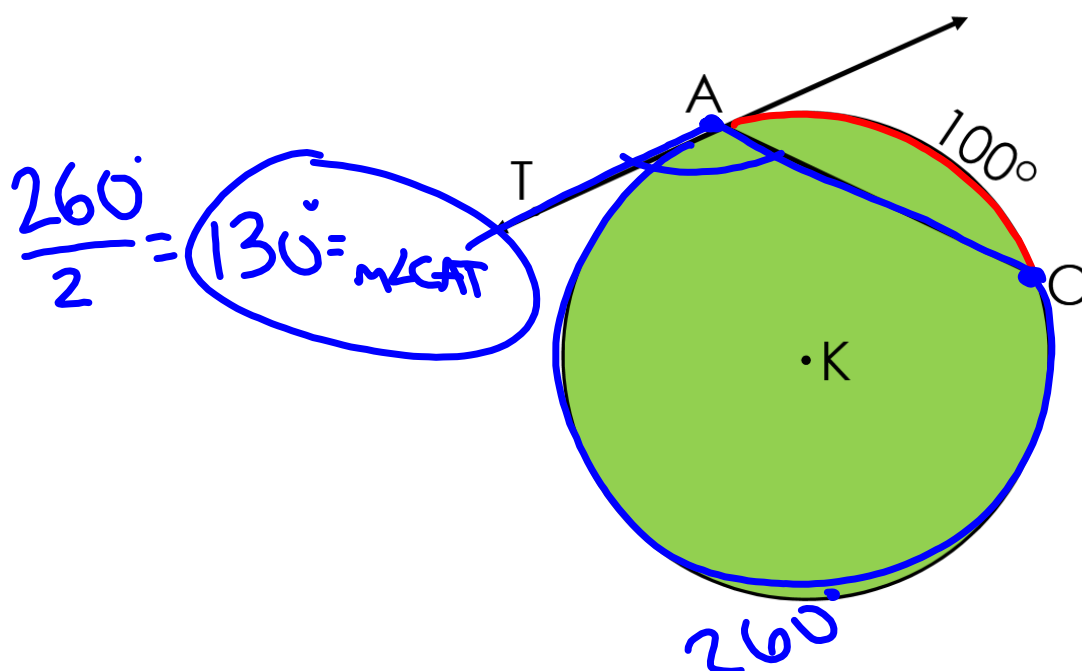
In  $\odot J$ ,  $m\angle 3 = 5x$  and  $m\angle 4 = 2x + 18$ .  
Find the value of  $x$ .

$$\begin{aligned} m\angle 3 &= m\angle 4 \\ 5x &= 2x + 18 \\ -2x & \quad -2x \\ \hline 3x &= 18 \\ \frac{3}{3} & \quad \frac{3}{3} \\ \boxed{x=6} \end{aligned}$$



Example 9

In  $\odot K$ ,  $m\widehat{AC} = 100^\circ$ , What is the  $m\angle CAT$ ?



Geometry

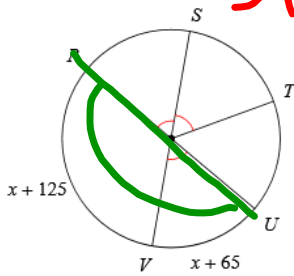
Name \_\_\_\_\_

Inscribed Angles

Date \_\_\_\_\_ Period \_\_\_\_\_

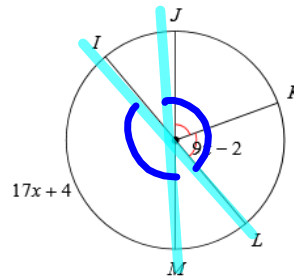
**REVIEW of Central Angles:** Find the measure of the arc or central angle indicated. Assume that lines which appear to be diameters are actual diameters.

1)  $m\widehat{TU}$



*Diameter 180*

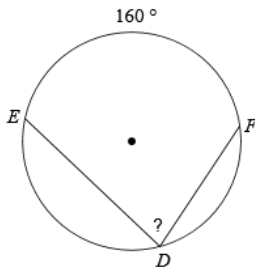
$m\widehat{LM}$



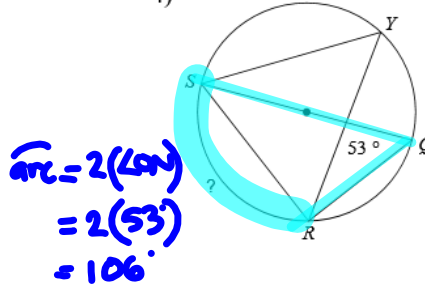
*Vertical angles*

Find the measure of the arc or angle indicated.

3)



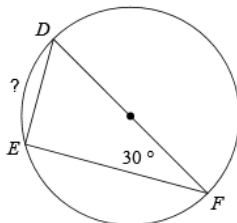
4)



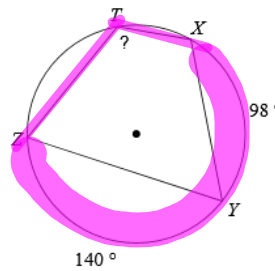
*arc = 2(53)  
= 2(53)  
= 106*

*40 + 98 = 238*

5)

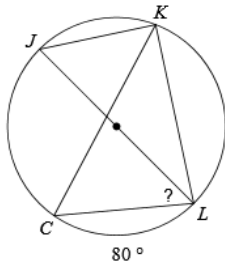


6)

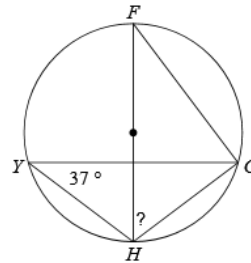


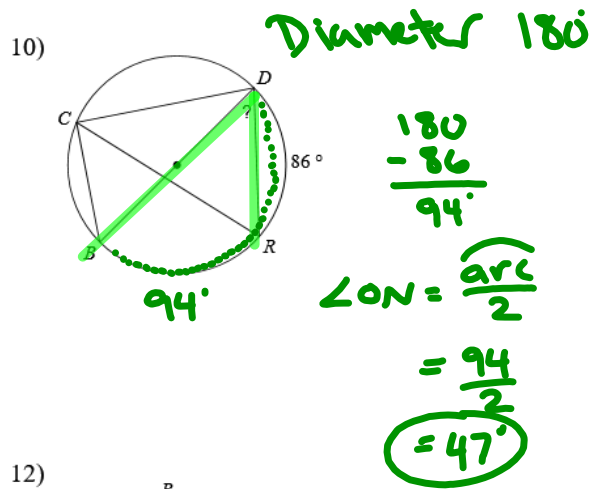
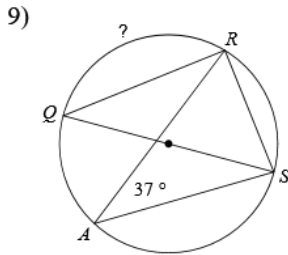
*∠ON = arc / 2  
= 238 / 2  
= 119*

7)

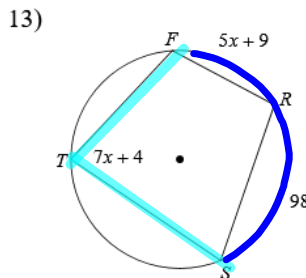
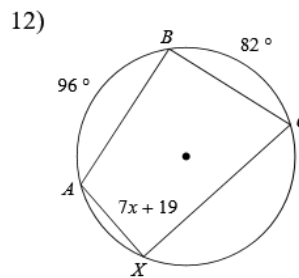
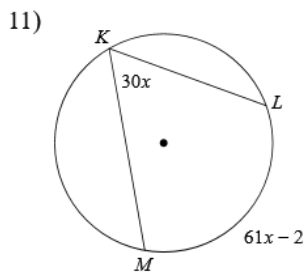


8)





Solve for x.

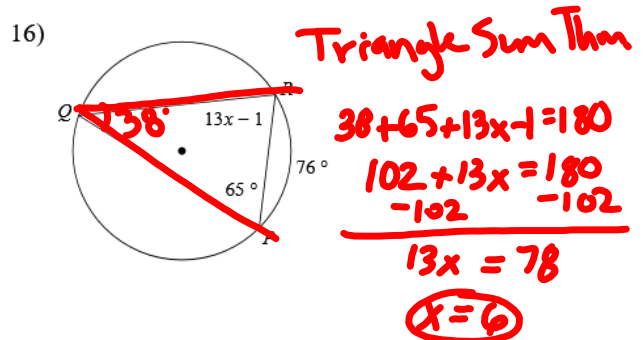
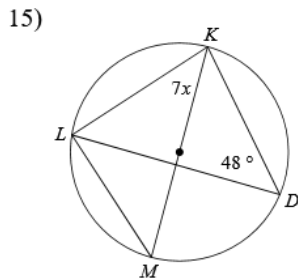
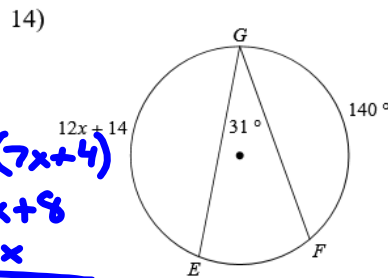


arc = 2(LON)

$$5x + 9 + 98 = 2(7x + 4)$$

$$5x + 107 = 14x + 8$$

$$\begin{array}{r} -5x \quad -5x \\ \hline 107 = 9x + 8 \\ -8 \quad -8 \\ \hline 99 = 9x \\ \hline x = 11 \end{array}$$



## Answers to Inscribed Angles

- |                |                |               |                |
|----------------|----------------|---------------|----------------|
| 1) $60^\circ$  | 2) $40^\circ$  | 3) $80^\circ$ | 4) $106^\circ$ |
| 5) $60^\circ$  | 6) $119^\circ$ | 7) $50^\circ$ | 8) $53^\circ$  |
| 9) $106^\circ$ | 10) $47^\circ$ | 11) 2         | 12) 10         |
| 13) 11         | 14) 12         | 15) 6         | 16) 6          |



Geometry

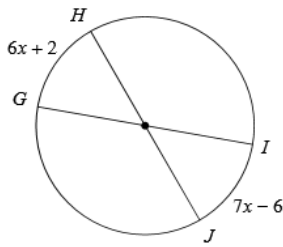
Name \_\_\_\_\_

Inscribed Angles HW

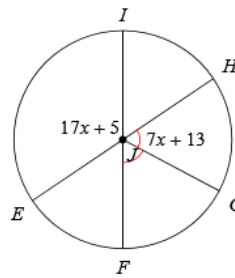
Date \_\_\_\_\_ Period \_\_\_\_\_

**REVIEW of Central Angles: Find the measure of the arc or central angle indicated. Assume that lines which appear to be diameters are actual diameters.**

1)  $m\widehat{HI}$

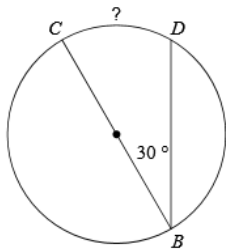


2)  $m\angle FJE$

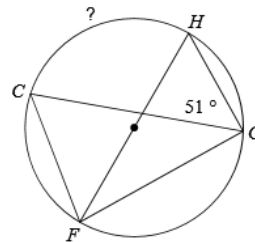


**Find the measure of the arc or angle indicated.**

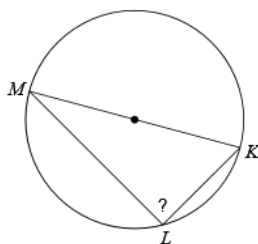
3)



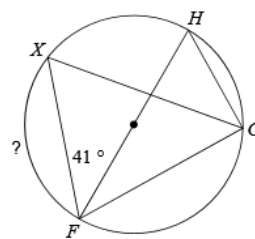
4)



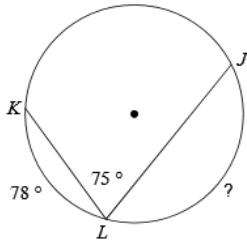
5)



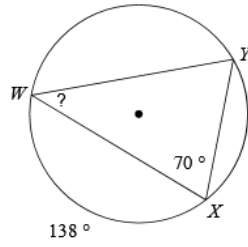
6)



7)

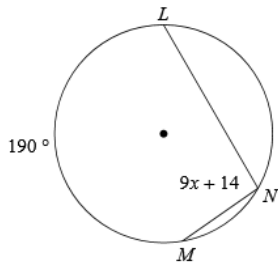


8)

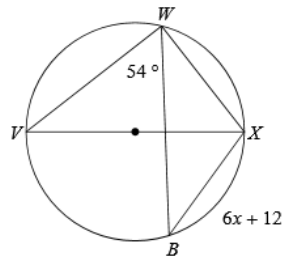


Solve for  $x$ .

9)

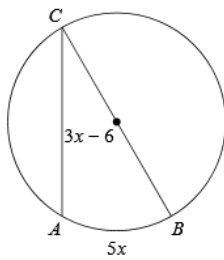


10)

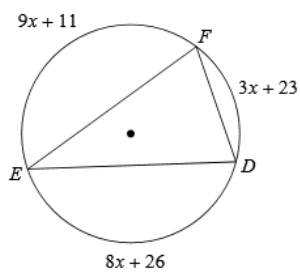


Find the measure of the arc or angle indicated.

11) Find  $m\angle BCA$



12) Find  $m\angle FDE$



## Answers to Inscribed Angles HW

- 1)  $130^\circ$
- 5)  $90^\circ$
- 9) 9

- 2)  $56^\circ$
- 6)  $98^\circ$
- 10) 10

- 3)  $60^\circ$
- 7)  $132^\circ$
- 11)  $30^\circ$

- 4)  $102^\circ$
- 8)  $41^\circ$
- 12)  $73^\circ$