

**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:  $(x - h)^2 + (y - k)^2 = r^2$

<https://www.georgiastandards.org/Georgia-Standards/Frameworks/Geometry-Unit-4.pdf>

Geometry

3- Circle Angles and Arcs

Notes

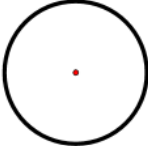
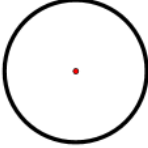
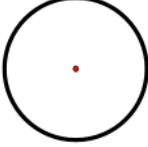
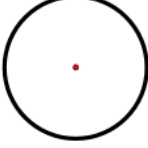
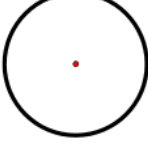
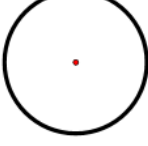
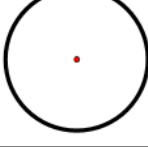
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**Circles: Vocabulary and Central Angles**

UNIT QUESTION: What special properties are found with the parts of a circle?

MMC9-12.G.C.1-5, MMC9-12.G.GMD.1-3

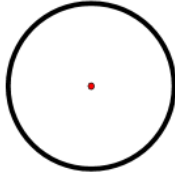
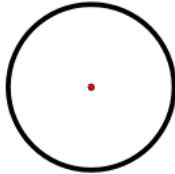
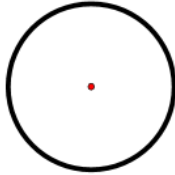
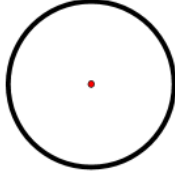
Today's Question: What are the parts of a circle? MMC9-12.G.C.2

<b>Circle</b>		
<b>Chord</b>		
<b>Diameter</b>		
<b>Radius</b>		
<b>Secant</b>		
<b>Tangent</b>		
<b>Point of Tangency</b>		

Geometry

3- Circle Angles and Arcs

Notes

<b>Central Angle</b>		
<b>Minor Arc</b>		
<b>Major Arc</b>		
<b>Semicircle</b>		

**You must remember:**

- A circle has \_\_\_\_\_ degrees
- A semicircle has \_\_\_\_\_ degrees
- Vertical Angles are \_\_\_\_\_
- Linear Pairs are \_\_\_\_\_

Which transformation of  $\triangle HIJ$  does NOT result in a congruent triangle?

A. ~~A reflection across the x-axis, followed by a rotation of  $180^\circ$  about the origin.~~

B. ~~A rotation by  $180^\circ$  about the origin, followed by a translation of 2 units left and 3 units down.~~

C. A translation of 1 unit right and 2 units up, followed by a dilation with a scale factor of 3.

D. A dilation with a factor of 2, followed by a dilation with a factor of 0.5.

$$5(2) = 10(.5) = 5$$

In right triangle ABC,  $\angle A$  and  $\angle B$  are

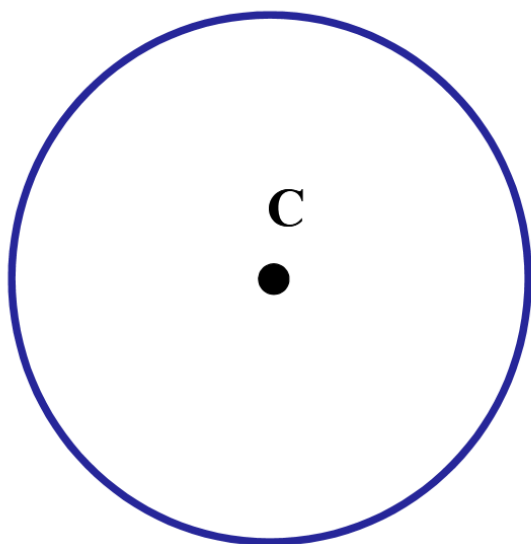
L complementary angles. The value of  $\cos(A) = \frac{5}{13}$ .

What is the value of  $\sin(B)$ ?

- A.  $\frac{5}{13}$     B.  $\frac{12}{13}$     C.  $\frac{13}{12}$     D.  $\frac{13}{5}$

$$\sin(\theta) = \cos(90 - \theta)$$

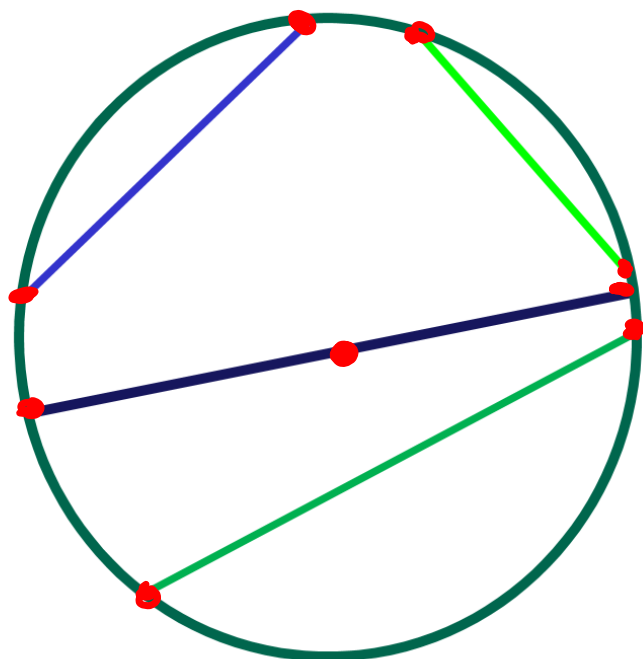
## Parts of a Circle



Circle – set of all points equidistant from a given point called the center of the circle (in a plane).

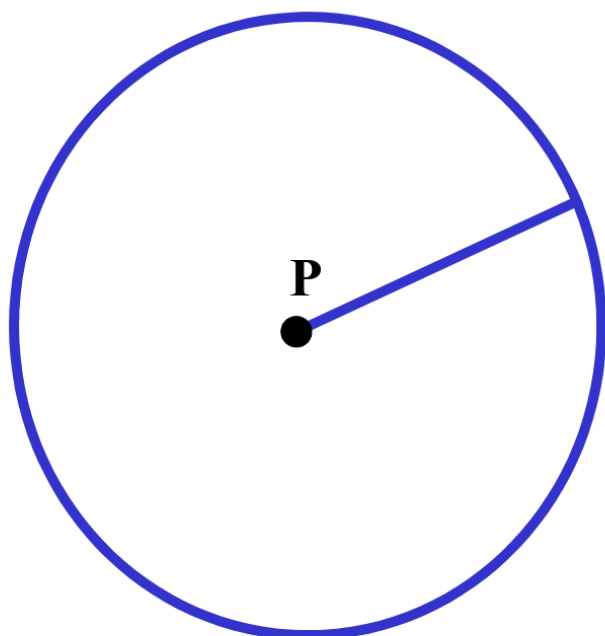
Symbol: 

**CHORD:** a segment whose endpoints are on the circle

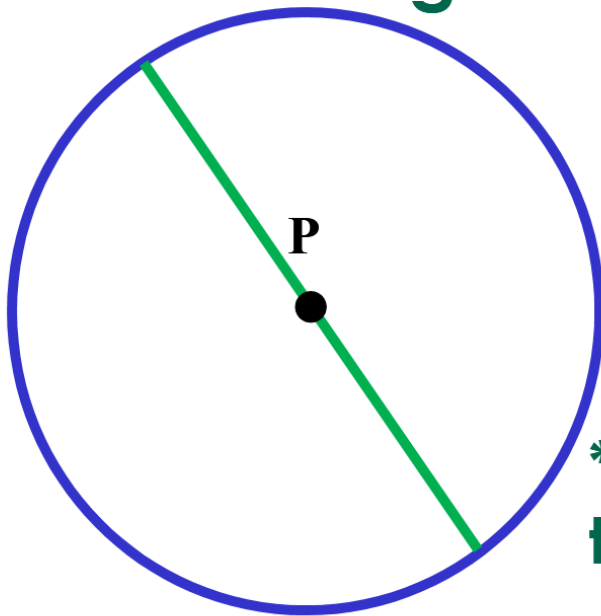




**RADIUS:** distance from the Center  
to a point on the circle

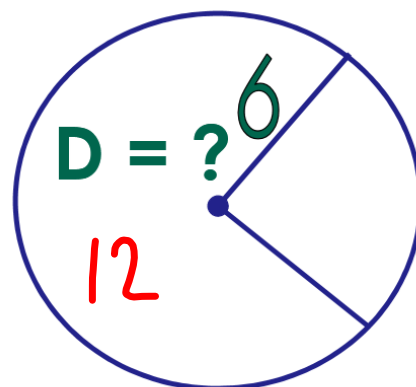
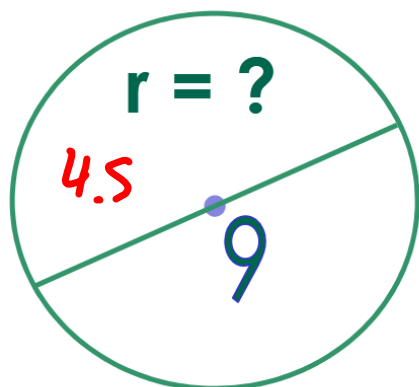
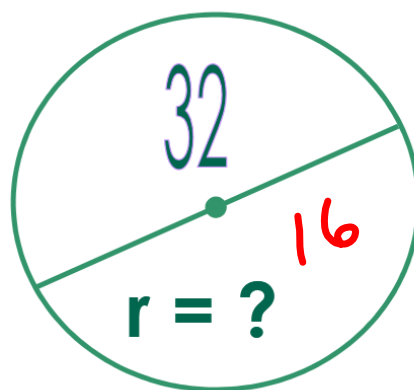
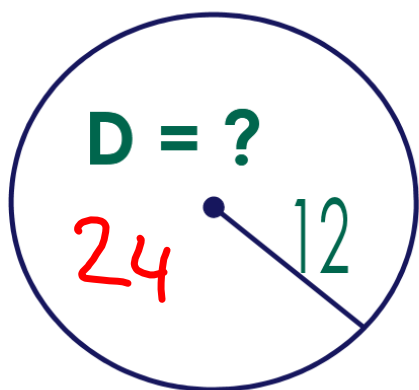


**DIAMETER:** distance across the circle through its center



\*Also known as the double radius.

"longest chord"

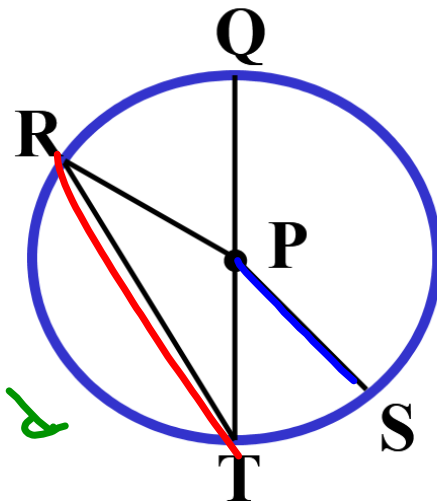


**Use  $\odot P$  to determine whether each statement is *true* or *false*.**

1.  $\overline{RT}$  is a ~~diameter~~ <sup>chord</sup>.

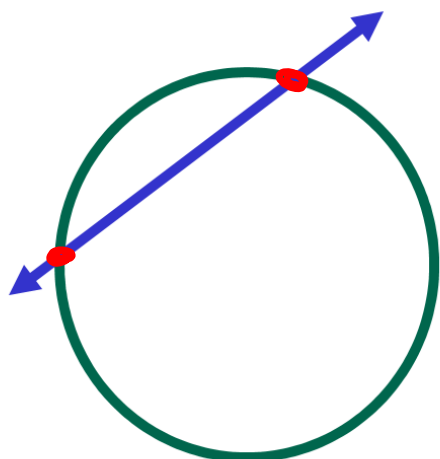
2.  $\overline{PS}$  is a radius. ✓

3.  $\overline{QT}$  is a chord. ✓

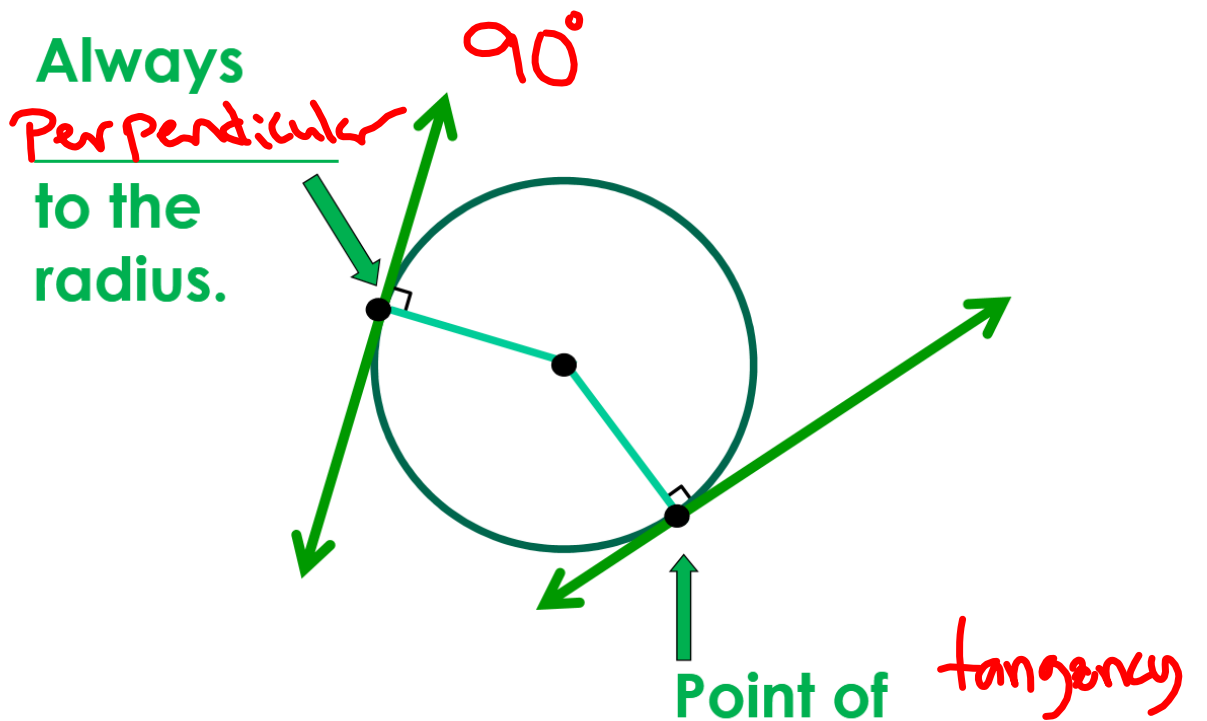


Psyche!  
longer chord  
diameter

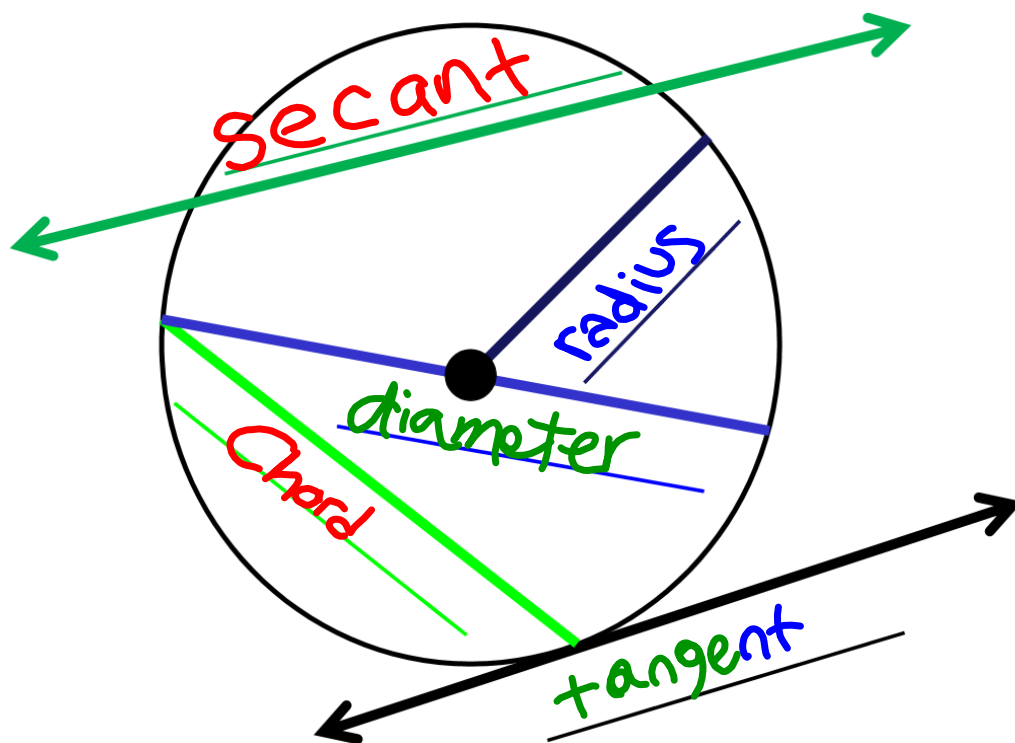
A Secant intersects the circle at exactly TWO points.



A tangent is a LINE that intersects the circle exactly ONE time



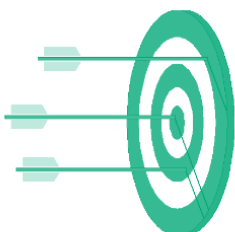
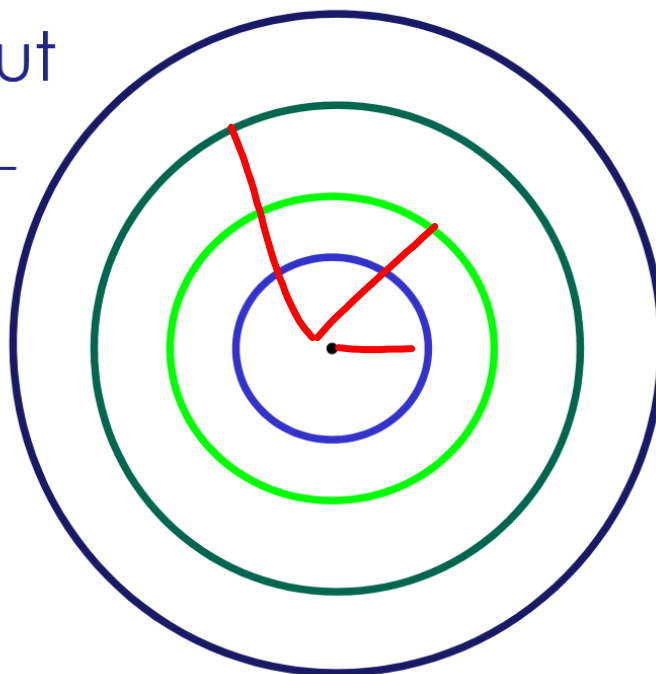
Name the term that best describes the line.



## Concentric Circles

Same Center but  
different radii

No points of  
intersection





**Central Angle:** An Angle whose vertex is at the center of the circle

Major Arc

$$180^\circ < x < 360^\circ$$

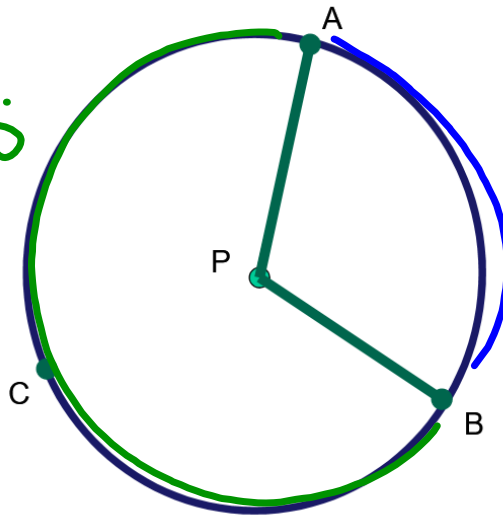
3 letters

$\widehat{ACB}$

or

$\widehat{BCA}$

$\neq \widehat{CAB}$



Minor Arc

$$0^\circ < x < 180^\circ$$

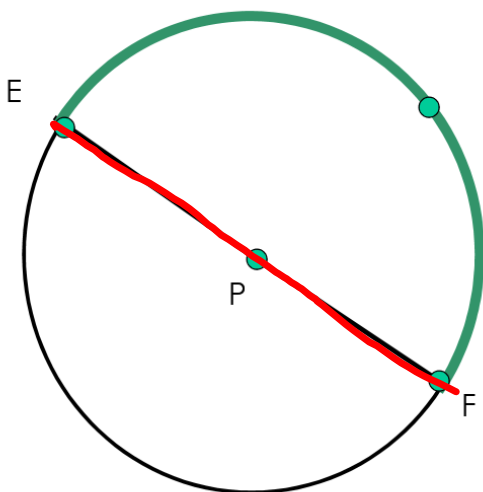
2 letters

$\widehat{BA}$

or

$\widehat{AB}$

Semicircle: An Arc that equals  $180^\circ$



To name: use 3 letters

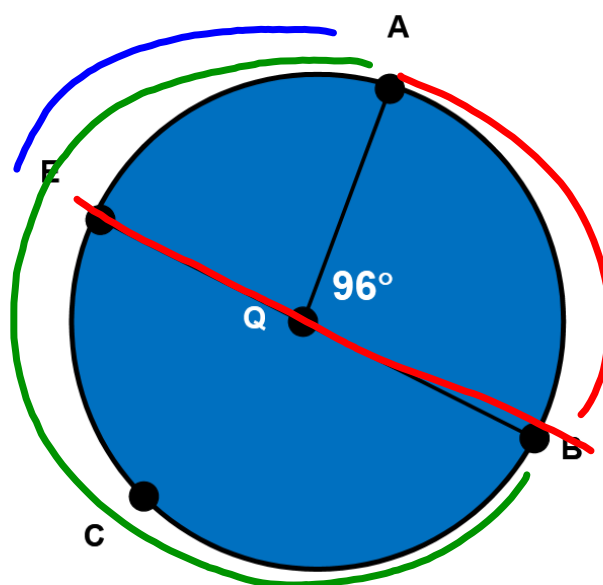
$\overbrace{FDE}$   
or  
 $\overbrace{EDF}$

measure of an arc = measure of central angle

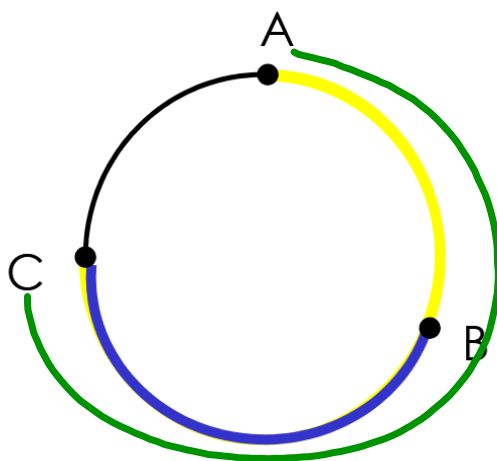
$$m\widehat{AB} = 96^\circ$$

$$m\widehat{ACB} = \begin{array}{r} 360^\circ \\ - 96^\circ \\ \hline 264^\circ \end{array}$$

$$m\widehat{AE} = \begin{array}{r} 180^\circ \\ - 96^\circ \\ \hline 84^\circ \end{array}$$



## Arc Addition Postulate



$$m \widehat{BC} + m \widehat{AB} = m \widehat{ABC}$$

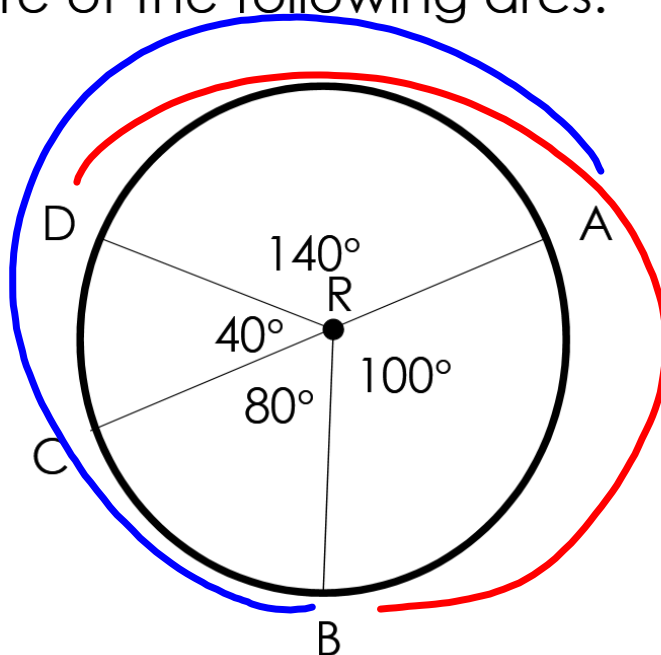
Identify the measure of the following arcs.

$$m\widehat{DAB} = 240^\circ$$

$$m\widehat{BCA} = 260^\circ$$

$$\begin{array}{r} 80 \\ + 40 \\ + 140 \\ \hline 260 \end{array}$$

$$\begin{array}{r} 360 \\ - 100 \\ \hline 260 \end{array}$$



Identify the measure of the following arcs.

$$m\widehat{CB} = 80^\circ$$

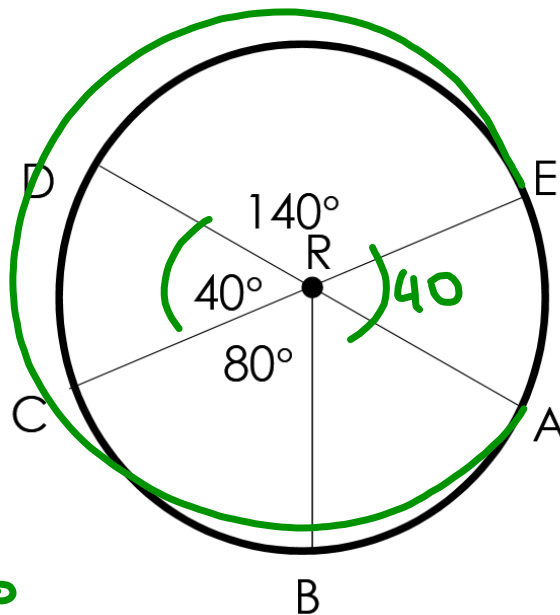
$$m\widehat{BD} = 120^\circ$$

$$m\widehat{EA} = 40^\circ$$

$$m\widehat{DAB} = 240^\circ$$

$$m\widehat{AB} = 60^\circ$$

$$m\widehat{ACE} = 320^\circ$$





Geometry

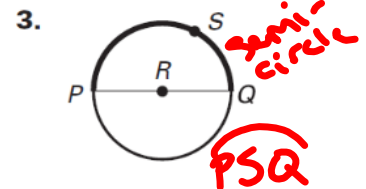
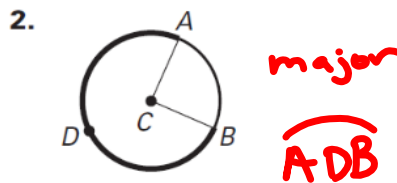
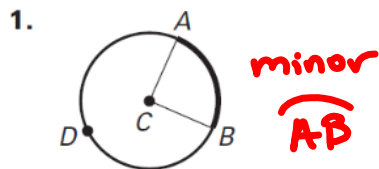
3 – Circles and Angles

Practice

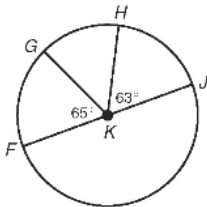
Name: \_\_\_\_\_ Date: \_\_\_\_\_

**Central Angles Practice**

Name the arc shown in bold.

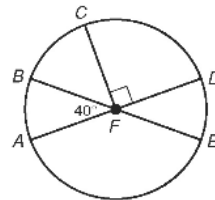


Find each measure.



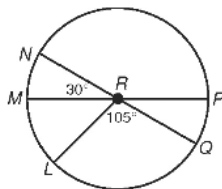
4.  $m\widehat{HJ}$  63°

5.  $m\widehat{FGH}$  117°



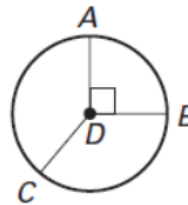
6.  $m\widehat{CDE}$  130°

7.  $m\widehat{BCD}$  140°

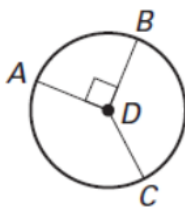


8.  $m\widehat{LMN}$  75°

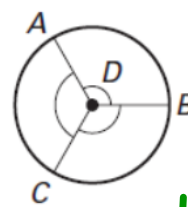
9.  $m\widehat{LNP}$  225°



10.  $m\widehat{AB}$  90°



11.  $m\widehat{ACB}$  270°



12.  $m\widehat{CA}$  120°



Geometry

Name \_\_\_\_\_

Central Angles

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

If an angle is given, name the arc it makes. If an arc is given, name its central angle.

1)  $\overline{KLJ}$   $\angle 1$  or  $\angle 3$

$360 - \angle 2$

2)  $\angle I$

$\widehat{IH}$  or  $\widehat{HI}$

3)  $\angle 2$

$\widehat{VW}$  or  $\widehat{WV}$

4)  $\widehat{GIH}$

$360 - \angle 2$

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

5)  $m\angle ECF$

$70^\circ$

6)  $m\widehat{WXU}$

$205^\circ$

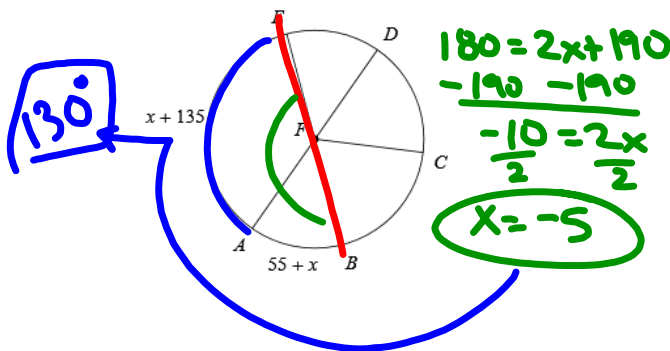
7)  $m\widehat{EF}$

$180 - 53 - 52 = 75^\circ$

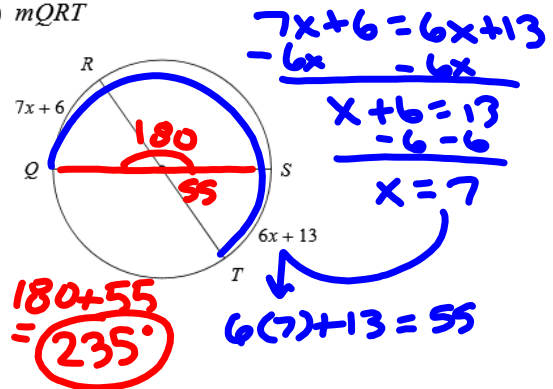
8)  $m\angle EAF$

$180 - 116 = 64^\circ$

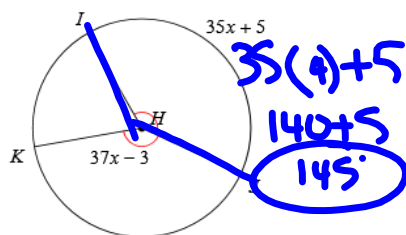
9)  $m\angle AFE$   $180 = x + 135 + 55 + x$



10)  $m\widehat{QRT}$

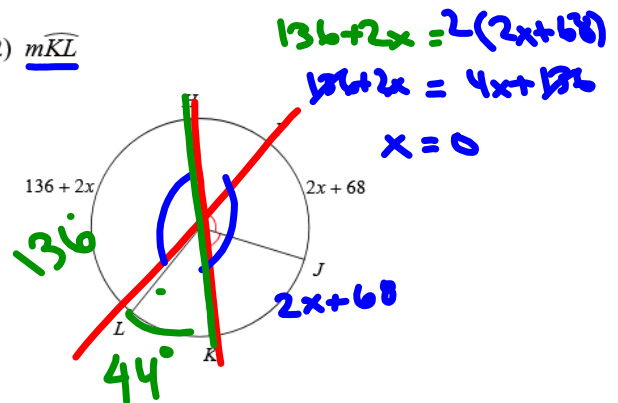


11)  $m\angle IHJ$



$35x + 5 = 37x - 3$   
 $-35x \quad -35x$   
 $5 = 2x - 3$   
 $+3 \quad +3$   
 $8 = 2x$   
 $\frac{8}{2} \quad \frac{2x}{2} \quad x = 4$

12)  $m\widehat{KL}$



## Answers to Central Angles

- 1)  $\angle 2$
- 5)  $70^\circ$
- 9)  $130^\circ$

- 2)  $\widehat{HI}$
- 6)  $205^\circ$
- 10)  $235^\circ$

- 3)  $\widehat{VW}$
- 7)  $75^\circ$
- 11)  $145^\circ$

- 4)  $\angle 2$
- 8)  $64^\circ$
- 12)  $44^\circ$

