

What you will learn about:  
Properties of Circles

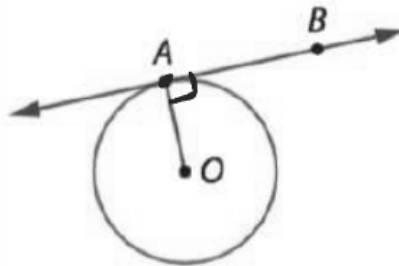
Tangents

Line that intersects  
Circle in only one  
point

Point A is called  
point of tangency

If a radius (diameter) intersects a tangent at the point of tangency then the radius (diameter) are perpendicular.

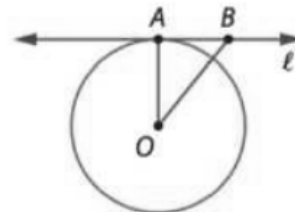
$$m\angle BAO = 90^\circ$$



Points on the interior, exterior, or on the circle.

Refer to the figure on the right.

If line  $\ell$  is tangent to circle O at point A, the radius of the circle is 4 inches, and AB is =3 inches, what is the length BO? Explain.



If AB=5 cm, and AO=12 cm, and BO= 13 cm, why is it correct to conclude that line  $\ell$  must be tangent to the circle at point A?

## Chords, Arcs, and Central Angles

Chords - Segment whose end points are on a circle

Central Angle - Angle with vertex at center of circle.

Minor Arc  $0^\circ < \text{Arc} < 180^\circ$

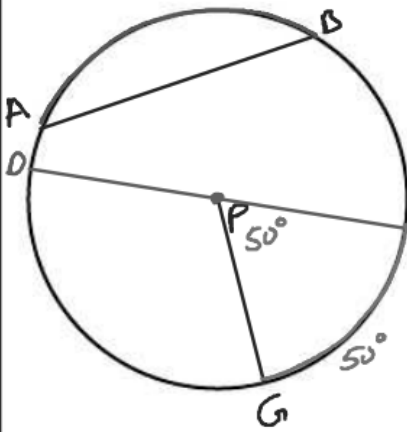
$\widehat{AB}$ ,  $\widehat{GF}$

Major Arc  $180^\circ < \text{Arc} < 360^\circ$

$\widehat{DFG}$   $\widehat{AFB}$

3 letters

Congruent Arcs



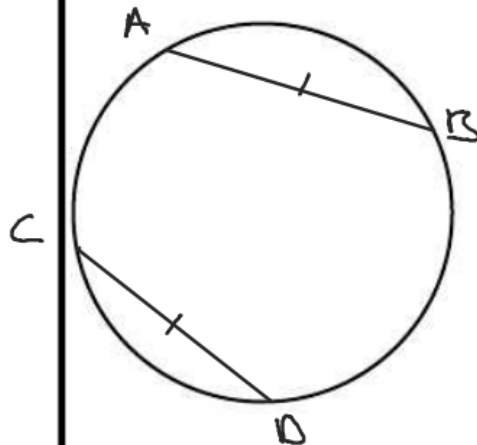
Central  $\angle$

$\angle FPG$

$\angle DPG$

measure of central  $\angle$  is equal to its intercepted arc.

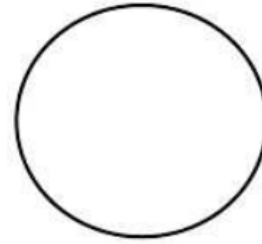
$$m\angle FPG = m\widehat{FG}$$



$$\overline{AB} \cong \overline{CD}$$

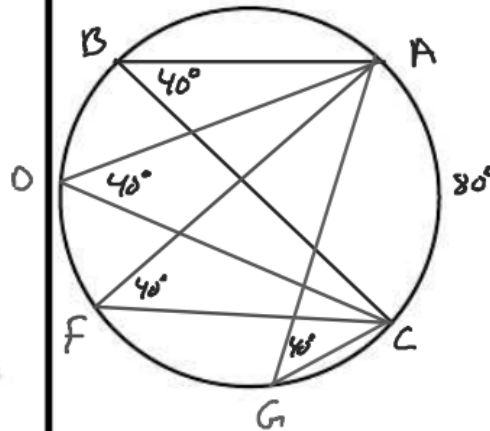
$$\widehat{AB} \cong \widehat{CD}$$

The perpendicular distance from the center of the circle to a chord is 4 inches. What is the length of the chord? What is the measure of its central angle?



### Inscribed Angles in Circles

Inscribed Angles Vertex is on the circle.



Inscribed Angle is half the measure of its intercepted arc.

Congruent Inscribed Angles

Have the same Intercepted arc.

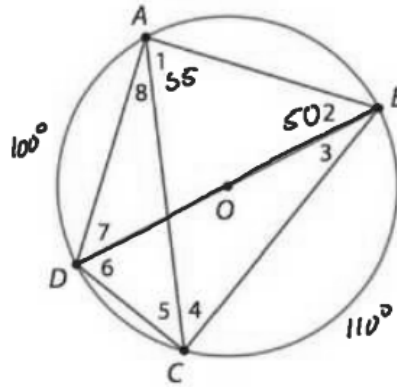
$$\widehat{AB} = 80^\circ$$

$$\widehat{BC} = 110^\circ$$

$$\widehat{CD} = 70^\circ$$

$$\widehat{DA} = 100^\circ$$

In the diagram below,  $\overline{BD}$  is a diameter of the circle with center O. Points A, B, C, and D are on the circle.



$$m\angle 7 = 50^\circ$$

$$m\angle 4 = 50^\circ$$

$$m\angle 2 = 40^\circ$$

$$m\angle 5 = 40^\circ$$

If measure of arc  $AB = 100^\circ$ , find the measure of as many possible numbered angles as possible.

Given the two measures  $m\angle 1 = 55^\circ$  and  $m\angle 2 = 50^\circ$ , find the measures of the four minor arcs AB, BC, CD, and DA.

1) If  $m\widehat{PQ} = 100^\circ$ ,  $m\widehat{QOS} = 110^\circ$ , and  $m\angle SOR = 35^\circ$  find:

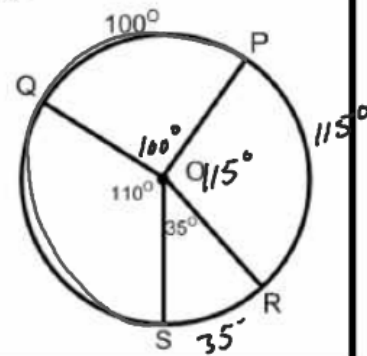
$$m\angle POQ = 100^\circ \quad m\widehat{QS} = 110^\circ$$

$$m\widehat{SR} = 35^\circ \quad m\angle ROP = 115^\circ$$

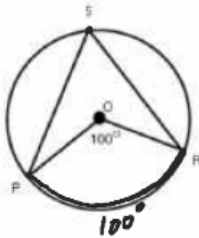
$$m\widehat{RP} = 115^\circ \quad m\widehat{PQS} = 210^\circ$$

$$m\angle QOR = 145^\circ \quad m\widehat{QSR} = 145^\circ$$

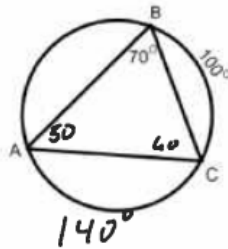
$$m\widehat{SRP} = 150^\circ \quad m\widehat{RPQ} = 215^\circ$$



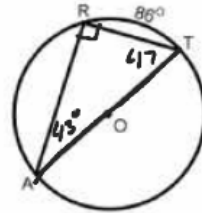
4)  $m\angle POR = 100^\circ$   
 $m\widehat{PR} = 100^\circ$   
 $m\angle PSR = 50^\circ$



5)  $m\angle ABC = 70^\circ$ ,  $m\widehat{BC} = 100^\circ$   
 $m\widehat{AC} = 140^\circ$ ,  $m\angle C = 60^\circ$   
 $m\angle A = 50^\circ$ ,  $m\widehat{AB} = 120^\circ$

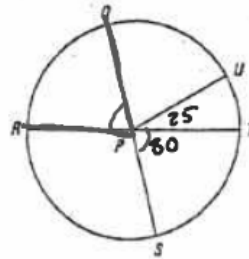


6)  $\overline{AT}$  is a diameter,  
 $m\widehat{RT} = 86^\circ$   
 $m\angle A = 43^\circ$ ,  $m\angle R = 90^\circ$   
 $m\angle T = 47^\circ$ ,  $m\widehat{AR} = 94^\circ$



For questions 3-8, use  $\odot P$  to find each measure.  
 In  $\odot P$ ,  $m\angle TPU = 25$ ,  $m\angle SPT = 80$ , and  $PT = 5$ .  
 $\overline{RT}$  and  $\overline{QS}$  are diameters.

3.  $QS = 10$
4.  $m\widehat{TSR} = 140^\circ$
5.  $m\widehat{UTS} = 105^\circ$
6.  $m\widehat{RQU} = 155^\circ$
7.  $m\angle RPQ = 80^\circ$
8.  $m\angle SPR = 100^\circ$



For questions 11-15, use the figure below. Find each measure.

11.  $m\widehat{FG} = 100$
12.  $m\angle FEG = 50^\circ$
13.  $m\widehat{EH} = 60^\circ$
14.  $m\angle EFH = 30^\circ$
15.  $m\angle FGE = 50^\circ$

