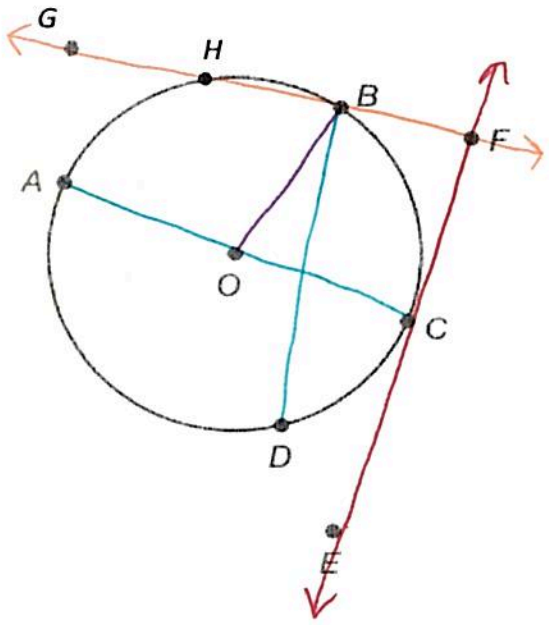
PAP Geometry Notes
Chapter 11 - Circles

Name: Coach C's Notes

11.1 – 11.2: Intro to Circles, Central & Inscribed Angles, and Intercepted Arcs

Circles Vocab:

- A circle is a set of all points in a plane that are equidistant from the **center of the circle**.
  A circle is named by its center, name the circle below
- The distance from a point on the circle to the center is the **radius**. *Draw a radius using point *B*.
- A **chord** is a line segment with each endpoint on the circle. *Draw two chords using B/D and A/C.
- A **diameter** is a chord that passes through the center.
- A **secant of a circle** is a line that intersects a circle at exactly *two points*. *Draw a secant using points *F/G*.
- A **tangent of a circle** is a line that intersects a circle at exactly *one point*. *Draw a tangent using points *F/E*.



Circle Name: Circle O

Radius: $\overline{OB}$

Chords: $\overline{BD}$ $\overline{AC}$

Diameter: $\overline{AC}$

Secant: $\overleftrightarrow{FG}$

Intersection points: A, B ~~H, B~~

Tangent: $\overleftrightarrow{FE}$

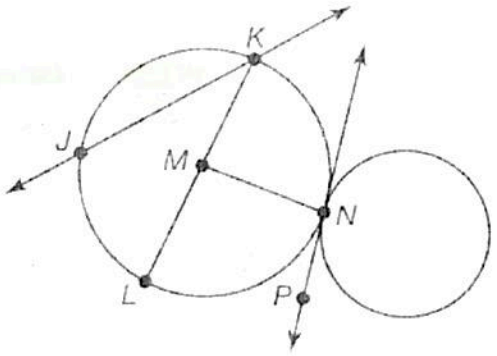
Point of tangency: C

What is always the longest chord in a circle?

Diameter

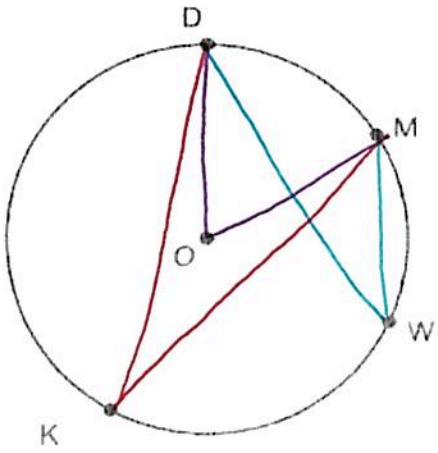
Check for Understanding:

Use the diagram to match each notation with the term that provides the best description



	Notation		Term
1.	$\overline{MN}$	D.	A. point of tangency
2.	$\overrightarrow{JK}$	F.	B. diameter
3.	Point *M*	E.	C. tangent
4.	Point *N*	A.	D. radius
5.	$\overline{LK}$	B.	E. center of circle
6.	$\overrightarrow{PN}$	C.	F. secant

Angles and Arcs:



- A **central angle** is an angle whose vertex is the *center of the circle*.
  *Draw a central angle using points D and M. ∠DOM

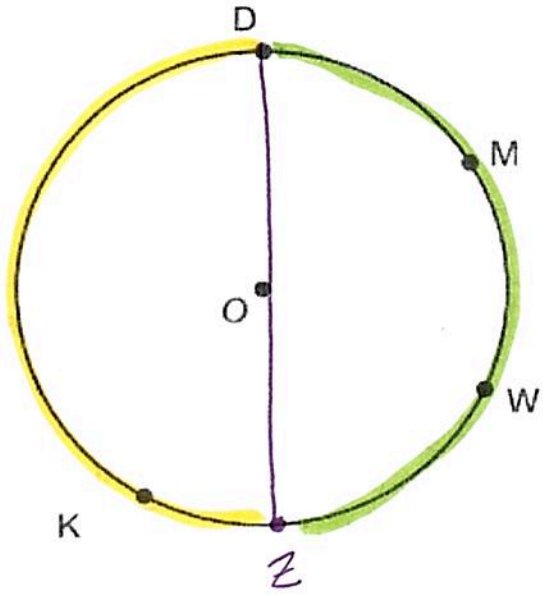
- An **inscribed angle** is an angle whose vertex is *on the circle*. ∠DKM
  *Draw an inscribed angle using K as the vertex and points D and M.
  *Draw an inscribed angle using W as the vertex and points D and M. ∠DWM

Compare and contrast the three angles created:

all create the same arc
all have same endpoints

- An **arc** of a circle is any unbroken part of the circumference of a circle. An arc is named using its two endpoints. The symbol used to describe are AB is $\overset{\frown}{AB}$
- A **major arc** of a circle is the largest arc formed by a secant and a circle. *It goes more than halfway around the circle.*
- A **minor arc** of a circle is the smallest arc formed by a secant and a circle. *It goes less than halfway around the circle.*
- A **semicircle** is *exactly half* of a circle.

**To avoid confusion, three points are used to name semicircles and major arcs. The first point is an endpoint of the arc, the second point is any point at which the arc passes through and the third point is the other endpoint of the arc.



a. Identify two different arcs and name them.
$\overset{\frown}{DM}$ $\overset{\frown}{KD}$

b. Draw a diameter on the circle so that point D is an endpoint. Label the second endpoint Z. What does the diameter divide the circle into?
2 semicircles

c. Name each semicircle
$\overset{\frown}{DKZ}$ $\overset{\frown}{DMZ}$

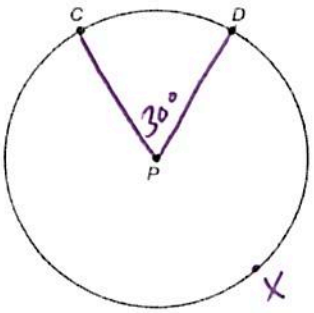
d. Name 2 minor arcs.
$\overset{\frown}{KZ}$ $\overset{\frown}{DK}$ $\overset{\frown}{DM}$ $\overset{\frown}{MW}$ $\overset{\frown}{DW}$ $\overset{\frown}{WZ}$...

e. Name two major arcs.
$\overset{\frown}{DZW}$ $\overset{\frown}{DWK}$ $\overset{\frown}{ZMK}$...

Arc Measures:

** Recall that the degree measure of a circle is 360° **

Each minor arc of a circle is associated with and determined by a specific *central angle*. The **degree measure** of a minor arc is the same as the degree measure of its central angle.



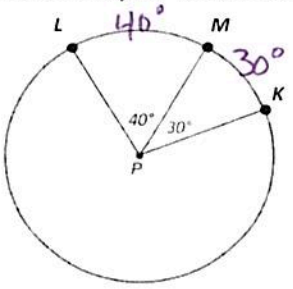
1. Draw a central angle and a minor arc using the points on the circle.
2. If the measure of $\angle CPD = 30°$, what would the measure of $\widehat{CD}$ be?

   30°
3. Add a point "X" anywhere on the circle, not on $\widehat{CD}$.
4. What would the measure of major arc CXD, $\widehat{CXD}$ be?

   360 - 30 = 330°

Adjacent arcs are two arcs of the same circle sharing a common endpoint.

The **arc addition postulate** states that the measure of an arc formed by two adjacent arcs is equal to the sum of the two arcs.



1. Name two minor arcs created in the circle.

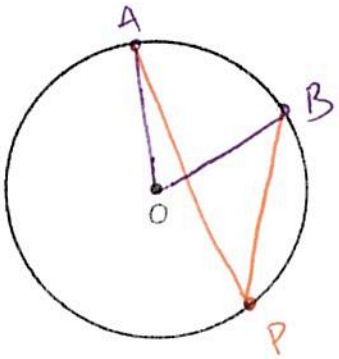
   $\widehat{LM}$ $\widehat{MK}$
2. Apply the arc addition postulate to two minor arcs created in the circle

   $\widehat{LM} + \widehat{MK} = \widehat{LK} = 70°$

An intercepted arc is an arc associated with and determined by angles of the circle.

An **intercepted arc** is a portion of the circumference of the circle located on the interior of the angle whose endpoints lie on the sides of an angle.

An intercepted arc can be created by central or inscribed angles.

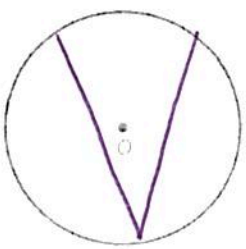


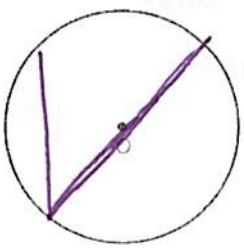
1. Draw a central angle on cirlce O. Label it $\angle AOB$.
2. Name the intercepted arc assosicted with $\angle AOB$.

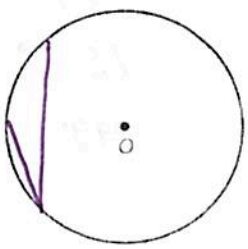
   $\widehat{AB}$
3. Draw an incribed angle on circle O that contains A and B on its sides. Label its vertex point P.
4. What do angles $\angle AOB$ and $\angle APB$ have in common?

   Same intercepted arc

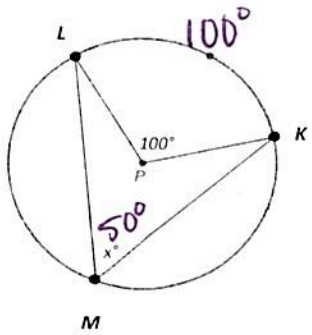
Inscribed angles formed by two chords can be drawn in different ways. Label each intercepted arc created.

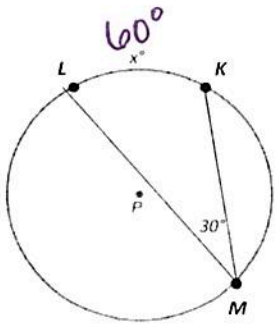


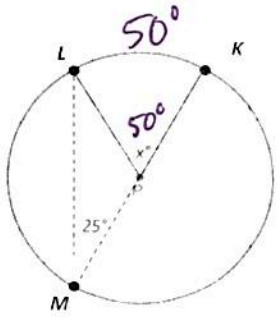




The **inscribed angle theorem** states that the measure of an inscribed anlge is half the measure of its intercepted arc.



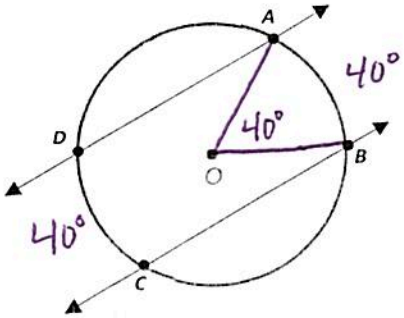




Parallel Lines-Congruent Arcs theorem states that parallel lines intercept congruent arcs on a circle.

$\angle AOB = 40°$

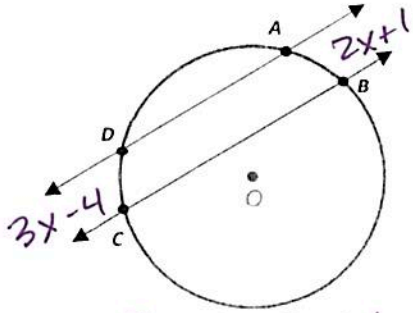
Find the measure of $\widehat{DC}$.



$\widehat{DC} = 3x - 4$

$\widehat{BA} = 2x + 1$

Find x.



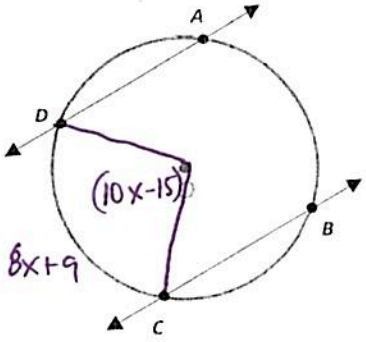
$3x - 4 = 2x + 1$

$x = 5$

$\angle DOC = (10x - 15)°$

$\widehat{DC} = 8x + 9$

Find the measure of $\widehat{BA}$.



$10x + 15 = 8x + 9$

$x = 12$

$\widehat{DC} = 105$ $\widehat{AB} = 105$

Check for Understanding:

Find the following.

$\widehat{NK} =$ 180°

$\widehat{JK} =$ 137°

$\widehat{PN} =$ 157°

$\widehat{NJ} =$ 43°

$\angle KJN =$ 90°

$\angle JNP =$

$\angle PKJ =$ 100°