Geometry H
Section 10.2 Arc Measures Notes

Name: Key
Date: _____ Period: _____

LEARNING TARGETS

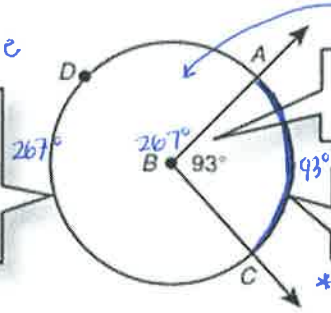
- I can identify minor and major arcs.
- I can use angle measures to find arc measures.

Arcs and Their Measure

- A **central angle** is an angle whose vertex is on the center of a circle
- An **arc** is an unbroken part of a circle consisting of two points on a circle and all the points on the circle between them.
  - a piece of the outside edge of a circle

a circle has a total angle measure of 360°

$\overset{\frown}{ADC}$ is a **major arc.**
$m\overset{\frown}{ADC}$ = 360 − 93
= 267°



∠ABC is a central angle

$\overset{\frown}{AC}$ is a **minor arc**
$m\overset{\frown}{AC}$ = 93° (same as its central angle)

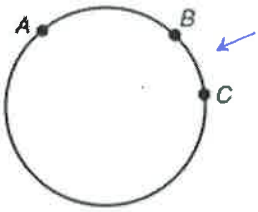
* measure of a central angle = measure of its intercepted arc

- If the endpoints of an arc lie on a diameter, the arc is a semicircle and its measure is 180°

Arc Addition Postulate

The measure of an arc formed by two adjacent arcs is the sum of the measures of the two arcs.

$m\overset{\frown}{ABC} = m\overset{\frown}{AB} + m\overset{\frown}{BC}$



Kind of like the segment addition postulate:

A B C

AB + BC = AC

Naming Arcs

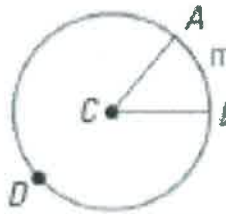
Minor arcs are named by their endpoints like this:

- $\overset{\frown}{AB}$ is a minor arc associated with ∠ACB.

* minor arcs are named using 2 capital letters

Major arcs and semicirlces are named by their endpoints and a point on the arc. For example, $\overset{\frown}{ADB}$ is the major arc associated with ∠ACB.

* major arcs & semi circles are named using 3 capital letters



minor arc $\overset{\frown}{AB}$ (less than 180°)

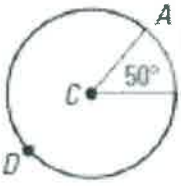
major arc $\overset{\frown}{ADB}$ (more than 180°)

Measuring Arcs

The measure of a minor arc is the measure of its central angle. The expression $m\overset{\frown}{AB}$ is read as *the measure of arc AB*.

An entire circle has 360°. The measure of a major arc is the difference between 360° and the measure of the related minor arc.

The measure of a semicircle is 180°.



$m\overset{\frown}{AB}$ = 50°

$m\overset{\frown}{ADB}$ = 360° − 50° = 310°

minor arcs: measures $0° < x < 180°$

semicircles: measures exactly 180°

major arcs: measures $180° < x < 360°$

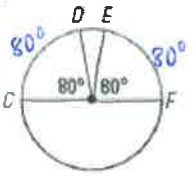
Example 1: Identify congruent arcs

Remember that two circles are congruent if they have the same radius. When two circles are congruent we can write $\odot L \cong \odot F$.

Two arcs are congruent if they have the same measure **AND** they are arcs of the same circle or congruent circles.

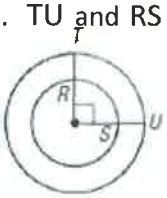
Tell whether the given arcs are congruent. Explain why or why not.

a. $\overset{\frown}{CD}$ and $\overset{\frown}{EF}$



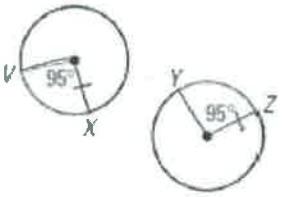
Yes, they belong to the same circle and they have the same measure

b. $\overset{\frown}{TU}$ and $\overset{\frown}{RS}$



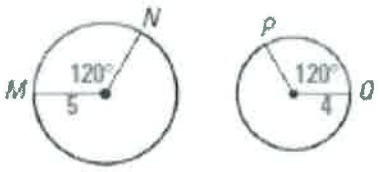
No, the radii are not the same length so the arcs are not congruent

c. $\overset{\frown}{VX}$ and $\overset{\frown}{YZ}$



Yes, the circles have the same length radius and the arc measures are the same

d. $\overset{\frown}{MN}$ and $\overset{\frown}{PQ}$



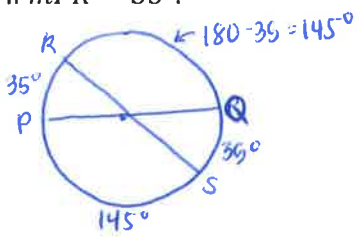
No, the radii are not the same length so the arcs are not congruent

Example 2: Finding measures of arcs

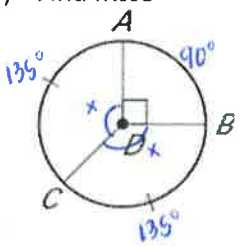
a) Two diameters of $\odot T$ are $\overline{PQ}$ and $\overline{RS}$. Find the given arc measure if $m\overset{\frown}{PR} = 35°$.

$m\overset{\frown}{PS} =$ 145° $m\overset{\frown}{PSR} =$ 145+35+145 = 325°

$m\overset{\frown}{PRQ} =$ 180° (semicircle) $m\overset{\frown}{PRS} =$ 35+145+35 = 215°



b) Find $m\overset{\frown}{AC}$ ← minor arc



x+x+90 = 360

2x+90 = 360

2x = 270

x = 135°

$m\overset{\frown}{AC} = 135°$

c) $\overline{AC}$ and $\overline{BE}$ are diameters of $\odot F$. Identify the arc as a major arc, minor arc, or semicircle, and find the measure of the arc.

$m\overset{\frown}{BC} =$ 70° minor

$m\overset{\frown}{DC} =$ 65° minor

$m\overset{\frown}{DB} =$ 65+70 = 135° minor

$m\overset{\frown}{AE} =$ 70° minor

$m\overset{\frown}{AD} =$ 70+45 = 115° minor

$m\overset{\frown}{ABC} =$ 110+70 = 180° semicircle

$m\overset{\frown}{ACD} =$ 110+70+65 = 245° major

$m\overset{\frown}{EAC} =$ 70+110+70 = 250° major