Geometry Unit 9

9-3: Arcs and Central Angles

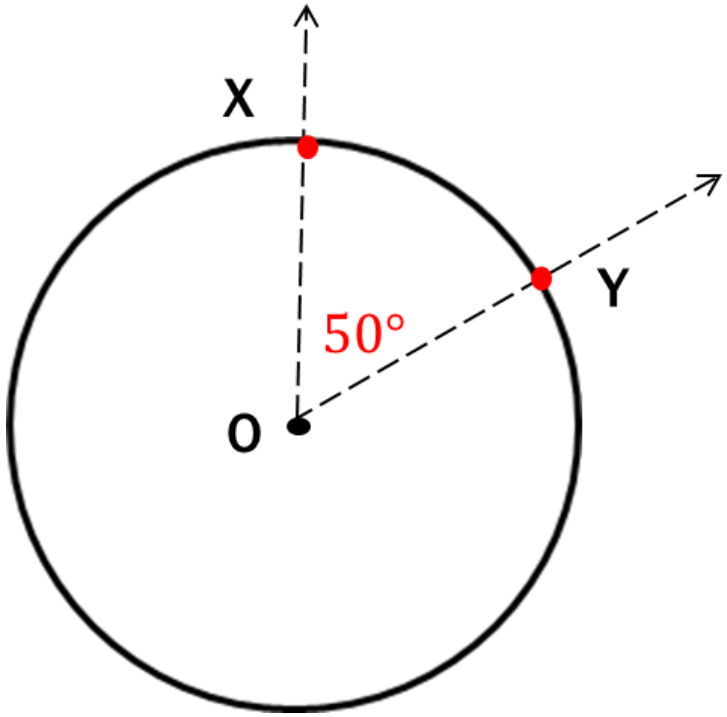
Angles in Circles

- **Content Objective**: Students will be able to find the measures of arcs and central angles in circles.

- **Language Objective**: Students will be able to name arcs and angles in circles based off notation and placement on the circle.

Angle in the Circle

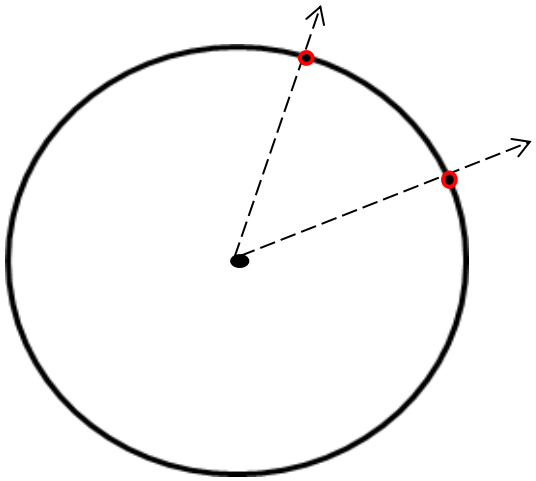
- **<u>Central Angle</u>**: An angle with its vertex at the center of the circle, created by two radii.



$m < YOX = 50°$

Arcs

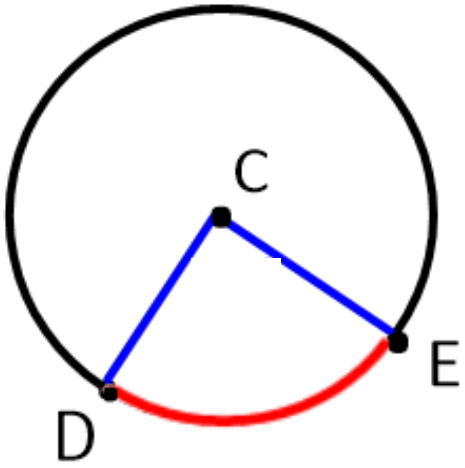
- **Arc**: A portion of the circle connecting two points from the circle.



- **Minor Arc**: The shortest arc connecting two points.
- **Semicircle**: An arc that connects two points on opposite sides of the circle (i.e. the points of the diameter).
- **Major Arc**: The longest arc connecting two points.

The Measures of the Arcs

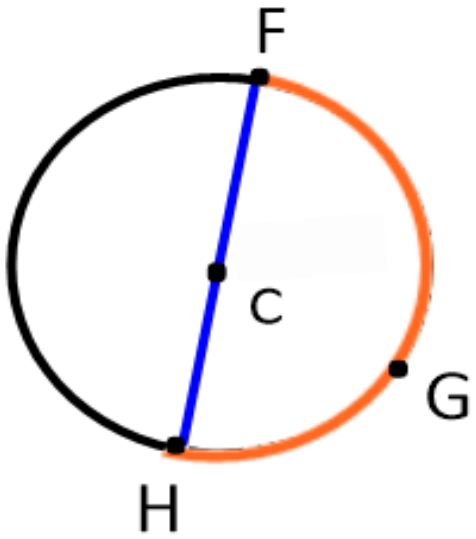
Minor Arc



Notation:

$\overset{\frown}{DE}$

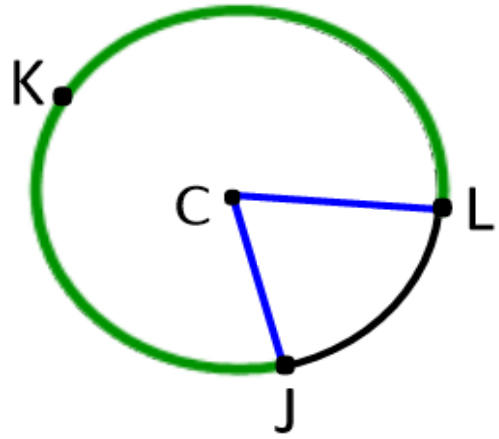
Semicircle



Notation:

$\overset{\frown}{FGH}$

Major Arc



Notation:

$\overset{\frown}{JKL}$

Note: Minor arcs are named using two points, while semicircles and major arcs require three points.

Arc Practice

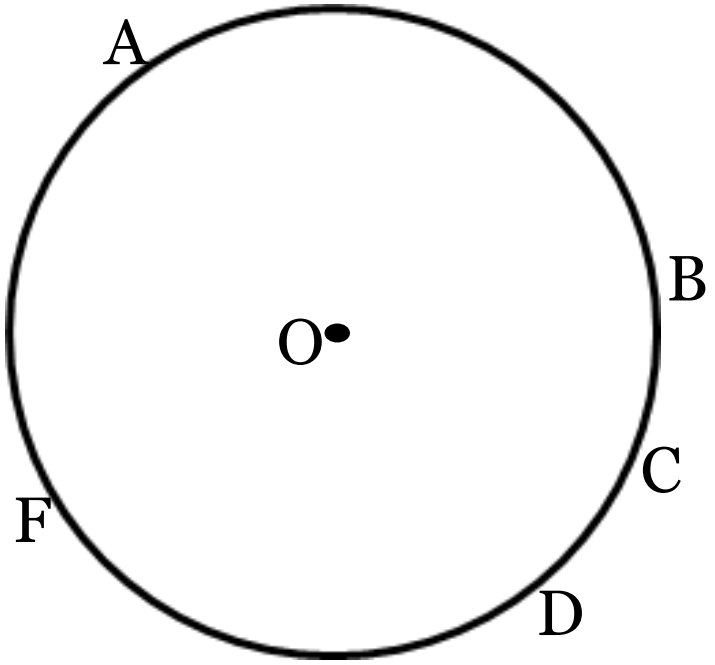
- Identify the type of arc based off the picture and the notation.

1.) $\overset{\frown}{ABD}$ Semicircle

2.) $\overset{\frown}{AC}$ Minor Arc

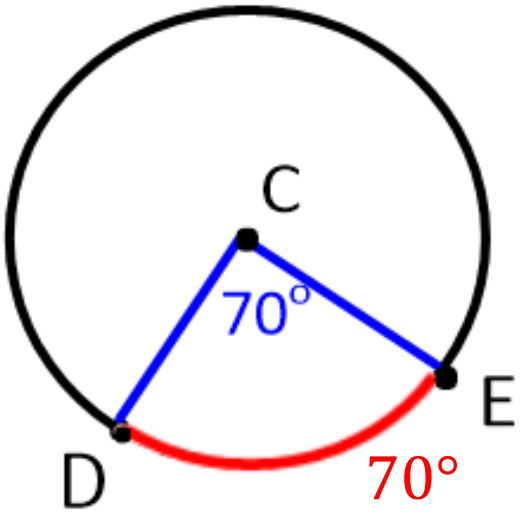
3.) $\overset{\frown}{ADB}$ Major Arc

4.) $\overset{\frown}{AFC}$ Major Arc



Use the measures given to find a rule for how to find the measure of each type of arc.

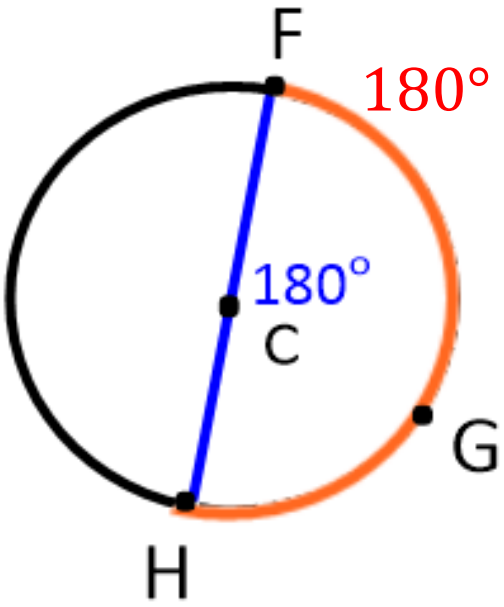
Minor Arc



$m\widehat{DE} = 70°$

Rule:
Minor Arc = Central Angle

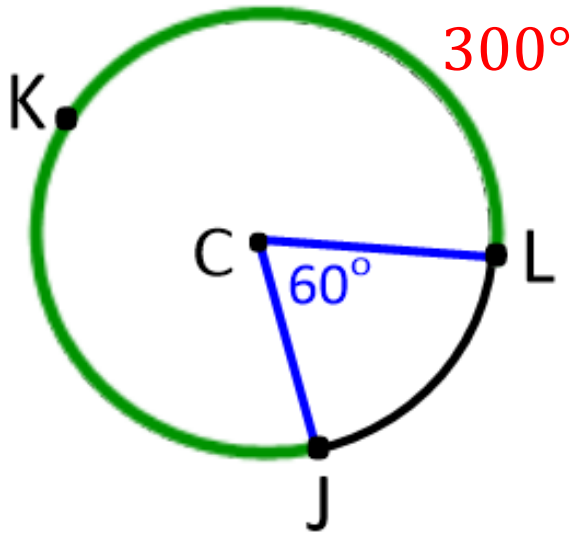
Semicircle



$m\widehat{FGH} = 180°$

Rule:
Always 180°

Major Arc



$m\widehat{JKL} = 300°$

Rule:
Major Arc = 360° – Central Angle

Arc Practice – With Measures

- Based on the given information, find the measure of the arc or of the angle.

1.) $m < KOJ$

$Minor\ Arc = Central\ Angle = \mathbf{80°}$

2.) $m\widehat{MJ}$

$m\widehat{MJ} = 50° + 80° = \mathbf{130°}$

3.) $m\widehat{MKN}$

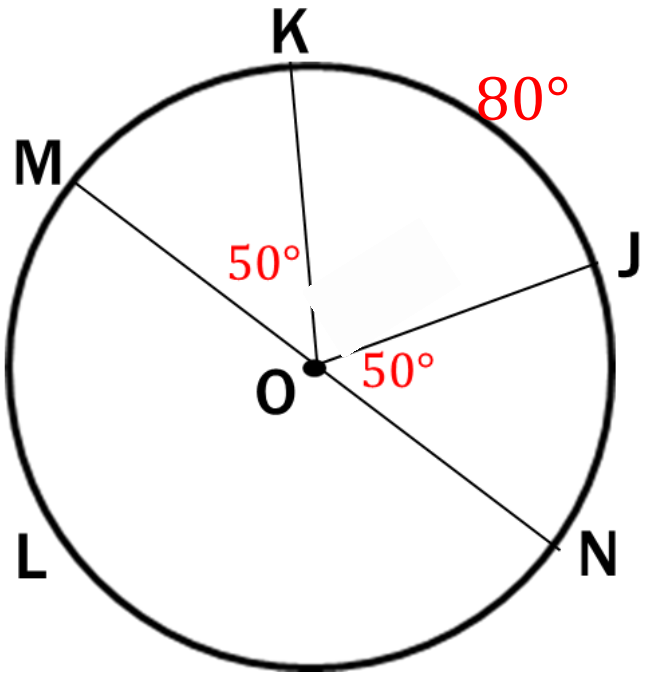
$m\widehat{MKN} = \mathbf{180°}$

4.) $m\widehat{MLK}$

$m\widehat{MLK} = 360° - 50° = \mathbf{310°}$

5.) $m\widehat{MLJ}$

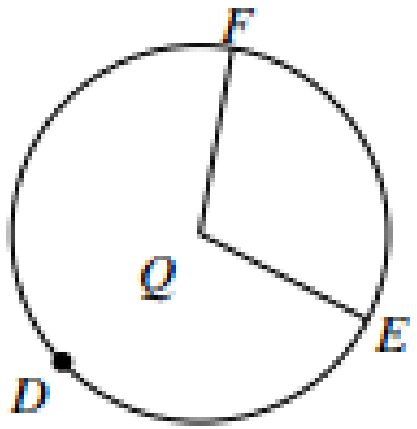
$m\widehat{MLJ} = 360° - 130° = \mathbf{230°}$



Practice With Names

Name the arc made by the given angle.

1) $\angle FQE$



The arc is made by the part of the circle connecting the two radii.

Thus, we have the minor arc

$$\widehat{FE}$$

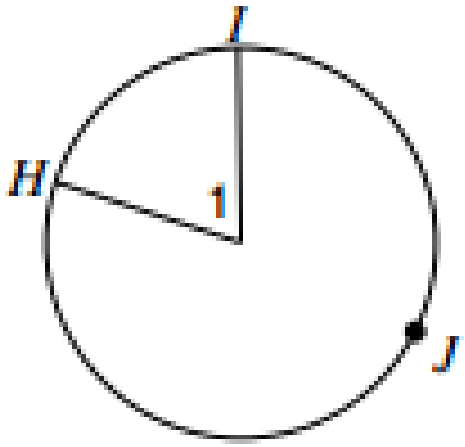
Or, we could also say we have the major arc

$$\widehat{FDE}$$

Practice With Names

Name the arc made by the given angle.

2) $\angle I$



Similar to the last problem

We have the minor arc

$\overset{\frown}{HI}$

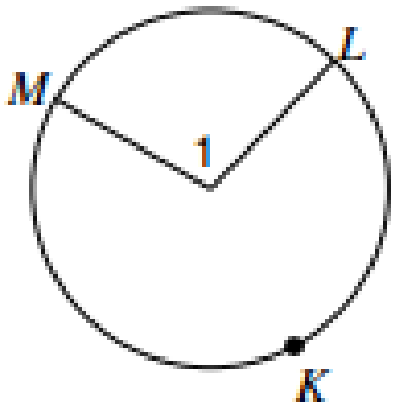
Or, we could also say we have the major arc

$\overset{\frown}{HJI}$

Practice With Names

Name the central angle of the given arc

3) $\overset{\frown}{ML}$



The central angle is covering the arc.

Thus, we have the central angle

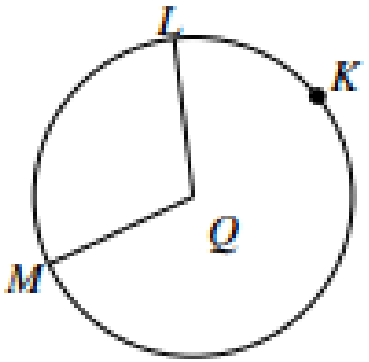
< 1

Note: I had to use a number because it was there, but also because I did not three letters.

Practice With Names

Name the central angle of the given arc

4) $\overset{\frown}{ML}$



The central angle is covering the arc.

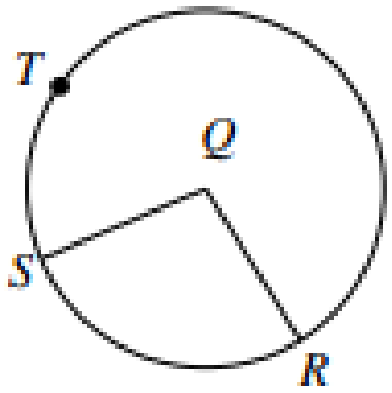
Thus, we have the central angle

$< MQL$

Practice With Names – Interchanging

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

5) $\overset{\frown}{RS}$



You were given an arc…

So find the central angle.

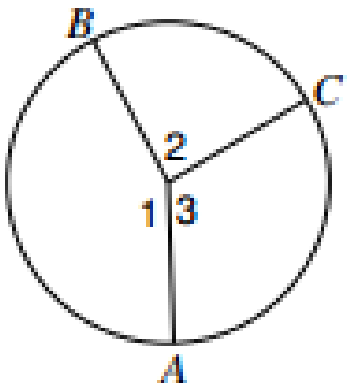
Central Angle

$< RQS$

Practice With Names – Interchanging

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

6) Major arc for $\angle 1$



You were given an angle…

And specifically asked to find the major arc.

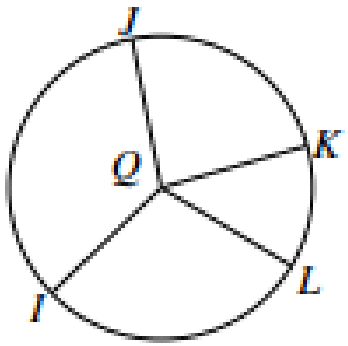
Major Arc

$\overset{\frown}{ACB}$

Practice With Names – Interchanging

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

7) $\angle KQL$



You were given a central angle…

So find the arc(s) it makes.

Arc:

Minor: $\overset{\frown}{KL}$

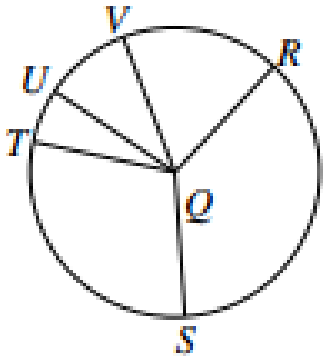
Or

Major: $\overset{\frown}{KIL}$

Practice With Names – Interchanging

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

8) $\overset{\frown}{SVT}$



You were given an arc, specifically a major arc…

So find the central angle.

Central Angle

$< SQT$

Finding Arcs and Angles

- Find the measure of the arc or central angle indicated.

9.) $< GQF$

60°

10.) $< EQF$

50°

11.) $\overset{\frown}{EHF}$

310°

12.) $\overset{\frown}{GE}$

110°

13.) $< GQE$

110°

14.) $\overset{\frown}{GHE}$

250°