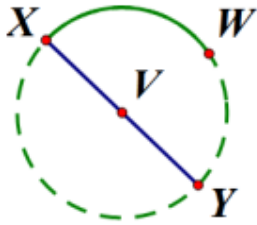


10.2 - Arc Measures

5/9/22
Notes

An arc consists of two points on a circle and all the points on the circle needed to connect them.



- small
Minor Arc = Short route
uses 2 letters \overbrace{XW}

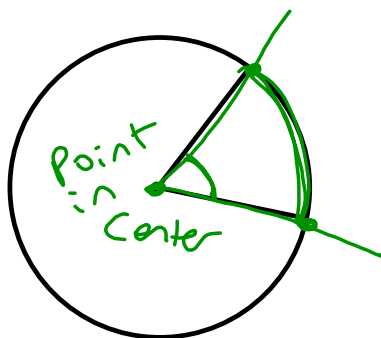
- big
Major Arc = Long route
uses 3 letters \overbrace{XYW}

\overline{XY} is a diameter
of circle V

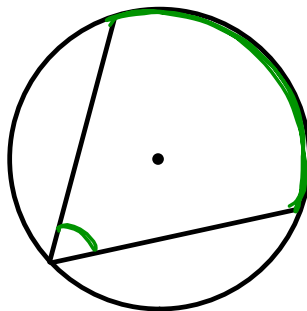
Semicircle = Half the circumference
 \overbrace{XY}

Intercepted Arc

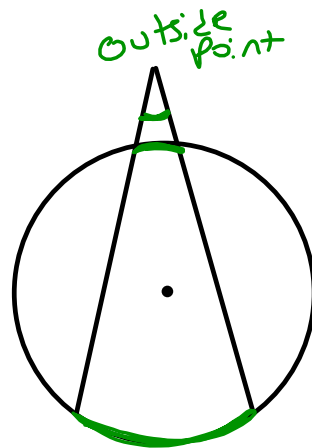
Arc formed inside an angle by connecting the points where the angle intersects the circle.



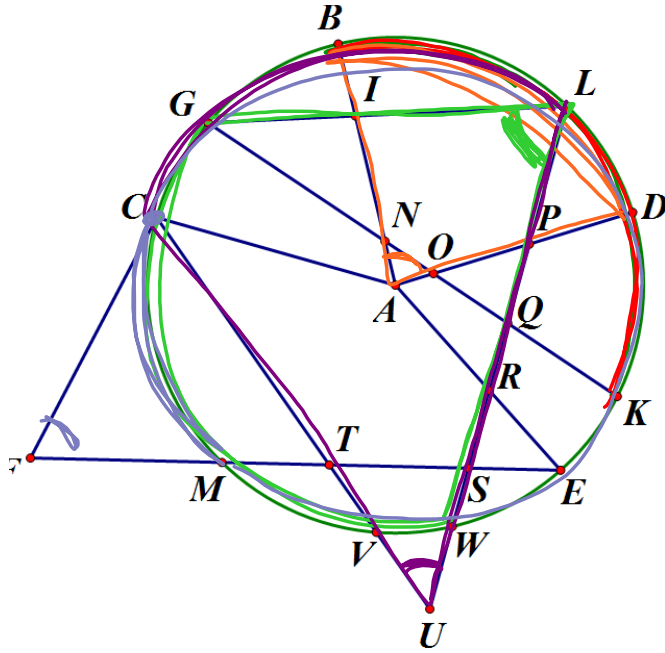
Point
in
Center



Point
on the
Side



Outside
Point



\widehat{BK} - minor Arc

\widehat{BMK} - major Arc

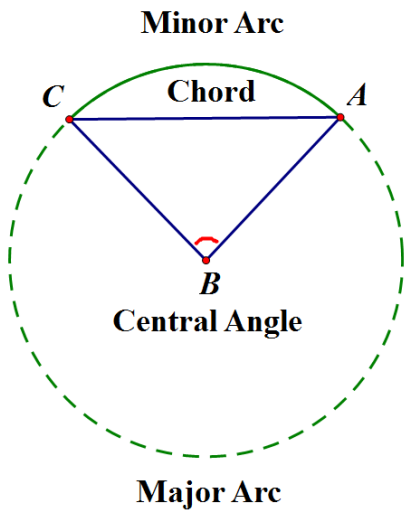
\widehat{BD} - Intercepted Arc
angle at center

\widehat{GW} - Intercepted Arc
Angle at side
at point L

\widehat{CL} - Int. Arc
 \widehat{VW} Angle outside
 $\angle U$
 \widehat{CM} and \widehat{CKM}

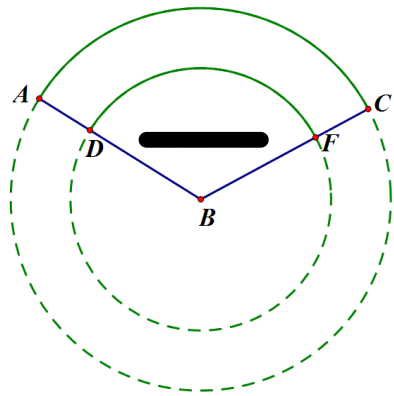
Central Angle

An angle whose vertex lies at the center of a circle.



$\angle ABC$ is a central angle

Arc Information



Length of an Arc

How long the arc is if you stretch it out into a segment.

cm, inch, ft

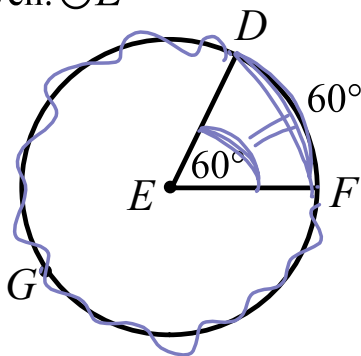
Measure of an Arc

Portion of the circumference of the circle. It is measured in degrees, with 360° being the entire circumference.

Measuring Arcs

- The measure of a minor arc is the measure of its central angle.
- The measure of the major arc is the minor arc subtracted from 360° .

Given: $\odot E$



$$m\angle DEF = 60^\circ$$

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

$$m\widehat{DGF} = 300^\circ$$

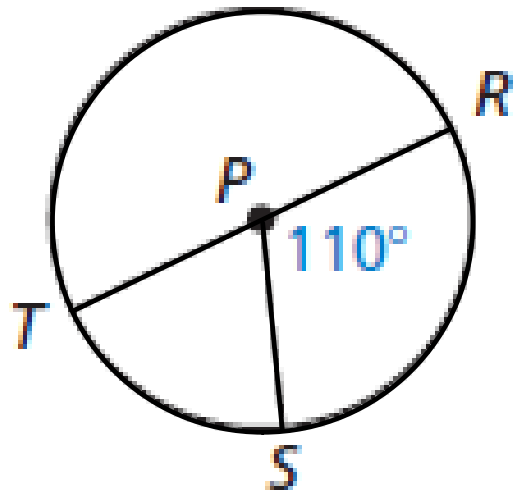
$$360 - 60$$

Example #1Find the measure of each arc of $\odot P$ (circle P)where \overline{RT} is a diameter.

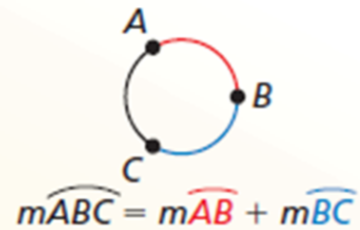
a. $\widehat{RS} = 110^\circ$

b. $\widehat{RTS} = 250^\circ$
 $360 - 110^\circ$

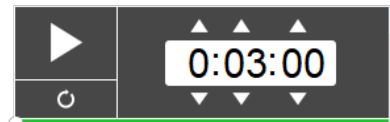
c. $\widehat{RST} = 180^\circ$

**Postulate 10.1 Arc Addition Postulate**

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



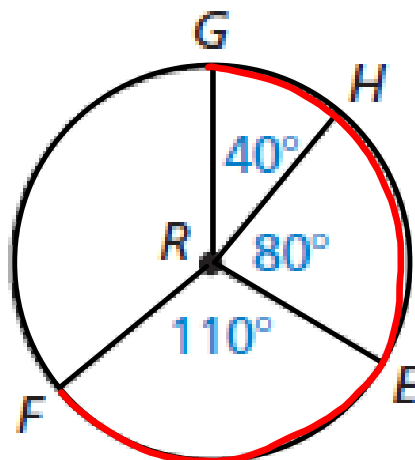
Whole = part + part

Example #2Find the measure of each arc of $\odot R$.

$$\text{a. } \widehat{GE} = 120 \\ 40 + 80$$

$$\text{b. } \widehat{GEF} = 230 \\ 40 + 80 + 110$$

$$\text{c. } \widehat{GF} = 130^\circ \\ 360 - 230^\circ$$

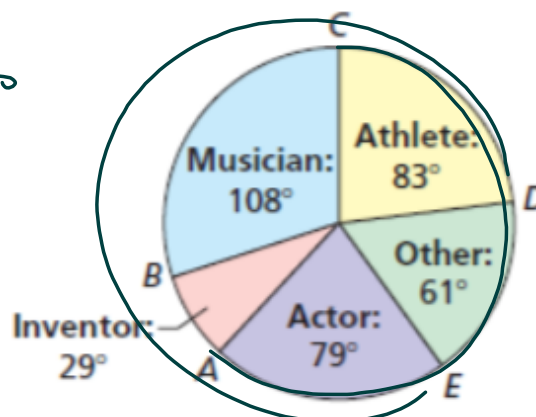
**Example #3**

A recent survey asked teenagers whether they would rather meet a famous musician, athlete, actor, inventor, or other person. The circle graph shows the results. Find the indicated arc measures.

$$\text{a. } m\widehat{AC} = 137^\circ \quad \text{b. } m\widehat{ACD} = 220^\circ \\ 29 + 108 \quad 29 + 108 + 83$$

$$\text{c. } m\widehat{ADC} = 223 \quad \text{d. } m\widehat{EBD} = 299^\circ \\ 79 + 61 + 83 \quad 360 - 61$$

Whom Would You Rather Meet?



Congruent Circles

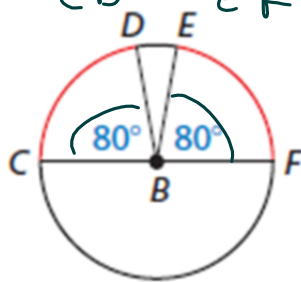
Circles with the same size radius.

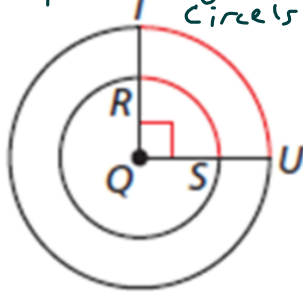
Congruent Arcs

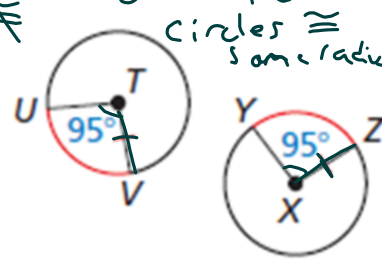
Arcs with the same measure AND part of the same circle or congruent circles.

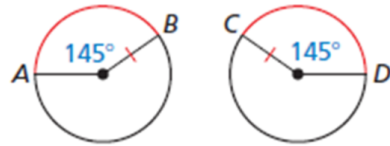
Example #4

Tell whether the red arcs in each question are congruent.

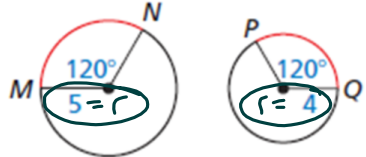
$\widehat{CD} \cong \widehat{EF}$


Not congruent circles \neq


$\widehat{UV} \cong \widehat{YZ}$
 circles \cong same radius




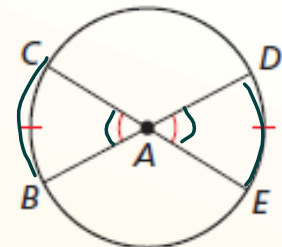
 $\widehat{AB} \cong \widehat{CD}$



 not \cong circles
 so arcs \neq

Theorem 10.4 Congruent Central Angles Theorem

In the same circle, or in congruent circles, two minor arcs are congruent if and only if their corresponding central angles are congruent.



$\widehat{BC} \cong \widehat{DE}$ if and only if $\angle BAC \cong \angle DAE$.

Proof Ex. 37, p. 544

Enriched

10.2 Homework

- p.542 #3-18,20,24,34

Geometry

10.2 Homework

- p.542 #3-21 odd only,24,32,36

3. \widehat{AB} , 135° ; \widehat{ADB} , 225° 4. \widehat{EF} , 68° ; \widehat{EGF} , 292° 13. major arc; 290°

5. \widehat{JL} , 120° ; \widehat{JKL} , 240° 6. \widehat{MN} , 170° ; \widehat{MPN} , 190° 15. a. 132°

b. 147°

c. 200°

d. 160°

7. minor arc; 70°

8. minor arc; 65°

9. minor arc; 45°

10. minor arc; 70°

17. a. 103°

b. 257°

c. 196°

d. 305°

e. 79°

f. 281°

11. semicircle; 180°

12. semicircle; 180°

14. major arc; 315°

20. not congruent; The circles 24. 15; 195°

16. a. 138°

b. 180°

c. 222°

d. 138°

31. 18°

32. a. 15°

b. 90°

c. 3 A.M.

18. yes; $\widehat{WX} = 108^\circ$, $\widehat{XY} = 54^\circ$, $\widehat{VW} = 72^\circ$

$$\widehat{YZ} = 72^\circ, \widehat{ZV} = 54^\circ,$$

34. yes; Both radii are \overline{CD} .

39. 15; yes

40. about 18.38; no

42. about 9.80; no

41. about 13.04; no

3. \widehat{AB} , 135° ; \widehat{ADB} , 225°	4. \widehat{EF} , 68° ; \widehat{EGF} , 292°
5. \widehat{JL} , 120° ; \widehat{JKL} , 240°	6. \widehat{MN} , 170° ; \widehat{MPN} , 190°
7. minor arc; 70°	8. minor arc; 65°
9. minor arc; 45°	10. minor arc; 70°
11. semicircle; 180°	12. semicircle; 180°
13. major arc; 290°	14. major arc; 315°
15. a. 132° b. 147° c. 200° d. 160°	16. a. 138° b. 180° c. 222° d. 138°
17. a. 103° b. 257° c. 196° d. 305° e. 79° f. 281°	18. yes; $\widehat{WX} = 108^\circ$, $\widehat{XY} = 54^\circ$, $\widehat{YZ} = 72^\circ$, $\widehat{ZV} = 54^\circ$, $\widehat{VW} = 72^\circ$
20. not congruent; The circles are not congruent.	24. 15; 195°
31. 18°	32. a. 15° b. 90° c. 3 A.M.
34. yes; Both radii are \overline{CD} .	39. 15; yes
40. about 18.38; no	41. about 13.04; no
42. about 9.80; no	