

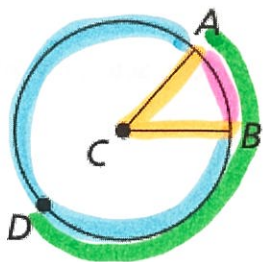
Finding Arc Measures

Learning Objective | WBAT find arc measures and identify $\cong$ arcs

Central Angle: The central angle of a circle is an angle whose vertex is the center of the circle.

→ This is $\angle ACB$ in the diagram below.

→ sides are radii



→ If $m\angle ACB$ is less than 180° , then the points on $\odot C$ that lie in the interior of $\angle ACB$ form a minor arc with endpoints A and B

→ The endpoints that do not lie on the minor arc AB form a major arc with endpoints A and B.

→ A semicircle is an arc with endpoints that are the endpoints of the diameter

Naming Arcs

→ Minor arcs are named by their endpoints: $\widehat{AB}$

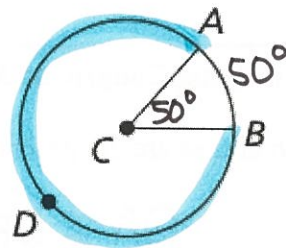
→ Major arcs and semicircles are named by their endpoints and a point on the arc: → semi $\odot$: $\widehat{ABD}$

Measuring Arcs (REMEMBER, the measure of the entire circle is 360° .)

→ The measure of a minor arc is the measure of its central $\angle$.

→ The measure of a major arc is the difference of 360° and its related minor arc

→ The measure of a semicircle is 180°

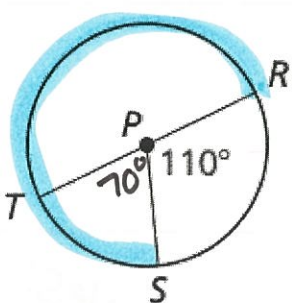


$$m\widehat{AB} = 50^\circ$$

$$m\widehat{ADB} = 360 - 50 = 310^\circ$$

Example

1. Find the measure of each arc of $\odot P$, where $\overline{RT}$ is the diameter.



a. $\widehat{RS}$ 110°

b. $\widehat{RTS}$ 250°

c. $\widehat{RST}$ 180°

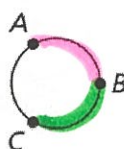
$$m\widehat{TS} = 70^\circ$$

Adjacent Arcs: two arcs of the same circle when they intersect at exactly one point.

→ You can add the measures of two adjacent arcs...

Addition Postulate

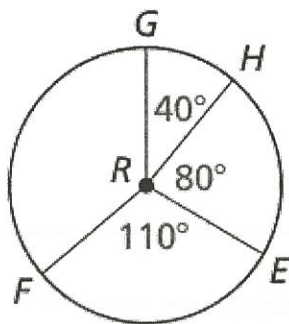
The measure of an arc formed by two adjacent arcs is the sum of the measures of the two arcs.



$$m\widehat{ABC} = m\widehat{AB} + m\widehat{BC}$$

Example:

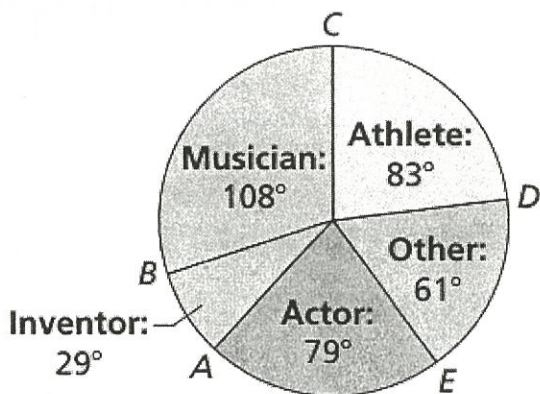
2. Find the measure of each arc.



- a. $\widehat{GE}$ 120°
 b. $\widehat{GEF}$ 230°
 c. $\widehat{GF}$ 130°

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.

Whom Would You Rather Meet?

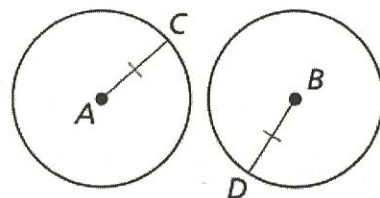


- a. $m\widehat{AC}$ 137°
 b. $m\widehat{ACD}$ 220°
 c. $m\widehat{ADC}$ 223°
 d. $m\widehat{EBD}$ 299°

Identifying Congruent Arcs: Congruent Circles Theorem

Two circles are congruent circles if and only if they have the same radius.

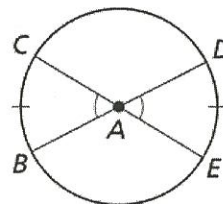
$$OA \cong OB \text{ if \& only if } \overline{AC} \cong \overline{BD}$$



→ Also, all circles are similar!

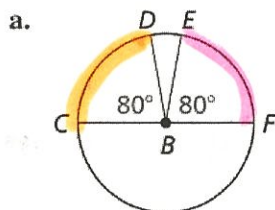
Identifying Congruent Arcs: Congruent Central Angles Theorem

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

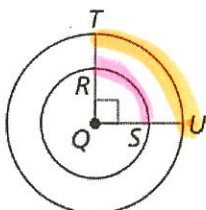


Example:

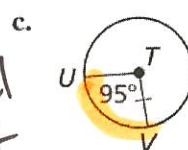
4. Tell whether the bold arcs are congruent. Explain why or why not.



Yes!
 $\angle$ in same $\odot$



No!
 same $\angle$ but
 OS not $\cong$



Yes!
 $\cong OS$
 $\angle$ central