

10.3 Arcs of a Circle

Defn: arc - 2 points on a circle and all the points in between them.

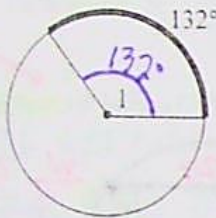
Defn: minor arc - an arc whose measure is between 0° and 180° .
 [note: a minor arc is named with 2 letters - its endpoints]

Defn: major arc - an arc whose measure is between 180° and 360° .
 [note: a major arc is named with 3 letters - its 2 endpoints and any point in between]

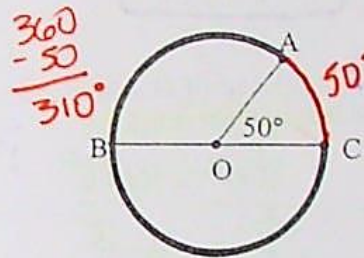
Defn: semi-circle - an arc whose measure is exactly 180° .
 [note: semi-circles should be named with 3 letters like a major arc]

Defn: central angle - an angle whose vertex lies in the center of a circle. Its sides are radii.
 [note: the measure of a central angle is equal to the measure of the arc it intercepts]

1. What is the measure of $\angle 1$?

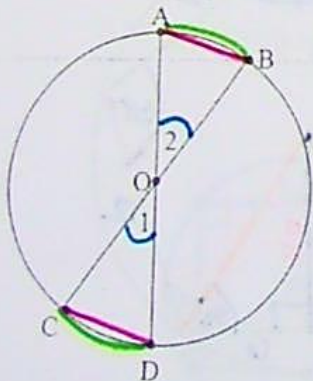


2. What is $m\widehat{ABC}$?



6 Theorems Summarized

congruent central angles \Leftrightarrow congruent intercepted arcs \Leftrightarrow congruent corresponding chords



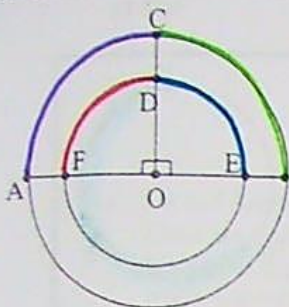
3. If $\angle 1 \cong \angle 2$, then $\overline{AB} \cong \overline{CD}$ and $\widehat{AB} \cong \widehat{CD}$.

4. If $\overline{AB} \cong \overline{CD}$, then $\widehat{AB} \cong \widehat{CD}$ and $\angle 1 \cong \angle 2$.

5. If $\widehat{AB} \cong \widehat{CD}$, then $\overline{AB} \cong \overline{CD}$ and $\angle 1 \cong \angle 2$.

Defn: congruent arcs - 2 arcs are congruent only if they have the same measure AND the radii of the circles from which they come are congruent.

6. Determine whether each statement is true or false.



a. $m\widehat{DE} = 90^\circ$ True

b. $m\widehat{AC} = 90^\circ$ True

c. $\widehat{DF} \cong \widehat{DE}$ True

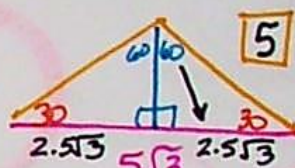
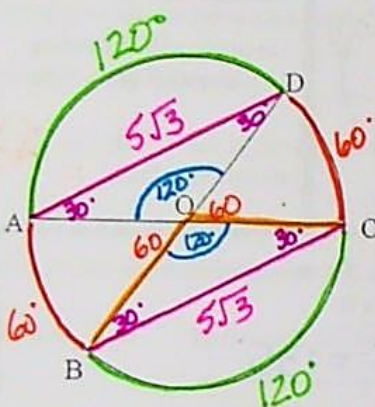
d. $\widehat{DE} \cong \widehat{AC}$ FALSE

e. $\widehat{AC} \cong \widehat{CB}$ True

Not true!

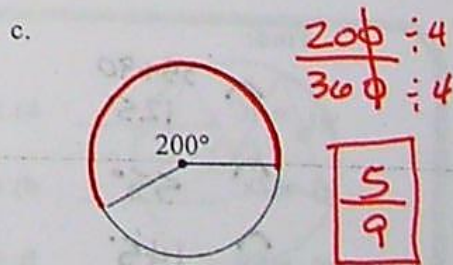
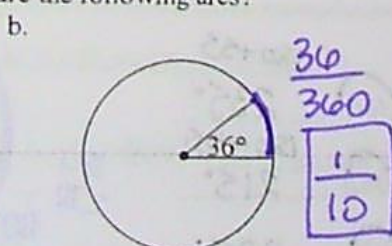
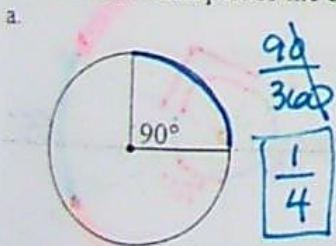
7. Given: $\odot O$
 $m\widehat{AD} = 120$
 $AD = 5\sqrt{3}$

- a. $m\angle AOD = 120^\circ$
- b. $m\widehat{BC} = 120^\circ$
- c. $m\angle DOC = 60^\circ$
- d. $BC = 5\sqrt{3}$
- e. $m\angle OAD = 30^\circ$
- f. $m\angle OCB = 30^\circ$
- g. radius = $5u$



30	60	90
x	$x\sqrt{3}$	2x
2.5	$2.5\sqrt{3}$	5

8. What fractional part of the circle are the following arcs?



9. Find the measure of an arc that is $\frac{7}{12}$ of its circle... that is $\frac{2}{3}$ of its circle.

in degrees!

$\frac{7}{12} \left(\frac{30}{360} \right)$
 210°

$\frac{2}{3} \left(\frac{120}{360} \right)$
 240°

Geometry: 10.3 - Arcs of a Circle

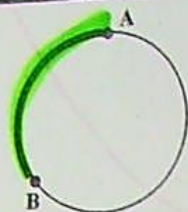
Definitions:

Minor Arc -

less than half of a circle

Name the minor arc shown:

AB BA



Major Arc -

more than half of a circle

Name the major arc shown:

ACB BCA

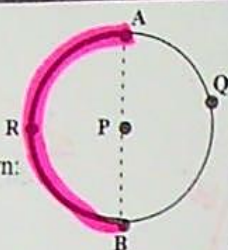


Semicircle -

exactly half of a circle

Name each semicircle shown:

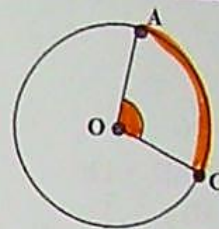
ARB BRA



Central Angle -

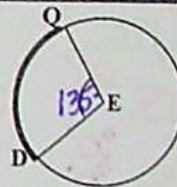
an angle with its vertex at the center of a circle

example: $\angle AOC = \widehat{AC}$



Theorem - The measure of an arc is equal to the measure of the central angle that intercepts it.

Example: If $\angle QED = 135^\circ$, then $\widehat{QD} = 135^\circ$



1. **Given:** $\odot P$, $\overline{BP} \perp \overline{CP}$, $\angle BPA = 35^\circ$, and $\angle DPE = 70^\circ$.

Find:

- a) $m\widehat{AC} = \frac{35 + 90}{125^\circ}$
- b) $m\widehat{ADC} = \frac{180 + 55}{235^\circ}$
- c) $m\widehat{DC} = 55^\circ$
- d) $m\widehat{DEB} = \frac{180 + 35}{215^\circ}$
- e) $m\widehat{EB} = \frac{145}{110 + 35}$
- f) $m\widehat{CAE} = \frac{235}{360 - (55 + 70)}$
 $\frac{235}{360 - 125}$

2. Find the measure of an arc that is exactly $\frac{1}{12}$ of a circle.

(repeat)

