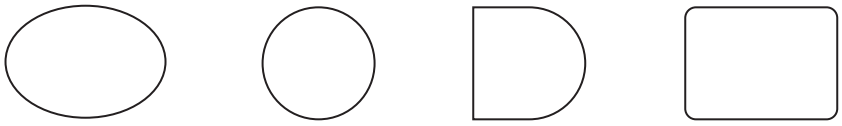
10-6 Circles and Arcs

Vocabulary

Review

1. Is a *circle* a two-dimensional figure? Yes / No
2. Is a *circle* a polygon? Yes / No
3. Is every point on a circle the same distance from the center? Yes / No
4. Circle the figure that is a *circle.*



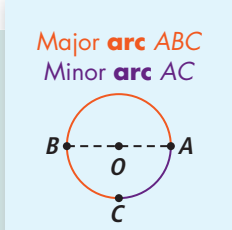
Vocabulary Builder

arc (noun) **ahrk**

Definition: An **arc** is part of a circle.

Related Words: minor arc, major arc, semicircle

Example: Semicircle *AB* is an **arc** of the circle.

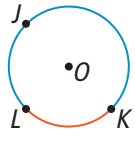


Use Your Vocabulary

Underline the correct word to complete each sentence.

5. A *minor arc* is larger / smaller than a semicircle.
6. A *major arc* is larger / smaller than a semicircle.
7. You use two / three points to name a *major arc.*
8. You use two / three points to name a *minor arc.*
9. Circle the name of the red *arc.*

$\overset{\frown}{JK}$ $\overset{\frown}{KL}$ $\overset{\frown}{LJK}$ $\overset{\frown}{LKJ}$

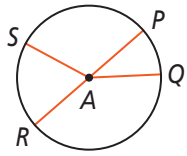


10. Circle the name of the blue *arc.*

$\overset{\frown}{JK}$ $\overset{\frown}{KL}$ $\overset{\frown}{LJK}$ $\overset{\frown}{LKJ}$

Problem 1 Naming Arcs

Got It? What are the minor arcs of $\odot A$?



Draw a line from each central angle in Column A to its corresponding minor arc in Column B.

Column A	Column B
11. $\angle PAQ$	$\overset{\frown}{RS}$
12. $\angle QAR$	$\overset{\frown}{SP}$
13. $\angle RAS$	$\overset{\frown}{PQ}$
14. $\angle SAP$	$\overset{\frown}{QR}$
15. $\angle SAQ$	$\overset{\frown}{SQ}$

16. The minor arcs of $\odot A$ are _____, _____, _____, _____, and _____.

take note

Key Concepts Arc Measure and Postulate 10-2

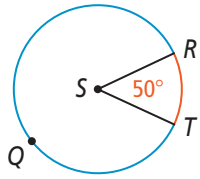
Arc Measure

The measure of a minor arc is equal to the measure of its corresponding central angle.

The measure of a major arc is the measure of the related minor arc subtracted from 360.

The measure of a semicircle is 180.

Use $\odot S$ at the right for Exercises 17 and 18.



17. $m\overset{\frown}{RT} = m\angle RST =$ _____

18. $m\overset{\frown}{TQR} = 360 - m\overset{\frown}{RT} = 360 -$ _____ $=$ _____

Postulate 10-2 Arc Addition Postulate

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

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

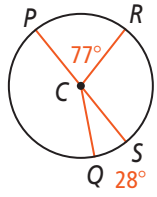
Use the circle at the right for Exercises 19 and 20.

19. If $m\overset{\frown}{AB} = 40$ and $m\overset{\frown}{BC} = 100$, then $m\overset{\frown}{ABC} =$ _____.

20. If $m\overset{\frown}{AB} = x$ and $m\overset{\frown}{BC} = y$, then $m\overset{\frown}{ABC} =$ _____.

Problem 2 Finding the Measures of Arcs

Got It? What are the measures of $\overset{\frown}{PR}$, $\overset{\frown}{RS}$, $\overset{\frown}{PRQ}$, and $\overset{\frown}{PQR}$ in $\odot C$?



Complete.

21. $m\angle PCR =$ _____, so $m\overset{\frown}{PR} =$ _____.

22. $m\angle RCS = m\angle PCS - m\angle PCR$

$= 180 -$ ____ $=$ ____

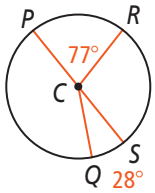
23. $m\angle RCS =$ ____, so $m\overset{\frown}{RS} =$ ____.

24. $m\overset{\frown}{PRQ} = m\overset{\frown}{PR} + m\overset{\frown}{RS} + m\overset{\frown}{SQ}$

$=$ ____ $+$ ____ $+$ ____ $=$ ____

25. $m\overset{\frown}{PQR} = 360 - m\overset{\frown}{PR}$

$= 360 -$ ____ $=$ ____

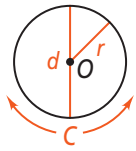


take note

Theorem 10-9 Circumference of a Circle

The circumference of a circle is π times the diameter.

$C = \pi d$ or $C = 2\pi r$



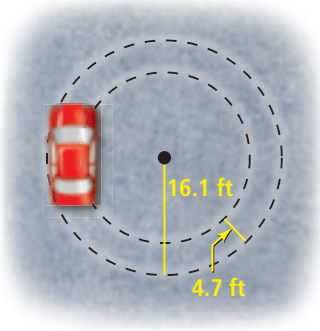
26. Explain why you can use either $C = \pi d$ or $C = 2\pi r$ to find the circumference of a circle.

_____

_____

Problem 3 Finding a Distance

Got It? **A car has a circular turning radius of 16.1 ft. The distance between the two front tires is 4.7 ft. How much farther does a tire on the outside of the turn travel than a tire on the inside?**



27. The two circles have the same center. To find the radius of the inner circle, do you *add* or *subtract*?

_____

Complete.

28. radius of outer circle $=$ ____

radius of inner circle $=$ ____ $- 4.7 =$ ____

29. circumference of outer circle $= 2\pi r = 2\pi \cdot$ ____ $=$ ____ $\cdot \pi$

circumference of inner circle $= 2\pi r = 2\pi \cdot$ ____ $=$ ____ $\cdot \pi$

30. Find the differences in the two distances traveled. Use a calculator.

____ $\cdot \pi -$ ____ $\cdot \pi =$ ____ $\cdot \pi$

$\approx$ ____

31. A tire on the outer circle travels about ____ ft farther.

take note

Theorem 10-10 Arc Length

The length of an arc of a circle is the product of the ratio $\frac{\text{measure of the arc}}{360}$ and the circumference of the circle.

32. Complete the formula below.

length of _____ $= \frac{m\overset{\frown}{AB}}{360} \cdot 2\pi r = \frac{m\overset{\frown}{AB}}{360} \cdot \pi d$

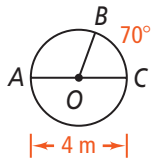
Write T for *true* or F for *false*.

____ **33.** The length of an arc is a fraction of the circumference of a circle.

____ **34.** In $\odot O$, $m\overset{\frown}{AB} = m\angle AOB$.

Lesson Check • Do you UNDERSTAND?

Error Analysis **Your class must find the length of $\overset{\frown}{AB}$. A classmate submits the following solution. What is the error?**



Length of $\overset{\frown}{AB} = \frac{m\overset{\frown}{AB}}{360} \cdot 2\pi r$

$= \frac{110}{360} \cdot 2\pi(4)$

$= \frac{22}{9}\pi$ m

35. Is $\overset{\frown}{AC}$ a semicircle? Yes / No

36. Does $m\overset{\frown}{AB} = 180 - 70 = 110$? Yes / No

37. Is the length of the radius 4? Yes / No

38. What is the error?

_____

Math Success

Check off the vocabulary words that you understand.

☐ circle ☐ minor arc ☐ major arc ☐ circumference

Rate how well you can *use central angles, arcs, and circumference.*

Need to review 0 2 4 6 8 10 Now I get it!