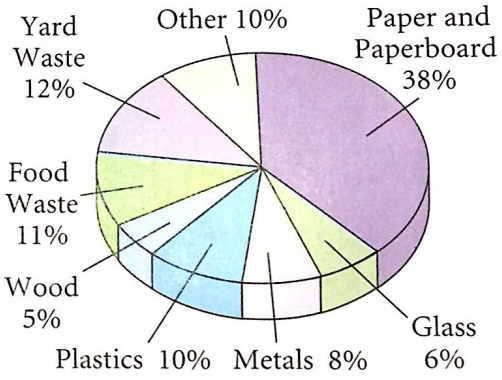
Practice and Problem Solving

A Practice by Example
Example 1
(page 386)

Trash **The graph shows types of trash in a typical American city. Find the measure of each central angle to the nearest whole number.**

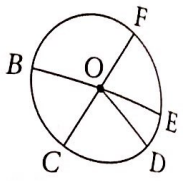
1. Glass
2. Metals
3. Plastics
4. Wood
5. Food Waste
6. Yard Waste
7. Other
8. Paper and Paperboard



SOURCE: Environmental Protection Agency, 2001.
Go to **www.PHSchool.com** for a data update.
Web Code: afg-2041

Example 2 (page 387)

Identify the following in $\odot O$.



9. a minor arc

10. a major arc

11. a semicircle

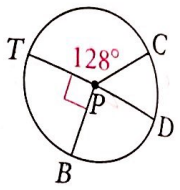
12. a pair of adjacent arcs

13. an acute central angle

14. a pair of congruent angles

Example 3 (page 388)

Find the measure of each arc in $\odot P$.



15. $\overset{\frown}{TC}$ **16.** $\overset{\frown}{TBD}$ **17.** $\overset{\frown}{BTC}$ **18.** $\overset{\frown}{TCB}$

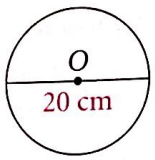
19. $\overset{\frown}{CD}$ **20.** $\overset{\frown}{CBD}$ **21.** $\overset{\frown}{TCD}$ **22.** $\overset{\frown}{DB}$

23. $\overset{\frown}{TDC}$ **24.** $\overset{\frown}{TB}$ **25.** $\overset{\frown}{BC}$ **26.** $\overset{\frown}{BCD}$

Example 4 (page 388)

Find the circumference of each circle. Leave your answer in terms of π.

27.



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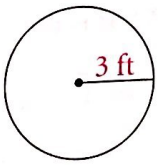

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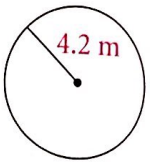

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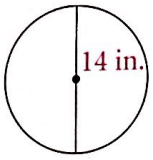
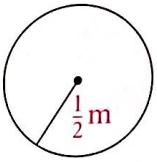


31.



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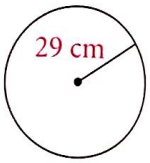
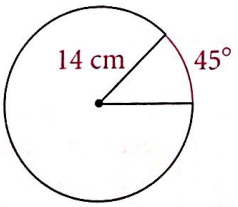


33. The wheel of an adult's bicycle has diameter 26 in. The wheel of a child's bicycle has diameter 18 in. To the nearest inch, how much farther does the larger bicycle wheel travel in one revolution than the smaller bicycle wheel?

Example 5 (page 389)

Find the length of each arc shown in red. Leave your answer in terms of π.

34.



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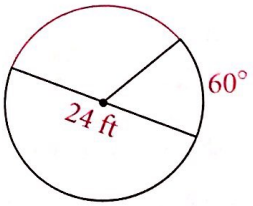

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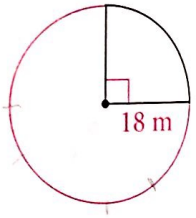

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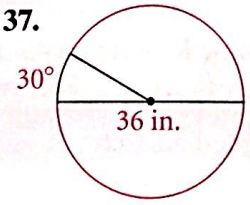

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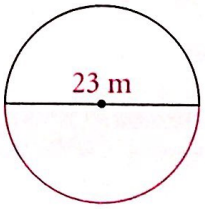
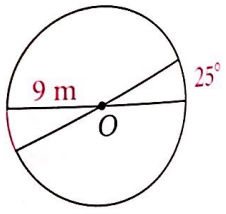


39.



B Apply Your Skills

40. Use a compass to draw $\odot A$ and $\odot B$ with different radii. Then use a protractor to draw $\overset{\frown}{XY}$ on $\odot A$ and $\overset{\frown}{ZW}$ on $\odot B$ so that $m\overset{\frown}{XY} = m\overset{\frown}{ZW}$. Is $\overset{\frown}{XY} \cong \overset{\frown}{ZW}$?

41. Environment Use the data in the table to construct a circle graph.

World Carbon Dioxide Emissions from Burning Fossil Fuels 2005 Projections

United States	24%
Eastern Europe and the former Soviet Union	13%
China	13%
Other Industrialized Countries	25%
Other Developing Countries	26%

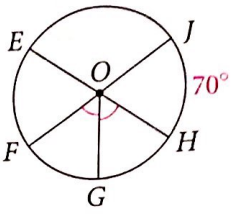
SOURCE: Energy Information Admin., 2001.

Go to **www.PHSchool.com** for a data update.
Web Code: afg-2041

Real-World Connection

In 5 minutes, the tip of the minute hand of Boston's Custom House Tower travels 6 ft 10 in.

Find each indicated measure for $\odot O$.



42. $m\angle EOF$ **43.** $m\widehat{EJH}$ **44.** $m\widehat{FH}$

45. $m\angle FOG$ **46.** $m\widehat{JEG}$ **47.** $m\widehat{HFJ}$

48. Open-Ended Make a circle graph showing how you spend a 24-hour weekday.

Time Hands of a clock suggest an angle whose measure is continually changing.

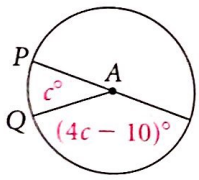
49. Through how many degrees does a minute hand move in each time interval?
a. 1 minute **b.** 5 minutes **c.** 20 minutes

50. Through how many degrees does an hour hand move in each time interval?
a. 1 minute **b.** 5 minutes **c.** 20 minutes

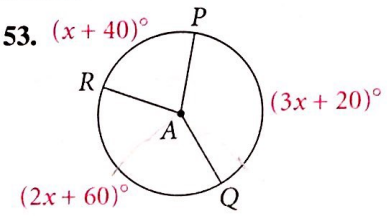
51. What is the measure of the angle formed by the hands of a clock at 7:20?

Algebra Find the value of each variable.

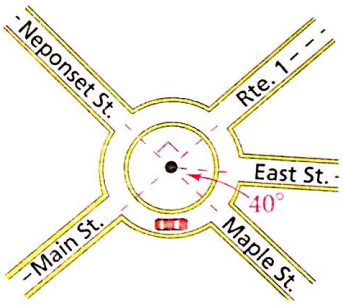
52.



53.



54. Traffic Five streets come together at a traffic circle. Vehicles travel counterclockwise around the circle. Use arc measure to give directions to someone who wants to get to East Street from Neponset Street.



The circumference of a circle is 100π in. Find each of the following.

55. the diameter **56.** the radius

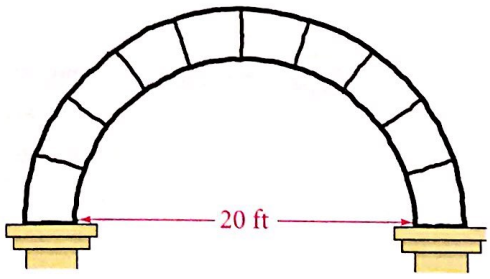
57. the length of an arc of 120°

58. A 60° arc of $\odot A$ has the same length as a 45° arc of $\odot B$. Find the ratio of the radius of $\odot A$ to the radius of $\odot B$.

Need Help?

For Exercise 58, draw $\odot A$ and $\odot B$ concentric. Draw 60° and 45° angles that share a side. To have equal arc lengths, which circle must be larger?

59. Metalworking Nina designed an arch made of wrought iron for the top of a mall entrance. The 11 segments between the two concentric semicircles are each 3 ft long. Find the total length of wrought iron used to make this structure. Round your answer to the nearest foot.



60. History In Exercise 24 on page 120, you learned that in 220 B.C., Eratosthenes estimated the circumference of Earth. He did so by finding that on a great circle of Earth, an arc of approximately 500 mi has a central angle of 7.2°.
a. Use Eratosthenes's measurements to estimate the circumference of Earth.
b. Compare your answer in part (a) to the actual circumference of Earth (at the equator) of 24,902 mi.

Need Help?

The Distance and Midpoint Formulas are on pages 43 and 45.

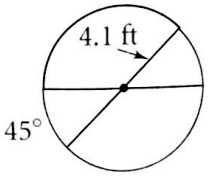
Coordinate Geometry A diameter of a circle has endpoints $A(1, 3)$ and $B(4, 7)$. Find each of the following.

61. the coordinates of the center

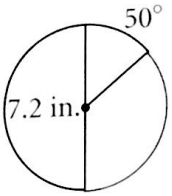
62. the circumference

Find the length of each arc shown in red. Leave your answer in terms of π.

63.



64.



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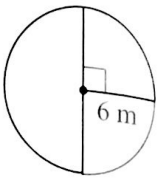
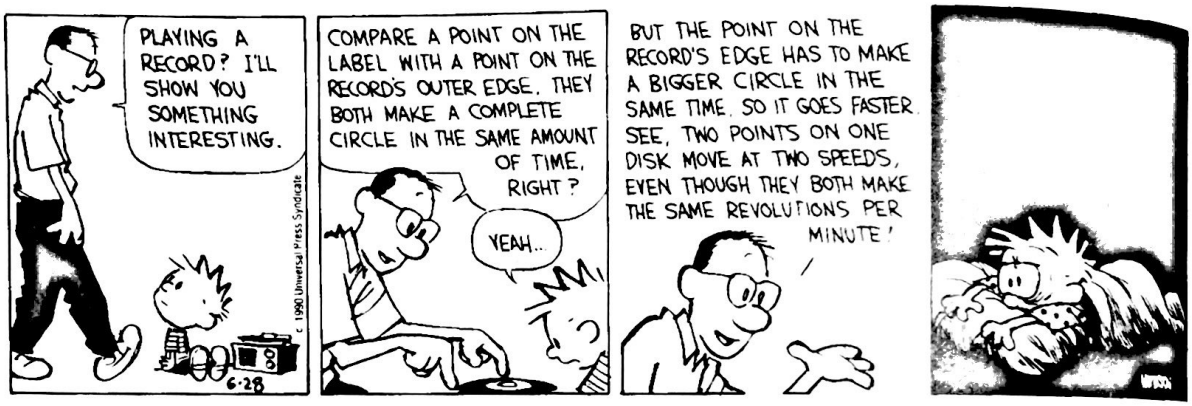


Use what you learn from Calvin's father to answer Exercises 66 and 67.

Calvin and Hobbes by Bill Watterson



66. In one revolution, how much farther does a point 10 cm from the center of the record travel than a point 3 cm from the center? Round your answer to the nearest tenth.

67. Writing Kendra and her mother plan to ride the carousel. Two horses on the carousel are side by side. For a more exciting ride, should Kendra sit on the inside or the outside? Explain your reasoning.

68. In $\odot O$, the length of $\overset{\frown}{AB}$ is 6π cm and $m\overset{\frown}{AB}$ is 120. What is the diameter of $\odot O$?

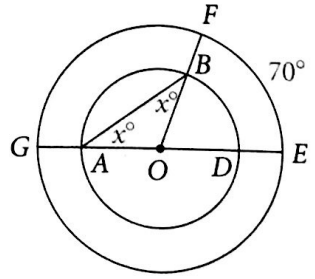
69. Coordinate Geometry Find the length of a semicircle with endpoints $(3, 7)$ and $(3, -1)$. Round your answer to the nearest tenth.

C Challenge

70. The two circles shown below are concentric.

a. Name two arcs that have the same measure.

b. Find the value of x.



71. Find the perimeter of the shaded portion of the figure below. Leave your answer in terms of π. Explain your reasoning and state what assumptions you make.