LESSON 11.4

NAME _____ DATE _____

Reteaching with Practice

For use with pages 683–689

GOAL **Find the circumference of a circle and the length of a circular arc**

VOCABULARY

The **circumference** of a circle is the distance around the circle.

An **arc length** is a portion of the circumference of a circle.

Theorem 11.6 Circumference of a Circle The circumference C of a circle is $C = \pi d$ or $C = 2\pi r$, where d is the diameter of the circle and r is the radius of the circle.

Arc Length Corollary In a circle, the ratio of the length of a given arc to the circumference is equal to the ratio of the measure of the arc to 360°.

$$\frac{\text{Arc length of } \overset{\frown}{AB}}{2\pi r} = \frac{m\overset{\frown}{AB}}{360^\circ}, \text{ or Arc length of } \overset{\frown}{AB} = \frac{m\overset{\frown}{AB}}{360^\circ} \cdot 2\pi r$$

EXAMPLE 1 Using Circumferences

a. Find the circumference of a circle with radius 10.5 inches.

b. Find the radius of a circle with circumference 25 feet.

SOLUTION

a. $C = 2\pi r$

$C = 2 \cdot \pi \cdot (10.5)$

$C = 21\pi$

$C \approx 65.97$ inches

b. $C = 2\pi r$

$25 = 2\pi r$

$\frac{25}{2\pi} = r$

$r \approx 3.98$ feet

Exercises for Example 1

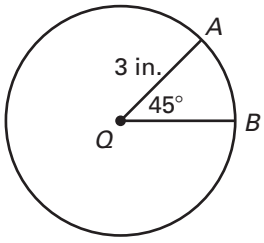
In Exercises 1–4, find the indicated measure.

1. Find the circumference of a circle with radius 17 centimeters.
2. Find the circumference of a circle with diameter 14 inches.
3. Find the radius of a circle with circumference 14 yards.
4. Find the diameter of a circle with circumference 12 feet.

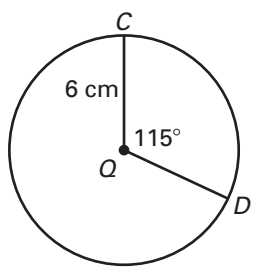
EXAMPLE 2 Finding Arc Lengths

Find the length of each arc.

a.



b.



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SOLUTION

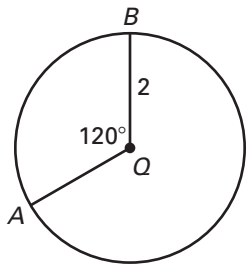
a. Arc length of $\overset{\frown}{AB} = \frac{45°}{360°} \cdot 2\pi(3) \approx 2.36$ inches

b. Arc length of $\overset{\frown}{CD} = \frac{115°}{360°} \cdot 2\pi(6) \approx 12.04$ centimeters

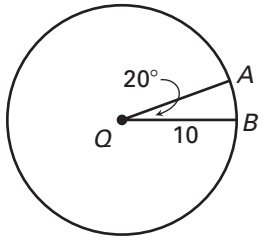
Exercises for Example 2

In Exercises 5–7, find the length of each arc.

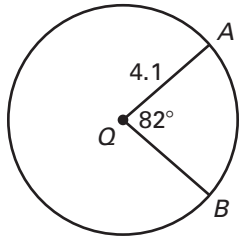
5.



6.

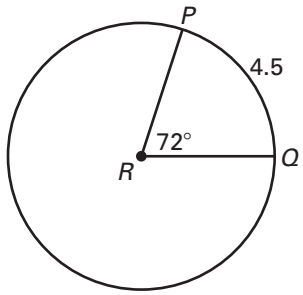


7.



EXAMPLE 3 Using Arc Lengths

Find the circumference of the circle.



SOLUTION

$$\frac{\text{Arc length of } \overset{\frown}{PQ}}{2\pi r} = \frac{m\overset{\frown}{PQ}}{360°}$$

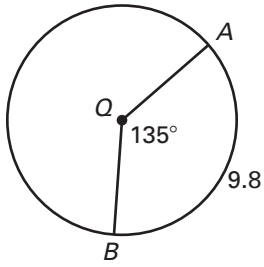
Now substitute 4.5 for the arc length of $\overset{\frown}{PQ}$, 72° for $m\overset{\frown}{PQ}$, and C for $2\pi r$.

So, $\frac{4.5}{C} = \frac{72°}{360°}$, or $\frac{4.5}{C} = 0.2$. So, $C = \frac{4.5}{0.2} = 22.5$.

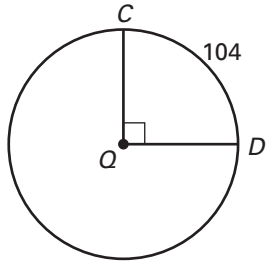
Exercises for Example 3

Find the indicated measure.

8. Circumference



9. Radius



10. $m\overset{\frown}{PQ}$