

Name

Adv Geo

10-9: Circumference and Arc Length

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**Objectives**

After studying this section, you will be able to

- Determine the circumference of a circle
- Determine the length of an arc

**Definition** The **circumference** of a circle is its perimeter.

**Postulate**  $C = \pi d$

**Theorem 98** *The length of an arc is equal to the circumference of its circle times the fractional part of the circle determined by the arc.*

$$\text{Length of } \widehat{PQ} = \left( \frac{m\widehat{PQ}}{360} \right) \pi d$$

where  $d$  is the diameter and  $\widehat{PQ}$  is measured in degrees.

**Problem 1** Find the radius of a circle whose circumference is  $50\pi$ .

**Problem 2** Find the length of each arc of a circle with a 12-cm radius.

**a** A  $30^\circ$  arc

**b** A  $105^\circ$  arc

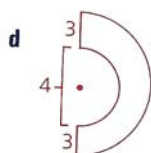
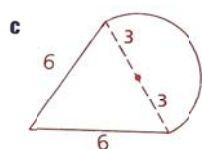
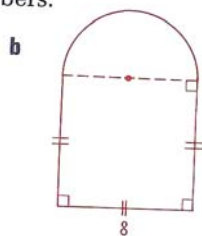
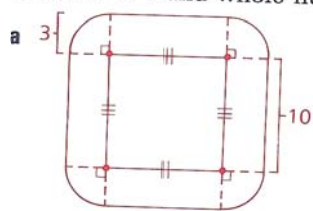
**Problem 3** The diameter of a bicycle wheel (including the tire) is 70 cm.

- a** How far will the bicycle travel if the wheel rotates 1000 times? (Approximate the answer in meters.)
- b** How many revolutions will the wheel make if the bicycle travels 15 m? (Approximate to the nearest tenth of a revolution.)

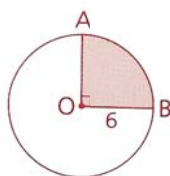
## Problem Set A

- 1 Find the circumference of the circle. Then approximate the circumference to the nearest hundredth.
- a A circle whose diameter is 21 mm
  - b A circle whose radius is 6 mm
- 2 Find, to the nearest hundredth, the radius of a circle whose circumference is
- a  $56\pi$
  - b 314
  - c  $17\pi$
  - d 88
- 3 Find the length of each arc of a circle with a radius of 10.
- a A  $72^\circ$  arc
  - b A  $90^\circ$  arc
  - c A  $60^\circ$  arc
  - d A semicircle
- 4 A bicycle has wheels 30 cm in diameter. Find, to the nearest tenth of a centimeter, the distance that the bicycle moves forward during
- a) 1 revolution
  - b) 10 revolutions
  - c) 1000 revolutions

- 5 Find the complete perimeter of each figure. Leave your answers in terms of  $\pi$  and whole numbers.



- 6 a Find the length of  $\widehat{AB}$ .  
b Find the perimeter of sector AOB. (The shaded region is a sector.)



- 7 Find, to the nearest meter, the length of fencing needed to surround the racetrack.

