Unit 3, Lesson 4

Applying Circumference

Let's use π to solve problems.

4.1 What Do We Know?

For each picture, which measurement is shown? Be prepared to explain your reasoning.

- Wagon wheel: 3 feet

- Plane propeller: 24 inches

- Sliced orange: 20 centimeters

4.2 Using π

Earlier, we looked at pictures of circular objects. One measurement for each object is listed in the table.

Your teacher will assign you an approximation of π to use for this activity.

1. Complete the table. Be prepared to explain your reasoning.

object	radius	diameter	circumference
wagon wheel		3 ft	
airplane propeller	24 in		
orange slice			20 cm

2. A bug was sitting on the tip of the propeller blade when the propeller started to rotate. The bug held on for 5 rotations before flying away. How far did the bug travel before it flew off?

4.3 Hopi Basket Weaving

Hopi (HOH-pee) weavers make baskets by weaving thin strips of yucca onto a circular willow frame.

Sifter Basket

Tray with Handles

1. To make a basket with a radius of $6\frac{1}{2}$ inches, how long does the piece of willow for the circular frame need to be?

2. If a weaver uses a piece of willow that is 33 inches long, what will the radius of the basket be?

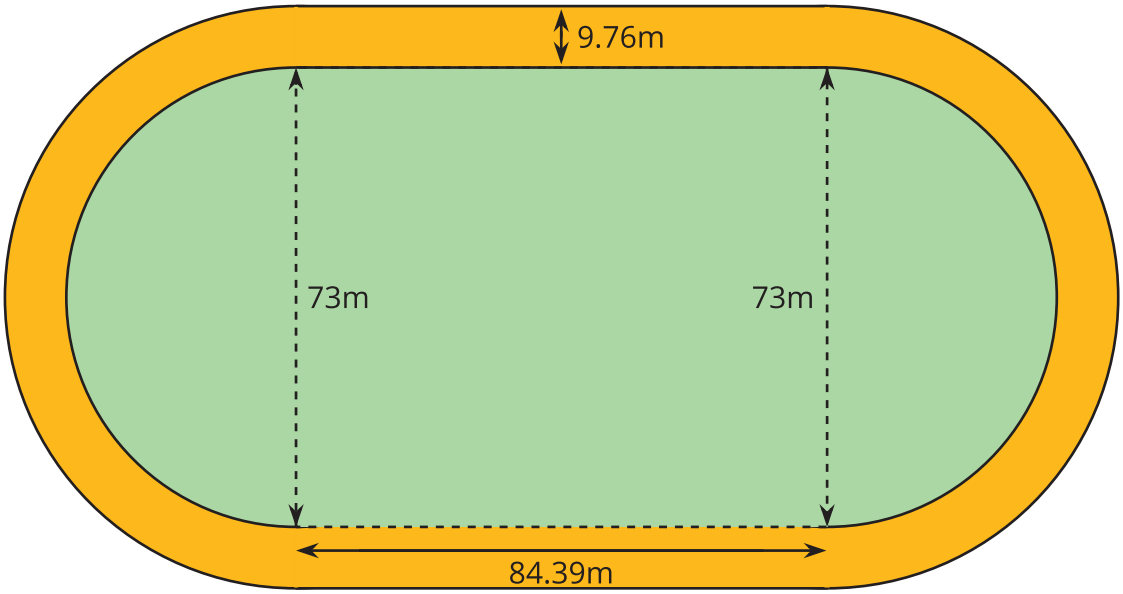
Are you ready for more?

Hopi weavers also make coil plaques that have thin strips of yucca wrapped around a spiraling core.

Describe a method you could use to approximate the length of the spiral core for a plaque made of 19 coils that are 1 cm thick.

4.4 Around the Running Track

The field inside a running track is made up of a rectangle that is 84.39 m long and 73 m wide, together with a half-circle at each end.



1. What is the distance around the inside of the track? Explain or show your reasoning.

2. The track is 9.76 m wide all the way around. What is the distance around the outside of the track? Explain or show your reasoning.

Are you ready for more?

This size running track is usually called a 400-meter track. However, if a person ran as close to the "inside" as possible on the track, they would run less than 400 meters in one lap. How far away from the inside border would someone have to run to make one lap equal exactly 400 meters?

Lesson 4 Summary

The circumference of a circle, C, is π times the diameter, d. The diameter is twice the radius, r. So if we know any one of these measurements for a particular circle, we can find the others. We can write the relationships between these different measures using equations:

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

If the diameter of a car tire is 60 cm, that means the radius is 30 cm, and the circumference is $60 \cdot \pi$, or about 188 cm.

If the radius of a clock is 5 in, that means the diameter is 10 in, and the circumference is $10 \cdot \pi$, or about 31 in.

If a ring has a circumference of 44 mm, that means the diameter is $44 \div \pi$, which is about 14 mm, and the radius is about 7 mm.