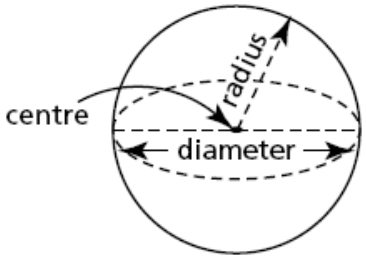
Sec 1.6 Surface Area and Volume of a Sphere

A **sphere** is a set of points in space that are the same distance from a fixed point, which is the center.

A line segment that joins the center to any point on the sphere is a **radius**.

A line segment that joins two points on a sphere and passes through the center in a **diameter**.

Sphere



Ex: A basketball

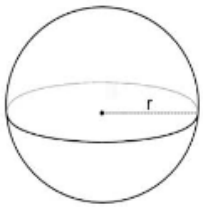
Surface Area of a Sphere

Video on the developing the formula for surface area of a sphere

https://www.youtube.com/watch?v=cAxHYFRx1Fs

$$SA = 4\pi r^2$$

where r is the radius



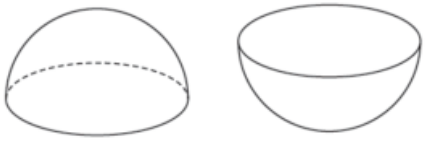
Example 1

An official basketball has a radius of 12.5 cm and usually has a leather covering. Approximately how much leather, in cm^2, is required to cover 12 official basketballs?

Example 2

The surface area of a softball is approximately 113.04 in^2.
Determine the diameter of the softball.

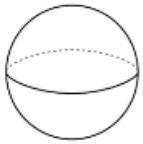
Note: When a sphere is cut in half, two hemispheres are formed.



Think About this ....

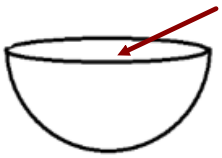
What is the formula for the surface area of a hemisphere?

Surface Area
of a Sphere



$$SA = 4\pi r^2$$

Surface Area
of a Hemisphere



This circle must be included in the surface area of the hemisphere

Note:
The surface area of a hemisphere is more than just half of a sphere's surface area. When the sphere is cut in half, an extra circle is created on the surface of the hemisphere!

**Surface Area
of a Hemisphere**

← This formula will not be given on a test or exam.

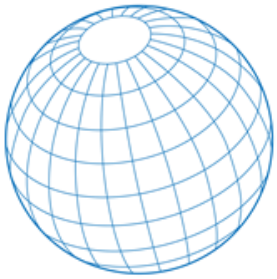
Example 3

A hemisphere has a radius of 8 cm. What is the surface area of the hemisphere to the nearest tenth of a square centimeter?

Volume of a Sphere

Video for developing the formula for the volume of a sphere

https://www.youtube.com/watch?v=xuPl_8o_j7k



$$V = \frac{4}{3}\pi r^3 \quad \text{or} \quad V = \frac{4\pi r^3}{3}$$

Example 4

A fitness ball when inflated with air has a circumference of 198 cm. Determine the volume of the fitness ball to the nearest tenth of a cm^3.

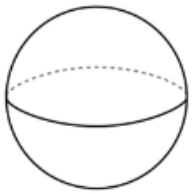
Example 5

A fitness ball deflates so that it is 80% of its original volume. If the original volume of the fitness ball was 113 040 cm^3 then determine the radius (to the nearest tenth of a cm) of the deflated ball.

Think About This....

How can we determine the volume of a hemisphere?

Volume of a Sphere



$$V = \frac{4\pi r^3}{3}$$

Volume of a Hemisphere

A hemisphere has half the volume of a sphere.

This formula will not be given on a test or exam.

Example 6

A hemisphere has a radius of 5 cm. What is the volume of the hemisphere to the nearest cubic centimeter?

Work Book Questions	Extra Practice Questions
p.51 #3ac, 4ac, 5a, 8, 9, 11a	p.51 #4bd, 5b, 7, 11b