CHAPTER 8: Measurement Relationships
8.7 Volume of a Sphere
Volume of a Sphere

The formula for the volume of a sphere with radius r is $V = \frac{4}{3}\pi r^3$.

You can calculate the empty space in a container by subtracting the volume of the object from the volume of the container in which it is packaged.

Example:

a) A tennis ball has a radius of 3.2 cm. Find the volume of the ball.

b) A dozen tennis balls were placed in a box such that they just fit, forming a single layer 3 balls by 4 balls.. How much empty space was left in the box?

Solution:

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

$= \frac{4}{3} \times \pi \times 3.2^3$

$= 137.3 \text{ cm}^3$

The volume of a tennis ball is 137.3 cm^3.

b) The diameter of a tennis ball is $2 \times 3.2 = 6.4$ cm.
The length of the box is $4 \times 6.4 = 25.6$ cm.
The width of the box is $3 \times 6.4 = 19.2$ cm.
The height of the box is 6.4 cm.

$V = lwh$

$= 25.6 \times 19.2 \times 6.4$

$= 3145.7 \text{ cm}^3$

The volume of the box is 3145.7 cm^3.

The volume of the dozen tennis balls is $12 \times 137.3 = 1647.6 \text{ cm}^3$.

The volume of empty space left in the box is $3145.7 - 1647.6 = 1498.1 \text{ cm}^3$.

Practice:

1. a) A basketball has a diameter of 0.24 m. Find the volume of the basketball.

b) A classroom measures 12 m by 9.6 m by 4.8 m. How many basketballs could it hold, using a rectangular pattern?

c) If the room were filled with basketballs, how much empty space would remain in the classroom?

Answers:

1. a) 0.0072 m^3 b) 40 000 basketballs c) 263.4 m^3