



higher education
& training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA



SUBJECT: FOUNDATIONAL MATHEMATICS

MODULE NAME: 3

UNIT NUMBER : 4

UNIT NAME : VOLUMES OF THREE DIMENSIONAL FIGURES

CALCULATE THE AREA OF TWO-DIMENSIONAL SHAPES

When you have completed this unit you will be able to:

1. Calculate the volume of a:
 - a. Cube
 - b. Rectangular prism
 - c. Cylinder

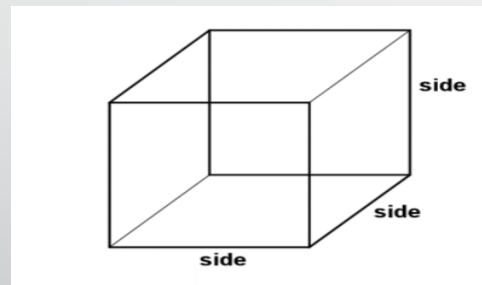
VOLUME

- Finding the volume of an object can help us to determine the amount required to fill that object, like the amount of water needed to fill a bottle, an aquarium or a water tank
- The volume of a object is measure in cubic units such as cubic centimetres , cubic inch , cubic foot , cubic meter etc.
- Example, the volume of the cuboid or rectangular prism, with unit cubes has been determined in cubic unit

Cubes

We now move onto the geometry of three-dimensional space, the kind of space we live in.

It is called **three-dimensional**, because there are three dimensions, (measurements) **breadth, length and height** that we must include in our sums.



Volume of the cube

- The formula to calculate the volume of a cube is $Volume = side \times side \times side$ which is the same as $V = S^3$
- **Example:**
- Calculate the volume of the cube shown below:
- **Answer:**

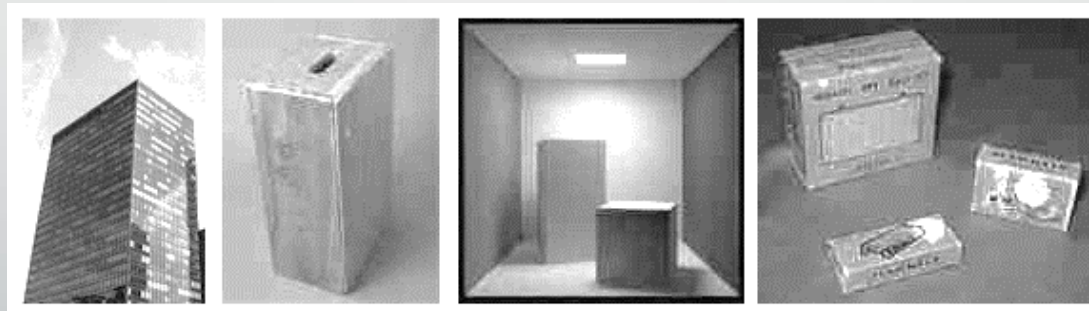
$$V = s^3$$

$$= 4^3$$

$$= 64 \text{ m}^3$$

The Rectangular Prism

Rectangular prisms are very common in our world, from boxes to buildings we see them everywhere. We can even fit them inside other rectangular prisms!



The Volume of a Prism

The Volume of a Prism

The volume of a rectangular prism is found using the formula:

$$\text{Volume} = \textit{length} \times \textit{breadth} \times \textit{height}$$

Which can be shortened to: $V = l \times b \times h$

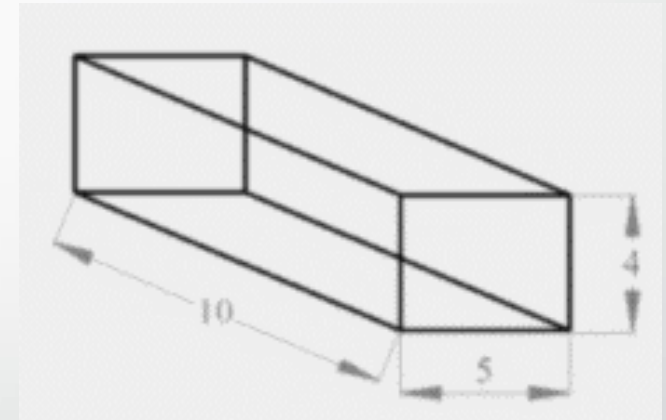
The Rectangular Prism

Example

Find the volume of this rectangular prism.

All measurements are in cm.

$$\begin{aligned} V &= l \times b \times h \\ &= 10 \times 5 \times 4 \\ &= 200 \text{ cm}^3 \end{aligned}$$



The Cylinder

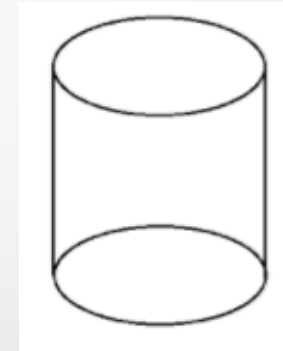
The cylinder has the following characteristics:

It has a flat base and a flat top

The base is the same as the top, both are circles.

From base to top the shape stays the same

It has one curved side. That would resemble a rectangle if you lay it down flat.



The Cylinder

Some every-day examples are tin cans, batteries and certain types of containers.



Volume of a Cylinder

- **Volume of a Cylinder**
- To calculate the volume we multiply the area of the base by the height of the cylinder:
- \square Area of the base(circle): $A = \pi \times r^2$ ($r = \text{radius}$) $\times h$ or

$$A = \pi \times \frac{d^2}{4} \quad (D = \text{diameter}) \times h$$

Height: h

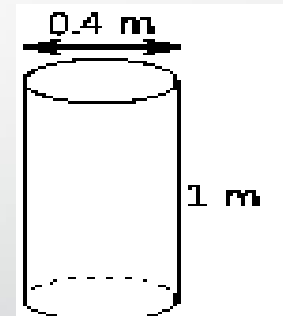
And we get:

$$V = \pi \times r^2 \times h \text{ or } V = \pi \times \frac{d^2}{4} \times h$$

Example 1:

Calculate the volume of the cylinder shown above.

$$\begin{aligned}\text{Answer: } V &= \pi \times \frac{d^2}{4} \times h \\ &= \pi \times \frac{0.4^2}{4} \times 1 \\ &= 0,126 \text{ m}^3\end{aligned}$$



Example 2:

Example 2:

A cylinder has a radius of $2,3 \text{ m}$ and a height of $6,4 \text{ m}$.

Calculate the volume of the cylinder.

Answer:

$$\begin{aligned} V &= \pi \times r^2 \times h \\ &= \pi \times (2,3)^2 \times 6,4 \\ &= 106,362 \text{ m}^2 \end{aligned}$$

Go to Exercise 4.1 to 4.3 in your workbook and do as classwork or homework.