

C4 *Volumes*

Introduction

Learning objectives

This unit, the final one in Strand C, deals with the important topic of *volume*. After completing Unit C4 you should be able to

- use the volume formulae for cubes, cuboids, cylinders and prisms
- calculate the density of an object, given its mass and volume
- use the volume formulae for pyramids, cones and spheres
- apply the volume formulae for cubes, cuboids, cylinders, prisms, pyramids, cones and spheres to solve real life problems
- * • apply dimensional analysis to develop formulae.

Introduction

The historical introduction for this unit has been combined with that for Unit C3, where an historical account of the concepts developed in Geometry is given.

Key points and principles

- There are formulae for volumes of many solids such as cubes, cuboids, cylinders and spheres.
- Dimensional analysis can be used to derive formulae, consistent with the dimensions.

Glossary of terms

- Volume of 3D solids
- Density $\left(= \frac{\text{Mass}}{\text{Volume}} \right)$

Dimensions, L (length), M (mass) and T (time).

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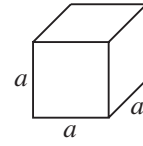
Introduction

Facts to remember

Volume :

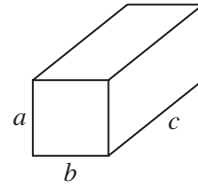
Cube

$$V = a^3$$



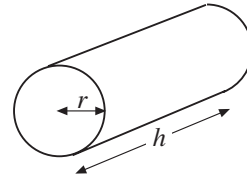
Cuboid

$$V = abc$$



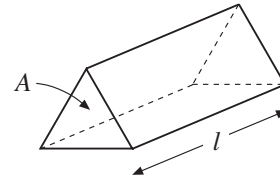
Cylinder

$$V = \pi^2 h$$



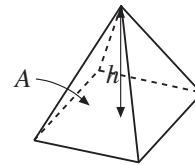
Prism

$$V = Al$$



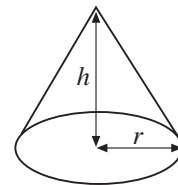
Pyramid

$$V = \frac{1}{3} Ah$$



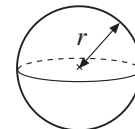
Cone

$$V = \frac{1}{3} \pi r^2 h$$



Sphere

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



where a , b and c represent side lengths; A , area; h , height; r , radius and V , volume.