Surface Area and Volume of 3-D Solids

Introduction

1. Anything which occupies space and has a definite shape is called a solid.
2. Surface area of a solid is the sum of the areas of all its faces.
3. The space occupied by a solid object is the volume of that object.

Cuboid

A rectangular solid which has six faces, each of which is a rectangle, is called a cuboid.

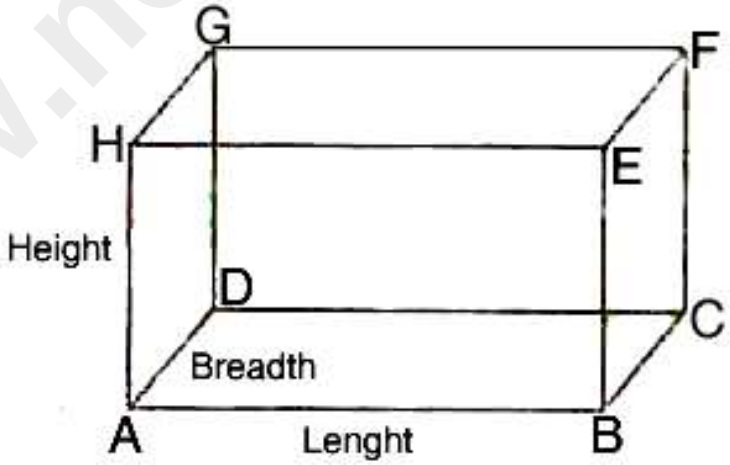
If l, b, h denote respectively the length, breadth and height of a cuboid, then

Lateral surface area or Area of four walls = 2(l + b) × h

Total surface area = 2(lb + bh + hl)

Volume = l × b × h

Length of diagonal $= \sqrt{l^2 + b^2 + h^2}$



Cube

A rectangular solid in which each face is a square, is called a cube

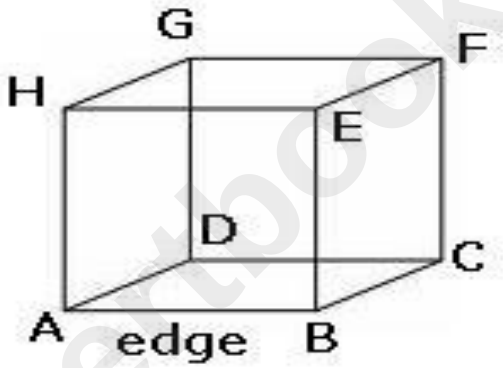
If the length of each edge of a cube is 'a' units, then

Lateral surface area = $4a^2$

Total surface area = $6a^2$

Volume = $(a)^3$

Diagonal of a cube = $a\sqrt{3}$



Cross-Section

If a cut is made through a solid perpendicular to its length (or height), then the surface so obtained is called its cross-section.

If the surface made by the cut has the same shape and size at every point of length (or height), it is called a uniform cross-section.

Volume = Area of cross-section × Length (or Height)

Lateral Surface Area = Perimeter of cross-section × Length (or Height)

Total Surface Area = Area of Lateral Surface + Area of two cross-sections