

SS1 THIRD TERM (MATHS)

Chapter 1.

SOLID MENSURATION

Solid Shapes are shapes that have three dimensions (that is; x , y , and z plane which represents Length, Height and Breadth respectively) while **Plane Shapes** are shapes that have two dimensions (that is; x and y plane which represents the Length and Breadth respectively)

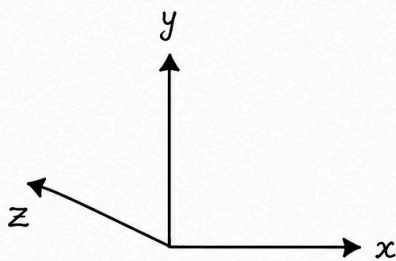


fig I. Solid shape

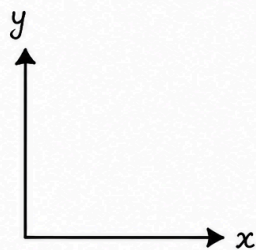
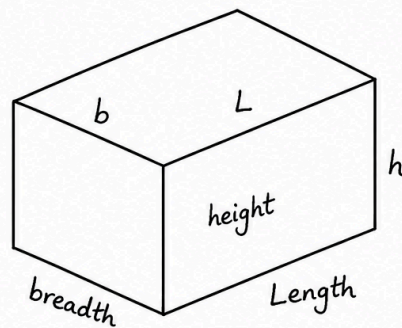
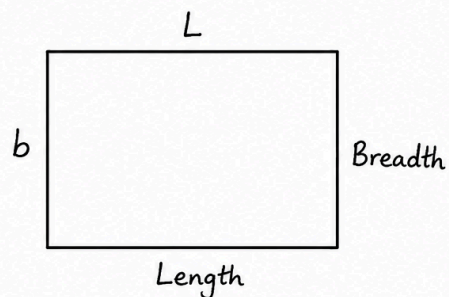


fig II. plane shape



Examples of Solid Shapes include Cube, Cuboid, Cylinder, Sphere, Hemisphere, Cone, Pyramid, Prism, Frustrum of a pyramid etc.

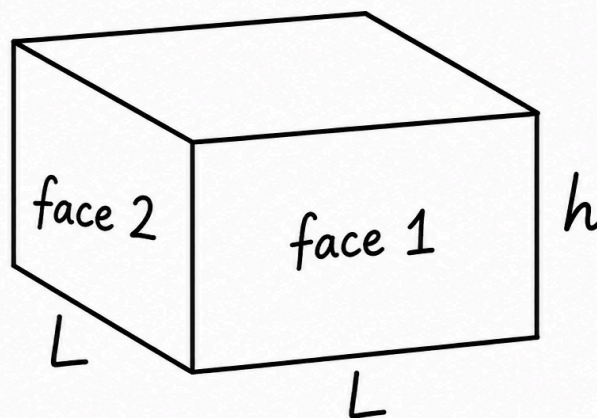
Examples of Plane Shapes include; Square, Rectangle, Circle, Triangle, Trapezium, Kite, Rhombus, Parallelogram etc

For this chapter, we would focus on Solid Mensuration. For solid mensuration we would discuss:

- i. The Volume of the Solid Shape
- ii. The Total Surface Area of the Solid Shape
- iii. The Curved Surface Area if the solid shape has a Circular Cross-Section as is the case for Sphere, Hemisphere, Cylinder, Cone and Frustrum of a Cone

CUBE

A Cube is a Solid Shape made from a Square by pulling the square along the **z-axis**. In a Cube, all the sides are equal.



NOTE

- i. To Find the Volume of any Solid Shape, just Multiply Area of Face 1 by the Length of Face 2.
- ii. To Find the Surface Area, Just Add all the Areas of each of the Faces Together.

- Volume of Cube = Area of Face1 \times Length of Face2

$$\text{Volume} = A \times L$$

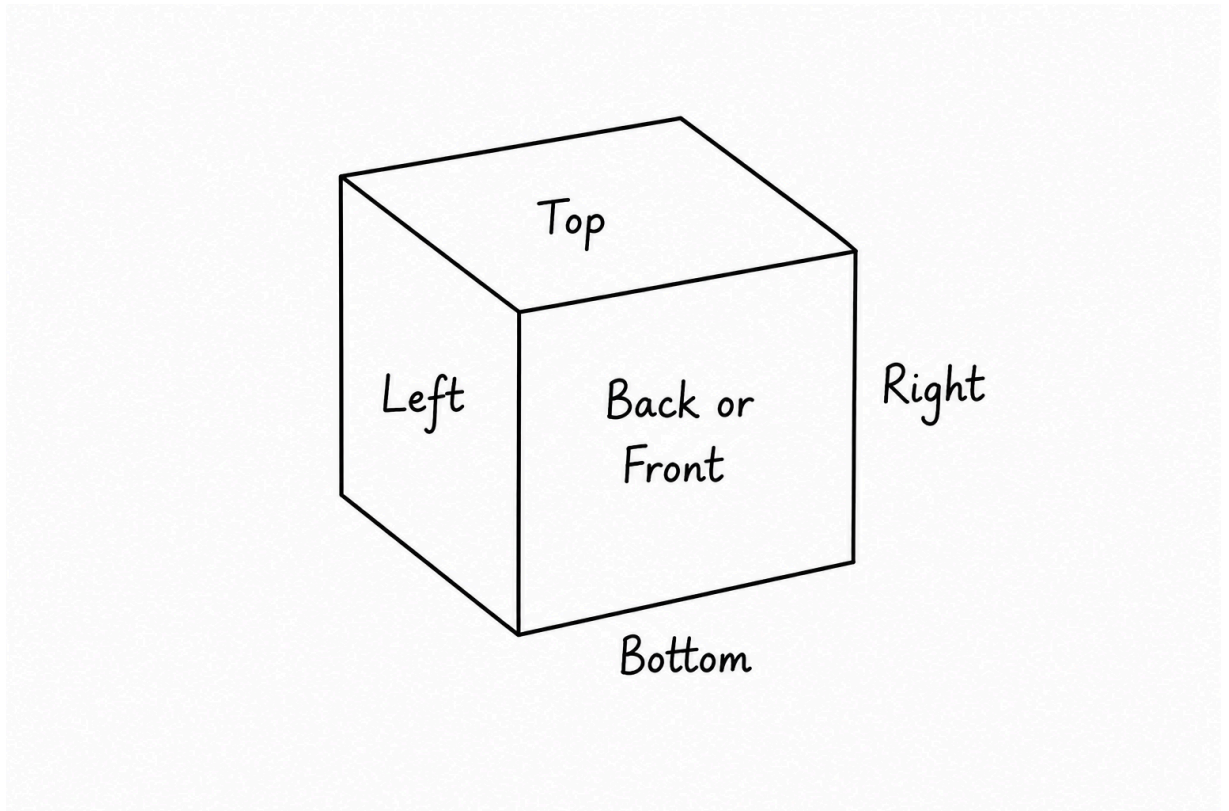
$$\text{Volume} = (L \times L) \times L$$

$$\text{Volume} = L \times L \times L$$

VOLUME OF CUBE = L^3
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- Total Surface Area of a Cube

Notice that a cube has Six Faces.



An Example of a Cube in real life is Dice (For Ludo Games)

$$\text{TSA}_{\text{cube}} = \text{Area}_{\text{top}} + \text{Area}_{\text{bottom}} + \text{Area}_{\text{right}} + \text{Area}_{\text{left}} + \text{Area}_{\text{front}} + \text{Area}_{\text{back}}$$

$$TSA_{\text{cube}} = A_{\text{top}} + A_{\text{bottom}} + A_{\text{right}} + A_{\text{left}} + A_{\text{front}} + A_{\text{back}}$$

Since each of the faces of a cube consists of squares each, then;

$$TSA_{\text{cube}} = \overset{\text{Top}}{(L \times L)} + \overset{\text{Bottom}}{(L \times L)} + \overset{\text{Right}}{(L \times L)} + \overset{\text{Left}}{(L \times L)} + \overset{\text{Front}}{(L \times L)} + \overset{\text{Back}}{(L \times L)}$$

$$TSA_{\text{cube}} = L^2 + L^2 + L^2 + L^2 + L^2 + L^2$$

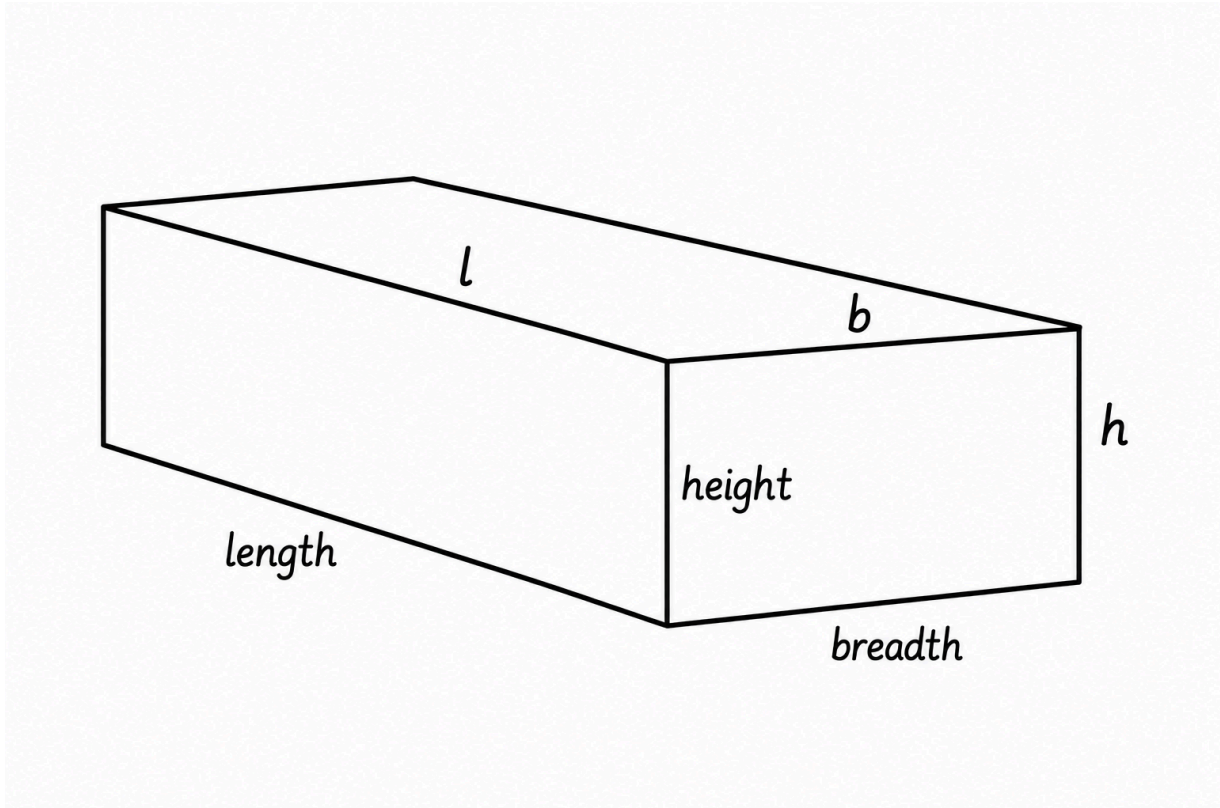
$TSA_{\text{cube}} = 6L^2$

Where TSA = Total Surface Area

L = Length of Each Side of the Cube

CUBOID

A Cuboid is a Solid Shape made from a rectangle by pulling the rectangle along the **z-axis**.



An Example of Cuboid in real life is a Match box

Just like we did for a cube;

- Volume of a Cuboid = Area of one face Length of the other side

$$\begin{aligned}\text{Volume} &= A \times H \\ &= (L \times B) \times H\end{aligned}$$

$$\text{Volume} = L \times B \times H$$

- $TSA_{\text{cuboid}} = A_{\text{top}} + A_{\text{bottom}} + A_{\text{right}} + A_{\text{left}} + A_{\text{front}} + A_{\text{back}}$
 $TSA_{\text{cuboid}} =$

$$\begin{aligned}
 \text{TSA}_{\text{cuboid}} &= \overset{\text{Top}}{(L \times B)} + \overset{\text{Bottom}}{(L \times B)} + \overset{\text{Right}}{(L \times H)} + \overset{\text{Left}}{(L \times H)} + \overset{\text{Front}}{(L \times H)} + \overset{\text{Back}}{(B \times H)} \\
 &= LB + LB + LH + LH + BH + BH \\
 &= 2LB + 2LH + 2BH
 \end{aligned}$$

$\text{TSA}_{\text{cuboid}} = 2(LB + LH + BH)$
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Where

TSA= Total Surface Area

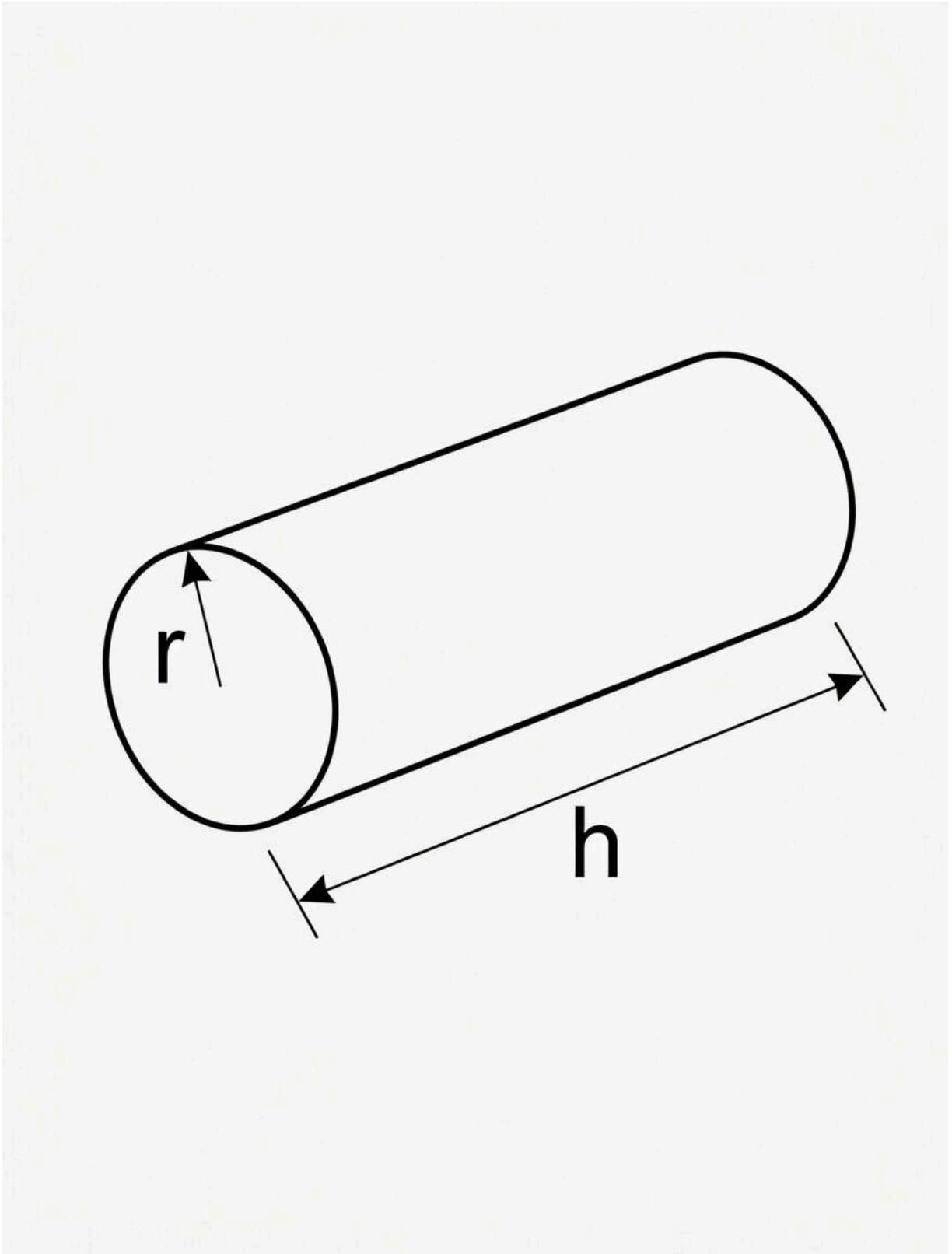
L = Length

B = Breadth

H = Height

CYLINDER

A Cylinder is a solid shape made from a circle by pulling the circle along the **z-axis**.



An Example of cylinder in real life is a can of Peak Milk

* Volume of a Cylinder = Area of Circular Part \times Length of Cylinder

$$\text{Volume} = \pi r^2 h$$

To find the Total Surface Area of a Cylinder, Let us picture a tin of peak milk sealed at both ends, we can cut open the top and bottom which are circular cross-sections and also stretch the middle part out as shown below;