

UNIT 12

THREE DEMENSIONAL SOLID

EXERCISE NO. 12.1

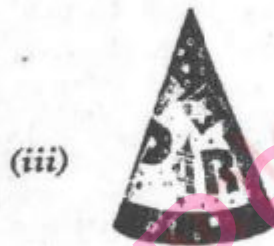
Q.1 Identify the objects and write the names of the 3D-figures which represent these objects:



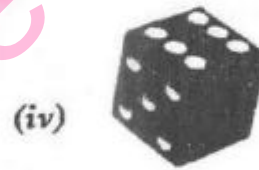
Solution
Sphere



Solution
Cylinder



Solution
Cone



Solution
Cube

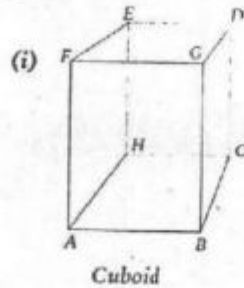


Solution
Cuboid

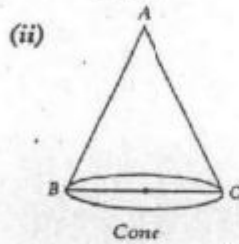


Solution
Cuboid

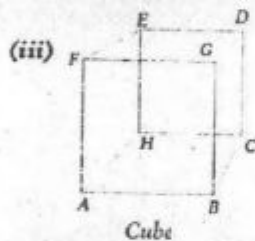
Q.2 Fill in the blanks for the following figures.



- (a) Number of edges = 12 .
 (b) Number of Faces = 6 .
 (c) Number of Vertices = 8 .



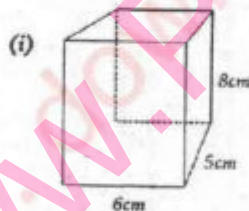
- (a) Point A represents Vertex .
 (b) Number of circular faces 1 .



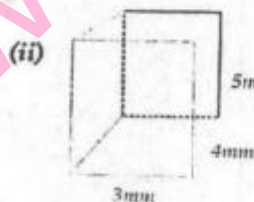
- (a) AB represents edge .
 (b) Point A represents Vertex .
 (c) Number of faces 6 .

EXERCISE 12.2

Q.1 Write the units of surface area and volume of the given figures.

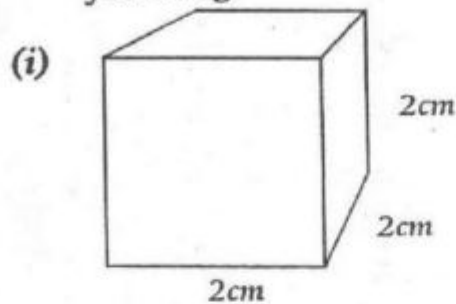


- (a) Unit of surface area = sq. cm .
 (b) Unit of volume = cubic. cm .



- (a) Unit of surface area = sq. mm .
 (b) Unit of volume = cubic. mm .

Q.2 Find the surface area and volume of each of the following.



Solution:

$$\begin{aligned}\text{Surface area} &= 6l^2 \\ &= 6(2)^2 \\ &= 6 \times 2 \times 2 \\ &= 24 \text{ sq. cm}\end{aligned}$$

$$\begin{aligned}\text{Volume} &= l \times l \times l \\ &= 2 \times 2 \times 2 \\ &= 8 \text{ cubic. cm}\end{aligned}$$

$$\text{Area} = 24 \text{ sq. cm}$$

$$\text{Volume} = 8 \text{ cubic. cm} \quad \text{Ans}$$



Solution:

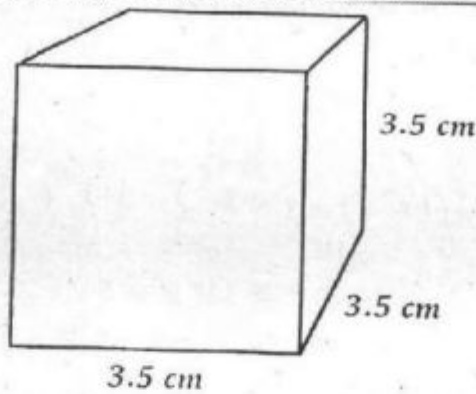
$$\begin{aligned}\text{Surface area} &= 2(l \times b + b \times h + h \times l) \\ &= 2(6.5 \times 2.5 + 2.5 \times 3 + 3 \times 6.5) \\ &= 2(16.25 + 7.5 + 19.5) \\ &= 2(43.25) \\ &= 86.5\end{aligned}$$

$$\begin{aligned}\text{Volume} &= l \times b \times h \\ &= 6.5 \times 2.5 \times 3 \\ &= 48.75\end{aligned}$$

$$\text{Surface of area} = 86.5 \text{ sq. cm}$$

$$\text{Volume} = 48.75 \text{ cubic. cm} \quad \text{Ans}$$

(iii)



Solution:

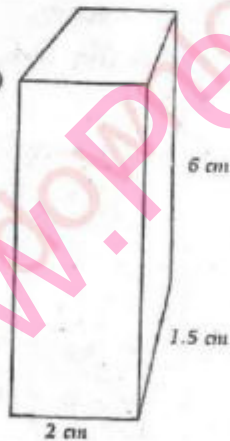
$$\begin{aligned}\text{Surface area} &= 6l^2 \\ &= 6 \times (3.5)^2 \\ &= 6 \times 3.5 \times 3.5 \\ &= 6 \times 12.25 \\ &= 73.5\end{aligned}$$

$$\begin{aligned}\text{Volume} &= l \times l \times l \\ &= 3.5 \times 3.5 \times 3.5 \\ &= 42.875 \\ &= 42.875 \text{ cubic}\end{aligned}$$

$$\text{Surface of area} = 73.5 \text{ sq. cm}$$

$$\text{Volume} = 42.875 \text{ cubic. cm} \quad \text{Ans}$$

(iv)



Solution:

Surface area of cuboid

$$\begin{aligned}&= 2(l \times b + b \times h + h \times l) \\ &= 2(2 \times 1.5 + 1.5 \times 6 + 6 \times 2) \\ &= 2(3 + 9 + 12) \\ &= 2(24) \\ &= 48 \text{ sq. cm}\end{aligned}$$

$$\begin{aligned}\text{Volume of cuboid} &= l \times b \times h \\ &= 2 \times 1.5 \times 6 \\ &= 18\end{aligned}$$

$$\text{Surface} = 48 \text{ sq. cm}$$

$$\text{Volume} = 18 \text{ cubic. cm} \quad \text{Ans}$$

Q.3 Find the volume of the following cubes whose each side is:

(i) 5cm

Solution:

$$\begin{aligned}\text{Volume of cube} &= l \times l \times l \\ &= l^3 \\ &= (5)^3 = 5 \times 5 \times 5 \\ &= 125 \text{ cubic. cm} \quad \text{Ans}\end{aligned}$$

(ii) 6.2

Solution:

$$\begin{aligned}\text{Volume of cube} &= l \times l \times l \\ &= l^3 \\ &= (6.2)^3 = 6.2 \times 6.2 \times 6.2 \\ &= 238.328 \text{ cubic.cm} \quad \text{Ans}\end{aligned}$$

(iii) 2.5 m

Solution:

$$\begin{aligned}\text{Volume of cube} &= l \times l \times l \\ &= (l)^3 \\ &= 2.5 \times 2.5 \times 2.5 \\ &= 15.625 \text{ cubic. cm} \quad \text{Ans}\end{aligned}$$

Q.4 Find the volume of each of the following cuboids in which.

(i) Length = 9cm, breadth = 6cm, height = 4cm.

Solution:

$$\begin{aligned}\text{Volume fo cuboid} &= l \times b \times h \\ &= 9 \times 6 \times 4 \\ &= 216 \text{ cubic. cm} \quad \text{Ans}\end{aligned}$$

(ii) Length = 5cm, breadth = 3.5 m, height = 4cm

Solution:

$$\text{Volume of cuboid} = l \times b \times h$$

$$\begin{aligned} &= 5 \times 3.5 \times 4 \\ &= 70 \text{ cubic. cm} \quad \text{Ans} \end{aligned}$$

(iii) Length = 3.5 cm, breadth = 2cm,
height = 2.5 cm.

Solution:

$$\begin{aligned} \text{Volume of cuboid} &= l \times b \times h \\ &= 3.5 \times 2 \times 2.5 \\ &= 17.5 \text{ cubic. cm} \quad \text{Ans} \end{aligned}$$

EXERCISE 12.3

Q.1 Find the cost of polishing cupboard with dimension 3m, 2m and 1m at the rate of Rs. 500 per sq. mm.

Solution:

$$\text{Length } l = 3\text{m}$$

$$\text{Breadth } b = 2\text{m}$$

$$\text{Height } h = 1\text{m}$$

$$\begin{aligned} \text{Surface area of cuboid} &= 2(l \times b + b \times h + h \times l) \\ &= 2(3 \times 2 + 2 \times 1 + 1 \times 3) \\ &= 2(6 + 2 + 3) \\ &= 2(11) \\ &= 22 \text{ cubic m} \end{aligned}$$

$$\begin{aligned} \text{Total cost} &= \text{surface area} \times \text{Rate} \\ &= 22 \times 500 \\ &= 11000 \text{ Rs.} \quad \text{Ans} \end{aligned}$$

Q.2 A tank is m long. um wide and 2.5m height. Find the capacity of tank?

Solution:

$$\text{Length } l = 5\text{m}$$

$$\text{Breadth } b = 4\text{m}$$

$$\text{Height } h = 2.5\text{m}$$

$$\begin{aligned}\text{Volume of cuboid} &= l \times b \times h \\ &= 5 \times 4 \times 2.5 \\ &= 50 \text{ cubic. m} \quad \text{Ans}\end{aligned}$$

Q.3 The dimension of a brick are 25cm × 10cm × 4.5cm. How much space will be occupied by 1000 such bricks?

Solution:

$$\begin{aligned}\text{Length} & l = 25\text{cm} \\ \text{Breadth} & b = 10\text{cm} \\ \text{Height} & h = 2.5\text{cm} \\ \text{Volume of cuboid} &= l \times b \times h \\ &= 25 \times 10 \times 2.5 \\ &= 1125\end{aligned}$$

$$\begin{aligned}\text{Total space occupied by 1000 bricks} & \\ &= 1000 \times 1125 = 1125000 \\ &= 1125000 \text{ cubic.cm} \quad \text{Ans}\end{aligned}$$

Q.4 Find the cost of painting a wooden cubic box with an edge of .5m long at the rate of Rs. 50 per sq. m.

Solution:

$$\begin{aligned}\text{Length} & l = 2.5\text{m} \\ \text{Surface area of a cube} &= 6(l)^2 \\ &= 6(2.5)^2 \\ &= 6(2.5 \times 2.5) \\ &= 6(6.25) \\ &= 37.5 \\ \text{Cost of painting} &= 37.5 \times 50 \\ &= 1875 \text{ Rs.} \quad \text{Ans}\end{aligned}$$

Q.5 Find the capacity of cubical oil tank each side 5m long.

Solution:

$$\begin{aligned}\text{Length} & l = 5 \text{ m} \\ \text{Volume of cube} &= l^3\end{aligned}$$

$$= 5 \times 5 \times 5$$

$$= 125 \text{ cubic. m} \quad \text{Ans}$$

Q.6 How many boxes of dimensions $15\text{cm} \times 10\text{cm} \times 5\text{cm}$ are required to fill a box of dimensions $30\text{cm} \times 20\text{cm} \times 10\text{cm}$.

Solution:

$$\begin{aligned} \text{Length} & l = 15\text{cm} \\ \text{Breadth} & b = 10\text{cm} \\ \text{Height} & h = 5\text{cm} \\ \text{Volume of cuboid} & = l \times b \times h \\ & = 15 \times 10 \times 5 \\ & = 750 \end{aligned}$$

$$\begin{aligned} \text{Length} & l = 30\text{cm} \\ \text{Breadth} & b = 20\text{cm} \\ \text{Height} & h = 10\text{cm} \\ \therefore \text{Volume of cuboid} & = l \times b \times h \\ 30 \times 20 \times 10 & = 6000 \end{aligned}$$

$$\begin{aligned} \text{Number of Boxes} & = \frac{6000}{750} \\ & = 8 \quad \text{Ans} \end{aligned}$$

Q.7 If the cost of cake of dimensions $10\text{cm} \times 5\text{cm} \times 5\text{cm}$ is Rs. 100. What is the cost of cake with dimensions $20\text{cm} \times 15\text{cm} \times 15\text{cm}$.

Solution:

$$\begin{aligned} \text{Length} & l = 10 \\ \text{Breadth} & b = 5 \\ \text{Height} & h = 5 \\ \therefore \text{Volume of cuboid} & = l \times b \times h \\ & = 10 \times 5 \times 5 \\ & = 250 \\ & = l \times b \times h \\ & = 20 \times 15 \times 15 \\ & = 4500 \times 100 \\ & = 450000 \end{aligned}$$

$$\begin{aligned}\text{Cost of cake} &= \frac{450000}{250} \\ &= 1800 \text{ Rs.} \quad \text{Ans}\end{aligned}$$

Q.8 Find the capacity of milk tank of dimensions $3.5\text{m} \times 3.4\text{m} \times 5.5\text{m}$.

Solution:

$$\begin{aligned}\text{Length} \quad l &= 3.5\text{m} \\ \text{Breadth} \quad b &= 3.4\text{m} \\ \text{Height} \quad h &= 5.5\text{m} \\ \text{Volume of cuboid} &= l \times b \times h \\ &= 3.5 \times 3.4 \times 5.5 \\ &= 65.45 \text{ cubic. m} \quad \text{Ans}\end{aligned}$$

Q.9 The dimensions of a tea box are $\frac{20}{3}\text{cm} \times \frac{21}{4}\text{cm} \times \frac{11}{2}\text{cm}$. How much space will be occupied by 100 such boxes.

Solution:

$$\begin{aligned}\text{Length} \quad l &= \frac{20}{3} \text{ cm} \\ \text{Breadth} \quad b &= \frac{21}{4} \text{ cm} \\ \text{Height} \quad h &= \frac{11}{2} \\ \text{Volume of cuboid} &= l \times b \times h \\ &= \frac{20}{3} \times \frac{21}{4} \times \frac{11}{2} \\ &= \frac{4620}{24} = 192.5 \\ \text{Space occupied by 100 boxes} &= 192.5 \times 100 \\ &= 19250 \text{ cubic. cm} \quad \text{Ans}\end{aligned}$$

Q.10 Find the cost of painting steel cube of each side 5.2m long at the rate of Rs. 15.5 per sq meter.

Solution:

Length $l = 5.2m$

$$\begin{aligned}\text{Volume of cubic} &= l \times l \times l \text{ or } l^3 \\ &= 5.2 \times 5.2 \times 5.2 \\ &= 140.608\end{aligned}$$

$$\begin{aligned}\text{Cost of painting steel cube} &= 140.608 \times 15.5 \\ &= 2179.424 \text{ Rs.} \quad \text{Ans}\end{aligned}$$

REVIEW EXERCISE 12

Q.1 Fill in the blanks.

- (i) Cube has 8 vertices.
- (ii) Cone has 1 circular face.
- (iii) Cuboid has 6 faces.
- (iv) Cylinder has 2 circular face.
- (v) Cube has 12 edges.

Q.2 Give three examples of 3D figures from daily life.

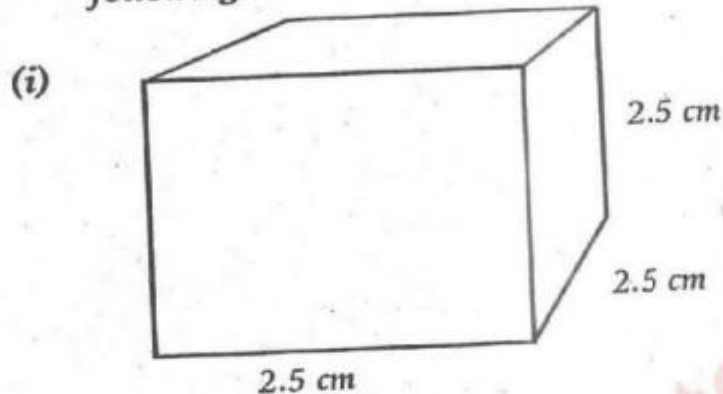
Solution

The examples of 3D figures are following.

- (i) Tennis ball (ii) Brick
- (iii) Geometry box (iv) Match Box
- (v) Tin of Ghee

Iqra Mathematics

Q.3 Find the surface area and volume of the following:



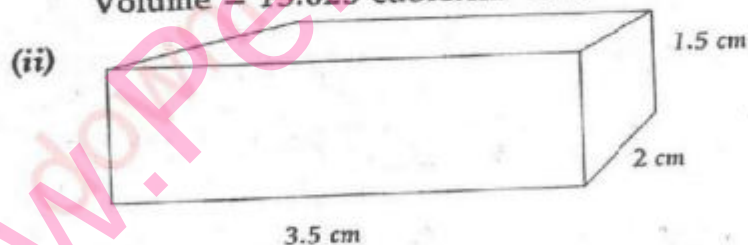
Solution:

$$\begin{aligned}\text{Surface area} &= 6(l)^2 \\ &= 6(2.5)^2 \\ &= 6 \times 2.5 \times 2.5 \\ &= 37.5\end{aligned}$$

$$\begin{aligned}\text{Volume} &= l \times l \times l \\ &= 2.5 \times 2.5 \times 2.5 \\ &= 15.625\end{aligned}$$

$$\text{Surface area} = 37.5 \text{ sq. cm}$$

$$\text{Volume} = 15.625 \text{ cubic.cm Ans}$$



Solution:

$$\begin{aligned}\text{Surface area of cuboid} &= 2(l \times b + b \times h + h \times l) \\ &= 2(3.5 \times 2 + 2 \times 1.5 + 1.5 \times 3.5) \\ &= 2(7 + 3 + 5.25) \\ &= 2(15.25) \\ &= 30.5\end{aligned}$$

$$\text{Volume of cuboid} = l \times b \times h$$

$$\text{Length } l = 3.5$$

$$\text{Breadth } b = 2$$

$$\text{Height } h = 1.5$$

$$\begin{aligned}\text{Volume} &= 3.5 \times 2 \times 1.5 \\ &= 10.5\end{aligned}$$

$$\text{Volume} = 10.5 \text{ cubic.cm}$$

$$\text{Surface area} = 30.5 \text{ sq. cm} \quad \text{Ans}$$

Q.4 Find the volume and surface area of a cube whose side is 1.5cm long.

Solution:

$$\text{Length } l = 1.5 \text{ cm}$$

$$\begin{aligned}\text{Surface area of cube} &= 6(l)^2 \\ &= 6 \times 1.5 \times 1.5 \\ &= 13.5\end{aligned}$$

$$\begin{aligned}\text{Volume of a cube} &= l \times l \times l \\ &= 1.5 \times 1.5 \times 1.5 \\ &= 3.375\end{aligned}$$

$$\text{Surface area} = 13.5 \text{ sq.cm}$$

$$\text{Volume} = 3.375 \text{ cubic} \quad \text{Ans}$$

Q.5 Find the cost of painting an cuboid with dimensions 5m, 6m and 7m at the rate of Rs. 100 per sq. m.

Solution:

$$\text{Length } l = 5\text{m}$$

$$\text{Breadth } b = 6\text{m}$$

$$\text{Height } h = 7\text{cm}$$

$$\begin{aligned}\text{Surface area of cuboid} &= 2(l \times b + b \times h + h \times l) \\ &= 2(5 \times 6 + 6 \times 7 + 7 \times 5) \\ &= 2(30 + 42 + 35) \\ &= 2(107) \\ &= 214\end{aligned}$$

$$\text{Total Cost} = \text{surface area} \times \text{rate}$$

$$\text{Total Cost} = 214 \times 100 = 21400 \text{ Rs.} \quad \text{Ans}$$

Q.6 How much milk can be filled in a tank with of dimension of 6.5m 2.7m and 10m.

Solution:

Length	$l = 6.5\text{m}$
Breadth	$b = 2.7\text{m}$
Height	$h = 10\text{m}$
Volume of cuboid	$= l \times b \times h$
	$= 6.5 \times 2.7 \times 10$
	$= 175.5 \text{ cubic. m Ans}$

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