Question 1.

Solution:

(i) length =12cm, breadth = 8 cm and height = 4.5 cm
∴ Volume of cuboid = l x b x h
= (12 x 8 x 4.5) cm^3= 432 cm^3
∴ Lateral surface area of a cuboid = 2(l + b) x h
= [2(12 + 8) x 4.5] cm^2
= (2 x 20 x 4.5) cm^2 = 180 cm^2
∴ Total surface area cuboid = 2(lb +b h+ l h)
= 2(12 x 8 + 8 x 4.5 + 12 x 4.5) cm^2
= 2(96 +36 +54) cm^2
= (2 x186) cm^2
= 372 cm^2

(ii) Length 26 m, breadth =14 m and height =6.5 m
∴ Volume of a cuboid = l x b x h
= (26 x 14 x 6.5) m^3
= 2366 m^3
∴ Lateral surface area of a cuboid =2 (l + b) x h
= [2(26+14) x 6.5] m^2
= (2 x 40 x 6.5) m^2
= 520 m^2
∴ Total surface area = 2(lb+ bh + lh)
= 2(26 x 14+14 x6.5 +26 x6.5)
= 2 (364+91+169) m^2
= (2 x 624) m2= 1248 m^2.

(iii) Length = 15 m, breadth = 6m and height = 5 dm = 0.5 m
∴ Volume of a cuboid = l x b x h
= (15 x 6 x 0.5) m3=45 m^3.
∴ Lateral surface area = 2(l + b) x h
= [2(15 + 6) x 0.5] m^2
= (2 x 21×0.5) m2=21 m^2
∴ Total surface area =2(lb+ bh + lh)
= 2(15 x 6 +6 x 0.5+ 15 x 0.5) m^2
= 2(90+3+7.5) m^2
= (2 x 100.5) m^2
=201 m^2

(iv) Length = 24 m, breadth = 25 cm =0.25 m, height = 6m.
∴ Volume of cuboid = l x b x h
= (24 x 0.25 x 6) m^3.
= 36 m^3.
∴ Lateral surface area = 2(l + b) x h
= [2(24 +0.25) x 6] m^2
= (2 x 24.25 x 6) m^2
= 291 m^2.
∴ Total surface area =2(lb+ bh + lh)
=2(24 x 0.25+0.25x 6 +24 x 6) m^2
= 2(6+1.5+144) m^2
= (2 x151.5) m^2
=303 m^2.

Question 2.

Solution:

Length of Cistern = 8 m
Breadth of Cistern = 6 m
And Height (depth) of Cistern =2.5 m
∴ Capacity of the Cistern = Volume of cistern
∴ Volume of Cistern = (l x b x h)
= (8 x 6 x2.5) m^3
=120 m^3
Area of the iron sheet required = Total surface area of the cistem.
∴ Total surface area = 2(lb +bh +lh)
= 2(8 x 6 + 6×2.5+ 2.5×8) m^2
= 2(48 + 15 + 20) m^2
= (2 x 83) m2=166 m^2

Question 3.

Solution:

Length of a room =9m,
Breadth of a room = 8m
And height of room = 6.5 m
∴ Area of 4 walls = Lateral surface area
= 2 (l+ b) x h
= [2 (9+8) x 6.5] m^2
= (2 x 17 x 6.5) m^2
=221 m^2
∴ Area not be whitewashed = (area of 1 door) + (area of 2 windows)
= (2 x 1.5) m^2 + (2 x 1.5 x 1) m^2
= $3m^2$ + $3m^2$ =$6m^2$
∴ Area to be whitewashed = (221-6) m^2 =215 m^2
∴ Cost of whitewashing the walls at the rate of Rs.6.40 per
Square meter = Rs. (6.40 x 215) = Rs. 1376

Question 4.

Solution:

Length of plank = 5m =500 cm
Breadth of plank = 25 m
Height of plank = 10 cm
∴ Volume of plank = l x b x h
= (500 x 25 x 10) cm^3

Now,
Length of pit = 20 m = 2000 cm
Breadth of pit = 6m = 600cm
Height of pit = 80 cm
∴ Volume of one pit = (2000 x 600 800) cm^3

$$\therefore \text{Number of planks that can be stored} = \frac{\text{Volume of pit}}{\text{Volume of plank}}$$

$$= \frac{(2000 \times 600 \times 80)}{(500 \times 25 \times 10)} = 768$$

Question 5.

Solution:

Length of wall = 8m = 800cm
Breadth of wall = 6m = 600 cm
Height of wall = 22.5 cm
∴ Volume of wall = l x b x h
= (800 x 600 x22.5) cm^3
Length of brick = 25cm
Breadth of brick = 11.25cm
Height of brick = 6cm
∴ Volume of brick = (25 x 11.25 x 6)cm^3

∴ Number of bricks required $= \frac{\text{Volume of the wall}}{\text{Volume of brick}}$

$$= \frac{(800 \times 600 \times 22.5)}{(25 \times 11.25 \times 6)} = 6400$$

Question 6.

Solution:

Length of wall = 15m
Breadth of wall = 0.3m
Height of wall = 4m
∴ Volume of the wall = (15 x 0.3 x4) m^3 =18m^3

$$\text{Volume of mortar} = \left(\frac{1}{12} \times 18\right) = 1.5\ m^3$$

$$\text{Volume of wall} = (18 - 1.5)m^3 = 16.5 = \frac{33}{2}\ m^3$$

Length of brick = 22 cm
Breadth of brick = 12.5 cm
Height of brick = 7.5 cm

$$\therefore \text{Volume of 1 brick} = \left(\frac{22}{100} \times \frac{12.5}{100} \times \frac{7.5}{100}\right) m^3$$

$$= \left(\frac{33}{16000}\right) m^3$$

$$\therefore \text{Number of bricks} = \frac{\text{Volume of bricks}}{\text{Volume of 1brick}}$$

$$= \left(\frac{33}{2} \times \frac{16000}{33}\right) = 8000$$

Question 7.

Solution:

External length of cistern = 1.35 m = 135 cm
External breadth of cistern = 1.08 m =108 cm
External height of cistern = 90cm
∴ External volume of cistern = (135 x 108 x 90) cm^3
=1312200 cm^3
Internal length of cistern = (135 – 2 x 2.5) cm
= (135 - 5) cm =130 cm
Internal breadth of cistern = (108 – 2 × 2.5) cm
= (108 – 5) cm=103 cm
Internal height of cistern = (90 – 2.5) cm = 87.5 cm
∴ Capacity of the cistern = Internal volume of cistern
= (130 x 103 x 87.5) cm^3
= 1171625 cm^3
Volume of the iron used = External volume of the cistern
-Internal volume of the cistern
= (1312200 -1171625) cm^3
= 140575 cm^3

Question 8.

Solution:

Depth of the river = 2 m
Breadth of the river = 45 m
Length of the river = 3 K M /h = $\left(\frac{3\times1000}{60}\right)$ m/min
= 50m /min.
∴ Volume of water running into the sea per minute = (50 x 45 x 2) m^3
= 4500 m^3

Question 9.

Solution:

Total cost of sheet = Rs. 1620

Cost of metal sheet per square meter = Rs.30

$\therefore$ Area of the sheet required $= \left(\frac{\text{Total cost}}{\text{rate } /m^2}\right)$ sq.m.

$= \left(\frac{1620}{30}\right)$ sq.m $= 54$ sq.m.

Length of box $= 5m$

Breadth of box $= 3m$

Now, Let the height of the box be x meters.

$\therefore$ Area of the sheet = Total surface area of the box.

$= 2(lb + bh + lh)$

$54 = 2(5 \times 3 + 3 \times x + 5 \times x)$

$54 = 2(15 + 3x + 5x)$

$54 = 2(15 + 8x)$

$\therefore \quad 2(15 + 8x) = 54$

$\Rightarrow \quad 30 + 16x = 54$

$\Rightarrow \quad 16x = 54 - 30$

$\Rightarrow \quad x = \frac{24}{16} = 1.5m$

$\therefore$ The height of the box = 1.5 m.

Question 10.

Solution:

Length of room $= 10$ m

Breadth of room $= 10$ m

Height of room $= 5$ m

$\therefore$ Length of the longest pole = length of diagonal

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

$= \sqrt{10^2 + 10^2 + 5^2}$

$= \sqrt{100 + 100 + 25} = \sqrt{225} = 15$ m

$\therefore$ The length of the longest pole that can be put in a room with given

Dimensions = 15 m.

Question 11.

Solution:

Length of hall = 20 m
Breadth of hall = 16 m
Height of hall = 4.5 m
∴ Volume of hall = $l \times b \times h$
$= (20 \times 16 \times 4.5)\ m^3$

Volume of air needed per person = $5\ m^3$

$$\therefore \text{Number of persons} = \left(\frac{\text{Volume of the hall}}{\text{Volume of air needed per person}}\right)$$

$$= \left(\frac{20 \times 16 \times 4.5}{5}\right) = 288.$$

Question 12.

Solution:

Length of classroom = 10m
Breadth of classroom = 6.4 m
Height of classroom = 5 m
Each student is given $1.6\ m^2$ of the floor area.

$$\text{Number of students} = \frac{(\text{area of the room})}{1.6}$$

$$= \frac{(10 \times 6.4)}{1.6} = \frac{64}{1.6} = 40$$

∴ Number of students = 40

$$\therefore \text{Air required by each student} = \left(\frac{\text{Volume of the room}}{\text{number of students}}\right) m^3$$

$$= \left(\frac{10 \times 6.4 \times 5}{40}\right) m^3 \left(\frac{320}{40}\right) m^3$$

$$= 8m^3$$

Question 13.

Solution:

Volume of a cuboid = 1536 m^3

Length of the cuboid = 16 m

Let the breadth and height of the cuboid be 3x and 2x.

$\therefore$ Volume of cuboid = $l \times b \times h$

$\Rightarrow$ $1536 = (16 \times 3x \times 2x)$

$\Rightarrow$ $1536 = 96x^2$

$\Rightarrow$ $x^2 = \frac{1536}{96} = 16$

$\therefore$ $x = \sqrt{16} = 4$ m.

$\therefore$ Breadth of the cuboid $= 3x = 3 \times 4 = 12$m

And height of the cuboid $= 2x = 2 \times 4 = 8$ m

Question 14.

Solution:

Surface area of a cuboid = 758 cm^2

Length = 14 cm

Breadth = 11 cm

Let the height of the cuboid = h cm

$\therefore$ Surface area of cuboid = $2(lb + bh + lh)$

$\Rightarrow$ $758 = 2(14 \times 11 + 11 \times h + 14 \times h)$

$\Rightarrow$ $758 = 2(154 + 11h + 14h)$

$\Rightarrow$ $758 = 2(154 + 25h)$

$\Rightarrow$ $758 = 308 + 50h$

$\Rightarrow$ $50h = 758 - 308$

$\therefore$ $h = \frac{450}{50} = 9$cm.

$\therefore$ The height of the cuboid = 9 cm

Question 15.

Solution:

(a) Each edge of a cube = 9m

$\therefore$ Volume of a cube $= a^3$

$= (9)^3\ m^3 = 729\ m^3$

$\therefore$ Lateral surface area of cube $= 4a^2$

$= 4 \times (9)^2$

$= (4 \times 81)\ m^2$

$= 324\ m^2$

$\therefore$ Total surface area of a cube $= 6a^2$

$= 6 \times (9)^2$

$= (6 \times 81)\ m^2$

$= 486\ m^2$

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

$= \sqrt{3} \times 9$

$= (1.73 \times 9)\ m = 15.57\ m$

(b) $\therefore$ Each edge of a cube $= 6.5$ cm

Volume of a cube $= a^3 = (6.5)^3\ cm^3$

$= 274.625\ cm^3$

$\therefore$ Lateral surface area of a cube $= 4a^2$

$= 4 \times (6.5)^2\ cm^2$

$= (4 \times 42.25)\ cm^2$

$= 169\ cm^2$

Total surface area of a cube $= 6a^2$

$= 6 \times (6.5)^2 cm^2$

$= (6 \times 42.25)\ cm^2$

$= 253.5\ m^2$

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

$= \sqrt{3} \times 6.5$

$= (1.73 \times 6.5)$ cm

$= 11.245$ cm.

Question 16.

Solution:

Let each side of the cube be a cm.

Then, the total surface area of the cube $= (6a^2)\ cm^2$

$\therefore$ $6a^2 = 1176$

$\Rightarrow$ $a^2 = \frac{1176}{6} = 196$

$\Rightarrow$ $a = \sqrt{196} = 14$ cm

$\therefore$ Volume of the cube $= a^3$

$= (14)^3 = (14 \times 14 \times 14)\ cm^3$

$= 2744\ cm^3$.

Question 17.

Solution:

Let each side of the cube be a cm

Then, the lateral surface area of the cube = $(4a^2)$ cm²

$\therefore \quad 4a^2 = 900$

$\Rightarrow \quad a^2 = \frac{900}{4} = 225$

$\therefore \quad a = \sqrt{225} = 15$ cm

$\therefore$ Volume of the cube = a^3

$= (15)^3 = (15 \times 15 \times 15)\text{cm}^3$

$= 3375\ \text{cm}^3.$

Question 18.

Solution:

Volume of the cube $= 512\ \text{cm}^3$ [Volume = a^3]

$\therefore$ Each edge of the cube = $\sqrt[3]{512} = 8$ cm.

$\therefore$ Surface area of cube = $6a^2$

$= 6 \times (8)^2\ \text{cm}^2$

$= (6 \times 64)\ \text{cm}^2$

$= 384\ \text{cm}^2$

Question 19.

Solution:

Volume of the new cube = $[(3)^3 + (4)^3 + (5)^3]$ cm

$= (27 + 64 + 125)\ \text{cm}^2$

$= 216\ \text{cm}^2$

Now edge of this cube = a cm

And, $a^3 = 216$

$\therefore \quad a = 6\text{cm}$

Lateral surface area of the new cube = $4a^2\ \text{cm}^2$.

$= 4 \times (6)^2\ \text{cm}^2$

$= (4 \times 36)\ \text{cm}^2$

$= 144\ \text{cm}^2$

$\therefore$ The lateral surface area of the new cube formed $= 144\ \text{cm}^2$.

Question 20.

Solution:

1 hectare = $10000\ m^2$

Area = 2 hectares = $2\times 10000\ m^2$

Depth of the ground = 5 cm = $\frac{5}{100}$ m

Volume of water = (area x depth)

$$= \left(2\times 10000\times \frac{5}{100}\right) m^3$$

$$= 1000\ m^3$$

$\therefore$ Volume of water that falls $= 1000\ m^3$