Exercise 21.3

Q.1 Find the surface area of a cubo'd, whose

(i) length = 10cm, breadth = 12cm, height = 14cm.

(ii) $l = 6\,dm$, $b = 8\,dm$, $h = 10\,dm$.

(iii) $l = 2m$, $b = 4m$, $h = 5m$.

(iv) $l = 3.2m$, $b = 30\,dm$, $h = 250\,cm$.

Sol: surface area of cuboid

$= 2(lb + bh + lh)$

(i) $l = 10\,cm$, $b = 12\,cm$, $h = 14\,cm$

$\therefore$ surface Area $= 2(10 \times 12 + 12 \times 14 + 10 \times 14)$

$= 2(120 + 168 + 140)$

$= 856\,cm^2$

(ii) $l = 6\,dm$, $b = 8\,dm$, $h = 10\,dm$.

surface area =

$= 2(6 \times 8 + 8 \times 10 + 6 \times 10)$

$= 2(48 + 80 + 60)$

$= 2(188) = 376\,dm^2$

docs.aglasem.com

aglasem.com

(iii) $l = 2m$, $b = 4m$, $h = 5m$

surface area $= 2(2\times4 + 4\times5 + 2\times5)$

$= 2(8+20+10) = 76m^2$

(iv) $l = 3.2m$, $b = 30dm$, $h = 250\ cm = 25dm$.

$= 320cm$

$= 32dm$.

surface area $= 2(32\times30 + 30\times25 + 32\times25)$

$= 2(960+750+800)\ dm^2$

$= 5020\ dm^2$

<u>Q.2</u> Find the surface area of a cube whose edge is-

(a) 1.2m (b) 27cm (iii) 3cm (iv) 6m

(v) 2.1m

<u>Sol</u>: $\because$ surface area of cube $= 6a^2$

(i) $a = 1.2m$,

surface area $= 6\times(1.2)^2 = 6\times1.44$

$= 8.64m^2$

(ii) $a = 27cm$

$\therefore$ S.A $= 6\times(27)^2 = 6\times729 = 4374cm^2$

docs.aglasem.com

aglasem.com

(iii) $a = 3\,cm$.

$$S.A = 6a^2$$
$$= 6 \times (3)^2 = 6 \times 9 = 54\ cm^2$$

(iv) $a = 6\,cm$, $S.A = 6a^2$
$$= 6 \times (6)^2 = 6 \times 36 = 216\ cm^2$$

(v) $a = 2.1\,m$

$$\therefore S.A = 6a^2$$
$$= 6 \times (2.1)^2 = 6 \times 4.41\ m^2 = 26.46\ cm^2$$

Q.3 A cuboidal box is 5 cm by 5 cm by 4 cm. Find its surface area

Sol: $l = 5\,cm$, $b = 5\,cm$, $h = 4\,cm$.

$$\text{Surface area} = 2(lb + bh + lh)$$
$$= 2(5 \times 5 + 5 \times 4 + 5 \times 4)$$
$$= 2(25 + 20 + 20)$$
$$= 130\ cm^2$$

Q.4 Find the surface area of a cube whose volume is (i) $343\ m^3$ (ii) $216\ dm^3$

Sol: (i) Vol of cube $= 343\ m^3$

$$\Rightarrow a^3 = (7)^3$$
$$\Rightarrow a = 7\ m$$

docs.aglasem.com
aglasem.com

Now, Surface area $= 6a^2$

$= 6\times(7)^2 = 6\times 49 = 294\ m^2$

(ii) volume $= 216\ dm^3$

$\Rightarrow a^3 = (6)^3$

$\Rightarrow a = 6\ dm$

$\therefore$ surface area $= 6a^2 = 6\times(6)^2 = 6\times 36 = 216\ dm^2$

Q.5 Find the volume of a cube whose surface area is -

(i) $96\ cm^2$ (ii) $150\ m^2$

Sol: (i) surface area $= 96\ cm^2$

$\Rightarrow 6a^2 = 96$

$\Rightarrow a^2 = \frac{96}{6} = 16$

$\Rightarrow a = 4\ cm.$

$\therefore$ volume $= a^3 = (4)^3 = 64\ cm^3$

(ii) surface area $= 150\ m^2$

$\Rightarrow 6a^2 = 150$

$\Rightarrow a^2 = \frac{150}{6} = 25$

$\Rightarrow a = 5\ m.$

$\therefore$ volume $= a^3 = (5)^3$

$= (5)^3 = 125\ m^3$

docs.aglasem.com

aglasem.com

Q.6 The dimension of a cubord are in the ratio 5:3:1 and its total surface area is 414 m^2. Find the dimensions.

Sol: let $l = 5x$, $b = 3x$, $h = x$.

$$TSA = 414$$

$$\Rightarrow 2(lb + bh + lh) = 414$$

$$\Rightarrow 2[5x \times 3x + 3x \times x + 5x \times x] = 414$$

$$\Rightarrow 2(15x^2 + 3x^2 + 5x^2) = 414$$

$$\Rightarrow 46x^2 = 414$$

$$\Rightarrow x^2 = \frac{414}{46} = 9 = (3)^2$$

$$\Rightarrow x = 3$$

$\therefore$ $l = 5x = 5 \times 3 = 15cm$

$b = 3x = 3 \times 3 = 9cm$

$h = x = 3cm$.

Q.7 Find the area of the card board required to make a closed box of length 25 cm, breadth = 0.5 m and height = 15 cm.

Sol: $l = 25cm$, $b = 0.5m = 50cm$, $h = 15cm$.

$$Area = 2(lb + bh + lh)$$

docs.aglasem.com

aglasem.com

$= 2(25\times50 + 50\times15 + 25\times15)\ cm^2$

$= 2(1250 + 750 + 375)\ cm^2$

$= 2(2375)\ cm^2 = 4750\ cm^2$

Q.8 Find the surface area of the wooden box whose shape is of cube, and if the edge of the box is 12 cm.

Sol edge of cube = 12 cm

Surface area $= 6a^2$

$= 6\times12^2 = 6\times144$

$= 864\ cm^2$

Q.9 The dimension of an oil tin are 26 cm × 26 cm × 45 cm. Find the area of the tin sheet required for making 20 such tins. If 1 square metre of the tin sheet costs Rs. 10. Find the cost of tin sheet used for these 20 tins.

Sol: $l = 26\ cm$, $b = 26\ cm$, $h = 45\ cm$.

Area of tin sheet $= 2(26\times26 + 26\times45 + 26\times45)$

$= 2(676 + 1170 + 1170)$

$= 2(3016) = 6032\ cm^2$

$\therefore$ Area of sheet for 20 tins $= 6032\times20 = 120640\ cm^2$

docs.aglasem.com

aglasem.com

$= \frac{120640}{10000} m^2 = 12.0640 m^2$

$\because$ Rate of $1 m^2$ tin sheet = Rs 10.

$\therefore$ cost of 20 such tins $= 12.0640 \times 10$

$= $ Rs 120.64

Q.10 A class room is 11 m long, 8 m wide, 5 m high. Find the sum of the areas of its floor and the four walls (including doors, windows etc.)

Sol: length of class room = 11 m

$b = 8 m$

$h = 5 m$

Now, Area of four walls + Area of floor

$2(l+b)h + lb$

$= 2(11+8)5 + (11 \times 8)$

$= 190 + 88 = 278 m^2$

Q.11 A swimming pool is 20 m long, 15 m wide and 3 m deep. Find the cost of repairing the floor and wall at the rate of Rs $25/m^2$

Sol: length of swimming pool = 25 m

wide = 15 m

$h = 3 m$.

docs.aglasem.com

aglasem.com

$\therefore$ Area of floor and walls

$= lb + 2(l+b)h$

$= (20 \times 15) + 2(20+15) \times 3$

$= 300 + 210 = 510\ m^2$

Rate of Reaping $=$ Rs $25/m^2$

$\therefore$ Total Cost $=$ Rs 510×25

$=$ Rs 12750

Q.12 The perimeter of a floor of a room is 30m, and its height is 3m. Find the area of the four walls of the room.

Sol: Perimeter of floor $= 30m$

$\Rightarrow 2(l+b) = 30m$

also, $h = 3m$.

$\therefore$ Area of four walls $= 2(l+b)h$

$= 30 \times 3 = 90\ m^2$

Q.13 Show that the product of the areas of floor and two adjacent walls of a cuboid is the square of its volume.

Sol: Area of floor $= lb$

Area of two adjacent faces $= bh$ and lh

docs.aglasem.com

aglasem.com

$$\text{Product} = lb \times bh \times lh$$
$$= l^2 b^2 h^2$$
$$= (lbh)^2$$
$$= (\text{Volume})^2$$

Q.14 The walls and ceiling of a room are to be plastered. The length, breadth and height of the room are 4.5 m, 3 m, and 350 cm, respectively. Find the cost of plastering at the rate of Rs 8 per square metre.

Sol: $l = 4.5\,m$, $b = 3\,m$, $h = 350\,cm = 3.5\,m$.

Area to be plastered = Area of walls + Area of ceiling

$$= 2(l+b)h + l \times b$$
$$= 2(4.5+3)(3.5) + (4.5 \times 3)$$
$$= 52.5 + 13.5$$
$$= 66\,m^2$$

Rate of plastering = Rs $8/m^2$

$$\therefore \text{Cost} = 66 \times 8$$
$$= \text{Rs } 528$$

Q.15 A cuboid has total surface area of $50\,m^2$ and the lateral surface area is $30\,m^2$. Find the area of its base.

Sol: Lateral surface area $= 30\,m^2$

TSA $= 50\,m^2$

docs.aglasem.com

aglasem.com

$\because$ Area of base $= \dfrac{TSA - lSA}{2}$

$= \dfrac{50-30}{2} = \dfrac{20}{2} = 10\,m^2$

Q.16 A class room is 7m long, 6m broad and 3.5 m high. Doors and windows occupy an area of $17\,m^2$. What is the cost of white washing the walls at the rate of Rs 1.50 per m^2?

Sol: length of class room $= 7\,m$,

$b = 6\,m$

$h = 3.5\,m$

Area of four walls $= 2(l+b)h$

$= 2(7+6)(3.5)$

$= 91\,m^2$

Area of doors and windows $= \because \quad 17\,m^2$

$\therefore$ Area to be white washed $= 91\,m^2 - 17\,m^2$

$= 74\,m^2$

Total Cost $= 74 \times 1.50$

$=$ Rs 111

docs.aglasem.com

aglasem.com

Q.17 The central hall of a school is 80 m long, 8 m high. It has 10 doors each of size 3 m × 1.5 m and 10 windows each of size 1.5 m × 1 m. If the cost of white washing the walls of the hall at the rate of Rs 1.20 per m^2 is Rs 2385.60, find the breadth of the hall.

Sol: Rate of white washing = Rs 1.20 / m^2

Cost = Rs 2385.60

∴ Area that is white washed $= \frac{2385.60}{1.20}$

$= 1988\ m^2$

Area of 10 doors $= 10 \times \{3 \times 1.5\}$

$= 45\ m^2$

Area of 10 windows $= 10 \times \{1.5 \times 1\} = 15\ m^2$

∴ Area to be white washed = Area of four walls − {Area of doors + windows}

$\Rightarrow 1988 = 2(l+b)h - \{45+15\}$

$\Rightarrow 1988 = 2(80+b)8 - 60$

$\Rightarrow 1988 + 60 = 16(80+b)$

$\Rightarrow \frac{2048}{16} = 80+b \Rightarrow 80+b = 128$

$\Rightarrow b = 128 - 80$

$= 48\ m$

docs.aglasem.com

aglasem.com