RD SHARMA

Solutions

Class 8 Maths

Chapter 21

Ex 21.3

Exercise - 21.3

1.) We have

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

Surface area of cuboid $= 2(l \times b + b \times h + h \times l)$

$= 2(10 \times 12 + 12 \times 14 + 14 \times 10)\ cm^2$

$= 2(120 + 168 + 140)\ cm^2$

$= 2(428)\ cm^2$

$= 856\ cm^2$

ii) length = 6 dm, breadth = 8 dm, height = 10 dm.

Surface area $= 2(l \times b + b \times h + h \times l) = 2 \times (6 \times 8 + 8 \times 10 + 10 \times 6)\ dm^2$

$= 2(48 + 80 + 60) = 2(188)\ dm^2$

$= 376\ dm^2$

iii) length = 2m, breadth = 4m, height = 5m.

Surface area $= 2(l \times b + b \times h + h \times l) = 2(2 \times 4 + 4 \times 5 + 5 \times 2)\ m^2$

$= 2(8 + 20 + 10)\ m^2 = 2(38)\ m^2$

$= 76\ m^2$

iv) length = 3.2 m, breadth = 30 dm, height = 250 cm.

$\Rightarrow$ breadth $= \frac{30}{10}\ m = 3\ m$, height $= \frac{250}{100}\ m = 2.5\ m$

Surface area $= 2(l \times b + b \times h + h \times l) = 2(3.2 \times 3 + 3 \times 2.5 + 2.5 \times 3.2)\ m^2$

$= 2(9.6 + 7.5 + 8)\ m^2 = 2(25.1)\ m^2$

$= 50.2\ m^2 = 5020\ dm^2$ [$\because 1\ m = 10\ dm$]

2.) We have,

i) side of cube $(l) = 1.2\ m$.

Surface area of cube $= 6l^2 = 6(1.2)^2 = 6 \times 1.44\ m^2$

$= 8.64\ m^2$

ii) Edge of cube $(l) = 27\ cm$.

Surface area $= 6l^2 = 6 \times (27)^2 = 6 \times 729\ cm^2 = 4374\ cm^2$

iii) Edge of cube (l) = 3cm.

Surface area = $6l^2 = 6 \times (3)^2 = 6 \times 9\ cm^2 =$ 54 cm^2

iv) Edge of cube (l) = 6m.

Surface area = $6l^2 = 6 \times (6)^2 = 6 \times 36\ m^2 =$ 216 m^2

v) Edge of cube (l) = 2.1m.

surface area = $6l^2 = 6 \times (2.1)^2 = 6 \times 4.41\ m^2 =$ 26.46 m^2

3.) We have,

cuboidal box of 5cm by 5cm by 4cm.

Surface area of cuboid = $2(l \times b + b \times h + h \times l)$

$= 2(5 \times 5 + 5 \times 4 + 4 \times 5)\ cm^2$

$= 2(25 + 20 + 20)\ cm^2$

$= 2(65)\ cm^2 =$ 130 cm^2

4.) We have

i) Volume of cube = $l^3 = 343\ m^3$

$\Rightarrow l^3 = 7^3\ m^3 \Rightarrow l = 7m$

$\therefore$ Surface area of cube $= 6l^2 = 6(7)^2$

$= 6 \times (49)\ m^2 = \underline{294\ m^2}$

ii) We have,

Volume of cube $= l^3 = 216\ dm^3$

$\Rightarrow l^3 = 6^3\ dm^3 \Rightarrow l = 6\ dm.$

$\therefore$ Surface area $= 6l^2 = 6 \times (6)^2 = 6 \times 36\ dm^2 = \underline{216\ dm^2}$

5.) We have

i) Surface area of cube $= 96\ cm^2$

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

$\Rightarrow l = 4\ cm.$

$\therefore$ Volume of cube $= l^3 = (4)^3\ cm^3 = \underline{64\ cm^3.}$

ii) Surface area of cube $= 150\ m^2$

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

$\Rightarrow l = 5m.$

$\therefore$ Volume of cube $= l^3 = (5)^3\ m^3 = \underline{125\ m^3}$

6.) We have,

Ratio of dimensions $= l : b : h = 5 : 3 : 1$

$\Rightarrow \frac{b}{h} = \frac{3}{1}$ and $\frac{l}{h} = \frac{5}{1}$

$\Rightarrow b = 3h$ and $l = 5h.$

Total surface area $= 2(l \times b + b \times h + h \times l) = 414\ m^2$

$\Rightarrow \quad 2(5h \times 3h + 3h \times h + h \times 5h) = 414\ m^2$

$\Rightarrow \quad 2(15h^2 + 3h^2 + 5h^2) = 414 m^2$

$\Rightarrow \quad 2(23h^2) = 414 m^2 \quad \Rightarrow \quad 46h^2 = 414 m^2$

$\Rightarrow \quad h^2 = \frac{414}{46} m^2 \quad \Rightarrow \quad h^2 = 9m^2$

$\Rightarrow \quad h = 3m.$

$\therefore$ length (l) $= 5h = 5 \times 3 = 15m.$

Breadth (b) $= 3h = 3 \times 3 = 9m$

height (h) $= h = 3m$ are dimensions of cuboid.

7) We have,

length $= 25cm$, breadth $= 0.5m = 0.5 \times 100\ cm = 50\ cm.$

height $= 15cm$ of the box (closed).

Then,

Area of card board required = Total surface area of closed box

$\Rightarrow$ Area of card board required $= 2(l \times b + b \times h \times h \times l)$

$= 2(25 \times 50 + 50 \times 15 + 15 \times 25)$

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

$= 2(2375)$

Area of card board $= 4750\ cm^2.$

8) We have,

Edge of a cubic wooden box $= 12\ cm.$

Surface area of cubic wooden box $= 6l^2 = 6 \times (12)^2\ cm^2$

$= 6(144)\ cm^2$

$= 864\ cm^2$

9.) We have,

dimensions of an oil tin are 26cm x 26cm x 45cm.

let, $l = 26\text{cm}$, $b = 26\text{cm}$, $h = 45\text{cm}$.

Then

Area of tin sheet required for making only one oil tin = Total surface area of oil tin

$$= 2(l \times b + b \times h + h \times l)$$

$$= 2(26 \times 26 + 26 \times 45 + 45 \times 26)\ \text{cm}^2$$

$$= 2(676 + 1170 + 1170) = 2(3016)\ \text{cm}^2$$

Area for 1 tin. $= 6032\ \text{cm}^2$

Then Area of tin sheet required for making 20 tins = 20 × Area for 1 tin

$$= 20 \times 6032\ \text{cm}^2 = \underline{120640\ \text{cm}^2}$$

$$= \frac{120640}{100 \times 100}\ \text{m}^2 = \underline{12.064\ \text{m}^2} \quad \left[\because 1\text{cm} = \tfrac{1}{100}\text{m}\right]$$

But 1m^2 of tin sheet cost Rs. 10.

Then cost of tin sheet for 20 tins

= 10 × Area of tin sheet for 20 tins in m^2

$= 10 \times 12.064\ \text{m}^2$

Cost = 120.64

So, Total cost = Rs. $\underline{120.64}$

10) We have,

Dimensions of class room as 11m x 8m x 5m

where $l = 11m$, $b = 8m$, $h = 5m$.

Then

Area of the floor = $l \times b = 11 \times 8\ m^2 = 88\ m^2$

Area of the four walls (including doors, windows etc)

$= 2(l \times h + b \times h)$

$= 2(11 \times 5 + 8 \times 5)\ m^2 = 2(55 + 40) m^2$

$= 2(95) = 190 m^2$

Then sum of areas of floor and four walls is = Area of floor + Area of four walls

$= 88 + 190 = 278\ m^2$.

11) We have,

Dimensions of swimming pool are 20m x 15m x 3m

where $l = 20m$, $b = 15m$, $h = 3m$.

Then area of floor and walls of swimming pool = $\underbrace{l \times b}_{\text{floor area}} + \underbrace{2(l \times h + b \times h)}_{\text{area of walls}}$

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

$= 300 + 2(60 + 45) = 300 + 2(105) = (300 + 210) m^2$

Area = $510 m^2$

Cost of repairing $1 m^2$ is Rs.25, Then

Cost of repairing floor and walls = 510×25

= R.S. 12750

12.) We have,

perimeter of a floor = 30 m = $2(l+b)$

$\Rightarrow l+b = \frac{30}{2} = 15m$ and height $(h) = 3m$ (given)

Area of four walls of room $= 2(lxh + bxh)$

$= 2h(l+b)$

$= 2 \times 3 \times 15$ $[\because l+b = 15m, \; h = 3m]$

Area of four walls $= 90m^2$

13.) We take,

length $= l$ cm, breadth $= b$ cm and height $= h$ cm of a cuboid.

Then

Area of floor $= lxb = lb\ cm^2$

Product of areas of two adjacent walls

$= (lxh) \times (bxh)$

$= lb\,h^2\ cm^4$

Product of areas of floor and two adjacent walls is

$= lb \times lbh^2\ cm^6$

$= l^2 b^2 h^2\ cm^6$

$= (lbh)^2\ cm^6$

$= (\text{Volume of cuboid})^2$ (Hence proved)

$[\because$ volume of cuboid $= lbh]$.

14) We have,

length (l) = 4.5m, breadth (b) = 3m and

height (h) = 350 cm = $\frac{350}{100}$ m = 3.5 m of a room

Then

Area of ceiling + Area of walls

$= l \times b + 2(l \times h + b \times h)$ [$\because$ floor is not considered]

$= 4.5 \times 3 + 2(4.5 \times 3.5 + 3 \times 3.5)$

$= 13.5 + 2(15.75 + 10.5)$

$= 13.5 + 2(26.25)$

$= 13.5 + 52.5 = 66\ m^2$

Cost of plastering $1m^2$ area is Rs. 8

Then cost of plastering the walls and ceiling of a room = $8 \times$ [area of ceiling + area of walls]

$= 8 \times 66 =$ Rs. 528

$\therefore$ cost of plastering = Rs. 528

15) We have,

Total surface area of cuboid $= 2(l \times b + b \times h + h \times l) = 50\ m^2$

lateral surface area $= 2(l \times h + b \times h) = 30\ m^2$

$= 2h(l + b) = 30\ m^2$

But we have

$2 \times (l \times b) + 2 \times (l \times h + b \times h) = 50\ m^2$

$\Rightarrow 2 \times (l \times b) + 2h(l + b) = 50\ m^2$

$\Rightarrow 2 \times (l \times b) + 30m^2 = 50m^2$

$\Rightarrow 2 \times (l + b) = 50 - 30 = 20m^2$

$\Rightarrow l \times b = \frac{20}{2} m^2 = \underline{10m^2}$

$\therefore$ Area of its base $= l \times b = \underline{10m^2}$

16) We have,

Dimensions of class room as $7m \times 6m \times 3.5m$

where $l = 7m$, $b = 6m$, $h = 3.5m$.

Area of four walls including doors and windows

$= 2(l \times h + b \times h)$

$= 2(7 \times 3.5 + 6 \times 3.5)\ m^2$

$= 2 \times 3.5 \times 13 = \underline{91m^2}$

Then

Area of walls without doors and windows

= (Area including doors and windows) − (Area occupied by doors and windows)

$= 91m^2 - 17\ m^2$ [$\because$ Area occupied by doors and windows is $17m^2$ given]

Area of only walls $= \underline{74m^2}$

Cost of white washing $1m^2$ area of wall is Rs. 1.50

Then,

Total cost of white washing total area of only walls $= 74 \times 1.50 = \underline{Rs.\ 111}$

17.) We have,

Dimensions of central hall of a school, i.e,

length (l) = 80m and height (h) = 8m.

Area of each door = 3m × 1.5m (given)

$= 4.5\ m^2$

Area of each window = $1.5\ m \times 1\ m = 1.5\ m^2$

Area of 10 doors = $10 \times 4.5\ m^2 = 45\ m^2$

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

Area occupied by windows and doors = $45 + 15$

$= 60\ m^2$

Area of the walls of the hall including doors and windows.

$= 2(l \times h + b \times h)$

$= 2(80 \times 8 + b \times 8)\ m^2$

$= 2(640 + 8b)\ m^2$

Then

Area of only walls i.e, without doors and windows

= (Area including doors and walls) − (Area occupied by doors and walls only)

Area of only walls $= \left[\left[2(640 + 8b)\right] - 60\right] m^2$

$= (1280 + 16b - 60)\ m^2 = (1220 + 16b)\ m^2$

Cost of white washing walls is Rs. 1.20 per m^2

So, For $1 m^2$ cost is Rs 1.20

It is given that the total cost of white washing the walls as Rs 2385.60.

So, cost of white washing walls

$= (\text{Area of only walls}) \times Rs\ 1.20$

$= (1220 + 16b) \times 1.20$

So,

$Rs.\ 2385.60 = (1220 + 16b) \times 1.20$

Since, cost of white washing only walls area is Rs 2385.60 and only wall area $= (1220 + 16b)\ m^2$

So,

$(1220 + 16b)\ 1.20 = 2385.60$

$\Rightarrow (1220 + 16b) = \frac{2385.60}{1.20} = 1988$

$\Rightarrow 1220 + 16b = 1988$

$\Rightarrow 16b = 1988 - 1220 = 768\ m.$

$\Rightarrow 16b = 768\ m$

$\Rightarrow b = \frac{768}{16}\ m = \underline{48\ m}$

$\Rightarrow b = 48\ m.$

$\therefore$ Breadth of the hall $= \underline{48\ m}$