Surface Area and volume of cuboid and cube-18.1

1.

Sol:

It is given that

Cuboid length $=80cm=L$

Breath $=40cm=$

Height $=20cm=h$

WKT,

Total surface area $=2[lb+bh+hl]$

$=2\left[(80)(40)+40(20)+20(80)\right]$

$=2[3200+800+1600]$

$=2[5600]$

$=11,200m^2$

Lateral surface area $=2[l+b]h=2[80+40]20$

$=40(120)$

$=4800cm^2$

2.

Sol:

Cube of edge $a=10cm$

WKT,

Cube lateral surface area $=4a^2$

$=4\times10\times10 \quad [\because a=10]$

$=400cm^2$

Total surface area $a=6a^2$

$=6\times(10)^2$

$=600cm^2$

3.

Sol:

Cube total surface area $=6a^2$

Where, $a=$edge of cube

And, lateral surface area $=LSA=4a^2$

Where $a=$ edge of cube

$\therefore$ Ratio of TSA and LSA $= \frac{6a^2}{4a^2}$ is $\frac{3}{2}$ is $3:2$

4.

Sol:

Given that mary wants to paste the paper on the outer surface of the box; The quantity of the paper required would be equal to the surface area of the box which is of the shape of cuboid. The dimension of the box are

Length $(l) = 80cm$ Breath $(b) = 40cm$ and height (h) = 2cm

The surface area of thee box $= 2[lb + bh + hl]$

$= 2[80(40) + 40(20) + 20(80)]$

$= 2(5600) = 11,200cm^2$

The area of the each sheet of paper $= 40 \times 10cm^2$

$= 1600cm^2$

$\therefore$ Number of sheets required $= \frac{Surface\ areaa\ of\ box}{area\ of\ one\ sheet\ of\ paper}$

$= \frac{11,200}{1600} = 7$

5.

Sol:

Total area to be washed $= lb + 2(l + b)h$

Where length $(l) = 5m$

Breath $(b) = 4cm$

Height $(h) = 3cm$

$\therefore$ Total area to be white washed $= (5 \times 4) + 2(5 + 4) \times 3$

$= 20 + 54 = 74m^2$

Now,

Cost of white washing $1m^2$ is Rs $7 \cdot 50$

$\therefore$ Cost of white washing $74m^2$ is $Rs(74 \times 7 \cdot 50)$

$= Rs\ 555$

6.

Sol:

Length of new cuboid $= 3a$

Breadth of cuboid $= a$

Height of new cuboid $= a$

The total surface area of new cuboid

$\Rightarrow (TSA)_1 = 2[lb + bh + hl]$

$\Rightarrow (TSA)_1 = 2[3a \times a + a \times a + 3a \times a]$

$\Rightarrow (TSA)_1 = 14a^2$

Total surface area of three cubes

$\Rightarrow (TSA)_2 = 3 \times 6a^2 = 18a^2$

$\therefore \frac{(TSA)_1}{(TSA)_2} = \frac{14a^2}{18a^2} = \frac{7}{9}$

$\therefore$ Ratio is $7:9$

7.

Sol:

Edge of cube $= 4cm$

Volume of $4cm$ cube $= (4cm)^3 = 64cm^2$

Edge of cube $= 1cm$

Volume of $1cm$ cube $= (1cm)^3 = 1cm^3$

$\therefore$ Total number of small cubes $= \frac{64cm^3}{1cm^3} = 64$

$\therefore$ Total surface area of $64cm$ all cubes

$= 64 \times 6 \times (1cm)^2$

$= 384cm^2$

8.

Sol:

Length of the hall $= 18m$

Width of hall $= 112m$

Now given,

Area of the floor and the flat roof = sum of the areas of four walls.

$\Rightarrow 2lb = 2lh + 2bh$

$\Rightarrow lb = lh + bh$

$\Rightarrow h = \frac{lb}{l+b} = \frac{18 \times 12}{18 + 12} = \frac{216}{30}$

$= 7 \cdot 2m.$

9.

Sol:

Given that

Hameed is giving 5 outer faces of the tank covered with titles he would need to know the surface area of the tank, to decide on the number of tiles required.

Edge of the cubic tank $= 1\cdot 5m = 150cm = a$

So, surface area of tank $= 5\times 150\times 150cm^2$

Area of each square title $= \dfrac{surface\ area\ of\ \tan k}{area\ of\ each\ title}$

$= \dfrac{5\times 150\times 150}{25\times 25} = 180$

Cost of 1 dozen titles i.e., cost of 12 tiles = Rs 360

Therefore, cost of 12 balls titles $= Rs\ 360$

$\therefore$ cost of one tube $= \dfrac{360}{12} = Rs\ 30$

$\therefore$ The cost of 180 tiles $= 180\times Rs\ 30$

$= Rs\ 5,400$

10.

Sol:

Let d be the edge of the cube

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

i.e, $S_1 = 6a^2$

According to problem when edge increased by 50% then the new edge becomes

$= a + \dfrac{50}{100}\times a$

$= \dfrac{3}{2}a$

New surface area becomes $= 6\times \left(\dfrac{3}{2}a\right)^2$

i.e., $S_2 = 6\times \dfrac{9}{4}a^2$

$S_2 = \dfrac{27}{2}a^2$

$\therefore$ Increased in surface Area $= \dfrac{27}{2}a^2 - 6aa^2$

$= \dfrac{15}{2}a^2$

So, increase in surface area $= \dfrac{\frac{15}{2}a^2}{6a^2} \times 100$

$= \dfrac{15}{12} \times 100$

$= 125\%$

11.

Sol:

Let the ratio be x

$\therefore$ length $= 2x$

Breath $= 3x$

Height $= 4x$

$\therefore$ Total surface area $= 2[lb + bh + hl]$

$= 2[6x^2 + 12x^2 + 8x^2]$

$= 52x^2 m^2$

When cost is at Rs 8 per m^2

$\therefore$ Total cost of $52x^2 m^2 = Rs\, 8 \times 52x^2$

$= Rs\ 416x^2$

And when the cost is at $95\, per\ m^2$

$\therefore$ Total cost of $52x^2 m^2 = Rs\ 9 \cdot 5 \times 52x^2$

$= Rs\ 499x^2$

$\therefore$ Different in cost $= Rs\ 494x^2 - Rs\ 416x^2$

$\Rightarrow 1248 = 494x^2 - 416x^2$

$\Rightarrow 78x^2 = 1248$

$\Rightarrow x^2 = 16$

$\Rightarrow x = 4$

12.

Sol:

Given length $= 12m$, Breadth $= 9m$ and Height $= 4m$.

Total surface area of tank $= 2(lb + bh + hl)$

$= 2[12 \times 9 + 9 \times 4 + 12 \times 4]$

$= 2[108 + 36 + 48]$

$= 384m^2$

Now length of iron sheet $= \dfrac{384}{width\ of\ \ iron\ sheet}$

$= \dfrac{384}{2} = 192m.$

Cost of iron sheet = length of sheet $\times$cost rate

$= 192 \times 5 = Rs\ 960.$

13.

Sol:

Given that

Shelter length = 4m

Breadth = 3m

Height = $2 \cdot 5m$

The tarpaulin will be required for to P and four sides of the shelter

Area of tarpaulin in required $= 2(lb + bh + hl)$

$= \left[2(4) \times 2 \cdot 5 + (3 \times 2 \cdot 5)\right] + 4 \times 3\right] m^2$

$= \left[2(10 + 7 \cdot 5) + 12\right] m^2$

$= 47m^2 = 47m^2.$

14.

Sol:

Given

Length $= 1 \cdot 48m = 148cm.$

Breath $= 1 \cdot 16m = 116cm$

Height $= 8 \cdot 3dm = 83cm$

Thickness of wood = 3cm

$\therefore$ inner dimensions:

Length $(148 - 2 \times 3)cm = 142cm$

Breadth $(116 - 2 \times 3)cm = 110cm$

Height $= (83 - 3)cm = 80cm.$

Inner surface area $= 2(l + b) + lb$

$= 2\left[(142) + 100\right)80 + 142 \times 110cm^2$

$= 2(252)[80] + 142 \times 110cm^2 = 55,940cm^2$

$= 559\ 40m^2$

Hence, cost of painting inner surface area

$= 5,5940 \times Rs\ 50$

$= Rs\ 279 \cdot 70$

15.

Sol:

Given that

Length of room = 12m.

Let a height of room be ‘n’ m.

Area of 4 walls $= 2(l+b)\times h$

According to question

$\Rightarrow 2(l+b)\times h \times 1\cdot 35 = 340\cdot 20$

$\Rightarrow 2(12+b)\times h \times 1\cdot 35 = 340\cdot 20$

$\Rightarrow (12+b)\times h = \dfrac{170\cdot 10}{1\cdot 35} = 126 \qquad ....(1)$

Also area of floor $= l \times b$

$\therefore l \times b \times 0\cdot 85 = 91\cdot 80$

$\Rightarrow 12 \times b \times 0\cdot 85 = 91\cdot 80$

$\Rightarrow b = 9m \qquad ......(2)$

Substituting $b = 9m$ in equation (1)

$\Rightarrow (12\times 9)\times h = 126$

$\Rightarrow h = 6m$

16.

Sol:

Given length of room $= 12\cdot 5m$

Breadth of room $= 9m$

Height of room $= 7m$

$\therefore$ Total surface area of 4 walls

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

$= 2(12\cdot 5 + 9)\times 7$

$= 301m^2$

Area of 2 doors $= 2[2\cdot 5 \times 1\cdot 2]$

$= 6m^2$

Area to be painted on 4 walls

$= 301 - (6+6)$

$= 301 - 12 = 289m^2$

$\therefore$ cost of painting $= 289 \times 3 \cdot 50$
$Rs\ 1011 \cdot 5.$

17.

Sol:
Let the length be 4x and breadth be 3x
Height $= 5 \cdot 5m$ [given]
Now it is given that cost of decorating 4 walls at the rate of $Rs\ 6 \cdot 601m^2$ is $Rs\ 5082$
$\Rightarrow$ Area of four walls $\times$rate = total cost of painting
$\Rightarrow 7x = \dfrac{5082}{5 \cdot 5 \times 2 \cdot 6 \times 2}$
$\Rightarrow 7x = 10$
$\Rightarrow x = 10$
Length $= 4x = 4 \times 10 = 40m$
Breadth $= 3x = 3 \times 10 = 30m$

18.

Sol:
External length of book shelf $= 85cm = l$
Breadth $= 25cm$
Height $= 110cm.$
External surface area of shelf while leaving front face of shelf
$= \left(h + 2\left(lb + bh\right)\right.$
$= \left[85 \times 110 + 21\left(85 \times 25 + 25 \times 110\right)\right] cm^2$
$= 19100cm^2$
Area of front face $= \left(85 \times 110 - 75 \times 100 + 2\left(75 \times 5\right)\right) cm^2$
$= 1850 + 750cm^2$
$= 2600cm^2$
Area to be polished $= 19100 + 2600cm^2$
$= 21700cm^2$
Cost of polishing $1cm^2$ area = $Rs\ 0 \cdot 20$
Cost of polishing $21700cm^2$ area $= Rs\left[21700 \times 0 \cdot 20\right]$
$= Rs\ 4340$
Now, length (l), breath (b), height (h) of each row of book shelf is 75cm, 20cm and 30cm
$= \left(\dfrac{110 - 20}{3}\right)$respectively.

Area to be painted in row $= 2(l+h)b+lh$

$= \left[2(75+30)\times 20+75\times 30\right]cm^2$

$= (4200+2250)cm^2$

$= 6450cm^2$

Area to be painted in 3 rows $= (3\times 6450)cm^2$

$= 19350cm^2$

Cost of painting $1cm^2$ $area = Rs\ 0\cdot 10.$

Cost of painting 19350 $area = Rs(19350\times 0\cdot 10) - Rs1935$

Total expense required for polishing and painting the surface of the bookshelf

$= Rs(4340+1935) = Rs\ 6275.$

19.

Sol:

We know that

Total surface area of one brick $= 2(lb+bh+hl)$

$= 2[22\cdot 5\times 10+10\times 7\cdot 5+22\cdot 5\times 75]cm^2$

$= 2[468\cdot 75)cm^2$

$= 937\cdot 5cm^2$

Let n number of bricks be painted by the container

Area of brick $= 937\cdot 50\ cm^2$

Area that can be painted in the container

$= 93755m^2 = 93750\,cm^2$

$93750 = 937\cdot 5n$

$n = 100$

Thus, 100 bricks can be painted out by the container.