NCERT SOLUTIONS
CLASS-IX MATHS
CHAPTER-13 SURFACE AREAS AND VOLUMES

QUESTIONS-:

1. A matchbox measures 5cm × 1cm × 3.5cm. Determine the volume of a packet containing 14 such boxes.

Soln.

Given the dimension of the matchbox = 5cm × 1cm × 3.5cm

Let us assume, l = 5cm, b = 1cm, h = 3.5cm

As we know that, Volume of one matchbox = (l × b × h)

= $(5 \times 1 \times 3.5)\, cm^3 = 17.5 cm^3$

$\therefore The\ volume\ of\ a\ packet\ containing\ 14\ such\ boxes = (17.5 \times 14)\, cm^3 = 245 cm^3$

2. A cuboidal water tank is 10 m long, 2 m wide and 7.5 m deep. How many litres of water can it hold? ($1m^3$ = 1000 l)

Soln.

Dimensions of water tank = 10m × 2m × 7.5m

Let us assume, l = 10m, b = 2m, h = 7.5m

Therefore Volume of the tank = $(l \times b \times h)\, m^3$

= $(10 \times 2 \times 7.5)\, m^3 = 150 m^3$

Hence, the tank can hold = 150 x 1000 litres = 150000 litres of water.

3. A cuboidal vessel is 25 m long and 12 m wide. Determine the height that must be made to hold 400 cubic metres of a liquid.

Soln.

Given, Length = 25 m , Breadth = 12 m and Volume = 400m^3

As we know, Volume of cuboid = Length x Breadth x Height

Therefore, Height = Volume of cuboid/(Length × Breadth)
= $\frac{400}{25 \times 12} m = 1.33 m$

4. ***Find the value of digging a cuboidal pit 15 m long, 5 m broad and 3 m deep at the rate of Rs.50 per m^3.***

Soln.

Here, length = 15m, breadth = 5m and height = 3m

As we know that, Volume of the pit = $(l \times b \times h)\, m^3$

= $(15 \times 5 \times 3)\, m^3 = 225 m^3$

The rate of digging is = Rs.50 per m^3

∴ The total value of digging the pit = Rs.(225 x 50)

= Rs.11250

5. The capacity of a cuboidal tank is 2,10000 litres of water. Calculate the breadth, given that the length is 3.5m and depth is 20m.

Soln.

Given, length = 3.5m, depth = 15m and volume = 30000 litres

As we know that, $1m^3 = 1000\, litres$

$\therefore 210000\, litres = \frac{210000}{1000} m^3$ = $2101 m^3$

Breadth = $\frac{volume\ of\ cuboid}{length \times depth}$

= $\frac{210}{(3.5 \times 20)} m$

= 3m

6. A village, with a population of 6000, requires 200 litres of water per head per day. It has a tank measuring 30m × 25m × 8m. Justify the number of days that will take to empty the water tank.

Soln.

Given, the dimension of the tank = 30m × 25m × 8m

So, l = 30m, b = 25m and h = 8m

As we know that, the total capacity of the tank = $(30 \times 25 \times 8)\, m^3 = 6000 m^3$

Water required for a single person per day = 200 litres

The requirement of water for 6000 person in a single day = (6000 x 200) litres

= $\frac{(6000 \times 200)}{1000} = 1200 m^3$

Hence, the number of days the water will last = (the capacity of the tank /water required per day) = $\left(\frac{6000}{1200}\right) = 5$

∴ The water lasts for 5 days.

7. A warehouse measures 50m × 35m × 25m. Calculate the maximum number of wooden boxes each measuring 2.5m × 1.5m × 1m that can be stored in the warehouse.

Soln.

Given the dimensions of the warehouse = 50m x 35m x 25m

As we know that, the volume of the warehouse will be = $(lbh)\, m^3$

= $(50 \times 35 \times 25)\, m^3 = 43750 m^3$

Now, the dimension of box = 2.5m x 1.5m x 1m

Similarly, volume of 1 box = $(2.5 \times 1.5 \times 1)\, m^3 = 3.75 m^3$

Hence, Number of box that can be stored = volume of warehouse / volume of 1 box = $\frac{43750}{3.75} = 11666.666 = 11666$

8. A solid cuboid having side 20 cm is cut into 16 cubes of equal volume. Calculate the side of the new cuboid and also calculate the ratio between their surface areas.

Soln.

Here the edge of the cube = 20cm

So, Volume of the cuboid = $(edge)^3 cm^3$

= $(20 \times 20 \times 20)\, cm^3 = 8000 cm^3$

Now, The number of smaller cube = 16

So, the volume of 1 small cube = $\frac{8000}{16} cm^3 = 500 cm^3$

Let us assume the side of small cube as 'p'

$p^3 = 500 \ \Rightarrow p = 7.937\ (approx)$

Hence, the surface area the cube = $7.937(side)^2$

Therefore, the ratio of their surface area

= (7.937 x 20 x 20)/(7.937 x 7.937 x 7.937)

= $\frac{40}{1.585}$ = 40 :1.585

9. A river 5 m deep and 60 m wide is flowing at a rate of 6 km per hour. Estimate the amount of water that will fall into the sea in a minute.

Soln.

Given, Depth (h) = 5m

Width (b) = 60m

So, the rate of flow of water (l) = 6km per hour= $\left(\frac{6000}{60}\right) m\ per\ minute = 100 m\ per\ minute$

Therefore, the volume of water flowing into the sea in a minute = $lbh\, m^3$

$(100 \times 60 \times 5)\, m^3 = 30000 m^3$