# Surface Areas and Volumes

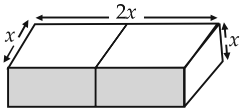
CHAPTER 13

NCERT FOCUS

## SOLUTIONS

### EXERCISE - 13.1

**1.** Let the edge of each cube = $x$




Given, volume of each cube

$= 64\text{ cm}^3$

$\therefore \quad x^3 = 64\text{ cm}^3$

$\Rightarrow \quad x = 4\text{ cm}$

Now, length of the resulting cuboid ($l$) = $2x$ cm = 8 cm

Breadth of the resulting cuboid ($b$) = $x$ cm = 4 cm

Height of the resulting cuboid ($h$) = $x$ cm = 4 cm

$\therefore$ Surface area of the cuboid = $2\,(lb + bh + hl)$

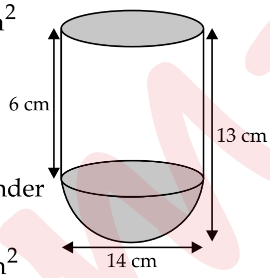
$= 2\,[(8 \times 4) + (4 \times 4) + (4 \times 8)]\text{ cm}^2$

$= 2\,[32 + 16 + 32]\text{ cm}^2 = 2\,[80]\text{ cm}^2 = 160\text{ cm}^2$

**2.** For hemispherical part, radius ($r$) $= \dfrac{14}{2} = 7\text{ cm}$

$\therefore$ Curved surface area of hemisphere = $2\pi r^2$

$$= 2 \times \frac{22}{7} \times 7 \times 7\text{cm}^2 = 308\text{ cm}^2$$




Total height of vessel = 13 cm

$\therefore$ Height of cylinder

$= (13 - 7)\text{ cm} = 6\text{ cm}$

and radius($r$) = 7 cm

$\therefore$ Curved surface area of cylinder

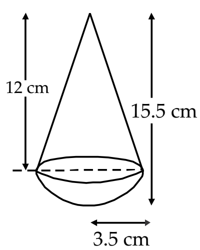
$= 2\pi rh$

$$= 2 \times \frac{22}{7} \times 7 \times 6\text{cm}^2 = 264\text{cm}^2$$

$\therefore$ Inner surface area of vessel $= (308 + 264)\text{ cm}^2$

$= 572\text{ cm}^2$

**3.** Given radius of cone ($r$)




= radius of hemisphere ($r$)

= 3.5 cm

Height of cone ($h$) = (15.5 – 3.5) cm

= 12 cm

Also, slant height ($l$) = $\sqrt{h^2 + r^2}$

$= \sqrt{12^2 + (3.5)^2} = \sqrt{156.25}$

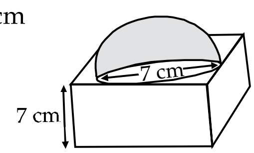
= 12.5 cm

Total surface area of the toy = curved surface area of conical part + curved surface area of hemispherical part

$$= \pi rl + 2\pi r^2 = \pi r\,(l + 2r) = \frac{22}{7} \times \frac{35}{10}(12.5 + 2 \times 3.5)\text{ cm}^2$$

$= 11 \times (12.5 + 7)\text{ cm}^2 = 11 \times 19.5\text{ cm}^2 = 214.5\text{ cm}^2$

**4.** Let side of the block, ($a$) = 7 cm




$\therefore$ The greatest diameter of the hemisphere = 7 cm

Radius of hemisphere, ($r$)

= 7/2 cm

Surface area of the solid

= [Total surface area of the cubical block]

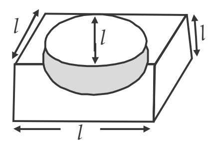
+ [Curved surface of the hemisphere]

– [Base area of the hemisphere]

$= (6 \times a^2) + 2\pi r^2 - \pi r^2$

$$= 6a^2 + \pi r^2 = (6 \times 7^2) + \left(\frac{22}{7} \times \frac{7}{2} \times \frac{7}{2}\right) = \left(294 + \frac{77}{2}\right) = 332.5\text{ cm}^2$$

**5.** Given, side of the cube = diameter of the hemisphere = $l$




$\Rightarrow$ Radius of the hemisphere $= \dfrac{l}{2}$

$\therefore$ Surface area of hemisphere = $2\pi r^2$

$$= 2 \times \pi \times \frac{l}{2} \times \frac{l}{2} = \frac{\pi l^2}{2}\text{ sq. units}$$

Base area of the hemisphere $= \pi\left(\dfrac{l}{2}\right)^2 = \dfrac{\pi l^2}{4}$ sq. units

Surface area of the cube = $6 \times l^2 = 6l^2$ sq. units

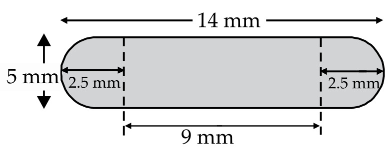
$\therefore$ Surface area of the remaining solid

$$= 6l^2 + \frac{\pi l^2}{2} - \frac{\pi l^2}{4} = \frac{24l^2 + 2\pi l^2 - \pi l^2}{4} = \frac{24l^2 + \pi l^2}{4}$$

$$= \frac{l^2}{4}(24 + \pi)\text{ sq.units.}$$

**6.** Radius of the hemispherical part ($r$) $= \dfrac{5}{2}$mm

= 2.5 mm




Curved surface area of one hemispherical part = $2\pi r^2$

$\therefore$ Surface area of both hemispherical parts

$$= 2(2\pi r^2) = 4\pi r^2 = 4 \times \frac{22}{7} \times \left(\frac{25}{10}\right)^2\text{ mm}^2$$

$$= 4 \times \frac{22}{7} \times \frac{25}{10} \times \frac{25}{10}\text{mm}^2$$

Entire length of capsule = 14 mm

$\therefore$ Length of cylindrical part = 14 – 2 × 2.5 = 9 mm

$\therefore$ Area of cylindrical part = $2\pi rh$

$$= 2 \times \frac{22}{7} \times 2.5 \times 9\text{ mm}^2 = 2 \times \frac{22}{7} \times \frac{25}{10} \times 9\text{ mm}^2$$

$\therefore$ Total surface area of capsule

$$= \left[2 \times \frac{22}{7} \times \frac{25}{10} \times 9\right] + \left[4 \times \frac{22}{7} \times \frac{25}{10} \times \frac{25}{10}\right]\text{mm}^2$$

$$=\left(2\times\frac{22}{7}\times\frac{25}{10}\right)\left[9+\frac{50}{10}\right]\text{mm}^2=\frac{44\times25}{70}\times14\text{ mm}^2=220\text{ mm}^2$$

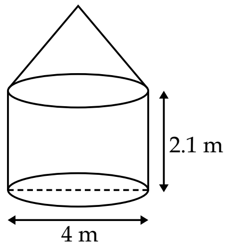
**7.** For cylindrical part :

Radius $(r)=\frac{4}{2}\text{m}=2\text{m}$ and

height $(h)$ = 2.1 m

$\therefore$ Curved surface area

$=2\pi rh=2\times\frac{22}{7}\times2\times\frac{21}{10}\text{m}^2$




For conical part :

Slant height $(l)$ = 2.8 m and base radius $(r)$ = 2 m

$\therefore$ Curved surface area $=\pi rl=\frac{22}{7}\times2\times\frac{28}{10}\text{m}^2$

$\therefore$ Total surface area

= [Curved surface area of the cylindrical part] + [Curved surface area of conical part]

$$=\left[2\times\frac{22}{7}\times2\times\frac{21}{10}\right]+\left[\frac{22}{7}\times2\times\frac{28}{10}\right]\text{m}^2$$

$$=2\times\frac{22}{7}\left[\frac{42}{10}+\frac{28}{10}\right]\text{m}^2=2\times\frac{22}{7}\times\frac{70}{10}\text{ m}^2=44\text{ m}^2$$

$\because$ Cost of 1 $\text{m}^2$ of canvas = ₹ 500

$\therefore$ Cost of 44 $\text{m}^2$ of canvas = ₹ (500 × 44) = ₹ 22000.

**8.** For cylindrical part :

Height $(h)$ = 2.4 cm and

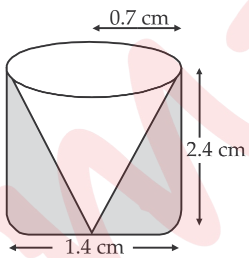
diameter = 1.4 cm

$\Rightarrow$ Radius $(r)$ = 0.7 cm

$\therefore$ Total surface area of the cylindrical part

$=2\pi rh+2\pi r^2=2\pi r\,[h+r]$

$=2\times\frac{22}{7}\times\frac{7}{10}[2.4+0.7]$




$$=\frac{44}{10}\times3.1=\frac{44\times31}{100}=\frac{1364}{100}\text{cm}^2$$

For conical part :

Base radius $(r)$ = 0.7 cm and height $(h)$ = 2.4 cm

$\therefore$ Slant height $(l)=\sqrt{r^2+h^2}=\sqrt{(0.7)^2+(2.4)^2}$

$=\sqrt{0.49+5.76}=\sqrt{6.25}=2.5\text{ cm}$

$\therefore$ Curved surface area of the conical part

$$=\pi rl=\frac{22}{7}\times0.7\times2.5\text{ cm}^2=\frac{550}{100}\text{cm}^2$$

Base area of the conical part

$$=\pi r^2=\frac{22}{7}\times\left(\frac{7}{10}\right)^2\text{cm}^2=\frac{22\times7}{100}\text{cm}^2=\frac{154}{100}\text{cm}^2$$

Total surface area of the remaining solid

= [(Total surface area of cylindrical part)

+ (Curved surface area of conical part)

– (Base area of the conical part)]

$$=\left[\frac{1364}{100}+\frac{550}{100}-\frac{154}{100}\right]\text{cm}^2=\frac{1760}{100}\text{cm}^2=17.6\text{ cm}^2.$$

Hence, total surface area to the nearest $\text{cm}^2$ is 18 $\text{cm}^2$.

**9.** Radius of the cylinder $(r)$ = 3.5 cm

Height of the cylinder $(h)$ = 10 cm

$\therefore$ Curved surface area = $2\pi rh$

$$=2\times\frac{22}{7}\times\frac{35}{10}\times10\text{cm}^2=220\text{cm}^2$$

Curved surface area of a hemisphere = $2\pi r^2$

$\therefore$ Curved surface area of both hemispheres

$$=2\times2\pi r^2=4\pi r^2=4\times\frac{22}{7}\times\frac{35}{10}\times\frac{35}{10}\text{cm}^2=154\text{ cm}^2$$

Total surface area of the remaining solid

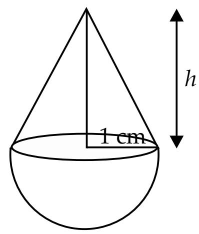
= (220 + 154) $\text{cm}^2$ = 374 $\text{cm}^2$

## EXERCISE - 13.2

**1.** Here, $r=1$ cm and $h=1$ cm.

Volume of the conical part $=\frac{1}{3}\pi r^2h$

and volume of the hemispherical part $=\frac{2}{3}\pi r^3$



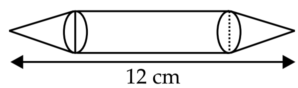

$\therefore$ Volume of the solid shape

$$=\frac{1}{3}\pi r^2h+\frac{2}{3}\pi r^3=\frac{1}{3}\pi r^2[h+2r]$$

$$=\frac{1}{3}\pi(1)^2[1+2(1)]\text{ cm}^3=\frac{1}{3}\pi\times1\times3\text{ cm}^3=\pi\text{ cm}^3$$

**2.** Here, diameter = 3 cm

$\Rightarrow$ Radius $(r)=\frac{3}{2}$ cm




Total height = 12 cm

Height of a cone $(h)$ = 2 cm

$\therefore$ Height of both cones = 2 × 2 = 4 cm

$\Rightarrow$ Height of the cylinder $(h_1)$ = (12 – 4) cm = 8 cm

Now, volume of the cylindrical part = $\pi r^2h$

Volume of both conical parts $=2\left[\frac{1}{3}\pi r^2h\right]$

$\therefore$ Volume of the whole model

$$=\pi r^2h_1+\frac{2}{3}\pi r^2h=\pi r^2\left[h_1+\frac{2}{3}h\right]$$

$$=\frac{22}{7}\times\left(\frac{3}{2}\right)^2\left[8+\frac{2}{3}(2)\right]=\frac{22}{7}\times\frac{9}{4}\times\left(\frac{24+4}{3}\right)$$

$$=\frac{22}{7}\times\frac{9}{4}\times\frac{28}{3}\text{cm}^3=66\text{ cm}^3.$$

**3.** Since, a gulab jamun is like a cylinder with hemispherical ends.

Total height of the gulab jamun = 5 cm.

Diameter = 2.8 cm $\Rightarrow$ Radius $(r)$ = 1.4 cm

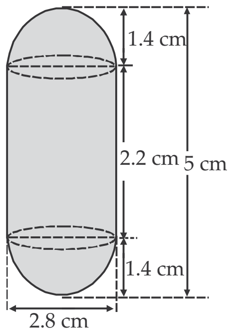
$\therefore$ Length (height) of the cylindrical part $(h)$

= 5 cm – (1.4 + 1.4) cm = 5 cm – 2.8 cm = 2.2 cm

Now, volume of the cylindrical part = $\pi r^2h$

and volume of both the hemispherical ends

$= 2\left(\frac{2}{3}\pi r^3\right) = \frac{4}{3}\pi r^3$




$\therefore$ Volume of a gulab jamun

$= \pi r^2 h + \frac{4}{3}\pi r^3 = \pi r^2\left[h + \frac{4}{3}r\right]$

$= \frac{22}{7} \times (1.4)^2\left[2.2 + \frac{4}{3}(1.4)\right]$

$= \frac{22}{7} \times \frac{14}{10} \times \frac{14}{10}\left[\frac{22}{10} + \frac{56}{30}\right]$

$= \frac{22 \times 2 \times 14}{10 \times 10}\left[\frac{66+56}{30}\right] = \frac{44 \times 14}{100} \times \frac{122}{30}\text{cm}^3$

Volume of 45 gulab jamuns

$= 45 \times \left[\frac{44 \times 14}{100} \times \frac{122}{30}\right] = \frac{15 \times 44 \times 14 \times 122}{1000}\text{cm}^3$

Since, the quantity of syrup in gulab jamuns

$= 30\%$ of [volume] $= 30\%$ of $\left[\frac{15 \times 44 \times 14 \times 122}{1000}\right]$

$= \frac{30}{100} \times \frac{15 \times 44 \times 14 \times 122}{1000} = 338.184\text{ cm}^3$

$= 338\text{ cm}^2$ (approx.)

**4.** Dimensions of the cuboid are 15 cm, 10 cm and 3.5 cm.

$\therefore$ Volume of the cuboid $= 15 \times 10 \times \frac{35}{10} = 525\text{ cm}^3$

Since each depression is conical in shape with base radius ($r$) = 0.5 cm and depth ($h$) = 1.4 cm.

$\therefore$ Volume of each depression

$= \frac{1}{3}\pi r^2 h = \frac{1}{3} \times \frac{22}{7} \times \left(\frac{5}{10}\right)^2 \times \frac{14}{10} = \frac{11}{30}\text{cm}^3$

Since there are 4 depressions.

$\therefore$ Total volume of 4 depressions $= 4 \times \frac{11}{30} = \frac{44}{30}\text{cm}^3$

Now, volume of the wood in entire stand

= [Volume of the wooden cuboid]

– [Volume of 4 depressions]

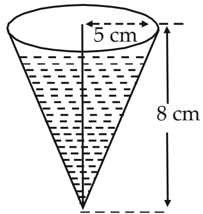
$= 525 - \frac{44}{30} = \frac{15750 - 44}{30} = \frac{15706}{30} = 523.53\text{ cm}^3$

**5.** Height of the conical vessel ($h$) = 8 cm

Base radius ($r$) = 5 cm

Volume of water in conical vessel

$= \frac{1}{3}\pi r^2 h = \frac{1}{3} \times \frac{22}{7} \times (5)^2 \times 8 = \frac{4400}{21}\text{cm}^3$




Now, total volume of lead shots

$= \frac{1}{4}$ of [Volume of water in the cone]

$= \frac{1}{4} \times \frac{4400}{21} = \frac{1100}{21}\text{cm}^3$

Since, radius of spherical lead shot ($r$) = 0.5 cm

$\therefore$ Volume of 1 lead shot $= \frac{4}{3}\pi r^3$

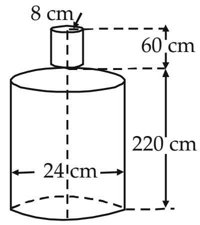
$= \frac{4}{3} \times \frac{22}{7} \times \frac{5}{10} \times \frac{5}{10} \times \frac{5}{10}\text{cm}^3$

$\therefore$ Number of lead shots $= \frac{\text{Total volume of lead shots}}{\text{Volume of 1 lead shot}}$

$= = \frac{\left[\frac{1100}{21}\right]}{\left[\frac{4 \times 22 \times 5 \times 5 \times 5}{3 \times 7 \times 1000}\right]} = 100$

Thus, the required number of lead shots = 100

**6.** Height of the big cylinder ($h$) = 220 cm




Base radius ($r$) $= \frac{24}{2}\text{cm} = 12\text{ cm}$

$\therefore$ Volume of the big cylinder

$= \pi r^2 h = \pi(12)^2 \times 220\text{ cm}^3$

Also, height of smaller cylinder ($h_1$)

= 60 cm

Base radius ($r_1$) = 8 cm

$\therefore$ Volume of the smaller cylinder $= \pi r_1^2 h_1 = \pi(8)^2 \times 60\text{ cm}^3$

$\therefore$ Volume of iron pole = [Volume of big cylinder]

+ [Volume of the smaller cylinder]

$= (\pi \times 220 \times 12^2 + \pi \times 60 \times 8^2)\text{ cm}^3$

$= 3.14[220 \times 12 \times 12 + 60 \times 8 \times 8]\text{ cm}^3$

$= \frac{314}{100}[220 \times 144 + 60 \times 64]\text{ cm}^3$

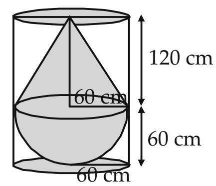
$= \frac{314}{100}[31680 + 3840]\text{ cm}^3 = \frac{314}{100} \times 35520\text{ cm}^3$

Mass of pole $= \frac{8 \times 314 \times 35520}{100}\text{g} = \frac{89226240}{100}\text{g}$

$= \frac{8922624}{10000}\text{kg} = 892.2624\text{ kg} = 892.26\text{ kg}.$

**7.** Height of the conical part ($h$)

= 120 cm.




Base radius of the conical part ($r$)

= 60 cm.

$\therefore$ Volume of the conical part

$= \frac{1}{3}\pi r^2 h = \frac{1}{3} \times \frac{22}{7} \times 60^2 \times 120\text{ cm}^3$

Radius of the hemispherical part ($r$) = 60 cm

$\therefore$ Volume of the hemispherical part

$= \frac{2}{3}\pi r^3 = \frac{2}{3} \times \frac{22}{7} \times (60)^3\text{cm}^3$

$\therefore$ Volume of the solid = [Volume of conical part]

+ [Volume of hemispherical part]

$= \left[\frac{1}{3} \times \frac{22}{7} \times 60^2 \times 120\right] + \left[\frac{2}{3} \times \frac{22}{7} \times 60^3\right]$

$= \frac{2}{3} \times \frac{22}{7} \times 60^2[60 + 60]$

$= \frac{2}{3} \times \frac{22}{7} \times 60 \times 60 \times 120 = \frac{6336000}{7}\text{ cm}^3$

Radius of cylinder ($r_1$) = 60 cm

and, Height of cylinder ($h_1$) = 180 cm

Volume of the cylinder = $\pi r_1^2 h_1$

$$= \frac{22}{7} \times 60^2 \times 180 = \frac{14256000}{7} \text{cm}^3$$

$\Rightarrow$ Volume of water in the cylinder $= \frac{14256000}{7} \text{cm}^3$

$\therefore$ Volume of the water left in the cylinder

$$= \left[\frac{14256000}{7} - \frac{6336000}{7}\right] = \frac{7920000}{7}$$

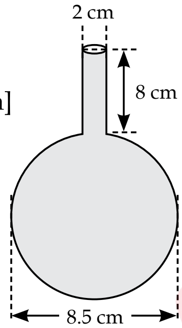
$= 1131428.571 \text{ cm}^3 = \frac{1131428.571}{1000000} \text{m}^3$

$= 1.131428571 \text{ m}^3 = 1.131 \text{ m}^3$ (approx).

**8.** Volume of the cylindrical part = $\pi r^2 h$

$= 3.14 \times 1^2 \times 8 = \frac{314}{100} \times 8 \text{ cm}^3$

$[\because \text{Radius}(r) = \frac{2}{2} = 1 \text{ cm}, \text{height}(h) = 8 \text{ cm}]$




Radius of spherical part $(r_1) = \frac{8.5}{2}$ cm

Volume of the spherical part $= \frac{4}{3}\pi r_1^3$

$$= \frac{4}{3} \times \frac{314}{100} \times \frac{85}{20} \times \frac{85}{20} \times \frac{85}{20} \text{cm}^3$$

Total volume of the glass-vessel

$$= \left[\frac{314}{100} \times 8\right] + \left[\frac{4}{3} \times \frac{314}{100} \times \frac{85 \times 85 \times 85}{8000}\right]$$

$$= \frac{314}{100}\left[8 + \frac{4 \times 85 \times 85 \times 85}{24000}\right] = \frac{314}{100}\left[8 + \frac{614125}{6000}\right]$$

$$= \frac{314}{100}\left[\frac{48000 + 614125}{6000}\right] = \frac{314}{100}\left[\frac{662125}{6000}\right]$$

$= 346.51 \text{ cm}^3$ (approx.)

$\Rightarrow$ Volume of water in the vessel = $346.51 \text{ cm}^3$

Since, the child finds the volume as $345 \text{ cm}^3$

$\therefore$ The child's answer is not correct

The correct answer is $346.51 \text{ cm}^3$.

## EXERCISE - 13.5

**1.** Since, diameter of the cylinder = 10 cm

$\therefore$ Radius of the cylinder $(r)$ = 10/2 cm = 5 cm

$\Rightarrow$ Length of wire in one round = $2\pi r$

= 2 × 3.14 × 5 cm = 31.4 cm

$\because$ Diameter of wire = 3 mm = 3/10 cm

$\therefore$ The thickness of cylinder covered in one round = 3/10 cm

$\Rightarrow$ Number of rounds (turns) of the wire to cover

$$12 \text{ cm} = \frac{12}{3/10} = 12 \times \frac{10}{3} = 40$$

$\therefore$ Length of wire required to cover the whole surface = Length of wire required to complete 40 rounds

$l$ = 40 × 31.4 cm = 1256 cm

Now, radius of the wire $= \frac{3}{2}\text{mm} = \frac{3}{20}\text{cm}$

$\therefore$ Volume of wire $= \pi r^2 l = 3.14 \times \frac{3}{20} \times \frac{3}{20} \times 1256 \text{ cm}^3$

$\because$ Density of wire = $8.88 \text{ g/cm}^3$

$\therefore$ Weight of the wire = [Volume of the wire] × density

$$= \left[3.14 \times \frac{3}{20} \times \frac{3}{20} \times 1256\right] \times 8.88 \text{ g}$$

$$= 3.14 \times \frac{3}{20} \times \frac{3}{20} \times 1256 \times \frac{888}{100} \text{g}$$

= 787.97 g = 788 g (approx.)

**2.** Let us consider the right $\Delta BAC$, right angled at $A$ such that $AB$ = 3 cm and $AC$ = 4 cm.

$\therefore$ Hypotenuse $BC = \sqrt{3^2 + 4^2} = 5 \text{ cm}$

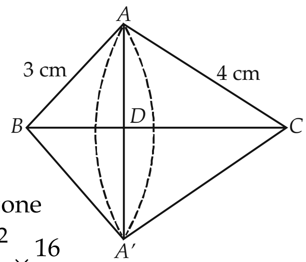
Obviously, we have obtained two cones on the same base $AA'$ such that radius = $DA$ or $DA'$

Now, $\frac{AD}{CA} = \frac{AB}{CB}$ $\qquad [\because ADB \sim \Delta CAB]$

$\Rightarrow \frac{AD}{4} = \frac{3}{5} \Rightarrow AD = \frac{3}{5} \times 4 = \frac{12}{5}\text{cm}$

Also, $\frac{DB}{AB} = \frac{AB}{CB} \Rightarrow \frac{DB}{3} = \frac{3}{5}$

$\Rightarrow DB = \frac{3 \times 3}{5} = \frac{9}{5}\text{cm}$




Since, $CD = BC - DB$

$\Rightarrow CD = 5 - \frac{9}{5} = \frac{16}{5}\text{cm}$

Now, volume of the double cone

$$= \frac{1}{3}\pi \times \left(\frac{12}{5}\right)^2 \times \frac{9}{5} + \frac{1}{3}\pi \times \left(\frac{12}{5}\right)^2 \times \frac{16}{5}$$

$$= \frac{1}{3}\pi \times \left(\frac{12}{5}\right)^2 \left[\frac{9}{5} + \frac{16}{5}\right] = \frac{1}{3} \times \frac{314}{100} \times \frac{144}{25} \times 5 = 30.14 \text{ cm}^3$$

Surface area of the double cone = $\pi r l_1 + \pi r l_2$

$$= \left(\pi \times \frac{12}{5} \times 3\right) + \left(\pi \times \frac{12}{5} \times 4\right) = \pi \times \frac{12}{5}[3 + 4]$$

$$= \frac{314}{100} \times \frac{12}{5} \times 7 = 52.75 \text{ cm}^2$$

**3.** $\because$ Dimensions of the cistern are 150 cm, 120 cm and 110 cm.

$\therefore$ Volume of the cistern = 150 × 120 × 110 = $1980000 \text{ cm}^3$

Volume of water contained in the cistern = $129600 \text{ cm}^3$

$\therefore$ Free space (volume) which is not filled with water = 1980000 – 129600 = $1850400 \text{ cm}^3$

Now, volume of one brick = 22.5 × 7.5 × 6.5 = $1096.875 \text{ cm}^3$

$\therefore$ Volume of water absorbed by one brick

$$= \frac{1}{17} \times 1096.875 \text{ cm}^3$$

Let $n$ bricks can be put in the cistern.

$\therefore$ Volume of water absorbed by $n$ bricks

$$= \frac{n}{17} \times 1096.875 \text{cm}^3$$

$\therefore$ Volume occupied by $n$ bricks = Free space in the cistern + Volume of water absorbed by $n$-bricks

$\Rightarrow \quad n \times (1096.875) = 1850400 + \frac{n}{17}(1096.875)$

$\Rightarrow \quad 1096.875\, n - \frac{n}{17}(1096.875) = 1850400$

$\Rightarrow \quad \left(n - \frac{n}{17}\right) \times 1096.875 = 1850400$

$\Rightarrow \quad \frac{16}{17}n = \frac{1850400}{1096.875} \Rightarrow n = \frac{1850400}{1096.875} \times \frac{17}{16}$

$\Rightarrow \quad n = 1792.4102 \approx 1792$

Thus, 1792 bricks can be put in the cistern.

**4.** Volume of three rivers

= 3 {(Surface area of a river) × Depth}

$= 3\left\{\left(1072 \text{ km} \times \frac{75}{1000} \text{ km}\right) \times \frac{3}{1000} \text{ km}\right\}$

$= 3\left\{\frac{241200}{1000000} \text{ km}^3\right\} = 0.7236 \text{ km}^3$

Volume of rainfall

= (Surface area of valley) × (Height of rainfall)

$= 97280 \times \frac{10}{100 \times 1000} \qquad \left[\because 10 \text{ cm} = \frac{10}{100 \times 1000} \text{ km}\right]$

$= \frac{9728}{1000} \text{ km}^3 = 9.728 \text{ km}^3$

Thus, amount of rainfall in 1 fortnight *i.e.*, 14 days is 9.728 km$^3$.

$\therefore$ Amount of rainfall in 1 day = 9.728/14 = 0.6949 km$^3$

Since, 0.6949 km$^3$ $\approx$ 0.7236 km$^3$

$\therefore$ The additional water in the three rivers is equivalent to the total rainfall.