Chapter 16 : Surface Area and Volume

ANSWER KEYS

EXERCISE 16.1

1. Total surface area of a cuboid = 2 ($lb + bh + hl$)

(i) Total surface area of the cuboid

$= 2(14 \times 9 + 9 \times 10 + 10 \times 14)$ cm^2

$= 2(126 + 90 + 140)$ cm^2

$= 2 \times 356$ cm^2

$= 712$ cm^2

(ii) Total surface area of the cuboid

$= 2(12 \times 10 + 10 \times 8 + 8 \times 12)$ cm^2

$= 2(120 + 80 + 96)$ cm^2

$= 2 \times 296$ cm^2

$= 592$ cm^2

(iii) Total surface area of cuboid

$= 2(16 \times 14 + 14 \times 18 + 18 \times 16)$ cm^2

$= 2(224 + 252 + 288)$ cm^2

$= 2 \times 76$ cm^2

$= 1528$ cm^2

2. Since, lateral surface area of a cube = $4l^2$

and total surface area of a cube = $6l^2$

where l is the length of side.

(i) Lateral surface area of the cube $= 4 \times (12 \text{ cm})^2$

$= 4 \times 144$ cm^2

$= 576$ cm^2

Total surface area of the cube $= 6 \times (12 \text{ cm})^2$

$= 6 \times 144$ cm^2

$= 864$ cm^2

(ii) Lateral surface area of the cube $= 4 \times (1.5 \text{ m})^2$

$= 4 \times 2.25$ m^2

$= 9$ m^2

Total surface area of the cube $= 6 \times (1.5 \text{ m})^2$

$= 6 \times 2.25$ m^2

$= 13.5$ m^2

(iii) Lateral surface area of the cube $= 4 \times (2.1 \text{ m})^2$

$= 4 \times 4.41$ m^2

$= 17.64$ m^2

Total surface area of the cube $= 6 \times (2.1 \text{ m})^2$

$= 6 \times 4.41$ m^2

$= 26.46$ m^2

3. Surface area of the cube = $6l^2$.

(i) Surface area of the cube $= 6 \times (4 \text{ m})^2$

$= 6 \times 16$ m^2

$= 96$ m^2

(ii) Surface area of the cube $= 6 \times (2.5 \text{ m})^2$

$= 6 \times 6.25$ m^2

$= 37.5$ m^2

(iii) Surface area of the cube $= 6 \times (1.2 \text{ m})^2$

$= 6 \times 1.44$ m^2

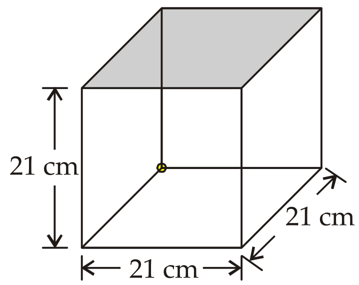
$= 8.64$ m^2

(iv) Surface area of the cube $= 6 \times (3.5 \text{ m})^2$

$= 6 \times 12.25$ m^2

$= 73.5$ m^2

4. For box A (cube) : $l = 21$ cm



Box A

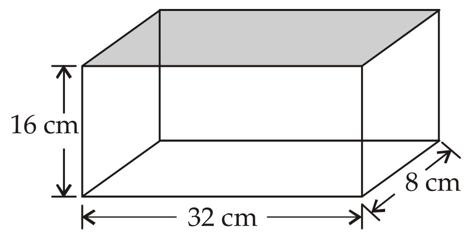
Total surface area of box A (cube) $= 6l^2$

$= 6(21 \text{ cm})^2$

$= 6 \times 441$ cm^2

$= 2646$ cm^2

For Box B (Cuboid) : $l = 32$ cm, $b = 8$ cm, $h = 16$ cm



Box B

Total surface area of box B (cuboid) $= 2(lb + bh + hl)$

$= 2(32 \times 8 + 8 \times 16 + 16 \times 32)$ cm^2

$= 2(256 + 128 + 512)$ cm^2

$= 2 \times 896$ cm^2

$= 1792$ cm^2

Total surface area of box B is less than that of box A.

Hence, box B (cuboid) will require lesser amount (1792 cm^2) of material.

5. Let the side of the cube be l cm.

$\because$ Surface area of a cube $= 6l^2$

Surface area of cube = 5400 sq. cm

$\therefore \quad 6l^2 = 5400$

$\Rightarrow \quad l^2 = \frac{5400}{6}$

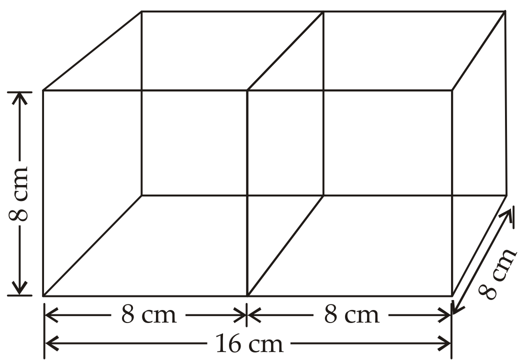
$\Rightarrow \quad l^2 = 900$

$\Rightarrow \quad l = \sqrt{900}$

$\Rightarrow \quad l = 30$

Hence, the length of the side of the cube is 30 cm.

6. Two cubes of side 8 cm each are joined end to end. Then the resultant shape is a cuboid.



Length of the resulting cuboid, $l = (8 + 8)$ cm = 16 cm

Breadth of the resulting cuboid, $b = 8$ cm

Height of the resulting cuboid, $h = 8$ cm

Surface area of the resulting cuboid $= 2(lb + bh + hl)$

$= 2(16 \times 8 + 8 \times 8 + 8 \times 16)$ cm^2

$= 2(128 + 64 + 128)$ cm^2

$= 2 \times 320$ cm^2

$= 640$ cm^2

$\therefore$ Surface area of the resulting cuboid is 640 cm^2.

7. Let the length of side of a cube be l cm.

If two equal cubes of side l cm are placed adjointly in a row, then the resultant shape is a cuboid.

Length of the resulting cuboid $= l + l = 2l$

Breadth of the resulting cuboid, $b = l$

Height of the resulting cuboid, $h = l$

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

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

$= 2(2l^2 + l^2 + 2l^2)$

$= 2 \times 5l^2 = 10l^2$

Surface area of resulting cuboid $= 10l^2$ sq. cm

Surface area of a cube $= 6l^2$

Surface area of 2 cubes $= 2 \times 6l^2 = 12l^2$

Ratio between surface area of cuboid to the sum of surface area of two cube $= \frac{10l^2}{12l^2} = \frac{10}{12} = \frac{5}{6} = 5 : 6$.

8. Length of the box, $l = 2.5$ m,

Breadth of the box, $b = 2$ m,

Height of the box, $h = 1$ m

Required area = Total surface area of the box – Area of the base of the box.

$= 2(lb + bh + hl) - lb$

$= 2(2.5 \times 2 + 2 \times 1 + 1 \times 2.5) - (2.5 \times 2)$

$= 2(5 + 2 + 2.5) - 5$

$= (2 \times 9.5) - 5$

$= 19 - 5$

$= 14$ m^2

$\therefore$ Required surface area is 14 m^2.

9. $l = 28$ cm, $b = 0.5$ m $= 50$ cm, $h = 0.2$ m $= 20$ cm

Area of required cardboard sheet to make an open box

= Total surface area – Area of upper face

$= 2(lb + bh + hl) - lb$

$= 2(28 \times 50 + 50 \times 20 + 20 \times 28) - 28 \times 50$

$= 2(1400 + 1000 + 560) - 1400$

$= 2 \times 2960 - 1400$

$= 5920 - 1400$

$= 4520$ cm^2

Hence, area of the required cardboard sheet is 4520 cm^2.

10. Length of the room, $l = 8$ m

Breadth of the room, $b = 6$ m

Height of the room, $h = 5$ m

Area of four walls of the room $= 2(l + b) \times h$

$= [2(8 + 6) \times 5]$ m^2

$= (2 \times 14 \times 5)$ m^2

$= 140$ m^2

The rate of whitewashing of 1 sq. m = ₹7

Total cost of whitewashing = ₹(7×140)

= ₹980

Hence, total cost of whitewashing is ₹980.

11. $\because$ Total surface area of cuboid = lateral surface area + 2 (area of base)

2(area of base) = total surface area of cuboid – lateral surface area

$2 \times$ area of base $= (86 - 32)$ m^2

$2 \times$ area of base $= 54$ m^2

Area of base $= \frac{54}{2} = 27$ m^2

The area of the base is 27 m^2

12. Let the height of the room be h.

Then, length of the room, $l = 3h$

and breadth of the room, $b = \frac{3}{2}h$.

Cost of whitewashing the wall at the rate of ₹1.50 per sq. m is ₹216.

$\therefore$ Area of four walls of the room $= \frac{₹216}{₹1.50} = 144$ sq. m

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

$$\therefore \quad 2\left(3h + \frac{3}{2}h\right) \times h = 144$$

$$\Rightarrow \quad 2\left(\frac{9h}{2}\right) \times h = 144$$

$$\Rightarrow \quad 9h^2 = 144$$

$$\Rightarrow \quad h^2 = \frac{144}{9} = 16$$

$$\Rightarrow \quad h = \sqrt{16} = 4$$

Hence, length $= 3h = 3 \times 4$ m $= 12$ m,

breadth $= \frac{3}{2}h = \frac{3}{2} \times 4$ m $= 6$ m,

and height $= 4$ m.

13. The perimeter of the floor of the room $= 2(l + b) = 46$ m

Height, $h = 3.5$ m

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

$= (46 \times 3.5)$ m^2

$= 161$ m^2

Hence, area of four walls is 161 m^2.

14. Length, $l = 9$ m, breadth, $b = 8$ m, height, $h = 6$ m

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

$= 2(9 + 8) \times 6$ sq. m

$= 2 \times 17 \times 6$ sq. m

$= 204$ sq. m

Area of a door $= (3 \times 1.5)$ sq. m $= 4.5$ sq. m

Area of a window $= (1.5 \times 1)$ sq. m $= 1.5$ sq. m.

Required area of walls of laboratory for whitewashed

= Area of 4 walls – ($2 \times$ area of a door $+ 4 \times$ area of a window)

$= 204$ sq. m $- (2 \times 4.5 + 4 \times 1.5)$ sq. m

$= 204$ sq. m $- (9 + 6)$ sq. m

$= (204 - 15)$ sq. m

$= 189$ sq. m

Rate of whitewashing the walls for 1 sq. m = ₹1.75

Total cost of whitewashing = ₹(1.75×189)

= ₹330.75

Hence, total cost of whitewashing the walls of laboratory is ₹330.75.

15. Area of four walls $= 2(l + b) \times h$

$= [2(20 + 12) \times 6]$ sq. m

$= (2 \times 32 \times 6)$ sq. m

$= 384$ sq. m

$\because$ Each can of paint is sufficient to point 96 sq. m of area of walls.

Thus, number of cans of paint required $= \frac{384}{96} = 4$

Hence, 4 cans of paint will be needed to paint the four walls of the room.

EXERCISE 16.2

1. (*i*) Diameter of base, $d = 14$ cm

$\therefore$ Radius, $r = \frac{\text{diameter}}{2} = \frac{14}{2}$ cm $= 7$ cm

Height, $h = 60$.

Curved surface area of cylinder $= 2\pi rh$

$= 2 \times \frac{22}{7} \times 7 \times 60$ cm^2

$= 2 \times 22 \times 60$ cm^2

$= 2640$ cm^2

Total surface area of cylinder $= 2\pi r\,(h + r)$

$= 2 \times \frac{22}{7} \times 7 \times (60 + 7)$ cm^2

$= 44 \times 67$ cm^2

$= 2948$ cm^2

(*ii*) Radius (r) = 4.2 cm, Height (h) = 90 cm

Curved surface area of cylinder $= 2\pi rh$

$= 2 \times \frac{22}{7} \times 4.2 \times 90$ cm^2

$= 2 \times 22 \times 0.6 \times 90$ cm^2

$= 2 \times 22 \times 54$ cm^2

$= 2376$ cm^2

Total surface area of cylinder $= 2\pi r\,(h + r)$

$= 2 \times \frac{22}{7} \times 4.2 \times (90 + 4.2)$ cm^2

$= 44 \times 0.6 \times 94.2$ cm^2

$= 2486.88$ cm^2

(*iii*) Radius (r) = 21 cm, Height (h) = 1 m = 100 cm

Curved surface area of cylinder $= 2\pi rh$

$= 2 \times \frac{22}{7} \times 21 \times 100$ cm^2

$= (2 \times 22 \times 3 \times 100)$ cm^2

$= 13200$ cm^2

Total surface area of cylinder = $2\pi r\ (h + r)$

$$= 2 \times \frac{22}{7} \times 21 \times (100 + 21)\ \text{cm}^2$$
$$= 2 \times 22 \times 3 \times 121\ \text{cm}^2$$
$$= 15972\ \text{cm}^2$$

2. Diameter of closed cylinder (d) = 21 cm

$\therefore$ radius (r) = $\frac{21}{2}$ cm

Height of cylinder (h) = 10 cm

Total surface area of closed cylinder = $2\pi r(h + r)$

$$= 2 \times \frac{22}{7} \times \frac{21}{2} \times \left(10 + \frac{21}{2}\right)\ \text{cm}^2$$
$$= 44 \times \frac{3}{2} \times \frac{41}{2}\ \text{cm}^2$$
$$= 1353\ \text{cm}^2$$

Hence, total surface area of closed cylinder is 1353 cm^2.

3. Let the radii of two cylinders of equal heights (h) be x and $3x$.

Curved surface area of I cylinder = $2\pi xh$ ...(i)

Curved surface area of II cylinder = $2\pi(3x)h$ ...(ii)

Dividing (i) by (ii), we get

$$\frac{\text{Curved surface area of I cylinder}}{\text{Curved surface area of II cylinder}} = \frac{2\pi xh}{2\pi(3x)h} = \frac{1}{3}$$

Hence, ratio of their curved surface areas is 1 : 3.

4. Let the height of the cylinder be h cm.

Radius of the base (r) = 7 cm

Total surface area of cylinder = $2\pi r\ (h + r)$

$\therefore$ $1936 = 2 \times \frac{22}{7} \times 7\ (h + 7)$

$\Rightarrow$ $1936 = 44\ (h + 7)$

$\Rightarrow$ $h + 7 = 44$

$\Rightarrow$ $h = 44 - 7$

$h = 37$

Thus, the height of the cylinder is 37 cm.

5. Let the radius of cylinder be r cm.

Height of the cylinder, h = 28 cm

Curved surface area of cylinder = $2\pi rh$

$\therefore$ $352 = 2 \times \frac{22}{7} \times r \times 28$

$\Rightarrow$ $352 = 44 \times r \times 4$

$\Rightarrow$ $r = \frac{352}{44 \times 4} = 2$

$\therefore$ Diameter of cylinder = $2 \times r$

$= 2 \times 2$ cm = 4 cm

Hence, diameter of cylinder is 4 cm.

6. Diameter of the base of the cylinder, d = 14 cm

Radius of the base (r) = $\frac{14}{2}$ cm = 7 cm, Height = 40 cm

Curved surface area of the cylinder = $2\pi rh$

$$= 2 \times \frac{22}{7} \times 7 \times 40$$
$$= 44 \times 40$$
$$= 1760\ \text{cm}^2$$

Total surface area of the cylinder = $2\pi r\ (h + r)$

$$= 2 \times \frac{22}{7} \times 7(40 + 7)\ \text{cm}^2$$
$$= 44 \times 47 = 2068\ \text{cm}^2$$

7. Let the radii of two cylinders be $3r$ and $2r$ respectively, and let the heights of the cylinders be $4h$ and $5h$ respectively.

Curved surface area of cylinder I

$= 2\pi \times$ radius $\times$ height

$= 2\pi(3r)\ (4h)$

$= 24\pi rh$

Curved surface of cylinder II

$= 2\pi \times$ radius $\times$ height

$= 2\pi(2r)(5h)$

$= 20\pi rh$

$$\frac{\text{Curved surface area of cylinder I}}{\text{Curved surface area of cylinder II}} = \frac{24\pi rh}{20\pi rh}$$
$$= \frac{24}{20} = \frac{6}{5} = 6 : 5$$

Hence, the ratio of curved surface areas of two cylinders is 6 : 5.

8. Circumference of the base of cylinder = 132 cm

height = 72 cm

Lateral surface area of cylinder

= circumference of base × height

= (132×72) cm^2 = 9504 cm^2

9. Height of cylindrical box (h) = 1.5 m = 150 cm

($\because$ 1 m = 100 cm)

Diameter of base (d) = 70 cm

$\Rightarrow$ Radius (r) = $\frac{70}{2}$ cm = 35 cm

Required sheet of metal = total surface area of cylinder

$$= 2\pi r\ (h + r)$$
$$= 2 \times \frac{22}{7} \times 35\ (150 + 35)$$
$$= 220 \times 185$$
$$= 40700\ \text{cm}^2$$
$$= 4.07\ \text{m}^2$$

(1 m^2 = 10000 cm^2)

Rate of sheet for 1 sq. m = ₹70

Total cost of sheet = ₹(70 × 4.07) = ₹284.90.

10. Radius of open cylindrical tank = 4.2 m

Height of open cylindrical tank = 15 m

Required metal sheet = curved surface area of cylinder + area of base

$= 2\pi \times \text{radius} \times \text{height} + \pi(\text{radius})^2$

$= \left[\left(2 \times \frac{22}{7} \times 4.2 \times 15\right) + \left(\frac{22}{7} \times 4.2 \times 4.2\right)\right] \text{m}^2$

$= (396 + 55.44)\ \text{m}^2$

$= 451.44\ \text{m}^2$

Hence, required metal sheet is $451.44\ \text{m}^2$.

EXERCISE 16.3

1. $\because$ Volume of a cuboid = $l \times b \times h$

(*i*) Volume of cuboid = $(8 \times 3 \times 2)\ \text{cm}^3 = 48\ \text{cm}^3$

(*ii*) Volume of cuboid = $(12 \times 8 \times 10)\ \text{cm}^3 = 960\ \text{cm}^3$

2. Area of the base, $(l \times b)$ = 32 sq. cm

Height, h = 4 cm

Volume of the cuboid = area of base × height

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

$= (32 \times 4)\ \text{cm}^3 = 128\ \text{cm}^3$

3. Volume of the cuboidal godown = 40 m × 30 m × 20 m

$= 24000\ \text{m}^3$

Volume of one cubical box = $0.6\ \text{m}^3$

So, number of cubical box that can be stored

$= \frac{\text{Volume of cuboidal godown}}{\text{Volume of one cubical box}}$

$= \frac{24000}{0.6} = \frac{240000}{6}$

$= 40000$

Hence, 40000 cubical boxes can be stored in godown.

4. Let the height of the cuboid be h cm.

Volume of cuboid = $1092\ \text{cm}^3$ (given)

Base area = $156\ \text{cm}^2$ (given)

Volume of cuboid = Area of base × height

$\therefore \quad 1092 = 156 \times h$

$\Rightarrow \quad h = \frac{1092}{156}$

$h = 7$ cm

Hence, height of the cuboid is 7 cm.

5. Let the depth of rectangular tank be h.

Volume of a rectangular tank = length × breadth × depth

$\therefore \quad 192 = 8 \times 6 \times h$

$\Rightarrow \quad h = \frac{192}{48}$

$h = 4$ m

Hence, depth of the rectangular tank is 4 m.

6. Volume of cardboard box = 1.4 m × 75 cm × 49 cm

= 140 cm × 75 cm × 49 cm

($\because$ 1 m = 100 cm)

$= 514500\ \text{cm}^3$

Volume of a bar of soap = 6 cm × 5 cm × 3.5 cm

$= 105\ \text{cm}^3$

Required numbers of bars of soap

$= \frac{\text{Volume of cardboard box}}{\text{Volume of a bar of soap}}$

$= \frac{514500\ \text{cm}^3}{105\ \text{cm}^3} = \frac{514500}{105} = 4900$

Hence, 4900 bars of soap can be put into the cardboard box.

7. Let the height of the room be h m.

Area of the floor = $l \times b$ = 47 sq. m

$\because$ Volume of the room = area of floor × height

$= l \times b \times h$

$\therefore \quad 235 = 47 \times h$

$\Rightarrow \quad h = \frac{235}{47}$

$\Rightarrow \quad h = 5$ m

$\therefore$ The height of the room is 5 m.

8. Let the depth of pit be h m.

$\because$ Volume of earth taken out = volume of pit

$\therefore \quad 28\ \text{m}^3 = 7\ \text{m} \times 2.5\ \text{m} \times h$

$\Rightarrow \quad h = \frac{28}{17.5}$ m

$\Rightarrow \quad h = 1.6$ m

Hence, the depth of pit is 1.6 m.

9. Capacity of a rectangular cistern = 12 m × 3.5 m × 5 m

$= 210\ \text{m}^3$

= 210 × 1000 litres

($\because$ $1\ \text{m}^3$ = 1000 litres)

= 210000 litres

Hence, the capacity of cistern is 210000 litres.

10. Volume of the cuboid = $l \times b \times h$

= 16 cm × 10 cm × 6 cm

$= 960\ \text{cm}^3$

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

Required number of cubes

$= \frac{\text{Volume of cuboid}}{\text{Volume of one cube}} = \frac{960\ \text{cm}^3}{64\ \text{cm}^3}$

$= \frac{960}{64} = 15$

Hence, such 15 cubes can be cut out from the cuboid.

11. $\because$ Volume of a cube = l^3

$\therefore$ $l^3 = 729\ \text{cm}^3$ (given)

$\Rightarrow$ $l = \sqrt[3]{729}$ cm

$\Rightarrow$ $l = 9$ cm

Now, total surface area of cube = $6l^2$

$= 6 \times (9\ \text{cm})^2$

$= 6 \times 81\ \text{cm}^2$

$= 486\ \text{cm}^2$

Hence, total surface area of the cube is 486 cm^2.

12. $\because$ Volume of a cube = l^3

$\therefore$ $l^3 = 729\ \text{cm}^3$ (given)

$\Rightarrow$ $l = \sqrt[3]{729}$ cm = 9 cm

Since, two cubes are joined end to end.

Then the resulting shape is cuboid.

Length of resulting shape cuboid, $l = (9 + 9)$ cm = 18 cm

Breadth of resulting shape cuboid, $b = 9$ cm

Height of resulting shape cuboid, $h = 9$ cm

Surface area of resulting cuboid = $2(lb + bh + hl)$

$= 2(18 \times 9 + 9 \times 9 + 9 \times 18)$

$= 2(162 + 81 + 162)$

$= 2 \times 405$

$= 810\ \text{cm}^2$

Hence, surface area of resulting cuboid is 810 cm^2.

13. $\because$ Volume of cube = l^3

$\therefore$ $l^3 = 1728\ \text{cm}^3$

$\Rightarrow$ $l = \sqrt[3]{1728}$ cm

$\Rightarrow$ $l = 12$ cm

$\therefore$ Total surface area = $6l^2$

$= 6 \times (12\ \text{cm})^2$

$= 6 \times 144\ \text{cm}^2$

$= 864\ \text{cm}^2$

Hence, total surface area of cube is 864 cm^2.

14. Outer dimensions of a closed wooden box are 16 cm × 12 cm × 8 cm.

$\therefore$ External volume of wooden box = $(16 \times 12 \times 8)\ \text{cm}^3$

$= 1536\ \text{cm}^3$

Since, thickness of wood is 1 cm.

$\therefore$ Inner dimensions of wooden box are

(16 – 2) cm × (12 – 2) cm × (8 – 2) cm, *i.e.*, 14 cm × 10 cm × 6 cm.

Now, internal volume of wooden box = $(14 \times 10 \times 6)\ \text{cm}^3$

$= 840\ \text{cm}^3$

Required wood = External volume of box

– Internal volume of box

$= (1536 - 840)\ \text{cm}^3$

$= 696\ \text{cm}^3$

Rate of wood per cubic cm = ₹2.50

Therefore, total cost of wood = ₹(696 × 2.50)

= ₹1740

Hence, the required cost is ₹1740.

15. Let the breadth of the room be x.

$\therefore$ Length of the room = $2x$

Height of the room, $h = 5$ m

$\because$ Area of four walls of a room = $2(l + b) \times h$

$\therefore$ $2(2x + x) \times 5 = 210$

$\Rightarrow$ $30x = 210$

$\Rightarrow$ $x = \dfrac{210}{30}$

$\Rightarrow$ $x = 7$

Therefore, length of the room = 2 × 7 = 14 m and Breadth of the room = 7 m.

Now, volume of the room = length × breadth × height

= 14 m × 7 m × 5 m

= 490 m^3

Hence, volume of the room is 490 m^3.

16. Volume of the room = length × breadth × height

= 10 m × 8 m × 6 m

= 480 m^3

Volume of air required for each person = 2.5 m^3

$\therefore$ No. of persons that can be accommodated in the room

$$= \frac{\text{Volume of the room}}{\text{Volume of air required for one person}}$$

$$= \frac{480\ \text{m}^3}{2.5\ \text{m}^3} = \frac{4800}{25}$$

$= 192$

Hence, 192 persons can be accommodated in the room.

17. Since, volume of a cube = l^3

$\therefore$ $l^3 = 3375\ \text{cm}^3$

$\Rightarrow$ $l = \sqrt[3]{3375}$ cm

$\Rightarrow$ $l = 15$ cm

Now, total surface area = $6l^2$

$= 6 \times (15)^2\ \text{cm}^2$

$= 6 \times 225\ \text{cm}^2$

$= 1350\ \text{cm}^2$

Hence, the total surface area of the cube is 1350 cm^2.

18. Let the length of the tank be x m.

Capacity of tank = Volume of tank

$\therefore$ 770 litres = x × 110 cm × 70 cm

($\because$ breadth = 110 cm, depth = 70 cm)

$$\Rightarrow \frac{770}{1000}\ \text{m}^3 = \left(x \times \frac{110}{100} \times \frac{70}{100}\right)\ \text{m}^3$$

($\because$ 1 m^3 = 1000 litres)

$\Rightarrow \quad x \times \frac{110 \times 70}{10000} = \frac{770}{1000}$

$\Rightarrow \quad x = \frac{770 \times 10000}{7700 \times 1000}$

$\Rightarrow \quad x = 1$

Hence, length of the rectangular tank = 1 m = 100 cm.

EXERCISE 16.4

1. Since, volume of a cylinder = $\pi r^2 h$

(*i*) Volume of cylinder $= \frac{22}{7} \times (7)^2 \times 10 \text{ cm}^3$

$= \frac{22}{7} \times 49 \times 10 \text{ cm}^3$

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

$= 1540 \text{ cm}^3$

(*ii*) Volume of cylinder $= \frac{22}{7} \times (2)^2 \times 7 \text{ cm}^3$

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

$= 22 \times 4 \text{ cm}^3$

$= 88 \text{ cm}^3$

2. (*i*) Diameter of cylinder = 14 cm

Radius of cylinder, $r = \frac{\text{Diameter}}{2} = \frac{14}{2}$ cm

$= 7$ cm

Height of cylinder, $h = 6$ cm

$\because$ Volume of cylinder = $\pi r^2 h$

$= \frac{22}{7} \times 7^2 \times 6 \text{ cm}^3$

$= 22 \times 42 \text{ cm}^3$

$= 924 \text{ cm}^3$

Hence, volume of the cylinder is 924 cm^3.

(*ii*) Diameter of cylinder = 7 cm

Radius of cylinder, $r = \frac{7}{2}$ cm

Height of cylinder, $h = 3$ cm

Volume of cylinder = $\pi r^2 h$

$= \frac{22}{7} \times \left(\frac{7}{2}\right)^2 \times 3 \text{ cm}^3$

$= \frac{22}{7} \times \frac{49}{4} \times 3 \text{ cm}^3$

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

$= 115.5 \text{ cm}^3$

Hence, volume of the cylinder is 115.5 cm^3.

3. Radius of cylinder (r) = 3.5 cm

Height of cylinder (h) = 10 cm

Volume of cylinder = $\pi r^2 h$

$= \frac{22}{7} \times (3.5)^2 \times 10 \text{ cm}^3$

$= \frac{22 \times 3.5 \times 3.5 \times 10}{7} \text{ cm}^3$

$= 385 \text{ cm}^3$.

4. Area of the base of cylinder = 250 m^2

Height of cylinder = 2 m

Volume of cylinder = Area of base × height

$= (250 \times 2) \text{ m}^3$

$= 500 \text{ m}^3$

Hence, volume of the cylinder is 500 m^3.

5. Let the radii of two cylinders of equal heights(h) be x and $3x$ respectively.

Volume of 1st cylinder = $\pi x^2 h$ ...(*i*)

Volume of 2nd cylinder = $\pi(3x)^2 h = 9\pi x^2 h$ ...(*ii*)

Ratio of their volumes $= \frac{\pi x^2 h}{9\pi x^2 h}$

$= \frac{1}{9} = 1 : 9$

Hence, the ratio of volumes of two cylinders is 1 : 9.

6. Let the radius of cylinder be r cm.

Volume of cylinder = $\pi r^2 h$

$\therefore \quad \frac{22}{7} \times r^2 \times 8 = 1232 \quad (\because h = 8 \text{ cm})$

$\Rightarrow \quad r^2 = \frac{1232 \times 7}{22 \times 8} = 49$

$\Rightarrow \quad r = \sqrt{49} = 7$

$\because$ Curved surface area of cylinder = $2\pi rh$

$= 2 \times \frac{22}{7} \times 7 \times 8 \text{ cm}^2$

$= 352 \text{ cm}^2$

$\therefore$ Curved surface area of the cylinder is 352 cm^2.

Total surface area of a cylinder = $2\pi r(h + r)$

$= 2 \times \frac{22}{7} \times 7 \times (8 + 7) \text{ cm}^2$

$= 2 \times 22 \times 15 \text{ cm}^2$

$= 660 \text{ cm}^2$

$\therefore$ Total surface area of the cylinder is 660 cm^2.

7. Let the radius of circular iron rod be r.

Height of cylinder = 1 m = 100 cm

Volume of cylinder = 3850 cm^3

Volume of circular iron rod = $\pi r^2 h$

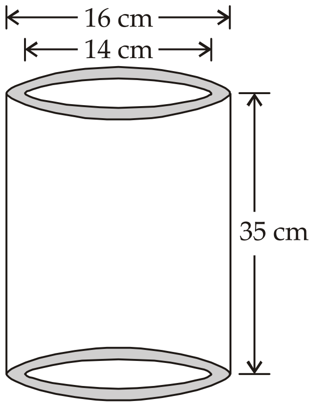
$$\therefore \quad 3850 = \frac{22}{7} \times r^2 \times 100$$

$$\Rightarrow \quad r^2 = \frac{3850 \times 7}{22 \times 100} = \frac{1225}{100}$$

$$\Rightarrow \quad r = \sqrt{\frac{1225}{100}} = \frac{35}{10} = 3.5 \text{ cm}$$

Hence, radius of circular iron rod is 3.5 cm.

8. Height of cylindrical metal pipe, h = 35 cm



Internal diameter = 14 cm

$\therefore$ Internal radius, $r = \frac{14}{2}$ cm = 7 cm

External diameter = 16 cm

$\therefore$ External radius, $R = \frac{16}{2}$ cm = 8 cm

Volume of metal used = External volume of cylinder – Internal volume of cylinder

$$= \pi R^2 h - \pi r^2 h$$

$$= \pi(R^2 - r^2)\, h$$

$$= \frac{22}{7} \times (8^2 - 7^2) \times 35 \text{ cm}^3$$

$$= \frac{22}{7} \times (64 - 49) \times 35 \text{ cm}^3$$

$$= \frac{22 \times 15 \times 35}{7} \text{ cm}^3$$

$$= 1650 \text{ cm}^3$$

$\because$ The weight of metal used for 1 cm^3 = 10 gm

Therefore,

Weight of pipe = (10 × 1650) gm

= 16500 gm

= 16.5 kg $\quad$ ($\because$ 1 kg = 1000 gm)

$\therefore$ Weight of pipe is 16.5 kg.

9. Radius of the well (r) = 2 m

Depth (height) of the well (h) = 14 m

Volume of the earth dug out = Volume of cylindrical well

$$= \pi r^2 h$$

$$= \frac{22}{7} \times (2)^2 \times 14 \text{ m}^3$$

$$= \frac{22}{7} \times 4 \times 14 \text{ m}^3$$

$$= (22 \times 8) \text{ m}^3$$

$$= 176 \text{ m}^3$$

Since, the earth dug out is evenly spread out on a rectangular field of dimensions 10 m × 4 m.

Let h be the height of platform raised.

$\therefore$ Volume of rectangular platform = volume of earth dug out

$$\therefore \quad 10 \text{ m} \times 4 \text{ m} \times h = 176 \text{ m}^3$$

$$\Rightarrow \quad 40 \times h = 176$$

$$\Rightarrow \quad h = \frac{176}{40} = 4.4 \text{ m}$$

Hence, the height of platform raised is 4.4 m.

10. Circumference of the base = 88 cm

$$\therefore \quad 2\pi r = 88 \text{ cm}$$

$$\Rightarrow \quad 2 \times \frac{22}{7} \times r = 88 \text{ cm}$$

$$\Rightarrow \quad r = \frac{88 \times 7}{44} \text{ cm}$$

$$\Rightarrow \quad r = 14 \text{ cm}$$

Volume of cylinder = $\pi r^2 h$

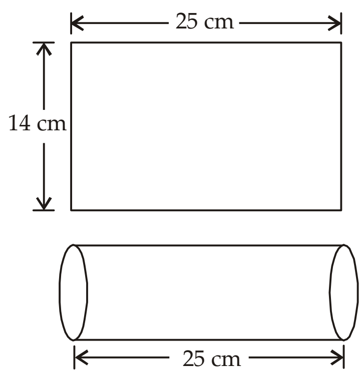
$$= \frac{22}{7} \times (14)^2 \times 30 \text{ cm}^3$$

$$= \frac{22 \times 196 \times 30}{7} \text{ cm}^3$$

$$= 18480 \text{ cm}^3$$

Hence, volume of the cylinder is 18480 cm^3.

11. The rectangular sheet is rolled along its width, then the width of the sheet forms the circumference of base of the cylinder and the length of sheet becomes the height of the cylinder.



Let r be the radius of base and h be the height of cylinder. Then,

$$h = 25 \text{ cm}$$

Now, circumference of base = width of sheet

$$\Rightarrow \quad 2\pi r = 14 \text{ cm}$$

$$\Rightarrow \quad 2 \times \frac{22}{7} \times r = 14 \text{ cm}$$

$$\Rightarrow \quad r = \frac{14 \times 7}{2 \times 22} \text{ cm}$$

$$\Rightarrow \quad r = \frac{49}{22} \text{ cm}$$

Volume of cylinder = $\pi r^2 h$

$$= \frac{22}{7} \times \left(\frac{49}{22}\right)^2 \times 25 \text{ cm}^3$$

$$= \frac{22}{7} \times \frac{49}{22} \times \frac{49}{22} \times 25 \text{ cm}^3$$

$$= \frac{7 \times 49 \times 25}{22} \text{ cm}^3$$

$$= 389.77 \text{ cm}^3$$

Hence, volume of the cylinder is 389.77 cm^3.

12. Volume of the tubewell = $\pi r^2 h$

$$= \frac{22}{7} \times (1.5)^2 \times 210 \text{ m}^3$$

$$= 22 \times 2.25 \times 30$$

$$= 1485 \text{ m}^3$$

Rate of sinking the well per m^3 = ₹3

Total cost of sinking the well = ₹(3 × 1485) = ₹4455

Curved surface area = $2\pi rh$

$$= 2 \times \frac{22}{7} \times 1.5 \times 210 \text{ m}^2$$

$$= 1980 \text{ m}^2$$

Rate of cementing = ₹25 per sq. m

$\therefore$ Total cost of cementing = ₹(25 × 1980)

= ₹49500

Hence, total cost of cementing the tubewell is ₹49500.

MULTIPLE CHOICE QUESTIONS

1. Surface area of a cube = $6l^2$

$$\therefore \quad 6l^2 = 600 \text{ sq. cm}$$

$$\Rightarrow \quad l^2 = 100$$

$$\Rightarrow \quad l = \sqrt{100} \text{ cm} = 10 \text{ cm}$$

Side of cube is 10 cm.

Hence, option (*b*) is correct.

2. Volume of a cube = $l^3 = (1.5 \text{ m})^3$

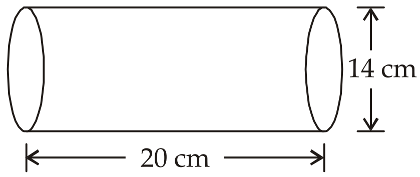
$$= 3.375 \text{ m}^3$$

Hence, option (*c*) is correct.

3. Diameter of cylinder = 14 cm

Radius of cylinder = $\frac{\text{Diameter}}{2} = \frac{14 \text{ cm}}{2} = 7$ cm

Height of cylinder = 20 cm



Volume of cylinder = $\pi r^2 h = \frac{22}{7} \times (7)^2 \times 20 \text{ cm}^3$

$$= \frac{22}{7} \times 49 \times 20 \text{ cm}^3$$

$$= 3080 \text{ cm}^3$$

Hence, option (*d*) is correct.

4. Let the edge of a cube be l.

Surface area of cube = $6l^2$ ...(*i*)

If the edge of the cube is doubled, *i.e.,* new edge = $2l$.

Therefore, surface area of new cube = $6(2l)^2$ ...(*ii*)

$$= 4 \times 4l^2$$

$$= 4 \times 6l^2$$

= 4 × Surface area of original cube

It becomes 4 times.

Hence, option (*c*) is correct.

5. Let the edge of cube be l.

Volume of cube = l^3 ...(*i*)

If the edge of the cube is doubled, *i.e.,* new edge = $2l$. Therefore,

Volume of new cube = $(2l)^3 = 8l^3$ ...(*ii*)

$\Rightarrow$ Volume of new cube = 8 × volume of original cube.

Hence, option (*b*) is correct.

6. The maximum length of a rod that can be kept in a box = length of diagonal of cuboidal box

$$= \sqrt{l^2 + b^2 + h^2}$$

$$= \sqrt{(12)^2 + (9)^2 + (8)^2}$$

$$= \sqrt{144 + 81 + 64}$$

$$= \sqrt{289} = 17 \text{ cm}$$

Hence, option (*c*) is correct.

7. $\because$ Surface area of a cube = $6l^2$

$$\therefore \quad 6l^2 = 294 \text{ sq. cm}$$

$$\Rightarrow \quad l^2 = \frac{294}{6} = 49$$

$$\Rightarrow \quad l = 7 \text{ cm}$$

Then, volume of cube = $l^3 = (7)^3 \text{ cm}^3 = 343 \text{ cm}^3$

Hence, option (*b*) is correct.

8. $\because$ Volume of a cube = l^3

$\therefore$ $l^3 = 125\text{ cm}^3$

$\Rightarrow$ $l = \sqrt[3]{125}\text{ cm} = 5\text{ cm}$

Then, surface area of a cube $= 6l^2$

$= 6 \times (5)^2\text{ cm}^2$

$= 6 \times 25\text{ cm}^2 = 150\text{ cm}^2$

Hence, option (*c*) is correct.

9. Let the breadth of box be *b*.

$\because$ Volume of a cuboidal box = $l \times b \times h$

$\therefore$ $4\text{ cm} \times b \times 3\text{ cm} = 48\text{ cm}^3$

$$\Rightarrow \quad b = \frac{48\text{ cm}^3}{12\text{ cm}^2}$$

$$\Rightarrow \quad b = \frac{48}{12}\text{ cm} = 4\text{ cm}$$

Hence, option (*a*) is correct.

10. Volume of rectangular iron piece

$= 40\text{ cm} \times 30\text{ cm} \times 20\text{ cm}$

$= 24000\text{ cm}^3$

Weight of 1 cm^3 of iron =10 g

$\therefore$ Total weight of iron piece = (24000×10) g

$= 240000$ g

$= 240$ kg

Hence, option (*c*) is correct.

MENTAL MATHS CORNER

Fill in the blanks:

1. Volume of the hall = $80\text{ m} \times 40\text{ m} \times 20\text{ m}$

$= 64000\text{ m}^3$

Volume of air required for one person = 160 m^3.

$\therefore$ Number of persons that can be sit in the hall

$$= \frac{\text{Volume of the hall}}{\text{Volume of air required for one person}}$$

$$= \frac{64000}{160} = 400$$

$\therefore$ **400** persons can sit in the hall, if each person requires 160 m^3 of air.

2. The edge of a cube is 3 cm, its surface area is **54** cm^2.

$\because$ Surface area of a cube = $6l^2 = 6 \times (3\text{ cm})^2$

$= 6 \times 9\text{ cm}^2$

$= 54\text{ cm}^2$.

3. The longest pole that can be put in a room of dimensions $10\text{ m} \times 10\text{ m} \times 5\text{ m}$ is **15 m.**

$\because$ Length of longest pole

= Length of diagonal of cuboidal room

$$= \sqrt{l^2 + b^2 + h^2}$$

$$= \sqrt{(10)^2 + (10)^2 + (5)^2}$$

$$= \sqrt{100 + 100 + 25}$$

$$= \sqrt{225} = 15\text{ m.}$$

4. **1000** cubes each of 10 cm edge can be put in a cubical box of edge 1 metre.

$\because$ Volume of cubical box = l^3

$= (1\text{ m})^3 = (100\text{ cm})^3$

$= 1000000\text{ cm}^3$

($\because$ 1 m = 100 cm)

Volume of smaller cube = $(10\text{ cm})^3 = 1000\text{ cm}^3$

Number of cubes that can be put into cubical box

$$= \frac{1000000}{1000}$$

$= 1000.$

5. The volume of a cuboid whose base area is 28 sq. m and height 6 m is **168 m^3.**

$\because$ Volume of a cuboid = Base area × height

$= (28 \times 6)\text{ m}^3$

$= 168\text{ m}^3$

6. Three cubes each of sides 3 cm, 4 cm and 5 cm are melted to form a new cube. The side of the new cube is **6 cm**.

Let the side of new cube be *l*.

$\therefore$ The volume of new cube = Sum of the volumes of three small cubes

$(l)^3 = (3\text{ cm})^3 + (4\text{ cm})^3 + (5\text{ cm})^3$

$\Rightarrow$ $(l)^3 = (27 + 64 + 125)\text{ cm}^3$

$\Rightarrow$ $(l)^3 = 216\text{ cm}^3$

$\Rightarrow$ $l = 6$ cm

Hence, side of new cube is 6 cm.

7. Two cubes have their volumes in the ratio 1 : 8, the ratio of their surface areas is **1 : 4**.

Let the sides of two cubes be l_1 and l_2.

$$\because \quad \frac{\text{Volume of 1st cube}}{\text{Volume of 2nd cube}} = \frac{(l_1)^3}{(l_2)^3}$$

$$\Rightarrow \quad \left(\frac{l_1}{l_2}\right)^3 = \frac{1}{8} \quad \Rightarrow \quad \frac{l_1}{l_2} = \sqrt[3]{\frac{1}{8}} = \frac{1}{2}$$

Now, ratio of their surface areas

$$= \frac{\text{Surface area of 1st cube}}{\text{Surface area of 2nd cube}}$$

$$= \frac{6l_1^2}{6l_2^2} = \frac{l_1^2}{l_2^2} = \left(\frac{l_1}{l_2}\right)^2 = \left(\frac{1}{2}\right)^2 = \frac{1}{4}$$

Thus, ratio of their surface areas is 1 : 4.

REVIEW EXERCISE

1. Area of cross section = 6 sq. cm.

Speed of water = 42 cm/sec

= 42 × 60 cm/min

In 1 minute, 42 × 60 cm long cylinder of water flows out.

Volume of water that flows in 1 min.

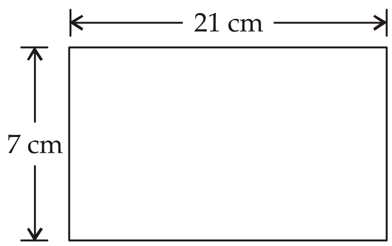
From pipe = 6 × 42 × 60 cm^3

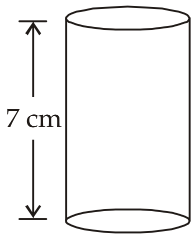
= 15120 cm^3

= 15.12 litres ($\because$ 1000 cm^3 = 1 l)

Hence, 15.12 litres of water flows out.

2. Since, a rectangular strip is rolled along the longer side the length of the strip forms the circumference of its base and breadth of the strip becomes the height of the cylinder.





Let r be the radius of the base and h be the height.

$$2\pi r = 21$$

$$2 \times \frac{22}{7} r = 21$$

$$\Rightarrow \quad r = \frac{21 \times 7}{2 \times 22} \text{ cm}$$

$$\Rightarrow \quad r = \frac{147}{44} \text{ cm}$$

Height of cylinder, h = 7 cm

Then, volume of resultant cylinder = $\pi r^2 h$

$$= \frac{22}{7} \times \frac{147}{44} \times \frac{147}{44} \times 7$$

$$= \frac{147 \times 147}{88} = 245.42 \text{ cm}^3$$

Hence, volume of the cylinder is 245.42 cm^3.

3. $\because$ Curved surface area of a cylinder = $2\pi rh$

$\therefore$ $2\pi rh = 880 \text{ cm}^2$ (given)

$$\Rightarrow \quad 2 \times \frac{22}{7} \times r \times 28 = 880$$

$$\Rightarrow \quad r = \frac{880 \times 7}{44 \times 28} = 5$$

Hence, radius of the base of the cylinder is 5 cm.

4. Surface area of a cube = $6l^2$

$\therefore$ $6l^2 = 1350 \text{ cm}^2$ (given)

$$\Rightarrow \quad l^2 = \frac{1350}{6} = 225$$

$$l = \sqrt{225}$$

$$\Rightarrow \quad l = 15 \text{ cm}$$

$\therefore$ Volume of cube = $(l)^3 = (15 \text{ cm})^3$

= 3375 cm^3

5. $\because$ Cuboid has square base *i.e.,*

Length of cuboid (l) = Breadth of cuboid (b) = 6 m

Height of cuboid (h) = 9 m.

(*i*) Leteral surface area of cuboid = $2(l + b)h$

= 2(6 + 6) × 9 m^2

= 2 × 12 × 9 m^2 = 216 m^2

(*ii*) Total surface area = $2(lb + bh + hl)$

= 2(6 × 6 + 6 × 9 + 9 × 6) m^2

= 2(36 + 54 + 54) m^2

= 2 × 144 m^2

= 288 m^2

6. Diameter of circular swimming pool = 15 m.

$$\text{Radius of circular pool } (r) = \frac{\text{diameter}}{2} = \frac{15}{2} \text{ m}$$

Depth of pool = 2 m

The swimming pool is in the form of circular cylinder having radius $\frac{15}{2}$ m and height 2 m.

(*i*) Volume of water = volume of circular pool

$= \pi r^2 h$

$$= 3.14 \times \left(\frac{15}{2}\right)^2 \times 2 \text{ m}^3$$

($\because$ π = 3.14 given)

$$= 3.14 \times \frac{225}{4} \times 2 \text{ m}^3$$

= 353.25 m^3

Volume of water is 353.25 m^3.

(*ii*) Capacity of swimming pool = 353.25 m^3

= (353.25 × 1000) litres

($\because$ 1 m^3 = 1000 litres)

= 353250 litres.

7. Let the radius and the height of the cylinder be r and h respectively.

Volume of cylinder = $\pi r^2 h$ = 2310 cm^3 ...(i)

Curved surface area of cylinder = $2\pi rh$ = 660 cm^2 ...(ii)

Dividing (i) by (ii), we get

$$\frac{\pi r^2 h}{2\pi rh} = \frac{2310}{660}$$

$$\Rightarrow \quad \frac{r}{2} = \frac{2310}{660}$$

$$\Rightarrow \quad r = \frac{2310 \times 2}{660} = 7$$

Putting the value of r in (ii), we get

$$2 \times \frac{22}{7} \times 7 \times h = 660$$

$$\Rightarrow \quad 44\,h = 660$$

$$\Rightarrow \quad h = \frac{660}{44} = 15$$

Hence, base radius = 7 cm and height = 15 cm.

8. Circumference of base of cylinder = 22 cm

$$2\pi r = 22 \text{ cm}$$

$$\Rightarrow \quad r = \frac{22 \times 7}{2 \times 22} \text{ cm} = \frac{7}{2} \text{ cm}$$

Height of cylinder = 14 cm

Volume of cylinder = $\pi r^2 h$

$$= \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} \times 14 \text{ cm}^3 = 539 \text{ cm}^3$$

Hence, volume of the cylinder is 539 cm^3.

9. Length of the room, l = 10 m

Breadth of the room, b = 8 m

Height of the room, h = 4 m

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

= 2(10 + 8) × 4 m^2

= 2 × 18 × 4 m^2

= 144 m^2

The cost of whitewashing for 1 sq. m = ₹10

∴ Total cost of whitewashing = ₹(10 × 144)

= ₹1440

Area of ceiling of the room = $l \times b$

= 10 × 8 m^2

= 80 m^2

Total area to be whitewashed = (144 + 80) m^2

= 224 m^2

Therefore, total cost of whitewashing, the ceiling and 4 walls of the room = ₹(10 × 224)

= ₹2240.

HOTS QUESTIONS

1. Let the diameter and the height of the cylinder be $2r$ and h respectively.

Radius the base = r

∵ Curved surface area = $2\pi rh$

∴ $2\pi rh$ = 550 cm^2 ...(i)

Volume = $\pi r^2 h$ = 1375 cm^3 ...(ii)

Dividing (ii) by (i), we get

$$\frac{\pi r^2 h}{2\pi rh} = \frac{1375}{550}$$

$$\Rightarrow \quad \frac{r}{2} = \frac{1375}{550}$$

$$\Rightarrow \quad r = \frac{1375 \times 2}{550} = 5$$

Putting the value of r in (i), we get

$$2 \times \frac{22}{7} \times 5 \times h = 550$$

$$\Rightarrow \quad h = \frac{550 \times 7}{2 \times 22 \times 5} = 17.5$$

Hence, diameter of the base = $2r$ = 2 × 5 cm = 10 cm and height = 17.5 cm.

2. Let the edges of a cuboid be x, $2x$ and $3x$.

Surface area of cuboid = $2(lb + bh + hl)$

∴ $198 = 2(x \times 2x + 2x \times 3x + 3x \times x)$

⇒ $198 = 2(2x^2 + 6x^2 + 3x^2)$

⇒ $2x^2 + 6x^2 + 3x^2 = 99$

⇒ $11x^2 = 99$

⇒ $x^2 = 9$

⇒ $x = 3$

∴ Length (l) of cuboid = 3 cm,

Breadth (b) of cuboid = 2 × 3 = 6 cm

Height (h) of cuboid = 3 × 3 = 9 cm

Volume of cuboid = $l \times b \times h$

= 3 × 6 × 9 cm^3

= 162 cm^3.

3. Cylinder A:

Volume of cylinder $A = \pi r^2 h$

$$= \frac{22}{7} \times (3.5)^2 \times 14$$

$$= 44 \times 12.25 \text{ cm}^3$$

$$= 539 \text{ cm}^3$$

Cylinder B:

Volume of cylinder $B = \pi r^2 h$

$$= \frac{22}{7} \times 14 \times 14 \times 3.5 \text{ cm}^3$$

$$= 44 \times 14 \times 3.5 \text{ cm}^3$$

$$= 2156 \text{ cm}^3$$

Volume of cylinder B is greater.

The heights and radius of these cylinders A and B are interchanged.

We know that, curved surface area = $2\pi rh$

Both the cylinders will have equal curved surface area.

Surface area of cylinder $A = 2\pi r(h + r)$

$$= 2 \times \frac{22}{7} \times 3.5(14 + 3.5)$$

$$= 2 \times \frac{22}{7} \times 3.5 \times 17.5$$

$$= 385 \text{ cm}^2.$$

Surface area of cylinder $B = 2\pi r(h + r)$

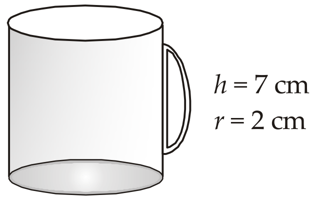
$$= 2 \times \frac{22}{7} \times 14(3.5 + 14) \text{ cm}^2$$

$$= 2 \times \frac{22}{7} \times 14 \times 17.5 \text{ cm}^2$$

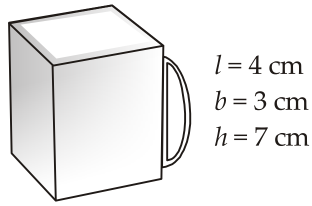
$$= 1540 \text{ cm}^2$$

Thus, the surface area of cylinder B is also greater than the surface area of cylinder A.

VALUE BASED QUESTION
SUMMATIVE ASSESSMENT



Glass 1



Glass 2

Glass 1:

Capacity of glass 1 = volume of cylinder of radius r and height h

$$= \pi r^2 h$$

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

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

$$= 88 \text{ cm}^3$$

Glass 2:

Capacity of glass 2 = volume of cuboid of dimensions 4 cm × 3 cm × 7 cm.

$$= l \times b \times h$$

$$= 4 \times 3 \times 7 \text{ cm}^3$$

$$= 84 \text{ cm}^3$$

$\therefore$ Glass 1 has more capacity than the glass 2.

"The juice seller demonstrates honesty."