TEXT BOOK EXERCISE 9.4

Q. 1. Find the lateral and total surface area of the cuboid having dimensions :

(i) **6 cm × 5 cm × 4 cm**

(ii) **15 m × 12 m × 8 m**

(iii) **8 m × 10 m × 8 m.**

Solution. (*i*) Given : 6 cm × 5 cm × 4 cm

Here, $l = 6$ cm, $b = 5$ cm and $h = 4$ cm

Lateral surface area of the cuboid

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

$= 2(6 + 5) \times 4 \text{ cm}^2$

$= 88 \text{ cm}^2$ **Ans.**

Total surface area of the cuboid
$= 2(l \times b + b \times h + h \times l)$
$= 2(6 \times 5 + 5 \times 4 + 4 \times 6)\ cm^2$
$= 2(30 + 20 + 24)\ cm^2$
$= 2(74)\ cm^2 = 148\ cm^2$ **Ans.**

(*ii*) Given : 15 m × 12 m × 8 m
Here, $l = 15$ m, $b = 12$ m and $h = 8$ m
Lateral surface area of the cuboid
$= 2(l + b) \times h = 2(15 + 12) \times 8\ m^2$
$= 2 \times 27 \times 8 = 432\ m^2$ **Ans.**

Total surface area of the cuboid
$= 2(l \times b + b \times h + h \times l)$
$= 2(15 \times 12 + 12 \times 8 + 8 \times 15)$
$= 2(180 + 96 + 120)\ m^2$
$= 792\ m^2$ **Ans.**

(*iii*) Given : 8m × 10 m × 8m
Here, $l = 8$ m, $b = 10$ m and $h = 8$ m
Lateral surface area $= 2(l + b) \times h$
$= 2(8 + 10) \times 8\ m^2$
$= 2 \times 18 \times 8\ m = 288\ m^2$

Total surface area of the cuboid
$= 2(l \times b + b \times h + h \times l)$
$= 2(8 \times 10 + 10 \times 8 + 8 \times 8)\ m^2$
$= 2(80 + 80 + 64)\ m^2 = 448\ m^2$ **Ans.**

Q. 2. Find the lateral and total surface area of the cubes having edge :
(*i*) 8 cm (*ii*) 12 m (*iii*) 15 mm.

Solution. (*i*) Edge of cube (l) = 8 cm
Lateral surface area of cube
$= 4l^2 = 4 \times (8)^2\ cm^2$
$= 4 \times 64\ cm^2 = 256\ cm^2$ **Ans.**

Total surface area of cube
$= 6l^2 = 6 \times (8)^2\ cm^2$
$= 6 \times 64\ cm^2 = 384\ cm^2$ **Ans.**

(*ii*) Edge of the cube (l) = 12 m
Lateral surface area of cube
$= 4l^2 = 4 \times (12)^2\ m^2$
$= 4 \times 144\ m^2 = 576\ m^2$ **Ans.**

Total surface area of cube
$= 6l^2 = 6 \times (12)^2\ m^2$
$= 6 \times 144\ m^2 = 864\ m^2$ **Ans.**

(*iii*) Edge of the cube (l) = 15 mm
Lateral surface area of cube
$= 4l^2 = 4 \times (15)^2\ mm^2$
$= 4 \times 225\ mm^2$
$= 900\ mm^2$ **Ans.**

Total surface area of cube
$= 6l^2 = 6 \times (15)^2\ mm^2$
$= 6 \times 225\ mm^2$
$= 1350\ mm^2$ **Ans.**

Q. 3. Find the side of a cube whose surface area is 2400 cm^2.

Solution. Surface area of cube = 2400 cm^2
$\therefore 6\ (side)^2 = 2400$

$\Rightarrow (side)^2 = \frac{2400}{6} = 400$

$\Rightarrow$ side $= \sqrt{400}$ cm = 20 cm **Ans.**

Q. 4. Neetu painted the outside of a cabinet of measure 3m × 2m × 1.5 m. How much surface area she covered if she painted all cabinet except bottom.

Solution. Here, $l = 3$ m, $b = 2$ m and $h = 1.5$ m
Surface area of the cabinet to point except bottom
$= l \times b + 2(l + b) \times l$
$= (3 \times 2)\ m^2 + 2(3 + 2) \times 1.5\ m^2$
$= 6\ m^2 + 2 \times 5 \times 1.5\ m^2$
$= 6\ m^2 + 15\ m^2 = 21\ m^2$ **Ans.**

Q. 5. Ashima painted her room of measure 15 m × 12 m × 7 m. How much surface area did he cover if he painted all except the floor ?

Solution. Length of the room (l) = 15 m
Breadth of the room (b) = 12 m
Height of the room (h) = 7 m
Area of the room to be painted except floor
$= l \times b + 2(b + l) \times h$
$= 15 \times 12\ m^2 + 2(12 + 15) \times 7\ m^2$
$= 180\ m^2 + 2 \times 27 \times 7\ m^2$
$= 180\ m^2 + 378\ m^2$
$= 558\ m^2$ **Ans.**

Q. 6. Manu wants her room to be painted. If the measures of her room is 20 m × 12 m × 15 m then find the cost of painting the room except the floor at ₹ 6 per m^2 ?

Solution. Length of the room (l) = 20 m

Breadth of the sum (b) = 12 m

Height of the room (h) = 15 m

Area of room to be painted except floor

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

$= 20 \times 12 + 2\,(20 + 12) \times 15\ m^2$

$= 240\ m^2 + 64 \times 15\ m^2$

$= 240\ m^2 + 960\ m^2 = 1200\ m^2.$

Cost of painting the room = $1200 \times ₹\ 2$

= ₹ 7200 **Ans.**

Q. 7. A suitcase with measurement 80 cm × 48 cm × 24 cm is to be covered with a cloth. How many metres of cloth of width 96 cm is required to cover the suitcase ?

Solution. Here, Length of suitcase (l) = 80 cm

Breadth of suitcase (b) = 48 cm

Height of suitcase (h) = 24 cm

Surface area of suitcase

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

$= 2\,(80 \times 48 + 48 \times 24 + 24 \times 80)\ cm^2$

$= 2\,(3840 + 1152 + 1920)\ cm^2$

$= 2 \times 6912\ cm^2 = 13824\ cm^2$

Length of the cloth of width 96 cm required to cover suitcase

$= \frac{13824}{96}$ cm = 144 cm **Ans.**

Q. 8. What will happen to the surface area of a cube if its edge is (*i*) tripled (*ii*) halved ?

Solution. Let each edge of the cube = l

$\therefore$ Its surface area = $6l^2$ square unit

(*i*) When the edge tripled

$\therefore$ Edge of new cube = $3l$ unit

New surface area of cube = $6 \times (3l)^2$ square unit

$= 6 \times 9l^2 = 54l^2$ square unit

Hence, if the edge of the cube is tripled,

$= 9 \times (6l)^2$

= 9 × Surface area of lesser cube

Hence, if the edge of the cube is tripled, then the surface area increased by 9 times.

(*ii*) New edge of the cube = $\frac{1}{2}l$ unit

Surface area of the new cube

$= 6\left(\frac{1}{2}l\right)^2$ square unit

$= 6 \times \frac{1}{4}l^2$ square unit $= \frac{1}{4}(l^2)$

Hence, if edge of the cube is halved the area of new cube is one fourth.

Q. 9. Three cubes each of side 5 cm are joined end to end. Find the surface area of the cuboid so formed.

Solution. Each side of cube = 5 cm

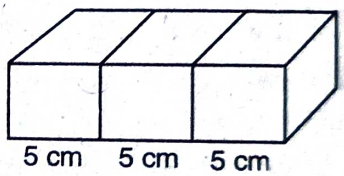
When three cubes are joined then,

Length of cuboid = 5 cm + 5 cm + 5 cm

= 15 cm

Breadth of cuboid = 5 cm

Height of cuboid = 5 cm



Thus, the surface area of cuboid

$= 2\,(15 \times 5 + 5 \times 5 + 5 \times 15)\ cm^2$

$= 2\,(75 + 25 + 75)\ cm^2$

$= 350\ cm^2$ **Ans.**

Q. 10. Find the curved and total surface area of a cylinder whose dimensions are :

(*i*) r = 7 cm, h = 20 cm

(*ii*) r = 14 cm, h = 15 m

(*iii*) diameter = 7 cm, h = 12 cm.

Solution. (*i*) Here, r = 7 cm, h = 20 cm

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

$= 2 \times \frac{22}{7} \times 7 \times 20\ cm^2$

$= 880\ cm^2$ **Ans.**

Total surface area of the cylinder

$= 2\pi r\,(h + r)$

$= 2 \times \frac{22}{7} \times 7\,(20+7)\ \text{cm}^2$

$= 44 \times 27\ \text{cm}^2$

$= 1188\ \text{cm}^2$ **Ans.**

(*ii*) Here, $r = 14$ cm, $h = 15$ cm

Curved surface area of the cylinder

$= 2\pi rh = 2 \times \frac{22}{7} \times 14 \times 15\ \text{m}^2$

$= 1320\ \text{cm}^2$ **Ans.**

Total surface area of cylinder

$= 2\pi r\,(h + r)$

$= 2 \times \frac{22}{7} \times 14 \times (15 + 14)$

$= 2 \times \frac{22}{7} \times 14 \times 29$

$= 2552\ \text{cm}^2$ **Ans.**

(*iii*) Here, diameter = 7 cm

Curved surface area of cylinder

$= 2\pi rh = 2 \times \frac{22}{7} \times \frac{7}{2} \times 12\ \text{cm}^2$

$= 264\ \text{cm}^2$ **Ans.**

Total surface area of cylinder

$= 2\pi r\,(h + r) = 2 \times \frac{22}{7} \times \frac{7}{2} \left(\frac{7}{2} + 12\right)\ \text{cm}^2$

$= 22 + \left(\frac{7+24}{2}\right)\text{cm}^2$

$= 22 \times \frac{31}{2}\text{cm}^2 = 341\ \text{cm}^2$ **Ans.**

Q. 11. Find the curved surface area of a cylinder whose circumference of the base is 77 cm and height is 12 cm.

Solution. Circumference of the base = 77 cm

Height = 12 cm

Curved surface area of cylinder

= Circumference × h

$= 77 \times 12\ \text{cm}^2$

$= 924\ \text{cm}^2$ **Ans.**

Q. 12. Find the radius of cylinder whose curved surface area is 1056 cm^2 and height 12 cm.

Solution. Curved surface area of cylinder $= 1056\ \text{cm}^2$

Height of the cylinder = 12 cm

$\therefore \quad 2\pi rh = 1056$

$\therefore \quad 2 \times \frac{22}{7} \times r \times 12 = 1056$

$\Rightarrow \quad r = \frac{1056 \times 7}{44 \times 12}$

$= 14$ cm **Ans.**

Q. 13. Find the height of cylinder whose radius is 7 cm and total surface area is 968 cm^2.

Solution. Radius (r) = 7 cm

Total surface area $= 968\ \text{cm}^2$

$\therefore \quad 2\pi r\,(h + r) = 968$

$\Rightarrow \quad 2 \times \frac{22}{7} \times 7\,(h + 7) = 968$

$44\,(h + 7) = 968$

$h + 7 = \frac{968}{24} = 22$

$\therefore \quad h = 22 - 7 = 15$ cm

Hence, height of cylinder = 15 cm

Q. 14. A cylindrical pipe open from both sides has radius 21 cm and height 50 cm. What is its surface area ?

Solution. Here, radius (r) = 21 cm

Height (h) = 50 cm

Surface area of cylinder $= 2\pi rh$

$= 2 \times \frac{22}{7} \times 21 \times 50$ cm

$= 6600\ \text{cm}^2$ **Ans.**

Q. 15. A road roller takes 950 complete revolutions to move once over to level a road. Find the area of road leveled if the diameter of road roller is 84 cm and length is 1 m.

Solution. Radius of the road roller (r)

$= \frac{84}{2} = 42$ cm

Height of the road roller (h) = 1 m = 100 cm

Curved surface area of the cylindrical road roller $= 2\pi rh$

$$= 2 \times \frac{22}{7} \times 42 \times 100 \text{ cm}^2$$

$$= 26400 \text{ cm}^2$$

$\therefore$ Area covered in 1 revolution

$$= 26400 \text{ cm}^2 = \frac{26400}{10,000} \text{ m}^2$$

$$= 2.64 \text{ m}^2$$

Area of road = Area covered in 950 revolutions

$$= 950 \times 2.64 \text{ m}^2$$

$$= 2508 \text{ m}^2 \textbf{ Ans.}$$

Q. 16. A closed cylindrical tank of radius 7 m and height 3 m is made from a sheet of metal. What is cost of tank if rate of metal sheet is ₹ 20 per m^2.

Solution. Here, radius of cylindrical tank = 7 m

Height of the cylindrical tank = 3 m

Total surface area of the cylindrical tank

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

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

$$= 44 \times 10 \text{ m}^2 = 440 \text{ m}^2$$

Rate of metal sheet

$$= ₹ 20 \text{ per m}^2$$

$\therefore$ Cost of the tank

$$= ₹ 20 \times 440 = ₹ 8800 \textbf{ Ans.}$$

Q. 17. Multiple Choice Questions :

(*i*) Lateral surface area of cube is :

(*a*) $6l^2$ (*b*) $5l^2$

(*c*) $4l^2$ (*d*) $2l^2$.

(*ii*) Curved surface area of cylinder is :

(*a*) $2\pi rh$ (*b*) πrh

(*c*) $2\pi r$ (*d*) $\pi r^2 h$.

(*iii*) If the edge of a cube is doubled then what will happen to the surface area ?

(*a*) 2 times (*b*) 4 times

(*c*) 3 times (*d*) Half.

Ans. (*i*) (*c*) $4l^2$ (*ii*) (*a*) $2\pi rh$

(*iii*) (*b*) 4 times.