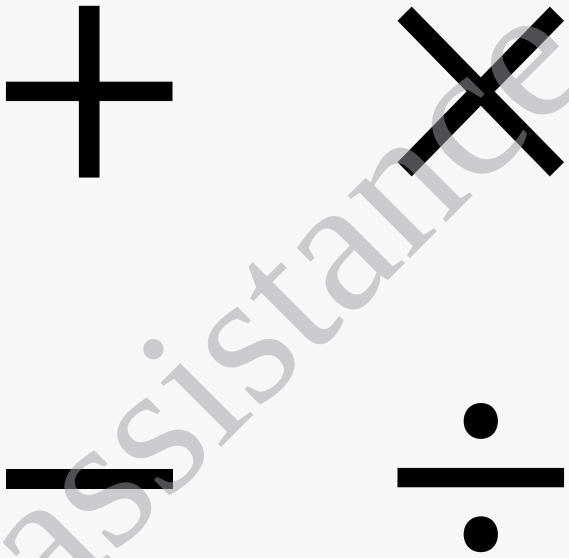
Mensuration
Ex. 9.2



Ex. 9.2

1. (A) 27 sq. cm

$l = 3$ cm, $b = 2$ cm, $h = 1.5$ cm

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

$= 2(3 \times 2 + 2 \times 1.5 + 1.5 \times 3)$

$= 2(6 + 3 + 4.5)$

$= 2 \times 13.5$

$= 27 \text{ cm}^2$

2. (B) four times

Let edge of cube $= a$ units

Surface area, $S = 6a^2$ sq. units — (1)

When the edge is doubled

New edge $= 2a$ units

Surface area $= 6(2a)^2$

$= 6 \times 4a^2$

$= 4(6a^2)$

$S' = 4S$ (using eq. (1))

∴ Surface area becomes four times.

3. (C) 36 sq. cm.

$l = 5$ cm, $b = 4$ cm, $h = 2$ cm

Lateral surface area of cuboid

$= 2(l + b)h$

$= 2(5 + 4)2$

$= 2 \times 9 \times 2$

$= 36 \text{ cm}^2$

4. (D) 14 cm

$h = 16$ cm

Lateral surface area of cylinder = 704 cm^2

or $2\pi rh = 704$

or $2 \times \frac{22}{7} \times r \times 16 = 704$

or $2r = \frac{704 \times 7}{22 \times 16}$

or $2r = 14$

or $d = 14$ cm

5. (B) 1100 sq. cm.

$h = 25$ cm, $r = 7$ cm

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

$= 2 \times \frac{22}{7} \times 7 \times 25$

$= 2 \times 22 \times 25$

$= 1100\ cm^2$

6a. $l = 25$ cm, $b = 12$ cm, $h = 8$ cm

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

$= 2(25 \times 12 + 12 \times 8 + 8 \times 25)$

$= 2(300 + 96 + 200)$

$= 2 \times 596$

$= 1192\ cm^2$

b. $a = 3.5$ cm

Total surface area of cube $= 6a^2$

$= 6 \times (3.5)^2$

$= 6 \times 12.25 = 73.5\ cm^2$

c. $l = 50\text{ cm}$, $b = 40\text{ cm}$, $h = 2.5\text{ cm}$

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

$= 2(50 \times 40 + 40 \times 2.5 + 2.5 \times 50)$

$= 2(2000 + 100 + 125)$

$= 2 \times 2225$

$= 4450\ \text{cm}^2$

7. For cube, $a = 50\text{ cm}$

Area of material required $= 6a^2$

$= 6(50)^2$

$= 6 \times 2500$

$= 15000\ \text{cm}^2$

For cuboid, $l = 60\text{ cm}$, $b = 40\text{ cm}$, $h = 50\text{ cm}$

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

$= 2(60 \times 40 + 40 \times 50 + 50 \times 60)$

$= 2(2400 + 2000 + 3000)$

$= 2 \times 7400$

$= 14800\ \text{cm}^2$

$14800 < 15000$

∴ Cuboidal box requires lesser amount of material to make.

8. Ratio of dimensions of cuboid $= 4 : 2 : 1$

Let $l = 4x\text{ cm}$, $b = 2x\text{ cm}$, $h = x\text{ cm}$

Surface area of cuboid $= 1372\ \text{cm}^2$

or $2(lb + bh + hl) = 1372$

or $2(4x \times 2x + 2x \times x + x \times 4x) = 1372$

or $2(8x^2 + 2x^2 + 4x^2) = 1372$

or $2 \times 14x^2 = 1372$

or $x^2 = \frac{\cancel{686}\ 49}{\cancel{1372}\ \cancel{2\times 14}\ 1}$

or $x = \sqrt{49}$

or $x = 7$

$\therefore$ $l = 4 \times 7 = 28$ cm

$b = 2 \times 7 = 14$ cm

$h = 7$ cm

9. Length of aquarium, $l = 80$ cm
Breadth of aquarium, $b = 30$ cm
Height of aquarium, $h = 40$ cm
Area of paper needed
= area of base + 2 × area of side face + area of back face
$= l \times b + 2 \times b \times h + l \times h$
$= 80 \times 30 + 2 \times 30 \times 40 + 80 \times 40$
$= 2400 + 2400 + 3200$
$= 8000\ cm^2$

10. One is cylinder and the other is a cube.
Both have the same height of 6 cm.
For cylinder
$r = \frac{d}{2} = \frac{6}{2} = 3$ cm

$h = 6$ cm
Lateral surface area of cylinder $= 2\pi rh$
$= 2 \times \frac{22}{7} \times 3 \times 6$

$= \frac{792}{7} \simeq 113.14\ cm^2$

For cube

$a = 6$ cm

Lateral surface area $= 4a^2$

$= 4(6)^2$

$= 4 \times 36$

$= 144\ cm^2$

$144 > 113.14$

$\therefore$ Cube has greater lateral surface area.

11. Length of room, $l = 5$ m

Width of room, $b = 3.2$ m

Height of room, $h = ?$

Area of four walls $= 57.4\ m^2$

or $2(l+b)h = 57.4$

or $2(5+3.2)h = 57.4$

or $2 \times 8.2 \times h = 57.4$

or $h = \frac{57.4}{12 \times 8.2}$ (28.7, 0.7, 0.2)

or $h = 3.5$ cm

$\therefore$ Height of room $= 3.5$ cm

12. Length of hall, $l = 12$ m

Breadth of hall, $b = 5$ m

Height of hall, $h = 4.25$ m

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

$= 2(12+5)4.25$

$= 2 \times 17 \times 4.25$

$= 144.5\ m^2$

Area that can be painted with one can $= 8.5\ m^2$

No. of cans of paint required

$= \frac{\text{area of four walls}}{\text{area painted with one can}}$

$= \frac{144.5}{8.5}$

$= \frac{1445}{85}$ $\quad \begin{matrix} 289 \\ 17 \end{matrix} \quad \begin{matrix} 17 \\ 1 \end{matrix}$

$= 17$

Cost of 1 can of paint = ₹510

Cost of 17 cans of paint = 510×17

= ₹8670

13.a $d = 7$ cm

$r = \frac{d}{2} = \frac{7}{2}$ cm

$h = 21$ cm

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

$= {}^{1}\cancel{2} \times \frac{22}{\cancel{7}_{1}} \times \frac{\cancel{7}^{1}}{\cancel{2}_{1}} \left(21 + \frac{7}{2}\right)$

$= \overset{11}{\cancel{22}} \times \frac{49}{2}$

$= 539 \text{ cm}^2$

b. $r = 14$ m, $h = 6$ m

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

$= 2 \times \frac{22}{\cancel{7}_{1}} \times \overset{2}{\cancel{14}}(6 + 14)$

$= 88 \times 20$

$= 1760 \text{ m}^2$

14. Width of sheet, $b = 48$ cm

Length of sheet, $l = ?$

Lateral surface area of cylinder $= 4224\ cm^2$

$\therefore$ Area of rectangular sheet = lateral surface area of cylinder

or $l \times b = 4224$

or $l \times 48 = 4224$

or $l = \frac{4224}{48} = 88$

or $l = 88$ cm

Perimeter of rectangular sheet $= 2(l + b)$

$= 2(88 + 48)$

$= 2 \times 136$

$= 272$ cm

15. Diameter of road roller, $d = 84$ cm

Radius of road roller, $r = \frac{d}{2} = \frac{84}{2} = 42$ cm

$= \frac{42}{100}$ m $= 0.42$ m

Length of road roller, $h = 1$ m

Area covered in 1 revolution $= 2\pi rh$

$= 2 \times \frac{22}{7} \times 0.42 \times 1$

$= 2.64\ m^2$

Area of playground $= 1980\ m^2$

No. of revolutions $= \frac{\text{area of playground}}{\text{area covered in 1 revolution}}$

$= \frac{1980}{2.64} = 750$