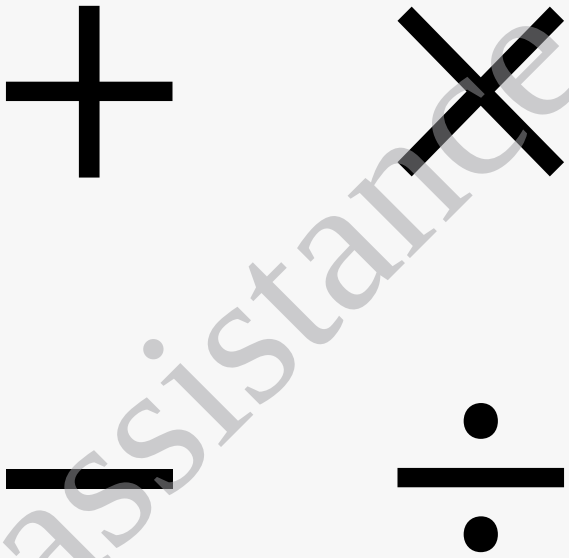
Mensuration
Ex. 9.3



Ex. 9.3

1. (A) 125 cu. cm.

Let edge of cube = a cm

Perimeter of one face = 20 cm

or $4a = 20$

or $a = \frac{20}{4_1}^{5}$

or $a = 5$ cm

Volume of cube $= a^3$

$= 5^3$

$= 125 \text{ cm}^3$

2. (C) 8 times

Let edge of cube = a units

Volume of cube, $V = a^3$ cu. units — (1)

When the edge is doubled, edge = 2a units

Volume of cube, $V' = (2a)^3$

$V' = 8a^3$

$V' = 8V$

∴ Volume becomes eight times of original volume.

3. (C) 18 m, 12 m, 6 m

Ratio of dimensions = 3 : 2 : 1

Let length of cuboid, $l = 3x$ metre

Breadth of cuboid, $b = 2x$ metre

Height of cuboid, $h = x$ metre

Volume of cuboid = 1296 m^3

or $l\,b\,h = 1296$

or $3x \times 2x \times x = 1296$

or $6x^3 = 1296$

or $x^3 = \frac{1296}{6}$ 216

or $x^3 = 216$

Taking cube root on both sides

$x = 6$ cm

$\therefore l = 3 \times 6 = 18$ m

$b = 2 \times 6 = 12$ m

$h = 1 \times 6 = 6$ m

4. (D) 2772 cu. cm.

Diameter of cylinder, $d = 21$ cm

Radius of cylinder, $r = \frac{d}{2} = \frac{21}{2}$ cm

Height of cylinder, $h = 8$ cm

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

$= \frac{22}{7_1} \times \frac{21}{2_1}^3 \times \frac{21}{2_1} \times 8^{4\,2}$

$= 2772 \text{ cm}^3$

5. (B) 4:1

Let radius of cylinder be 'r' units and height of cylinder be 'h' units

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

When the radius is doubled, height $= 2r$ units

Volume of cylinder, $V' = \pi (2r)^2 h$

$V' = 4\pi r^2 h$

$V' = 4V$

$V' : V = 4:1$

6. (A) 10 cm

Radius of tank, $r = 14$ cm

Height of tank, $h = ?$

Capacity of tank $= 6160\ cm^3$

or $\pi r^2 h = 6160$

or $\frac{22}{7_1} \times \cancel{14}^{2} \times 14 \times h = 6160$

or $h = \frac{\cancel{6160}^{\cancel{560}^{\cancel{40}^{\cancel{20}\ 10}}}}{1 \cancel{22} \times \cancel{2}_1 \times \cancel{14}_1}$

or $h = 10$ cm

7a. Length of cuboid, $l = 12$ m

Breadth of cuboid, $b = 8$ m

Height of cuboid, $h = 6$ m

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

$= 12 \times 8 \times 6$

$= 576\ cm^3$

b. Length of cuboid, $l = 15$ m

Breadth of cuboid, $b = 10$ m

Height of cuboid, $h = 428$ cm

$= \frac{428}{100}$ m (1 m $= 100$ cm)

$= 4.28$ m

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

$= 15 \times 10 \times 4.28$

$= 642\ cm^3$

8. Length of hall, $l = 20\,m$
Breadth of hall, $b = 15\,m$
Height of hall, $h = ?$
Volume of hall $= 1200\,m^3$
or $lbh = 1200$
or $20 \times 15 \times h = 1200$
or $h = \frac{1200}{20 \times 15}$
or $h = 4\,m$
∴ Height of hall $= 4\,m$

9. Let length of edge of cube $= a$ metre
Volume of cube $= 1000\,m^3$
or $a^3 = 1000$
Taking cube root on both sides
$a = 10\,m$
∴ Length of edge of cube $= 10\,m$

10. Edge of cube, $a = 12\,cm$
Volume of cube $= a^3$
$= 12^3$
$= 1728\,cm^3$
When the edge is trifled, edge $= 12 \times 3$
$= 36\,cm$
Volume of cube $= a^3$
$= (36)^3$
$= 46656\,cm^3$

11. Length of iron piece, $l = 5m = 5 \times 100\ cm = 500\ cm$
Breadth of iron piece, $b = 6\ cm$
Height of iron piece, $h = 2\ cm$
Volume of iron piece $= l\,b\,h$
$= 500 \times 6 \times 2$
$= 6000\ cm^3$
Weight of $1\ cm^3$ of iron $= 50\ g$
Weight of $6000\ cm^3$ of iron $= 50 \times 6000$
$= 300000\ g.$
$= \frac{300000}{1000}\ kg \quad (1\ kg = 1000\ g)$
$= 300\ kg$

12. Ratio of dimensions of cuboid $= 4:2:1$
Let length of cuboid, $l = 4x\ cm$
Breadth of cuboid, $b = 2x\ cm$
Height of cuboid, $h = x\ cm$
Surface area of cuboid $= 1372\ cm^2$
or $2(lb + bh + hl) = 1372$
or $2(4x \times 2x + 2x \times x + x \times 4x) = 1372$
or $8x^2 + 2x^2 + 4x^2 = \frac{1372}{2}$ 686
or $14x^2 = 686$
or $x^2 = \frac{686}{14}$ 49 1
or $x^2 = 49$
Taking square root on both sides
$x = 7\ cm$
Length of cuboid, $l = 4 \times 7 = 28\ cm$

Breadth of cuboid, $b = 2 \times 7 = 14$ cm

Height of cuboid, $h = 1 \times 7 = 7$ cm

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

$= 28 \times 14 \times 7$

$= 2744\ cm^3$

13. Let height of cuboid $= h$ cm

Area of base of cuboid $= 180\ cm^2$

Volume of cuboid $= 900\ cm^3$

or area of base $\times$ height $= 900$

or $180 \times h = 900$

or $h = \frac{900}{180}^{5}_{1}$

or $h = 5$

$\therefore$ Height of cuboid $= 5$ cm

14. Radius of cylinder, $r = 7$ m

Height of cylinder, $h = ?$

Volume of cylinder $= 3850\ m^3$

or $\pi r^2 h = 3850$

or $\frac{22}{\cancel{7}_{1}} \times \cancel{7}^{1} \times 7 \times h = 3850$

or $h = \frac{\cancel{3850}^{\cancel{550}\ 25}}{{}_{1}\cancel{22} \times \cancel{7}_{1}}$

or $h = 25$

$\therefore$ Height of cylinder $= 25$ cm

15. Ratio of radius and height of cylinder $= 1 : 3$

Let radius of cylinder, $r = x$ cm
and height of cylinder, $h = 3x$ cm
Volume of cylinder $= 3234\ cm^3$

or $\pi r^2 h = 3234$

or $\frac{22}{7} \times x^2 \times 3x = 3234$

or $x^3 = \frac{\cancel{1078}\ 49}{\cancel{3234} \times 7}{}_{1}\ \cancel{22} \times \cancel{3}\ 1$

or $x^3 = 343$

Taking cube root on both sides

$x = 7$

$\therefore$ Radius of cylinder, $r = 7$ cm

Height of cylinder, $h = 3 \times 7 = 21$ cm

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

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

$= 44 \times 28$

$= 1232\ cm^2$