Chapter - 9

MENSURATION-II

(c) 3
(d) 4

Foundation

Solutions

1. (c); length = 2m, breadth = 2m and height = 1m
Total surface area = 2(lb+ bh + hl)
= 2(2 × 2 + 2 × 1 + 1 × 2) = 2(4 + 2 + 2) = 16m²

2. (a); Volume = l × b × h

$$\text{Volume} = 5\text{m} \times 2\text{m} \times \frac{10}{100}\text{m} = \frac{100}{100}\text{m}^3 = 1\text{m}^3$$

3. (b); Volume of beam = 900 × 40 × 20 = 720000 cm³
= .72 m³
Weight of the beam = 50 × .72 = 36 kg

4. (d); length of longest rod $= \sqrt{l^2 + b^2 + h^2}$

$$= \sqrt{30^2 + 24^2 + 18^2} = \sqrt{900 + 576 + 324}$$

$$= \sqrt{900 + 900} = \sqrt{1800} = 30\sqrt{2}\text{ m}$$

5. (b); Let the side of cube be a
Here, 4a = 40, a = 10 cm
Volume of cube = 10^3 = 1000 cm³

6. (d); Volume of cube = $a^3 = 4^3$ = 64 cm³
Weight of cube = 64 × 10 = 640 gms
Cost of 8 gms = Rs. 30

$$\text{Cost of 640 gm} = \frac{30}{8} \times 640 = \text{Rs. } 2400$$

7. (d); Surface area = $6a^2$ = 384

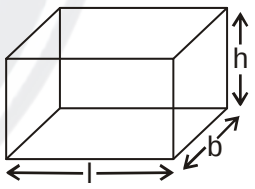
$$a^2 = \frac{384}{6} = 64, \quad a = 8\text{ cm}$$

Volume = $a^3 = 8^3$ = 512 cm³

8. (c); Let the edge of the cube be 'a'.

$$\text{Length of diagonal} = a\sqrt{3} = 4\sqrt{3}, \quad a = 4\text{ cm}$$

9. (c); Area of three adjacent faces are x, y and z respectively.
Let the side of cuboid be l, b and h.
therefore on multiplying
x, y and z
x × y × z = lb × bh × hl
$xyz = l^2b^2h^2$
$= (lbh)^2$
$lbh = \sqrt{xyz}$



Volume of cuboid = $lbh = \sqrt{xyz}$

10. (c); Surface area = 2(lb + bh + hl)
= 2(16 × 8 + 8 × 8 + 8 × 16)
= 2(128 + 64 + 128)
= 2 × 320 = 640 cm²

11. (c); Volume of three cubes = $6^3 + 8^3 + 10^3$
= 216 + 512 + 1000
= 1728 cm³
Volume of new cube = a^3 = 1728, a = 12 cm

12. (d); Number of cubes $= \dfrac{\text{Volume of big cube}}{\text{Volume of small cube}}$

$= \dfrac{6\times6\times6}{2\times2\times2} = 27$

13. (a); Height of cylinder $= 14$ cm

radius of cylinder $= \dfrac{d}{2} = \dfrac{4}{2} = 2$ cm

volume of cylinder $= \pi r^2 h = \dfrac{22}{7}\times 2^2 \times 14$

$= 22 \times 8 = 176\ cm^3$

14. (a); Volume of cylindrical pillar $= \pi r^2 h$

$= \dfrac{22}{7}\times 2\times 2\times 21 = 264\ m^3$

Cost of construction = Rs. 1.50 × 264 = Rs. 396

15. (b); Radius of tunnel $= \dfrac{d}{2} = \dfrac{2}{2} = 1$ m

length = 40 m

Area of sheet $= 2\pi rh = 2\times\pi\times1\times40 = 80\pi\ m^2$

16. (c); $2\pi rh = 1760$, $2\pi \times 14 \times h = 1760$

$h = \dfrac{1760\times7}{2\times22\times14} = 20$ cm

17. (d); Volume $= \dfrac{1}{3}\pi r^2 h = \dfrac{1}{3}\times\pi\times6\times6\times12 = 144\pi\ cm^3$

18. (d); Volume of cone $= \dfrac{1}{3}\pi r^2 h = \dfrac{1}{3}\pi(3r)^2\times3r = 9\pi r^3$

19. (b); Lateral surface area of cone $= \pi rH$

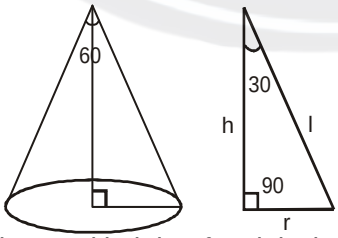
Base area $= \pi r^2$

$\dfrac{\text{Lateral surface ara}}{\text{Base area}} = \dfrac{\pi rH}{\pi r^2} = \dfrac{H}{r}$

20. (a); $\dfrac{\text{Radius of base}}{\text{Slant height}} = \sin 30°$

$\dfrac{r}{l} = \sin 30°$

$\dfrac{r}{l} = \dfrac{1}{2}$



21. (b); Let radius of each be r and height of each be h.

Then, $\dfrac{\text{Volume of cylinder}}{\text{Volume of cone}} = \dfrac{\pi r^2 h}{\frac{1}{3}\pi r^2 h} = \dfrac{3}{1}$

22. (d); Number of balls $= \dfrac{\text{Volume of metal ball}}{\text{Volume of smaller ball}}$

$= \dfrac{\frac{4}{3}\pi\times(8)^3}{\frac{4}{3}\pi\times(2)^3} = \dfrac{512}{8} = 64$

23. (c); Total Surface area $= 3\pi r^2$

$= 3\pi \times 7^2 = 147\pi\ cm^2$

24. (c); Volume of cylinder $= \pi r^2 h = \dfrac{22}{7}\times2\times2\times45$

Volume of sphere $= \dfrac{4}{3}\times\pi\times r^3 = \dfrac{4}{3}\times\dfrac{22}{7}\times3\times3\times3$

Number of solid sphere $= \dfrac{\frac{22}{7}\times2\times2\times45}{\frac{4}{3}\times\frac{22}{7}\times3\times3\times3} = 5$

25. (a); Let the radius of cone be R.

Volume of sphere = Volume of cone

$\dfrac{4}{3}\pi r^3 = \dfrac{1}{3}\pi R^2\cdot r$, $R^2 = 4r^2$, $R = 2r$

26. (c); Volume of water $= 16\times24\times\dfrac{16\frac{2}{3}}{100}$

$= \dfrac{16\times24\times50}{3\times100} = 64\ m^3$

27. (b); Number of bricks $= \dfrac{500\times300\times20}{250\times12.5\times7.5} = 128$

28. (c); Number of bricks $= \dfrac{1500\times300\times50}{25\times12\times6} = 12500$ cm

29. (c); Edge of cubical block = 20 cm

Volume $= 20^3 = 8000\ cm^3$

Edge of small cubical block = 5 cm

Volume $= 5^3 = 125\ cm^3$

Number of smaller cubes $= \dfrac{8000}{125} = 64$

30. (b); Surface area = 2(12 × 24 + 12 × 12 + 12 × 24)

= 2(288 + 144 + 288)

$= 2\times720 = 1440\ cm^2$

31. (b); Volume of hemisphere = Volume of cone

$\dfrac{2}{3}\pi r^3 = \dfrac{1}{3}\pi R^2 H$, $\dfrac{2}{3}\times6\times6\times6 = \dfrac{1}{3}\times R^2\times75$

$R^2 = \dfrac{2\times6\times6\times6}{75} = 5.76$, $R = \sqrt{5.76} = 2.4$ cm

32. (a); Let the radii of two cylinders be 2x and 3x and their height = 5y and 3y

$$\text{Required ratio} = \frac{\pi(2x)^2(5y)}{\pi(3x)^2(3y)} = \frac{20}{27}$$

33. (c); Volume of iron rod = $\pi r^2 h$

$$= \frac{22}{7} \times 1 \times 1 \times 70 = 220\ cm^3$$

$$\therefore \text{Weight of the cylinder} = \frac{220 \times 10}{1000} = 2.2\ kg$$

34. (b); Here, $h = \frac{14}{3}$ m, $r = 3$m

$$\text{Volume} = \frac{1}{3} \times \frac{22}{7} \times \frac{14}{3} \times 3 \times 3 = 44\ m^3$$

$$\text{Average of air each person get} = \frac{44}{11} = 4\ m^3$$

35. (a); Circumference = 44 m

$2\pi r = 44$

$$r = \frac{44}{2 \times 22} \times 7 = 7m$$

Mensuration formulas

→ Mensuration formulas of 2D Shapes

Shapes	Perimeter	Area
Square	4a	a2
Rectangle	2 (l + b)	l × b
Circle	2 π r	πr2
Scalene Triangle	a+b+c	√[s(s−a)(s−b)(s−c)], Where, s = (a+b+c)/2
Isosceles Triangle	2a + b	½ × b × h
Equilateral triangle	3a	(√3/4) × a2
Right Angle Triangle	b + h+ p	½ × b × h
Rhombus	4 × side	½ × d1 × d2
Parallelogram	2(l+b)	b × h
Trapezium	a+b+c+d	½ h(a+c)

→ Mensuration formulas of 3D shapes

Shapes	Volume	Curved surface area	Total surface area
Cube	a3	LSA = 4 a2	6 a2
Cuboid	l × b × h	LSA = 2h(l + b)	2 (lb +bh +hl)
Sphere	(4/3) π r3	4 π r2	4 π r2
Hemisphere	(⅔) π r3	2 π r2	3 π r2
Cylinder	π r2 h	2π r h	2πrh + 2πr2
Cone	(⅓) π r2 h	π r l	πr (r + l)