Chapter - 8

MENSURATION-I

Foundation

Solutions

1. (c); Let the breadth be x
then length = x + 2
Perimeter of rectangle = 2(l + b)
48 = 2(x + 2 + x), 24 = 2x + 2, 2x = 22, x = 11
breadth, x = 11
length, x + 2 = 13
Area = l × b = 11 × 13 = 143 cm^2

2. (b); Breadth = 40m, length = x
Perimeter = 2(x + 40)
200 = 2(x + 40), x + 40 = 100, x = 60
Area = 40 × 60 = 2400 m^2

3. (c); Area of road = 2w(l + b + 2w)
= 2(1)(15 + 2) = 34m^2
Cost of metalling the road = 200 × 34 = Rs. 6800

4. (c); Area of ground $= \left(\frac{900}{1.25}\right) m^2 = 720\ m^2$
$\text{width} = \frac{\text{Area}}{\text{Length}} = \left(\frac{720}{30}\right) m = 24\ m$

5. (c); Let the breadth be 'x', length be '2x'
Area = $2x^2$
New length = (2x – 5) cm
New breadth = (x + 5) cm
New Area = (2x – 5) (x + 5)
ATQ, $2x^2 + 75 = (2x - 5)(x + 5) \Rightarrow x = 20$
length = 2 × x = 2 × 20 = 40 cm

6. (d); Area of lawn = 2w(l + b + 2w)
= 2 × 5 × (90 + 40 + 10) = 1400 m^2

7. (a); Let the length and breadth be l and b respectively.
According to question
$l^2 + b^2 = 17^2$, $l^2 + b^2 = 289$ ...(i)
and 2(l + b) = 46, l + b = 23 ...(ii)
From (i) and (ii)
$(l + b)^2 = l^2 + b^2 + 2lb$
$lb = \frac{1}{2}(23^2 - 289)$, $lb = 120\ cm^2$

8. (c); Number of tiles $= \frac{400 \times 300}{8 \times 6} = 2500$

9. (a); Number of marble slabs $= \frac{300 \times 300}{20 \times 30} = 150$

10. (d); Let the original side be x and the new side be 2x

$$\frac{\text{New area}}{\text{Original area}} = \frac{(2x)^2}{x^2} = \frac{4x^2}{x^2} = 4:1$$

11. (b); Area of square $= \frac{1}{2} \times (\text{diagonal})^2$

$$= \frac{1}{2} \times 5.2 \times 5.2 = 13.52 \text{ cm}^2$$

12. (b); Number of tin sheets $= \frac{100 \times 100}{20 \times 20} = 25$

13. (b); Number of Handkerchiefs $= \frac{175 \times 105}{35 \times 35} = 15$

14. (c); Let the side of square be 10.
Area of square $= 10^2 = 100$

New side $= 10 \times \frac{150}{100} = 15$

New area $= 15 \times 15 = 225$
percent increase in area $= (225 - 100)\% = 125\%$

15. (b); Let the side of square be 'a'

diagonal of square $= \sqrt{2}\,a$

Required ratio $= \frac{a^2}{(\sqrt{2}a)^2} = \frac{a^2}{2a^2} = 1:2$

16. (b); Area of triangle $= 9 \times y$

Area of equilateral triangle $= \frac{\sqrt{3}}{4} \times a^2$

$$= \frac{\sqrt{3}}{4} \times 6 \times 6 = 9\sqrt{3}$$

According to question
$9 \times y = 9 \times \sqrt{3}, \quad y = \sqrt{3}$

17. (b); Let the side of equilateral triangle be a

Given, $\frac{\sqrt{3}}{2}a = \sqrt{6}, \quad a = 2\sqrt{2}$

Area $= \frac{\sqrt{3}}{4}a^2 = \frac{\sqrt{3}}{4} \times 4 \times 2 = 2\sqrt{3}$

18. (b); Area $= \frac{1}{2}az + \frac{1}{2}ay + \frac{1}{2}tb + \frac{1}{2}cx$

$$= \frac{1}{2}[bt + cx + ay + az]$$

19. (a); Circumference $= 2\pi r$

$352 = 2\pi r, \quad r = \frac{352}{2 \times 22} \times 7 = 56 \text{ m}$

Area $= \pi r^2 = \frac{22}{7} \times 56 \times 56 = 9856 \text{ m}^2$

20. (a); Circumference of a circle = 88 cm

$2\pi r = 88, \quad r = \frac{88}{2 \times 22} \times 7, \quad r = 14$

Area of circle $= \pi r^2 = \pi(14)^2 = 196\pi$

21. (c); Area of regular hexagon $= 6 \times \left(\frac{\sqrt{3}}{4}a^2\right)$

$$= 6 \times \frac{\sqrt{3}}{4} \times 2 \times 2 = 6\sqrt{3} \text{ m}^2$$

22. (d); Required area $= [10 \times 2\pi - \pi(1)^2]$
$= 20\pi - \pi = 19\pi \text{ m}^2$

23. (d); Required ratio $= \frac{\left(\frac{a}{2}\right)^2}{\left(\frac{\sqrt{2}a}{2}\right)^2} = 1:2$ a = side of square

24. (a); Area of circle $= \pi r^2$
Area of square $= a^2$

$a^2 = \pi r^2, \quad \frac{a^2}{r^2} = \frac{\pi}{1}, \quad \frac{a}{r} = \sqrt{\pi} : 1$

25. (d); Length of arc = 20, Circumference $= 2\pi r$
Angle, $\theta = 60°$

$2\pi r\left(\frac{60°}{360°}\right) = 20, \quad r = \frac{20 \times 6}{2\pi} = \frac{60}{\pi} \text{ cm}$

26. (c); Let side of equilateral triangle be a

then its height $= \frac{\sqrt{3}}{2}a$

Required ratio $= \frac{a}{\frac{\sqrt{3}}{2}a} = 2:\sqrt{3}$

27. (d); Area of rhombus $= \frac{1}{2} \times d_1 \times d_2 = \frac{1}{2}xy$

28. (a); Area of parallelogram = BC × height
$= (50 \times 20)m^2 = 1000\ m^2$

29. (c); Area of triangle $= \sqrt{S(S-a)(S-b)(S-c)}$
Let a = 15 m, b = 16 m, c = 17 m
$S = \frac{a+b+c}{2} = 24$
$= \sqrt{24(24-15)(24-16)(24-17)}$
$= \sqrt{24 \times 9 \times 8 \times 7} = \sqrt{8 \times 3 \times 3 \times 3 \times 8 \times 7} = 24\sqrt{21}$

30. (c); Here, $S = \frac{20+21+29}{2} = 35$ m
Area $= \sqrt{35(35-20)(35-21)(35-29)}$
$= \sqrt{35 \times 15 \times 14 \times 6} = 210\ m^2$

31. (a); Hypotenuse = 20 cm
Perimeter = 2 × 24 = 48 cm
Let the length and breadth be l and b respectively
l + b + 20 = 48, l + b = 28 ...(i)
By phythagorus theorem,
$l^2 + b^2 = 400$, $(l + b)^2 = 28^2$
$l^2 + b^2 + 2lb = 784$, 2lb = 384, lb = 192
$l - b = \sqrt{784 - 4 \times 192} = \sqrt{16} = 4$ ...(ii)
Solving (i) and (ii), we get
l = 16 cm and b = 12 cm

32. (c); Given hypotenuse = 8
$\sqrt{2}a = 8$, $a = \frac{8}{\sqrt{2}}$
Area of isosceles triangle
$= \frac{1}{2} \times \frac{8}{\sqrt{2}} \times \frac{8}{\sqrt{2}} = 16\ cm^2$

33. (b); Area of parallelogram = b × h
240 = b × 12 ⇒ base, b = 20 cm

34. (c); Let x and y be the sides of the square
then, $\frac{x^2}{y^2} = \frac{9}{1}$, $\frac{x}{y} = \frac{3}{1}$
Ratio of perimeter $= \frac{4x}{4y} = \frac{x}{y} = \frac{3}{1} = 3:1$

35. (c); Area of carpet $= \frac{105}{3.50} = 30\ m^2$
width = 5 m, length $= \frac{30}{5} = 6$ m

36. (d); Required $= \pi\left(\frac{d_1}{2}\right)^2 - \pi\left(\frac{d_2}{2}\right)^2$
$= \pi(5)^2 - \pi(4)^2 = 25\pi - 16\pi = 9\pi\ cm^2$

37. (b); Let the side be a and b of squares s_1 and s_2 respectively,
Ratio of area $= \frac{a^2}{b^2} = \frac{4}{25}$
$\frac{6^2}{b^2} = \frac{4}{25}$, $b^2 = \frac{6 \times 6 \times 25}{4}$, b = 15 cm

38. (d); Let the width be x
then length $= \frac{4}{3}x$, Area $= \frac{4}{3}x \cdot x = 300$
$x^2 = \frac{900}{4}$, x = 15 cm
then length $= \frac{4}{3} \times 15 = 20$ cm
Difference = (20 – 15) cm = 5 cm

39. (d); Circumference = πd
$\pi d - d = 105$, $(\pi - 1)d = 105$, $\frac{15}{7}d = 105$
$d = \frac{105}{15} \times 7 = 49$ cm

40. (d); Let r be the radius of circle and a be the side of square
Side of square $= \sqrt{256} = 16$ cm
Diameter of circle = $16\sqrt{2}$
Radius of circle = $8\sqrt{2}$
Area of circle $= \pi(8\sqrt{2})^2 = 128\pi\ cm^2$