CH 6 MENSURATION

ANSWERS AND EXPLANATIONS

EXERCISE 1

1. (c) According to question, circumference of circle = Area of circle

$$\text{or} \quad \pi d = \pi\left(\frac{d}{2}\right)^2$$

[where d = diameter]

$\therefore \quad d = 4$

2. (a) In a parallelogram.

Area = Diagonal × length of perpendicular on it.

$= 30 \times 20 = 600 \text{ m}^{2\backslash}$

3. (b) Required area covered in 5 revolutions

$= 5 \times 2\pi rh$

$$= 5 \times 2 \times \frac{22}{7} \times 0.7 \times 2 = 44 \text{ m}^2$$

4. (c) In a triangle,

$$\text{Area} = \frac{1}{2} \times \text{length of perpendicular} \times \text{base}$$

$$\text{or} \quad 615 = \frac{1}{2} \times \text{length of perpendicular} \times 123$$

$\therefore$ Length of perpendicular

$$= \frac{615 \times 2}{123} = 10 \text{ m.}$$

5. (a) In an isoscele right angled triangle,

Area = 1/23.3 × perimeter^2

$= 1/23.3 \times 20^2 = 17.167 \text{ m}^2$

6. (a) Area of rhombus = side × height

$= 13 \times 20$

$= 260 \text{ cm}^2$

7. (a) In a circle, circumference = $2\pi r$

Hence, $44 = 2\pi r$

$$\therefore \quad r = \frac{44}{2\pi}$$

Now, area of circle = πr^2

$$= \pi \times \frac{44}{2\pi} \times \frac{44}{2\pi} = 154 \text{ m}^2$$

8. (a) Let the length and breadth of a rectangle are 9 xm and 5 xm respectively.

In a rectangle, area = length × breadth

$\therefore \quad 720 = 9x \times 5x$

or $x^2 = 16 \Rightarrow x = 4$

Thus, length = $9 \times 4 = 36$ m

and breadth = $5 \times 4 = 20$ m

Therefore, perimeter of rectangle = 2(36 + 20) = 112 m

9. (d) Required no. of squares $= \frac{5^2}{1^2} = 25$

10. (c) Let the area of two squares be 9x and x respectively.

So, sides of both squares will be

$\sqrt{9x}$ and $\sqrt{x}$ respectively.

[since, side = $\sqrt{\text{area}}$]

Now, perimeters of both squares will be

$4 \times \sqrt{9x}$ and $4\sqrt{x}$ respectively.

[since , perimeter = 4 × side]

Thus, ratio of their perimeters $= \frac{4\sqrt{9x}}{4\sqrt{x}} = 3 : 1$

11. (a) Volume of the bucket = volume of the sand emptied

Volume of sand = $\pi (21)^2 \times 36$

Let r be the radius of the conical heap.

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Then, $\frac{1}{3}\pi r^2 \times 12 = \pi(21)^2 \times 36$

or $r^2 = (21)^2 \times 9$

or $r = 21 \times 3 = 63$

12. (a) Let inner radius of the pipe be r.

Then, $440 = \frac{22}{7} \times r^2 \times 7 \times 10$

or $r^2 = \frac{440}{22 \times 10} = 2$

or $r = \sqrt{2}\,m$

13. (c) Area of field = 576 km^2. Then,

each side of field = $\sqrt{576} = 24$ km

Distance covered by the horse

= Perimeter of square field

= 24 × 4 = 96 km

$\therefore$ Time taken by horse = $\frac{\text{distance}}{\text{speed}} = \frac{96}{12} = 8$ h

14. (c) Clearly, we have :

$l = 9$ and $l + 2b = 37$ or b = 14.

$\therefore$ Area = $(l \times b) = (9 \times 14)$ sq. ft.

= 126 sq. ft.

15. (b) We have : $2b + l = 30$

$\Rightarrow$ $l = 30 - 2b$.

Area = 100 m^2

$\Rightarrow$ $l \times b = 100$

$\Rightarrow$ $b(30 - 2b) = 100$

$\Rightarrow$ $b^2 - 15b + 50 = 0$

$\Rightarrow$ $(b - 10)(b - 5) = 0$

$\Rightarrow$ b = 10 or b = 5.

When b = 10, l = 10 and when b = 5, l = 20.

Since the garden is rectangular,

so its dimension is 20 m × 5 m.

16. (c) Area of the field

= 13.5 × 2.5 = 33.75 m^2

Area covered by the rectangular tank

= 5 × 4.5 = 22.50 m^2

Area of the field on which the earth dug out is to be spread = 33.75 – 22.50 = 11.25 m^2

Let the required height be h.

Then, 11.25 × h = 5 × 4.5 × 2.1

or h = 4.2 m

17. (b) Area of the field grazed

$= \left(\frac{22}{7} \times 14 \times 14\right)$ sq. ft.

= 616 sq. ft.

Number of days taken to graze the field

$= \frac{616}{100}$ days = 6 days (approx.)

18. (a) Volume of the water running through pipe per hour

$= \frac{20}{100} \times \frac{20}{100} \times 15000 = 600$ cubic metre

Required time

$= \frac{60 \times 6.5 \times 80}{600} = 52$ hours

19. (c) Length of wire

$= 2\pi \times R = \left(2 \times \frac{22}{7} \times 56\right)$ cm

= 352 cm.

Side of the square

$= \frac{352}{4}$ cm = 88 cm.

Area of the square = (88 × 88) cm^2 = 7744 cm^2.

20. (a) Let the edge of the third cube be x cm.

Then, $x^3 + 6^3 + 8^3 = 12^3$

$\Rightarrow$ $x^3 + 216 + 512 = 1728$

$\Rightarrow$ $x^3 = 1000$

$\Rightarrow$ x = 10.

Thus the edge of third cube = 10 cm.

21. (b) Area of the inner curved surface of the well dug

$= [2\pi \times 3.5 \times 22.5] = 2 \times \frac{22}{7} \times 3.5 \times 22.5$

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= 44 × 0.5 × 22.5 = 495 sq. m.

∴ Total cost = 495 × 3 = ₹ 1485.

22. (a) In a cube,

Area = 6 (side)^2

or 150 = 6 (side)^2

∴ side = $\sqrt{25} = 5$ m

Length of diagonal = $\sqrt{3} \times \text{side} = 5\sqrt{3}$ m

23. (c) Required length = length of the diagonal

$= \sqrt{12^2 + 9^2 + 8^2} = \sqrt{144 + 81 + 64} = \sqrt{289} = 17$ m

24. (c) In a sphere, volume $= \frac{4}{3}\pi r^3$

and surface area $= 4\pi r^2$

According to question,

$\frac{4}{3}\pi r^3 \div 4\pi r^2 = 27$

or r = 27 × 3 = 81 cms

25. (a) Let depth of rain be h metre. Then,

volume of water

= area of rectangular field × depth of rain

or 3000 = 500 × 300 × h

$\therefore h = \frac{3000}{500 \times 300}$ m

$= \frac{3000 \times 100}{500 \times 300}$ cms = 2 cms

26. (a) Area of the wet surface

= [2(ℓb + bh + ℓh) – ℓb]

= 2(bh + ℓh) + ℓb

= [2(4 × 1.25 + 6 × 1.25) +6 × 4] m^2

= 49 m^2.

27. (a) Internal volume

= 115 × 75 × 35 = 3,01, 875 cm^3

External volume

= (115 + 2 × 2.5) × (75 + 2× 2.5)× (35+2×2.5)

= 120 × 80 × 40 = 3,84,000 cm^3

∴ Volume of wood = External volume – Internal volume

= 3,84,000 – 3,01,875 = 82,125 cm^3

28. (a) Let height will be h cm.

Volume of water in roof = Volume of water in cylinder

$\Rightarrow \frac{9 \times 10000 \times 0.1}{900 \times 10} = h$

∴ h = 1 cm

29. (b) Required speed of flow of water

$= \frac{225 \times 162 \times 20}{5 \times 100} = \frac{60}{100} \times \frac{45}{100} \times h$

∴ h = 5400

30. (b) Let ℓ be the length and b be the breadth of cold storage.

L = 2B, H = 3 metres

Area of four walls

= 2[L × H + B × H] = 108

⇒ 6BH = 108

⇒ B = 6

∴ L = 12, B = 6, H = 3

Volume = 12 × 6 × 3 = 216 m^3

31. (b) Volume of water displace = (3 × 2 × 0.01) m^3 = 0.06 m^3.

∴ Mass of man

= Volume of water displaced × Density of water

= (0.06 × 1000) kg = 60 kg.

32. (c) Let h be the required height then,

$\frac{22}{7} \times (60)^2 \times h$

$= 30 \times 60 \times \frac{22}{7} \times (1)^2 \times (600)$

⇒ 60 h = 30 × 600

⇒ h = 300 cm = 3 m

33. (c) Surface area of the cube

= (6 ×8^2) sq. ft. = 384 sq. ft.

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