

CH 6 MENSURATION

ANSWERS AND EXPLANATIONS

EXERCISE 1

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

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

[where d = diameter]

$$\therefore d = 4$$

2. (a) In a parallelogram.
Area = Diagonal \times length of perpendicular on it.
= $30 \times 20 = 600 \text{ m}^2$

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,

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

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

\therefore Length of perpendicular

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

5. (a) In an isoscele right angled triangle,
Area = $1/23.3 \times \text{perimeter}^2$
= $1/23.3 \times 20^2 = 17.167 \text{ m}^2$

6. (a) Area of rhombus = side \times height
= 13×20
= 260 cm^2

7. (a) In a circle, circumference = $2\pi r$
Hence, $44 = 2\pi r$

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

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 \times breadth

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

$$\text{or } x^2 = 16 \Rightarrow x = 4$$

Thus, length = $9 \times 4 = 36 \text{ m}$

and breadth = $5 \times 4 = 20 \text{ m}$

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

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

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

Now, perimeters of both squares will be

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

[since, perimeter = $4 \times$ 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

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

Let r be the radius of the conical heap.



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

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

$$\text{or } r = 21 \times 3 = 63$$

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

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

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

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

13. (c) Area of field = 576 km². Then,

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

Distance covered by the horse

$$= \text{Perimeter of square field}$$

$$= 24 \times 4 = 96 \text{ km}$$

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

14. (c) Clearly, we have :

$$l = 9 \text{ and } l + 2b = 37 \text{ or } b = 14.$$

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

$$= 126 \text{ sq. ft.}$$

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

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

$$\text{Area} = 100 \text{ m}^2$$

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

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

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

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

$$\Rightarrow b = 10 \text{ or } b = 5.$$

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

Since the garden is rectangular,

so its dimension is $20 \text{ m} \times 5 \text{ m}$.

16. (c) Area of the field

$$= 13.5 \times 2.5 = 33.75 \text{ m}^2$$

Area covered by the rectangular tank

$$= 5 \times 4.5 = 22.50 \text{ m}^2$$

Area of the field on which the earth dug out is to be spread = $33.75 - 22.50 = 11.25 \text{ m}^2$

Let the required height be h .

$$\text{Then, } 11.25 \times h = 5 \times 4.5 \times 2.1$$

$$\text{or } h = 4.2 \text{ m}$$

17. (b) Area of the field grazed

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

$$= 616 \text{ sq. ft.}$$

Number of days taken to graze the field

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

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

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

Required time

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

19. (c) Length of wire

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

$$= 352 \text{ cm.}$$

Side of the square

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

$$\text{Area of the square} = (88 \times 88) \text{ cm}^2 = 7744 \text{ cm}^2.$$

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

$$\text{Then, } x^3 + 6^3 + 8^3 = 12^3$$

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

$$\Rightarrow x^3 = 1000$$

$$\Rightarrow x = 10.$$

Thus the edge of third cube = 10 cm.

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

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



$$= 44 \times 0.5 \times 22.5 = 495 \text{ sq. m.}$$

$$\therefore \text{Total cost} = 495 \times 3 = ₹ 1485.$$

22. (a) In a cube,

$$\text{Area} = 6 (\text{side})^2$$

$$\text{or } 150 = 6 (\text{side})^2$$

$$\therefore \text{side} = \sqrt{25} = 5 \text{ m}$$

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

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

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

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

$$\text{and surface area} = 4\pi r^2$$

According to question,

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

$$\text{or } r = 27 \times 3 = 81 \text{ cms}$$

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

volume of water

$$= \text{area of rectangular field} \times \text{depth of rain}$$

$$\text{or } 3000 = 500 \times 300 \times h$$

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

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

26. (a) Area of the wet surface

$$= [2(\ell b + bh + \ell h) - \ell b]$$

$$= 2(bh + \ell h) + \ell b$$

$$= [2(4 \times 1.25 + 6 \times 1.25) + 6 \times 4] \text{ m}^2$$

$$= 49 \text{ m}^2.$$

27. (a) Internal volume

$$= 115 \times 75 \times 35 = 3,01,875 \text{ cm}^3$$

External volume

$$= (115 + 2 \times 2.5) \times (75 + 2 \times 2.5) \times (35 + 2 \times 2.5)$$

$$= 120 \times 80 \times 40 = 3,84,000 \text{ cm}^3$$

\therefore Volume of wood = External volume – Internal volume

$$= 3,84,000 - 3,01,875 = 82,125 \text{ cm}^3$$

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

Volume of water in roof = Volume of water in cylinder

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

$$\therefore h = 1 \text{ cm}$$

29. (b) Required speed of flow of water

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

$$\therefore h = 5400$$

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

$$L = 2B, H = 3 \text{ metres}$$

Area of four walls

$$= 2[L \times H + B \times H] = 108$$

$$\Rightarrow 6BH = 108$$

$$\Rightarrow B = 6$$

$$\therefore L = 12, B = 6, H = 3$$

$$\text{Volume} = 12 \times 6 \times 3 = 216 \text{ m}^3$$

31. (b) Volume of water displaced = $(3 \times 2 \times 0.01) \text{ m}^3 = 0.06 \text{ m}^3$.

\therefore Mass of man

$$= \text{Volume of water displaced} \times \text{Density of water}$$

$$= (0.06 \times 1000) \text{ kg} = 60 \text{ kg.}$$

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

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

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

$$\Rightarrow 60h = 30 \times 600$$

$$\Rightarrow h = 300 \text{ cm} = 3 \text{ m}$$

33. (c) Surface area of the cube

$$= (6 \times 8^2) \text{ sq. ft.} = 384 \text{ sq. ft.}$$



