Solutions Mensuration SET 2

1. *(c)* Side of square = $\sqrt{\text{Area}}$

$= \sqrt{196} = 14$ cm

$\therefore$ Radius of circle = 28 cm

$\therefore$ Circumference of circle

$= 2 \times \frac{22}{7} \times 28 = 176$ cm

If length of rectangle is x cm, then

$2(x + 176) = 712$

$\Rightarrow \quad x + 176 = \frac{712}{2} = 356$

$\Rightarrow \quad x = 356 - 176$

$x = 180$ cm

2. *(a)* Circumference of circular plot

$= \frac{7700}{14} = 550$ ft

Circumference, $2\pi r = 550$

$r = \frac{550}{2\pi} = \frac{550 \times 7}{2 \times 22}$

$r = 87.5$ ft

$\therefore$ Area of circular field = πr^2

$= \frac{22}{7} \times 87.5 \times 87.5$

$= 24062.5$ sq ft

3. *(a)* If the side of square is x cm, then $\pi r^2 + x^2 = 2611$

$\Rightarrow \quad \frac{22}{7} \times 21 \times 21 + x^2 = 2611$

$\Rightarrow \quad 1386 + x^2 = 2611$

$\Rightarrow \quad x^2 = 2611 - 1386$

$\therefore \quad x = 1225$

$x = \sqrt{1225} = 35$ cm

$\therefore$ Required sum of the circumference of circle + Perimeter of square

$= 2\pi r + 4x$

$= 2 \times \frac{22}{7} \times 21 + 4 \times 35$

$= 132 + 140 = 272$ cm

4. *(d)* Area of circular field = 32378.5

$\pi r^2 = 32378.5$

$\Rightarrow \quad r^2 = \frac{32378.5}{22} \times 7$

$\Rightarrow \quad r = \sqrt{\frac{32378.5 \times 7}{22}}$

$\Rightarrow \quad r = 101.5$ m

Circumference of circle = $2\pi r$

$= 2 \times \frac{22}{7} \times 101.5$

$= 638$ m

$\therefore$ Expenditure of fencing

$= ₹ (154 \times 638)$

$= ₹ 98252$

5. *(a)* Let the breadth of the rectangular plot be x m.

$\therefore \quad$ Length = $3x$ m

According to the question,

$3x \times x = 7803$

$\Rightarrow \quad x^2 = \frac{7803}{3} = 2601$

$\therefore \quad x = \sqrt{2601} = 51$ m

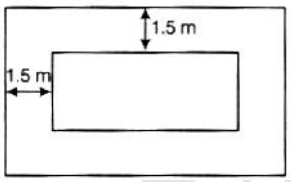
6. *(c)* Suppose the length of the field is x m.

So, the breadth of the field will be $\frac{3x}{4}$ m.

According to the question,

$x \times \frac{3x}{4} = 300$

$\Rightarrow \quad x^2 = \frac{300 \times 4}{3}$



$\Rightarrow \quad x^2 = 400$

$\Rightarrow \quad x = 20$

$\therefore \quad$ Length = 20 m

Breadth = $\frac{3}{4} \times 20 = 15$ m

Length of the field with garden

$= 20 + 1.5 \times 2$

$= 20 + 3 = 23$ m

Breadth of the field with garden

$= 15 + 1.5 \times 2 = 18$ m

$\therefore \quad$ Its area = $23 \times 18 = 414$ m^2

Area of garden = $(414 - 300)$m^2

$= 114$ m^2

7. *(c)* Let the length of rectangular plot be x m and breadth be y m.

$\therefore$ Perimeter = $2(x + y) = 340$ m

Now, area of the boundary

$= (x + 2)(y + 2) - xy$

$= xy + 2x + 2y + 4 - xy$

$= 2x + 2y + 4$

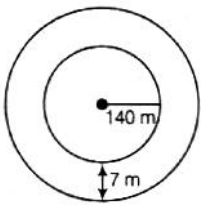
$= 2(x + y) + 4$

$= 340 + 34 = 344$

$\therefore$ Cost of gardening = 344×10

$= ₹ 3440$

8. *(e)* Radius of the field = 140 m



Width of the garden = 7 m

$\therefore$ Area of garden = $\pi(147^2 - 140^2)$

$= \frac{22}{7}(147 + 140)(147 - 140)$

$= \frac{22}{7} \times 287 \times 7$

$= 22 \times 287 = 6314$ m^2

$\therefore$ Required cost = $₹ 21 \times 6314$

$= ₹ 132594$

9. *(a)* $D_1 = 2$ cm, $r_1 = 1$ cm,

$D_2 = 4$ cm,

$r_2 = 2$ cm

$\therefore$ Volume of the silver used in the ball

$= \frac{4}{3}\pi(r_2^3 - r_1^3)$

$= \frac{4}{3}\pi[(2)^3 - (1)^3]$

$= \frac{4}{3} \times \frac{22}{7} \times 7$

$= \frac{28}{3}\pi$ cm^3

10. *(c)* Let the length, breadth and height of the cuboid be a, b and c cm respectively.

$2(ab + bc + ca) = 22$

and $\quad 4(a + b + c) = 24$

$\Rightarrow \quad a + b + c = 6$

$\Rightarrow (a + b + c)^2 = a^2 + b^2 + c^2 + 2ab + 2ac + 2bc$

$\Rightarrow \quad 36 = a^2 + b^2 + c^2 + 22$

$\Rightarrow \quad a^2 + b^2 + c^2 = 14$

$\Rightarrow \quad \sqrt{a^2 + b^2 + c^2} = \sqrt{14}$

= Diagonal of cuboid

11. *(a)* Volume of the cylindrical jar = $\pi r_1^2 h$ ...(i)

Now, volume of the cylindrical jar on reducing height = $\pi r_2^2 \frac{64}{100} h$

$= \frac{16}{25}\pi r_2^2 h$ ... (ii)

According to the question,

$\pi r_1^2 h = \frac{16}{25}\pi r_2^2 h$

$\frac{r_2^2}{r_1^2} = \frac{25}{16}, \left(\frac{r_2}{r_1}\right) = \frac{5}{4}$

$\therefore$ Increased radius

$\left(\frac{r_2 - r_1}{r_1}\right) = \left(\frac{5 - 4}{4}\right) \times 100$

$= \frac{1}{4} \times 100 = 25\%$

So, radius must be increased by 25%.

12. ***(b)*** According to the question,
in both cases, volume will be the same.

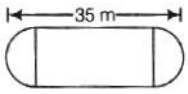
$$\therefore \quad \frac{4}{3}\pi r^3 = \pi R^2 H$$

$$\Rightarrow \quad \frac{4}{3}\pi r^3 = \pi R^2 \cdot 2r \qquad [\because H = 2r]$$

$$\Rightarrow \quad \frac{2}{3}r^2 = R^2$$

$$\therefore \quad R = r\sqrt{\frac{2}{3}}$$

13. ***(d)*** Let the radius of the cylinder be r and height of the cylinder be h cm.



Then, $r = \frac{h}{8}$

and $h = 35 - 2r$

$$\Rightarrow \quad h = 35 - 2 \times \frac{h}{8}$$

$$\Rightarrow \quad h = 35 - \frac{h}{4}$$

$$\Rightarrow \quad \frac{5h}{4} = 35$$

$$\Rightarrow \quad h = \frac{35 \times 4}{5} = 28\,\text{cm}$$

Now, $r = \frac{h}{8} = \frac{28}{8} = \frac{7}{2}$ cm

$\therefore$ Radius of hemisphere $= \frac{7}{2}$ cm

Total surface area of solid

$$= (2\pi rh + 2 \times 2\pi r^2)\text{cm}^2$$

$$= 2\pi r(h + 2r)\text{cm}^2$$

$$= 2 \times \frac{22}{7} \times \frac{7}{2}\left(28 + 2 \times \frac{7}{2}\right)\text{cm}^2$$

$$= 2 \times \frac{22}{7} \times \frac{7}{2} \times 35\,\text{cm}^2$$

$$= 770\,\text{cm}^2$$

14. ***(b)*** Volume of earth dug out

$$= \frac{22}{7} \times 7 \times 7 \times 10\,\text{m}^3$$

$$= 1540\,\text{m}^3$$

Area of embankment

$$= \frac{22}{7}[(28)^2 - (7)^2]\text{m}^2$$

$$= \frac{22}{7} \times (28 + 7)(28 - 7)\text{m}^2$$

$$= \frac{22}{7} \times 35 \times 21\text{m}^2$$

$$= 2310\,\text{m}^2$$

$\therefore$ Height of embankment

$$= \frac{\text{Volume}}{\text{Area}} = \frac{1540}{2310}$$

$$= \frac{2}{3}\,\text{m}$$

15. **(b)**

16. **(c)**

Gupta Class