Mensuration

Self-Evaluation Test

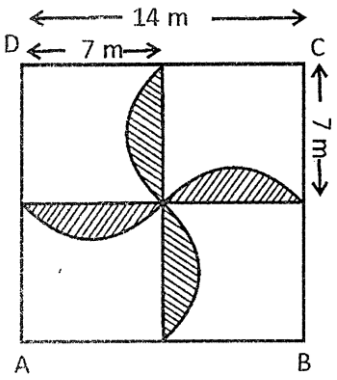
1. A rectangular courtyard 3.78 m long and 5.25 m broad is to be paved exactly with square tiles, all of the same size. The minimum number of such tiles is:

(a) 350 (b) 250
(c) 450 (d) 495
(e) None of these

2. A rectangular mat has an area of 120 sq. metres and perimeter of 46 m. The length of its diagonal is:

(a) 16 m (b) 17 m
(c) 18 m (d) 20 m
(e) None of these

3. ABCD is a square park divided into 4 squares as shown in the figure. Semi-circular square beds are made as shown by the shaded portion. Find the area of the shaded region.



(a) 75 m^2 (b) 76 m^2
(c) 77 m^2 (d) 189 m^2
(e) None of these

4. The diagonal of a rhombus are 65 m 60 m. Its area is:

(a) 3900 cm^2
(b) 1950 cm^2
(c) 1960 cm^2
(d) 3960 cm^2
(e) None of these

5. The diagonals of a rhombus are 24 cm and 10 cm. Find the perimeter of rhombus.

(a) 52 cm (b) 58 cm
(c) 99 cm (d) 81 cm
(e) None of these

6. Four cows are tied at the four corner of the square field of side 35 m, so that they can just reach to each other. What is the area of the field which remain ungrased?

(a) 256.7 cm^2 (b) 262.5 cm^2
(c) 555.5 cm^2 (d) 985.6 cm^2
(e) None of these

7. A wire, when bent in the form of a square, encloses an area of 484 cm^2. If the same wire is bent in the form of a circle then find the area enclosed by it.

(a) 161 cm^2 (b) 166 cm^2
(c) 616 cm^2 (d) 916 cm^2
(e) None of these

8. Semi-circular lawns are attached to the edges of a rectangular field measuring 42 m×35 m. Find the area of the total field.

(a) 3895.6 m^2 (b) 3818.5 m^2
(c) 3735.6 m^2 (d) 3899.9 m^2
(e) None of these

9. Find the area of a triangle whose sides are 9 cm, 12 cm and 15 cm.

(a) 51 cm^3 (b) 52 cm^3
(c) 53 cm^4 (d) 54 cm^2
(e) None of these

10. If the radius of a circle is decreased by 50%, its area is decreased by:

(a) 75 % (b) 50 %
(c) 85 % (d) 65 %
(e) None of these

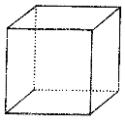
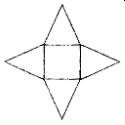
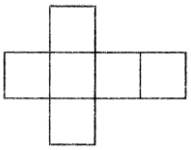
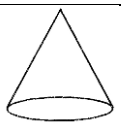
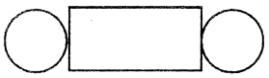
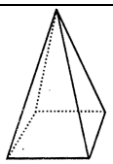
11. A tank is 25 m long, 12 m wide and 6 m deep. The cost of plastering its walls and bottom at 75 paise per sq. m, is:

(a) Rs 456 (b) Rs 458
(c) Rs 558 (d) Rs 568
(e) None of these

12. **A rectangular park 60 m long and 40 m wide has two concrete cross-roads running in the middle of the park and rest of the park has been used as a lawn. If the area of the lawn is 2109 sq. m, then what is the width of the road?**

(a) 2.91 m (b) 3 m
(c) 5.82 m (d) None of these
(e) None of these

13. **Some solid figures and their nets are given in two columns:**

(a)		(i)	
(b)		(ii)	
(c)		(iii)	
(d)		(iv)	

Their correct match is

(a) a-i, b-ii, c-iii, d-iv (b) a-iv, b-ii, c-iii, d-i
(c) a-ii, b-iii, c-iv, d-I (d) a-ii, b-iv, c-iii, d-i
(e) None of these

Answer – Key

1. (C)	**2.** (B)	**3.** (C)	**4.** (B)	**5.** (A)
6. (B)	**7.** (C)	**8.** (B)	**9.** (D)	**10.** (A)
11. (C)	**12.** (B)	**13.** (C)		

Explanation for Selected Questions

1. **Explanation**

$I = 378\text{ cm}$ and $b = 525\text{ cm}$

Maximum length of a square tile $= \text{HCF of } (378, 525) = 21\text{ cm}$

378×525

Number of tiles $= \dfrac{378 \times 525}{21 \times 21} = (18 \times 25) = 450.$

2. **Explanation**

Rectangular area $= \ell \times b = 120$ and perimeter

$\Rightarrow \quad \ell + b = 23$

$\Rightarrow \quad \ell + b = 23 \quad \ldots\ldots\ldots$ (i)

Now, $(\ell - b)^2 - 4\ell b = (23)^2 - 4 \times 120 =$

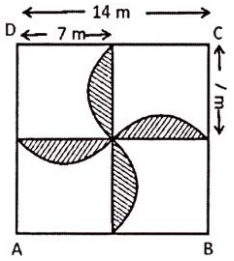
$(529 - 480) = 49 \Rightarrow \ell - b = 7 \quad \ldots\ldots\ldots$ (ii)

On solving equation (i) and (ii), we get $\ell = 15, b = 8$

Diagonal

$= \sqrt{15^2 + 8^2} = \sqrt{225 + 64} = \sqrt{289} = 17\text{ m}.$

3. **Explanation**



For each of the semicircle diameter $= 7\text{ m}.$:

$\therefore$ radius $= \dfrac{7}{2} = 3.5\text{ m}.$

Area of each of the semi-circle

$= \dfrac{1}{2}\pi \times (3.5)^2$

$= \dfrac{1}{2} \times \dfrac{22}{7} \times 3.5 \times 3.5 = 19.25\text{ m}^2$

Area of shaded region $= 4 \times 19.25 = 77\text{ m}^2.$

4. **Explanation**

Area of the rhombus

$= \dfrac{1}{2} d_1 d_2 = \dfrac{1}{2} \times 65 \times 60\text{ cm}^2 = 65 \times 30 = 1950\text{ cm}^2$

5. **Explanation**

$\text{Area} = \dfrac{1}{2}(\text{produce of diagonals})$

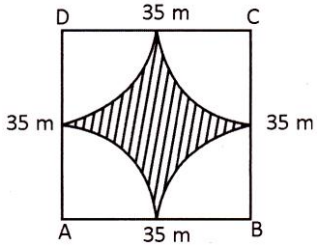
$= \dfrac{1}{2} \times 24 \times 10 = 120\text{ cm}^2$

$\text{side} = \dfrac{1}{2}\sqrt{(\text{sum of the square of diagonals})}$

$= \frac{1}{2}\sqrt{(24^2+10^2)} = \frac{\sqrt{676}}{2} = \frac{26}{2} = 13\,\text{cm}$

Perimetre $= 4 \times 13 = 52\,\text{cm}$.

6. Explanation



Clearly, the shaded portion of the square shows the area of the field remain ungrazed.

Radius of each of the circle $= \frac{35}{2} = 17.5\,\text{cm}$

Area grazed by 1 cow

$= \frac{\pi r^2\theta}{360} = \frac{22}{7} \times 17.5 \times 17.5 \times 90 \times \frac{1}{360} = 240.625\,\text{cm}^2$

Area grazed by four cows

$= 4 \times 240.625\,\text{cm}^2 = 962.5\,\text{cm}^2$

Area of field remain ungrazed = Area of field - Area of grazed region

$= 1225 - 962.5 = 262.5\,\text{cm}^2$.

7. Explanation

Area of square $= 484\,\text{cm}^2$

Side of square $= \sqrt{484} = 22\,\text{cm}$

Perimetre of square $= 4 \times 22\,\text{cm} = 88\,\text{cm}$

Let r be the radius of the circle.

Same wire is bent in the form of a square and circle.

Therefore, circumference of the circle = perimetre of the square.

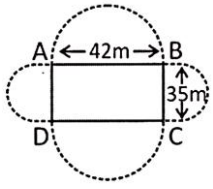
or $2\pi r = 88$

$2 \times \frac{22}{7} \times r = 88 \Rightarrow r = \frac{88 \times 7}{2 \times 22} = 14\,\text{cm}$

Thus area of circle

$= \pi r^2 = \frac{22}{7} \times 14 \times 14 = 616\,\text{cm}^2$.

8. Explanation



Area of lawn = Area of rectangle ABCD + 2 x Area of semicircle with diametre AB + 2 x Area of semi-circle with diametre BC $= \text{Length} \times \text{breadth} + 2\left(\frac{\pi R^2}{2}\right) + 2\left(\frac{\pi r^2}{2}\right)$

Where R = radius of bigger semicircle $= = \frac{42}{2} = 21\,\text{m}$

r = radius of smaller semicircle $= \frac{35}{2}\,\text{m}$

Now, area of lawn

$= 42 \times 35 + \frac{22}{7} \times 21 \times 21 + \frac{22}{7} \times \frac{35}{2} \times \frac{35}{2}$

$= 1470 + 1386 + 962.5 = 3818.5\,\text{m}^2$.

9. Explanation

Here, $a = 9\,\text{cm}, b = 12\,\text{cm}$ and $c = 15\,\text{cm}$

$\therefore s = \frac{a+b+c}{2} = \frac{9+12+15}{2} = \frac{36}{2} = 18$

Area $= \sqrt{s(s-a)(s-b)(s-c)}$

$= \sqrt{18(18-9)(18-12)(18-15)}$

$= \sqrt{18 \times 9 \times 6 \times 3} = 54\,\text{cm}^2$.

10. Explanation

Original area $= \pi r^2$

New area $= \pi(r/2)^2 = (\pi r^2)/4$

Reduction in area $= \left[\pi r^2 - \frac{\pi r^2}{4}\right] = \left(\frac{3\pi r^2}{4}\right)$

Reduction percent $= \frac{3\pi r^2}{\frac{4}{\pi r^2} \times 100} = 75\%$.

11. Explanation

Area to be plastered $= [2(\ell + b) \times h] + (\ell \times b)$

$= \{[2(25+12) \times 6] + (25 \times 12)\}\,\text{m}^2 = (444 + 300)\,\text{m}^2$

$= 744\,\text{m}^2$

$\therefore$ Cost of plastering $= \left(744 \times \frac{75}{100}\right) = 558$.

12. Explanation

Area of park $= (60 \times 40)\,\text{m}^2 - 2400\,\text{m}^2$

Area of the lawn $= 2109\,\text{m}^2$

$\therefore$ Area of the cross-roads

$= (2400 - 2109)\,\text{m}^2 = 291\,\text{m}^2$

Let the width of the road be x metres, then,

$60x + 40x - x^2 = 291$

$\Rightarrow x^2 - 100x + 291 = 0$

$\Rightarrow (x - 97)(x - 3) = 0$

$\Rightarrow x = 3.$