Mensuration
Exercise 20F

Q1

Answer :

(i) Given:
r = 21 cm

∴ Area of the circle = (πr^2) sq. units
= $\left(\frac{22}{7} \times 21 \times 21\right)$ cm^2 = $(22 \times 3 \times 21)$ cm^2 = 1386 cm^2

(ii) Given:
r = 3.5 m

Area of the circle = (πr^2) sq. units
= $\left(\frac{22}{7} \times 3.5 \times 3.5\right)$ m^2 = $(22 \times 0.5 \times 3.5)$ m^2 = 38.5 m^2

Q2

Answer :

(i) Given:
d = 28 cm ⇒ r = $\left(\frac{d}{2}\right)$ = $\left(\frac{28}{2}\right)$ cm = 14 cm
Area of the circle = (πr^2) sq. units
= $\left(\frac{22}{7} \times 14 \times 14\right)$ cm^2 = $(22 \times 2 \times 14)$ cm^2 = 616 cm^2

(ii) Given:
r = 1.4 m ⇒ r = $\left(\frac{d}{2}\right)$ = $\left(\frac{1.4}{2}\right)$m = 0.7 m
Area of the circle = (πr^2) sq. units
= $\left(\frac{22}{7} \times 0.7 \times 0.7\right)$ m^2 = $(22 \times 0.1 \times 0.7)$ m^2 = 1.54 m^2

Q3

Answer :

Let the radius of the circle be r cm.
Circumference = $(2\pi r)$cm
∴ $(2\pi r)$ = 264
⇒ $\left(2 \times \frac{22}{7} \times r\right) = 264$
⇒ r = $\left(\frac{264 \times 7}{2 \times 22}\right)$ = 42
∴ Area of the circle = πr^2
= $\left(\frac{22}{7} \times 42 \times 42\right)$ cm^2
= 5544 cm^2

Q4

Answer :

Let the radius of the circle be r m.
Then, its circumference will be $(2\pi r)$m.
∴ $(2\pi r)$ = 35.2
⇒ $\left(2 \times \frac{22}{7} \times r\right) = 35.2$
⇒ r = $\left(\frac{35.2 \times 7}{2 \times 22}\right)$ = 5.6
∴ Area of the circle = πr^2
= $\left(\frac{22}{7} \times 5.6 \times 5.6\right)$ m^2 = 98.56 m^2

Q5

Answer :

Let the radius of the circle be *r* cm.
Then, its area will be πr^2 cm^2.
$\therefore \pi r^2 = 616$
$\Rightarrow \left(\frac{22}{7} \times r \times r\right) = 616$
$\Rightarrow r^2 = \left(\frac{616 \times 7}{22}\right) = 196$
$\Rightarrow r = \sqrt{196} = 14$
$\Rightarrow$ Circumference of the circle = $(2\pi r)$ cm
$= \left(2 \times \frac{22}{7} \times 14\right)$ cm = 88 cm

Q6

Answer :

Let the radius of the circle be *r* m.
Then, area = πr^2 m^2
$\therefore \pi r^2 = 1386$
$\Rightarrow \left(\frac{22}{7} \times r \times r\right) = 1386$
$\Rightarrow r^2 = \left(\frac{1386 \times 7}{22}\right) = 441$
$\Rightarrow r = \sqrt{441} = 21$
$\Rightarrow$ Circumference of the circle = $(2\pi r)$ m
$= \left(2 \times \frac{22}{7} \times 21\right)$ m = 132 m

Q7

Answer :

Let r_1 and r_2 be the radii of the two given circles and A_1 and A_2 be their respective areas.

$\frac{r_1}{r_2} = \frac{4}{5}$
$\therefore \frac{A_1}{A_2} = \frac{\pi {r_1}^2}{\pi {r_2}^2} = \frac{{r_1}^2}{{r_2}^2} = \left(\frac{r_1}{r_2}\right)^2 = \left(\frac{4}{5}\right)^2 = \frac{16}{25}$
Hence, the ratio of the areas of the given circles is 16:25.

Q8

Answer :

If the horse is tied to a pole, then the pole will be the central point and the area over which the horse will graze will be a circle. The string by which the horse is tied will be the radius of the circle.
Thus,
Radius of the circle (*r*) = Length of the string = 21 m

Now, area of the circle = $\pi r^2 = \left(\frac{22}{7} \times 21 \times 21\right)$ m^2 = 1386 m^2
$\therefore$ Required area = 1386 m^2

Q9

Answer :

Let *a* be one side of the square.
Area of the square = 121 cm^2 (given)
$\Rightarrow a^2 = 121$
$\Rightarrow a = 11$ cm (since 11 × 11 = 121)
Perimeter of the square = 4 × side = 4*a* = (4 × 11) cm = 44 cm
Length of the wire = Perimeter of the square
= 44 cm
The wire is bent in the form of a circle.
Circumference of a circle = Length of the wire
$\therefore$ Circumference of a circle = 44 cm
$\Rightarrow 2\pi r = 44$
$\Rightarrow \left(2 \times \frac{22}{7} \times r\right) = 44$
$\Rightarrow r = \left(\frac{44 \times 7}{2 \times 22}\right) = 7$ cm
$\therefore$ Area of the circle = πr^2
$= \left(\frac{22}{7} \times 7 \times 7\right)$ cm^2
= 154 cm^2

Q10

Answer :

It is given that the radius of the circle is 28 cm.

Length of the wire = Circumference of the circle

⇒ Circumference of the circle $= 2\pi r = \left(2 \times \frac{22}{7} \times 28\right)$ cm = 176 cm

Let the wire be bent into the form of a square of side *a* cm.

Perimeter of the square = 176 cm

⇒ $4a = 176$

⇒ $a = \left(\frac{176}{4}\right)$ cm = 44 cm

Thus, each side of the square is 44 cm.

Area of the square = $(\text{Side})^2 = (a)^2 = (44 \text{ cm})^2$

$= 1936 \text{ cm}^2$

∴ Required area of the square formed = 1936 cm^2

Q11

Answer :

Area of the acrylic sheet = 34 cm × 24 cm = 816 cm^2

Given that the diameter of a circular button is 3.5 cm.

∴ Radius of the circular button (r) = $\left(\frac{3.5}{2}\right)$ cm = 1.75 cm

∴ Area of 1 circular button = πr^2

$= \left(\frac{22}{7} \times 1.75 \times 1.75\right) \text{ cm}^2$

$= 9.625 \text{ cm}^2$

∴ Area of 64 such buttons = $(64 \times 9.625) \text{ cm}^2 = 616 \text{ cm}^2$

Area of the remaining acrylic sheet = (Area of the acrylic sheet - Area of 64 circular buttons)

$= (816 - 616) \text{ cm}^2 = 200 \text{ cm}^2$

Q12

Answer :

Area of the rectangular ground = 90 m × 32 m = $(90 \times 32) \text{ m}^2 = 2880 \text{ m}^2$

Given:

Radius of the circular tank (r) = 14 m

∴ Area covered by the circular tank = $\pi r^2 = \left(\frac{22}{7} \times 14 \times 14\right) \text{ m}^2$

$= 616 \text{ m}^2$

∴ Remaining portion of the rectangular ground for turfing = (Area of the rectangular ground - Area covered by the circular tank)

$= (2880 - 616) \text{ m}^2 = 2264 \text{ m}^2$

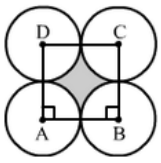
Rate of turfing = Rs 50 per sq. metre

∴ Total cost of turfing the remaining ground = Rs (50 × 2264) = Rs 1,13,200

Q13

Answer :

Area of each of the four quadrants is equal to each other with radius 7 cm.



Area of the square ABCD = $(\text{Side})^2 = (14 \text{ cm})^2 = 196 \text{ cm}^2$

Sum of the areas of the four quadrants = $\left(4 \times \frac{1}{4} \times \frac{22}{7} \times 7 \times 7\right) \text{ cm}^2$

$= 154 \text{ cm}^2$

∴ Area of the shaded portion = Area of square ABCD - Areas of the four quadrants

$= (196 - 154) \text{ cm}^2$

$= 42 \text{ cm}^2$

Q14

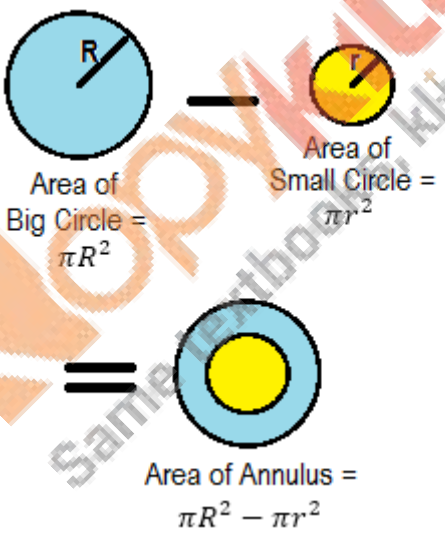
Answer :

Let ABCD be the rectangular field.

Here, AB = 60 m
BC = 40 m

Let the horse be tethered to corner A by a 14 m long rope.

Then, it can graze through a quadrant of a circle of radius 14 m.
∴ Required area of the field = $\left(\frac{1}{4} \times \frac{22}{7} \times 14 \times 14\right)$ m^2 = 154 m^2
Hence, horse can graze 154 m^2 area of the rectangular field.



Q15

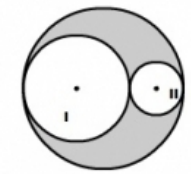
Answer :

Diameter of the big circle = 21 cm

Radius = $\left(\frac{21}{2}\right)$ cm = 10.5 cm

∴ Area of the bigger circle = $\pi r^2 = \left(\frac{22}{7} \times 10.5 \times 10.5\right)$ cm^2

= 346.5 cm^2



Diameter of circle I = $\frac{2}{3}$ of the diameter of the bigger circle

= $\frac{2}{3}$ of 21 cm = $\left(\frac{2}{3} \times 21\right)$ cm = 14 cm

Radius of circle I (r_1) = $\left(\frac{14}{2}\right)$ cm = 7 cm

∴ Area of circle I = $\pi r_1^2 = \left(\frac{22}{7} \times 7 \times 7\right)$ cm^2

= 154 cm^2

Diameter of circle II = $\frac{1}{3}$ of the diameter of the bigger circle

= $\frac{1}{3}$ of 21 cm = $\left(\frac{1}{3} \times 21\right)$ cm = 7 cm

Radius of circle II (r_2) = $\left(\frac{7}{2}\right)$ cm = 3.5 cm

∴ Area of circle II = $\pi r_2^2 = \left(\frac{22}{7} \times 3.5 \times 3.5\right)$ cm^2

= 38.5 cm^2

∴ Area of the shaded portion = {Area of the bigger circle - (Sum of the areas of circle I and II)}

= {346.5 - (154 + 38.5)} cm^2

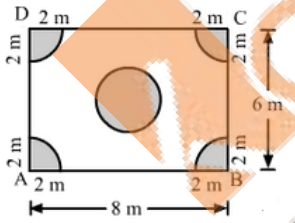
= {346.5 - 192.5} cm^2

= 154 cm^2

Hence, the area of the shaded portion is 154 cm^2

Q16

Answer :



Let ABCD be the rectangular plot of land that measures 8 m by 6 m.

∴ Area of the plot = (8 m × 6 m) = 48 m^2

Area of the four flower beds = $\left(4 \times \frac{1}{4} \times \frac{22}{7} \times 2 \times 2\right)$ m^2 = $\left(\frac{88}{7}\right)$ m^2

Area of the circular flower bed in the middle of the plot = πr^2

= $\left(\frac{22}{7} \times 2 \times 2\right)$ m^2 = $\left(\frac{88}{7}\right)$ m^2

Area of the remaining part = $\left\{48 - \left(\frac{88}{7} + \frac{88}{7}\right)\right\}$ m^2

= $\left\{48 - \frac{176}{7}\right\}$ m^2

= $\left\{\frac{336-176}{7}\right\}$ m^2 = $\left(\frac{160}{7}\right)$ m^2 = 22.86 m^2

∴ Required area of the remaining plot = 22.86 m^2