

Mensuration

EXERCISE 20 (A)

Question 1.

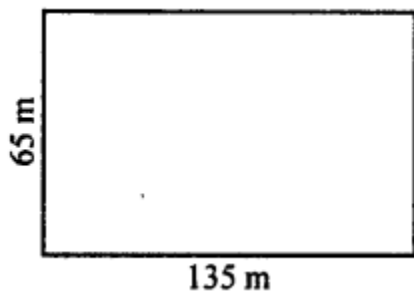
The length and the breadth of a rectangular plot are 135 m and 65 m. Find, its perimeter and the cost of fencing it at the rate of ₹60 per m.

Solution:

Given :

Length (l) = 135 m

Breadth (b) = 65 m



$$\text{Perimeter} = 2(l + b)$$

$$= 2(135 + 65)$$

$$= 2(200) = 400 \text{ m}$$

∴ Perimeter of rectangular plot is = 400 m

Cost of fencing per m = ₹60

∴ Cost of fencing 400 m = ₹60 x 400 m = ₹24000

Question 2.

The length and breadth of a rectangular field are in the ratio 7 : 4. If its perimeter is 440 m, find its length and breadth. Also, find the cost of fencing it @ ₹150 per m.

Solution:

Given : Perimeter = 440 m

Let the length of rectangular field = l x and breadth = 4 x

$$2(l + b) = \text{Perimeter}$$

$$2(7x + 4x) = 440 \text{ m}$$

$$2(11x) = 440 \text{ m}$$

$$22x = 440 \text{ m}$$

$$x = \frac{440}{22}$$

$$x = 11 \text{ m}$$

$$\therefore \text{Length} = 7x = 7 \times 11 = 77 \text{ m}$$

$$\text{Breadth} = 4x = 4 \times 11 = 44 \text{ m}$$

Cost of fencing per m = ₹150

Cost of fencing 440 m = ₹150 x 440 = ₹66,000

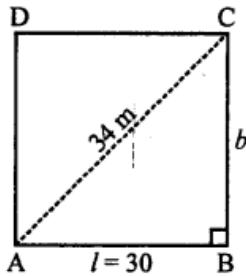
Question 3.

The length of a rectangular field is 30 m and its diagonal is 34 m. Find the breadth of the field and its perimeter.

Solution:

Length = 30 m

Diagonals = 34 m



Let the breadth of the rectangle = b m

Applying Pythagoras Theorem in triangle ABC,

We get,

$$AC^2 = AB^2 + BC^2$$

$$(34)^2 = (30)^2 + b^2$$

$$1156 = 900 + b^2$$

$$1156 - 900 = b^2$$

$$256 = b^2$$

$$\Rightarrow b = \sqrt{256} = 16 \text{ m}$$

$$\text{Perimeter} = 2(l + b)$$

$$= 2(30 + 16) = 2 \times 46 = 92 \text{ m}$$

Question 4.

The diagonal of a square is $12\sqrt{2}$ cm. Find its perimeter.

Solution:

Diagonal of square = Its side $\times \sqrt{2}$

$$\text{Side } \sqrt{2} = \sqrt{2} \sqrt{2}$$

i.e. side = 12 cm

Perimeter of a square = 4 $\times$ Side

$$= 4 \times 12 = 48 \text{ cm}$$

Question 5.

Find the perimeter of a rectangle whose length = 22.5 m and breadth = 16 dm.

Solution:

Length = 22.5 m

Breadth = 16 dm = 1.6 m

$$\text{Perimeter of rectangle} = 2(l + b)$$

$$- 2(22.5 + 1.6)$$

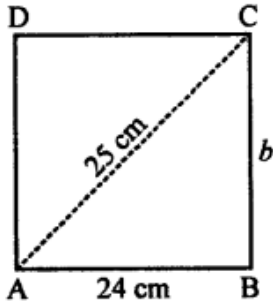
$$- 2(24.1) = 48.2 \text{ m}$$

Question 6.

Find the perimeter of a rectangle with length = 24 cm and diagonal = 25 cm

Solution:

Length of a rectangle (l) = 24 cm Diagonal = 25 cm



Let breadth of the rectangle = b m

Applying Pythagoras Theorem in triangle ABC,

We get, $(AC)^2 = (AB)^2 + (BC)^2$

$$(25)^2 = (24)^2 + (b)^2$$

$$625 = 576 + (b)^2$$

$$625 - 576 = b^2$$

$$49 = b^2$$

$$\sqrt{49} = b$$

$$\therefore b = 7 \text{ cm}$$

Now, perimeter of the rectangle

$$= 2(l + b)$$

$$= 2(24 + 7)$$

$$= 2(31)$$

$$= 62 \text{ cm}$$

Question 7.

The length and breadth of rectangular piece of land are in the ratio of 5 : 3. If the total cost of fencing it at the rate of ₹48 per metre is ₹19,200, find its length and breadth.

Solution:

Ratio in length and breadth of a rectangular piece of land = 5:3

Cost of fencing = ₹ 19,200

and rate = ₹48 per m

$$\therefore \text{Perimeter} = \frac{19200}{48} = 400 \text{ m}$$

Let length = 5x.

Then breadth = 3x

$$\therefore \text{Perimeter} = 2(l + b)$$

$$400 = 2(5x + 3x)$$

$$400 = 2 \times 8x = 16x$$

$$\therefore 16x = 400$$

$$\Rightarrow x = \frac{400}{16} = 25$$

$$\therefore \text{Length of the land} = 5x = 5 \times 25 = 125 \text{ m and breadth} = 3x = 3 \times 25 = 75 \text{ m}$$

Question 8.

A wire is in the shape of square of side 20 cm. If the wire is bent into a rectangle of length 24 cm, find its breadth.

Solution:

Side of square = 20 cm

Perimeter of square = $4 \times 20 = 80 \text{ cm}$

Or perimeter of rectangle = 80 cm

Length of a rectangle = 24 cm

$\therefore$ Perimeter of a rectangle = $2(l + b)$

$$b = \frac{80}{2} - 24$$

$$b = 40 - 24 = 16 \text{ m}$$

Question 9.

If P = perimeter of a rectangle, l = its length and b = its breadth find :

(i) P, if l = 38 cm and b = 27 cm

(ii) b, if P = 88 cm and l = 24 cm

(iii) l, if P = 96 m and b = 28 m

Solution:

(i) Length (l) = 38 cm

Breadth (b) = 27 cm

Perimeter of a rectangle = $2(l + b)$

$$= 2(38 + 27)$$

$$= 2(65) = 130 \text{ cm}$$

(ii) Perimeter of a rectangle = 88 cm

Length (l) = 24 cm

Let breadth = b

$$P = 2(l + b)$$

$$b = \frac{P}{2} - l$$

$$b = \frac{88}{2} - 24 \text{ cm} = 44 \text{ cm} - 24 \text{ cm}$$

$\therefore$ Breadth of a rectangle = 20 cm

(iii) Perimeter of a rectangle = 96 m

Breadth (b) = 28 m

Let length = l

$$P = 2(l + b)$$

$$l = \frac{P}{2} - b$$

$$= \frac{96}{2} - 28 = 48 - 28 = 20 \text{ m}$$

$\therefore$ Length of a rectangle = 20 m

Question 10.

The cost of fencing a square field at the rate of

Cost of fencing 440 m = ₹150 × 440 = ₹75 per meter is

Cost of fencing 440 m = ₹150 × 440 = ₹67,500. Find the perimeter and the side of the square field.

Solution:

$$\text{Length of the fence} \times \text{its rate} = ₹67,500$$

$$\Rightarrow \text{Length of the fence} = ₹ \frac{67500}{75} = 900 \text{ m}$$

$$\therefore \text{Perimeter of a square field} = \text{length of its fence} = 900 \text{ m}$$

$$\text{Since, perimeter of a square} = 4 \times \text{Length of its side}$$

$$\Rightarrow \text{Length of the side of the square}$$

$$= \frac{\text{Perimeter}}{4} = \frac{900}{4} = 225 \text{ m}$$

Question 11.

The length and the breadth of a rectangle are 36 cm and 28 cm. If its perimeter is equal to the perimeter of a square, find the side of the square.

Solution:

$$\text{Length of rectangle} = 36 \text{ cm}$$

$$\text{Breadth of rectangle} = 28 \text{ cm}$$

$$\text{Perimeter of the rectangle} = 2(l + b)$$

$$= 2(36 + 28)$$

$$= 2(64) = 128 \text{ cm}$$

$$\text{Given, perimeter of the square} = \text{perimeter of rectangle} = 128 \text{ cm}$$

$$\therefore \text{Side of the square} = \frac{\text{Perimeter}}{4}$$

$$= \frac{128}{4} = 32 \text{ cm}$$

Question 12.

The radius of a circle is 21 cm. Find the circumference (Take $\pi = 3\frac{1}{7}$).

Solution:

$$\text{Given, radius } (r) = 21 \text{ cm and } \pi = \frac{22}{7}$$

$$\text{Circumference of the circle} = 2\pi r$$

$$= 2 \times \frac{22}{7} \times 21 \text{ cm}$$

$$= 2 \times 22 \times 3 \text{ cm} = 132 \text{ cm}$$

Question 13.

The circumference of a circle is 440 cm. Find its radius and diameter. (Take $\pi = \frac{22}{7}$)

Solution:

$$(i) \text{ Circumference of circle} = 440 \text{ cm}$$

$$\text{Radius} = \frac{C}{2\pi} = \frac{440 \times 7}{2 \times 22} \text{ cm}$$

$$= \frac{3080}{44} = 70 \text{ cm}$$

$$(ii) \text{ Diameter} = 2 \times \text{radius}$$

$$= 2 \times 70 = 140 \text{ cm}$$

Question 14.

The diameter of a circular field is 56 m. Find its circumference and cost of fencing it at the rate of ₹80 per m. (Take $\pi = \frac{22}{7}$)

Solution:

$$\text{Given, Diameter of a circular field} = 56 \text{ m}$$

$$\therefore \text{ Radius} = \frac{56}{2} = 28 \text{ m}$$

$$\text{Circumference of the circle} = 2\pi r$$

$$= 2 \times \frac{22}{7} \times 28 \text{ m}$$

$$= 2 \times 22 \times 4 \text{ m} = 176 \text{ m}$$

Cost of fencing of 176 m is

$$= 176 \text{ m} \times ₹80 \text{ per m} = ₹1,40,780$$

Question 15.

The radii of two circles are 20 cm and 13 cm. Find the difference between their circumferences. (Take $\pi = \frac{22}{7}$)

Solution:

Radius of 1st circle = 20 cm

Circumference of the circle = $2\pi r$

$$= 2 \times \frac{22}{7} \times 20$$

$$= \frac{880}{7} = 122.8 \text{ cm}$$

Radius of 2nd circle = 13 cm

Circumference of the circle = $2\pi r$

$$= 2 \times \frac{22}{7} \times 13 = \frac{572}{7} = 81.7$$

$$\therefore \text{Difference of circumference of two circles} \\ = 122.8 - 81.7 \text{ cm} = 41.1 \text{ cm}$$

Question 16.

The diameter of a circle is 42 cm, find its perimeter. If the perimeter of the circle is doubled, what will be the radius of the new circle. (Take $\pi = \frac{22}{7}$)

Solution:

Given, Diameter of a circle = 42 cm

$$\therefore \text{Radius of circle} = \frac{42}{2} = 21 \text{ cm}$$

Perimeter of the circle = $2\pi r$

$$= 2 \times \frac{22}{7} \times 21 = 132 \text{ cm}$$

If the perimeter of the circle doubled

$$= 2 \times 132 = 264 \text{ cm}$$

$$\text{Radius} = \frac{C}{2\pi} = \frac{264}{2 \times \frac{22}{7}}$$

$$= \frac{264 \times 7}{2 \times 22} = 42 \text{ cm}$$

Question 17.

The perimeter of a square and the circumference of a circle are equal. If the length of each side of the square is 22 cm, find:

- (i) perimeter of the square.
- (ii) circumference of the circle.
- (iii) radius of the circle.

Solution:

(i) Side of square = 22 cm

Perimeter of square = $4 \times \text{Side}$

$$= 4 \times 22 = 88 \text{ cm}$$

(ii) Circumference of circle

Given, Perimeter of square = Circumference of circle

$$= 88 \text{ cm}$$

(iii) Circumference of circle = 88 cm

$$\therefore \text{Radius} = \frac{C}{2\pi} = \frac{88 \times 7}{2 \times 22} = \frac{616}{44} = 14 \text{ cm}$$

Question 18.

Find the radius of the circle whose circumference is equal to the sum of the circumferences of the circles having radii 15 cm and 8 cm.

Solution:

For circle with radius = 15 cm

Circumference of circle = $2\pi r$

$$= 2 \times \frac{22}{7} \times 15 \text{ cm} = \frac{660}{7} \text{ cm}$$

For circle with radius = 8 cm

Circumference of circle = $2\pi r$

$$= 2 \times \frac{22}{7} \times 8 \text{ cm} = \frac{352}{7} \text{ cm}$$

Sum of the circumferences of these two circles

$$= \frac{660}{7} \text{ cm} + \frac{352}{7} \text{ cm} = \frac{1012}{7} \text{ cm}$$

If the required radius = R cm

Its circumference = $2\pi R$

$$= 2 \times \frac{22}{7} \times R \text{ cm} = \frac{44}{7} R \text{ cm}$$

$$\text{Given, } \frac{44}{7} R = \frac{1012}{7}$$

$$\Rightarrow R = \frac{7}{44} \times \frac{1012}{7} \text{ cm} = 23 \text{ cm}$$

$\therefore$ Required radius = 23 cm

Question 19.

Find the diameter of a circle whose circumference is equal to the sum of circumference of circles with radii 10 cm, 12 cm and 18 cm.

Solution:

Let the radius of the circle = R cm

$$\therefore 2\pi R = 2\pi \times 10 + 2\pi \times 12 + 2\pi \times 18$$

On dividing each terms by 2π , we get :

$$R = 10 + 12 + 18 = 40 \text{ cm}$$

$$\therefore \text{Radius of the circle obtained} = 40 \text{ cm}$$

And, its diameter = $2 \times \text{Radius}$

$$= 2 \times 40 \text{ cm} = 80 \text{ cm}$$

Question 20.

The circumference of a circle is eighth time the circumference of the circle with radius 12 cm. Find its diameter.

Solution:

Radius of the given circle = 12 cm

Circumference of the given circle = $2\pi r$

$$= 2 \times \frac{22}{7} \times 12 = \frac{528}{7} \text{ cm}$$

Circumference of the required circle = $5 \times$

$$\frac{528}{7} = \frac{2640}{7} \text{ cm}$$

If the radius of the required circle = R cm

Its circumference = $2\pi R$

$$= 2 \times \frac{22}{7} \times R = \frac{44}{7} \times R \text{ cm}$$

$$\text{Given : } \frac{44}{7} \times R = \frac{2640}{7}$$

$$\Rightarrow R = \frac{2640}{7} \times \frac{7}{44} = 60 \text{ cm}$$

$\therefore$ Required radius = 60 cm

Question 21.

The radii of two circles are in the ratio 3 : 5, find the ratio between their circumferences.

Solution:

The ratio of the radii of the circles = 3 : 5

Let radius of the first circle = $3x$

and radius of second circle = $5x$

∴ Circumference of first circle = $2\pi r$

$$= 2\pi \times 3x = 6\pi x$$

and circumference of second circle = $2\pi r$

$$= 2\pi \times 5x = 10\pi x$$

∴ Ratio between their circumference

$$= 6\pi x : 10\pi x$$

$$= 16 : 10$$

$$= 3 : 5$$

Question 22.

The circumferences of two circles are in the ratio 5 : 7, find the ratio between their radii.

Solution:

The ratio of the circumference of the circle

$$= 5 : 7$$

Let circumference of first ratio = $5x$

$$\therefore 2\pi r = 5x \Rightarrow r = \frac{5x}{2\pi}$$

and the circumference of second ratio = $7x$

$$\therefore 2\pi r = 7x \Rightarrow r = \frac{7x}{2\pi}$$

$$\text{Ratio between their radii} = \frac{5x}{2\pi} : \frac{7x}{2\pi}$$

$$= 5 : 7$$

Question 23.

The perimeters of two squares are in the ratio 8:15, find the ratio between the lengths of their sides.

Solution:

Let the perimeter of first square = $8x$

$$\therefore \text{Side of the first square} = \frac{\text{Perimeter}}{4} = \frac{8x}{4}$$

and the perimeter of second square = $7x$

$$\begin{aligned}\therefore \text{Side of the second square} &= \frac{\text{Perimeter}}{4} \\ &= \frac{15x}{4}\end{aligned}$$

Now, the ratio between the sides of the

$$\begin{aligned}\text{square} &= \frac{8x}{4} : \frac{15x}{4} \\ &= 8 : 15\end{aligned}$$

Question 24.

The lengths of the sides of two squares are in the ratio 8:15, find the ratio between their perimeters.

Solution:

Let the side of first square = $8x$

$$\therefore \text{Perimeter of first square} = 4 \times \text{Side} = 4 \times 8x = 32x$$

and the side of second squares = $15x$

$$\therefore \text{Perimeter of second square} = 4 \times \text{Side} = 4 \times 15x = 60x$$

Now, the ratio between their perimeter = $32x : 60x = 8 : 15$

Question 25.

Each side of a square is 44 cm. Find its perimeter. If this perimeter is equal to the circumference of a circle, find the radius of the circle.

Solution:

The side of a square = 44 cm

$$\therefore \text{Its perimeter} = 4 \times \text{Side}$$

$$= 4 \times 44 = 176 \text{ cm}$$

Since, It is given that, Circumference of a circle = Perimeter of a square

$$\therefore \text{Circumference of a circle} = 176 \text{ cm}$$

Let, the radius of the circle = r

$$\Rightarrow 2\pi r = 176 \text{ cm}$$

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

$$\therefore \text{The radius of the circle} = 28 \text{ cm}$$

EXERCISE 20 (B)

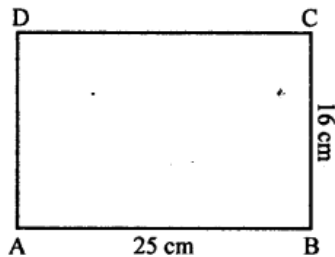
Question 1.

Find the area of a rectangle whose length and breadth are 25 cm and 16 cm.

Solution:

Length of rectangle = 25 cm

Breadth of rectangle = 16 cm



Area of rectangle = $l \times b$ or $AB \times BC$

$$= 25 \times 16 \text{ cm}^2 = 400 \text{ cm}^2$$

$$\therefore \text{Area of rectangle} = 400 \text{ cm}^2$$

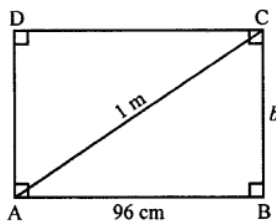
Question 2.

The diagonal of a rectangular board is 1 m and its length is 96 cm. Find the area of the board.

Solution:

Length of diagonal (AC) = 96 cm

Diagonal (AC) = 1 m = 100 cm



In right-angled triangle ABC,

By applying Pythagoras Theorem,

$$(AC)^2 = (AB)^2 + (BC)^2$$

$$= (100)^2 = (96)^2 + BC^2$$

$$10000 = 9216 + BC^2$$

$$10000 - 9216 = BC^2$$

$$\sqrt{784} = BC$$

$$\therefore BC = 28 \text{ cm}$$

Area of rectangular board

$$= l \times b \text{ or } AB \times BC$$

$$= 96 \times 28 = 2688 \text{ cm}^2$$

Question 3.

The sides of a rectangular park are in the ratio 4 : 3. If its area is 1728 m^2 , find

(i) its perimeter

(ii) cost of fencing it at the rate of ₹40 per meter.

Solution:

Ratio in the sides of a rectangle = 4 : 3

Area = 1728 m^2

Let length = $4x$, and breadth = $3x$

$$\therefore \text{Area} = l \times b$$

$$1728 = 4x \times 3x$$

$$\Rightarrow 12x^2 = 1728$$

$$\Rightarrow x^2 = \frac{1728}{12}$$

$$\Rightarrow x^2 = 144 = (12)^2$$

$$\therefore x = 12$$

$$\therefore \text{Length} = 4x = 4 \times 12 = 48 \text{ m}$$

$$\text{Breadth} = 3x = 3 \times 12 = 36 \text{ m}$$

(i) Now perimeter = $2(l + b)$

$$= 2(48 + 36) \text{ m}$$

$$= 2 \times 84 = 168 \text{ m}$$

(ii) Rate of fencing = ₹40 per metre

$$\text{Total cost} = 168 \times 40 = ₹6720$$

Question 4.

A floor is 40 m long and 15 m broad. It is covered with tiles, each measuring 60 cm by 50 cm. Find the number of tiles required to cover the floor.

Solution:

Length of floor (l) = 40 m

Breadth of floor (b) = 15 m

$$\therefore \text{Area of floor} = l \times b = 40 \times 15 = 600 \text{ m}^2$$

$$\text{Length of one tile} = 60 \text{ cm} = \frac{6}{10} \text{ m}$$

$$\text{and breadth} = 50 \text{ cm} = \frac{5}{10} \text{ m}$$

$$\therefore \text{Area of one tile} = \frac{6}{10} \times \frac{5}{10}$$

$$= \frac{30}{100} = \frac{3}{10} \text{ m}^2$$

$$\therefore \text{Number of tiles} = \frac{\text{Total area of floor}}{\text{Area of one tile}}$$

$$= \frac{600}{\frac{3}{10}} = \frac{600 \times 10}{3} = 2000$$

Question 5.

The length and breadth of a rectangular piece of land are in the ratio 5 : 3. If the total cost of fencing it at the rate of ₹24 per meter is ₹9600, find its :

(i) length and breadth

(ii) area

(iii) cost of levelling at the rate of ₹60 per m².

Solution:

Ratio in length and breadth of a rectangular piece of land = 5 : 3

Cost of fencing = ₹9600

and rate = ₹24 per m

$$\text{Perimeter} = \frac{\text{Total cost of fencing}}{\text{Rate per m.}} = \frac{9600}{24} = 400 \text{ m}$$

Let length = $5x$

Then breadth = $3x$

$$\therefore \text{Perimeter} = 2(l + b)$$

$$400 = 2 \times (5x + 3x)$$

$$\therefore 16x = 400$$

$$x = \frac{400}{16} = 25$$

$$(i) \therefore \text{Length of land} = 5x = 5 \times 25 = 125 \text{ m}$$

$$\text{and breadth} = 3x = 3 \times 25 = 75 \text{ m}$$

$$(ii) \text{Area} = l \times b$$

$$= 125 \times 75 = 9375 \text{ m}^2$$

$$(iii) \text{Cost of levelling at rate ₹60 per m}^2$$

$$= ₹60 \times 9375 \text{ m}^2 = ₹5,62,500$$

Question 6.

Find the area of the square whose perimeter is 56 cm.

Solution:

Perimeter of square = 56 cm

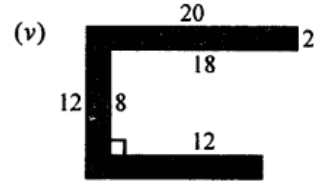
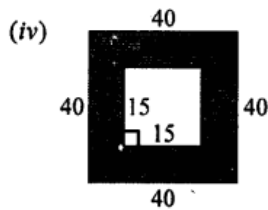
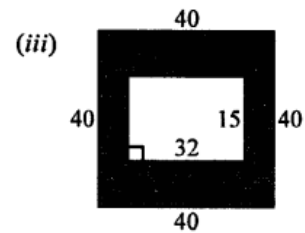
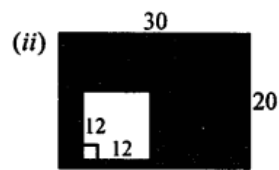
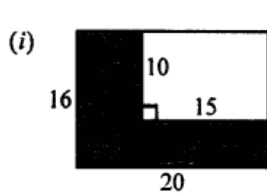
$$\Rightarrow 4 \times \text{side} = 56 \text{ cm}$$

$$\Rightarrow \text{Side} = \frac{56}{4} \text{ cm}$$

$$\Rightarrow \text{Side} = 14 \text{ cm}$$

$$\therefore \text{Area of square} = (\text{Side})^2 = (14)^2$$

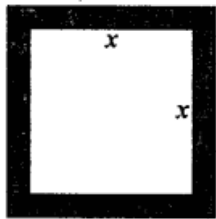
$$= 14 \times 14 \text{ cm}^2 = 196 \text{ cm}^2$$



Question 7.

A square lawn is surrounded by a path 2.5 m wide. If the area of the path is 165 m² find the area of the lawn.

Solution:



$$\text{Area of path} = 165 \text{ m}^2$$

$$\text{Width of path} = 2.5 \text{ m}$$

$$\text{Let side of square lawn} = x \text{ m}$$

$$\therefore \text{Outer side} = x + 2 \times 2.5$$

$$= (x + 5) \text{ m}$$

$$\therefore \text{Area of path} = (x + 5)^2 - x^2$$

$$\Rightarrow x^2 + 10x + 25 - x^2 = 165$$

$$\Rightarrow 10x = 165 - 25 = 140$$

$$\Rightarrow x = \frac{140}{10} = 14 \text{ m}$$

$$\therefore \text{Side of lawn} = 14 \text{ m}$$

$$\text{and area of lawn} = (14)^2 \text{ m}^2 = 196 \text{ m}^2$$

Question 8.

For each figure, given below, find the area of shaded region : (All measurements are in cm)

Solution:

(i) Outer length = 20 cm
and breadth = 16 cm

$$\therefore \text{Outer area} = l \times b \\ = 20 \times 16 \text{ cm}^2 = 320 \text{ cm}^2$$

Inner length = 15 cm
and Inner breadth = 10 cm

$$\therefore \text{Inner area} = 15 \times 10 = 150 \text{ cm}^2$$

$$\therefore \text{Area of shaded region} = \text{Area of whole region} - \text{Area of unshaded region} \\ = 320 - 150 \text{ cm}^2 = 170 \text{ cm}^2$$

(ii) Outer length = 30 cm
and Outer breadth = 20 cm

$$\therefore \text{Outer area} = l \times b \\ = 30 \times 20 = 600 \text{ cm}^2$$

Inner length = 12 cm and inner breadth = 12 cm

$$\text{Inner area} = l \times b = 12 \times 12 = 144 \text{ cm}^2$$

$$\text{Area of shaded portion} = \text{Area of outer figure} - \text{Area of inner figure} \\ = 600 - 144 = 456 \text{ cm}^2$$

(iii) Area of shaded portion = Area of outer region – Area of unshaded region

$$= 40 \times 40 - 32 \times 15 \\ = 1600 - 480 \text{ cm}^2 = 1120 \text{ cm}^2$$

(iv) Area of shaded region = Area of outer region – Area of inner region

$$= 40 \times 40 - 15 \times 15 \\ = 1600 - 225 = 1375 \text{ cm}^2$$

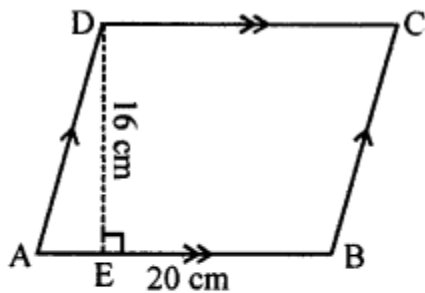
(v) Area of shaded portion

$$= 2 \times 20 + 2 \times 8 + 2 \times (12 + 2) \\ = 40 + 16 + 28 \text{ cm}^2 = 84 \text{ cm}^2$$

Question 9.

One side of a parallelogram is 20 cm and its distance from the opposite side is 16 cm. Find the area of the parallelogram.

Solution:



$$\text{Area of parallelogram} = \text{Base} \times \text{Height}$$

$$= AB \times DE$$

$$= 20 \times 16 \text{ cm} = 320 \text{ cm}^2$$

$$\therefore \text{Area of parallelogram} = 320 \text{ cm}^2$$

Question 10.

The base of a parallelogram is thrice its height. If its area is 768 cm^2 , find the base and the height of the parallelogram.

Solution:

$$\text{Area of the parallelogram} = 768 \text{ cm}^2$$

$$\text{Let the height of the parallelogram} = x$$

$$\text{Then base} = 3x$$

$$\therefore \text{Area} = \text{Base} \times \text{Height}$$

$$\Rightarrow 768 = 3x \times x$$

$$\Rightarrow 768 = 3x^2$$

$$\Rightarrow x^2 = \frac{768}{3} = 256 \text{ cm}$$

$$\therefore x = \sqrt{16 \times 16} = 16 \text{ cm}$$

$$\therefore \text{Base} = 3 \times 16 = 48 \text{ cm}$$

$$\text{and height} = x = 16 \text{ cm}$$

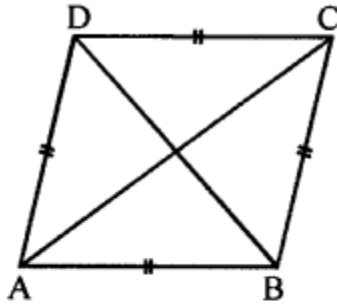
Question 11.

Find the area of the rhombus, if its diagonals are 30 cm and 24 cm.

Solution:

Given, diagonal (d_1) = 30 cm

Other diagonal (d_2) = 24 cm



If AC and BD are the diagonals of a rhombus
its

$$\text{Area} = \frac{1}{2} \times \text{Product of its diagonals}$$

$$= \frac{1}{2} \times AC \times BD$$

$$= \frac{1}{2} \times d_1 \times d_2$$

$$= \frac{1}{2} \times 30 \times 24 \text{ cm}^2$$

$$= 15 \times 24 = 360 \text{ cm}^2$$

$$\therefore \text{Area of rhombus} = 360 \text{ cm}^2$$

Question 12.

If the area of a rhombus is 112 cm^2 and one of its diagonals is 14 cm , find its other diagonal.

Solution:

$$\text{Area of rhombus} = 112 \text{ cm}^2$$

$$\text{One diagonal} = 14 \text{ cm}$$

$$\text{Let second diagonal} = x$$

$$\text{Then, area} = \frac{\text{Product of diagonal}}{2}$$

$$\Rightarrow 112 = \frac{14 \times x}{2}$$

$$\Rightarrow x = \frac{112 \times 2}{14} = \frac{224}{14}$$

$$\Rightarrow x = 16$$

$$\therefore \text{Second diagonal} = 16 \text{ cm}$$

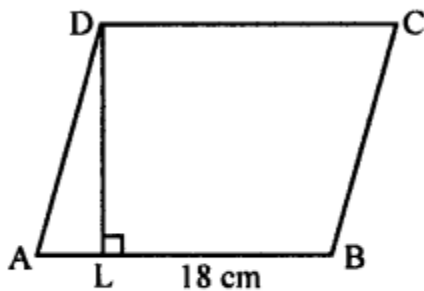
Question 13.

One side of a parallelogram is 18 cm and its area is 153 cm^2 . Find the distance of the given side from its opposite side.

Solution:

$$\text{Area of parallelogram ABCD} = 153 \text{ cm}^2$$

$$\text{Side (Base) AB} = 18 \text{ cm}$$



$\therefore$ Distance DL between AB and DC (altitude)

$$= \frac{\text{Area}}{\text{Base}} = \frac{153}{18} = \frac{17}{2} \text{ cm} = 8.5 \text{ cm}$$

Question 14.

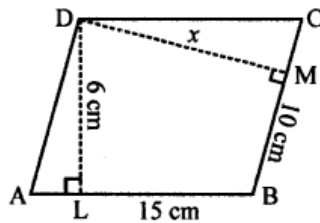
The adjacent sides of a parallelogram are 15 cm and 10 cm. If the distance between the longer sides is 6 cm, find the distance between the shorter sides.

Solution:

In parallelogram ABCD

$$AB = DC = 15 \text{ cm}$$

$$BC = AD = 10 \text{ cm}$$



Distance between longer sides AB and DC
is 6 cm

i.e., perpendicular $DL = 6 \text{ cm}$

$DM \perp BC$

Area of parallelogram = Base $\times$ Altitude

$$= AB \times DL = 15 \times 6 = 90 \text{ cm}^2$$

Again let $DM = x \text{ cm}$

$$\therefore \text{Area of parallelogram ABCD} = BC \times DM$$

$$= 10 \times x = 10x \text{ cm}^2$$

$$\therefore 10x \text{ cm}^2 = 90 \text{ cm}^2$$

$$\Rightarrow x = \frac{90}{10} = 9 \text{ cm}$$

Question 15.

The area of a rhombus is 84 cm^2 and its perimeter is 56 cm. Find its height.

Solution:

$$\therefore \text{Area of rhombus} = 84 \text{ cm}^2$$

$$\text{Perimeter} = 56 \text{ cm}$$

$$\therefore \text{Its side} = \frac{56}{4} = 14 \text{ cm}$$

$$\therefore \text{Height} = \frac{\text{Area of rhombus}}{\text{Base}} = \frac{84}{14} = 6 \text{ cm}$$

Question 16.

Find the area of a triangle whose base is 30 cm and height is 18 cm.

Solution:

Base of triangle = 30 cm

Height of triangle = 18 cm

$$\therefore \text{Area} = \frac{1}{2} \text{base} \times \text{height}$$

$$= \frac{1}{2} \times 30 \times 18 = 270 \text{ cm}^2$$

Question 17.

Find the height of a triangle whose base is 18 cm and area is 270 cm².

Solution:

Base of triangle = 18 cm

Area of triangle = 270 cm²

$$\therefore \text{Height} = \frac{\text{Area} \times 2}{\text{Base}}$$

$$= \frac{270 \times 2}{18} = \frac{540}{18} = 30 \text{ cm}$$

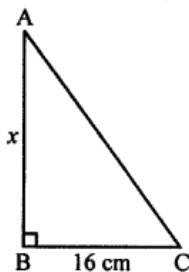
Question 18.

The area of a right-angled triangle is 160 cm². If its one leg is 16 cm long, find the length of the other leg.

Solution:

Area of the right angled triangle = 160 cm²

Let base (one side) = 16 cm



$\therefore$ Altitude (second side)

$$= \frac{\text{Area} \times 2}{\text{Base}} = \frac{160 \times 2}{16} = \frac{320}{16} = 20 \text{ cm}$$

Question 19.

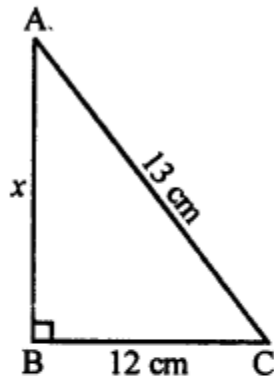
Find the area of a right-angled triangle whose hypotenuse is 13 cm long and one of its legs is 12 cm long.

Solution:

In right angled $\triangle ABC$,

Base $BC = 12$ cm

and hypotenuse $AC = 13$ cm



Applying Pythagoras Theorem,

$$(AC)^2 = (AB)^2 + (BC)^2$$

$$(13)^2 = (AB)^2 + (12)^2$$

$$169 = (AB)^2 + 144$$

$$(AB)^2 = 169 - 144$$

$$(AB)^2 = 25$$

$$\therefore AB = \sqrt{25}$$

$$= \sqrt{5 \times 5} = 5 \text{ cm}$$

$$\text{Now, area of } \triangle ABC = \frac{1}{2} \text{ base} \times \text{altitude}$$

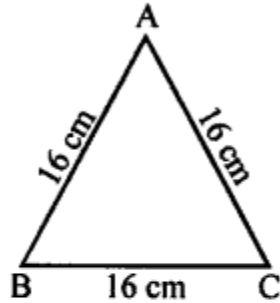
$$= \frac{1}{2} \times 12 \times 5 = 30 \text{ cm}^2$$

Question 20.

Find the area of an equilateral triangle whose each side is 16 cm. (Take $\sqrt{3} = 1.73$)

Solution:

Side of the equilateral triangle = 16 cm



$$\begin{aligned}\therefore \text{Area} &= \frac{\sqrt{3}}{4} (a)^2 \\ &= \frac{\sqrt{3}}{4} \times 16 \times 16 \\ &= 1.73 \times 4 \times 16 = 110.72 \text{ cm}^2\end{aligned}$$

Question 21.

The sides of a triangle are 21 cm, 17 cm and 10 cm. Find its area.

Solution:

Let $a = 21$ cm, $b = 17$ cm and $c = 10$ cm

$$\begin{aligned}\therefore a + b + c \\ &= 21 \text{ cm} + 17 \text{ cm} + 10 \text{ cm} = 48 \text{ cm}\end{aligned}$$

$$s = \frac{a+b+c}{2} = \frac{48}{2} = 24 \text{ cm}$$

Area of the triangle

$$\begin{aligned}&= \sqrt{s(s-a)(s-b)(s-c)} \\ &= \sqrt{24(24-21)(24-17)(24-10)} \\ &= \sqrt{24 \times 3 \times 7 \times 14} \\ &= \sqrt{2 \times 2 \times 2 \times 3 \times 3 \times 7 \times 2 \times 7} \\ &= 2 \times 2 \times 3 \times 7 = \text{cm}^2 = 84 \text{ cm}^2\end{aligned}$$

Question 22.

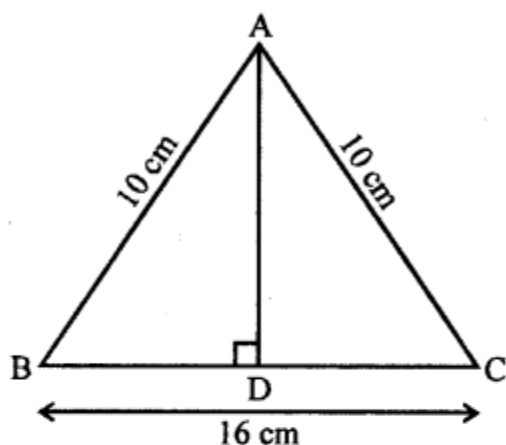
Find the area of an isosceles triangle whose base is 16 cm and length of each of the equal sides is 10 cm.

Solution:

In isosceles $\triangle ABC$

Base $BC = 16$ cm

and $AB = AC = 10$ cm



$$\text{Let } AD \perp BC \text{ and } BD = \frac{1}{2} BC = \frac{16}{2}$$

$$\therefore BD = 8 \text{ cm}$$

In right $\triangle ABD$

$$AB^2 = AD^2 + BD^2 \text{ (Pythagoras Theorem)}$$

$$(10)^2 = AD^2 + (8)^2$$

$$100 = AD^2 + 64$$

$$100 - 64 = AD^2$$

$$36 = AD^2$$

$$AD = \sqrt{36} = \sqrt{6 \times 6}$$

$$\therefore AD = 6 \text{ cm}$$

$$\text{Now, area of triangle} = \frac{\text{Base} \times \text{Altitude}}{2}$$

$$= \frac{16 \times 6}{2} = 48 \text{ cm}^2$$

Question 23.

Find the base of a triangle whose area is 360 cm^2 and height is 24 cm .

Solution:

$$\text{Area of triangle} = 360 \text{ cm}^2$$

$$\text{and height } (h) = 24 \text{ cm}$$

$$\therefore \text{Base} = \frac{\text{Area} \times 2}{\text{Height}}$$

$$= \frac{360 \times 2}{24} = \frac{720}{24} = 30 \text{ cm}$$

Question 24.

The legs of a right-angled triangle are in the ratio $4 : 3$ and its area is 4056 cm^2 . Find the length of its legs.

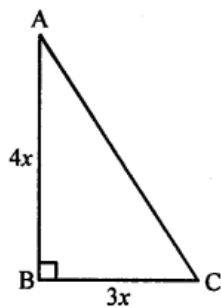
Solution:

$$\text{Area of right angled triangle} = 4056 \text{ cm}^2$$

Legs of a right angled triangle are in the ratio i.e. $4 : 3$

$$\text{Let one leg (base)} = 3x$$

$$\text{Then second leg (altitude)} = 4x$$



$$\text{Area} = \frac{1}{2} \times \text{Base} \times \text{Altitude}$$

$$= \frac{1}{2} \times 3x \times 4x = 6x^2$$

$$\therefore 6x^2 = 4056$$

$$x^2 = \frac{4056}{6} = 676$$

$$x = \sqrt{676} = \sqrt{26 \times 26}$$

$$\therefore x = 26 \text{ cm}$$

$$\therefore \text{One leg (base)} = 3x = 3 \times 26 = 78 \text{ cm}$$

$$\text{and second leg (altitude)} = 4x = 4 \times 26 = 104 \text{ cm}$$

Question 25.

The area of an equilateral triangle is $(64 \times \sqrt{3}) \text{ cm}^2$ – Find the length of each side of the triangle.

Solution:

$$\text{Area of equilateral triangle} = 64 \sqrt{3} \text{ cm}^2$$

$$\text{Let each side} = a$$

$$\text{Then, } \frac{\sqrt{3}}{4} a^2 = 64 \sqrt{3}$$

$$a^2 = \frac{64 \sqrt{3} \times 4}{\sqrt{3}} = 256$$

$$a = (16)^2$$

$$\therefore a = 16 \text{ cm}$$

$$\therefore \text{Each side} = 16 \text{ cm}$$

Question 26.

The sides of a triangle are in the ratio 15 : 13 : 14 and its perimeter is 168 cm. Find the area of the triangle.

Solution:

$$\text{Perimeter of the triangle} = 168 \text{ cm}$$

$$\text{Sum of ratios of sides} = 15 + 13 + 14 = 42$$

$$\text{Let the first side} = \frac{168 \times 15}{42} = 60 \text{ cm}$$

$$\text{Second side} = \frac{168 \times 13}{42} = 52 \text{ cm}$$

$$\text{Third side} = \frac{168 \times 14}{42} = 56 \text{ cm}$$

$$\text{Now, } s = \frac{a+b+c}{2}$$

$$= \frac{60+52+56}{2} = \frac{168}{2} = 84$$

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

$$= \sqrt{84(84-60)(84-52)(84-56)}$$

$$= \sqrt{84 \times 24 \times 32 \times 28}$$

$$= \sqrt{\begin{matrix} 2 \times 2 \times 3 \times 7 \times 2 \times 2 \times 2 \times 3 \times 2 \\ \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 7 \end{matrix}}$$

$$= 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 7 = 1344 \text{ cm}^2$$

Question 27.

The diameter of a circle is 20 cm. Taking $\pi = 3.14$, find the circumference and its area.

Solution:

$$\text{Diameter of circle } (d) = 20 \text{ cm}$$

$$\therefore \text{Circumference} = d\pi = 20 \times 3.14 = 62.8 \text{ cm}$$

$$\text{Radius } (r) = \frac{d}{2} = 10 \text{ cm}$$

$$\begin{aligned}\therefore \text{Area of a circle} &= \pi r^2 \\ &= 3.14 \times 10 \times 10 = 314 \text{ cm}^2\end{aligned}$$

Question 28.

The circumference of a circle exceeds its diameter by 18 cm. Find the radius of the circle.

Solution:

Let c be the circumference and d be the diameter of the circle.

$$\therefore c = d + 18$$

$$\Rightarrow d\pi = d + 18 \Rightarrow d\pi - d = 18$$

$$d(\pi - 1) = 18$$

$$\Rightarrow d\left(\frac{22}{7} - 1\right) = 18$$

$$\Rightarrow d\left(\frac{15}{7}\right) = 18$$

$$\Rightarrow d = \frac{18 \times 7}{15} = \frac{126}{15} = 8.4 \text{ cm}$$

$$\therefore \text{Radius} = \frac{d}{2} = \frac{8.4}{2} = 4.2 \text{ cm}$$

Question 29.

The ratio between the radii of two circles is 5 : 7. Find the ratio between their :

(i) circumference

(ii) areas

Solution:

(i) The ratio of the radii of the circles

$$= 5 : 7$$

Let radius of first circle = $5x$

and radius of second circle = $7x$

∴ Circumference of first circle = $2\pi r$

$$= 2\pi \times 5x = 10\pi x$$

and circumference of second circle

$$= 2\pi \times 7x = 14\pi x$$

∴ Ratio between their circumference

$$= 10\pi x : 14\pi x$$

$$= 10 : 14 = 5 : 7$$

(ii) Area of first circle = πr^2

$$= \frac{22}{7} \times 5x \times 5x = \frac{550}{7} x^2$$

and area of second circle = πr_2^2

$$= \frac{22}{7} \times 7x \times 7x = \frac{1078}{7} x^2$$

Ratio between their areas

$$= \frac{550}{7} x^2 : \frac{1078}{7} x^2$$

$$= 550 : 1078 \quad (\text{Dividing by } 22)$$

$$= 25 : 49$$

Question 30.

The ratio between the areas of two circles is 16 : 9. Find the ratio between their :

(i) radii

(ii) diameters

(iii) circumference

Solution:

(i) Let the radius of first circle = r_1
and radius of second circle = r_2
Given that ratio of the areas of circles
= 16 : 9

$$\Rightarrow \frac{\pi r_1^2}{\pi r_2^2} = \frac{16}{9}$$

$$\Rightarrow \frac{\pi r_1^2}{\pi r_2^2} = \frac{4^2}{3^2}$$

$$\Rightarrow \frac{r_1}{r_2} = \frac{4}{3}$$

(ii) Let the diameter of first circle = d_1
and diameter of second circle = d_2
Since, we know that diameter = $2 \times$ radius

$$\therefore d_1 = 2 \times r_1 = 2 \times 4x = 8x$$

$$\text{and } d_2 = 2 \times r_2 = 2 \times 3x = 6x$$

Now, the ratio between the diameter of two
circles = $d_1 : d_2$
= $8x : 6x = 4 : 3$

(iii) Now, consider the ratio of circumference
of the circles

$$= \frac{2\pi r_1}{2\pi r_2} = \frac{r_1}{r_2} = \frac{4}{3}$$

$\therefore$ The ratio between the circumference of two
circles = 4 : 3

Question 31.

A circular racing track has inner circumference 528 m and outer circumference 616 m. Find the width of the track.

Solution:

Outer circumference = 616 m

$$\text{Radius (R)} = \frac{C}{2\pi} = \frac{616 \times 7}{2 \times 22} \text{ m} = 98 \text{ m}$$

Inner circumference = 528 m

$$\therefore \text{Inner radius (r)} = \frac{528 \times 7}{2 \times 22} \text{ m} = 84 \text{ m}$$

$$\begin{aligned} \therefore \text{Width of track} &= R - r \\ &= 98 - 84 = 14 \text{ m} \end{aligned}$$

Question 32.

The inner circumference of a circular track is 264 m and the width of the track is 7 m. Find:

- (i) the radius of the inner track.
- (ii) the radius of the outer circumference.
- (iii) the length of the outer circumference.
- (iv) the cost of fencing the outer circumference at the rate of ₹50 per m.

Solution:

Inner circumference of the circular track
= 264 m

$$(i) \therefore \text{Inner radius (r)} = \frac{C}{2\pi}$$

$$= \frac{264 \times 7}{2 \times 22} = \frac{1848}{44} = 42 \text{ m}$$

(ii) Width of the track = 7 m

$$\therefore \text{Outer radius (R)} = 42 + 7 = 49 \text{ m}$$

(iii) Outer circumference = $2\pi R$

$$= 2 \times \frac{22}{7} \times 49 = 308 \text{ m}$$

(iv) Rate of fencing = ₹50 per metre

$$\begin{aligned} \therefore \text{Total cost of fencing outer circumference} \\ &= ₹50 \times 308 = ₹15,400 \end{aligned}$$

Question 33.

The diameter of every wheel of a car is 63 cm. How much distance will the car move during 2000 revolutions of its wheel.

Solution:

$$\therefore \text{Diameter of car wheel } (d) = 63 \text{ cm}$$

$$\therefore \text{Circumference} = \pi d = \frac{22}{7} \times 63 = 198 \text{ cm}$$

Distance covered in 2000 revolutions

$$= 2000 \times 198 \text{ cm}$$

$$= \frac{2000 \times 198}{100} = 3960 \text{ m} = 3.96 \text{ km}$$

Question 34.

The diameter of the wheel of a car is 70 cm. How many revolutions will it make to travel one kilometre?

Solution:

$$\therefore \text{Diameter of car wheel } (d) = 70 \text{ cm}$$

$$\therefore \text{Circumference} = \pi d = \frac{22}{7} \times 70 \text{ cm}$$

$$= 220 \text{ cm} = \frac{220}{100} \text{ m}$$

No. of revolutions in 1 km

$$= 1 \text{ km} \div \frac{220}{100} \text{ m}$$

$$= 1 \times 1000 \times \frac{100}{220} \text{ m} = \frac{5000}{11} = 454 \frac{6}{11} \text{ km}$$

Question 35.

A metal wire, when bent in the form of a square of largest area, encloses an area of 484 cm². Find the length of the wire. If the same wire is bent to a largest circle, find:

(i) radius of the circle formed.

(ii) area of the circle.

Solution:

$$\text{Area of the square made wire} = 484 \text{ cm}^2$$

$$\therefore \text{Length (side)} = \sqrt{\text{Area}} = \sqrt{484} = 22 \text{ cm}$$

$$(i) \text{ Perimeter of wire} = 4 \times \text{Side}$$

$$= 4 \times 22 = 88 \text{ cm}$$

∴ Circumference of circular wire = 88 cm

$$\therefore \text{Radius } (r) = \frac{C}{2\pi} = \frac{88 \times 7}{2 \times 22} \text{ cm} = 14 \text{ cm}$$

(ii) ∴ Area of the circle = πr^2

$$= \frac{22}{7} \times 14 \times 14 = 616 \text{ cm}^2$$

Question 36.

A wire is along the boundary of a circle with radius 28 cm. If the same wire is bent in the form of a square, find the area of the square formed.

Solution:

Radius of circular wire = 28 cm

∴ Circumference = $2\pi r$

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

∴ Perimeter of the square formed by this wire
= 176 cm

$$\therefore \text{Side } (a) = \frac{176}{4} = 44 \text{ cm}$$

$$\begin{aligned} \text{Area of square so formed} &= a^2 = (44)^2 \text{ cm}^2 \\ &= 1936 \text{ cm}^2 \end{aligned}$$

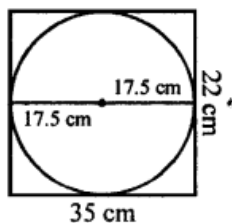
Question 37.

The length and the breadth of a rectangular paper are 35 cm and 22 cm. Find the area of the largest circle which can be cut out of this paper.

Solution:

Length of rectangular paper (l) = 35 cm

Breadth of rectangular paper (b) = 22 cm



$$\therefore \text{Area} = 35 \times 22 = 770 \text{ cm}^2$$

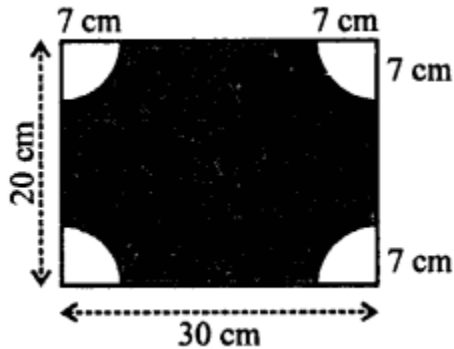
The largest circle which can be cut from the rectangular paper will have radius of 17.5 cm

$$\therefore \text{Area of a circle} = \pi r^2$$

$$= \frac{22}{7} \times 17.5 \times 17.5 = 962.50 \text{ cm}^2$$

Question 38.

From each corner of a rectangular paper (30 cm x 20 cm) a quadrant of a circle of radius 7 cm is cut. Find the area of the remaining paper i.e., shaded portion.



Solution:

Length of paper (l) = 30 cm

and breadth (b) = 20 cm

$\therefore$ Area of rectangular paper = $l \times b$

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

Radius of each quadrant at the corner

$$= 7 \text{ cm}$$

$$\text{Area of 4 quadrants} = 4 \times \frac{1}{4} \pi r^2$$

$$= \pi r^2 = \frac{22}{7} \times 7 \times 7 = 154 \text{ cm}^2$$

$\therefore$ Area of remaining paper

$$= 600 - 154 = 446 \text{ cm}^2$$