

Chapter: 11 Area and Perimeter

$$E x = 11.4$$

Some Important formulae to solve questions of $\bar{X}=11.4$ are as following:

- ① Area of Rectangle = length $\times$ breadth
- ② Perimeter of Rectangle = $2(l+b)$
- ③ Area of Square = (Side)²
- ④ Perimeter of Square = $4 \times$ Side
- ⑤ Area of Circle = πr^2
- ⑥ Circumference of Circle = $2\pi r$
- ⑦ Area of Parallelogram = Base $\times$ Height
- ⑧ Area of triangle = $\frac{1}{2} \times b \times h$

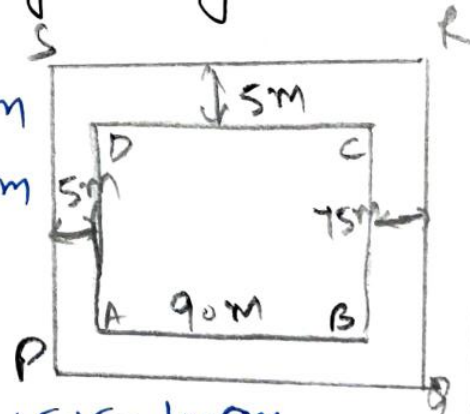
Q1: A garden is 90 m long and 75 m broad. A path 5 m wide is to be built outside and around it. Find the area of the path. Also find the area of the garden in hectare.



Diagram showing a rectangular garden with dimensions 90m (length) and 75m (breadth). A path 5m wide is shown around the garden.

in hectare.

Solution: Given Length of the garden = 90m
Breadth " " " = 75m



Area of garden = $l \times b$
 $(ABCD) = 90 \times 75 = 6750 \text{ m}^2$

length of the garden including paths $= 90 + 5 + 5 = 100 \text{ cm}$
" " $= 75 + 5 + 5 = 85 \text{ m}$

Breadth " " " " = $75 + 5 + 5 = 85 \text{ m}$

Area of garden including path = $100 \times 85 = 8500 \text{ m}^2$
(PQRS)

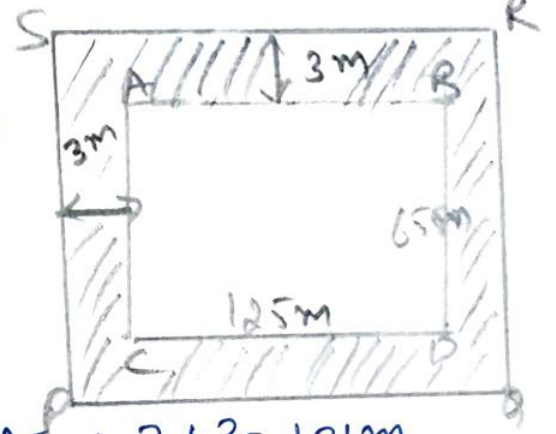
Area of path = $8500 - 6750 = 1750 \text{ m}^2$

Again area of garden = 6750 m^2
 $= \underline{6750}$ hecta

$$= \frac{6750}{10000} \text{ hectare} = 0.675 \text{ hectare}$$

1 m² / 10000 = hectare

Q2: A 3m wide path runs outside and around a rectangular park of length 125m and breadth 65m. Find the area of the path.



Solution: Length of the park = 125m
Breadth " " " = 65m

$$\text{Area of park (ABCD)} = l \times b = 125 \times 65 = 8125 \text{ m}^2$$

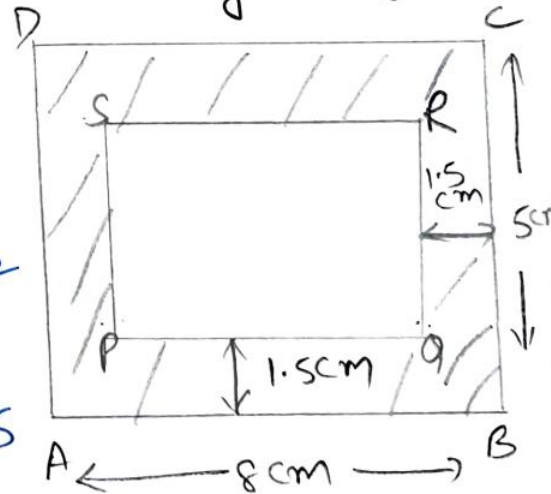
$$\text{Length of park including path} = 125 + 3 + 3 = 131 \text{ m}$$

$$\text{Breadth " " " "} = 65 + 3 + 3 = 71 \text{ m}$$

$$\text{Area of park including path (PQRS)} = 131 \times 71 = 9301 \text{ m}^2$$

$$\text{Area of Path} = 9301 - 8125 = 1176 \text{ m}^2$$

Q3: A picture is painted on a Cardboard 8cm long and 5cm wide such that there is a margin of 1.5cm along each of its sides. Find the total area of margin.



Solution: Length of Cardboard = 8cm
Breadth of Cardboard = 5cm

$$\text{Area of Cardboard (ABCD)} = 8 \times 5 = 40 \text{ cm}^2$$

$$\text{Width of margin} = 1.5 \text{ cm}$$

$$\text{Length of inner Cardboard} = 8 - 1.5 - 1.5 = 8 - 3 = 5 \text{ cm}$$

$$\text{Breadth " " " "} = 5 - 1.5 - 1.5 = 5 - 3 = 2 \text{ cm}$$

$$\text{Area of inner rectangle (PQRS)} = 5 \times 2 = 10 \text{ cm}^2$$

$$\text{Area of margin} = 40 \text{ cm}^2 - 10 \text{ cm}^2 = 30 \text{ cm}^2$$

Q4. A verandah of width 2.25 m is constructed all along outside a room which is 5.5 m long and 4 m wide. Find:
 (i) the area of the verandah.
 (ii) the cost of cementing the floor of the verandah at the rate of ₹ 200 per m^2 .

Solution: length of the room = 5.5 m

Breadth " " " = 4 m

$$\text{Area of room} = 5.5 \times 4 = 22.0 m^2$$

width of verandah = 2.25 m

length of room including verandah = $5.5 + 2.25 + 2.25 = 10 m$

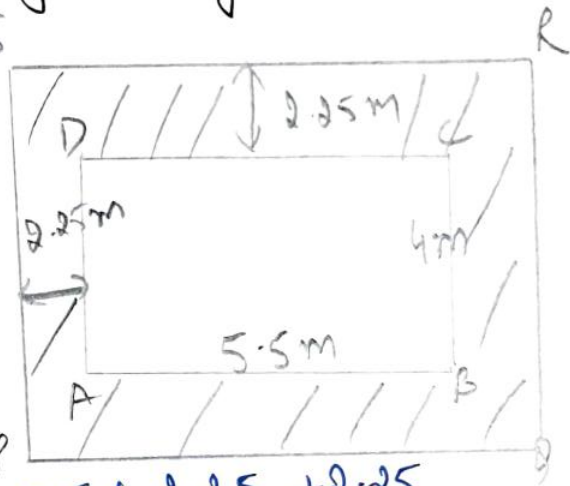
Breadth " " " " = $4 + 2.25 + 2.25 = 8.50 m$

$$\begin{aligned} \text{Area of room including verandah} &= l \times b \\ &= 10 \times 8.50 m \\ &= 85 m^2 \end{aligned}$$

$$(i) \text{ Area of verandah} = 85 m^2 - 22 m^2 = 63 m^2$$

(ii) Cost of cementing $1 m^2$ floor of verandah = ₹ 200

$$\begin{aligned} \text{" " " } 63 m^2 \text{ " " " } &= ₹ 63 \times 200 \\ &= ₹ 12600 \end{aligned}$$



Q5. A path 1 m wide is built along the border and inside a square garden of side 30 m. Find:

(i) the area of the path.

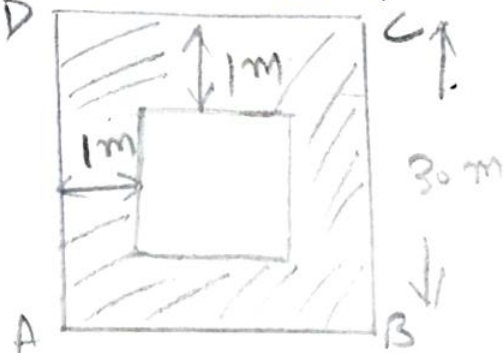
(ii) Cost of planting grass in the remaining portion of the garden at the rate of ₹ 40 per m^2 .

Sol: Side of square garden = 30 m

$$\begin{aligned} \text{Area of square garden} &= (\text{side})^2 \\ &= (30)^2 = 900 m^2 \end{aligned}$$

Length of the garden excluding the path = $30 - 1 - 1 = 28\text{m}$
 Area of garden excluding the path = $(28)^2$
 $= 784\text{m}^2$

(i) Area of path = $900 - 784$
 $= 116\text{m}^2$

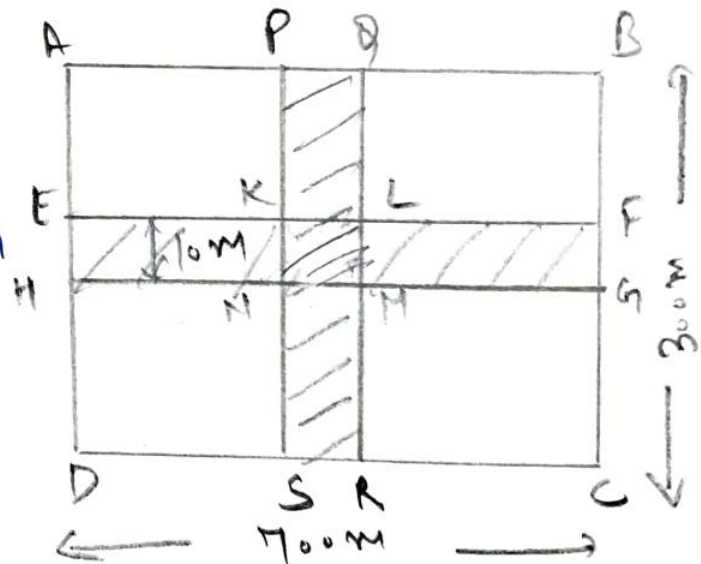


(ii) Cost of planting the remaining portion for $1\text{m}^2 = ₹ 40$
 " " " " " " " " $784\text{m}^2 = 40 \times 784$
 $= ₹ 31,360$

Q6: Two cross roads, each of width 10m , cut at right angles through the centre of a rectangular park of length 700m and breadth 300m and parallel to its sides. Find the area of the roads. Also find the area of the park excluding cross roads. Give the answer in hectares.

Sol: For Road EFGH

Length of the road parallel to the length of park = 700m
 Width of the Road = 10m
 Area of Road EFGH = 700×10
 $= 7000\text{m}^2$



For Road PQRS

Length of the road parallel to the breadth of park = 300m
 Width of the road = 10m
 Area of Road PQRS = $300 \times 10 = 3000\text{m}^2$

For Common Portion KLMN

Side of square KLMN = 10m
 Area of KLMN = $10 \times 10 = 100\text{m}^2$

Area of both roads = Area of Road EFGH + Area of Road PQRS
 - area of common portion (KLMN)

($\because$ area of KLMN is covering twice, so we will subtract it one time for finding area of both roads)

$$= 7000 + 3000 - 100 = 10,000 - 100 = 9900 \text{ m}^2$$

But $1 \text{ m}^2 = \frac{1}{10000} \text{ hectare}$

$$\therefore 9900 \text{ m}^2 = \frac{9900}{10000} \text{ hectare}$$

$$= 0.99 \text{ hectare}$$

$$\text{Area of park} = 700 \times 300 = 210000 \text{ m}^2$$

$$\text{Area of park excluding the roads} = 210000 - 9900 \text{ m}^2$$

$$= 200100 \text{ m}^2$$

$$= \frac{200100}{10000} = 20.01 \text{ hectare}$$

Q7: Through a rectangle field of length 90 m and breadth 60 m, two roads are constructed which are parallel to the sides and cut each other at right angles through the centre of the fields. If the width of each road is 3 m, find:

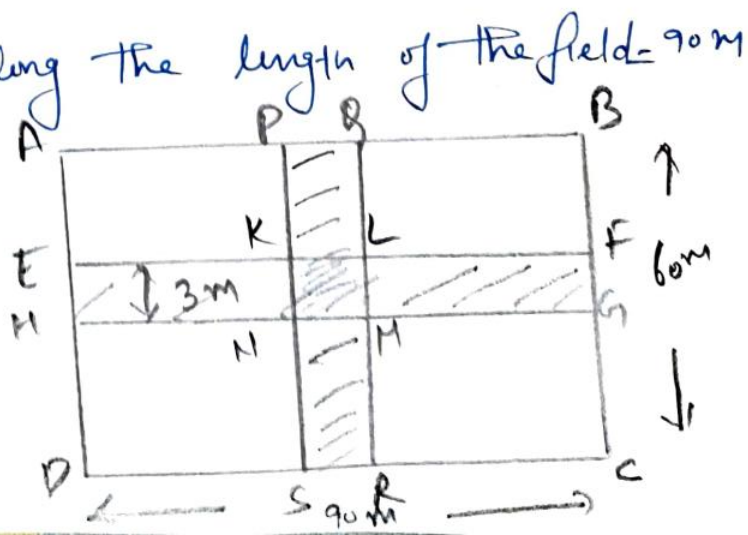
- the area covered by the roads.
- the cost of constructing the roads at the rate of ₹ 110 per m^2 .

Solution: Length of the road along the length of the field = 90 m

Breadth = 3 m

$$\text{Area of Road EFGH} = 90 \times 3$$

$$= 270 \text{ m}^2$$



For Road PQRS

Similarly, area of road Parallel to the breadth of field = 60 m
width = 3 m

$$\text{area of road PQRS} = 60 \times 3 = 180 \text{ m}^2$$

For Square KLMN (Common portion)

$$\text{Area of Square KLMN} = 3 \times 3 = 9 \text{ m}^2$$

$$\begin{aligned} \text{(i) Area of Two Roads} &= 270 + 180 - 9 \\ &= 450 - 9 = 441 \text{ m}^2 \end{aligned}$$

$$\text{(ii) Cost of Constructing the Road} = 441 \times 110 = \text{Rs } 48,510$$

Q8: Pragya wrapped a cord around a circular pipe of radius 4 cm and cut off the length of the cord. Then she wrapped it around a square box of side 4 cm. Did she have any cord left?

$$\begin{aligned} \text{sol: length of Cord} &= \text{Circumference of circular pipe} \\ &= 2\pi r \\ &= 2 \times 3.14 \times 4 = 25.12 \text{ cm} \end{aligned}$$

$$\begin{aligned} \text{Perimeter of Square box} &= 4 \times \text{side} \\ &= 4 \times 4 = 16 \text{ cm} \end{aligned}$$

$$25.12 \text{ cm} > 16 \text{ cm}$$

$$\begin{aligned} \therefore \text{length of Cord left} &= 25.12 \text{ cm} - 16 \text{ cm} \\ &= 9.12 \text{ cm} \end{aligned}$$

Yes, 9.12 cm Cord left

Q9: The given figure represents a rectangular lawn with a circular flower bed in the middle. Find:

(i) the area of whole land.

(ii) the area of flower bed

(iii) The area of the lawn excluding the area of the flower bed.

(iv) The circumference of the flower bed.

Solution: (i) Length of the lawn = 10 m

Breadth " " " = 5 m

Area of the lawn = $10 \times 5 = 50 \text{ m}^2$

(ii) Area of circular flower bed = πr^2

$$= \frac{22}{7} \times 2 \times 2 = \frac{88}{7} \text{ m}^2$$

(iii) Area of lawn excluding area of circular flower bed

$$= 50 - \frac{88}{7} = \frac{350 - 88}{7} = \frac{262}{7} = 37.43 \text{ m}^2$$

(iv) Circumference of flower bed = $2\pi r$

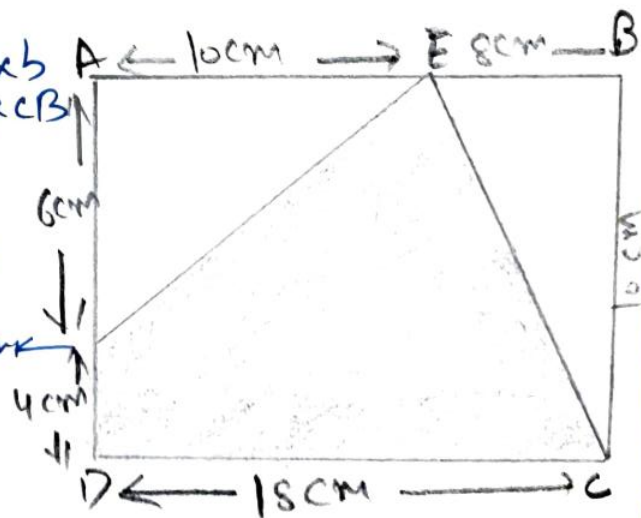
$$= 2 \times \frac{22}{7} \times 2 = \frac{88}{7} \text{ m}$$

Q20: In the following figures, find the area of shaded portion:

Solution: (i) Area of Rectangle = $l \times b$
 $= DC \times CB$
 $= 18 \times 10 = 180 \text{ cm}^2$

$$\begin{aligned} \text{Area of triangle AFE} &= \frac{1}{2} \times b \times h \\ &= \frac{1}{2} \times 6 \times 10 = 30 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Area of triangle EBC} &= \frac{1}{2} \times b \times h \\ &= \frac{1}{2} \times 8 \times 10 \\ &= 40 \text{ cm}^2 \end{aligned}$$



Area of shaded portion = Area of Rectangle - area of $\triangle AFE$ - area of $\triangle EBC$

$$= 180 - 30 - 40 = 110 \text{ cm}^2$$

(ii) Side of Square PQRS = 20 cm
 area of Square PQRS = (Side)²
 $= 20 \times 20 = 400 \text{ cm}^2$

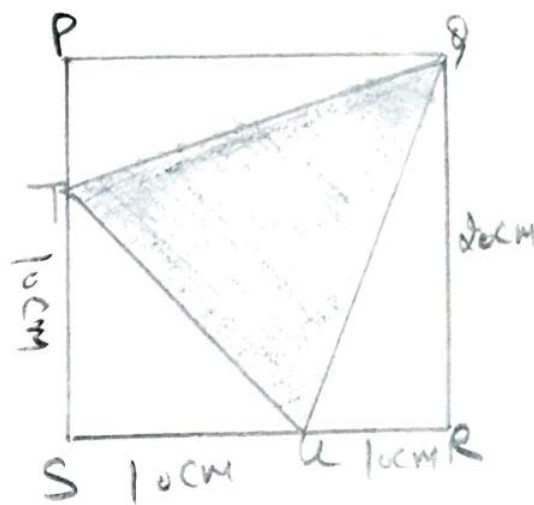
$$\begin{aligned} \text{area of } \Delta PTQ &= \frac{1}{2} \times b \times h \\ &= \frac{1}{2} \times 10 \times 20 = 100 \text{ cm}^2 \end{aligned}$$

$$\text{area of } \Delta TSU = \frac{1}{2} \times 10 \times 10 = 50 \text{ cm}^2$$

$$\begin{aligned} \text{area of } \Delta URQ &= \frac{1}{2} \times b \times h \\ &= \frac{1}{2} \times 10 \times 20 = 100 \text{ cm}^2 \end{aligned}$$

$$\text{area of all 3 triangles} = 100 + 50 + 100 = 250 \text{ cm}^2$$

$$\begin{aligned} \text{Area of Shaded portion} &= 400 - 250 \\ &= 150 \text{ cm}^2 \end{aligned}$$



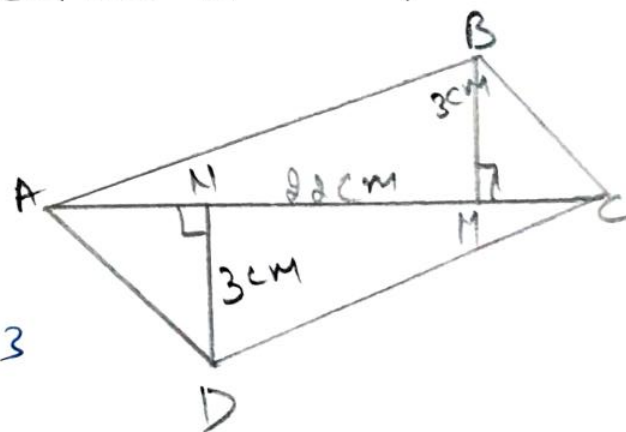
11 Q:- Find the area of the quadrilateral ABCD, Here
 $AC = 22 \text{ cm}$, $BM = 3 \text{ cm}$, $DN = 3 \text{ cm}$ and $BM \perp AC$, $DN \perp AC$

$$\begin{aligned} \text{Sol:- area of } \Delta ABC &= \frac{1}{2} \times b \times h \\ &= \frac{1}{2} \times 22 \times 3 = 33 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Similarly area of } \Delta ADC &= \frac{1}{2} \times 22 \times 3 \\ &= 33 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{area of quadrilateral ABCD} &= \text{area of } \Delta ABC + \text{area of } \Delta ADC \\ &= 33 + 33 = 66 \text{ cm}^2 \end{aligned}$$

Hence, The required area = 66 cm^2



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