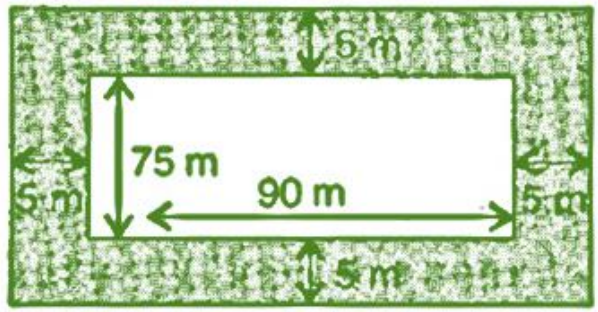
Exercise 11.4

Question 1:

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 hectares.

Answer 1:

Length of rectangular garden = 90 m and breadth of rectangular garden = 75 m
Outer length of rectangular garden with path = 90 + 5 + 5 = 100 m
Outer breadth of rectangular garden with path = 75 + 5 + 5 = 85 m



Outer area of rectangular garden with path = length x breadth = 100 x 85 = 8,500 m^2
Inner area of garden without path = length x breadth = 90 x 75 = 6,750 m^2
Now, Area of path = Area of garden with path – Area of garden without path
= 8,500 – 6,750
= 1,750 m^2

Since, $1\ m^2 = \frac{1}{10000}$ hectares

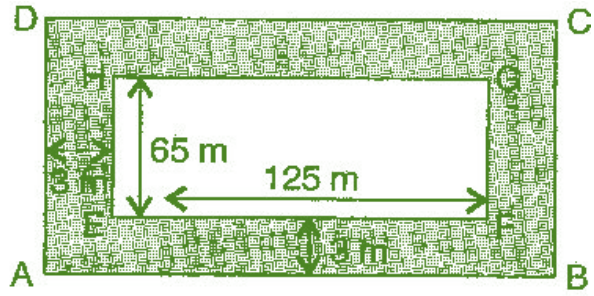
Therefore, $6{,}750\ m^2 = \frac{6750}{10000} = 0.675$ hectares

Question 2:

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

Answer 2:

Length of rectangular park = 125 m,
Breadth of rectangular park = 65 m and
Width of the path = 3 m
Length of rectangular park with path = 125 + 3 + 3 = 131 m
Breadth of rectangular park with path = 65 + 3 + 3 = 71 m



∴ Area of path = Area of park with path – Area of park without path
= (AB x AD) – (EF x EH)
= (131 x 71) – (125 x 65)
= 9301 – 8125
= 1,176 m^2

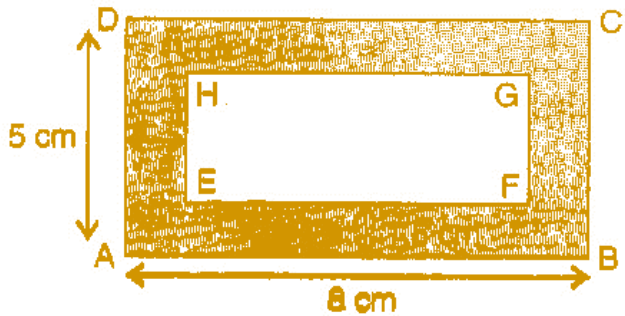
Thus, area of path around the park is 1,176 m^2.

Question 3:

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

Answer 3:

Length of painted cardboard = 8 cm and breadth of painted card = 5 cm
Since, there is a margin of 1.5 cm long from each of its side.
Therefore reduced length = 8 – (1.5 + 1.5) = 8 – 3 = 5 cm



And reduced breadth = 5 – (1.5 + 1.5) = 5 – 3 = 2 cm
∴ Area of margin = Area of cardboard (ABCD) – Area of cardboard (EFGH)
= (AB x AD) – (EF x EH)
= (8 x 5) – (5 x 2)
= 40 – 10
= 30 cm^2

Thus, the total area of margin is 30 cm^2.

Question 4:

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*.

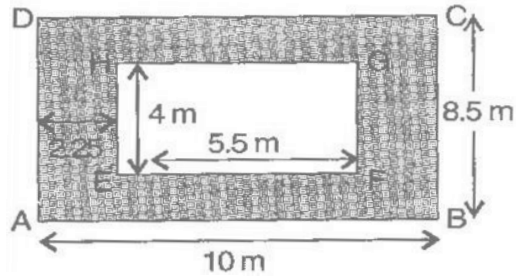
(ii) the cost of cementing the floor of the *verandah* at the rate of ₹200 per m^2.

Answer 4:

(i) The length of room = 5.5 m and width of the room = 4 m

The length of room with verandah = 5.5 + 2.25 + 2.25 = 10 m

The width of room with verandah = 4 + 2.25 + 2.25 = 8.5 m



Area of verandah

= Area of room with verandah – Area of room without verandah

= Area of ABCD – Area of EFGH

= (AB x AD) – (EF x EH)

= (10 x 8.5) – (5.5 x 4)

= 85 – 22

= 63 m^2

(ii) The cost of cementing 1 m^2 the floor of verandah = ₹ 200

The cost of cementing 63 m^2 the floor of verandah = 200 x 63 = ₹12,600

Question 5:

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

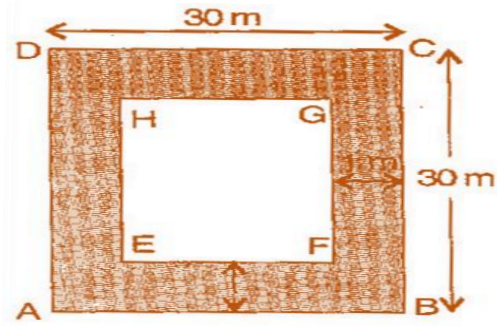
Answer 5:

(i) Side of the square garden = 30 m and

Width of the path along the border = 1 m

Side of square garden without path = 30 – (1 + 1) = 30 – 2 = 28 m

Now Area of path = Area of ABCD – Area of EFGH
= (AB x AD) – (EF x EH)
= (30 x 30) – (28 x 28)
= 900 – 784
= 116 m^2



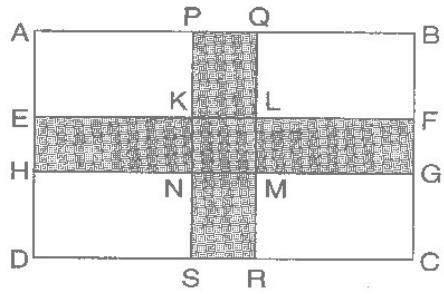
(ii) Area of remaining portion = 28 x 28 = 784 m^2
The cost of planting grass in 1 m^2 of the garden = ₹ 40
The cost of planting grass in 784 m^2 of the garden = ₹40 x 784 = ₹ 31,360

Question 6:

Two cross roads, each of width 10 m, cut at right angles through the centre of a rectangular park of length 700 m and breadth 300 m 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.

Answer 6:

Here, PQ = 10 m and PS = 300 m, EH = 10 m and EF = 700 m
And KL = 10 m and KN = 10 m



Area of roads = Area of PQRS + Area of EFGH – Area of KLMN
[∵ KLMN is taken twice, which is to be subtracted]
= PS x PQ + EF x EH – KL x KN

$= (300 \times 10) + (700 \times 10) - (10 \times 10)$
$= 3000 + 7000 - 100$
$= 9{,}900\ m^2$

Area of road in hectares, $1\ m^2 = \frac{1}{10000}$ hectares

$\therefore$ $9{,}900\ m^2 = \frac{9900}{10000} = 0.99$ hectares

Now, Area of park excluding cross roads
= Area of park – Area of road
= (AB x AD) – 9,900
= (700 x 300) – 9,900
= 2,10,000 – 9,900
= 2,00,100 m^2
$= \frac{200100}{10000}$ hectares = 20.01 hectares

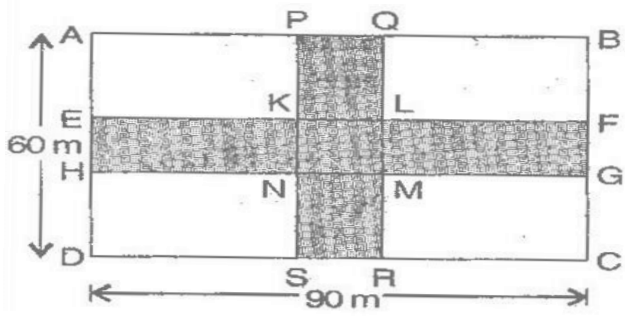
Question 7:

Through a rectangular 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:

(i) the area covered by the roads.
(ii) the cost of constructing the roads at the rate of ₹110 per m^2.

Answer 7:

(i) Here, PQ = 3 m and PS = 60 m, EH = 3 m and
EF = 90 m and KL = 3 m and KN = 3 m



Area of roads = Area of PQRS + Area of EFGH – Area of KLMN
[$\because$ KLMN is taken twice, which is to be subtracted]
= PS x PQ + EF x EH – KL x KN

= (60 x 3) + (90 x 3) – (3 x 3)
= 180 + 270 – 9
= 441 m^2

(ii) The cost of 1 m^2 constructing the roads = ₹110
The cost of 441 m^2 constructing the roads = ₹110 x 441 = ₹48,510
Therefore, the cost of constructing the roads = ₹48,510

Question 8:

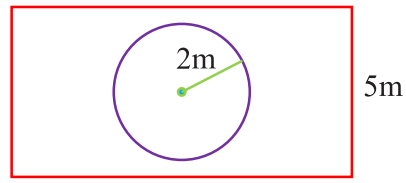
Pragya wrapped a cord around a circular pipe of radius 4 cm (adjoining figure) and cut off the length required of the cord. Then she wrapped it around a square box of side 4 cm (also shown). Did she have any cord left? (Take $\pi = 3.14$)

Answer 8:

Radius of pipe = 4 cm
Wrapping cord around circular pipe = $2\pi r$
= 2 x 3.14 x 4 = 25.12 cm
Again, wrapping cord around a square = 4 x side
= 4 x 4 = 16 cm
Remaining cord = Cord wrapped on pipe – Cord wrapped on square
= 25.12 – 16
= 9.12 cm
Thus, she has left 9.12 cm cord.

Question 9:

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



(i) the area of the whole land.
(ii) the area of the flower bed.
(iii) the area of the lawn excluding the area of the flower bed.
(iv) the circumference of the flower bed.

Answer 9:

Length of rectangular lawn = 10 m,
breadth of the rectangular lawn = 5 m
And radius of the circular flower bed = 2 m

(i) Area of the whole land = length x breadth
= 10 x 5 = 50 m^2

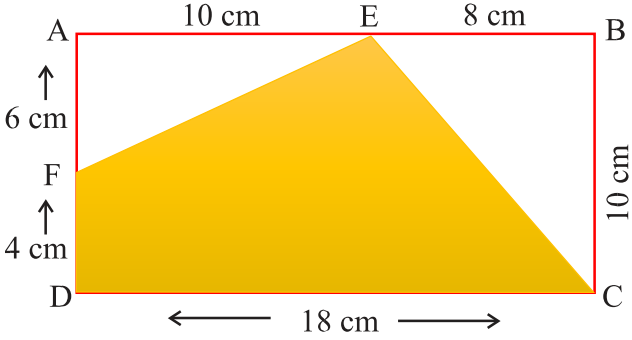
(ii) Area of flower bed = πr^2
= 3.14 x 2 x 2 = 12.56 m^2

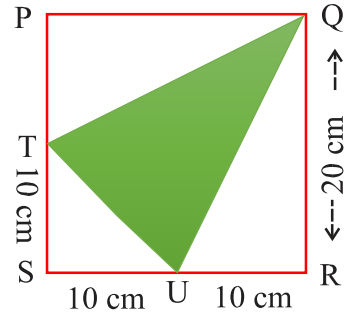
(iii) Area of lawn excluding the area of the flower bed
= area of lawn – area of flower bed
= 50 – 12.56
= 37.44 m^2

(iv) The circumference of the flower bed = $2\pi r$
= 2 x 3.14 x 2 = 12.56 m

Question 10:

In the following figures, find the area of the shaded portions:





Answer 10:

(i) Here, AB = 18 cm, BC = 10 cm, AF = 6 cm, AE = 10 cm and BE = 8 cm
Area of shaded portion
= Area of rectangle ABCD – (Area of ΔFAE + area of ΔEBC)

$= (AB \times BC) - (\frac{1}{2} \times AE \times AF + \frac{1}{2} \times BE \times BC)$

$= (18 \times 10) - (\frac{1}{2} \times 10 \times 6 + \frac{1}{2} \times 8 \times 10)$

= 180 – (30 + 40)
= 180 – 70
= 110 cm^2

(ii) Here, SR = SU + UR = 10 + 10 = 20 cm, QR = 20 cm
PQ = SR = 20 cm, PT = PS – TS = 20 – 10 cm
TS = 10 cm, SU = 10 cm, QR = 20 cm and UR = 10 cm
Area of shaded region
= Area of square PQRS – Area of ΔQPT – Area of ΔTSU – Area of ΔUQR

$= (SR \times QR) - \frac{1}{2} \times PQ \times PT - \frac{1}{2} \times ST \times SU - \frac{1}{2}$

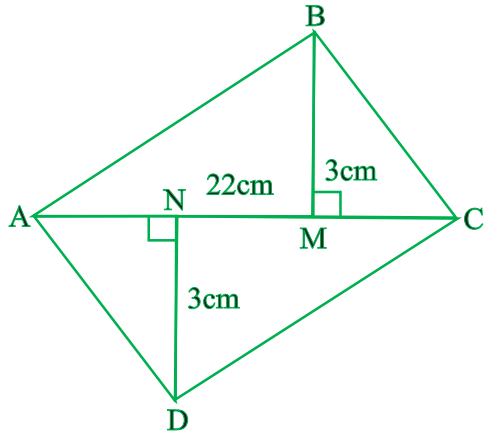
$= 20 \times 20 - \frac{1}{2} \times 20 \times 10 - \frac{1}{2} \times 10 \times 10 - \frac{1}{2} \times 20 \times 10$

$= 400 - 100 - 50 - 100$

$= 150\ cm^2$

Question 11:

Find the area of the equilateral ABCD. Here, AC = 22 cm, BM = 3 cm, DN = 3 cm and BM $\perp$ AC, DN $\perp$ AC.



Answer 11:

Here, AC = 22 cm, BM = 3 cm, DN = 3 cm
Area of quadrilateral ABCDF = Area of ΔABC + Area of ΔADC

$= \frac{1}{2} \times AC \times BM + \frac{1}{2} \times AC \times DN$

$= \frac{1}{2} \times 22 \times 3 + \frac{1}{2} \times 22 \times 3$

$= 3 \times 11 + 3 \times 11$

$= 33 + 33$

$= 66\ cm^2$

Thus, the area of quadrilateral ABCD is cm^2.