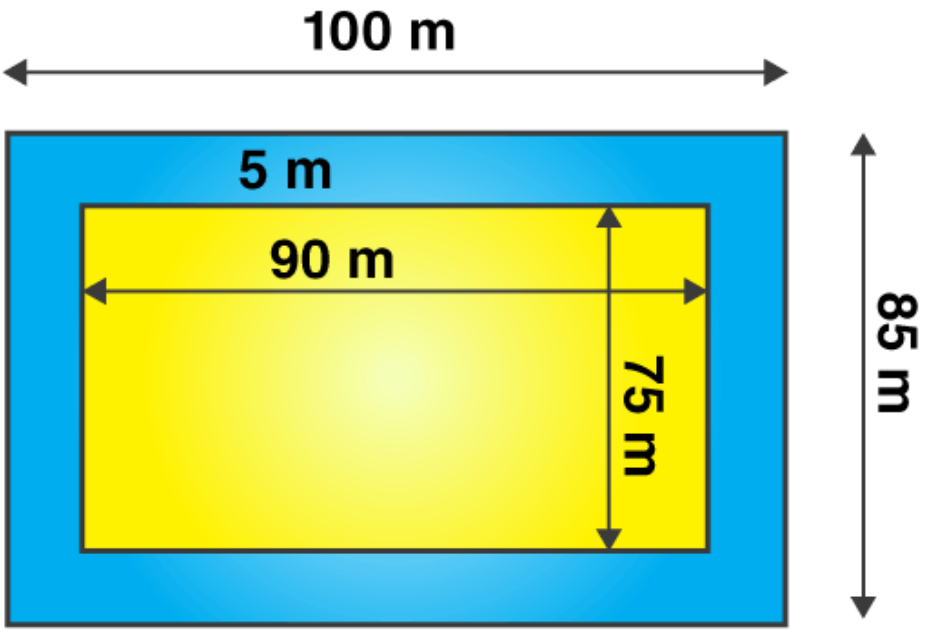
EXERCISE 11.4 PAGE: 226

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.

Solution:-



From the question, it is given that

Length of the garden (L) = 90 m

Breadth of the garden (B) = 75 m

Then,

Area of the garden = Length × Breadth

= 90 × 75

= 6750 m^2

From the figure,

The new length and breadth of the garden when the path is included are 100 m and 85 m, respectively.

New area of the garden = 100 × 85

= 8500 m^2

The area of path = New area of the garden including path – Area of garden

= 8500 – 6750

= 1750 m^2

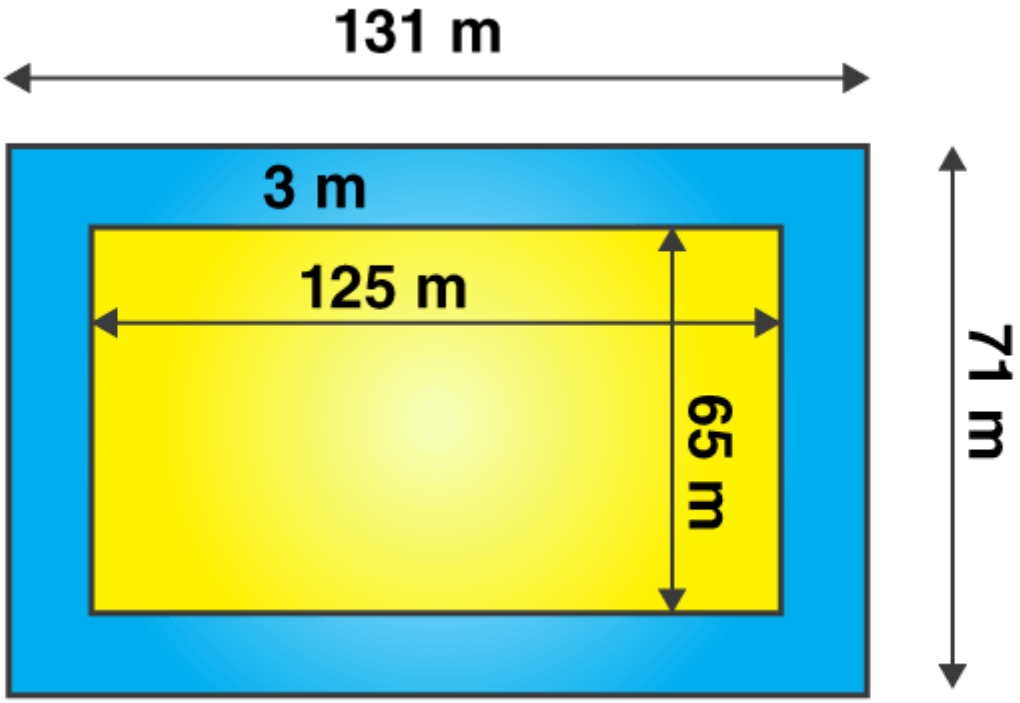
For 1 hectare = 10000 m^2

Hence, the area of the garden in hectares = 6750/10000

= 0.675 hectare

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.

Solution:-



From the question, it is given that

Length of the park (L) = 125 m

Breadth of the park (B) = 65 m

Then,

Area of the park = Length × Breadth

= 125 × 65

= 8125 m^2

From the figure,

The new length and breadth of the park when the path is included are 131 m and 71 m, respectively.

New area of the park = 131 × 71

= 9301 m^2

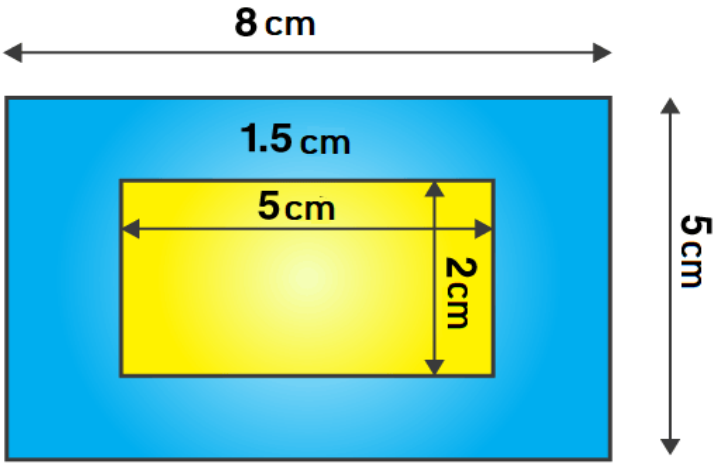
The area of path = New area of the park including path – Area of the park

= 9301 – 8125

= 1176 m^2

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.

Solution:-



From the question, it is given that

Length of the cardboard (L) = 8 cm

Breadth of the cardboard (B) = 5 cm

Then,

Area of the cardboard = Length × Breadth

= 8 × 5

= 40 cm^2

From the figure,

The new length and breadth of the cardboard when the margin is not included are 5 cm and 2 cm, respectively.

New area of the cardboard = 5 × 2

= 10 cm^2

The area of margin = Area of the cardboard when the margin is included – Area of the cardboard when the margin is not included

= 40 – 10

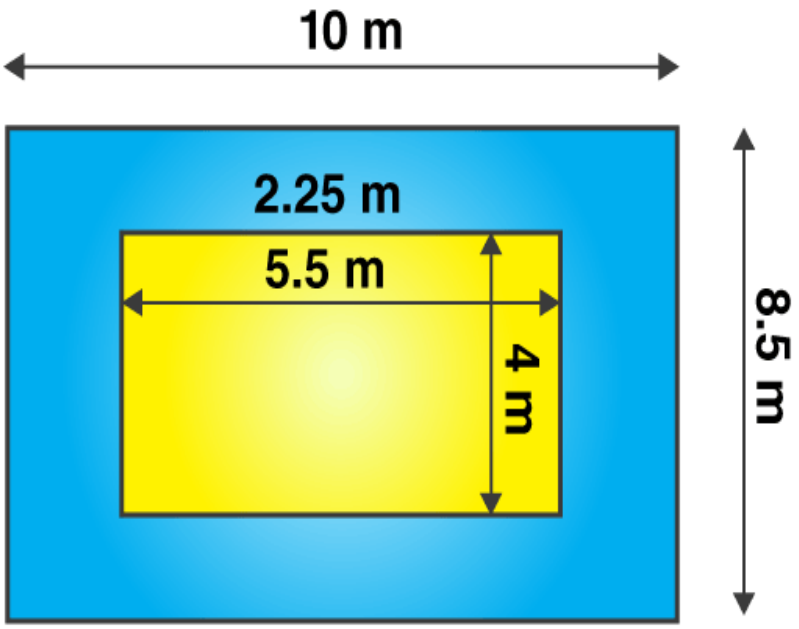
= 30 cm^2

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.

Solution:-



(i)

From the question, it is given that

Length of the room (L) = 5.5 m

Breadth of the room (B) = 4 m

Then,

Area of the room = Length × Breadth

= 5.5 × 4

= 22 m^2

From the figure,

The new length and breadth of the room when the verandah is included are 10 m and 8.5 m, respectively.

The new area of the room when the verandah is included = 10 × 8.5

= 85 m^2

The area of verandah = Area of the room when verandah is included – Area of the room

= 85 – 22

= 63 m^2

(ii)

Given, the cost of cementing the floor of the verandah at the rate of ₹ 200 per m^2

Then the cost of cementing the 63 m^2 area of floor of the verandah = 200 × 63

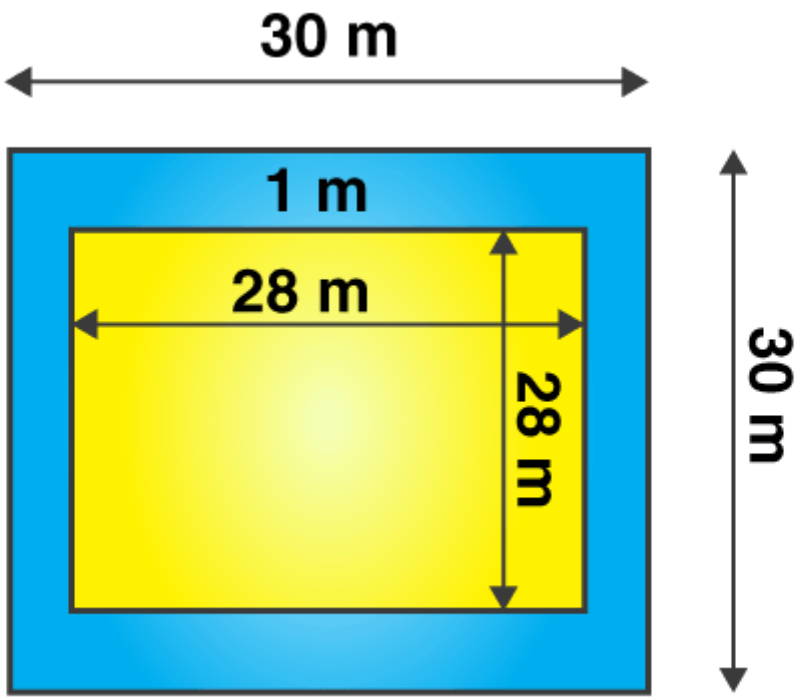
= ₹ 12600

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.

Solution:-



(i)

From the question, it is given that

Side of the square garden (s) = 30 m

Then,

Area of the square garden = S^2

= 30^2

= 30 × 30

= 900 m^2

From the figure,

The new side of the square garden, when the path is not included, is 28 m.

The new area of the room when the verandah is included = 28^2

= 28 × 28

= 784 m^2

The area of the path = Area of the square garden when the path is included – Area of the square garden when the path is not included

= 900 – 784

= 116 m^2

(ii)

Given, the cost of planting the grass in the remaining portion of the garden at the rate of

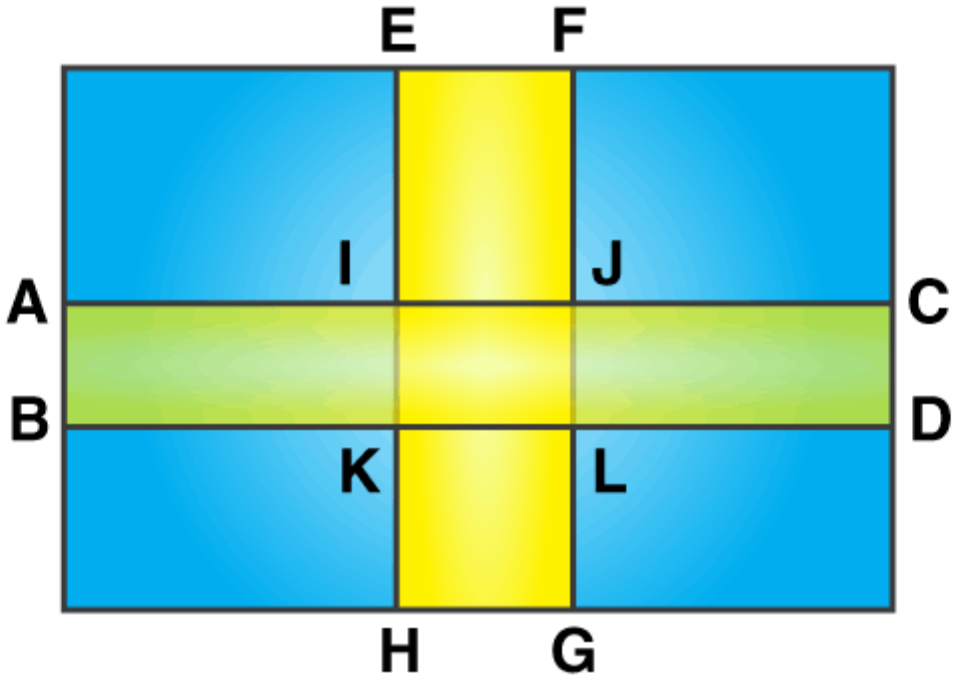
= ₹ 40 per m^2

Then the cost of planting the grass in 784 m^2 area of the garden = 784 × 40

= ₹ 31360

6. Two crossroads, 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 the crossroads. Give the answer in hectares.

Solution:-



From the question, it is given that

Length of the park (L) = 700 m

Breadth of the park (B) = 300 m

Then,

Area of the park = Length × Breadth

= 700 × 300

= 210000 m^2

Let us assume that ABCD is the one crossroad and EFGH is another crossroad in the park.

The length of ABCD cross road = 700 m

The length of EFGH cross road = 300 m

Both crossroads have the same width = 10 m

Then,

Area of the ABCD cross road = Length × Breadth

= 700 × 10

= 7000 m^2

Area of the EFGH cross road = Length × Breadth

= 300 × 10

= 3000 m^2

Area of the IJKL at centre = Length × Breadth

= 10 × 10

= 100 m^2

Area of the roads = Area of ABCD + Area of EFGH – Area of IJKL

= 7000 + 3000 – 100

= 10000 – 100

= 9900 m^2

We know that for 1 hectare = 10000 m^2

Hence, the area of roads in hectares = 9900/10000

= 0.99 hectare

Finally, the area of the park excluding roads = Area of the park – Area of the roads

= 210000 – 9900

= 200100 m^2

= 200100/10000

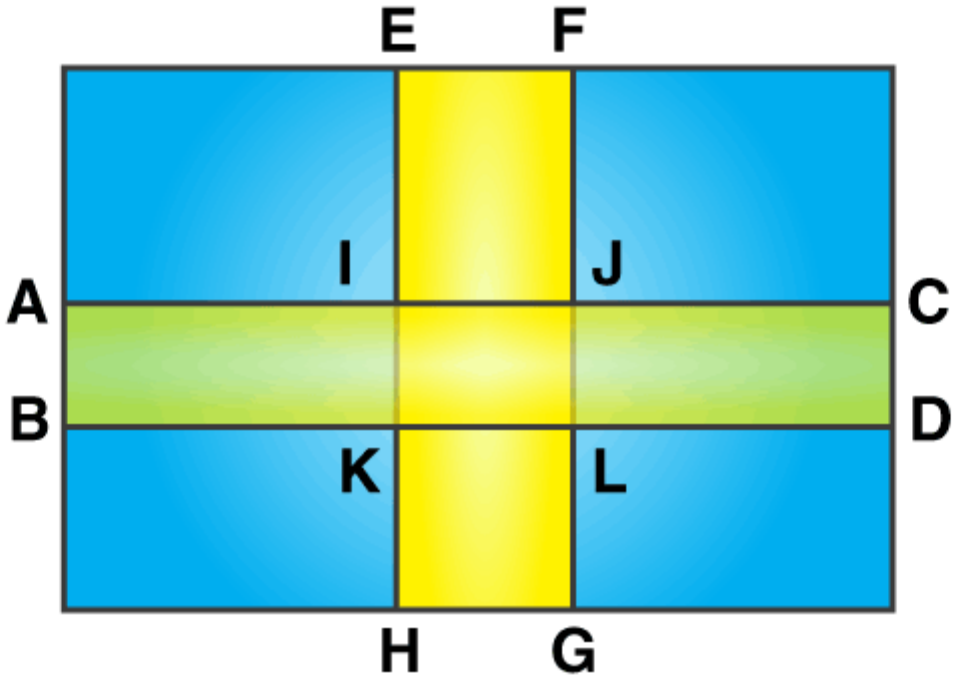
= 20.01 hectare

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.

Solution:-



(i)

From the question, it is given that

Length of the field (L) = 90 m

Breadth of the field (B) = 60 m

Then,

Area of the field = Length × Breadth

= 90 × 60

= 5400 m^2

Let us assume that ABCD is the one crossroad and EFGH is another crossroad in the park.

The length of ABCD cross road = 90 m

The length of EFGH cross road = 60 m

Both crossroads have the same width = 3 m

Then,

Area of the ABCD cross road = Length × Breadth

= 90 × 3

= 270 m^2

Area of the EFGH cross road = length × breadth

= 60 × 3

= 180 m^2

Area of the IJKL at centre = Length × Breadth

= 3 × 3

= 9 m^2

Area of the roads = Area of ABCD + Area of EFGH – Area of IJKL

= 270 + 180 – 9

= 450 – 9

= 441 m^2

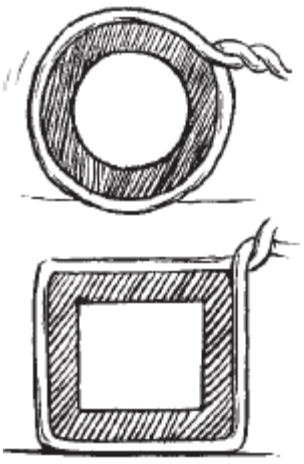
(ii)

Given, the cost of constructing the roads at the rate of ₹ 110 per m^2.

Then the cost of constructing the 441 m^2 roads = 441 × 110

= ₹ 48510

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 cords left? (π = 3.14)



Solution:-

From the question, it is given that

Radius of a circular pipe = 4 cm

Side of a square = 4 cm

Then,

Perimeter of the circular pipe = 2πr

= 2 × 3.14 × 4

= 25.12 cm

Perimeter of the square = 4 × Side of the square

= 4 × 4

= 16 cm

So, the length of cord left with Pragya = Perimeter of the circular pipe – Perimeter of the square

= 25.12 – 16

= 9.12 cm

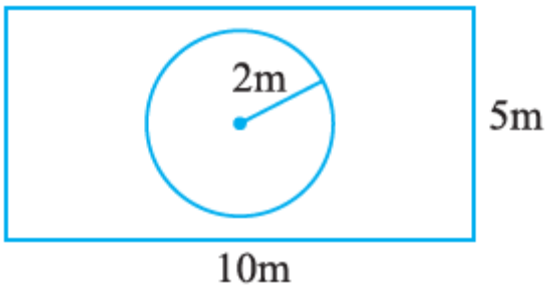
Yes, 9.12 cm cord is left.

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.



Solution:-

(i)

From the figure,

Length of rectangular lawn = 10 m

Breadth of rectangular lawn = 5 m

Area of the rectangular lawn = Length × Breadth

= 10 × 5

= 50 m^2

(ii)

From the figure,

Radius of the flower bed = 2 m

Area of the flower bed = πr^2

= 3.14 × 2^2

= 3.14 × 4

= 12.56 m^2

(iii)

The area of the lawn, excluding the area of the flower bed = Area of the rectangular lawn –

Area of the flower bed

= 50 – 12.56

= 37.44 m^2

(iv)

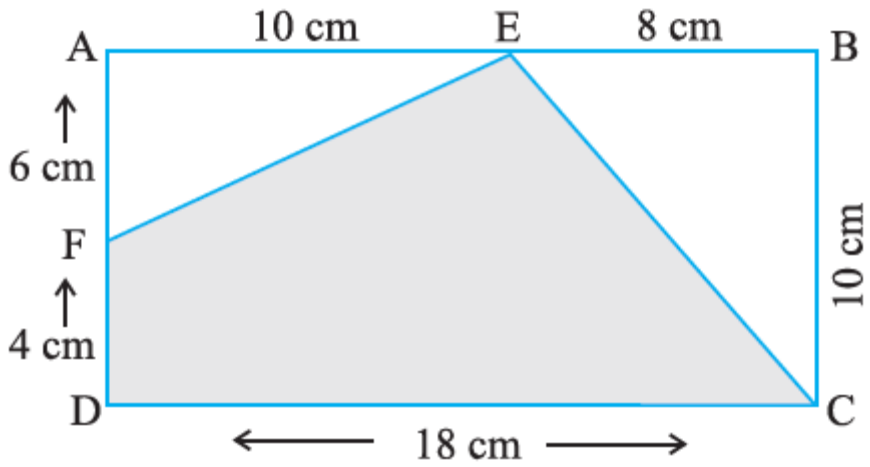
The circumference of the flower bed = 2πr

= 2 × 3.14 × 2

= 12.56 m

10. In the following figures, find the area of the shaded portions.

(i)



Solution:-

To find the area of EFDC, first, we have to find the area of ΔAEF, ΔEBC and rectangle ABCD.

Area of ΔAEF = ½ × Base × Height

= ½ × 6 × 10

= 1 × 3 × 10

= 30 cm^2

Area of ΔEBC = ½ × Base × Height

= ½ × 8 × 10

= 1 × 4 × 10

= 40 cm^2

Area of rectangle ABCD = Length × Breadth

= 18 × 10

= 180 cm^2

Then,

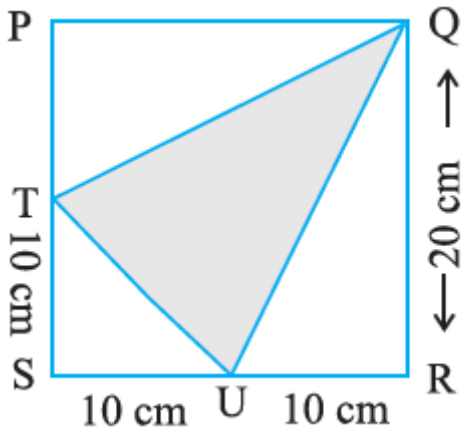
Area of EFDC = ABCD area – (ΔAEF + ΔEBC)

= 180 – (30 + 40)

= 180 – 70

= 110 cm^2

(ii)



Solution:-

To find the area of ΔQTU, first, we have to find the area of ΔSTU, ΔTPQ, ΔQRU and square PQRS.

Area of ΔSTU = ½ × Base × Height

= ½ × 10 × 10

= 1 × 5 × 10

= 50 cm^2

Area of ΔTPQ = ½ × Base × Height

= ½ × 10 × 20

= 1 × 5 × 20

= 100 cm^2

Area of ΔQRU = ½ × Base × Height

= ½ × 10 × 20

= 1 × 5 × 20

= 100 cm^2

Area of square PQRS = $Side^2$

= 20 × 20

= 400 cm^2

Then,

Area of ΔQTU = PQRS area – (ΔSTU + ΔTPQ + ΔQRU)

= 400 – (50 + 100 + 100)

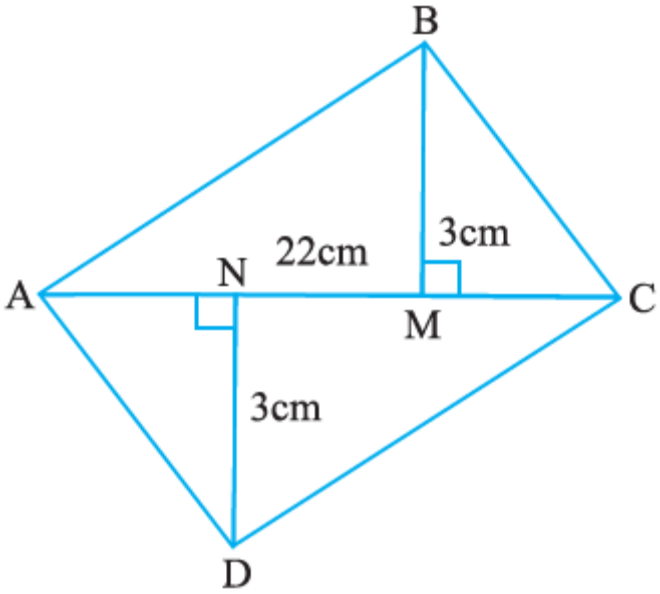
= 400 – 250

= 150 cm^2

11. Find the area of the quadrilateral ABCD.

Here, AC = 22 cm, BM = 3 cm,

DN = 3 cm, and BM ⊥ AC, DN ⊥ AC



Solution:-

From the question, it is given that

AC = 22 cm, BM = 3 cm DN = 3 cm and BM ⊥ AC, DN ⊥ AC

To find the area of quadrilateral ABCD, first, we have to find the area of ΔABC, and ΔADC Area of ΔABC = ½ × Base × Height

= ½ × 22 × 3

= 1 × 11 × 3

= 33 cm^2

Area of ΔADC = ½ × Base × Height

= ½ × 22 × 3

= 1 × 11 × 3

= 33 cm^2

Then,

Area of quadrilateral ABCD = Area of ΔABC + Area of ΔADC

= 33 + 33

= 66 cm^2