Question 1.

The length and breadth of a rectangular field are in the ratio 9 : 5. If the area of the field is 14580 square metres, find the cost of surrounding the field with a fence at the rate of ₹3·25 per metre.

Solution:

Let the length = 9x and the breadth = 5x

Area = l × b ⇒ 14580 = 9x × 5x

⇒ $45x^2 = 14580$

∴ $x^2 = \frac{14580}{45} = 324 \Rightarrow x = \sqrt{324}$

⇒ $x = \sqrt{18 \times 18}$

or x = 18

Length = 9 × 18 = 162 m

Breadth = 5 × 18 = 90 m

Perimeter = 2(l + b)

= 2 (162 + 90) = 2(252)

= 504 m.

∴ Cost for 504 m fencing the surrounding

at the rate of ₹3·25 per metre = ₹(504 × 3·25) = ₹1638

Question 2.

A rectangle is 16 m by 9 m. Find a side of the square whose area equals the area of the rectangle. By how much does the perimeter of the rectangle exceed the perimeter of the square?

Solution:

Area of rectangle = $(16 \times 9)\ m^2 = 144\ m^2$

Area of square = Area of rectangle (given)

∴ $(side)^2 = 144$

Side = $\sqrt{144} = \sqrt{12 \times 12}$ = 12 m

Perimeter of square = 4 × 12 = 48 m

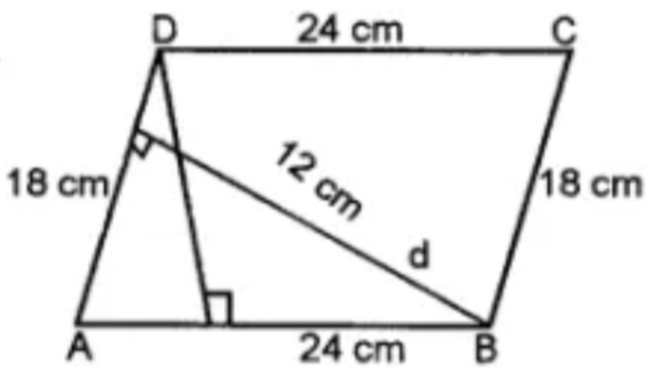
Perimeter of rectangle = 2(l + b) = 2 (16 + 9) = 50 m
Difference in their perimeters = 50 − 48 = 2 m

Question 3.

Two adjacent sides of a parallelogram are 24 cm and 18 cm. If the distance between longer sides is 12 cm, find the distance between shorter sides.

Solution:

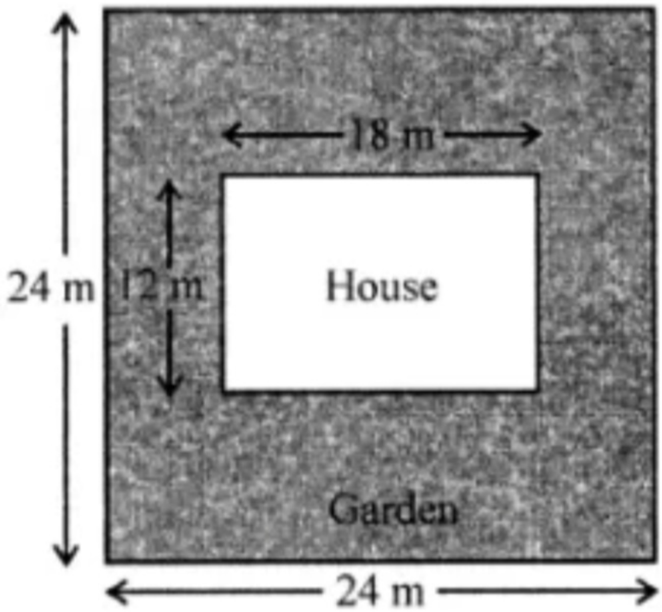
Taking 24 cm as a base of parallelogram, its height is 12 cm.



∴ Area of parallelogram = b × h = 24 × 12 = 288 cm^2
Let d cm be the distance between the shortest sides.
∴ Area of parallelogram = (18 × d) cm^2
⇒ 18 × d = 288
⇒ d = $\frac{288}{18}$ = 16 cm

Question 4.

Rajesh has a square plot with the measurement as shown in the given figure. He wants to construct a house in the middle of the plot. A garden is developed around the house. Find the total cost of developing a garden around the house at the rate of ₹50 per m^2.

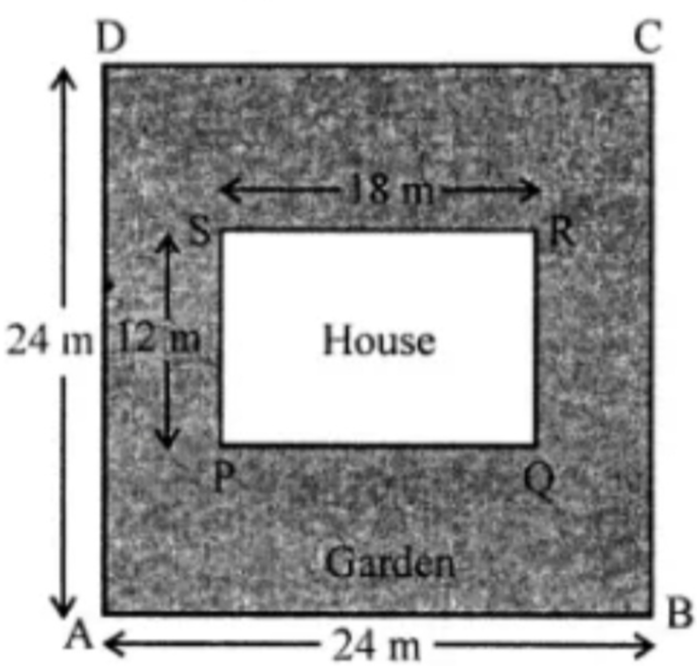


Solution:

Side of square plot = 24 m

Length of house (l) = 18 m

and breadth (b) = 12m



Now area of square plot = $(24)^2$ m^2 = 24 × 24 = 576 m^2

and area of hosue = 18 × 12 = 216 m^2

Remaining area of the garden = 576 − 216 = 360 m^2

Cost of developing the garden = ₹50 per m^2

Total cost = ₹50 × 360 = ₹18000

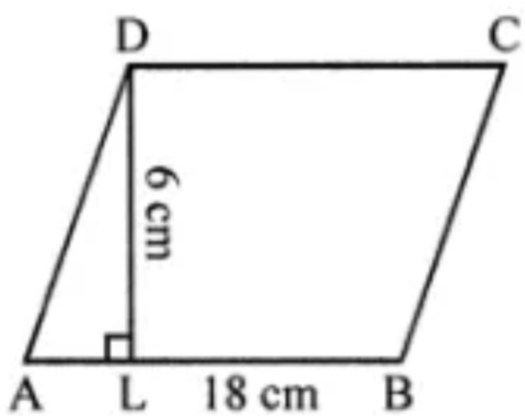
Question 5.

A flooring tile has a shape of a parallelogram whose base is 18 cm and the corresponding height is 6 cm. How many such tiles are required to cover a floor of area 540 m^2? (If required you can split the tiles in whatever way you want to fill up the comers).

Solution:

Base of the parallelogram–shaped flooring tile = 18 cm

and height = 6 cm



∴ Area of one tile = Base × Height = 18 × 6 = 108 cm^2

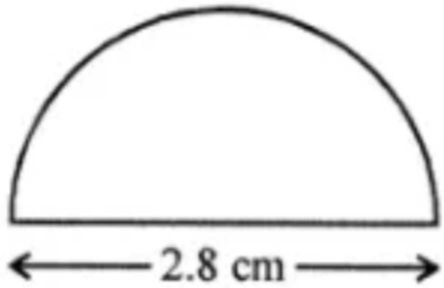
Area of floor = 540 m^2

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

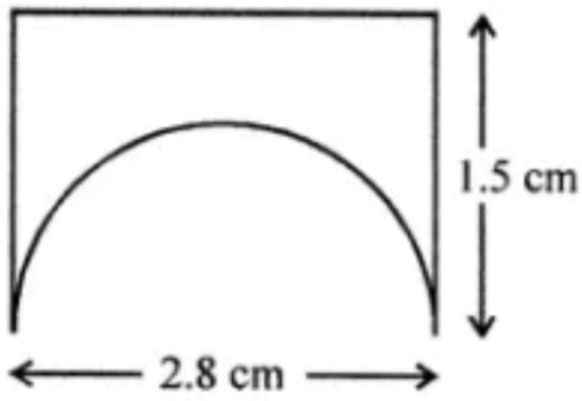
= $\frac{540 \times 100 \times 100}{108}$ = 50000

Question 6.

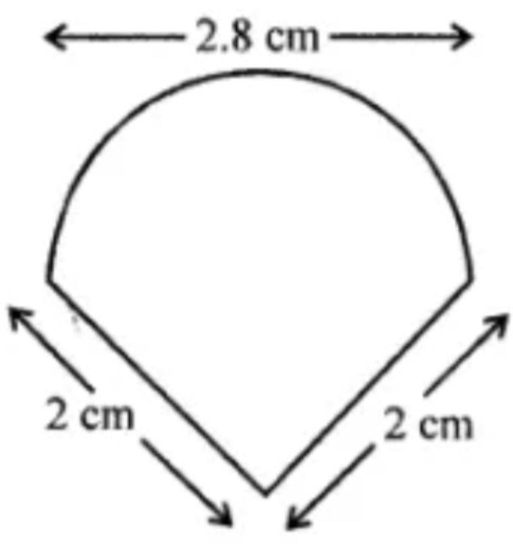
An ant is moving around a few food pieces of different shapes scattered on the floor. For which food piece would the ant have to take a longer round?



(a)



(b)



(c)

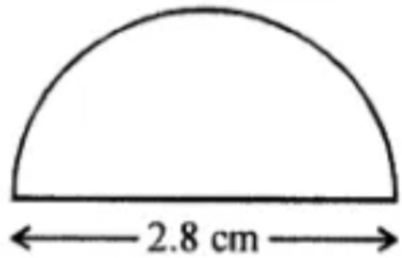
Solution:

(a) Diameter of semicircle = 2.8 cm

∴ Perimeter = $\pi r + 2r$

$= \frac{22}{7} \times 2.8 + 2 \times 2.8$

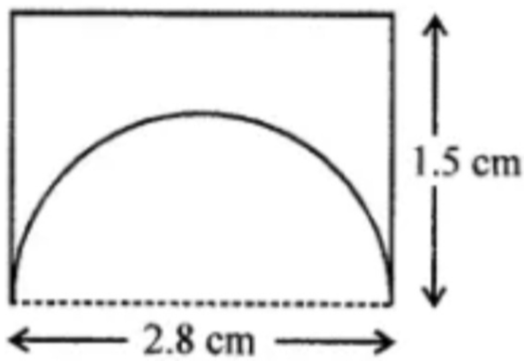
= 8.8 + 5.6 cm = 14.4 cm



(b) Total perimeters

= 1.5 + 1.5 + 2.8 + Semi circular

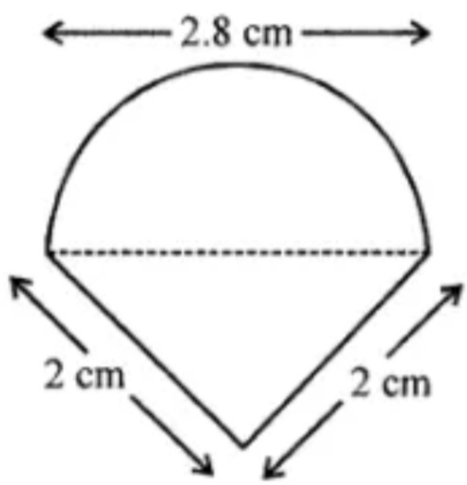
= 5.8 + 8.8 = 14.6 cm



(c) Total perimeter = 2 + 2 + Semi circumference

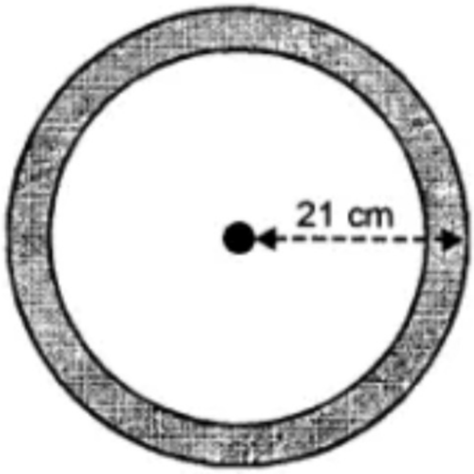
= 4 + 8.8 = 12.8 cm

It is clear that distance of (b) i.e. 14.6 is longer.



Question 7.

In the adjoining figure, the area enclosed between the concentric circles is 770 cm2. If the radius of the outer circle is 21 cm, calculate the radius of the inner circle.



Solution:

Radius of outer circle (R) = 21 cm.

radius of inner circle (r) = r cm.

Area of shaded portion = 770 cm^2

$\Rightarrow \pi (R^2 - r^2) = 770$

$\Rightarrow \frac{22}{7} (21^2 - r^2) = 770$

$\Rightarrow 441 - r^2 = 770 \times \frac{7}{22} = 35 \times 7 = 245$

$\Rightarrow r^2 = 441 - 245$

$\Rightarrow r^2 = 196$

$\Rightarrow r^2 = 196$

$\Rightarrow r = \sqrt{196} = \sqrt{14 \times 14}$

$\Rightarrow r = 14$ cm

Question 8.

A copper wire when bent in the form of a square encloses an area of 121 cm2. If the same wire is bent into the form of a circle, find the area of the circle.

Solution:

Area of the square = 121 cm^2

$\therefore$ Side = $\sqrt{121} = \sqrt{11 \times 11}$ = 11 cm

Perimeter = 4 a = 4 × 11= 44 cm

Now, circumference of the circle = 44 cm

$\therefore$ Radius = $\frac{44 \times 7}{2 \times 22}$ = 7cm

and area of the circle = $\pi r^2 = \frac{22}{7}(7)^2$

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

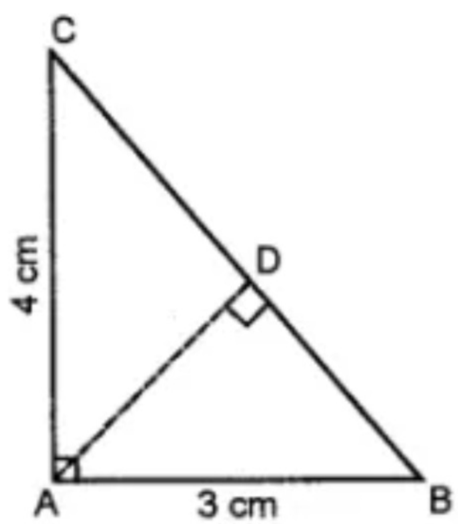
Question 9.

From the given figure, find

(i) the area of Δ ABC

(ii) length of BC

(iii) the length of altitude from A to BC



Solution:

(i) Base = 3 cm, height = 4 cm.

Area = $\frac{1}{2}$ × base × height

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

(ii) By pythagoras theorem,

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

$\therefore BC^2 = (3)^2 + (4)^2$

$= 9 + 16 = 25$

$\Rightarrow BC = \sqrt{25}$ cm = 5 cm

(iii) Now, Base = BC = 5 cm., h = AD = ?

Area = $\frac{1}{2} \times b \times h$

$\Rightarrow 6 = \frac{1}{2} \times 5 \times h$

[∵ Area = 6 cm^2 as in part (i)]

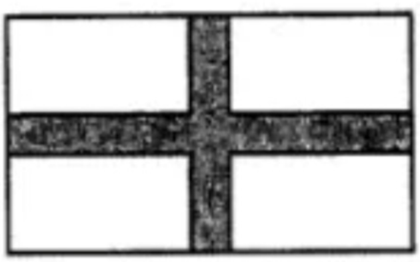
$\Rightarrow h = \frac{12}{5} = 2 \cdot 4$ cm.

Question 10.

A rectangular garden 80 m by 40 m is divided into four equal parts by two cross–paths 2.5 m wide. Find

(i) the area of the cross–paths.

(ii) the area of the unshaded portion.

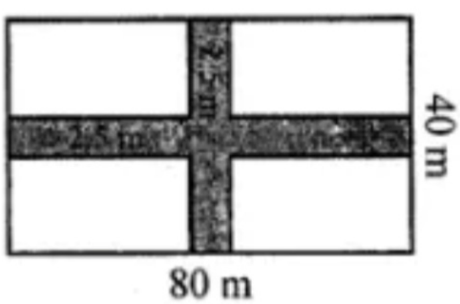


Solution:

Length of rectangular garden = 80 m

and breadth = 40 m

Width of crossing path 2.5 m



Area of length wise path

$= 80 \times 2.5 = 200\ m^2$

Area of breadth wise path

$= 40 \times 2.5 = 100\ m^2$

(i) Total area of both paths

$= 200 + 100 - 2.5 \times 2.5\ m^2$

$= 300 - 6.25 = 293.75\ m^2$

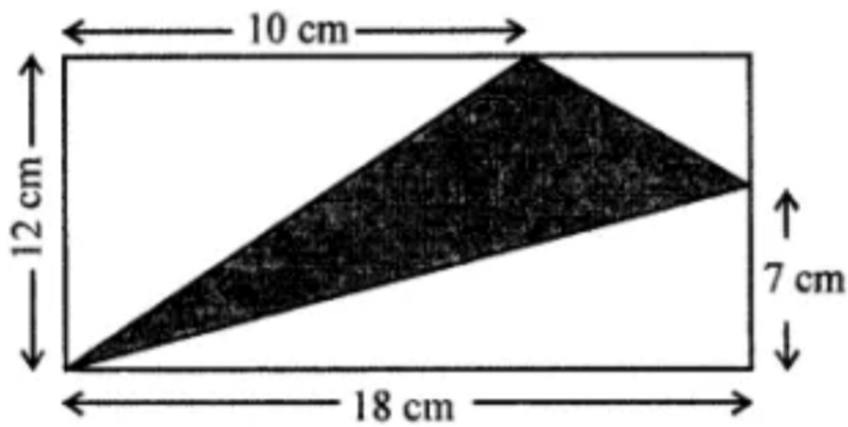
(ii) Area of unshaded portion

= Area of garden – Area of paths

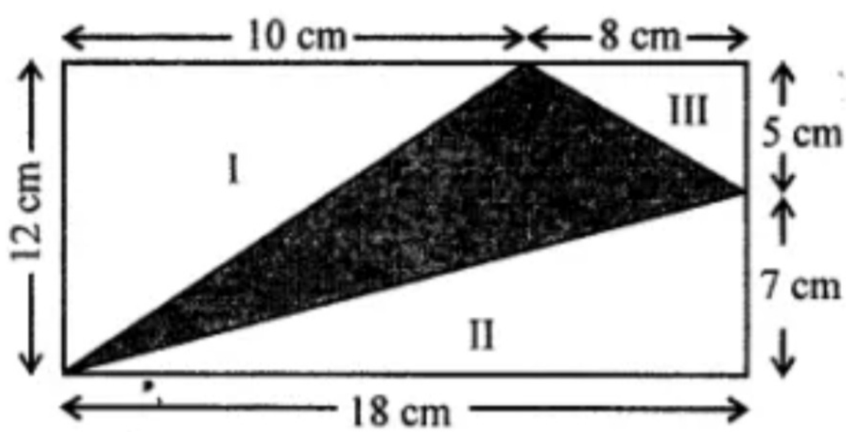
$= 80 \times 40 - 293.75\ m^2$

= $3200 - 293.75 \text{ m}^2$
= 2906.25 m^2

Question 11.
In the given figure, ABCD is a rectangle. Find the area of the shaded region.



Solution:
In the given figure.



Length of rectangle = 18 cm
and breadth = 12 cm
∴ Area = $l \times b = 18 \times 12 \text{ cm}^2 = 216 \text{ cm}^2$
Area of triangle I = $\frac{1}{2} \times 12 \times 10 = 60 \text{ cm}^2$
Area of triangle III = $\frac{1}{2} \times 18 \times 7 = 63 \text{ cm}^2$
∴ Area of shaded portion
= Area of rectangle – Area of 3 triangles
= $216 - (60 + 63 + 20)$
= 216 – 143 cm2

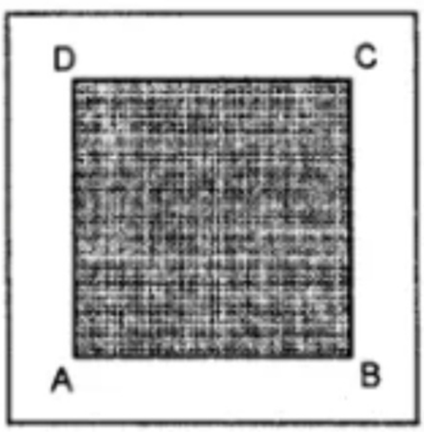
$= 73 \text{ cm}^2$

Question 12.

In the adjoining figure, ABCD is a square grassy lawn of area 729 m^2. A path of uniform width runs all around it. If the area of the path is 295 m^2, find

(i) the length of the boundary of the square field enclosing the lawn and the path.

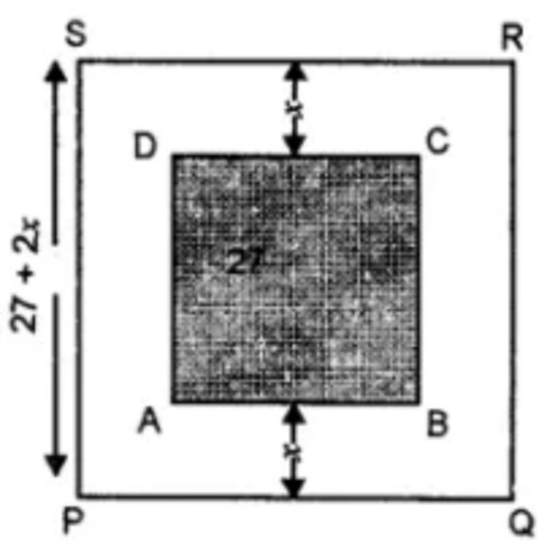
(ii) the width of the path.



Solution:

Area of square ABCD = 729 m^2

Side = $\sqrt{729} = \sqrt{27 \times 27}$ = 27 m



Let the width of path = x m

Then side of outer field = 27 + x + x = (27 + 2x) m

Area of square PQRS = $(27 + 2x)^2$ m^2

Area of PQRS – Area of ABCD = Area of path

$\therefore (27 + 2x)^2\ m^2 - 729\ m^2 = 295\ m^2$

$\Rightarrow 729 + 4x^2 + 108x - 729 = 295$

$\Rightarrow 4x^2 + 108x - 295 = 0$

$$\Rightarrow x = \frac{-108 \pm \sqrt{(108)^2 - 4 \times (4) \times (-295)}}{8}$$

$$\left(\because\ x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}\right)$$

$$= \frac{-108 \pm \sqrt{11664 + 4720}}{8}$$

$$= \frac{-108 \pm \sqrt{16384}}{8} = \frac{-108 \pm 128}{8}$$

$$= \frac{20}{8} = 2 \cdot 5$$

$\therefore$ Width of the path is 2.5 m

Now, side of square field PQRS

$= 27 + 2x = (27 + 2 \times 2 \cdot 5)\ m = 32\ m$

Length of boundary = 4 × side = 32 × 4 = 128