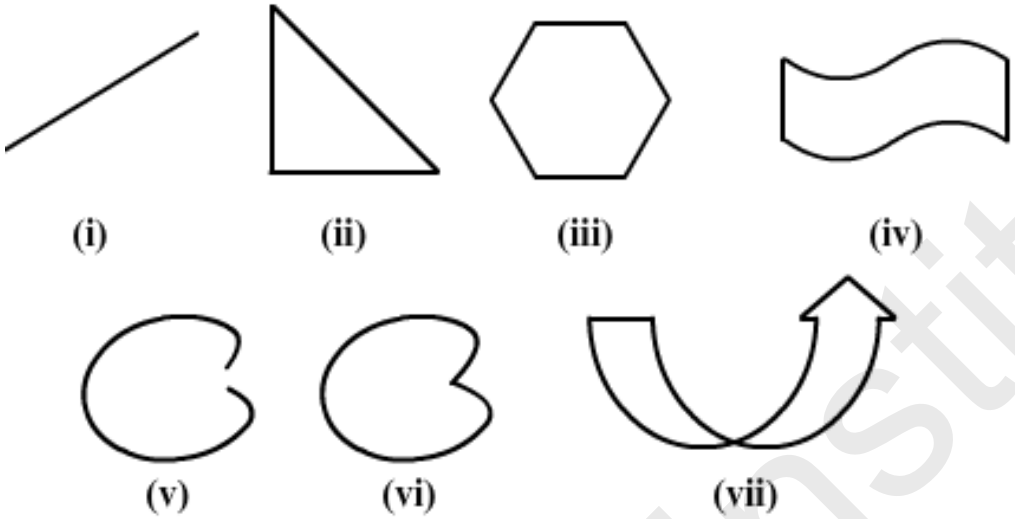
Mensuration

Exercise 20.1

Question: 1

Which of the following are closed curves? Which of them are simple?



Solution:

Figure (ii), (iii), (iv), (vi), and (vii) are closed curves, whereas Figure (ii), (iii), (iv) and (vi) are simple closed curves.

Question: 2

Define perimeter of a closed figure.

Solution:

The length of the boundary of a closed figure is known as its permieter.

Question: 3

Find the perimeter of each of the following shapes:

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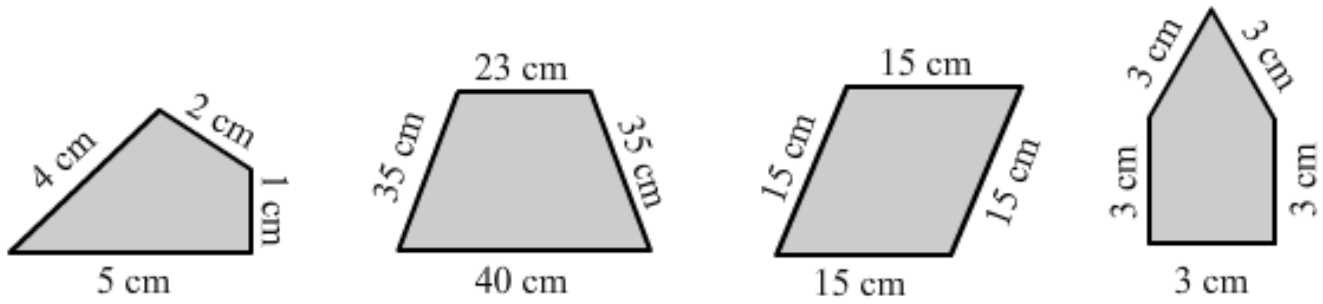

Solution:

Perimeter = Sum of lengths of all sides os a closed figure

(i) Perimeter = (4 + 2 + 1 + 5) cm = 12 cm

(ii) Perimeter = (23 + 35 + 40 + 35) cm = 133 cm

(iii) Perimeter = (15 + 15 + 15 + 15) cm = 60 cm

(iv) Perimeter = (3 + 3 + 3 + 3 + 3) cm = 15 cm

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Exercise 20.2

Question: 1

Find the perimeter of the rectangle whose lengths and breadths are given below:

(i) 7 cm, 5 cm

(ii) 5 cm, 4 cm

(iii) 7.5 cm, 4.5 cm

Solution:

(i) Perimeter of a rectangle = 2 × (Length + Breadth)

Since, Length = 7 cm, Breadth = 5 cm

Therefore, Perimeter = 2 × (7 + 5) = 2 × (12) = 24 cm

(ii) Perimeter of a rectangle = 2 × (Length + Breadth)

Since, Length = 5 cm, Breadth = 4 cm

Therefore, Perimeter = 2 × (5 + 4) = 2 × (9) = 18 cm

(iii) Perimeter of a rectangle = 2 × (Length + Breadth)

Since, Length = 7.5 cm, Breadth = 4.5 cm

Therefore, Perimeter = 2 × (7.5 + 4.5) = 2 × (12) = 24 cm

Question: 2

Find the perimeter of the squares whose sides are given below:

(i) 10 cm

(ii) 5 m

(iii) 115.5 cm

Solution:

Perimeter of a square = 4 × (Length of one side)

(i) Length of one side = 10 cm

Perimeter = 4 × 10 = 40 cm

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(ii) Length of one side = 5 m

Perimeter = 4 × 5 = 20 m

(iii) Length of one side = 115.5 cm

Perimeter = 4 × 115.5 = 462 cm

Question: 3

Find the side of the square whose perimeter is:

(i) 16 m

(ii) 40 cm

(iii) 22 cm

Solution:

Side of a square = Perimeter 4

(i) Perimeter = 16 m

Side of this square = 16/4 = 4 m

(ii) Perimeter = 40 cm

Side of this square = 40/4 = 10 cm

(iii) Perimeter = 22 cm

Side of this square = 22/4 = 5. 5 cm

Question: 4

Find the breadth of the rectangle whose perimeter is 360 cm and whose length is

(i) 116 cm

(ii) 140 cm

(iii) 102 cm

Solution:

Perimeter of a rectangle = 2 (Length + Breadth)

Therefore, Breadth of the rectangle = Perimeter/2 – Length

(i) Perimeter = 360 cm

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Length = 116 cm

Breadth = 360/2 – 116

= 180 – 116 = 64 cm

(ii) Perimeter = 360 cm

Length = 140 cm

Breadth = 360/2 – 140

= 180 -140 = 40 cm

(iii) Perimeter = 360 cm

Length = 10/2 cm

Breadth = 360/2 – 102 = 180 – 102 = 78 cm

Question: 5

A rectangular piece of lawn is 55 m wide and 98 m long. Find the length of the fence around it.

Solution:

Length of the lawn = 98 m

Breadth of the lawn = 55 m

Length of the fence around the lawn = Perimeter of the lawn = 2 × (Length + Breadth)

Perimeter of the lawn = 2 × (98 + 55) m = 2 × (153) = 306 m

Thus, the length of the fence around the lawn = 306 m

Question: 6

The side of a square field is 65m. What is the length of the fence required all around it?

Solution:

Side of the square field = 65 m

Length of the fence around the square field = Perimeter of the square field = 4 × (Side of the square)

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Perimeter of the square field = 4 × 65 = 260 m

Thus, the length of the fence around the square filed = 260 m

Question: 7

Two sides of a triangle are 15 cm and 20 cm. The perimeter of the triangles is 50 cm. What is the third side?

Solution:

Given: Perimeter = 50 cm

Length of the first side = 15 cm

Length of the second side = 20 cm

We have to find the length of the third side.

Perimeter of a triangle = Sum of all three sides of the triangle

Length of the third side = (Perimeter of the triangle) – (Sum of the length of the other two sides)

= 50 – (15 + 20)

= 50 – 35 = 15 cm

Question: 8

A wire of length 20 m is to be folded in the form of a rectangle. How many rectangles can be formed by folding the wire if the sides are positive integers in metres?

Solution:

It is given that a wire of length 20 m is to be folded in the form of a rectangle;

Therefore, we have: Perimeter of the rectangle = 20 m

⇒ 2 (Length + Breadth) = 20 m

⇒ (Length + Breadth) = 20/2 = 10 m

Since, length and breadth are positive integers in metres, therefore, the possible dimensions are: (1m, 9m), (2m, 8m), (3m, 7m), (4m, 6m) and (5m, 5m)

Thus, five rectangles can be formed with the given wire.

Question: 9

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A square piece of land has each side equal to 100 m. If 3 layers of metal wire have to be used to fence it, what is the length of the wire?

Solution:

Side of the square field = 100 m

Wire required to fence the square field = Perimeter of the square field = 4 × Side of the square field Perimeter = 4 × 100 = 400 m

This perimeter is the length of wire required to fence one layer.

Therefore, the length of wire required to fence three layers = 3 × 400 m = 1200 m

Question: 10

Shikha runs around a square of side 75 m. Priya runs around a rectangle with length 60 m and breadth 45 m. Who covers the smaller distance?

Solution:

Shikha and Priya, while running around the square and rectangular field respectively, actually cover a distance equal to the perimeters of these fields.

Distance covered by Shikha = Perimeter of the square = 4 × 75 m = 300 m

Similarly, distance covered by Priya = Perimeter of the rectangle = 2 × (60 + 45)

= 2 × 105 = 210 m

Thus, it is evident that the distance covered by Priya is less than that covered by Shikha.

Question: 11

The dimensions of a photographs are 30 cm X 20 cm. What length of wooden frame is needed to frame the picture?

Solution:

Dimensions of the photograph = 30 cm x 20 cm

So, the required length of wooden frame = Perimeter of the photograph

= 2 (Length + Breadth)

= 2 × (30 + 20) cm = 2 × 50 cm

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= 100 cm

Question: 12

The length of a rectangular field is 100 m. If its perimeter is 300 m, what is its breadth?

Solution:

Length of the rectangular field = 100 m

Perimeter of the rectangular field = 300 m

Perimeter of a rectangle = 2 (Length + Breadth)

Applying the above formula, we get:

Breadth of the rectangular field = Perimeter/2 – Length

= 300/2 – 100

= 150 – 100 = 50 m

Question: 13

To fix fence wires in a garden. 70 m long and 50 m wide, Arvind bought metal pipes for posts. He fixed a post every 5 metres apart; each post was 2 m long. What is total length og the pipers he bought for the posts?

Solution:

Length of the garden = 70 m

Breadth of the garden = 50 m

Perimeter of the garden = 2 × (Length + Breadth)

= 2 × (70 + 50)

= 2 × 120 = 240 m

On the perimeter of the garden, it is given that Arvind fixes a post every 5 metres apart.

So, the number of posts required =240/5 = 48

Since, Length of each post = 2 m

Therefore, Total length of the pipe required = 48 × 2 = 96 m

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Question: 14

Find the cost of fencing a rectangular park of length 175 m and breadth 125 m at the rate of Rs 12 per meter.

Solution:

Length of the park = 175 m

Breadth of the park = 125 m

Perimeter of the park = 2 × (Length + Breadth)

= 2 × (175 + 125)

= 2 × 300 = 600 m

Rate of fencing = Rs. 12 per meter

Cost of fencing = Rs. 12 × 600 = Rs. 7,200

Question: 15

The perimeter of a rectangular pentagon is 100 cm. How long is each side?

Solution:

A regular pentagon is a closed polygon having five sides of equal length.

Perimeter of the regular pentagon = 100 cm

Perimeter of the regular pentagon = 5 x Side of the regular pentagon

Therefore, side of the regular pentagon = Perimeter/5

= 100/5 = 20 cm

Question: 16

Find the perimeter of a regular hexagon with each side measuring 8 m.

Solution:

A regular hexagon is a closed polygon having six sides of equal lengths.

Side of the hexagon = 8 m

Perimeter of the hexagon = 6 × Side of the hexagon

= 6 × 8 = 48 m

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Question: 17

A rectangular piece of land measure 0.7 km by 0.5 km. Each side is to be fenced with four rows of wires. What length of the wire is needed?

Solution:

Dimensions of the rectangular land = 0.7 km x 0.5 km

Perimeter of the rectangular land = 2 (Length + Breadth)

= 2 (0.7 + 0.5) km

= 2 × 1.2 km = 2.4 km

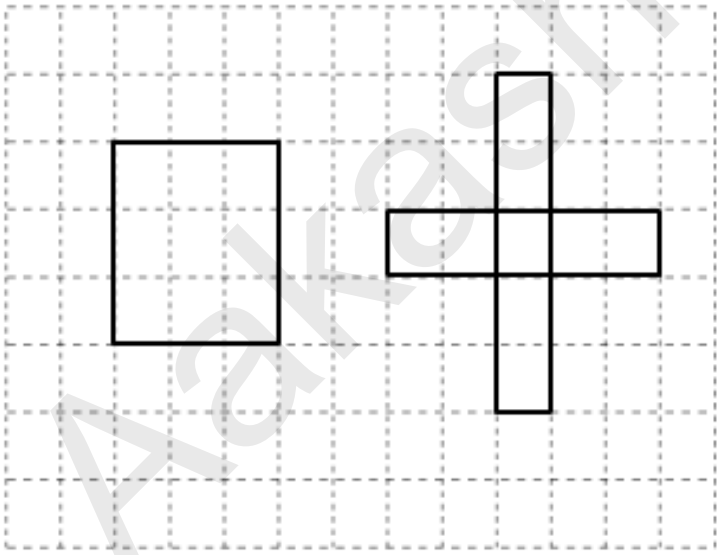
This perimeter is equal to one row of wire required to fence the land.

Therefore, length of wire required to fence the land with four rows of wire = 4 × 2.4 km

= 9.6 km

Question: 18

Avneet buys 9 square paving slabs, each with a side of ½ m. He lays them in the form of a square.



(i) What is the perimeter of his arrangement?

(ii) Shari does not like his arrangement. She gets him to lay them out like a cross. What is the perimeter of her arrangement?

(iii) Avneet wonders, if there is a way of getting an even greater perimeter. Can you find a way of doing this? (The paving slabs must meet along complete edges

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they cannot be broken)

Solution:

(i) Length of the side of one slab = 1/2 m

In the square arrangement, one side of the square is formed by three slabs.

So, length of the side of the square = 3 × 1/2 = 3/2 m

The perimeter of the square arrangement = 4 × 3/2 = 6 m

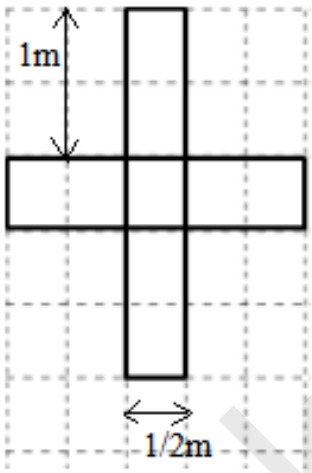
(ii) The cross arrangement consists of 8 sides.

These sides form the periphery of the arrangement and measure 1 m each.

Also, this arrangement consists of other 4 sides that measure 1/2 m each.

So, the perimeter of the cross arrangement = (1 + 1/2 + 1 + 1 + 1/2 + 1 + 1 + 1/2 + 1 + 1 + 1/2 + 1)

= (8 + 2) = 10 m



(iii) Perimeter of the cross arrangement = 10 m

Perimeter of the square arrangement = 6 m

Thus, the perimeter of the cross arrangement is more than that of the square arrangement.

(iv) No, there is no way of arranging these slabs where the perimeter is more than 10 m.

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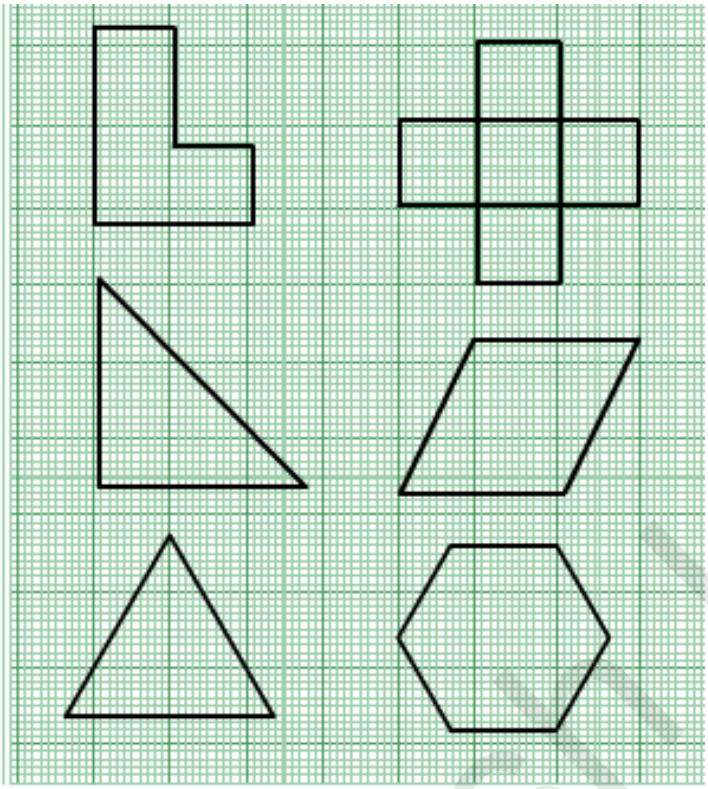
Exercise 20.3

Question: 1

The following figures are drawn on a squared paper. Count the number of squares enclosed by each figure and find its area, taking the area of each square as 1 cm^2.



Solution:

(i) There are 16 complete squares in the given shape.

Since, Area of one square = 1 cm^2

Therefore, Area of this shape = 16 × 1 = 16 cm^2

(ii) There are 36 complete squares in the given shape.

Since, Area of one square = 1 cm^2

Therefore, Area of 36 squares = 36 × 1 = 36 cm^2

(iii) There are 15 complete and 6 half squares in the given shape.

Since, Area of one square = 1 cm^2

Therefore, Area of this shape = (15 + 6 × 12) = 18 cm^2

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(iv) There are 20 complete and 8 half squares in the given shape.

Since, Area of one square = 1 cm^2

Therefore, Area of this shape = (20 + 8 × 12) = 24 cm^2

(v) There are 13 complete squares, 8 more than half squares and 7 less than half squares in the given shape.

Area of one square = 1 cm^2

Area of this shape = (13 + 8 × 1) = 21 cm^2

(vi) There are 8 complete squares, 6 more than half squares and 4 less than half squares in the given shape.

Area of one square = 1 cm^2

Area of this shape = (8 + 6 × 1) = 14 cm^2

Question: 2

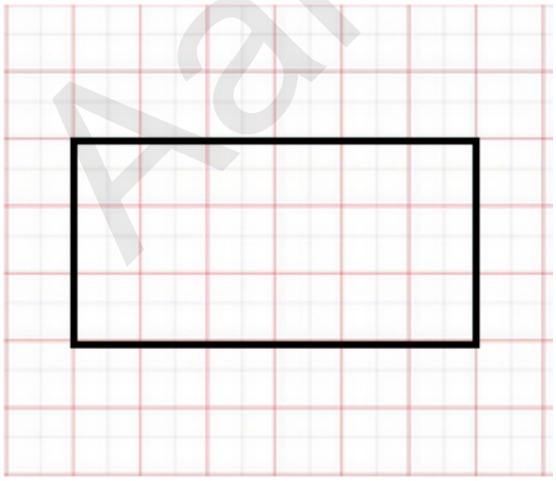
On a squared paper, draw (i) a rectangle, (ii) a triangle, (iii) any irregular closed figure, Find approximate area of each by counting the number of squares complete, more than half and exactly half.

Solution:

(i) A rectangle: This contains 18 complete squares.

If we assume that the area of one complete square is 1 cm^2,

Then the area o this rectangle will be 18 cm^2.



(ii) A triangle: This triangle contains 4 complete squares, 6 more than half squares and 6 less than half squares.

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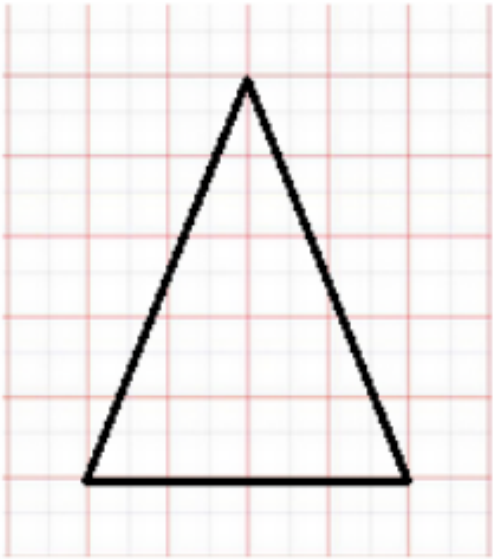
If we assume that the area of one complete square is 1 cm^2,

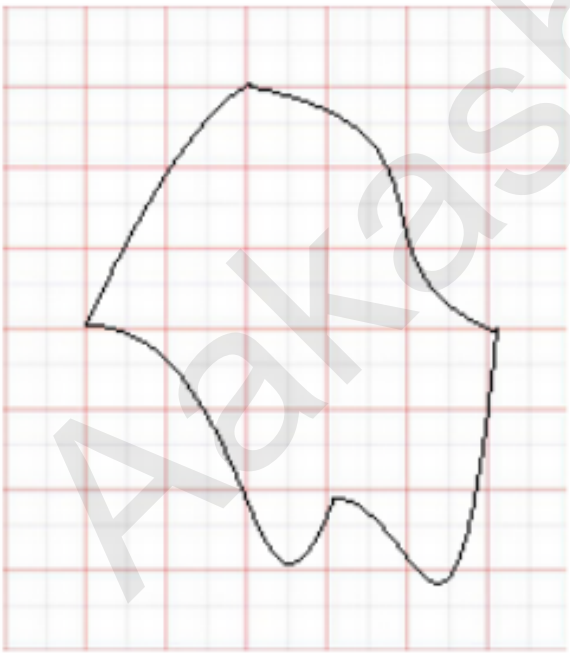
Then the area of this shape = (4 + 6 x 1) = 10 cm^2



(iii) Any irregular figure: This figure consists of 10 complete squares, 1 exactly half square, 7 more than half squares and 6 less than half squares.

If we assume that the area of one complete square is 1 cm^2,

Then the area of this shape = (10 + 1 x12 + 7 x 1) = 17.5 cm^2



Question: 3

Draw any circle on the graph paper, Count the squares and use them to estimate the area the area of the circular region.

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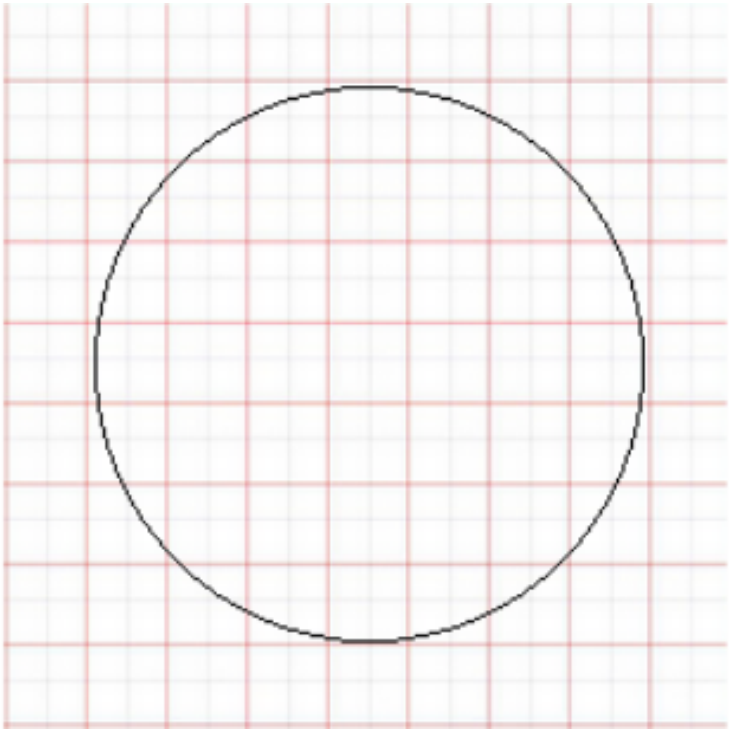
Solution:



This circle on the squared paper consists of 21 complete squares, 15 more than half squares and 8 less than half squares.

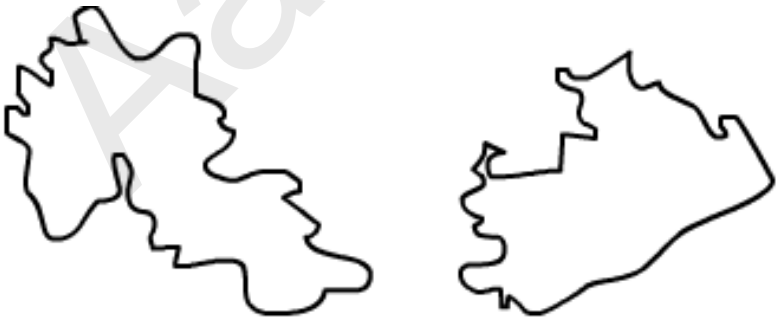
Let us assume that the area of 1 square is 1 cm^2.

If we neglect the less than half squares while approximating more than half square as equal to a complete square, we get:

Area of this shape = (21 + 15) = 36 cm^2

Question: 4

Using tracing paper and centimeter graph paper to compare the areas of the following pairs of figures:



Solution:

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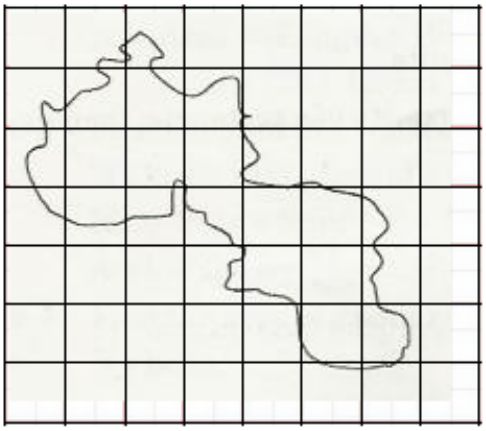
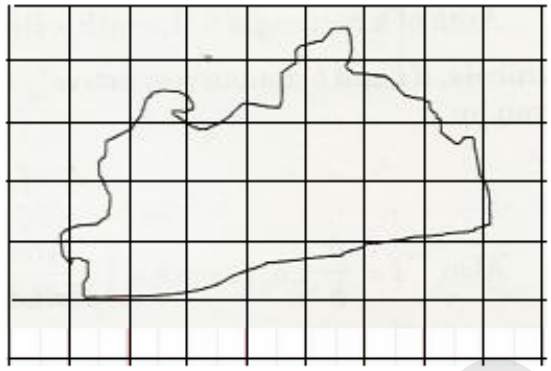


(i)



(ii)

Using tracing paper, we traced both the figures on a graph paper.

This figure contains 4 complete squares, 9 more than half squares and 9 less than half squares. Let us assume that the area of one square is 1 cm^2

If we neglect the less than half squares and consider the area of more than half squares as equal to area of complete square, we get:

Area of this shape = (4 + 9) = 13 cm^2

This figure contains 8 complete squares, 11 more than half squares and 10 less than half squares.

Let us assume that the area of one square is 1 cm^2.

If we neglect the less than half squares and consider the area of more than half squares as equal to area of complete square, we get:

Area of this shape = (8 + 11) = 19 cm^2

On comparing the areas of these two shapes, we get that the area of Fig. (ii) is more than that of Fig. (i).

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Exercise 20.4

Question: 1

Question 1. Find the area of a rectangle, whose

(i) Length = 6cm, breadth = 3 cm

(ii) Length = 8 cm, breadth = 3 cm

(iii) Length = 4.5 cm, breadth = 2 cm

Solution:

(i) Area of a rectangle = Length × Breadth

Length = 6 cm Breadth = 3 cm

Area of rectangle = 6 × 3 = 18 cm^2

(ii) Area of a rectangle = Length × Breadth

Length = 8 cm Breadth = 3 cm

Area of rectangle = 8 × 3 = 24 cm^2

(iii) Area of a rectangle = Length × Breadth

Length = 4.5 cm

Breadth = 2 cm

Area of rectangle = 4.5 × 2 = 9 cm^2

Question: 2

Find the area of a square whose side is:

(i) 5 cm

(ii) 4.1 cm

(iii) 5.5 cm

(iv) 2.6 cm

Solution:

Area of a square = Side × Side

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(i) Side of the square = 5 cm

Area of the square = 5 × 5 = 25 cm^2

(ii) Side of the square = 4.1 cm

Area of the square = 4.1 × 4.1 = 16.81 cm^2

(iii) Side of the square = 5.5 cm

Area of the square = 5.5 × 5.5 = 30.25 cm^2

(iv) Side of the square = 2.6 cm

Area of the square = 2.6 × 2.6 = 6.76 cm^2

Question: 3

The area of a rectangle is 49 cm^2 and its breadth is 2.8 cm. Find the length of the rectangle.

Solution:

Area = 49 cm^2 Breadth = 2.8 cm

Area of the rectangle = Length × Breadth

Therefore, Length = Area/Breadth

= 49/2.8 = 17.5 cm

Question: 4

The side of a square is 70 cm. Find its area and perimeter.

Solution:

Side of the square = 70 cm

Area of the square = Side × Side = 70 × 70 = 4900 cm^2

Perimeter of the square = 4 × Side

= 4 × 70 = 280 cm

Question: 5

The area of a rectangle is 225 cm^2 and its one side is 25 cm, find its other side.

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Solution:

Area = 225 cm^2

One of the sides = 25 cm

Area of the rectangle = Product of the lengths of its two side

Other side = Area/Side = 225/25 = 9 cm

Question: 6

What will happen to the area of a rectangle if its

(i) Length and breadth are trebled (ii) Length is doubled and breadth is same

(iii) Length is doubled

Solution:

(i) If the length and breadth of a rectangle are trebled.

Let the initial length and breadth be l and b, respectively.

Original area = $l \times b = lb$

Now,

the length and breadth are trebled which means they become three times of their original value.

Therefore New length = 3l

New breadth = 3b

New area = $3l \times 3b = 9lb$

Thus, the area of the rectangle will become 9 times that of its original area.

(ii) If the length is doubled and the breadth is same.

Let the initial length and breadth be l and b, respectively.

Original area = $l \times b = lb$

Now, length is doubled and breadth remains same.

Therefore New length = 2l

New breadth = b

New area = $2l \times b = 2\ lb$

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Thus, the area of the rectangle will become 2 times that of its original area.

(iii) If the Length is doubled and breadth is halved.

Let the initial length and breadth be land b, respectively.

Original area =l × b = lb

Now, length is doubled and breadth is halved.

Therefore New length = 2l

New breadth = b/2

New area = 2 l × b / 2 = lb

New area is also lb.

This means that the areas remain the same.

Question: 7

What will happen to the area of a square if its side is :

(i) Tripled

(ii) increased by half of it

Solution:

(i) Let the original side of the square be s.

Original area = s x s = s^2

If the side of a square is tripled, new side will be equal to 3s.

New area = 3s × 3s = $9s^2$

This means that the area becomes 9 times that of the original area.

(ii) Let the original side of the square be s.

Original area = s × s = s^2

If the side of a square is increased by half of it, new side $= \left(s + \frac{1}{2}s\right) = \frac{3}{2}s$

$$\text{New area} = \frac{3}{2}s \times \frac{3}{2}s = \frac{9}{4}s$$

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This means that the area becomes 9/4 times that of the original area.

Question: 8

Find the perimeter of a rectangle whose area is 500 cm^2 and breadth is 20 cm.

Solution:

Area = 500 cm^2

Breadth = 20 cm

Area of rectangle = Length × Breadth

Therefore Length = Area/Breadth

= 500/20 = 25 cm

Perimeter of a rectangle = 2 (Length + Breadth)

= 2(25 + 20) cm = 2 × 45 cm = 90 cm

Question: 9

A rectangle has the area equal to that of a square of side 80 cm. If the breadth of the rectangle is 20 cm, Find its length.

Solution:

Side of the square = 80 cm

Area of square = Side × Side = 80 × 80 = 6400 cm^2

Given that:

Area of the rectangle = Area of the square = 6400 cm^2

Breadth of the rectangle = 20 cm

Applying the formula:

Length of the rectangle = Area/Breadth

We get:

Length of the rectangle = 6400/20 = 320 cm

Question: 10

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Area of a rectangle of breadth 17 cm is 340 cm^2. Find the perimeter of the rectangle.

Solution:

Area of the rectangle = 340 cm^2

Breadth of the rectangle = 17 cm

Applying the formula:

Length of a rectangle = Area / Breadth

We get:

Length of the rectangle = 340/17 = 20 cm

Perimeter of rectangle = 2 (Length + Breadth)

= 2 (20 + 17)

= 2 × 37

= 74 cm

Question: 11

A marble tile measures 15 cm × 20cm. How many tiles will be required to cover a wall of size 4m × 6m?

Solution:

Dimensions of the tile = 15 cm × 20 cm

Dimensions of the wall = 4 m × 6 m = 400 cm × 600 cm (Since, 1 m = 100 cm)

Area of the tile = 15 cm × 20 cm = 300 cm^2

Area of the wall = 400 cm × 600 cm = 2, 40, 000 cm^2

$$\text{Number of tiles required to cover the wall} = \frac{\text{Area of wall}}{\text{Area of onetile}}$$

$$= \frac{240000}{300} = 800 \text{ tiles}$$

Question: 12

A marble tile measures 10 cm × 12 cm. How many tiles will be required to cover a wall of size 3m × 4m? Also, find the total cost of the tiles at the rate of Rs 2

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per tile.

Solution:

Dimension of the tile = 10 cm × 12 cm

Dimension of the wall =3 m × 4 m = 300 cm × 400 cm (Since, 1 m = 100 cm)

Area of the tile = 10 cm × 12 cm = 120 cm^2

Area of the wall = 300 cm × 400 cm = 1, 20, 000 cm^2

Number of tiles required to cover the wall = Area of wall / Area of one tile

= 120000/120 = 1,000 tiles

Cost of tiles at the rate of Rs. 2 per tile = 2 × 1,000 = Rs. 2,000

Question: 13

One tile of a square plot is 250 m, find the cost of leveling it at the rate of Rs 2 per square meter.

Solution:

Side of the square plot = 250 m

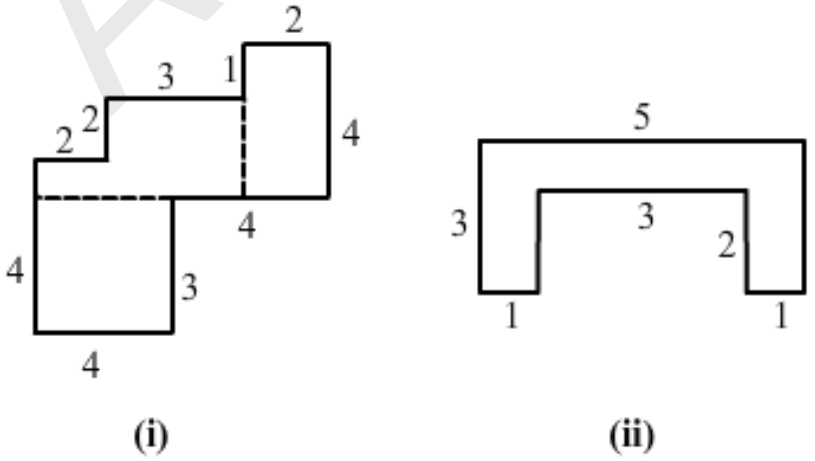
Area of the square plot = Side × Side = 250 × 250 = 62,500 m^2

Rate of leveling the plot = Rs. 2 per m^2

Cost of leveling the square plot = Rs. 62,500 × 2 = Rs. 1, 25, 000

Question: 14

The following figures have been split into rectangles. Find the areas. (The measures are given in centimeters)



(i) (ii)

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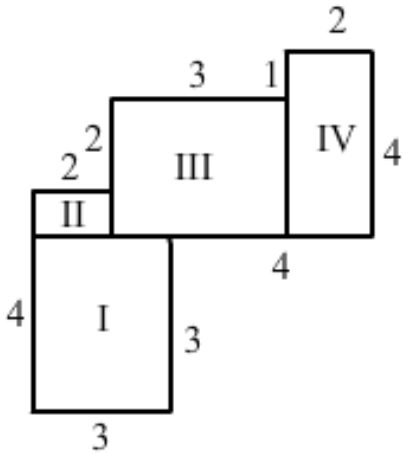
Solution:



(i) This figure consists of two rectangles II and IV and two squares I and III.

Area of square I = Side × Side = 3 × 3 = 9 cm=2

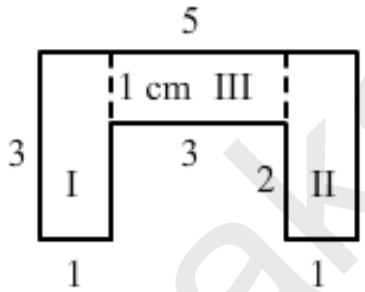
Similarity, area of rectangle II = (2 × 1) = 2 cm^2

Area of square III = (3 × 3) = 9 cm^2

Area of rectangle IV = (2 × 4) = 8 cm^2

Thus, the total area of this figure = (Area of square I + Area of rectangle II + Area of square III + Area of rectangle IV) = 9 + 2 + 9 + 8 = 28 cm^2

(ii) This figure consists of three rectangles I, II and Ill.



Area of rectangle I = Length × Breadth = 3 × 1 = 3 cm^2

Similarly, area of rectangle II = (3 × 1) = 3 cm^2

Area of rectangle III = (3 × 1) = 3 cm^2

Thus,

the total area of this figure = (Area of rectangle I + area of rectangle II + area of rectangle III)

= 3 + 3 + 3 = 9 cm^2

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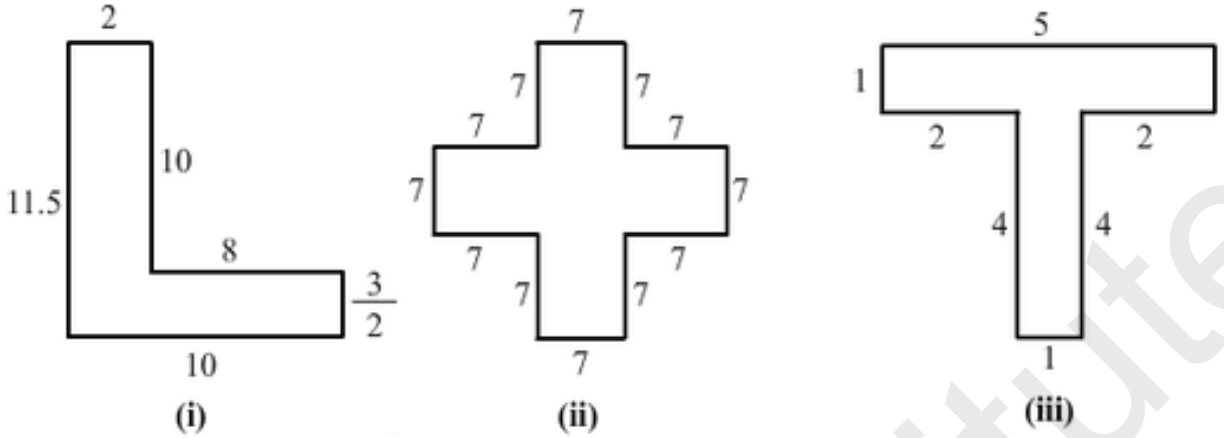
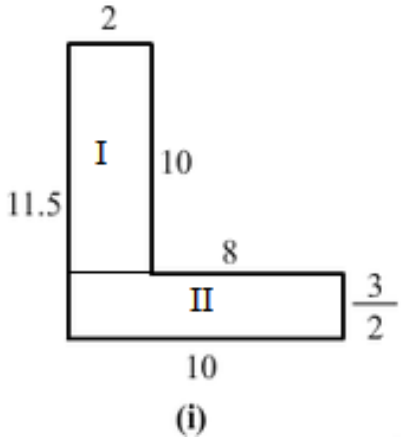
Question: 15

Split the following shapes into rectangles and find the area of each. (The measures are given in centimeters)





Solution:

(i) This figure consists of two rectangles I and II.

The area of rectangle I = Length × Breadth = 10 × 2 = 20 cm^2

Similarly, area of rectangle II = 10 × 32 = 15 cm^2

Thus, total area of this figure = (Area of rectangle I + Area of rectangle II) = 20 + 15 = 35 cm^2

(ii) This figure consists of two squares I and III and one rectangle II.

Area of square I = Area of square III = Side × Side = 7 × 7 = 49 cm^2

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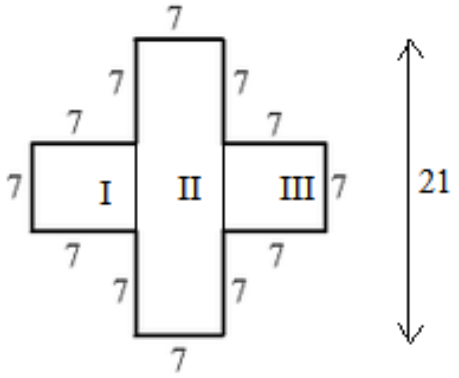


(ii)

Similarly, area of rectangle II = (21 × 7) = 147 cm^2

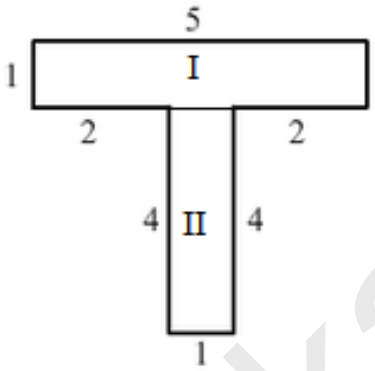
Thus, total area of this figure = (Area of square I + Area of rectangle II + Area of square III)

= 49 + 49 + 147 = 245 cm^2

(iii) This figure consists of two rectangles I and II.

Area of rectangle I = Length × Breadth = 5 × 1 = 5 cm^2

Similarly, area of rectangle II = 4 × 1 = 4 cm^2



(iii)

Thus, total area of this figure = (Area of rectangle I + Area of rectangle II) = 5 + 4 = 9 cm^2

Question: 16

How many tiles with dimension 5 cm and 12 cm will be needed to fit a region whose length and breadth are respectively?

(i) 100 cm and 144 cm

(ii) 70 cm and 36 cm

Solution:

(i) Dimension of the tile = 5 cm × 12 cm

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Dimension of the region = 100 cm × 144 cm

Area of the tile = 5 cm × 12 cm = 60 cm^2

Area of the region = 100 cm × 144 cm = 14,400 cm^2

Number of tiles required to cover the region = Area of the region / Area of one tile

= 14400/60 = 240 tiles

(ii) Dimension of the tile = 5 cm × 12 cm

Dimension of the region = 70 cm × 36 cm

Area of the tile = 5 cm × 12 cm = 60 cm^2

Area of the region = 70 cm × 36 cm = 2,520 cm^2

Number of tiles required to cover the region = Area of the region / Area of one tile

= 2520/42 = 42 tiles

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Exercise 20.5

Question: 1

The sides of a rectangle are in the ratio 5 : 4. If its perimeter is 72 cm, then its length is

(a) 40 cm

(b) 20 cm

(c) 30 cm

(d) 60 cm

Solution:

(b) 20 cm

Explanation:

Let the sides of the rectangle be 5x and 4x. (Since, they are in the ratio 5 : 4)

Now, perimeter of rectangle = 2 (Length + Breadth)

$72 = 2 (5x + 4x)$

$72 = 2 \times 9x$

$72 = 18x$

$x = 4$

Thus, the length of the rectangle = $5x = 5 \times 4 = 20$ cm

Question: 2

The cost of fencing a rectangular field 34 m long and 18 m wide at As 2.25 per metre is

(a) Rs 243

(b) Rs 234

(c) Rs 240

(d) Rs 334

Solution:

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(b) Rs. 234

Explanation:

For fencing the rectangular field, we need to find the perimeter of the rectangle.

Length of the rectangle = 34 m

Breadth of the rectangle = 18 m

Perimeter of the rectangle = 2 (Length + Breadth) = 2 (34 + 18) m = 2 × 52 m = 104 m

Cost of fencing the field at the rate of Rs. 2.25 per meter = Rs. 104 × 2.25 = Rs. 234

Question: 3

If the cost of fencing a rectangular field at Rs. 7.50 per metre is Rs. 600, and the length of the field is 24 m, then the breadth of the field is

(a) 8 m

(b) 18 m

(c) 24 m

(d) 16 m

Solution:

(d) 16 m

Explanation:

Cost of fencing the rectangular field = Rs. 600

Rate of fencing the field = Rs. 7.50 per m

Therefore, perimeter of the field = Cost of fencing / Rate of fencing = 600 / 7.50 = 80 m

Now, length of the field = 24 m

Therefore, breadth of the field = Perimeter/2 – Length = 80/2- 24 = 16 m

Question: 4

The cost of putting a fence around a square field at As 2.50 per metre is As 200. The length of each side of the field is

(a) 80 m

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(b) 40 m

(c) 20 m

(d) None of these

Solution:

(c) 20 m

Explanation:

Cost of fencing the square field = Rs. 200

Rate of fencing the field = Rs. 2.50

Now, perimeter of the square field = Cost of fencing / Rate of fencing = 200/2.50 = 80 m

Perimeter of square = 4 × Side of the square

Therefore, side of the square = Perimeter/4 = 80/4 = 20 m

Question: 5

The length of a rectangle is three times of its width. If the length of the diagonal is 8√10 m, then the perimeter of the rectangle is

(a) 15√10 m

(b) 16√10 m

(c) 24√10 m

(d) 64 m

Solution:

(d) 64 m

Explanation:

Let us consider a rectangle ABCD.

Also, let us assume that the width of the rectangle, i.e., BC be x m.

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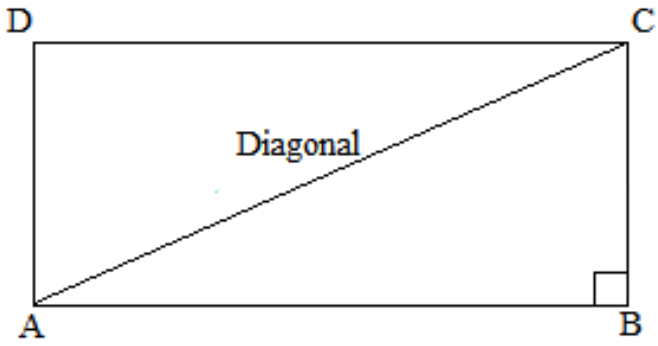

It is given that the length is three times width of the rectangle.

Therefore, length of the rectangle, i.e., AB = 3x m

Now, AC is the diagonal of rectangle.

In right angled triangle ABC.

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

$$\left(8\sqrt{10}\right)^2 = (3x)^2 + x^2$$

$640 = 9x^2 + x^2$

$640 = 10x^2$

$x^2 = 640/10 = 64$

x = 64 = 8 m

Thus, breadth of the rectangle = x = 8 m

Similarly, length of the rectangle = 3x = 3 × 8 = 24 m

Perimeter of the rectangle = 2 (Length + Breadth)

= 2 (24 + 8)

= 2 × 32 = 64 m

Question: 6

If a diagonal of a rectangle is thrice its smaller side, then its length and breadth are in the ratio

(a) 3:1

(b) √3:1

(c) √2:1

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(d) 2√2:1

Solution:

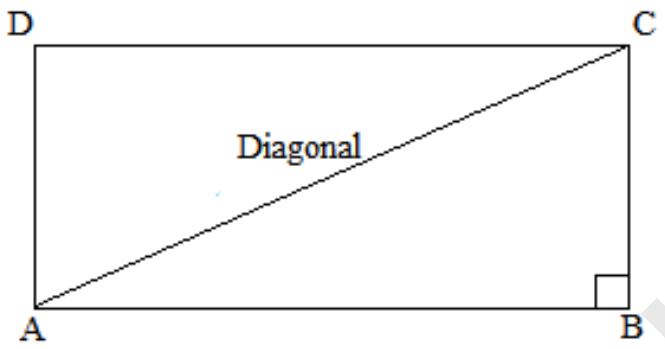
(d) 22 : 1

Explanation:

Let us assume that the length of the smaller side of the rectangle, i.e., BC be x and length of the larger side , i.e., AB be y.

It is given that the length of the diagonal is three times that of the smaller side.

Therefore, diagonal = 3x = AC



Now, applying Pythagoras theorem, we get:

$(\text{Diagonal})^2 = (\text{Smaller side})^2 + (\text{Larger side})^2$

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

$(3x)^2 = (x)^2 + (y)^2$

$9x^2 = x^2 + y^2$

$8x^2 = y^2$

Now, taking square roots of both sides, we get:

22 x = y

or, y / x = 22 / 1

Thus, the ratio of the larger side to the smaller side = 22 : 1

Question: 7

The ratio of the areas of two squares, one having its diagonal double than the other, is

(a) 1 : 2

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(b) 2:3

(c) 3 : 1

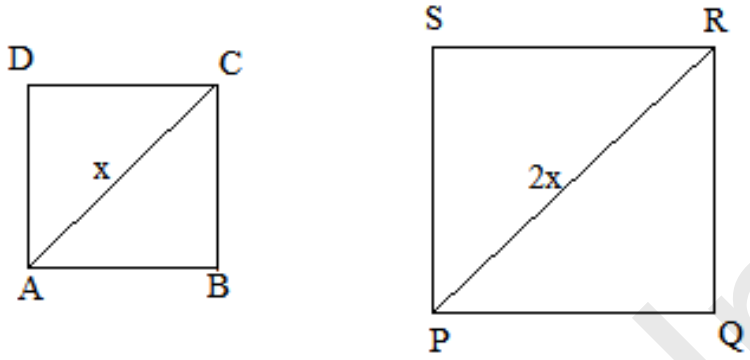
(d) 4 : 1

Solution:

(d) 4 : 1

Explanation:

Let the two squares be ABCD and PQRS. Further, the diagonal of square PQRS is twice the diagonal of square ABCD



PR = 2 AC

Now, area of the square = $(\text{diagonal})^2/2$

Area of PQRS = $(PR)^2)/2$

Similarly, area of ABCD = $(AC)^2/2$

According to the question:

If AC = x units, then, PR = 2x units

$$\text{Therefore,} \quad \frac{\text{Area of PQRS}}{\text{Area of ABCD}} = \frac{(PR)^2 \times 2}{2 \times (AC)^2} = \frac{(PR)^2}{(AC)^2} = \frac{(2x)^2}{(1x)^2} = \frac{4}{1} = 4 : 1$$

Thus, the ratio of the areas of squares PQRS and ABCD = 4:1

Question: 8

If the ratio of areas of two squares is 225:256, then the ratio of their perimeters is

(a) 225 : 256

(b) 256 : 225

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(c) 15:16

(d) 16 : 15

Solution:

(c) 15 : 16

Explanation:

Let the two squares be ABCD and PQRS.

Further, let the lengths of each side of ABCD and PQRS be x and y, respectively.

Therefore Area of sq. ABCD / Area of sq. PQRS = x^2 / y^2

$\Rightarrow x^2/y^2 = 225 / 256$

Taking square roots on both sides, we get:

$x/y = 15/16$

Now, the ratio of their perimeters:

Perimeter of sq. ABCD / Perimeter of sq. PQRS

= 4 × side of sq. ABCD / 4 × Side of sq. PQRS = 4x / 4y

Perimeter of sq. ABCD / Perimeter of sq. PQRS = x y

Perimeter of sq. ABCD / Perimeter of sq. PQRS = 15 / 16

Thus, the ratio of their perimeters = 15:16

Question: 9

If the sides of a square are halved, then its area

(a) remains same

(b) becomes half

(c) becomes one fourth

(d) becomes double

Solution:

(c) becomes one fourth

Explanation:

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Let the side of the square be x.

Then, area = (Side × Side) = (x × x) = x^2

If the sides are halved, new side = x/2

Now, new area = $(x/2)^2$

= $(x^2)/4$

It is clearly visible that the area has become one-fourth of its previous value.

Question: 10

A rectangular carpet has area 120 m^2 and perimeter 46 metres. The length of its diagonal is

(a) 15 m

(b) 16 m

(c) 17 m

(d) 20 m

Solution:

(c) 17 m

Explanation:

Area of the rectangle = 120 m^2

Perimeter = 46 m

Let the sides of the rectangle be l and b.

Therefore

Area = lb = 120 m^2 …(1)

Perimeter = 2 (l + b) = 46

Or, (l + b) = 46 / 2 =23 m …(2)

Now, length of the diagonal of the rectangle = $l^2 + b^2$

So, we first find the value of $(l^2 + b^2)$

Using identity:

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$(l^2 + b^2) = (l + b)^2 - 2\ (lb)$ [From (1) and (2)]

Therefore

$(l^2 + b^2) = (23)^2 - 2\ (120)$

$= 529 - 240 = 289$

Thus, length of the diagonal of the rectangle = $l^2 + b^2 = 289 = 17$ m

Question: 11

If the ratio between the length and the perimeter of a rectangular plot is 1: 3, then the ratio between the length and breadth of the plot is

(a) 1 : 2

(b) 2 : 1

(c) 3 : 2

(d) 2 : 3

Solution:

(b) 2 : 1

Explanation:

It is given that Length of rectangle / Perimeter of rectangle = 1 / 3

$\Rightarrow l/(2l + 2b) = 1 / 3$

After cross multiplying, we get:

$3l = 2l + 2b$

$\Rightarrow l = 2b$

$\Rightarrow l / b = 2 / 1$

Thus, the ratio of the length and the breadth is 2: 1.

Question: 12

If the length of the diagonal of a square is 20 cm, then its perimeter is

(a) $10\sqrt{2}$ cm

(b) 40 cm

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(c) 40√2 cm

(d) 200 cm

Solution:

(c) 40√2 cm

Explanation:

Length of diagonal = 20 cm

$$\text{Length of diagonal} = 20 \text{ cm}$$

$$\text{Length of side of a square} = \frac{\text{Length of diagonal}}{\sqrt{2}}$$

$$= \frac{20}{\sqrt{2}}$$

$$= \frac{10}{\sqrt{2}}$$

Therefore, perimeter of the square is $4 \times \text{side} = 4 \times 10\sqrt{2}$ cm

$= 40\sqrt{2}$ cm

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