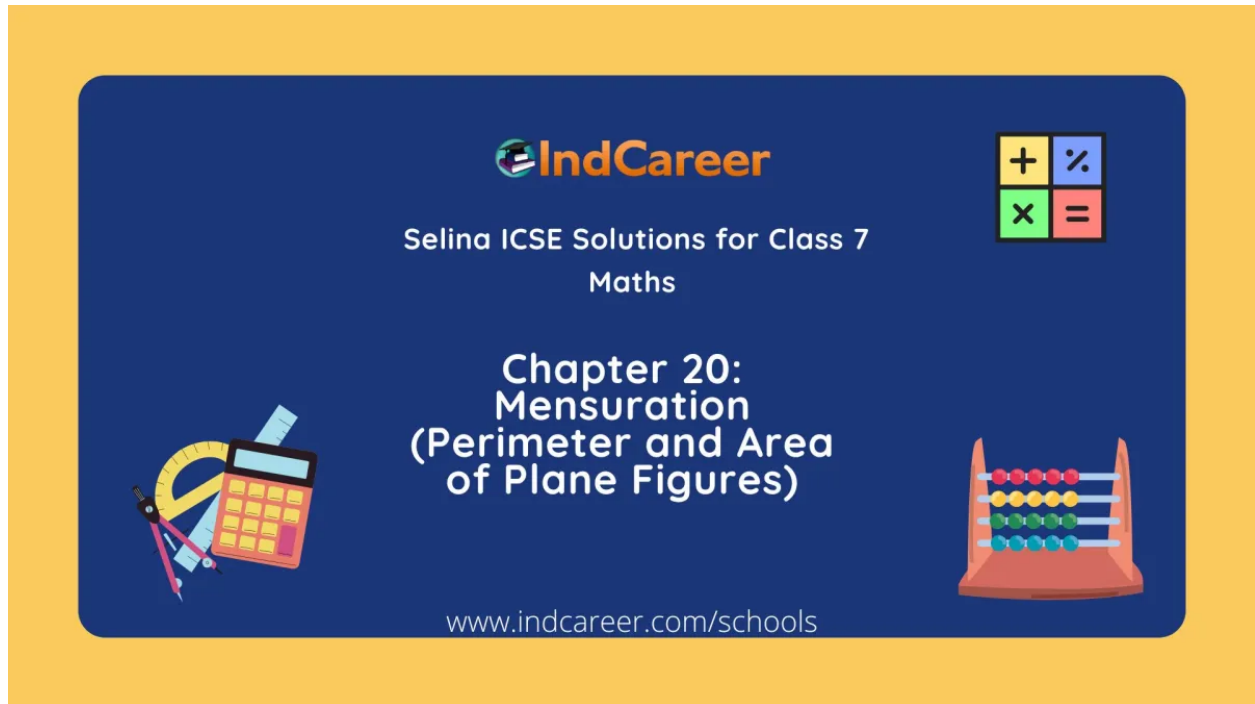


Selina Class 7 ICSE Solutions Mathematics : Chapter 20- Mensuration (Perimeter and Area of Plane Figures)



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Selina Class 7 ICSE Solutions Mathematics : Chapter 20- Mensuration (Perimeter and Area of Plane Figures)

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Selina Class 7 ICSE Solutions Mathematics : Chapter 20- Mensuration (Perimeter and Area of Plane Figures)

Selina 7th Maths Chapter 20, Class 7 Maths Chapter 20 solutions

Exercise 20A page: 220

1. The length and the breadth of a rectangular plot are 135 m and 65 m. Find, its perimeter and the cost of fencing it at the rate of ₹ 60 per m.

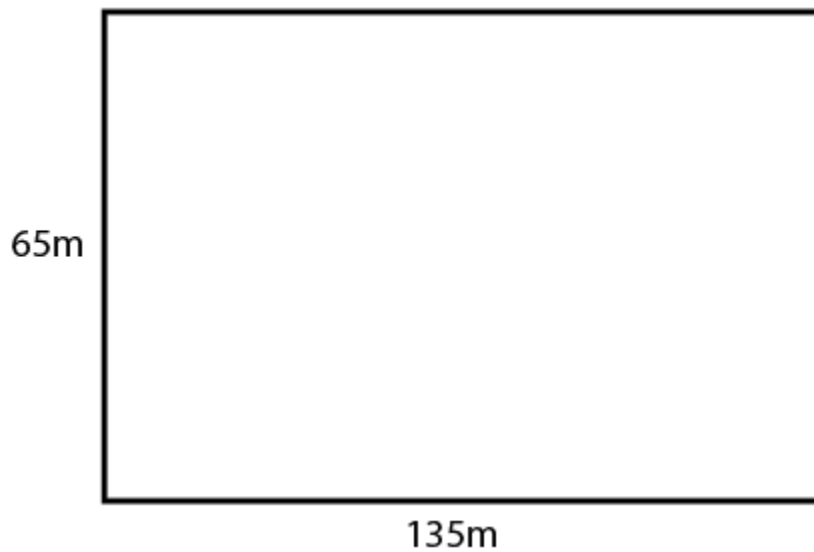
Solution:

It is given that

Length of a rectangular plot = 135 m

Breadth of a rectangular plot = 65 m

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We know that

Perimeter of a rectangular plot = $2 (\text{length} + \text{breadth})$

Substituting the values

$$= 2 (135 + 65)$$

$$= 2 (200)$$

$$= 400 \text{ m}$$

Here the cost of fencing = ₹ 60 per m

So the cost of fencing 400 m = $60 \times 400 = ₹ 24,000$

2. The length and breadth of a rectangular field are in the ratio 7 : 4. If its perimeter is 440 m, find its length and breadth.

Also, find the cost of fencing it @ ₹150 per m.

Solution:

It is given that

Perimeter of rectangular field = 440 m

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Consider $7x$ as the length and $4x$ as the breadth of rectangular field

So we get

$$2(l + b) = \text{Perimeter}$$

Substituting the values

$$2(7x + 4x) = 440$$

By further calculation

$$2(11x) = 440$$

$$22x = 440$$

So we get

$$x = 440/22 = 11 \text{ m}$$

Here

$$\text{Length} = 7x = 7 \times 11 = 77\text{m}$$

$$\text{Breadth} = 4x = 4 \times 11 = 44\text{m}$$

We know that

$$\text{Cost of fencing} = ₹150 \text{ per m}$$

$$\text{So the cost of fencing } 440 \text{ m} = 150 \times 440 = ₹ 66,000$$

3. The length of a rectangular field is 30 m and its diagonal is 34 m. Find the breadth of the field and its perimeter.

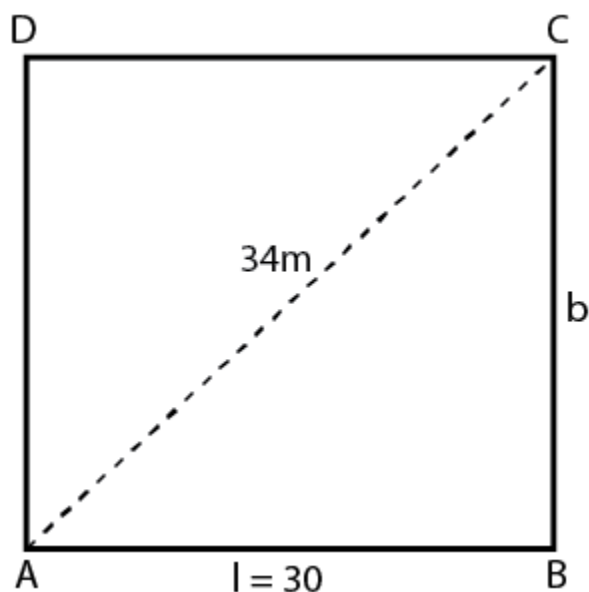
Solution:

It is given that

$$\text{Length of a rectangular field} = 30 \text{ m}$$

$$\text{Diagonal of a rectangular field} = 34 \text{ m}$$

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Consider the breadth of rectangular field = b m

Using the Pythagoras theorem

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

Substituting the values

$$34^2 = 30^2 + b^2$$

By further calculation

$$1156 = 900 + b^2$$

So we get

$$b^2 = 1156 - 900 = 256$$

$$b = \sqrt{256} = 16 \text{ m}$$

We know that

$$\text{Perimeter} = 2(l + b)$$

Substituting the values

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$$= 2 (30 + 16)$$

$$= 2 \times 46$$

$$= 92 \text{ m}$$

4. The diagonal of a square is $12\sqrt{2}$ cm. Find its perimeter.

Solution:

It is given that

Diagonal of a square = $12\sqrt{2}$ cm

We know that diagonal = side $\times \sqrt{2}$

Here the side = 12 cm

So the perimeter = $4 \times 12 = 48$ cm

5. Find the perimeter of a rectangle whose length = 22.5 m and breadth = 16 dm.

Solution:

It is given that

Length = 22.5 m

Breadth = 16 dm = 1.6 m

We know that

Perimeter of a rectangle = $2(l + b)$

Substituting the values

$$= 2 (22.5 + 1.6)$$

So we get

$$= 2 (24.1)$$

$$= 48.2 \text{ m}$$

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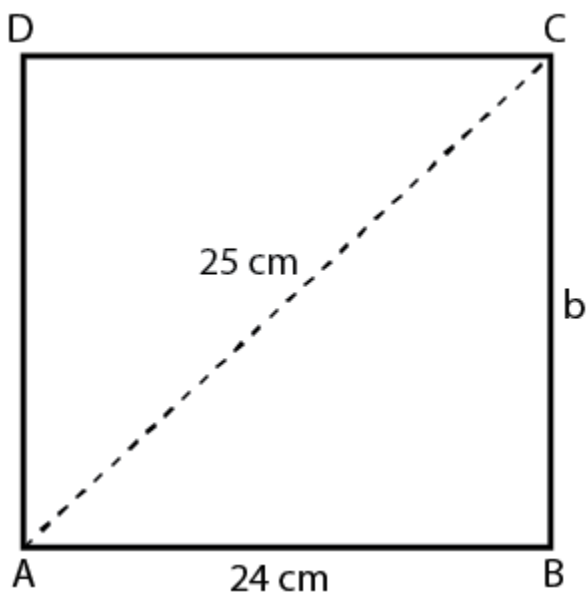
6. Find the perimeter of a rectangle with length = 24 cm and diagonal = 25 cm.

Solution:

It is given that

Length = 24 cm

Diagonal = 25 cm



Consider the breadth of a rectangle = b m

Using Pythagoras theorem in triangle ABC

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

Substituting the values

$$25^2 = 24^2 + b^2$$

$$625 = 576 + b^2$$

By further calculation

$$b^2 = 625 - 576 = 49$$

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$$b = \sqrt{49} = 7 \text{ cm}$$

Here the perimeter of rectangle = $2(l + b)$

Substituting the values

$$= 2(24 + 7)$$

So we get

$$= 2(31)$$

$$= 62 \text{ cm}$$

7. The length and breadth of rectangular piece of land are in the ratio of 5 : 3. If the total cost of fencing it at the rate of ₹48 per metre is ₹19,200, find its length and breadth.

Solution:

It is given that

Length and breadth of rectangular piece of land are in the ratio = 5 : 3

Cost of fencing = ₹19,200

Rate = ₹48 per metre

We know that

Perimeter of rectangular piece of land = $19,200/48 = 400 \text{ m}$

Consider length = $5x$

Breadth = $3x$

So the perimeter = $2(l + b)$

Substituting the values

$$400 = 2(5x + 3x)$$

By further calculation

$$400 = 2(8x)$$

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$$400 = 16x$$

So we get

$$x = 400/16 = 25$$

$$\text{Length} = 5x = 5 \times 25 = 125 \text{ m}$$

$$\text{Breadth} = 3x = 3 \times 25 = 75 \text{ m}$$

8. A wire is in the shape of square of side 20 cm. If the wire is bent into a rectangle of length 24 cm, find its breadth.

Solution:

It is given that

$$\text{Side of square} = 20 \text{ cm}$$

$$\text{So the perimeter of square} = 4 \times 20 = 80 \text{ cm}$$

$$\text{Perimeter of rectangle} = 80 \text{ cm}$$

We know that

$$\text{Length of rectangle} = 24 \text{ cm}$$

$$\text{So the perimeter of rectangle} = 2(l + b)$$

Substituting the values

$$80 = 2(24 + b)$$

By further calculation

$$40 = 24 + b$$

$$b = 40 - 24 = 16 \text{ m}$$

9. If P = perimeter of a rectangle, l = its length and b = its breadth; find:

(i) P , if $l = 38 \text{ cm}$ and $b = 27 \text{ cm}$

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(ii) b, if $P = 88$ cm and $l = 24$ cm

(iii) l, if $P = 96$ m and $b = 28$ m

Solution:

(i) It is given that

$$l = 38 \text{ cm}$$

$$b = 27 \text{ cm}$$

We know that

$$\text{Perimeter} = 2(l + b)$$

Substituting the values

$$= 2(38 + 27)$$

$$= 2(65)$$

$$= 130 \text{ cm}$$

(ii) It is given that

$$P = 88 \text{ cm}$$

$$l = 24 \text{ cm}$$

Consider b as the breadth

We know that

$$P = 2(l + b)$$

It can be written as

$$b = P/2 - l$$

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Substituting the values

$$b = 88/2 - 24$$

$$b = 44 - 24$$

$$b = 20 \text{ cm}$$

(iii) It is given that

$$P = 96 \text{ m}$$

$$B = 28 \text{ m}$$

Consider l as the length

We know that

$$P = 2(l + b)$$

It can be written as

$$l = P/2 - b$$

Substituting the values

$$l = 96/2 - 28$$

$$l = 48 - 28$$

$$l = 20 \text{ m}$$

10. The cost of fencing a square field at the rate of ₹75 per meter is ₹67,500. Find the perimeter and the side of the square field.

Solution:

$$\text{Cost of fencing} = ₹67,500$$

$$\text{So the length of fence} = 67,500/75 = 900 \text{ m}$$

$$\text{We know that the perimeter of square field} = \text{length of fence} = 900 \text{ m}$$

Here

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Perimeter of a square = $4 \times$ Length of its side

Substituting the values

Length of the side of a square = Perimeter/ 4

So we get

$$= 900/4$$

$$= 225 \text{ m}$$

11. The length and the breadth of a rectangle are 36 cm and 28 cm. If its perimeter is equal to the perimeter of a square, find the side of the square.

Solution:

It is given that

Length of a rectangle = 36 cm

Breadth of a rectangle = 28 cm

We know that

$$\text{Perimeter} = 2 (l + b)$$

Substituting the values

$$= 2 (36 + 28)$$

$$= 2 (64)$$

$$= 128 \text{ cm}$$

It is given that

$$\text{Perimeter of a square} = \text{Perimeter of a rectangle} = 128 \text{ cm}$$

$$\text{So the side of square} = \text{perimeter}/4$$

Substituting the value

$$= 128/ 4$$

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$$= 32 \text{ cm}$$

12. The radius of a circle is 21 cm. Find the circumference (Take $\pi = 3 \frac{1}{7}$).

Solution:

It is given that

Radius of a circle = 21 cm

We know that $\pi = \frac{22}{7}$

So the circumference of a circle = $2 \pi r$

Substituting the values

$$= 2 \times \frac{22}{7} \times 21$$

So we get

$$= 2 \times 22 \times 3$$

$$= 132 \text{ cm}$$

13. The circumference of a circle is 440 cm. Find its radius and diameter. (Take $\pi = \frac{22}{7}$).

Solution:

It is given that

Circumference of a circle = 440 cm

So the radius = $C / 2\pi$

Substituting the values

$$= (440 \times 7) / (2 \times 22)$$

So we get

$$= 3088/44$$

$$= 70 \text{ cm}$$

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Diameter of the circle = $2 \times \text{radius}$

So we get

$$= 2 \times 70$$

$$= 140 \text{ cm}$$

14. The diameter of a circular field is 56 m. Find its circumference and cost of fencing it at the rate of ₹80 per m. (Take $\pi = 22/7$).

Solution:

It is given that

Diameter of a circular field = 56 m

So the radius = $56/2 = 28 \text{ m}$

We know that

Circumference of the circle = $2 \pi r$

Substituting the values

$$= 2 \times 22/7 \times 28$$

So we get

$$= 2 \times 22 \times 4$$

$$= 176 \text{ m}$$

Here the cost of fencing 176 m = $176 \times 80 = ₹ 14,080$

15. The radii of two circles are 20 cm and 13 cm. Find the difference between their circumferences. (Take $\pi = 22/7$).

Solution:

It is given that

Radius of first circle = 20 cm

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We know that

Circumference of the circle = $2 \pi r$

Substituting the values

$$= 2 \times \frac{22}{7} \times 20$$

So we get

$$= \frac{880}{7}$$

$$= 122.8 \text{ cm}$$

Similarly

Radius of the second circle = 13 cm

We know that

Circumference of the circle = $2 \pi r$

Substituting the values

$$= 2 \times \frac{22}{7} \times 13$$

So we get

$$= \frac{572}{7}$$

$$= 81.7$$

So the difference of circumference of two circles = $122.8 - 81.7 = 41.1 \text{ cm}$

Exercise 20B page: 228

1. Find the area of a rectangle whose length and breadth are 25 cm and 16 cm.

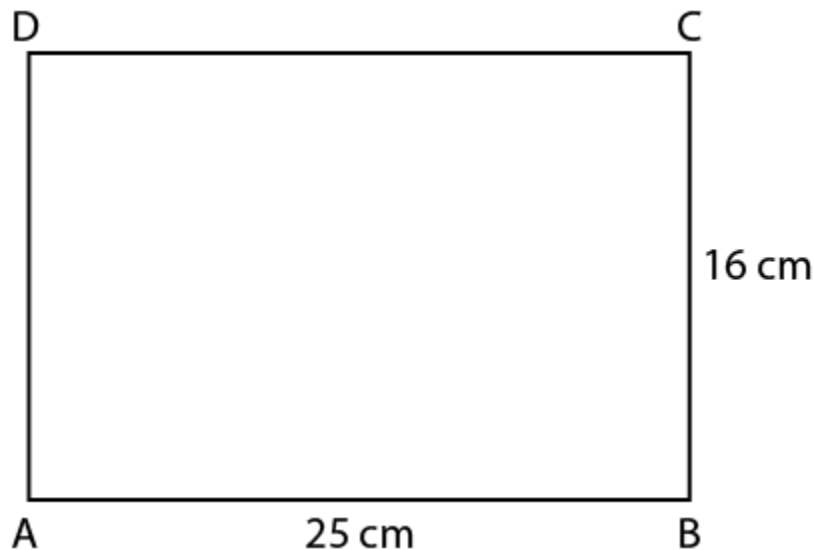
Solution:

It is given that

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Length of a rectangle = 25 cm

Breadth of a rectangle = 16 cm



We know that

Area of a rectangle = $l \times b$

Substituting the values

$$= 25 \times 16$$

$$= 400 \text{ cm}^2$$

2. The diagonal of a rectangular board is 1 m and its length is 96 cm. Find the area of the board.

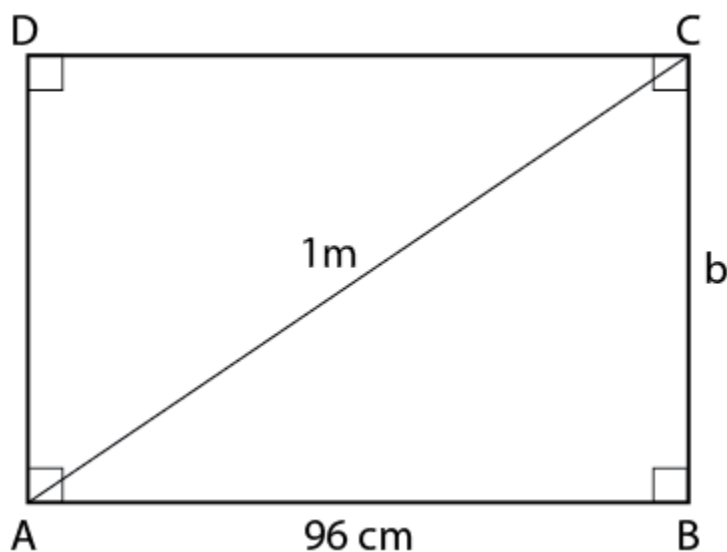
Solution:

It is given that

Length of rectangular board = 96 cm

Diagonal of rectangular board = 1 m = 100 cm

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Using the Pythagoras theorem in right angled triangle ABC

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

Substituting the values

$$100^2 = 96^2 + BC^2$$

By further calculation

$$10000 = 9216 + BC^2$$

So we get

$$BC^2 = 10000 - 9216 = 784$$

$$BC = \sqrt{784} = 28 \text{ cm}$$

Here the area of rectangular board = $l \times b$

Substituting the values

$$= 96 \times 28$$

$$= 2688 \text{ cm}^2$$

3. The sides of a rectangular park are in the ratio 4 : 3. If its area is 1728 m^2 , find:

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(i) its perimeter

(ii) cost of fencing it at the rate of ₹40 per meter.

Solution:

It is given that

Ratio in the sides of a rectangular park = 4 : 3

Area = 1728 m²

Consider 4x as the length and 3x as the breadth

We know that

Area = l × b

Substituting the values

$$1728 = 4x \times 3x$$

By further calculation

$$12x^2 = 1728$$

$$x^2 = 1728/12 = 144$$

$$x = \sqrt{144} = 12$$

Here we get

$$\text{Length} = 4x = 4 \times 12 = 48 \text{ m}$$

$$\text{Breadth} = 3x = 3 \times 12 = 36 \text{ m}$$

(i) We know that

$$\text{Perimeter} = 2(l + b)$$

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Substituting the values

$$= 2 (48 + 36)$$

So we get

$$= 2 (84)$$

$$= 168 \text{ m}$$

(ii) It is given that

Rate of fencing = ₹40 per meter

$$\text{So the total cost of fencing} = 168 \times 40 = ₹ 6720$$

4. A floor is 40 m long and 15 m broad. It is covered with tiles, each measuring 60 cm by 50 cm. Find the number of tiles required to cover the floor.

Solution:

Given below are the dimensions of floor

$$\text{Length} = 40 \text{ m}$$

$$\text{Breadth} = 15 \text{ m}$$

We know that

$$\text{Area} = l \times b = 40 \times 15 = 600 \text{ m}^2$$

$$\text{Here the length of one tile} = 60 \text{ cm} = 6/10 \text{ m}$$

$$\text{Breadth of one tile} = 50 \text{ cm} = 5/10 \text{ m}$$

$$\text{So the area of one tile} = 6/10 \times 5/10 = 30/100 = 3/10 \text{ m}^2$$

We know that

$$\text{Number of tiles} = \text{total area of floor} / \text{area of one tile}$$

Substituting the values

$$= 600 / 3/10$$

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$$= (600 \times 10) / 3$$

$$= 2000$$

5. The length and breadth of a rectangular piece of land are in the ratio 5 : 3. If the total cost of fencing it at the rate of ₹24 per meter is ₹9600, find its:

(i) length and breadth

(ii) area

(iii) cost of levelling at the rate of ₹60 per m².

Solution:

It is given that

Ratio in length and breadth of a rectangular piece of land = 5 : 3

Cost of fencing = ₹9600

Rate = ₹24 per meter

We know that

Perimeter = total cost of fencing / rate per meter

Substituting the values

$$= 9600 / 24$$

$$= 400 \text{ m}$$

Consider 5x as the length and 3x as the breadth

Here perimeter = 2 (l + b)

Substituting the values

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$$400 = 2 (5x + 3x)$$

By further calculation

$$400 = 2 (8x)$$

So we get

$$400 = 16x$$

$$x = 400/16 = 25$$

$$(i) \text{ Length of land} = 5x = 5 \times 25 = 125 \text{ m}$$

$$\text{Breadth of land} = 3x = 3 \times 25 = 75 \text{ m}$$

$$(ii) \text{ Area} = l \times b$$

Substituting the values

$$= 125 \times 75$$

$$= 9375 \text{ m}^2$$

$$(iii) \text{ Cost of levelling at the rate of ₹60 per m}^2 = 60 \times 9375 = ₹ 5,62,500$$

6. Find the area of the square whose perimeter is 56 cm.

Solution:

It is given that

$$\text{Perimeter of the square} = 56 \text{ cm}$$

We know that

$$4 \times \text{side} = 56 \text{ cm}$$

So we get

$$\text{Side} = 56/4 = 14 \text{ cm}$$

Here

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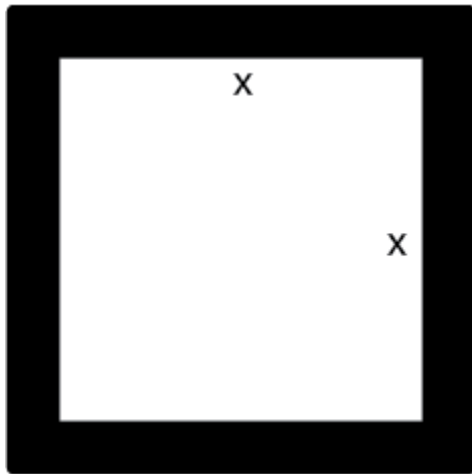
Area of the square = side²

Substituting the values

Area of the square = $14^2 = 196 \text{ cm}^2$

7. A square lawn is surrounded by a path 2.5 m wide. If the area of the path is 165 m^2 , find the area of the lawn.

Solution:



It is given that

Area of the path = 165 m^2

Width of the path = 2.5 m

Consider x m as the side of square lawn

So the outer side = $x + 2 \times 2.5$

We get

Outer side = $(x + 5) \text{ m}$

Here the area of path = $(x + 5)^2 - x^2$

Substituting the values

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$$x^2 + 10x + 25 - x^2 = 165$$

By further calculation

$$10x = 165 - 25 = 140$$

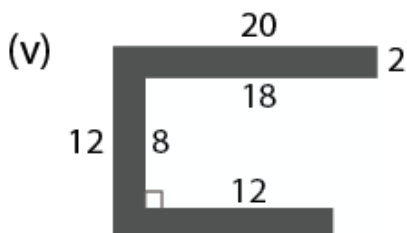
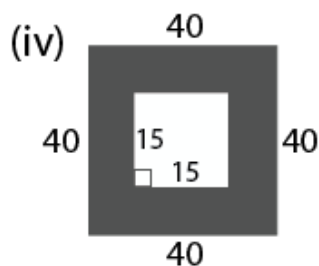
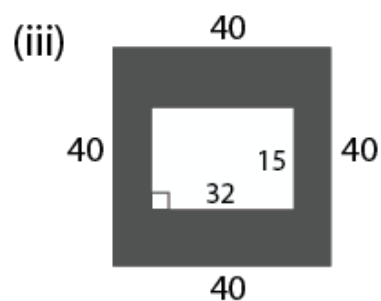
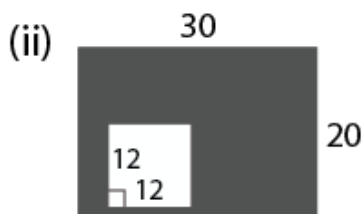
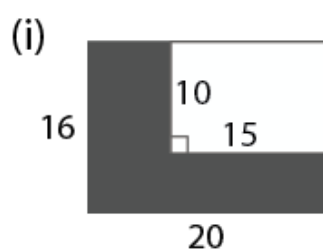
So we get

$$x = 140/10 = 14 \text{ m}$$

Here the side of lawn = 14 m

$$\text{Area of the lawn} = 14^2 = 196 \text{ m}^2$$

8. For each figure, given below, find the area of shaded region: (All measurements are in cm)



Solution:

(i) It is given that

Outer length = 20 cm

Outer breadth = 16 cm

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$$\text{Outer area} = l \times b$$

Substituting the values

$$= 20 \times 16$$

$$= 320 \text{ cm}^2$$

Similarly

$$\text{Inner length} = 15 \text{ cm}$$

$$\text{Inner breadth} = 10 \text{ cm}$$

$$\text{So the inner area} = l \times b$$

Substituting the values

$$= 15 \times 10$$

$$= 150 \text{ cm}^2$$

Here the area of shaded region = area of whole region – area of unshaded region

Substituting the values

$$= 320 - 150$$

$$= 170 \text{ cm}^2$$

(ii) It is given that

$$\text{Outer length} = 30 \text{ cm}$$

$$\text{Outer breadth} = 20 \text{ cm}$$

$$\text{Outer area} = l \times b$$

Substituting the values

$$= 30 \times 20$$

$$= 600 \text{ cm}^2$$

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Similarly

Inner length = 12 cm

Inner breadth = 12 cm

So the inner area = $l \times b$

Substituting the values

$$= 12 \times 12$$

$$= 144 \text{ cm}^2$$

Here the area of shaded region = area of outer figure – area of inner figure

Substituting the values

$$= 600 - 144$$

$$= 456 \text{ cm}^2$$

(iii) Here the area shaded portion = area of outer region – area of unshaded region

Substituting the values

$$= 40 \times 40 - 32 \times 15$$

So we get

$$= 1600 - 480$$

$$= 1120 \text{ cm}^2$$

(iv) Here the area of shaded region = area of outer region – area of inner region

Substituting the values

$$= 40 \times 40 - 15 \times 15$$

So we get

$$= 1600 - 225$$

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$$= 1375 \text{ cm}^2$$

$$(v) \text{ Area of shaded portion} = 2 \times 20 + 2 \times 8 + 2 \times (12 + 2)$$

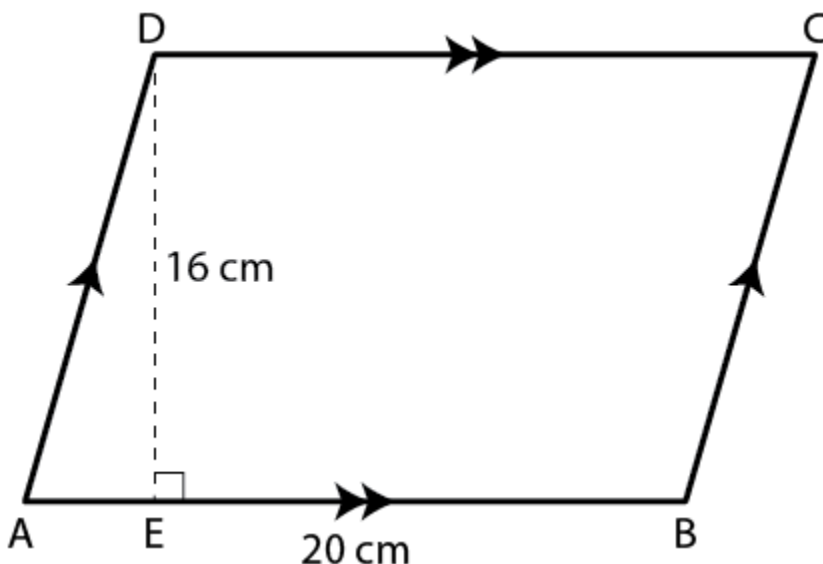
By further calculation

$$= 40 + 16 + 28$$

$$= 84 \text{ cm}^2$$

9. One side of a parallelogram is 20 cm and its distance from the opposite side is 16 cm. Find the area of the parallelogram.

Solution:



We know that

Area of parallelogram = base $\times$ height

Here

Area of parallelogram = AB $\times$ DE

Substituting the values

$$= 20 \times 16$$

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$$= 320 \text{ cm}^2$$

10. The base of a parallelogram is thrice its height. If its area is 768 cm^2 , find the base and the height of the parallelogram.

Solution:

It is given that

$$\text{Area of parallelogram} = 768 \text{ cm}^2$$

Consider x as the height and $3x$ as the base of parallelogram

So we get

$$\text{Area} = \text{base} \times \text{height}$$

Substituting the values

$$768 = 3x \times x$$

By further calculation

$$768 = 3x^2$$

$$x^2 = 768/3 = 256 \text{ cm}$$

$$x = \sqrt{256} = 16 \text{ cm}$$

$$\text{Height} = x = 16 \text{ cm}$$

$$\text{Base} = 3x = 3 \times 16 = 48 \text{ cm}$$

11. Find the area of the rhombus, if its diagonals are 30 cm and 24 cm.

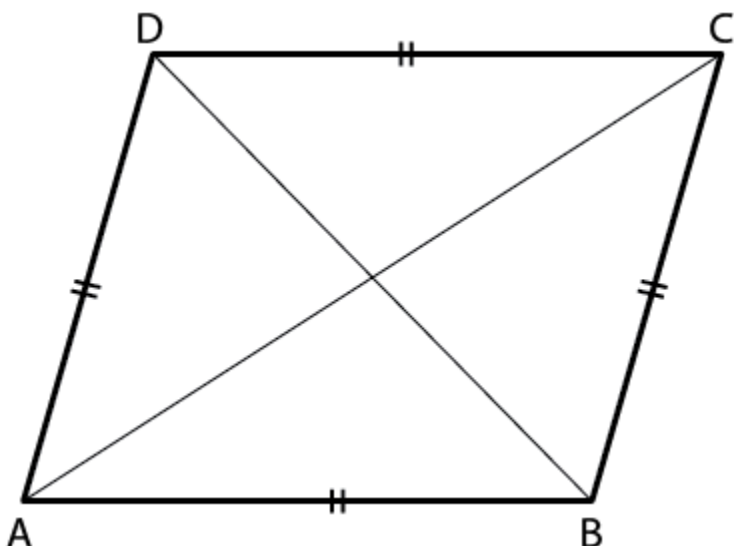
Solution:

It is given that

$$\text{Diagonal } d_1 = 30 \text{ cm}$$

$$\text{Other diagonal } d_2 = 24 \text{ cm}$$

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Consider AC and BD as the diagonals of rhombus

We know that

Area = $\frac{1}{2} \times$ product of diagonals

So we get

$$= \frac{1}{2} \times AC \times BD$$

$$= \frac{1}{2} \times d_1 \times d_2$$

Substituting the values

$$= \frac{1}{2} \times 30 \times 24$$

$$= 15 \times 24$$

$$= 360 \text{ cm}^2$$

Hence, the area of the rhombus is 360 cm^2 .

12. If the area of a rhombus is 112 cm^2 and one of its diagonals is 14 cm, find its other diagonal.

Solution:

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It is given that

Area of a rhombus = 112 cm^2

One diagonal = 14 cm

Consider x cm as the second diagonal

We know that

Area = product of diagonal/2

Substituting the values

$$112 = (14 \times x) / 2$$

By further calculation

$$x = (112 \times 2) / 14$$

So we get

$$x = 224 / 14 = 16 \text{ cm}$$

Hence, the other diagonal of the rhombus is 16 cm.

13. One side of a parallelogram is 18 cm and its area is 153 cm^2 . Find the distance of the given side from its opposite side.

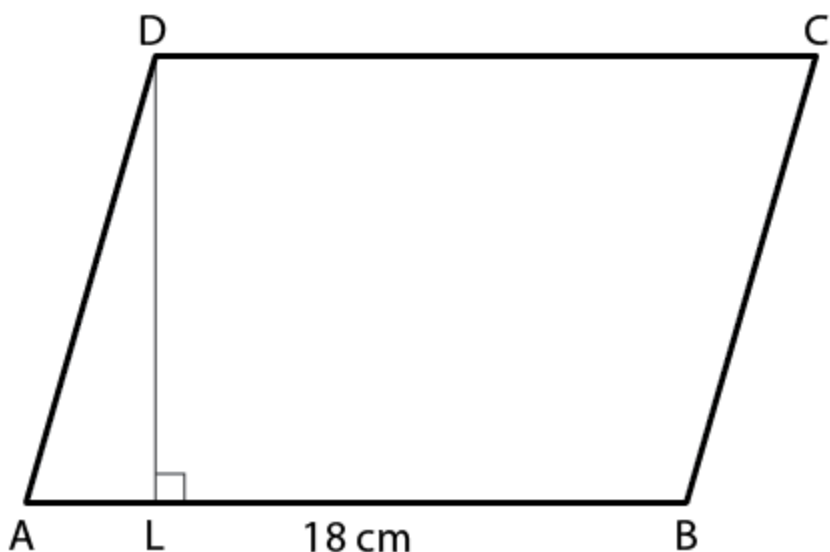
Solution:

It is given that

Area of parallelogram = 153 cm^2

One side = 18 cm

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So the distance between AB and DC = area/ base

Substituting the values

$$= 153/ 18$$

$$= 17/2$$

$$= 8.5 \text{ cm}$$

14. The adjacent sides of a parallelogram are 15 cm and 10 cm. If the distance between the longer sides is 6 cm, find the distance between the shorter sides.

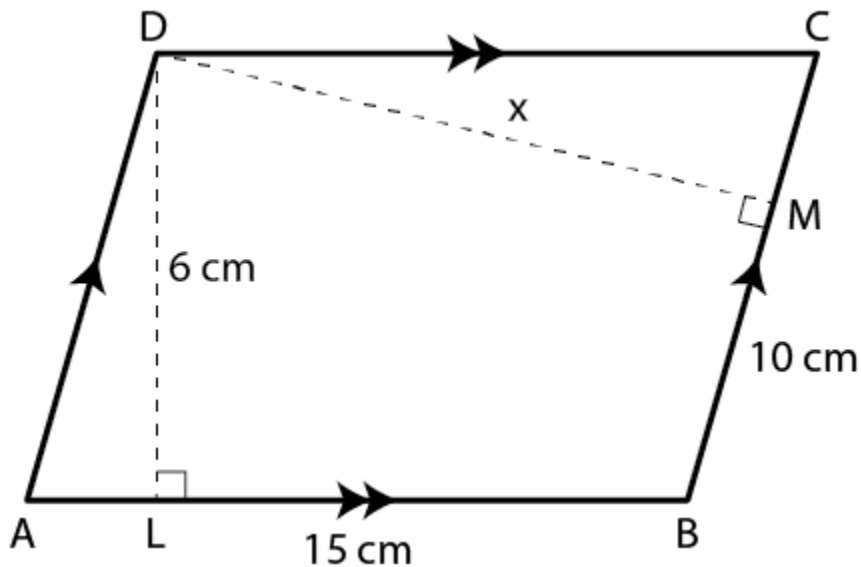
Solution:

It is given that

$$AB = DC = 15 \text{ cm}$$

$$BC = AD = 10 \text{ cm}$$

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Here the distance between longer sides AB and DC = 6 cm

So perpendicular DL = 6 cm

DM is perpendicular to BC

We know that

Area of parallelogram = base $\times$ altitude

So we get

$$= AB \times DL$$

Substituting the values

$$= 15 \times 6$$

$$= 90 \text{ cm}^2$$

Consider DM = x cm

Similarly

Area of parallelogram ABCD = BC $\times$ DM

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Substituting the values

$$= 10 \times x$$

$$= 10 \times \text{cm}^2$$

By equating both

$$10 \times = 90$$

$$x = 90/10 = 9 \text{ cm}$$

15. The area of a rhombus is 84 cm^2 and its perimeter is 56 cm. Find its height.

Solution:

It is given that

$$\text{Area of a rhombus} = 84 \text{ cm}^2$$

$$\text{Perimeter of a rhombus} = 56 \text{ cm}$$

$$\text{So the side of a rhombus} = 56/4 = 14 \text{ cm}$$

$$\text{Here the height} = \text{area} / \text{base}$$

Substituting the values

$$= 84/14$$

$$= 6 \text{ cm}$$



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