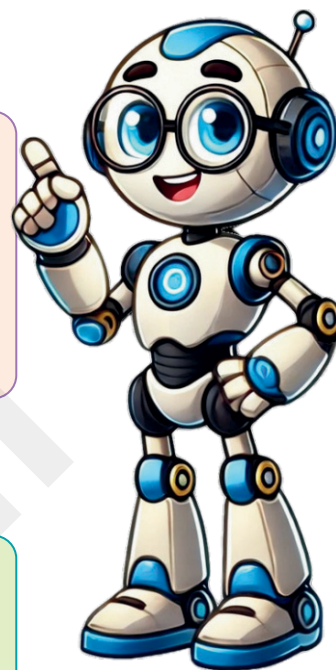# 10 Area and Perimeter

We'll cover the following key points:

→ Perimeter

→ Area

→ Area of a Triangle

→ Word Problems

Do you Remember fundamental concept in previous class.
In class 4ᵗʰ we learnt

→ Meaning of Perimeter

EeeBee

Still curious? Talk to me by scanning the QR code.

Learning Outcomes

By the end of this chapter, students will be able to:

- Understand the meaning of area and perimeter in simple terms.

- Calculate the perimeter of squares, rectangles, and triangles using basic formulas.

- Find the area of squares and rectangles by multiplying length and width.

- Learn how to measure the length of the sides of shapes and use those measurements for calculations.

- Understand the difference between area and perimeter and know when to use each one.

- Solve simple problems involving finding the area and perimeter of everyday objects, like a garden or a room.

- Apply the knowledge of area and perimeter to fun activities, like planning a park or designing a room.

Work out the area and perimeter of the following rectangles.
Each square on the sheet is 1 square cm. Remember area is the number of squares inside, and perimeter is the distance round the outside of the shape.
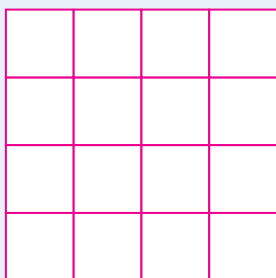
(1)

Area = _____ square cm

Perimeter = _____ cm
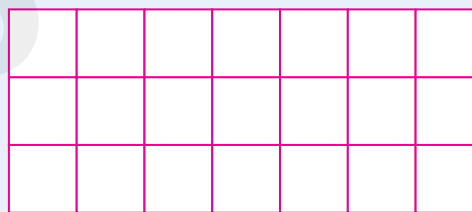
(2)

Area = _____ square cm
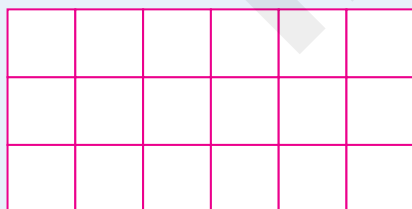
Perimeter = _____ cm

(3)

Area = _____ square cm

Perimeter = _____ cm

(4)

Area = _____ square cm

Perimeter = _____ cm
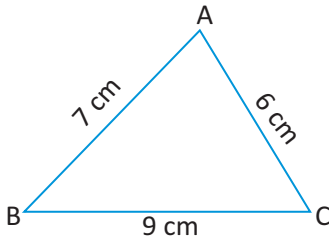
(5)

Area = _____ square cm

Perimeter = _____ cm

(6)

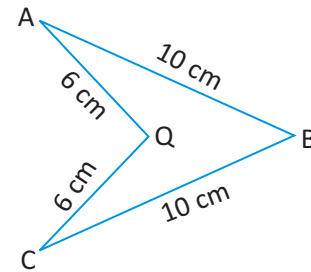Area = _____ square cm

Perimeter = _____ cm

Perimeter

The distance around a figure is the perimeter of the figure. The length of the boundary of a polygon is called the perimeter of the polygon.

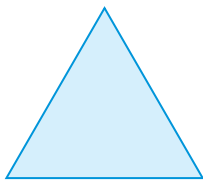The perimeter of a closed figure is the total length of its boundary.

Perimeter = AB + BC + AC

= 7 cm + 9 cm + 6 cm

= 22 cm

Perimeter = AB + BC + CD + AD

= 10 cm + 10 cm + 6 cm + 6 m

= 32 cm

Thus, perimeter = sum of the lengths of the line segments forming a figure.

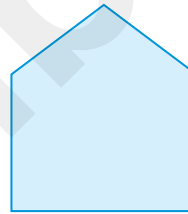Polygons having number of sides 3, 4, 5 and 6 are called triangle, quadrilateral, pentagon and hexagon respectively.
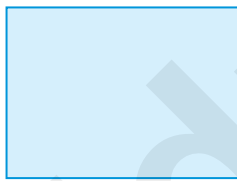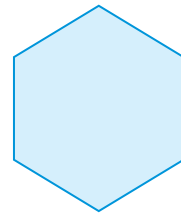
| Triangle	Quadrilateral	Pentagon	Hexagon

Rectilinear figure : A plane figure bounded by the segments is called rectilinear figure. **For example** : triangle, quadrilateral, pentagon and hexagon are rectilinear figures. A circle is not a rectilinear figure.

Perimeter of a Triangle

In the given figure, ABC is a triangle. Its three sides AB, BC and CA are of lengths 4 cm, 5 cm and 6 cm respectively.

Perimeter of D ABC = AB + BC + CA

= 4 cm + 5 cm + 6 cm = 15 cm

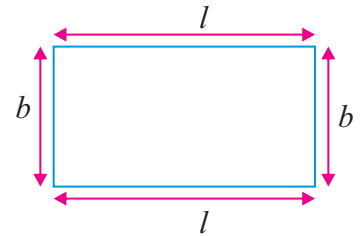| Perimeter of a triangle = Sum of the lengths of its three sides |
|---|
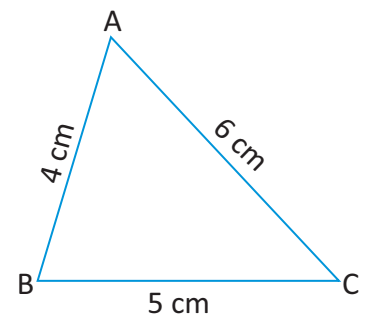
Perimeter of a Rectangle

We know that the perimeter of a closed figure is the length of its boundary. In a rectangle, the

opposite sides are equal.

Perimeter of a rectangle   = length + breadth + length + breadth

= $l + b + l + b$

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

So, | Perimeter of a rectangle = 2 (length + breadth) |

Perimeter of a Square

In a square, all the sides are equal.

Perimeter of a square   = side + side + side + side

= $s + s + s + s = 4 \times s$
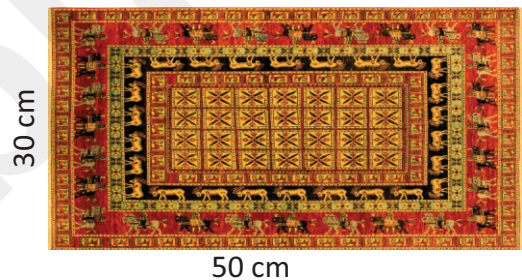
So, | Perimeter of a square = 4 × side |
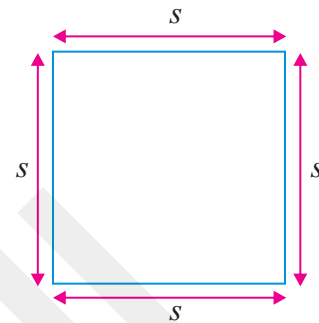
Example 1 :   Find the perimeter of a rectangular carpet 50 cm long and 30 cm wide.

Solution :   Here, l = 50 cm, b = 30 cm

∴   Perimeter = $2(l + b)$

= $2(50 + 30)$

= $2 \times 80 = 160$

Thus, the perimeter of the carpet is 160 cm.

Example 2 :   Find the perimeter of a square handkerchief of each side equal to 14 cm.

Solution :   Here, s = 14 cm

Perimeter = $4 \times s$ = $4 \times 14 = 56$

Thus, the perimeter of the handkerchief is 56 cm.

Example 3 :   Find the side of a square-shaped flower bed of perimeter 20 m.

Solution :   Here, perimeter = 20 m

To find the length of one side, divide the perimeter by 4.

So, the side of the flower bed = 20 ÷ 4 = 5

Thus, the length of one side of the flower bed is 5 m.

1. **Find the perimeter of each of the following:**

(a)
12 cm
6 cm

(b)
30 cm
20 cm

(c)
20 cm
25 cm

(d)
5 cm 5 cm
15 cm
15 cm
5 cm 5 cm

_____ _____ _____ _____
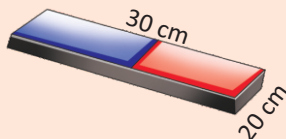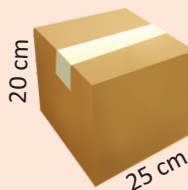
2. **A square garden is 24 m long. How much wire will be required for fencing around it ?**

Exercise 10.1

1. **Find the perimeter:**

(a)
25 cm
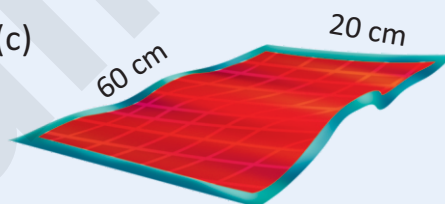35 cm

(b)
20 cm
16 cm

(c)
60 cm
20 cm

(d)
70 cm
50 cm

(e)
90 cm
140 cm

(f)
16 cm
22 cm
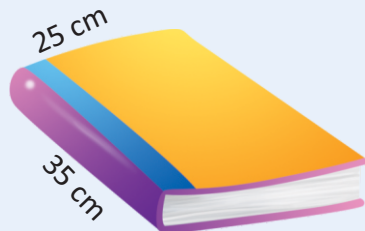
2. **Complete the tables:**

TABLE : Square

	Side	Perimeter
(a)	8 cm	32
(b)	14 cm	
(c)	22 cm	
(d)		172 cm

TABLE : Rectangle

	Length	Breadth	Perimeter
(a)	5 cm	4 cm	
(b)	2.5 cm	2.1 cm	
(c)	8 cm	6 cm	
(d)	12.5 cm	10.1 cm	

3. The perimeter of square field is 84 m. Find the side of this square.

4. The perimeter of square field is 100 m. Find the side of this field.

HOTS (Higher Order Thinking Skills)

1. The length and breadth of a rectangular field are 230 m and 150 m respectively. What distance will a boy cover in walking around it 2 times ?
2. A square field is 45 m long. How much wire will be required for fencing it two times?

Area

The amount of surface of the plane enclosed by a plane figure is known as area. We have studied about the closed plane figures. A rectangle, a square, a triangle and a circle, are all examples of closed plane figures.

The inner part of the plane enclosed by the rectangle ABCD is called the **interior region** of the rectangle ABCD. The outer part of the rectangle ABCD is called the exterior region of the rectangle ABCD.
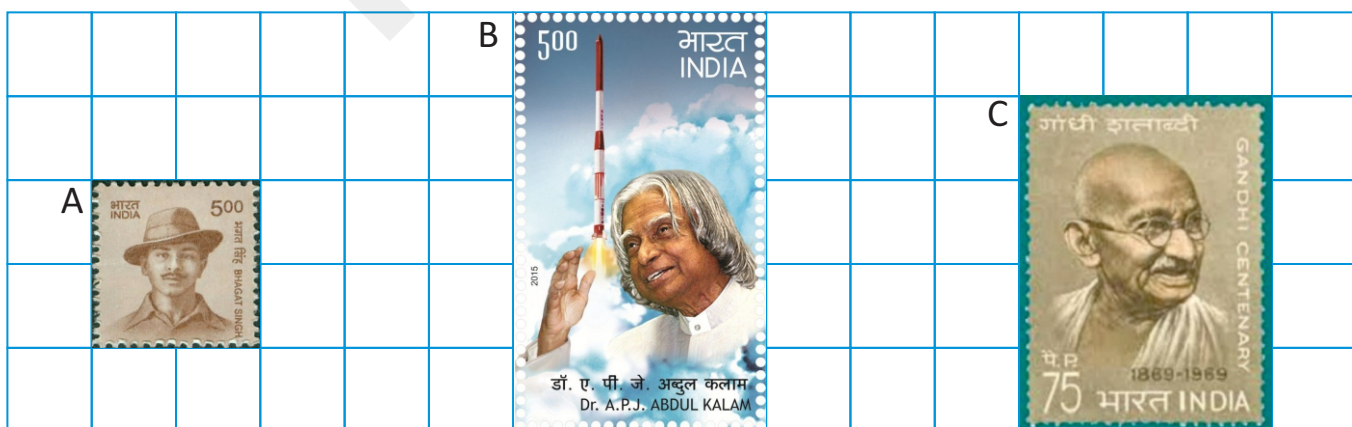
The interior regions of four closed figures are shown below :

Exterior Region

D —————————— C

Interior Region

A —————————— B

Take a Task

Watch Remedial

Area of a Rectangle

We know that the area of a closed figure is the surface covered by it.

Look at the colourful stamps shown below. Which stamp has the maximum area and which has the minimum ?

Count the number of small squares covered by each stamp.

1. Stamp A covers _____ squares. The area of stamp A is 4 sq. units.

2. Stamp B covers _____ squares. The area of stamp B is _____ sq. units.

3. The area of stamp C is _____ sq. units.

4. Stamp _____ has the maximum area and stamp _____ has the minimum.
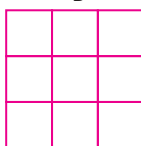
> Area of a rectangle = length × breadth
>
> i. e., A = $l \times b$

Area of a Square

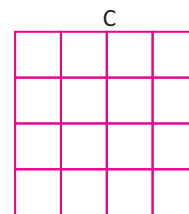Find the area of the following by counting the small squares.

A

_____ sq. units

B

_____ sq. units

C
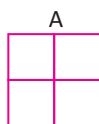
_____ sq. units

Area of a square = side × side

Now measure the side of the above squares and find the area.

Area of A = _____ × _____ = _____ sq. cm

Area of B = _____ × _____ = _____ sq. cm

Area of C = _____ × _____ = _____ sq. cm

REMEMBER

A square is a special rectangle with all four sides of the same length.
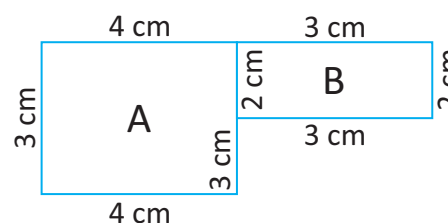
Area of Irregular Figures

Every figure will not have a regular shape like square or rectangle. To find the area of irregular figure, we divide it into regular figures like squares or rectangles. To find the area of each regular figure, we add them together.

For example : The area of figure below can be calculated as :

The area of part 'A'

= 3 × 4 = 12 sq. cm

The area of part 'B' = 2 × 3 = 6 sq. cm

Therefore, area of whole figure = area of 'A' + area of 'B'
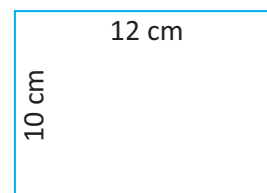
= 12 sq. cm + 6 sq. cm = 18 sq. cm

Example 4 : Find the area of a rectangular sheet of paper which is 12 cm long and 10 cm wide.

Solution : Here, *l* = 12 cm, *b* = 10 cm

Area = l × b = 12 × 10 = 120

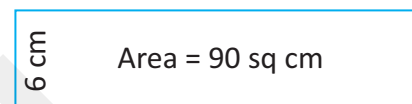Thus, the area of the rectangular sheet is 120 sq. cm.

12 cm

10 cm

Example 5 : Find the length of a rectangular piece of tile whose area is 90 sq. cm and the breadth is 6 cm.
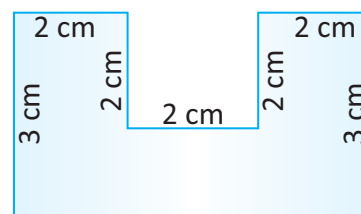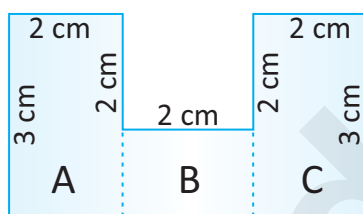
Solution : Here, Area = 90 sq. cm, *b* = 6 cm

6 cm   Area = 90 sq cm

To find the length, divide the area by the breadth.

Length = Area ÷ breadth = 90 ÷ 6 = 15 cm

Thus, the length of the rectangular tile is 15 cm.

Example 6 : Find the area of the figure given alongside.

2 cm   2 cm   2 cm   2 cm

3 cm 2 cm   2 cm   2 cm 3 cm

A   B   C

2 cm   2 cm

3 cm 2 cm   2 cm 3 cm

2 cm

Solution : Area of the given figure = Area of A + Area of B + Area of C

Rectangle A	**Rectangle B**	**Rectangle C**
Length = 3 cm	Length = 2 cm	Length = 3 cm
Breadth = 2 cm	Breadth = 1 cm	Breadth = 2 cm
Area = 3×2 = 6 = 6 sq. cm	Area = 2×1 = 2 sq. cm	Area = 3×2 = 6 sq. cm

Area of the given figure = 6 + 2 + 6 = 14 sq. cm

Thus, the area of the given figure is 14 sq. cm.

Exercise 10.2

Knowledge Application

1. **Find the area of a rectangle whose length and breadth respectively are :**

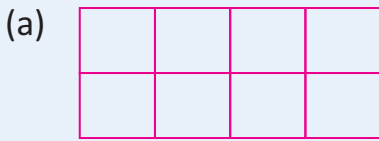(a) 6.5 cm and 4.5 cm   (b) 16 cm and 8 cm

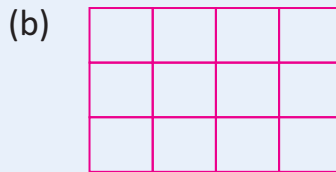(c)   12 cm and 6.5 cm   (d)   8 cm and 6 cm

2.   Measure the length and breadth and find the area:
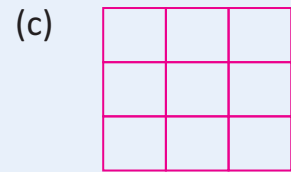
(a)

$l =$ _____ cm

$b =$ _____ cm

$A =$ _____ sq. cm
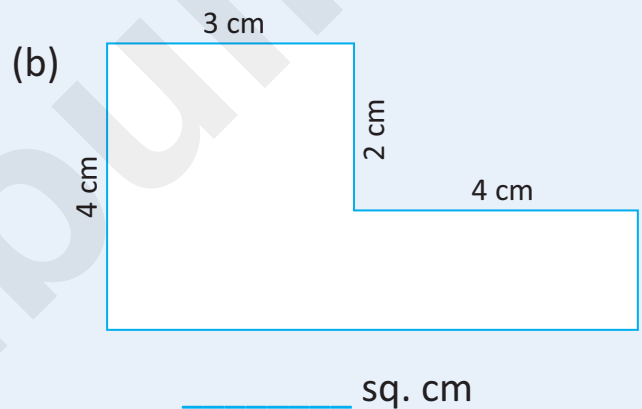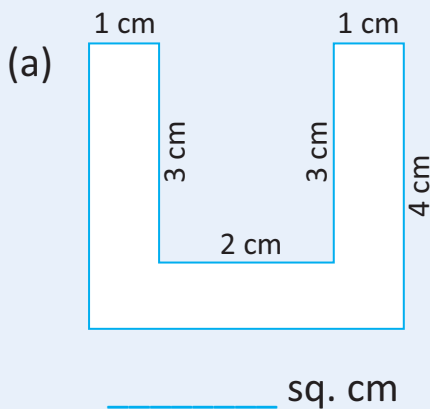
(b)

$l =$ _____ cm

$b =$ _____ cm

$A =$ _____ sq. cm

(c)

$l =$ _____ cm

$b =$ _____ cm

$A =$ _____ sq. cm

3.   Find the area by dividing the figure into rectangles and squares:

(a)

1 cm   1 cm

3 cm   3 cm

4 cm

2 cm

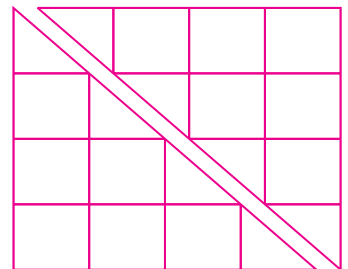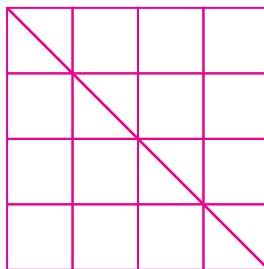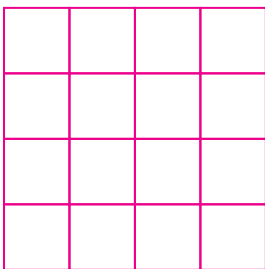_____ sq. cm

(b)

3 cm

4 cm   2 cm

4 cm

_____ sq. cm

Area of a Triangle

Look at the square shown below.

What is its area? _____ sq. cm

This square can be divided into two equal triangles as shown below.
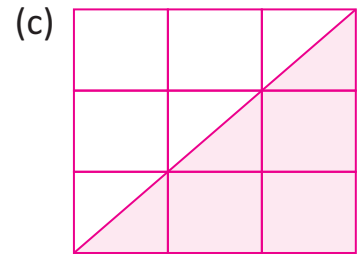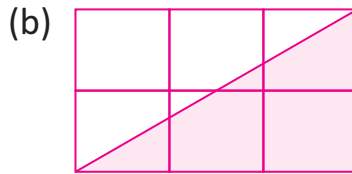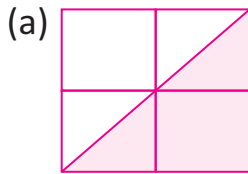
Can you tell the area of each of the triangles so formed?

Since each triangle is half of the square, its area will be half the area of the square.

Area of the square = ____16____ sq. cm

Half of the area of the square = ____8____ sq. cm

Area of each triangle = ____8____ sq. cm

Find the area of the triangles shaded in pink colour.

(a)

(b)

(c)

_____ sq. cm

_____ sq. cm
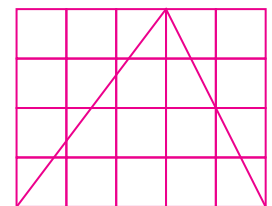
_____ sq. cm

Now, let us find the area of the triangle shown in colour.

To find the area of the colour triangle, let us divide the big rectangle into two rectangles A and B.

A   B
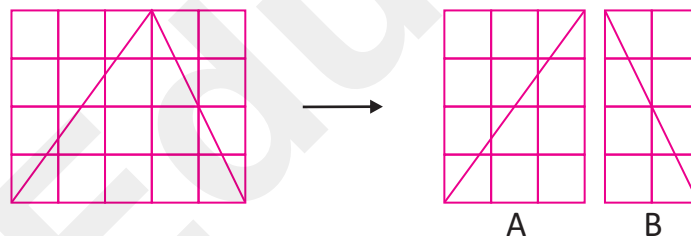
Area of rectangle A = 12 sq. cm, so the area of the triangle in A = 6 sq. cm

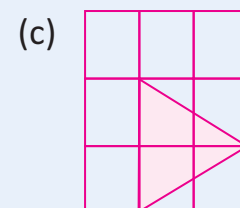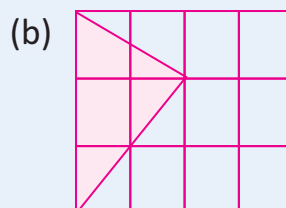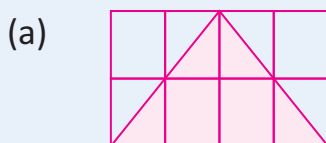Area of rectangle B = 8 sq. cm, so the area of the triangle in B = 4 sq. cm
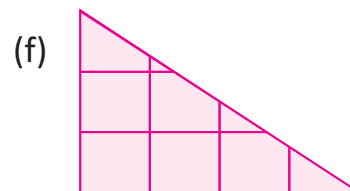
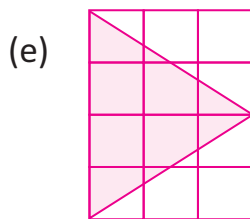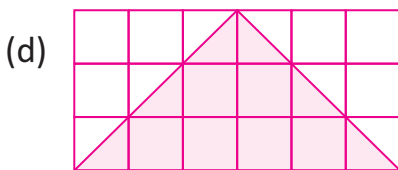Area of colour triangle = 6 + 4 = 10 sq. cm

Exercise 10.3

Knowledge Application

1. **Find the area of the shaded triangles, if the side of each small square is 1 cm:**

(a)

(b)

(c)

(d)   (e)   (f)

2. **Divide the following into triangles of equal area and write the area of each triangle:**

(a)

(b)

(c)
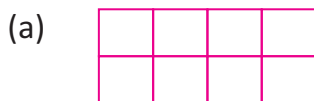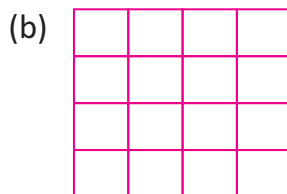
_____ sq. cm   _____ sq. cm   _____ sq. cm
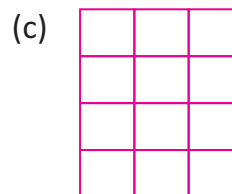
Project Work

A square is divided into 4 equal Squares. Shade the smaller square in half, such that the shaded part also makes a square.
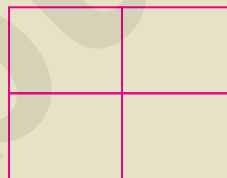
Word Problems

Example 7 : Find the length of the wall needed to fence a rectangular garden of length 18. 4 m and breadth 6.6 m.

Solution : Length of wall = Perimeter of garden

Perimeter = 2 × (length + breadth)

= 2 × (18.4 m + 6.6 m) = 2 × 25.0 m = 50 m

Thus, 50 m long wall would be needed to fence the rectangular garden.

Example 8 : The area of a rectangular field is 832 sq. m. If its length is 32 m, find its breadth.

Solution : Area of the rectangular field = 832 sq. m and its length = 32 m.

Now, breadth of the rectangular field = $\dfrac{\text{area}}{\text{length}}$ = $\dfrac{832}{32}$ m = 26 m

Example 9 : The side of a square-field is 50 m long find its area.

Solution : Length of side of the field = 50 m

Therefore, area of the field = side × side = 50 m × 50 m = 2500 sq. m.

Example 10 : Find the cost of tiling an office 30 m long and 25 m broad at the rate of ₹4 per sq. m.

Solution : Tiling the office means tiling the area of the office.

Area = length × breadth = 30 m × 25 m = 750 sq. m

Cost of tiling 1 sq. m = ₹4

Cost of tiling 750 sq. m = 750 × ₹4 = ₹3000

Thus, the cost of tiling the office is ₹3000.

Example 11 : How many square tiles of side 10 cm will be required to tile a path of dimensions 360 cm by 90 cm?

Solution : Area of the path = length × breadth

= 360 cm × 90 cm = 32400 sq. cm

Area of a tile = side × side = 10 cm × 10 cm = 100 sq. cm

Number of tiles needed = Area of the path ÷ Area of a tile

= 32400 ÷ 100 = 324

Thus, 324 tiles will be required to tile the path.

Exercise 10.4 Knowledge Application

Solve these word problems.

1. What will be the cost of mowing grass in a rectangular field of dimensions 240 m by 120 m at ₹50 per metre?

2. A square field has a perimeter of 480 m. What is the length of its side? Find the area of the field.

3. A playground of dimensions 42 m by 32 m needs to be fenced. Find the length of fencing required. What will be the cost of fencing at ₹50 per metre?

4. Find the length of the border needed for a quilt of length 150 cm and breadth 70 cm.

5. How many tiles of length 8 cm and breadth 5 cm are needed to tile the floor of a dining space 400 cm long and 200 cm wide?

6. 100 bricks of length 24 cm and breadth 15 cm are used to tile a path. What is the area of the path?

7. Find the area of a wall of a classroom 4.5 m high and 6 m wide.

8. The perimeter of a square is 44 cm. Find its area.

9. Find the length of a rectangle, whose area is 96 sq. m and breadth is 8 m.

Think Tank

1. **Tick (✓) the correct answer.**

(a) The area of a rectangle with length 15 cm and breadth 7 cm is _____.

    (i) 105 sq. cm ☐   (ii) 108 sq. cm ☐

    (iii) 205 sq. cm ☐   (iv) 95 sq. cm ☐

(b) The perimeter of a square with side 18 cm is _____.

    (i) 72 cm ☐   (ii) 324 cm ☐

    (iii) 36 cm ☐   (iv) 72 sq. cm ☐

(c) The area of a square with side 9 m is _____.

    (i) 81 m ☐   (ii) 81 sq. m ☐

    (iii) 80 sq. m ☐   (iv) 36 sq. m ☐

2. **Tick (✓) the unit of area you will use to find the area of the following,**

Knowledge Application

	Sq.cm	Sq.m	Sq.km
(a) A page of your notebook.	○	○	○
(b) The door of your classroom.	○	○	○
(c) New Delhi, the capital of India.	○	○	○
(d) A blackboard.	○	○	○
(e) A football field.	○	○	○
(f) Your teacher's tabletop:	○	○	○
(g) The label of your exercise.	○	○	○

Custom Learning Path

Scan to Create Your Own Learning Path

3. Complete the following table:

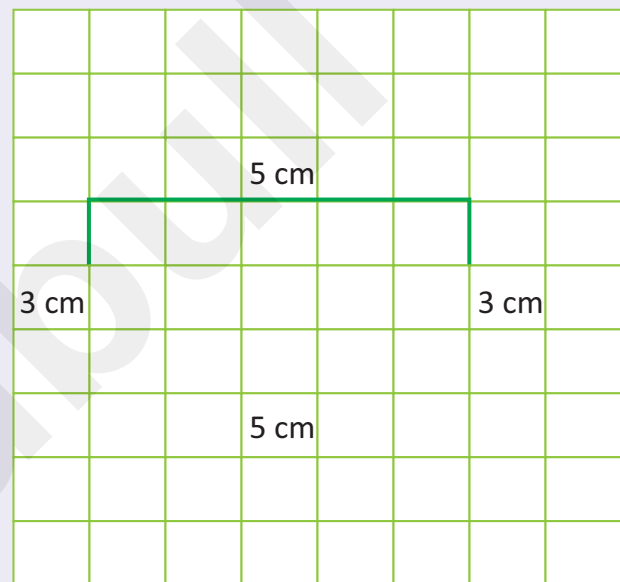|	1	2	3	4	5	6	7	8	9	10	11	12
l (cm)	8	16	14	24	11		13		16		21	
b (cm)	5		8		9	15	7	5	15	10	11	3
A (sq.cm)		144		240		270		425		220		81

Puzzle

Conceptual Learning

Vijay has made a rectangle. Find its perimeter and area.

Can you extend its length and width in such a way, so that it has equal perimeter and area.

(No, we cannot extend its length and width so that it has equal perimetre and area.)
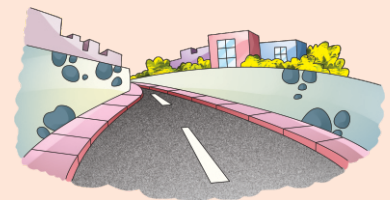

Mental Math

Critical Thinking

1. To find the distance around a field, we need to know its _____ .

2. The area of a rectangle is 40 sq. cm. If its breadth is 4 cm, its length is _____ .

3. The area of a square of side 5 cm is _____ .

4. The side of a square of perimeter 36 cm is _____ .

5. 49 sq. cm is the area of a square of side _____ .

Maths Lab Activity

Material required:

cm-squared paper, tracing paper and a sketch pen.

Procedure:

1. Take a tracing paper and put your left palm firmly on it and trace the outline with a pen.

2. Paste the tracing paper on the cm-squared paper in such a way that one of the sides must coincide with a dark line on the paper.

3. Observe the squares that lie completely inside the palm outline.

4. Mark a tick (✓) for a complete square and a cross (✗) for a half square. If a square under the figure is more than half then count the square as a complete square and mark a tick (✓) on all such squares as well.

5. Count the squares.

    Number of full squares = x and number of half squares = y

    Therefore, approximate area of your palm

    $$= \text{Number of full squares} + \frac{1}{2} \text{Number of half squares}$$
    $$= x + \frac{1}{2} y$$

    Draw more shapes on the square paper and find the area.

HOTS

When the side of a square is doubled, the perimeter increase _____ time while the area increases _____ times.