11 Perimeter and Area

In order to protect your farm from the animals, you need to put a fence around the farm. How much wire should you buy for fencing?

You will require the wire of length equal to the length of boundary.

Perimeter of a Polygon

The length of the boundary of a polygon is called the perimeter of the polygon. In other words, the distance around a polygon is its perimeter.

We use the perimeter to find the :

❖ length of the border of a saree, shawl, quilt or blanket.

❖ length of coir or rope needed to fence a park, farm, field, garden or a piece of land.

INFO ZONE

○ A perimeter of any polygon is the sum of the lengths of its sides or line segments.

❖ length of frame needed for a picture or a blackboard.

❖ distance around a field or park.

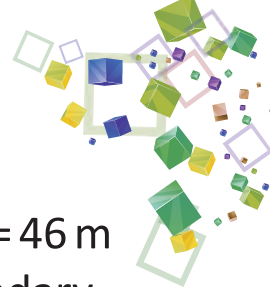Perimeter of a polygon = Sum of the lengths of sides of the polygon

Example I : Which has a longer boundary — field A or field B?

Field A: 9 m (top), 6 m (left), 12 m (slant side), 18 m (bottom)

Field B: 7 m (top), 2 m, 7 m, 9 m (left), 7 m (right), 14 m (bottom)
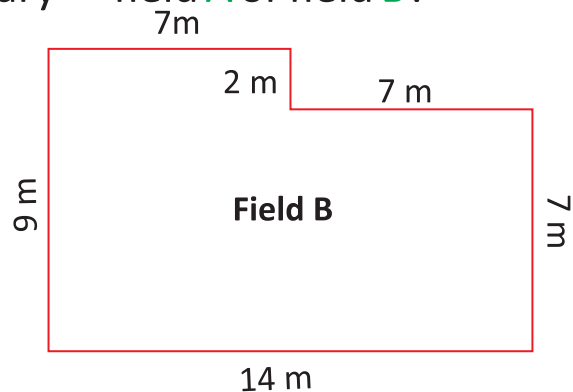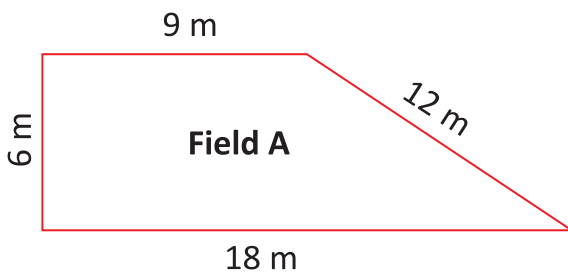
Solution : Boundary = Perimeter = Sum of the lengths of sides

Field A :   Perimeter = 9 m + 12 m + 18 m + 6 m = 45 m.

Field B :   Perimeter = 7 m + 2 m + 7 m + 7 m + 14 m + 9 m = 46 m

Since, 45 m < 46 m, so, field B has a longer boundary.

Example II : Find the perimeter of the shapes. Whose perimeter is bigger?

2 cm
1 cm

1 cm   2 cm
1 cm
2 cm
Shape B
4 cm   2 cm

6 cm

1 cm
1 cm
3 cm
3 cm   **Shape A**   2 cm
4 cm
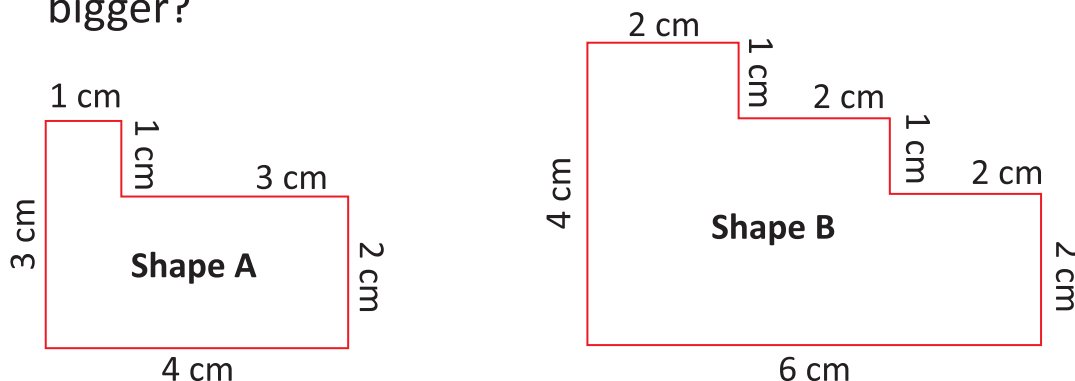
Solution : Perimeter of shape A = Sum of the sides of shape A

= 3 cm + 1 cm + 1 cm + 3 cm + 2 cm + 4 cm

= 14 cm

Perimeter of shape B = Sum of the sides of shape B

= 6 cm + 4 cm + 2 cm + 1 cm + 2 cm +

1 cm + 2 cm + 2 cm

= 20 cm

The perimeter of shape A is 14 cm and the perimeter of shape B is 20 cm. So, perimeter of shape B is bigger.

Example III: Find the length of the third side of the given figure if its perimeter is 36m.

Solution : Sum of 2 sides   = 10 m + 13 m = 23 m

Length of third side = Perimeter – Sum of 2 sides

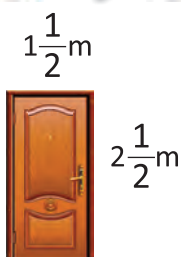= 36 m – 23 m = 13 m

The length of the third side is 13 m.

?   13 m
10 m
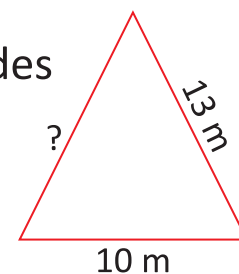
E X E R C I S E 11.1

1. Find the perimeter.

a.

10 cm   5 cm

b.

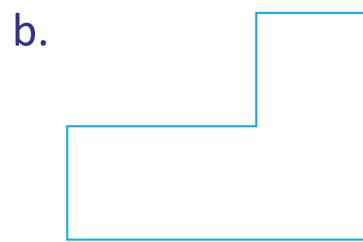$1\frac{1}{2}$ m

$2\frac{1}{2}$ m

c.

2 cm

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5 cm

2. Find the perimeter of each figure. The side of each small square is 1 cm.

a.   b.   c.

d.   e.   f.

g.   h.   i.
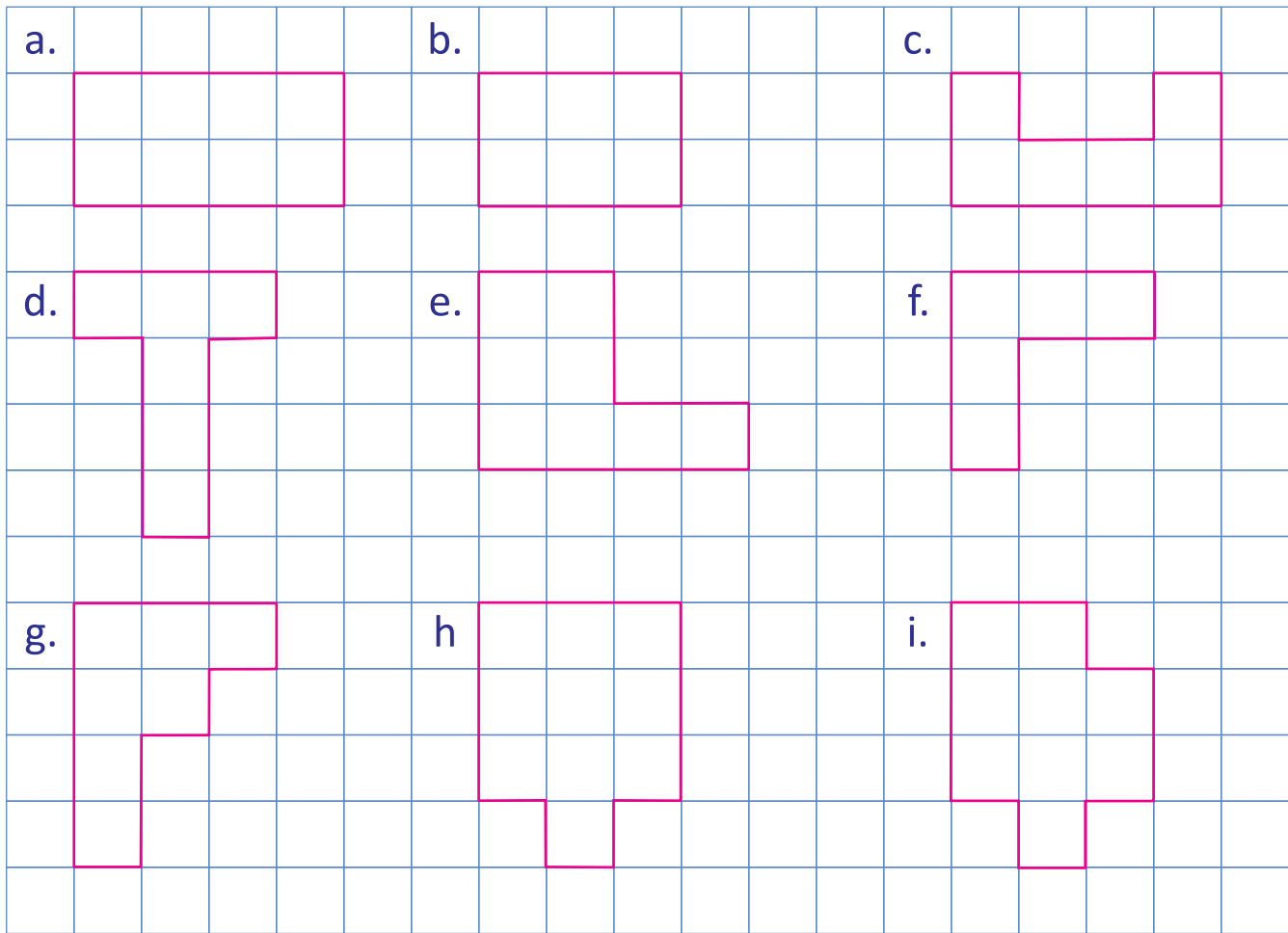
3. Measure the sides of the given shapes with a scale. Find the perimeter of each.

a.

b.
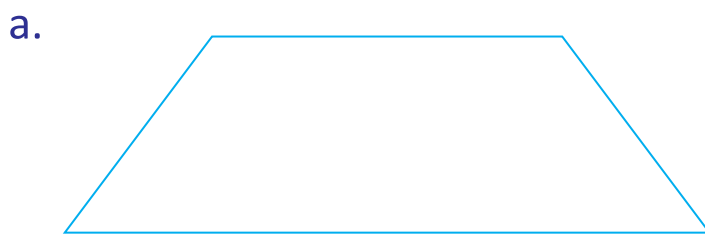
4. Find the missing length.

a.
8 cm
?
6 cm
3 cm
Perimeter = 21 cm

b.
8 m
4 m
?
4 m
Perimeter = 22 m

A Gateway to Mathematics-4

5. Aany has to fix a lace around a carpet. She bought a 50 m roll of lace. How much lace will be needed for one carpet? How much lace will be used for 5 such carpets? How much lace will be left over?

1 m 50 cm

6. Every morning Mrs. Vidya walks around a triangular park of sides 90 m, 120 m and 150 m. If she walks four rounds of the park, then how much distance does her walk?

7. A square mirror of side 30 cm has to be framed. What is the length of the frame needed? Give the answer in metres and centimetres.

(**Hint :** All sides of a square are equal.)

8. Rita has a 1 m long ribbon. She uses it to decorate the given handkerchief. How much ribbon will be left over?

(**Hint :** 1 m = 100 cm)

Area

The number of square units needed to cover a region occupied by a figure/thing is the area of the figure/thing.

Look at Raman's stamps. Which stamp has the maximum area and which has the minimum?

Stamp A covers .... number of squares.

Stamp B covers .... number of squares.

Stamp C covers .... number of squares.

Which stamp covers the maximum number of squares? ....

Which stamp covers the minimum number of squares? ....

We say, the area of stamp .... is more than stamp .... and stamp ....

Area is the amount of surface a figure covers.

Draw around some objects like your eraser and sharpener.
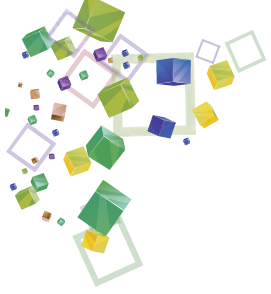
The area covered by the eraser is 20 square units.

The area covered by the sharpener is 15 square units.
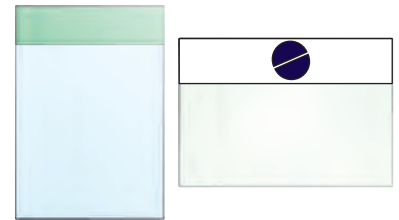
EXERCISE 11.2

1. Count the number of squares each shape covers. Write its area.

a.

b.

c.

d.

e.

f.

g.

h.

i.

A Gateway to Mathematics-4

2. **What is the area of the given shapes?**
Hint : Divide the shape into squares to find out.

a.

8 cm

1 cm

7 cm

3 cm

2 cm

1 cm

b.

5 cm

1 cm   1 cm

2 cm   2 cm

2 cm   2 cm

1 cm

3. What is the area of the given shape? The side of each square is 1 unit. Draw a shape with a greater area. Draw a shape smaller in area.

Area = ... sq. units

4. The given shape has an area of 8 square units. Draw shapes of area 5, 7, 9 and 10 square units.

5. **Find the area of these book covers. The side of each square is 1 unit.**

a.

b.

c.

d.

Finding the Area of Irregular Shapes

Example IV :   Find the area of given rocket.
Solution   :   The rocket covers 8 whole squares and 4 half squares.

4 half squares = 2 squares

So, the area of the rocket

= 8 + 2 = 10 sq. units.

		1	2	
		1	2	
		3	4	
		5	6	
3	7	8	4	

Example V : Find the area of given figure.

Solution : The figure covers 19 whole squares.

6 half squares = 3 squares

4 more than half squares

= 4 squares

Leave out the squares that cover less than half.

So, the area of the figure

= 19 + 3 + 4 = approximately 26 sq. units.

Less then half square

More than half square
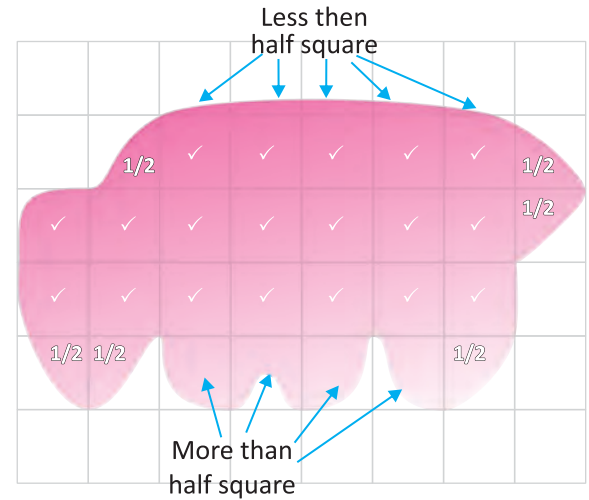
INFO ZONE

- Area is the measure of the surface of the plane covered by a closed plane figure.
- While calculating the area of an irregular shape, consider
  $\frac{1}{2}$ square + $\frac{1}{2}$ square = 1 square.
- More than half square = 1 square.
- Do not count the square which is less than half square.

EXERCISE 11.3

1. **Calculate the area of these shapes in square units. The side of each square is 1 unit.**

a.

b.

c.

d.

e.

A Gateway to Mathematics-4
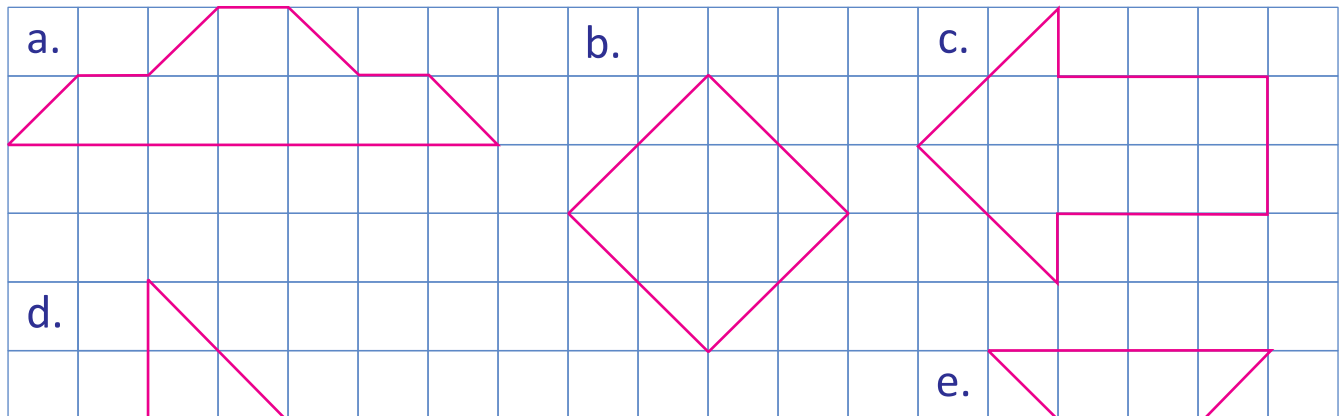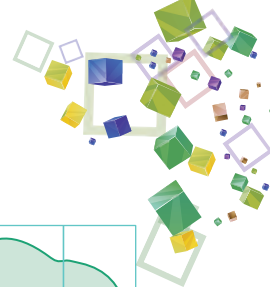
2. Find the area of these leaves.

a.
b.
c.
d.
e.

RECAP EXERCISE

1. Multiple Choice Questions (MCQs)
Tick (✓) the correct options:

a. The perimeter is same as the sum of .... of a polygon.

(i) area

(ii) sides

(iii) volume

(iv) none of these

b. If the length and breadth of a rectangular field is 9 m and 6 m. What is its perimeter?

(i) 54 m

(ii) 30 m

(iii) 108

(iv) none of these

c. The unit of area is.......................

(i) square unit

(ii) unit

(iii) cm^3

(iv) m^4

d. Area of a square whose side is 4 cm is....................... .

(i) 8 cm

(ii) 12 cm

(iii) 16 cm

(iv) $16\ cm^2$

e. A hexagon has......................sides.

(i) 4

(ii) 5

(iii) 6

(iv) 7

2. Find the perimeter of the following shapes.

a.

4 cm   4 cm   3 cm   8 cm
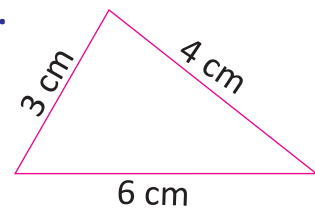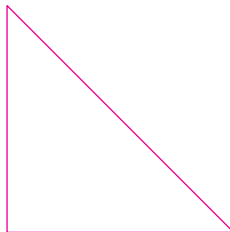
b.

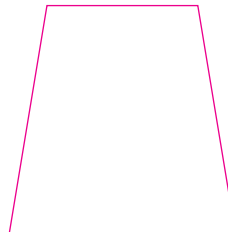2 cm   5 cm   4 cm   5 cm

c.

3 cm   4 cm   6 cm
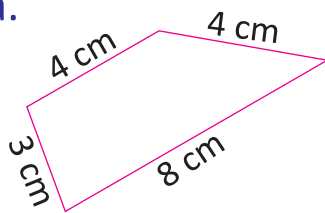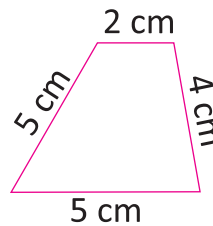
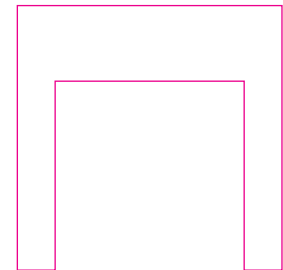## 3. Measure the sides by ruler and find the perimeter of the following shapes.

a.

b.

c.

4. Find the area of the following shapes.

a.

2 cm   5 cm

b.

6 cm   3 cm

c.
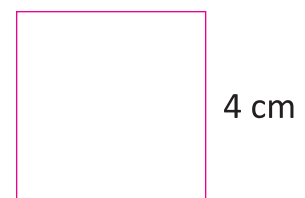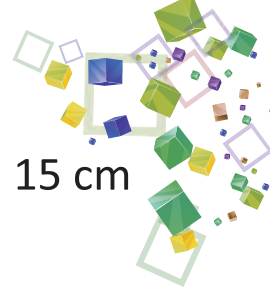
4 cm
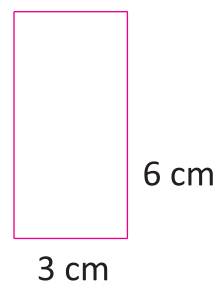
5. Naina wants to make a photo frame. She has a photo of length 15 cm and breadth 10 cm. How long frame will be required?

6. How much carpet is required to cover a field of length 25 m and breadth 10 m?

7. A play ground is 260 m long and 225 m wide. What is the area of the field?

8. The length and width of a table are 3 m and 2 m respectively. Find the area and perimeter of the table.

9. Rekha bought a mat 7 m long and 4 m broad. Find the area and perimeter of the mat.

HOTS

What length of ribbon is needed to tie the gift of length 6 cm and breadth 4 cm?

Lab Activity

Objective : Working with perimeter and area.

Materials : Sheet of drawing paper, scale, pencil, a pair of scissors, tape to hold the folds together.

Presentation :

❖ Draw the figure shown alongside, having 6 equal square surfaces of side 5 cm on a thick sheet of paper.

❖ Cut along the bold lines and fold on the dotted lines to make a cube.

❖ Now, make an observation table.

Perimeter = ...

Area of all the surfaces = ...