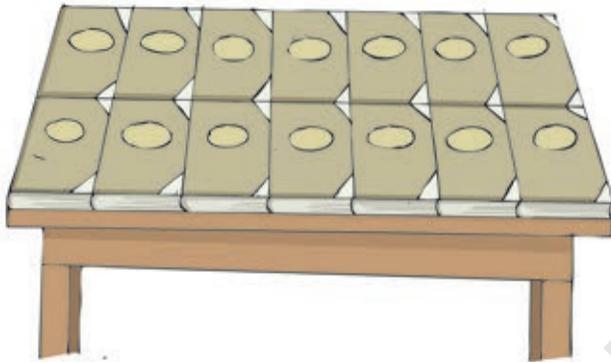


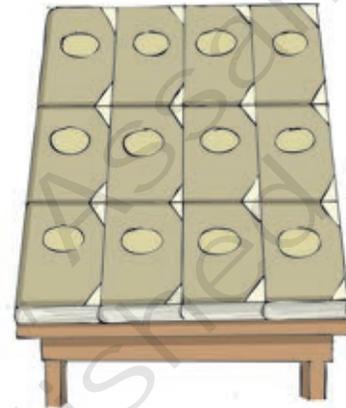


AREA AND PERIMETER

Which of the two tables is larger :



(a)



(b)

Look at the two tables shown above. Count the number of books covering the top surfaces of the two tables. Which top surface of the two tables is covering a larger space?

How much area for which one?

⇒ Area of the table (a) = The sum of areas of number of Mathematics Books.

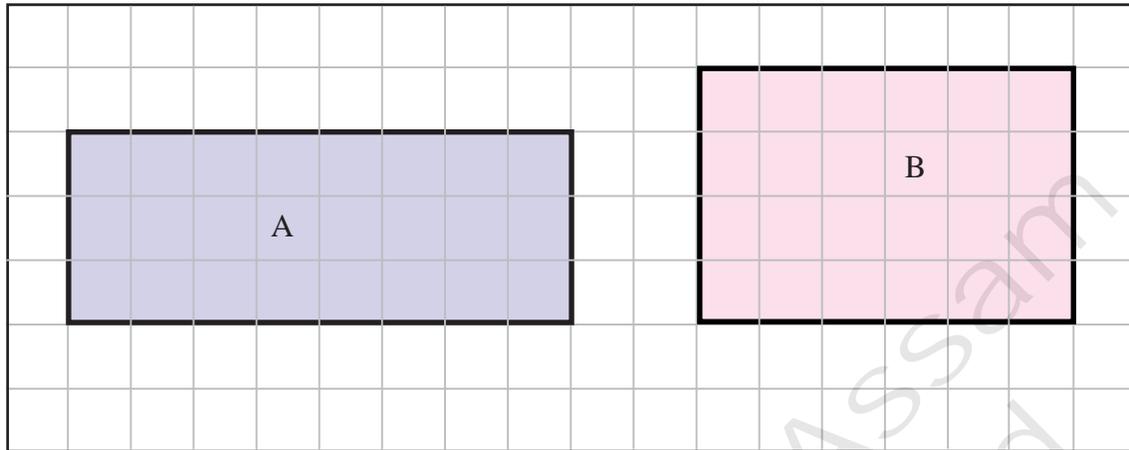
⇒ Area of the table (b) = The sum of areas of number of Mathematics Books.

⇒ The larger table is →

Which one is larger?

Can you say, which of the following figures is covering more space? To measure the regions covered by the two figures, you can use a small piece of square paper.

The two rectangles shown in the picture are placed on a squared paper (Graph paper):



The area of the square piece  is 1 square unit.

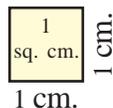
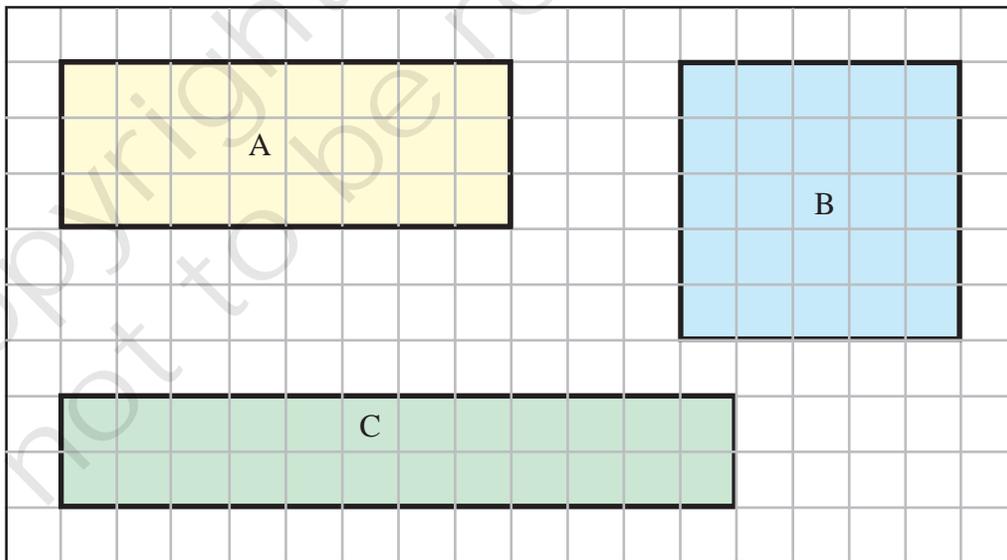
Observe now :

- ⇒ How many squares on the squared paper are covered by the first rectangle?
- ⇒ How many squares on the squared paper are covered by the second rectangle?
- ⇒ Are the two figures covering the same number of squares?

What did you understand? Are the areas of the two figures not equal?

Observe : The figure covering more squares has the greater area.

Let us compare areas –

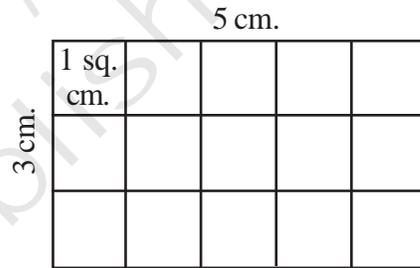


A small square with length of each side equal to 1 cm. Its area is assumed to be **1 square cm.**

- ☞ The figure A is covering 24 squares.
- ☞ The figure B is covering _____ squares.
- ☞ The figure C is covering _____ squares.
- ☞ Which of the three figures is covering the largest number of squares _____?
- ☞ Which figure has the largest area _____?
- ☞ By how many squares is the area of the figure B more than the figure A?
- ☞ Considering the area of each small square as 1 square cm, isn't the area of the figure A equal to 24 square cm?
- ☞ What is the area of the figure B? _____ square cm.
- ☞ What is the area of the figure C? _____ square cm.

Let us calculate area of a rectangle :

As shown in the adjoining picture the area of the rectangle is 15 square cm, since it is covering 15 small squares. The area of a small square is 1 square cm. and therefore the area of the rectangle is 15 square cm. Now observe that the length of the rectangle is 5 cm and that its breadth is 3cm (since the length as well as the breadth of each small square is 1cm) So, the area of the rectangle can be calculated easily by multiplying its length by breadth. Isn't it? Let us see—



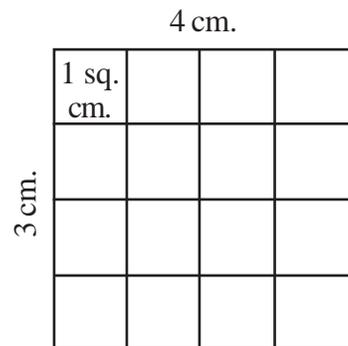
$$\text{Area of the rectangle} = 5 \times 3 \text{ square cm} = 15 \text{ square cm.}$$

Thus we have –

$$\text{Area of the rectangle} = \text{length of the rectangle} \times \text{breadth of the rectangle.}$$

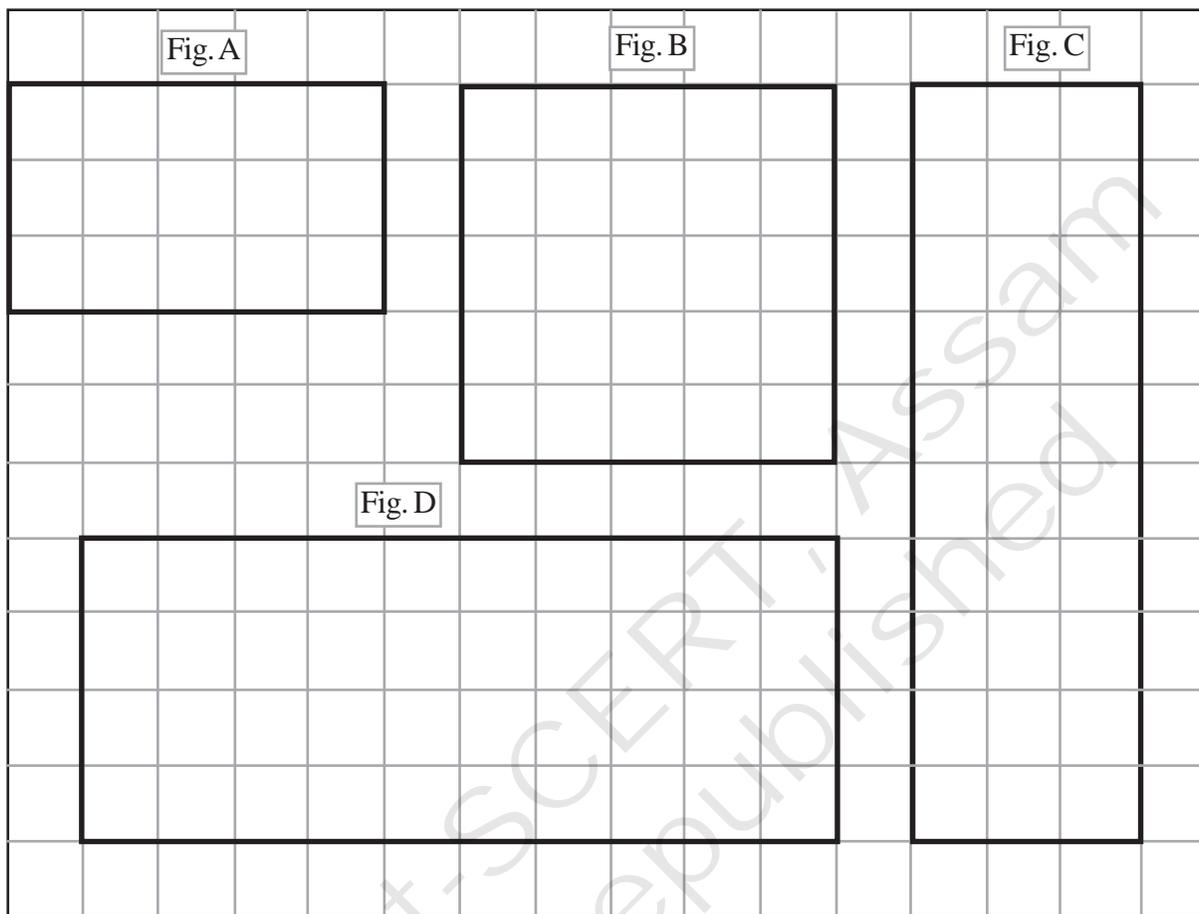
Area of a square :

The measure of each of the adjoining square is 4cm. Now each side of the square is divided into 4 equal parts. How many small squares are obtained? Area of each small square = 1 square cm and the whole square has altogether 16 small squares. So, the area of the square = 16 square cm = 4×4 square cm. Thus, we can show that the area of the square is obtained by multiplying the length of its side by itself. If the unit of length is cm, then the unit of area will be written as square cm.



i.e. $\text{Area of square} = \text{side} \times \text{side}$

Practice Session :



1 cm.



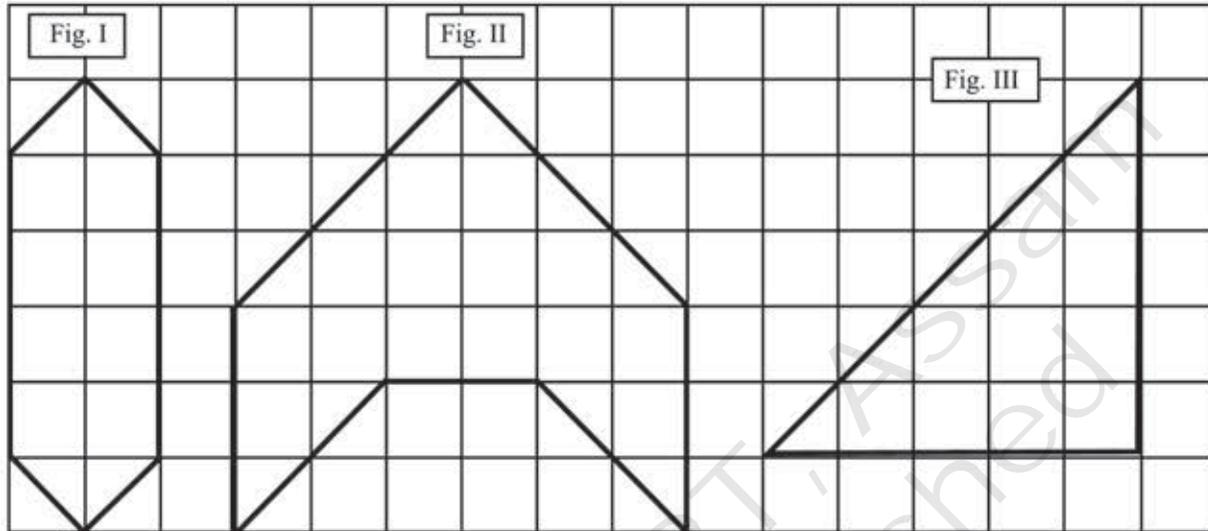
Its area is 1 square cm.

★ Look at the figures given above. Let us fill up the table given below–

Figures	Measuring by square pieces		Measuring the lengths and breadths		
	Number of squares	Area	Length (cm.)	Breadth (cm.)	Area (sq. cm.)
Figure A					
Figure B					
Figure C					
Figure D					

★ Let us calculate areas of shapes other than squares and rectangles.

Look at the figures given below and answer the questions—



→ 1 square cm.
1 cm.



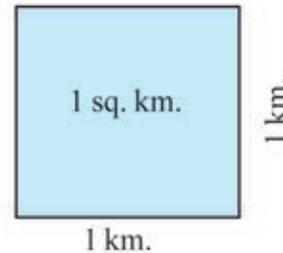
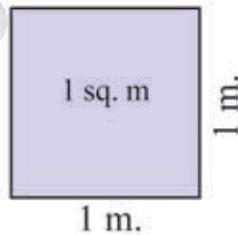
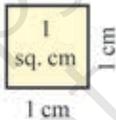
→ Half of 1 square cm.
 $= \frac{1}{2}$ square cm.



2 = 1 square cm.

- ◆ Area of Fig. I square cm
- ◆ Area of Fig. II square cm
- ◆ Area of Fig. III square cm
- ◆ Which figure has the largest area

☞ Let us make ourselves familiar with different units –

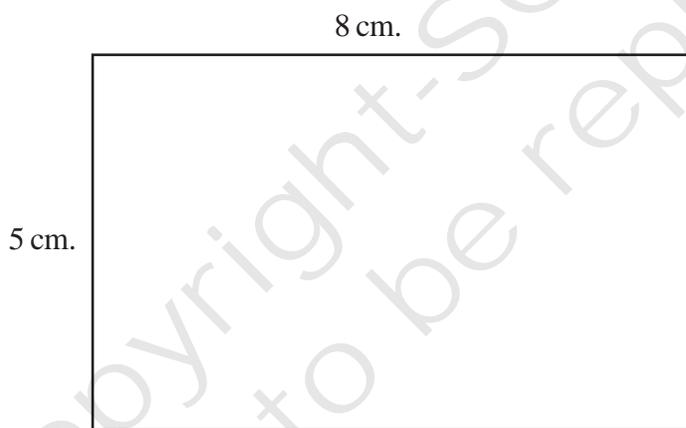


Generally we use square meter (sq.m) to calculate the areas of floors, walls, yards, gardens etc of a house. To calculate areas of bigger regions like cultivating fields, forests etc. we use square kilometer (sq.km.) To calculate areas of smaller shapes like a note book page, card, mobile screen, television screen etc we generally use square centimeter (sq.cm)

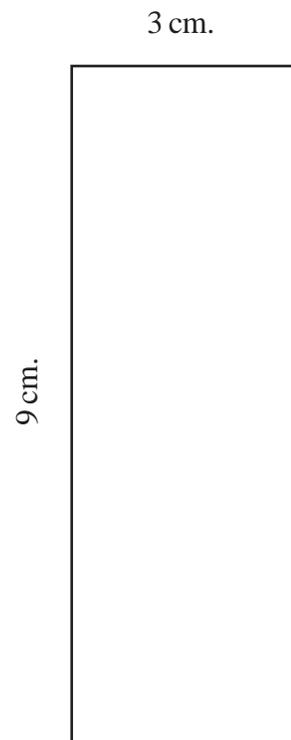
Guess the unit in each of the following cases and put mark in appropriate column in appropriate case.

Area	sq.cm.	sq.m.	sq.km.
(a) Area of a handkerchief	✓		
(b) Assam's land area			
(c) Area of cultivating field			
(d) Area of a Ludo Board			
(e) Area of a house floor			
(f) Area of a garden			
(g) Area of Kaziranga Forest Sanctuary			
(h) Area of a Blackboard			

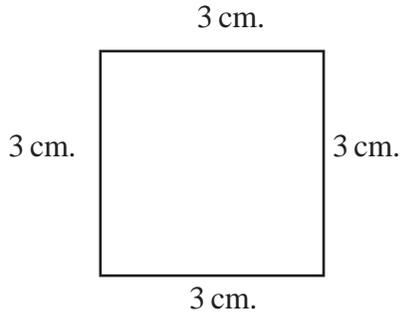
☞ Let us find out areas of the following figures :



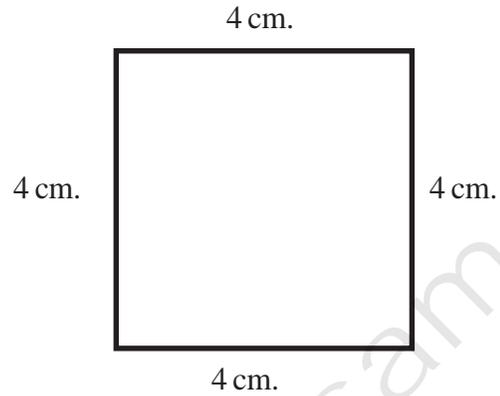
Area =



Area =

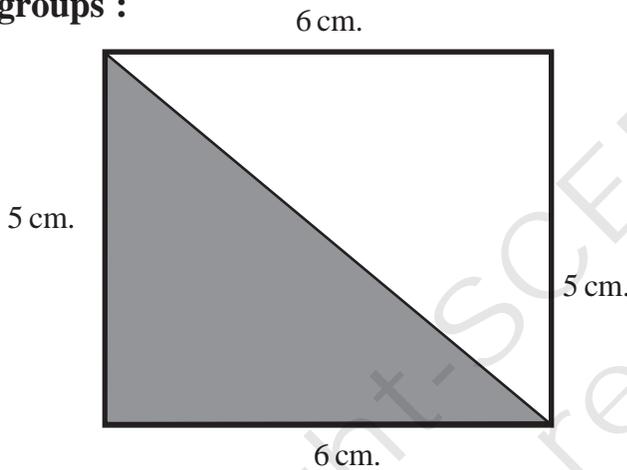


Area =

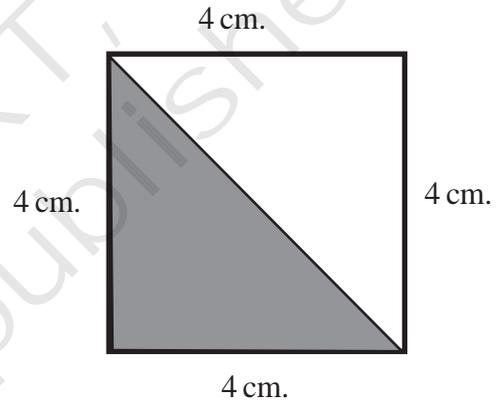


Area =

☞ Try to obtain the areas of coloured parts of the following figures in groups :



Area of the coloured part



Area of the coloured part

Let us solve the problems :

☞ Jiten's father wanted to lay tiles on his bedroom floor. The length and breadth of the room are 14 feet and 12 feet respectively. If the tiles brought from market are of same length and breadth equal to 2 feet then what is the area of each tile? What is the required number of tiles for the floor?

Note that 'foot' is a unit of length. Now a days, it is rarely used.

☞ A thick piece of paper has length 12cm and breadth 8cm. How many stamps of size 4 sq.cm. each can be pasted on the thick paper?

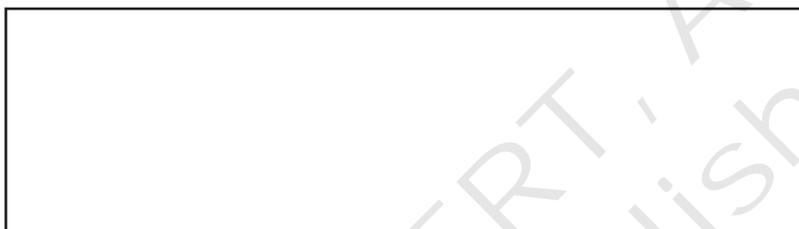
Activity : Measure the length and breadth of your class room in meter. Write down the results you have got –

Length = meters, Breadth = meters,

✎ Determine the area of the floor of the class room.

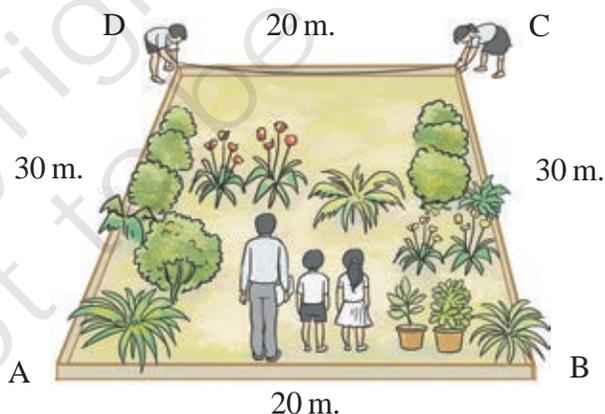
Activity : Think about how different rectangular shapes with area equal to 100 square centimeters can be cut off from a paper sheet and write down the measure of these rectangular pieces. Now, cut the paper to make these rectangles (measures may be different)

How many rectangles of length 5cm and breadth 2 cm. can be pasted upon a square paper of area 100 sq.cm. ? Try it.



Measure of Flower Garden Fencing :

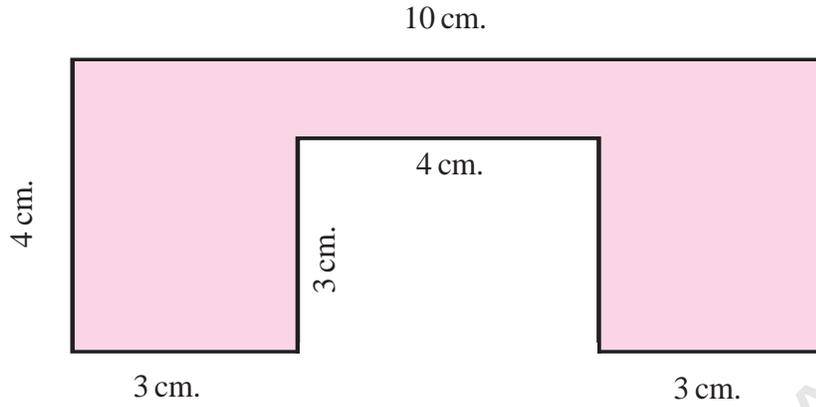
The headmaster took the students of class V to the flower garden of the school. He gave a measuring tap to the students and asked them to measure the four boundaries of the fencing. Starting from one end the students took measurements of all four boundaries of the garden. “This measurement is the **perimeter** of the garden”, The headmaster told the students.



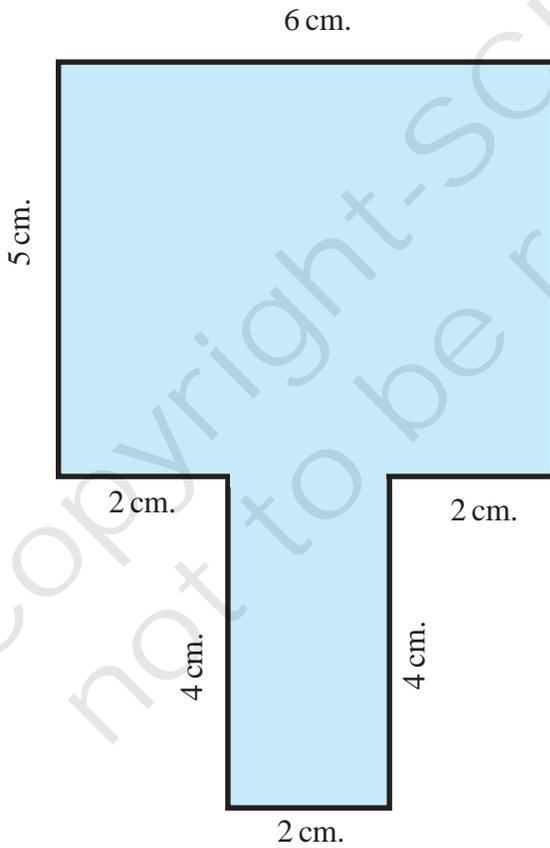
Starting from A, going around the boundaries and finally coming back to A, the total length will be = $20\text{m} + 30\text{m} + 20\text{m} + 30\text{m} = 100\text{m}$

Total measure of the whole boundary is called perimeter.

Find the Perimeters of the shapes given below :



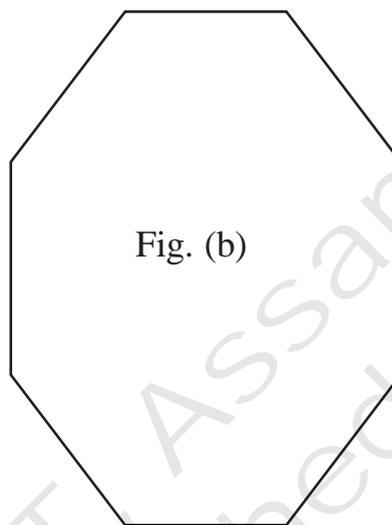
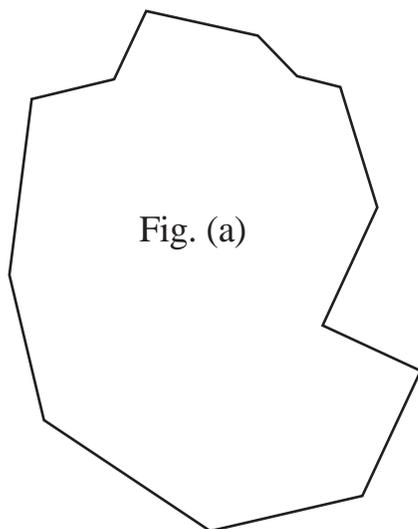
Perimeter =



Perimeter =

Discuss about how you have got the perimeters

Activity : Try to find the perimeters of the two figures given below. (Do it in a team of two)



How to do it?

Take a flexible thread. Hold one end of the thread upon any point of the figure and carefully go on laying the thread over the whole boundary of it. Finally, when the thread reaches the starting point, put a mark on the thread and cut it there. Now measure the length of this thread. The length of the thread is the perimeter of the figure.

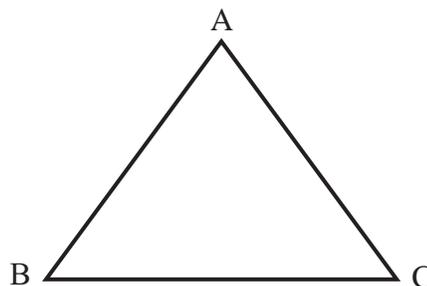
Perimeter of a triangle :

Let us measure the sides of the adjoining triangle –

$$AB = \text{---} \text{ cm.}$$

$$BC = \text{---} \text{ cm.}$$

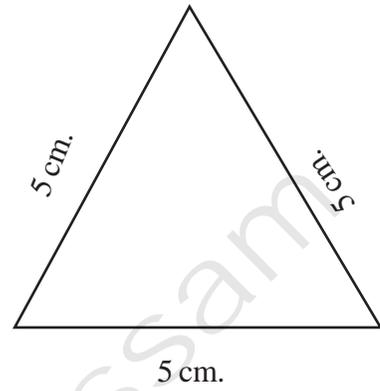
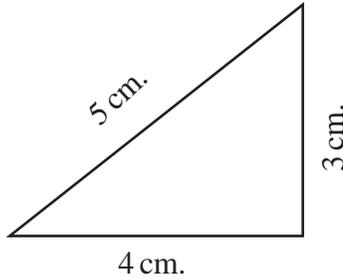
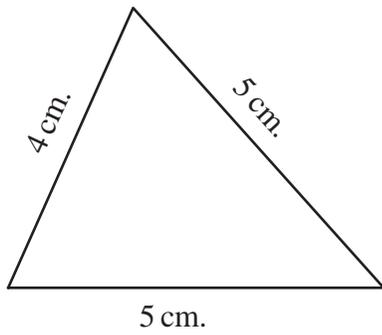
$$CA = \text{---} \text{ cm.}$$



$$AB + BC + CA = \text{---} \text{ cm.}$$

This measure is the perimeter of the triangle. Is not it?

☞ Measures of sides of the following triangles are given. Let us find their perimeters—



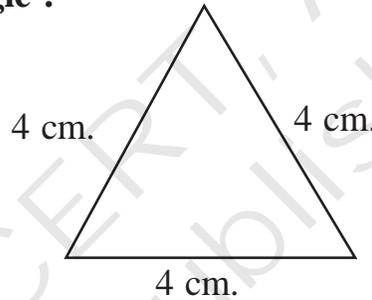
Perimeter = cm. Perimeter = cm. Perimeter = cm.

Perimeter of the equilateral triangle :

$$AB = 4 \text{ cm.}$$

$$BC = 4 \text{ cm.}$$

$$CA = 4 \text{ cm.}$$



$$\text{Perimeter of equilateral triangle ABC} = 4\text{cm} + 4\text{cm} + 4\text{cm}$$

$$= 12\text{cm}$$

$$= 3 \times 4\text{cm}$$

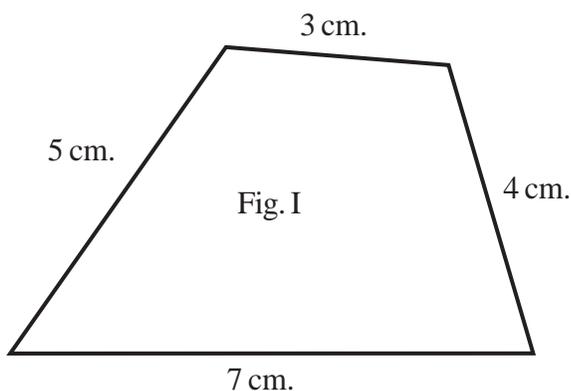
$$= 3 \times \text{length of one side}$$

Perimeter of an equilateral triangle = 3 × length of one side

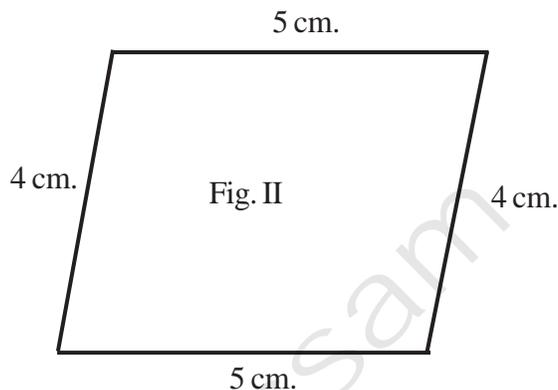
☞ Let us fill up the following table –

Length of one side of the equilateral triangle (in cm.)	Perimeter (in cm.)
5	<input type="text"/>
<input type="text"/>	30
7	<input type="text"/>
<input type="text"/>	24
3	<input type="text"/>

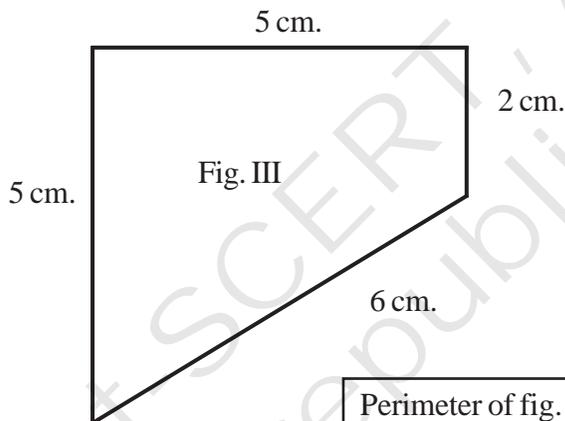
☞ Let us find the perimeters of the quadrilaterals given below –



Perimeter of fig. I = _____ cm.

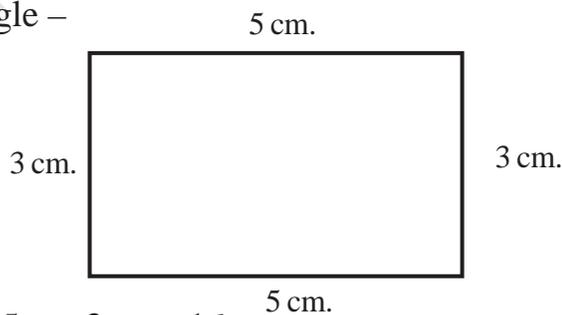


Perimeter of fig. II = _____ cm.



Perimeter of fig. III = _____ cm.

Let us observe the perimeter of a rectangle –



Perimeter of the rectangle = $5\text{cm} + 3\text{cm} + 5\text{cm} + 3\text{cm} = 16\text{cm}$

Is there an easier way to find the perimeter of the rectangle?

Try to find it out –

Perimeter of the rectangle = length + breadth + length + breadth
 $= 2 \times (\text{length} + \text{breadth})$. Isn't it?

Perimeter of a rectangle = $2 \times (\text{length} + \text{breadth})$

☞ Let us find perimeters of the rectangles using formula–

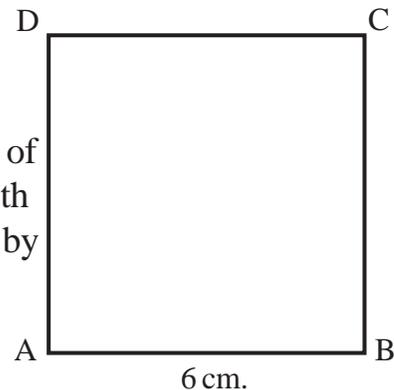
(a) Length = 8 cm., Breadth = 6cm.	Perimeter =
(b) Length = 50 cm., Breadth = 42 cm.	Perimeter =
(c) Length = 90 cm., Breadth = 40 cm.	Perimeter =
(d) Length = 15 cm., Breadth = 8 cm.	Perimeter =
(e) Length = 20 cm., Breadth = 8 cm.	Perimeter =

Solve :

- Length and breadth of a rectangular garden are 10 m. and 8m respectively. What is its perimeter?
- Perimeter of a rectangle is 40cm and its length is 15cm. What is its breadth?
- Length and breadth of a rectangular field are 120m and 80m respectively. Find the perimeter of the field.
- The perimeter of a rectangular floor is 16m. If the breadth of the floor is 3m, what is its length?
- A rectangle is made of a smooth wire of length 20cm. If the length of the rectangle is 6cm, find its breadth.

Perimeter of a square :

Look at the adjoining figure. ABCD is a square. Each of its sides has equal length. Suppose each side has length equal to 6cm. What is its perimeter then? Let us see– by adding the lengths of sides AB, BC, CD and DA you will get the perimeter of the square.



That is, the perimeter of the square = $6\text{cm} + 6\text{cm} + 6\text{cm} + 6\text{cm}$
 $= 4 \times 6\text{cm}$
 $= 4 \times \text{length of a side}$

$$\text{Perimeter of a square} = 4 \times \text{length of one side}$$

Therefore,

$$\text{Length of one side of a square} = \text{Perimeter} \div 4$$

☞ Try to find the perimeter of the square if :

- (a) Length of a side = 3cm. (b) Length of a side = 7cm.
 (c) Length of a side = 6cm. (d) Length of a side = 5cm.

- ⇒ Perimeter of a square garden is 120 meter. What is the Length of one side?
 ⇒ The measure of whole boundary of a square playground is 400 meters. Find the measure of one side of the playground.

Activity : Divide the students of your class into three teams. Name the teams as A, B and C. Let each team cut off 12 square pieces of side length 5cm each from a thick sheet of paper.

Let the team A arrange the square pieces one by one in a line as shown in the picture

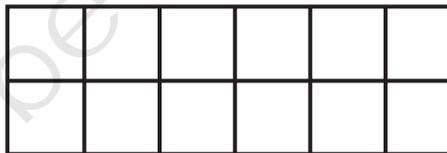


arrangement by team A

Find the area and perimeter of the arrangement made by the team A.

perimeter Area

Let the team B arrange the 12 squares in two rows with each row having 6 squares as shown in the picture

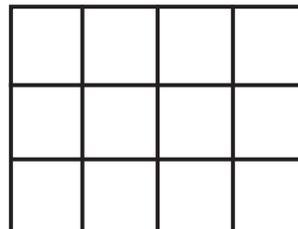


arrangement by team B

Find the perimeter and area of the arrangement made by the team B

Perimeter Area

Again, let the team C arrange the 12 squares in three rows with 4 squares in each row. Find the area and perimeter of the design.



arrangement by team C

Perimeter Area

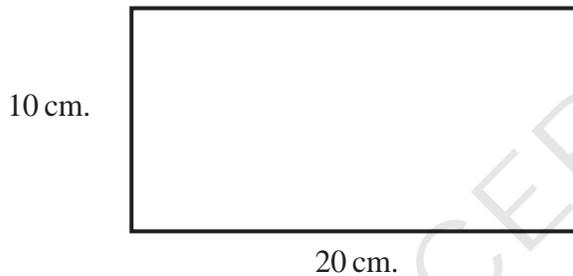
- Is the value of area of each team the same?
- Also, have you found the values of perimeters obtained by the teams all different?
- Discuss in your team why the values of perimeters are all different?

Activity :

Take a smooth wire of length 60cm. Try to form rectangles of different sizes with the help of the wire. Find the perimeter and area of each of these rectangles.

Will you get the same perimeter in each case? Do you see any change in the values of its areas?

Think over it (Some measures are given below)



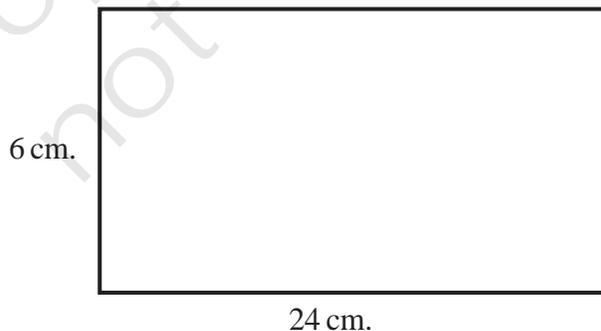
Perimeter = cm.

Area = sq. cm.



Perimeter = cm.

Area = sq. cm.



Perimeter = cm.

Area = sq. cm.

Activity :

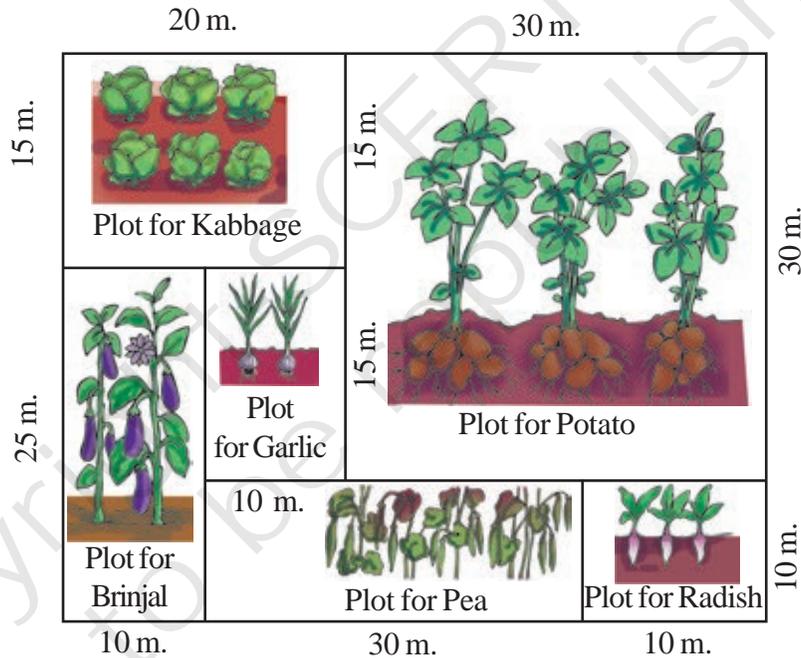
Draw a square of side 4cm. Mark it as 'A'.

Draw another square of side equal to three times the side of the first one. Mark it as 'B'

- ☞ What is the perimeter of the square 'A'?
- ☞ What is the perimeter of the square 'B'?
- ☞ What is the area of the square 'B'?
- ☞ By how many times the area of the square 'B' is more than the area of the square 'A'?
- ☞ Find the difference of perimeters of the two squares?
- ☞ Find the difference of areas of the two squares?

Let us solve Arnob's problem :

Arnob's father decided to cultivate Rabi crops in the plot of land near his house. He divided the plot as given below –



- ☞ What is the area of the plot Arnob's father is willing to cultivate?
- ☞ What will be the length of the fencing if the plot is covered by a fence along its boundary?
- ☞ At the rate of Rs40/- per meter, what will be total cost of fencing the boundary of the plot?
- ☞ What is the area of the plot for potato?
- ☞ Find the perimeter of the plot for brinjal.
- ☞ What crop was cultivated in the plot with the smallest land area?

