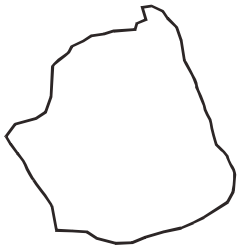
Chapter 17

MENSURATION - 2

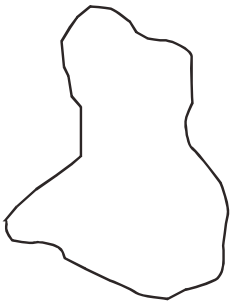
PERIMETER

Look at the given figures. They have been made by thread.



A

Fig 1



A

Fig 2

A

Fig 3

In the above figures if we start moving from a point A and complete a full circle and return to A again, it is definite that the distance covered would be equal to the length of the thread required to make this figure. This is therefore, the length of the circumference of the figure.

Make some more such figures with the help of thread and find the length of the circumference of the figures you have made. This is known as the perimeter of the area.

You must have noticed that only one round of the circumference of an area is the perimeter, therefore, when we are trying to make a boundary of wire or bricks for a particular area, we need to measure its perimeter.

Perimeter

Many objects are used in our daily life which are circular, triangular and rectangular in shape. You have already seen objects of these shapes. The page of your notebook, chess board, carrom board etc. are rectangular in shape.

The notebook, chess board, book, posters, blackboard are all rectangular. Some of these are square in shape too. Find out some more objects around you and calegolise the rectangular and square shaped objects.

List them out in the space given below:

Only rectangular object	Objects that are in square shaped also
1. Page of your copy.	1.
2.	2.
3.	3.
4.	4.
5.	5.

Now look at edges of the following figures and say how many edges do they have?

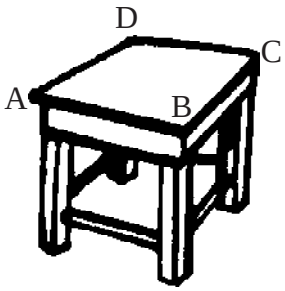


Fig. 4

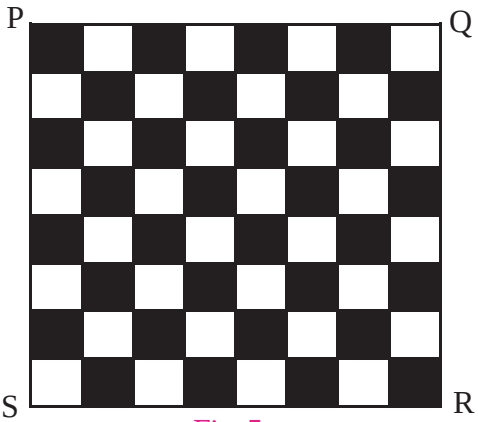


Fig. 5

Here, you can see that the table has 4 sides. Similarly, the chessboard also has 4 sides.

Let us find the perimeter of some rectangular objects.

ACTIVITY 1

Measure the edges of the upper surface of the table (fig. 4) and write them down:

AB =…….. cm BC =……cm

CD = …..…….. cm DA =……cm

Now add all the lengths and write them down

The sum of all the 4 edges =

= AB + BC + C D + DA = ... + ... + ... + ...+

= ..... cm

ACTIVITY 2

Similarly, measure the outer edges of the chessboard and add them

PQ + QR + RS + SP = ...+.....+.....+..... = ... cm

ACTIVITY 3

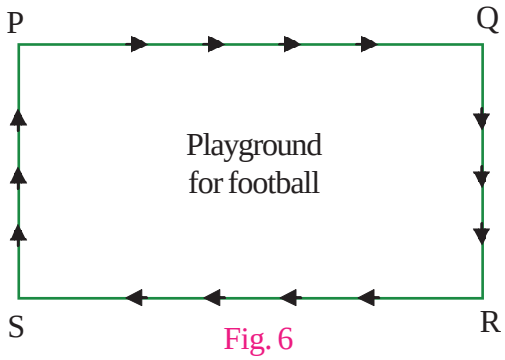


Fig. 6

Figure 6 is a football playground PQRS. A student of class VI, Golu, wakes up at 5 O'clock and runs around the playground once everyday. Can you say, how much distance does Raju walks everyday?

Total distance covered by Golu in one round = length of PQ + length of QR + length of RS + length of SP.

In all these activities 1, 2, and 3, you have seen that the sum of the lengths of all the edges of the figure is the perimeter of the figure.

Find out perimeter of the given figures and fill in the blanks :

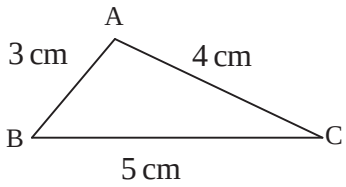


Fig. 7

Perimeter = ...

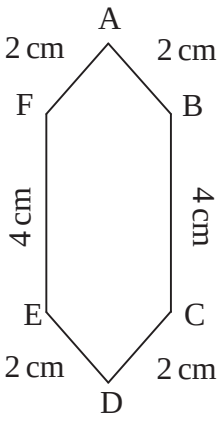


Fig. 8

AB + BC + CD + DE + EF + FA

= __ + __ + __ + __ + __ + __

Perimeter = ...

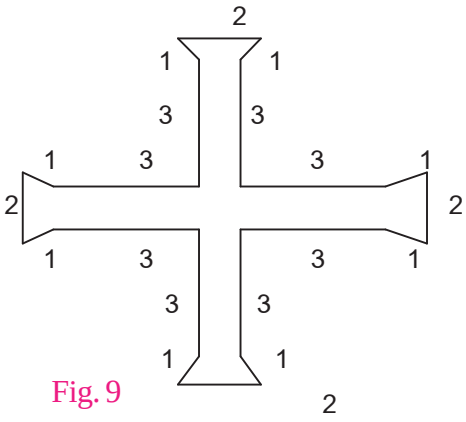
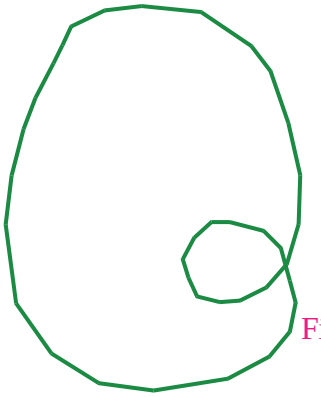


Fig. 9

Perimeter = ...

Keep a thread on the picture and measure its length. That would be the perimeter of the figure.



Perimeter =.....

Fig. 10

Perimeter =.....

Fig. 11

Perimeter =.....

Fig. 12

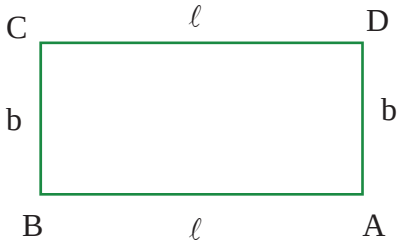
Practice 1

1. The length of a rectangular garden is 6cm and its width is 3cm. You need to make a boundary of wire around it, find the length of the wire you'll require.
2. In a rectangular playground that is 100m long and 50m wide, how much distance will be covered while taking 2 rounds of the playground.

How will you find perimeter? You must have understood that

Perimeter of the rectangle = the length of its four sides

Now if the length of the rectangle is 'ℓ' and 'b' is its breadth then,



Perimeter of rectangle = the sum of the 4 sides of the rectangle

= length of AB + length of BC + length of CD + length of DA

= ℓ unit + b unit + ℓ unit + b unit

$= \ell$ unit + ℓ unit + b unit + b unit

$= (\ell + \ell)$ units + (b + b) units

$= 2\ \ell$ units + 2 b units

$= 2\ (\ell + b)$ units

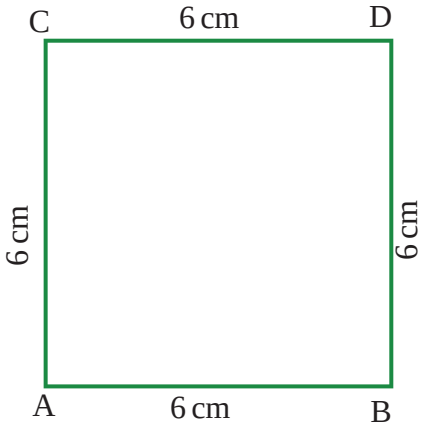
Therefore, the perimeter of a ℓ unit long and b unit wide rectangle

$= 2\ (\ell + b)$ units

The perimeter of the rectangle = 2 (length + width)

Perimeter of Square

The length of the side of a square is 6cm. What is its perimeter?



Perimeter of a square = Total length of the 4 sides of square

= 6 cm + 6 cm + 6 cm + 6 cm

= 4 × 6 cm (one side of 6 cm)

∴ Perimeter of square = 4 × length of one side

Perimeter of square = 4 × side

Unit of Perimeter

Perimeter is the total length of the circumference of the closed figure. So, what should be its unit? Since perimeter is actually the length and its unit would be the unit of length.

Fill in the blanks in the given table:

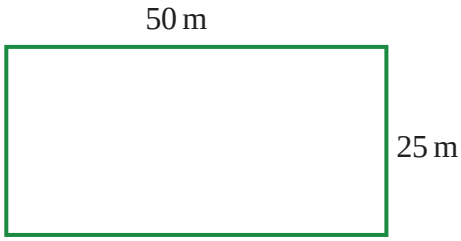
S. no.	Length of the rectangle (ℓ)	Breadth of the rectangle (b)	The sum of the sides of the rectangle	The perimeter of the rectangl	Perimeter of rectangl with the help of formula
1.	10 cm	5 cm	10cm + 5cm + 10cm + 5cm = 30cm	30cm	2(10+5)cm = 2×15cm = 30cm
2.	5 cm	5 cm	5cm + 5cm + 5cm + 5cm = 20cm	20cm	4×5cm = 20cm
3.	6 cm	4 cm			
4.	7 cm	7 cm			

Let us see some more examples.

Example 1.

The length and width of a rectangular field are 50 meter and 25 meter respectively. An athelete runs around the field 10 times. Find out how much distance does he run?

Solution:



Here, the length of the rectangle (ℓ) = 50m

breadth of the rectangle (b) = 25m

The perimeter of the rectangle = 2 (ℓ + b)

= 2 (50m + 25m)

= 150m

Now the athlete cover 150m in one round.

$\therefore$ In 10 rounds the athelete runs = 10 × 150 m = 1500m distance covered.

Example 2.

If a square has a perimeter of 200m, find its area.

Solution:

Here, perimeter = 200m

4 × length of one side = 200m

length of a side of the square = $\frac{200}{4}$ meters

= 50 meters

Now, the area of the square = side × side

= 50m × 50m

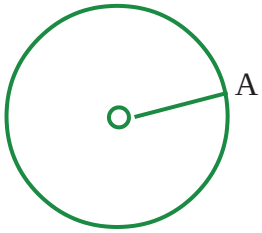
= 2500m^2

or 2500 square meter.

Finding the Perimeter of a Circle

You have already done the activity of finding out the circumference of a circle. You have also seen that the length of the circumference of the circle and the diameter of a circle are in a

ratio that is equal to π, where π is a constant. The relationship can be written as follows-



$$\frac{\text{The length of the circumference of the circle}}{\text{diameter of the circle}} = \pi$$

The boundary around the circle is the perimeter, which is also known as its circumference.

If the radius of the circle = r

then the diameter of the circle = $2r$

$$\therefore \frac{\text{The circumference of the circle}}{2r} = \pi,$$

or the circumference of the circle = $2\pi r$ (where $\pi = \frac{22}{7}$)

So, **Circumference of the circle (C) = $2\pi r$.**

Example 3.

If the radius of a circle is 7cm, find the circumference of the circle.

$C = 2\pi r$

$$C = \frac{2 \times 22 \times 7}{7} = 44\text{cm}.$$

Example 4.

If one round of the circle is of distance 1km. What would be the radius of the circle?

$C = 2\pi r$

$1000 = \frac{2 \times 22 \times r}{7}$

$\therefore \quad 7 \times 1000 = 2 \times 22 \times r$

$$\frac{7 \times 1000}{2 \times 22} = r$$

$r = \frac{1750}{11}$ m.

$r = 150.9$ m.

Practice 2

(1) The following are the radius of different circle. Find out the perimeter.

1. 3.5cm 2. 10.5cm 3. 17.5cm

(2) The following are perimeters of different circles. Find out the radius -

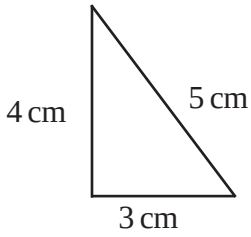
1. 500 metre 2. 100 metre 3. 22 cm. 4. 11 cm.

(3) The radius of a wheel is 1/2m. How many rounds do you need to take to cover 11km. of distance?

EXERCISE 17

(1) Select the close figures and find their perimeter.

(i)



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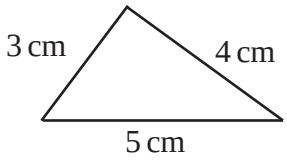

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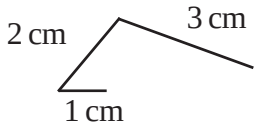

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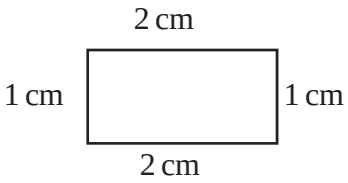

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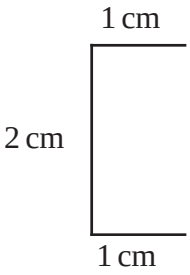

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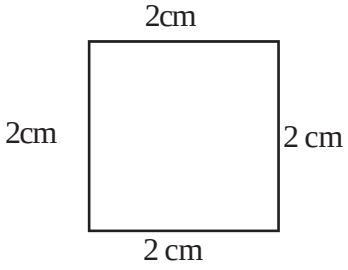

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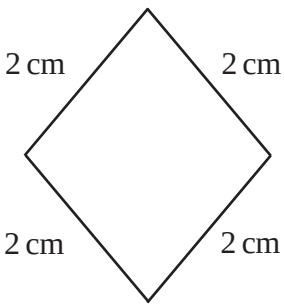

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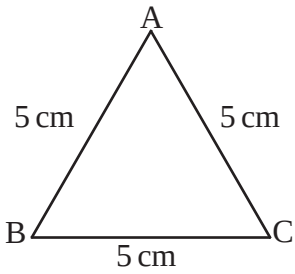


(2) Find out the perimeter of the given rectangles. The length and breadth are as follows:

(i) length = 15 cm breadth = 6 cm

(ii) length = 12 cm breadth = 6 cm

(iii) length = 3.5 cm breadth = 2.5 cm

(iv) length = 100 cm breadth = 50 cm

(3) Write in the brackets, whether the statements are true or false. Correct those that are false:

(i) Every square is a rectangle. ( )

(ii) Every rectangle is a square. ( )

(iii) If all the sides of a rectangle are measured in cm, the perimeter would be in meter. ( )

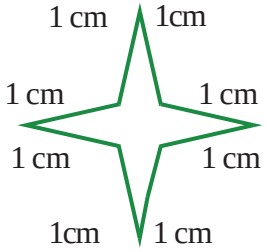
(iv) The perimeter of the rectangle is the sum of its 4 sides. ( )

(4) If the side of a square is 15cm, find its perimeter.

(5) The length of a rectangle is 20 cm and breadth is 0.5 m, find out the perimeter in cm and meter.

(6) In the given figure, the measures are in cms. Find its perimeter.

(i)



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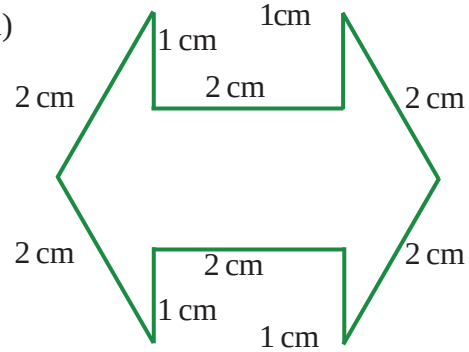

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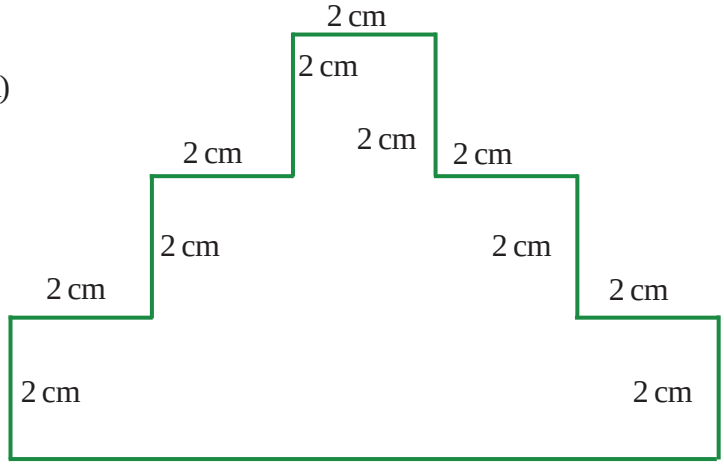

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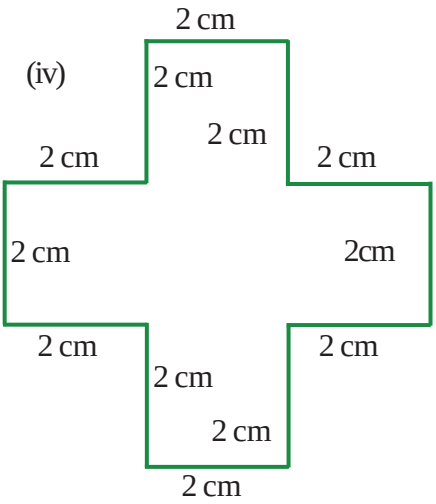

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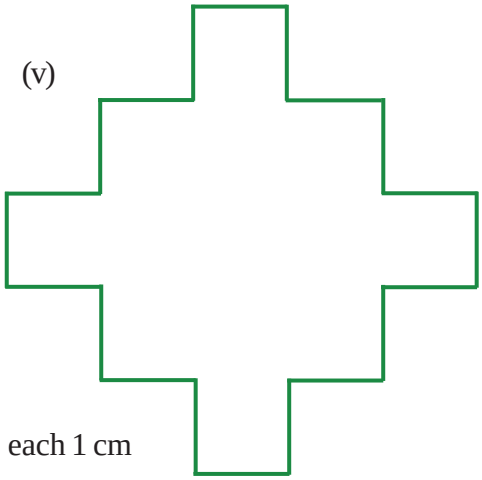

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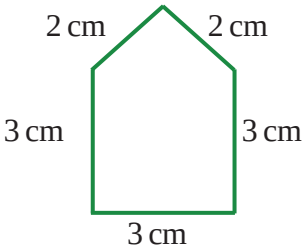
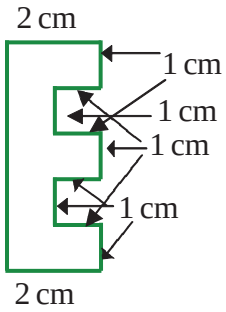


(vii)



(7) The length of a rectangular ground is 25m and the width is 10meter. An athlete completes 4 rounds, how much distance does he cover?

What Have We Learnt ?

1) It is possible to find out perimeter and area only in closed figures.
2) Close figures are those that end at the starting point without passing through any point 2 times.
3) Area of the rectangle = the area of the inner space of a rectangle.
4) Area of the rectangle = length × width.
5) Every square is a rectangle, but not all rectangles are squares.
6) Area of a square = $(\text{side})^2$.
7) Perimeter of a rectangle = 2 (length + breadth).
8) Perimeter of the square = 4 × side.
9) 1 meter^2 = 1m × 1m = 100cm × 100cm = 10,000 square cm = 10,000 cm^2.

Project work

Measure the length and breadth of your class room and calculate its perimeter.