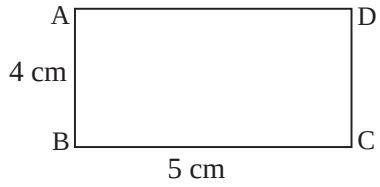
12. Perimeter and Area

❒ Perimeter : Revision

Closed figures have a perimeter. You know that the sum of the lengths of all the sides of a figure is called its perimeter.

Fill in the empty boxes in the following problems.

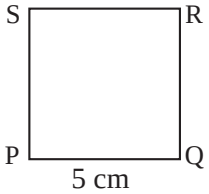
1. 

The lengths of the adjacent sides of rectangle ABCD are given.

The perimeter of rectangle ABCD is ☐ cm.

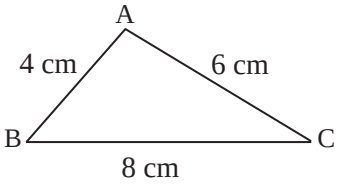
Remember, the lengths of the opposite sides of a rectangle are equal.

2. The length of the adjacent sides of a rectangle are 10 cm and 7 cm. The perimeter of the rectangle is ☐ cm.

3. 

The length of a side of square PQRS is 5 cm.

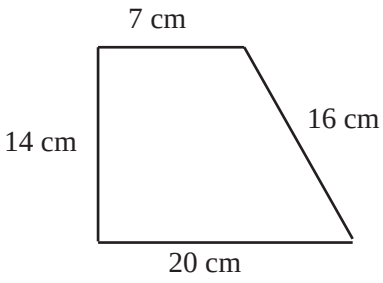
The perimeter of square PQRS is ☐ cm.

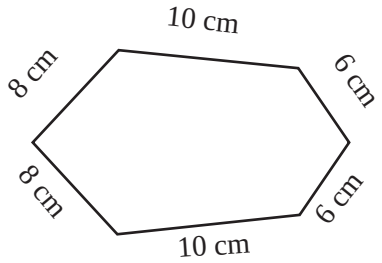
4. 

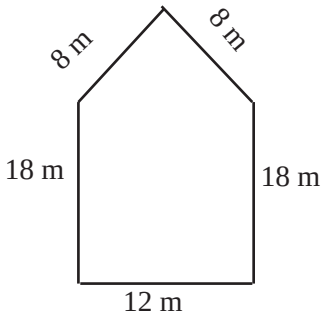
In triangle ABC, the length of side AB is 4 cm, the length of BC is 8 cm and the length of CA is 6 cm. The perimeter of triangle ABC is ☐ cm.

Problem Set 48

1. Write the perimeter of each figure in the box given below it.

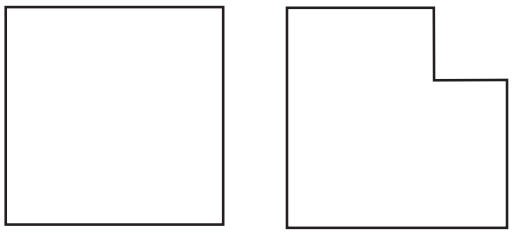




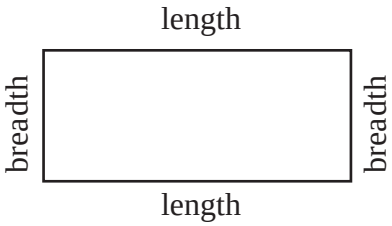


☐ ☐ ☐

2. If a square of side 1 cm is cut out of the corner of a larger square with side 3 cm (see the figure), what will be the perimeter of the remaining shape?



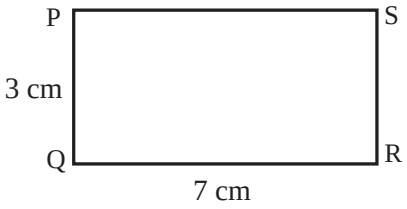
❒ Formula for the perimeter of a rectangle



Perimeter = length + breadth + length + breadth
Opposite sides of a rectangle are of the same length.
So, the perimeter of a rectangle
= twice the length + twice the breadth
= 2 × length + 2 × breadth

Perimeter of a rectangle = 2 × length + 2 × breadth

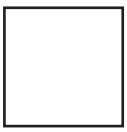
Example : The length of the rectangle below is 7 cm and its breadth, 3 cm. Let us find its perimeter.



Perimeter of rectangle PQRS = 2 × length + 2 × breadth
= 2 × 7 + 2 × 3
= 14 + 6
= 20

Therefore, the perimeter of the rectangle is 20 cm.

❒ Formula for the perimeter of a square



The lengths of all the sides of a square are equal. Therefore, the perimeter of a square = four times the length of one of its sides.

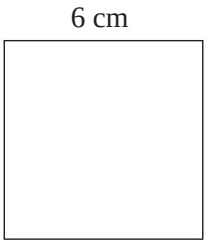
Perimeter of a square = 4 × the length of one side

Example : The length of one side of a square is 6 cm. Find its perimeter.

The perimeter of a square is four times the length of one side.

Perimeter of a square = 4 × length of one side
= 4 × 6
= 24

Therefore, the perimeter of the square is 24 cm.



❒ Word problems

Example (1) The length of a rectangular park is 100 m, while its width is 80 m. What is its perimeter ?

Perimeter of the rectangle = 2 × length + 2 × breadth
= 2 × 100 + 2 × 80
= 200 + 160
= 360

The perimeter of the rectangular park is 360 m.

Example (2) How much wire will be needed to put a triple fence around a square plot with side 30 m? What will be the total cost of the wire at ₹ 70 per metre?

To put a single fence around the square plot, we need to find its perimeter.

Perimeter of a square = 4 × length of one side = 4 × 30 = 120

The perimeter of the square plot is 120 metres. Since the fence is to be a triple fence, we must triple the perimeter.

120 × 3 = 360 m of wire will be needed.

Now let us find out how much the wire will cost. One metre of wire costs ₹ 70. Therefore, the cost of 360 m of wire will be 360 × 70 = 25, 200.

The total cost of wire for putting a triple fence around the plot will be ₹ 25, 200.

Problem Set 49

1. How much wire will be needed to make a rectangle 7 cm long and 4 cm wide?

2. If the length of a rectangle is 20 m and its width is 12 m, what is its perimeter ?

3. Each side of a square is 9 m long. Find its perimeter.

4. If we take 4 rounds around a field that is 160 m long and 90 m wide, what is the distance we walk in kilometres?

5. Sanju completes 12 rounds around a square park every day. If one side of the park is 120 m, find out in kilometres and metres the distance that Sanju covers daily.

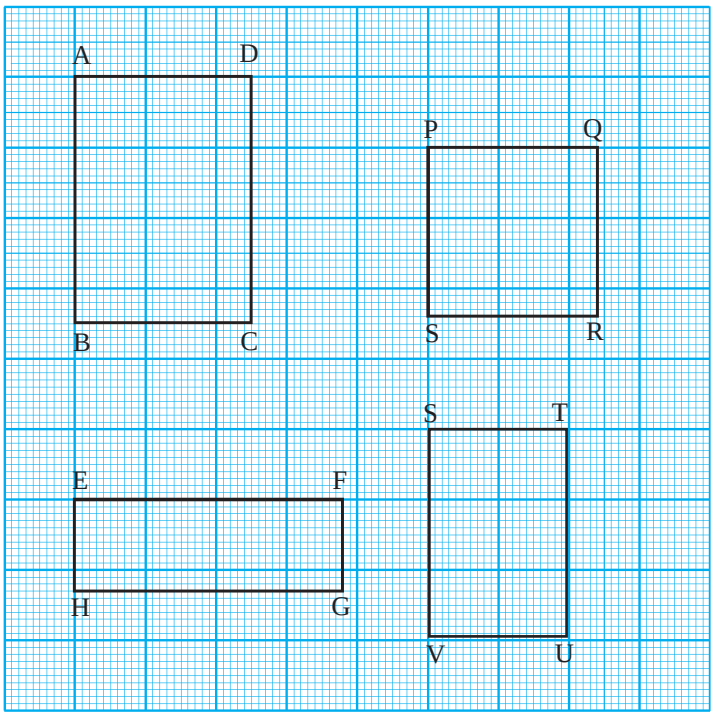
6. The length of a rectangular plot of land is 50 m and its width is 30 m. A triple fence has to be put along its edges. If the wire costs 60 rupees per metre, what will be the total cost of the wire needed for the fence?

7. A game requires its players to run around a square playground. Each side of the playground is 20 m long. One player took 5 rounds around the playground. How many metres did he run altogether ?

8. Four rounds of wire fence have to be put around a field. If the field is 60 m long and 40 m wide, how much wire will be needed?

9. The sides of a triangle are 24.7cm, 20.4 cm and 10.5 cm respectively. What is the perimeter of the triangle?

10. Look at the figures on the sheet of graph paper. Measure their sides with the help of the lines on the graph paper. Write the perimeter of each in the right box.



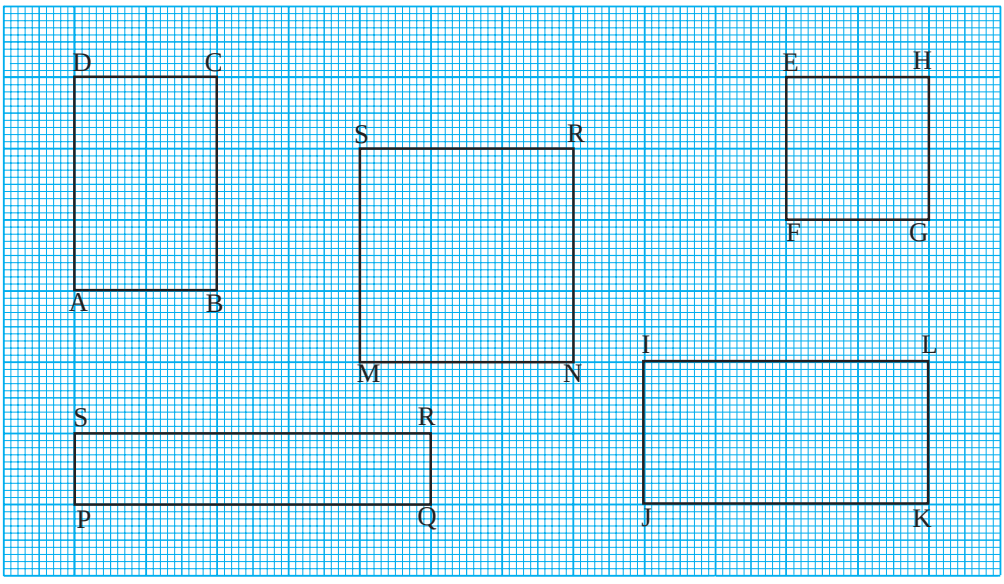
(1) Perimeter of rectangle ABCD = ☐ cm

(2) Perimeter of rectangle EFGH = ☐ cm

(3) Perimeter of square PQRS = ☐ cm

(4) Perimeter of rectangle STUV = ☐ cm

❒ Area : Revision



Of the figures given above, figure ABCD has six squares of 1 cm each inside it. It means that its area is 6 sq cm.

In the same way, count the squares in each figure and write its area.

(1) Area of MNRS = ☐ sq cm (2) Area of EFGH = ☐ sq cm

(3) Area of PQRS = ☐ sq cm (4) Area of IJKL = ☐ sq cm

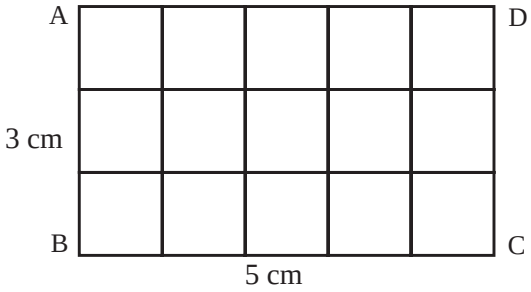
Atul : Sir, why is the unit for area written as sq cm? We measure the sides in centimetres.

Teacher : Centimetre is a standard unit of length. In order to measure area, we need a standard unit of area. For this, a square with a side 1 cm is taken as the standard unit. The area of this square is 1 square centimetre. That is why this unit is written as sq cm, in short.

To measure large areas like fields, parks and playgrounds, a square with side 1 m, that is, an area of 1 sq m, is taken as the standard unit.

To measure the areas of *talukas* or districts, a square with side 1 km, or 1 sq km is the standard unit used.

❒ Formula for the area of a rectangle



(1) In the rectangle ABCD given alongside, 1 cm divisions were marked off on each side. The points on opposite sides were joined as shown in the figure. The length of the sides of each square thus created is 1 cm. Therefore, the area of each square is 1 sq cm.

In ABCD, 3 rows with 5 squares each have been created.

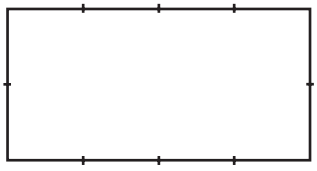
The number of squares in rectangle ABCD is $3 \times 5 = 15$.

Therefore, the area of rectangle ABCD is 15 sq cm.

Here, the length of the figure is 5 cm and its breadth is 3 cm.

Note that the product of 3 and 5 is 15.

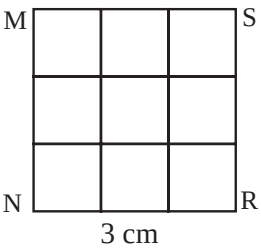
(2) In the rectangle with sides 4 cm and 2 cm, make squares of 1 sq cm each as shown above. Count the number of squares.



Note that here too, the number of squares formed are the same as the product of the length and width of the rectangle.

Therefore, **The area of a rectangle = length × breadth**

❒ Formula for the area of a square



(1) Look at the square given alongside. The side of the square is 3 cm long. 9 squares of 1 cm each are formed within this square. Therefore, the area of this square is 9 sq cm.

Here, there are 3 rows with 3 squares each, i.e., there are $3 \times 3 = 9$ squares.

The length of each side of the square is 3 cm.

The product of two sides of the square is $3 \times 3 = 9$.

(2) Measure the area of a square with side 5 cm, in the same way.

The answer will be 25 sq cm.

Note that $5 \times 5 = 25$

Therefore, **The area of a square = length of a side × length of a side**

It is not necessary to divide a square or rectangle into small squares every time you calculate their area. The advantage of a formula is that you can calculate the area simply by substituting the appropriate values.

❒ Word problems

Example (1) What is the area of a rectangle of length 20 cm and width 15 cm ?

Area of a rectangle = length × breadth

= 20 × 15 = 300.

Therefore, the area of the rectangle is 300 sq cm.

Example (2) A wall that is 4 m long and 3 m wide has to be painted. If the labour charges are ₹25 per sq m, what is the cost of labour for painting this wall ?

First let us calculate the area of the wall to be painted.

Area of the wall = length of the wall × breadth of the wall = 4 × 3 = 12

Thus, the area of the wall is 12 sq m.

Labour cost of 1 sq m is 25 rupees.

So the labour cost for 12 sq m will be = 12 × 25 = 300

The cost of labour for painting the wall will be 300 rupees.

Example (3) What will be the area of a square with sides 15 cm?

Area of a square = length of side × length of side

= 15 × 15 = 225

The area of the square is 225 sq cm.

Example (4) One side of a square room is 4 m. If the cost of labour for laying 1 sq m of the floor is 35 rupees, what will be the total cost of labour?

First we must find the area of the square room.

Area of the square room = length of side × length of side = 4 × 4 = 16

Therefore, the area of the square room is 16 sq m.

The labour cost of laying 1 sq m of flooring is 35 rupees.

Therefore, the cost of laying 16 sq m of flooring is 16 × 35 = 560 rupees.

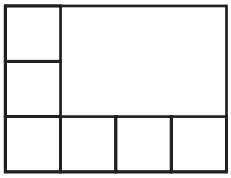
Problem Set 50

1. The length of the side of each square is given below. Find its area.
(1) 12 metres (2) 6 cm (3) 25 metres (4) 18 cm

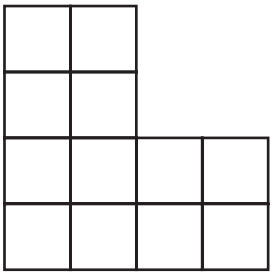
2. If the cost of 1 sq m of a plot of land is 900 rupees, find the total cost of a plot of land that is 25 m long and 20 m broad.

3. The side of a square is 4 cm. The length of a rectangle is 8 cm and its width is 2 cm. Find the perimeter and area of both figures.

4. What will be the labour cost of laying the floor of an assembly hall that is 16 m long and 12 m wide if the cost of laying 1 sq m is 80 rupees?

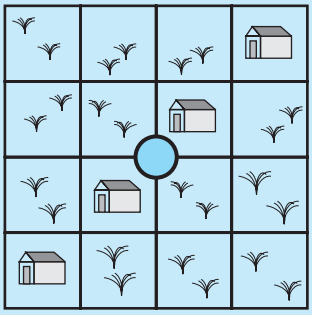
5. 

The picture alongside shows some squares. Find out how many squares with the same measures will fit in the empty space in the figure.

6. 

Divide the figure given alongside into four parts in such a way that the area and shape of each part is the same. Colour the parts with different colours.

Fair and square



As shown in the figure alongside, a square plot of land owned by the government contains four houses and a well right in the centre. The government has to divide the houses and the land between four poor persons according to the following conditions.

(1) Each person must get only one house.

(2) The shape and area of the land must be the same.

(3) Each person must be able to use the well without trespassing on any one else's land.

Show the appropriate divisions in four different colours.

Activity

Using a graph paper, find out the area of different rectangles and squares.