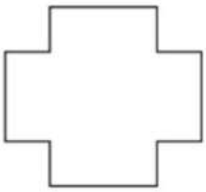
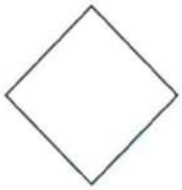
Chapter 10

Mensuration

Perimeter

Perimeter

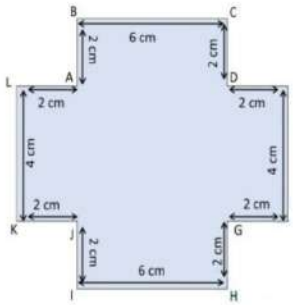




Here, some of the figures are given above which are made from the wire. If we go round the figure starting from one pointing and ending at the same then the total distance covered will be the
length of the wire.
Perimeter is the distance covered along the boundary forming a closed figure when you go round the figure once.

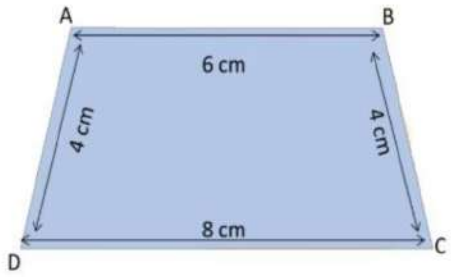
In the above figure, we see a circular ground. When we go around the ground once, we get the perimeter of the ground.

Example: Find the perimeter of the following:-
i)



Perimeter of figure = AB+BC+CD+DE+EF+FG+GH+HI+IJ+JK+KL+LA
= 2+6+2+2+4+2+2+6+2+2+4+2 = 36 cm

ii)

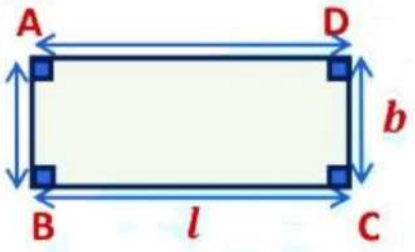


Perimeter of figure = AB+BC+CD+DA
= 6+4+8+4 = 22 cm

Perimeter of Rectangle

Rectangle

Rectangle is a quadrilateral with opposite sides of equal and each interior angle is a right angle.

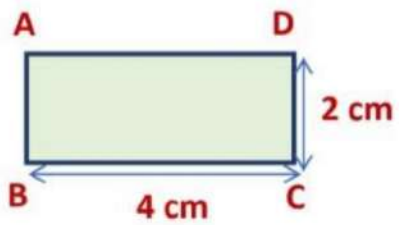


In the above figure, ABCD is a rectangle, it has length(l) and breadth (b)and each interior angle is 90°.

In this case
Perimeter of a rectangle = AB + BC + CD + DA
= b + l + b + l = 2l + 2b
= 2×(length + breadth)
Perimeter of a rectangle = 2×(length + breadth)
Example: Find the perimeter of a rectangle of sides is 4 cm and 2 cm.

We know that,
Perimeter of a rectangle = 2×(length + breadth)

Perimeter of the rectangle $= 2\times(4 + 2)$
Perimeter of the rectangle $= 2(6) = 12$ cm



Example: A rectangular plot with perimeter 64 m and breadth 20m. What will be the length of a rectangular plot?

Let l and b be the length and breadth of the rectangular plot.
We have,
Perimeter = 64 m and breadth = 20 m
Perimeter of a rectangular plot = 2 (l + b)

$$64 = 2\ (l + 20)$$

$$\frac{64}{2} = (l + 20)$$

$$32 = l + 20$$

$$32 - 20 = l + 20 - 20$$

$$12 = l$$

$$l = 12 \text{ cm}$$

Example: Amrita wants to put a lace border all around a rectangular table cover, 4 m long and 3 m wide. Find the length of the lace required by Amrita.
Sol.
Length of lace required = Perimeter of table.

$$= 2(\text{length} \times \text{breadth})$$
$$= 2\ (4 \times 3)\ \text{m}$$
$$= 2 \times 12 = 24\ \text{m}$$

Perimeter of Regular Shapes

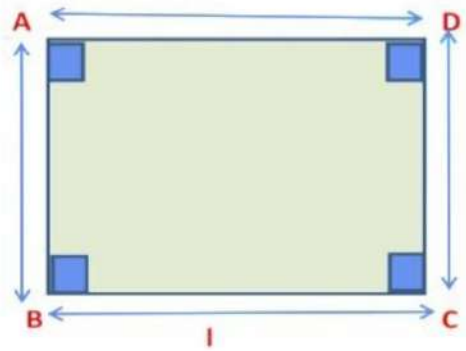
Perimeter of regular shapes

Let us see what will be the perimeter if all the sides of any given figure are equal.

That is th perimeter of regular shapes.
Let us start with,

Square

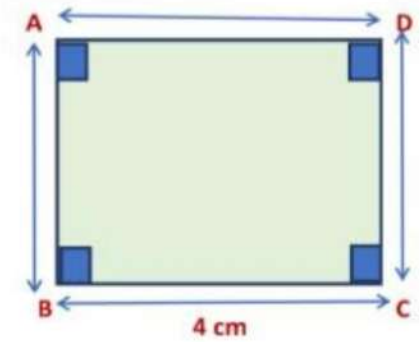
Square is a quadrilateral with all sides equal and each interior angleis a right angle.



In the above figure, ABCD is a square, it has a side (l) and each interior angle is 90°.

In this case
Perimeter of a square = AB+BC+CD+DA
$= l+l+l+l = 4l$
$= 4 \times (\text{side})$
Perimeter of a square $= 4 \times (\text{side})$

Example: Find the perimeter of a square of side 4 cm.
We know that,
Perimeter of a square $= 4 \times (\text{side})$



Perimeter of the square $= 4\times(4)$
Perimeter of the square $= 4(4) = 16$ cm

Example: A square plot with perimeter 64 m and breadth 20 is there. What will be the side of this plot?
Let s be the side of the squared plot.
We have,
Perimeter $= 64$ m
Perimeter of plot $= 4$ (side)

$$64 = 4\ (s)$$

$$\frac{64}{4} = (s)$$

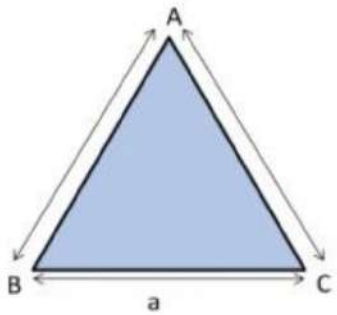
$$16 = s$$

$$\text{side} = 16 \text{ m}$$

Equilateral triangle

Equilateral triangle is a triangle with all sides equal and each interior angle is 60°.

In the figure, ABC is an equilateral triangle, it has the side of length a and each interior angle is 60°.



In this case
Perimeter of equilateral triangle $= AB+BC+CA$
$= a+a+a = 3a$
$= 3\times(\text{side})$
Perimeter of equilateral triangle $= =3\times(\text{side})$

Example: Find the perimeter of an equilateral triangle of side 4 cm.

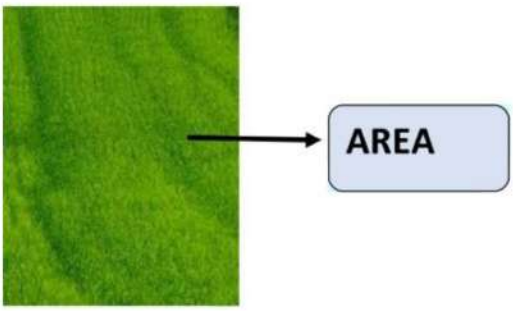
We know that,
Perimeter of an equilateral triangle $= 3\times(\text{side})$
Perimeter of the equilateral triangle $= 3\times(4)$
Perimeter of the equilateral triangle $= 12$ cm
Here we see that

- Perimeter of a square $= 4\times(\text{side})$, square has 4 sides.
- Perimeter of an equilateral triangle $= 3\times(\text{side})$, equilateral triangle has 3 sides.

So, a regular pentagon has 5 sides then
Perimeter of a regular pentagon $= 5\times(\text{side})$ and so on

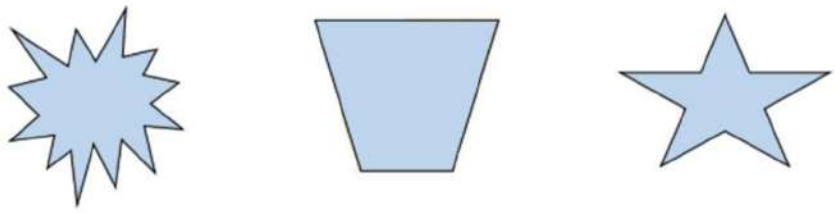
Area

Area: The amount of plane or region or surface enclosed by the figure is called the area.
In the following figure, the green portion represents the area of the figure.



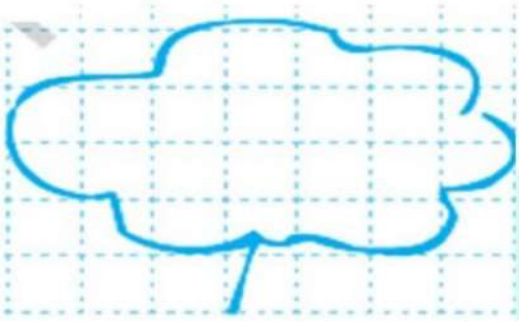
Now, suppose you want to fit tiles in your bedroom, how would you decide how many tiles will fit in the entire bedroom?

In such a case, we need to calculate the area of the hall.



Now, the above figures will also enclose some areas. We can find the approximate area by using squared paper of dimension 1 cm by 1 cm.

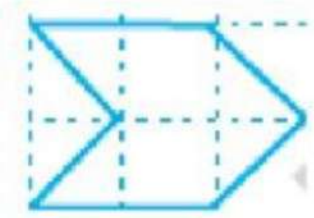
Example: By counting squares, estimate the area of the figure.



(REFERENCE: NCERT) Sol.		
Covered	Number	Area Estimate (sq units)
(i) Fully-filled squares	11	11
(ii) Half-filled squares	3	$3 \times \frac{1}{2}$
(iii) More than Half-filled squares	7	7
(iv) Less than Half-filled squares	5	0

Total area $= 11 + 3 \times \frac{1}{2} + 7 = 19\frac{1}{2}$ sq units.

Example: By counting squares, estimate the area of the figure.



(REFERENCE: NCERT)		
Sol.		
Covered	Number	Area Estimate(sq units)
(i) Fully-filled squares	2	2
(ii) Half-filled squares	4	$4 \times \frac{1}{2} = 2$

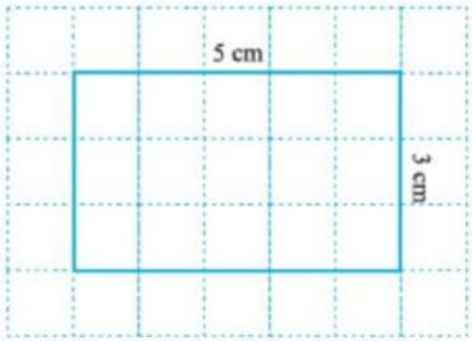
(iii) More than Half-filled squares	0	0
(iv) Less than Half-filled squares	0	0

Total area = 2 + 2 = 4 sq units

Area of Rectangle

Area of Rectangle

With the help of squared paper, we can also tell the area of a rectangle. Let us find the area of a rectangle of length 5 cm and breadth 3 cm on a squared sheet of 1 cm by 1 cm.



(PC: NCERT)

Here we see it includes 15 full squares.

So, the area of rectangle = 15 cm2, which is the product of 5 and 3.

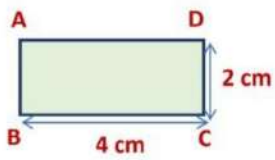
So, here we deduce that

Area of rectangle = length × breadth.

We see square is nothing but a rectangle whose length and breadthare equal.

So,

Area of square = side ×
side.



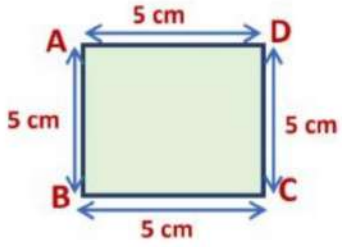
Example: Find the perimeter and area of a rectangle of sides is 4 cm and 2 cm.

We know that,
Perimeter of a rectangle = $2\times(\text{length} + \text{breadth})$
Perimeter of the rectangle = $2\times(4 + 2)$
Perimeter of the rectangle = $2(6) = 12$ cm

Area of a rectangle = length × breadth
Area of the rectangle = 4 cm × 2 cm
Area of the rectangle = 8 cm2

Example: Find the perimeter and area of a square whose side is 5 cm.

We know that,
Perimeter of a square = 4 × length of its sides
Perimeter of a square = 4 ×5
Perimeter of a square = 20 cm
Area of a square = $(\text{Side})^2$
Area of a square = $(5)^2$
Area of a square = 25 cm2



Example: Find the area of a square park whose perimeter is 400 m.

Suppose,
The length of each side of a park = "a"
Perimeter = 400 m
We know that,
Perimeter of a square = 4 × length of its sides
400 m = 4 × a
4a = 400

$$a = \frac{400}{4}$$

a = 100 m

Area of a square = $(\text{side})^2 = a^2$

$\therefore$ Area of a square $= (100 \times 100)\ m^2$
Area of a square $= 10000\ m^2$

Example: A rectangular plot has perimeter 64 m and breadth 20m. What will be the area of a rectangular plot?

Let l and b be the length and breadth of the rectangular plot.
We have,
Perimeter = 64 m and breadth = 20 m
Perimeter of a rectangular plot $= 2\ (l + b)$

$$64 = 2\ (l + 20)$$

$$\frac{64}{2} = (l + 20)$$

$$32 = l + 20$$

$$32 - 20 = l + 20 - 20$$

$$12 = l$$

$l = 12$ cm
Now,
Area of a rectangular plot = length $\times$ breadth
Area of the rectangular plot $= 12 \times 20$
Area of the rectangular plot $= 240\ m^2$