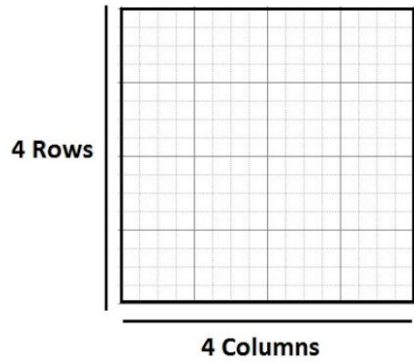# Area and Perimeter of Plain Figures

Triangle, Rectangle, Square, Circle etc are the plane figures. The total length of the boundary lines of a plane figure is called its perimeter.

Area and Perimeter of a Square

We can divide the square into small squares of 1 cm side length to find the area of a square by the method of counting squares.

4 Rows

4 Columns

Consider a square that has a side length of 4 cm using the method of counting squares, we find that the area of the square = 16 cm^2

Clearly, the square contains 4 rows of 4 squares. Therefore, Area = 4cm x 4cm = 16cm^2

This suggests that:

The area of a square is equal to its side-length multiplied by its side-length. That is

Area = length x length

= (length)^2
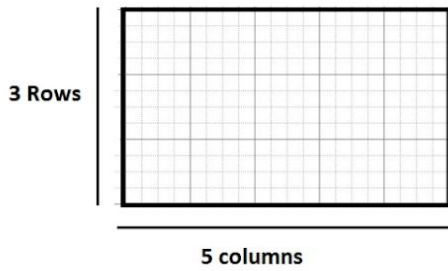
Using A for area and *l* for length, we can write it as:

A = l^2

$\therefore$ Area of square = l^2

Also, Perimeter of a square = a + a + a + a

= 4a

Area and Perimeter of a Rectangle

To find the area of a rectangle by the method of counting squares, we divide the rectangle into small squares of 1 cm side length.

Consider a rectangle of length 5 cm and width 3 cm

Using the method of counting squares, we find that the area of the rectangle is 15cm^2.

Clearly, the rectangle contains 3 rows of 5 squares.

Therefore, area = 5cm x 3cm = 15 cm^2

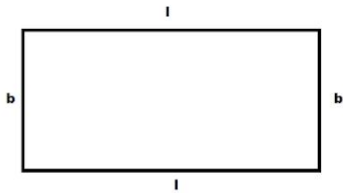This suggests that:

The area of a rectangle is equal to its length multiplied by its width. That is,

Area = Length x Width

Using A for area, l for length and b for width, we can write it simply as:

A = l x b
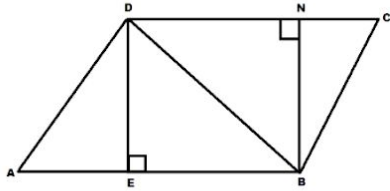

∴ Area of rectangle = l x b

Also, perimeter of a rectangle = 2(l+b)

Area of a Parallelogram

Let, ABCD be the parallelogram. Let DE? AB and BN? DC

Here, AB// DC, DE = BN

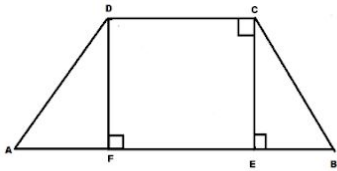Area of Parallelogram = area of $\triangle$ DAB + area of $\triangle$BCD

$= \frac{1}{2}$ AB X DE + $\frac{1}{2}$ DC x BN

$= \frac{1}{2}$ AB X DE + $\frac{1}{2}$ AB X DE (AB = DC, DE =BN)

Thus, area of a parallelogram = base x height

Area of Trapezium

We know that a trapezium is a quadrilateral whose one pair of opposite sides is parallel. If two non-parallel sides of a trapezium, it is called an isosceles trapezium.

Let, ABCD be a trapezium having parallel sides AB and DC. Draw DF? AB and CE? AB. Let DF = CE = h. Then area of the trapezium ABCD = area of $\triangle$AFD + area of rectangle FECD + area of $\triangle$EBC

$= \frac{1}{2}$ AF x DF + FE x DF + $\frac{1}{2}$ EB xCE

$= \frac{1}{2}$ AF x h + FE x h+ $\frac{1}{2}$ EB xh

$= \frac{1}{2}$ h(AF + 2FE + EB)
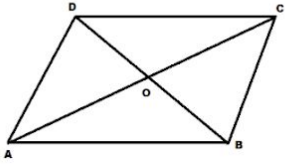
$= \frac{1}{2}$ h(AF + FE + EB + FE) [AF+FE+EB = AB and FE = DC]

$= \frac{1}{2}$ h (AB+DC)

Thus, area of a trapezium = $\frac{1}{2}$ x (sum of parallel sides) x distance between them.

Area of Rhombus

We know that the rhombus is a parallelogram having sides equal. We also know that the diagonals of a rhombus bisect each other at right angles.

Consider a rhombus ABCD whose diagonals AC and BD bisect each other at right angles at a point O.

Let, AC $=d_1$ and BD $=d_2$

Then, AO $=\frac{1}{2}d_1$ and BO $=\frac{1}{2}d_2$

Area of $\triangle$AOB $= \frac{1}{2}$ AO x BO $= \frac{1}{2} \times \frac{1}{2}d_1 \times \frac{1}{2}d_2 = \frac{1}{8}d_1d_2$

Since diagonals of a rhombus divide it in to four congruent right angled triangles,

Area of rhombus = 4 x area of $\triangle$ AOB

$=4 \times \frac{1}{8}d_1d_2$

$=\frac{1}{2}d_1d_2$

Thus, area of rhombus ABCD $= \frac{1}{2}$ xproduct of diagonals.

Note: Since square is also a rhombus having equal diagonals, area of a square $= \frac{1}{2}d^2$

Area and Perimeter of a Triangle

A triangle is a polygon with three vertices, and three sides or edges that are line segments. To find the area of a triangle by the method of counting squares, firstly we divide a rectangle into small squares of 1 cm side length. Secondly, we draw the largest triangle to divide the rectangle into three parts as shown below:

Finally, we estimate the area of a triangle by counting the squares. Area of rectangle = 7x 5 = 35cm^2

Area of Triangle = 17.5cm^2

This shows that area of triangle $=\frac{1}{2}$ base x height $=\frac{1}{2}$ bh

Also, If a, b and c denote three sides of a $\triangle$ABC, Perimeter of $\triangle$ABC = AB + BC + CA

= c + a + b

= a + b + c