**Mensuration**

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**1 Introduction**

What does ‘mensuration’ mean? It means measurements. By the context of the word, we can say that we are going to have a lot of measurements to be done in this Chapter.

Before diving into some crap, we will look after some basic definitions,

* Rectilinear Figure: A figure developed by some collection of straight lines. Example: Triangles, Quadrilaterals, etc.
* Closed Figure: A rectilinear figure which has no free ends. All Polygons with sides are Closed Figure,

NOTE: Family of Triangles[[1]](#footnote-1) is a 3 - sided polygon. Family of Quadrilaterals[[2]](#footnote-2) is a 4 - sided polygon, Family of Circles[[3]](#footnote-3) is an - sided polygon.

* Perimeter: Length of the boundary of a simple closed figure.
* Area is the measure of the region bounded by a plane figure.

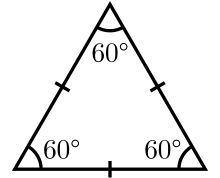
**2 Triangle**

A Triangle is a polygon with 3 edges and 3 vertices.

As mentioned above, the family of triangles includes,

* Equilateral Triangle
* Isosceles Triangle
* Scalene Triangle
* Acute Angled Triangle
* Obtuse Angled Triangle
* Right Angled Triangle

**2.1 Equilateral Triangles**



**Fig. 1:** Equilateral Triangle

The properties of Equilateral Triangles are:

* It is a Regular Polygon with 3 sides
* All the 3 sides are equal, say .
* All the 3 angles are equal, say , with each measuring 600.
* Perimeter of an Equilateral Triangle is .

PROOF:

We know, in Equilateral Triangles, all the 3 sides are equal.

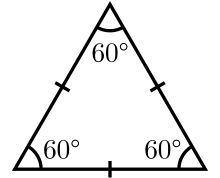
So,

Now, by definition of the Perimeter, we know,

(As )

* Area of an Equilateral Triangle is .

PROOF:



30o

90o



Area of half triangle[[4]](#footnote-4) =

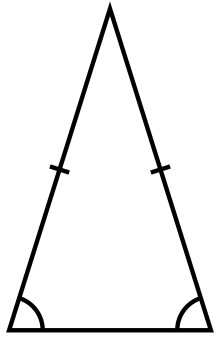
Now, by Pythagoras Theorem[[5]](#footnote-5),

Area of half triangle =

Area of half triangle =

Area of full triangle =

**2.2 Isosceles Triangles**



**Fig. 2:** Isosceles Triangle

The properties of Isosceles Triangles are:

* It is a Regular Polygon with 3 sides
* 2 of the 3 sides are equal, say .
* 2 the 3 angles are equal, say .
* Perimeter of an Isosceles Triangle is .

PROOF:

We know, in Equilateral Triangles, 2 of the 3 sides are equal.

So,

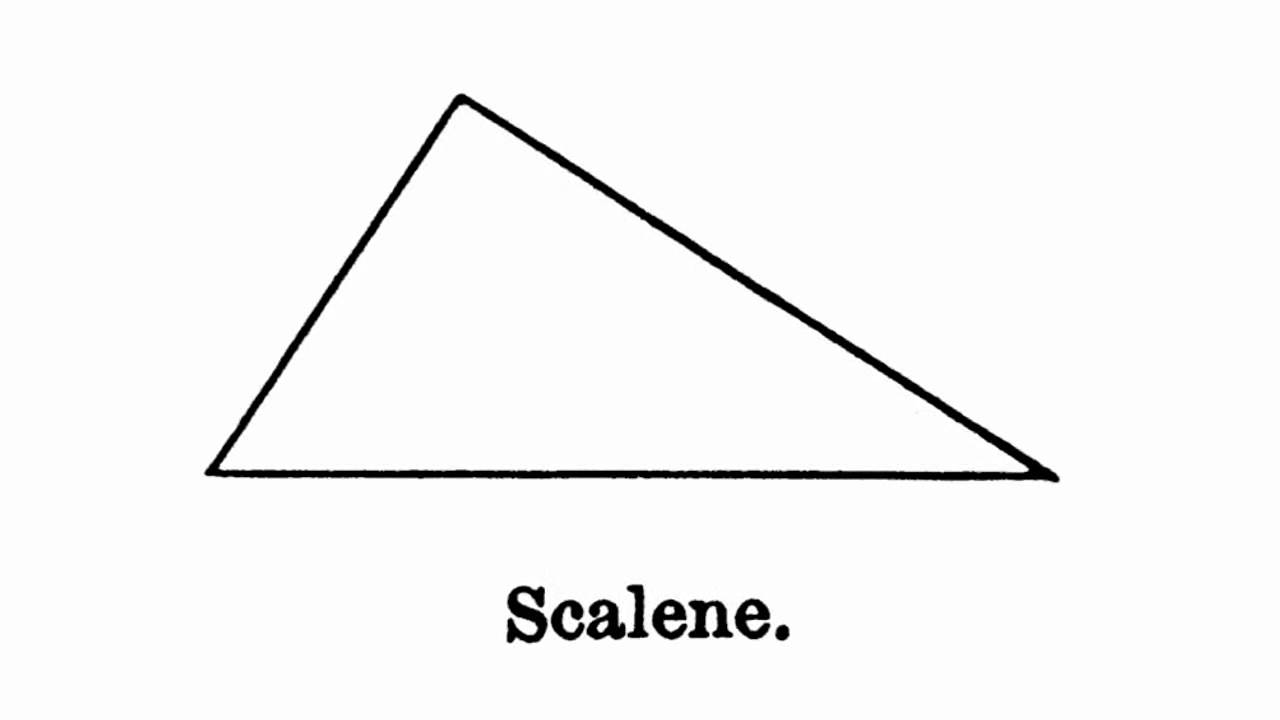
Now, by definition of the Perimeter, we know,

(As )

* Area of an Isosceles Triangle is .

PROOF:

**2.3 Scalene Triangles**



**Fig. 3:** Scalene Triangle

The properties of Scalene Triangles are:

* It is a Regular Polygon with 3 sides
* All of the 3 sides are unequal, say .
* All the 3 angles are equal, say .
* Perimeter of a Scalene Triangle is .

PROOF:

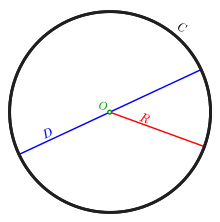
Now, by definition of the Perimeter, we know,

(As )

* Area of a Scalene Triangle is as {Heron’s Formula}

**3 Circles**

A circle is a shape consisting of all points in a plane that are at a given distance from a given point, the center (O) equivalently it is the curve traced out by a point that moves in a plane so that its distance from a given point is constant, which is known as radius (R).



**Fig. 4:** Circle

The properties of Circle are:

* The distance from the centre to any point on the circle is always constant, which is known as radius of the circle.
* The Diameter (D) of the circle is the longest chord[[6]](#footnote-6) of the circle.
* The Circumference (C) of the circle of radius R is , where .
* The Area (A) of the circle of radius R is , where .



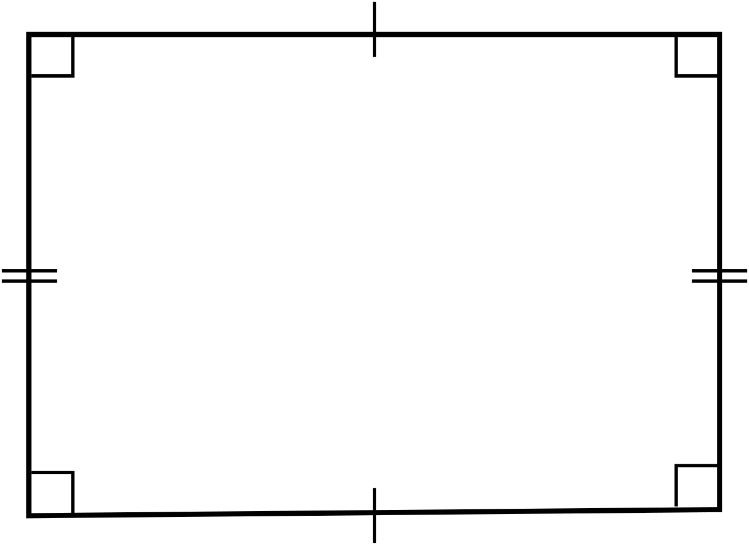
**3 Quadrilaterals**

A Quadrilaterals is a polygon with 4 edges and 4 vertices.

The family of Quadrilaterals includes,

* Rectangle
* Square
* Rhombus
* Trapezium
* Parallelogram
* Kite

**3.1 Rectangle**

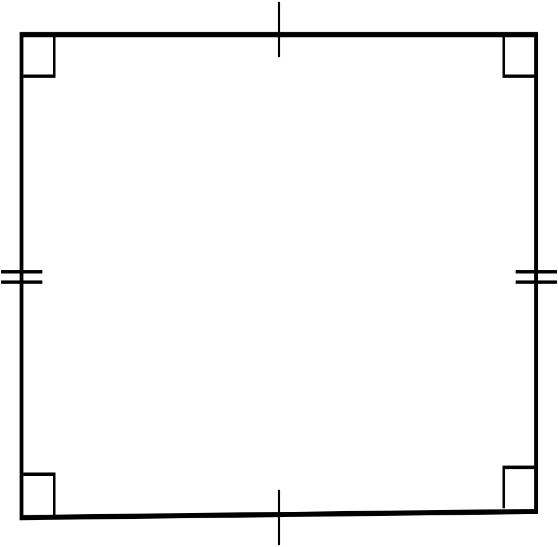


**Fig. 5:** Rectangle

The properties of Rectangle are:

* The opposite sides are parallel and equal to each other
* All the angles are right angled in nature.
* The diagonals of a rectangle are equal in length and intersect at a certain point present inside the rectangle.
* The Area (A) of a rectangle whose length is units, and breadth is units is square units.
* The Perimeter (P) of a rectangle whose length is units, and breadth is units is units.

**3.2 Square**

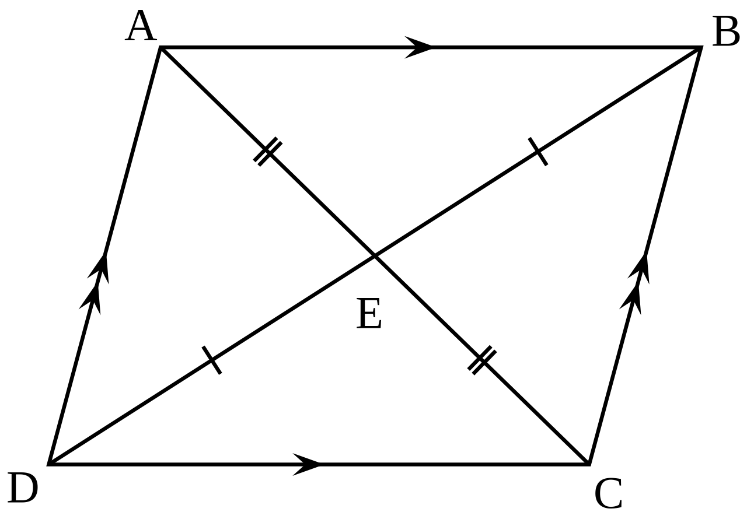


**Fig. 6:** Square

The properties of Square are:

* All the sides of a square are equal in length.
* All the angles are right angled in nature.
* The diagonals of a rectangle are equal in length and intersect at a certain point present inside the square.
* The Area (A) of a square with side length units is square units.
* The Perimeter (P) of a square with side length units is units.

**3.3**

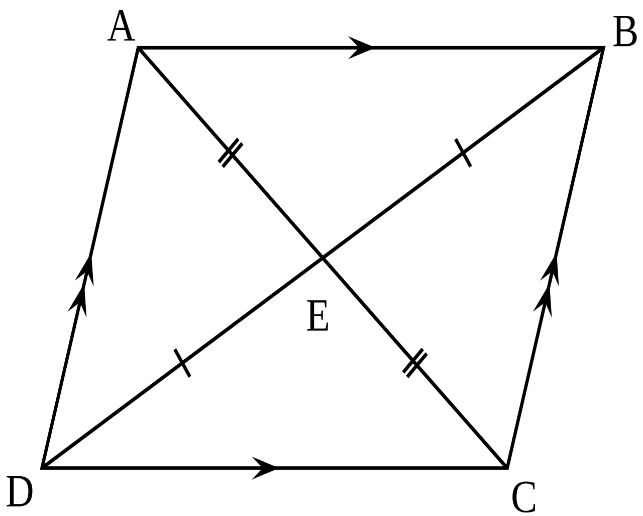


**Fig. 7:**

The properties of parallelogram are:

* Two pairs of opposite sides are parallel and equal in size.
* Diagonals of a bisects each other.
* Two pairs of opposite angles are equal in measure.
* The Area (A) of a with base length units and height units is square units.

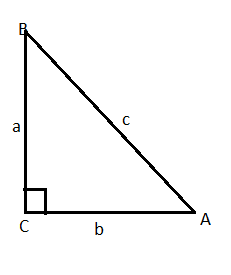
**3.4 Rhombus**



**Fig. 8:** Rhombus

The properties of rhombus are:

* All the sides of a rhombus are equal in size.
* Diagonals of a rhombus bisects each other at right angle.
* Two pairs of opposite angles are equal in measure.
* The Area (A) of a rhombus with diagonal lengths and is .

1. Family of Triangles includes Equilateral Triangles, Isosceles Triangles, Scalene Triangles, Acute Angled Triangles, Obtuse Angled Triangles, Right Angled Triangles. [↑](#footnote-ref-1)
2. Family of Quadrilaterals includes Squares, Rectangles, Trapeziums, Rhombus, Parallelograms, etc. [↑](#footnote-ref-2)
3. Family of Circles includes Semi-Circles, Quadrant of a Circle, etc. [↑](#footnote-ref-3)
4. Area of a triangle (general case whose base and height is given) = [↑](#footnote-ref-4)
5. In a right-angled triangle,  [↑](#footnote-ref-5)
6. It is a line segment joining two points on the circumference of the circle. [↑](#footnote-ref-6)