L-12 Fundamental Concepts of Geometry
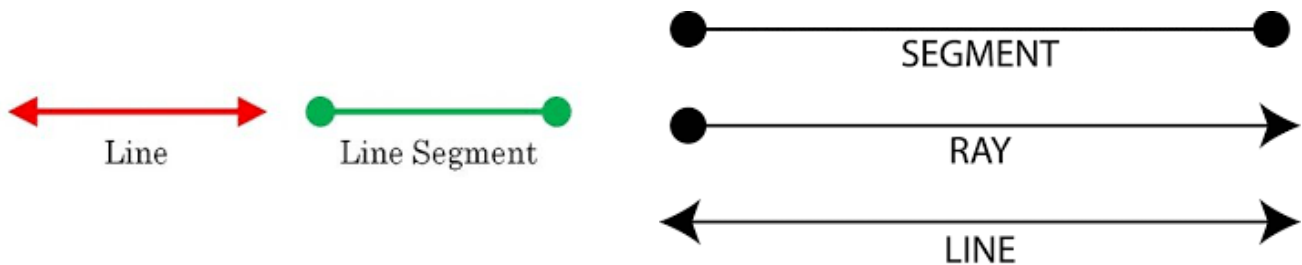
Basic Geometrical Terms

Point – A point is a small mark that has position, but no magnitude. A point has no length and width, no shape and size.

.A

Line – A line is a collection of points which extends in both directions. A line has only length but no width.

Line Segment – A line segment is part of a line. It has two end points and has definite length.
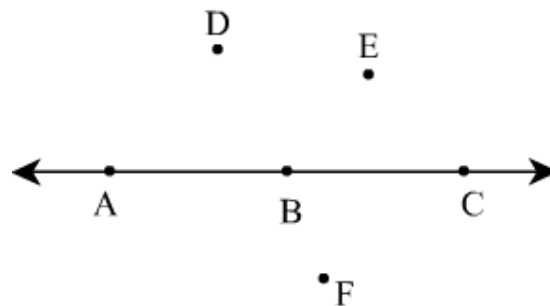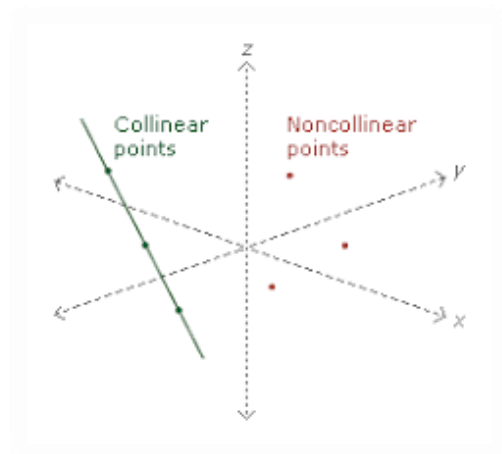
Ray – A ray is a line with one end point that extends indefinitely in other direction.

Plane – A flat surface that extends indefinitely in all directions is known as a plane. A plane has length and breadth.

Collinear and Non collinear Points – If two or more points on a plane lie on a straight line, then those points are called collinear points.
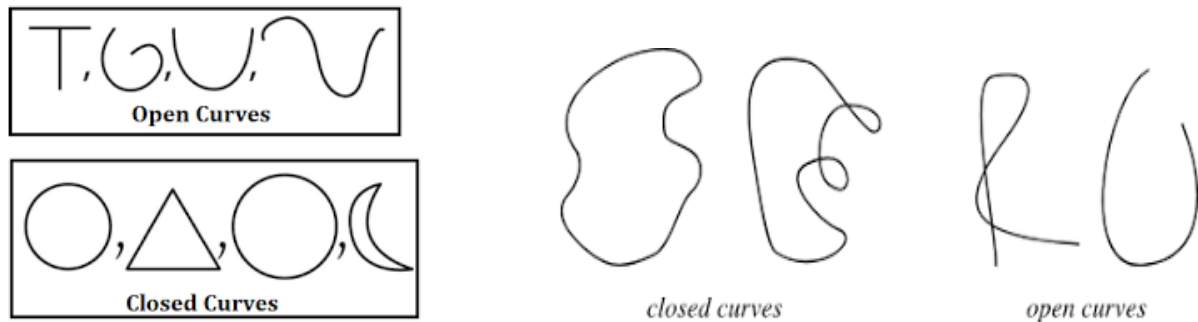
The points that do not lie on the same straight line are called non collinear points.

Simple curve – A curve that does not cross over itself at any point is called simple curve. A simple closed curve divides a plane into three parts- an interior, exterior and the boundary part.

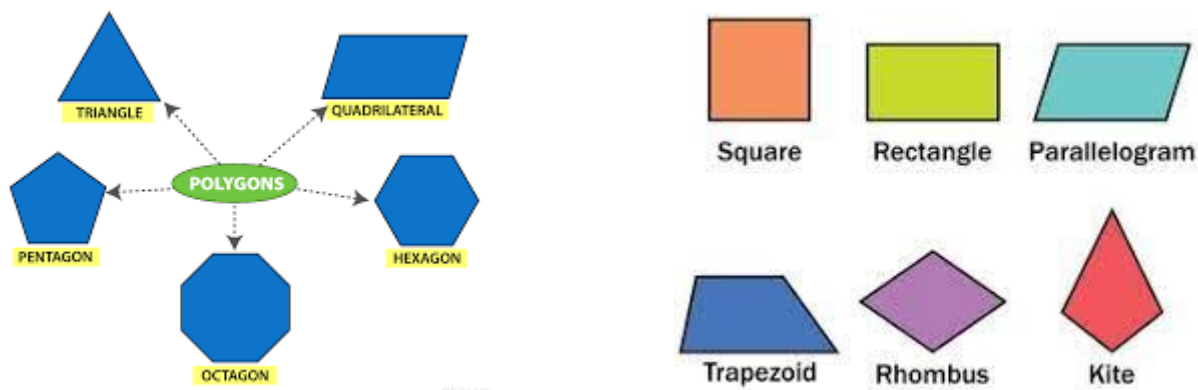Open curve – A curve with different initial point and ending point is called an open curve.

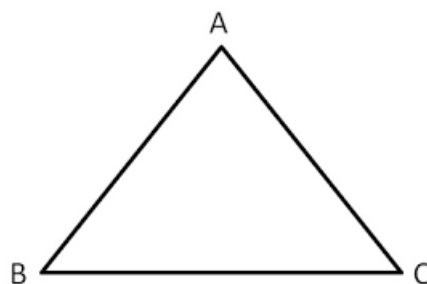Closed curve – A curve with the same initial and ending points is called a closed curve.

Linear and Curvilinear boundaries – If every part of the boundary of a closed figure is a line segment, then the figure is said to have a linear boundary.

The boundary which is made up of both curved and straight lines is called Curvilinear boundary.

Polygons – Simple curves made of only line segments are called polygons.

Triangle – The line segments joining three non collinear points form a closed shape called a triangle. A triangle has 3 sides, 3 vertices, 3 angles.
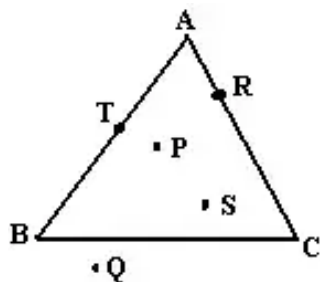
Interior and Exterior Of Triangle

In triangle ABC, there are three parts :

Interior region : The points lie inside the region enclosed by triangle.

On the sides : The points lie on the sides of the triangle.

Exterior region : The points lie outside the region enclosed by triangle.
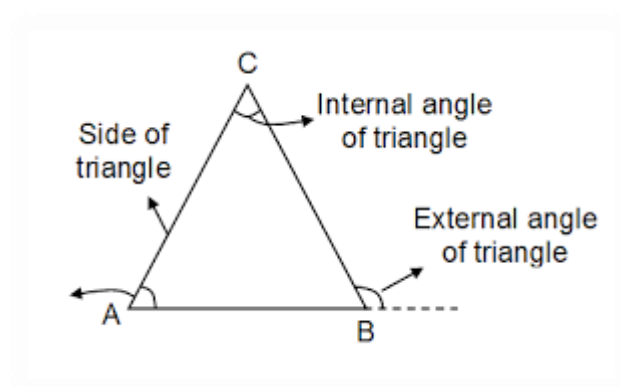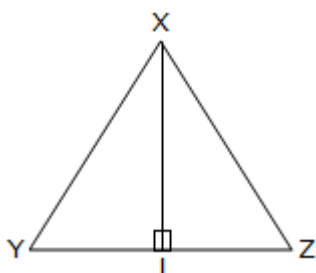
Example

Interior points : P and S

Exterior points : Q

On the sides : R and T

Interior and Exterior angle-

Median - The straight line joining a vertex of a triangle to the midpoint of the opposite side is called a median. A triangle has three medians.
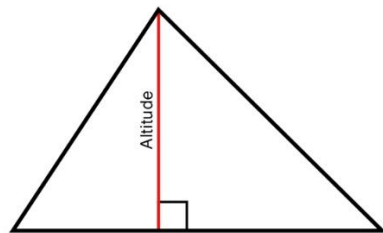

XL is the median in triangle XYZ

Altitude - The altitude of a triangle is the perpendicular drawn from the vertex of the triangle to the opposite side. Also, known as the height of the triangle, the altitude makes a right-angle triangle with the base.

Since there are three sides in a triangle, three altitudes can be drawn in it. Different triangles have different kinds of altitudes.
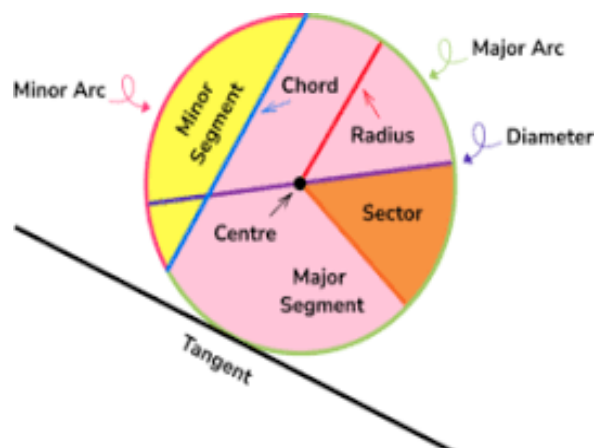

Altitude of a Triangle

Quadrilateral –

A quadrilateral is a polygon having four sides. The interior of the quadrilateral along with its boundary is called quadrilateral region. A quadrilateral is a plane figure that has four sides or edges, and also has four corners or vertices.

Circle – A round plane figure whose boundary consists of points equidistant from a fixed point.

The different parts of a circle are listed below:

- Circumference
- Radius
- Diameter
- Chord
- Tangent
- Secant
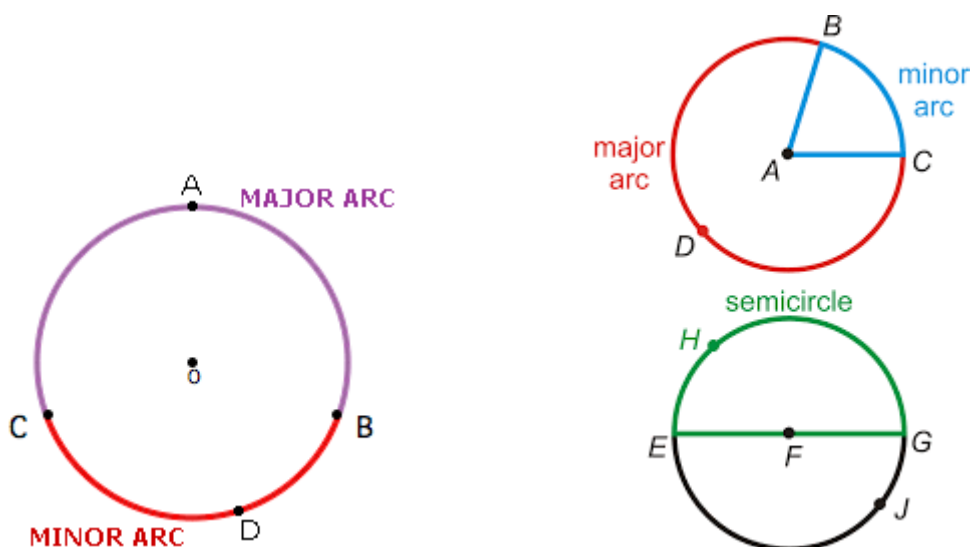- Arc
- Segment
- Sector

Centre - The centre of the circle is the fixed point from which all points on the boundary of the circle are equidistant.

Radius – The line segment joining the centre of a circle with any point on its circumference is the radius of the circle.

Diameter- A line segment which passes though the centre of a circle and has end points on the circumference of the circle is called the diameter of the circle.

Chord – A chord is a line segment formed by joining any two points on the circumference of a circle.
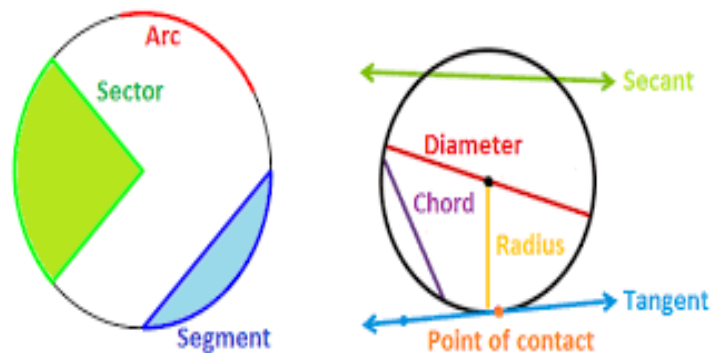
Arc- A portion of the circumference of a circle between any two points on the circle is called an arc.

Semicircle – A circle is divided into two equal halves by its diameter. Each half is called semicircle.

Secant - A secant of a circle is a line that intersects a circle at two points.

<u>Tangent</u> – A line that touches the circle at only one point. The point of contact of the tangent with the circle is known as the point of tangency(point of contact).

<u>Sector</u> – A sector is said to be a part of a circle made of the arc of the circle along with its two radii.

<u>Segment</u> – The region bounded by a chord and its corresponding arc is called a segment. A chord divides a circle into two segments. – minor and major segment.

<u>Circumference</u> – The length of the total boundary of a circle is called its circumference.

$$C = \pi d \qquad\qquad C = 2\pi r$$