

Basic Geometrical Ideas

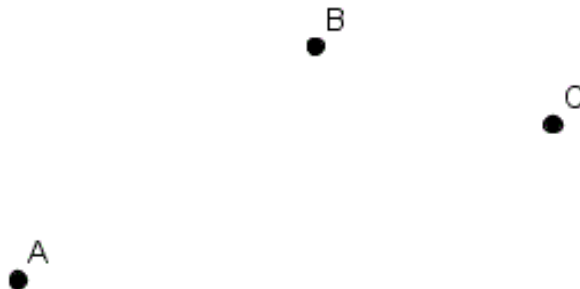
Chapter -IV

Geometry

- In this chapter we shall study some basic ideas of **geometry**, a very fascinating branch of mathematics.
- Geometry is derived from two Greek words which means **measurement of the earth**.
- In fact geometry is the study of objects around you. You notice that there are objects of various shapes in and around you. The objective of this chapter is to acquaint you to some of their properties.

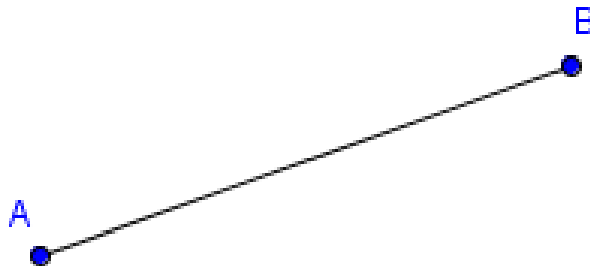
Point

- A **point** is a dot that appears when you put your pencil on paper . It is very small and has no length, breadth or even height.
- A point is the smallest possible mark that you can make on paper with your pencil.
- A point is usually denoted by a capital letter, like A, B, C, etc.



Line Segment

- A line segment has **length**, but **no breadth** and **height**.
- It has a **starting position** and an **ending position**.
- A line segment between two points A and B is denoted by AB.
- Between any two points A and B, the shortest distance is the line segment AB.



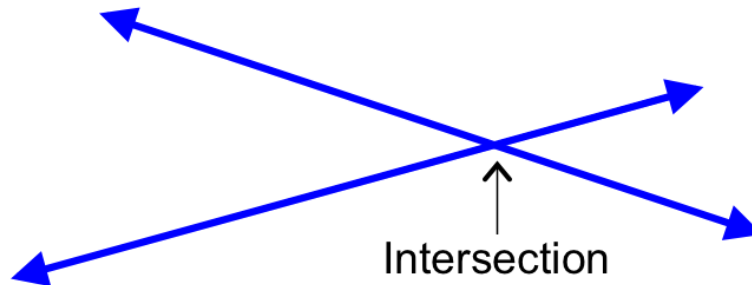
Line

- A line is a **line segment extended beyond the end** and beginning points of the segment.
- It has **infinite length**, but **no breadth** and **height**.
- We cannot draw a line completely because it would then take infinite space.
- It is enough to **represent** the line.



Intersecting Lines

- Lines which have a **common point** in them are called **intersecting lines**.
- Note that two lines **cannot intersect in more than one point**.
- At one point however, there can be more than two intersecting lines, in fact there can be **infinite number** of intersecting lines at a single point.



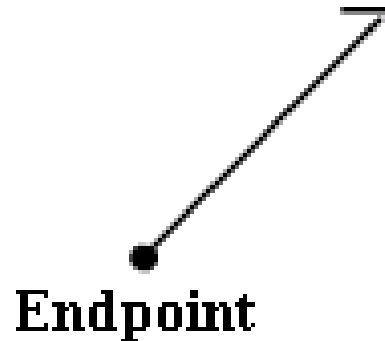
Parallel Lines

- Lines which **do not meet** each other at any point are called **parallel lines**.
- If L and P are two parallel lines, then we write ' $L \parallel P$ ' meaning 'L is parallel to P'.
- A line can be parallel to an infinite number of lines.
- Through a point, we can draw only one parallel line to another fixed li



Ray

- A ray is a **part of** a line.
- It has a **starting point** and then **goes on infinitely** in one direction.
- A ray has **no end point**.



Differences

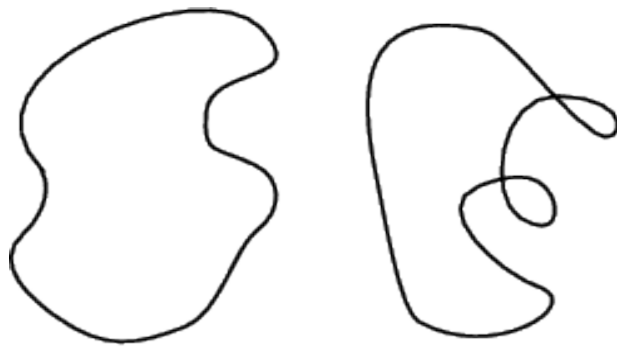
Line Segment	Line	Ray
Definite length	Indefinite length	Indefinite length
Two end points	No end point	One end point

Curves

- If you move your pencil in paper in a random manner than what you get is a **curve**.
- Thus any drawing (straight or non-straight) done without lifting the pencil may be called a curve.
- A curve which **does not cross itself** is called a **simple curve**.



- A curve can have **two end points**, in which case it is called an **open curve** .
- A curve can have **no end point**, in which case it is called a **closed curve**.

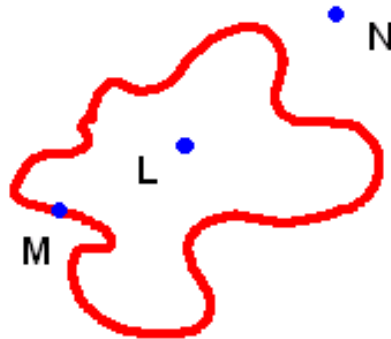


closed curves



open curves

- A closed curve has three regions, **the interior**, **the exterior** and **the boundary**.
- **Interior region of the curve** contains the set of all points that **lie inside** the curve. (E.g. Point 'L' lies in the interior region of the curve)
- **Exterior region of the curve** contains the set of all points that **lie outside** the curve. (Point 'N' lies in the exterior region of the curve)
- **The boundary of the curve** , contains set of all points that **lie on** the curve (Point 'M' lies on the boundary)

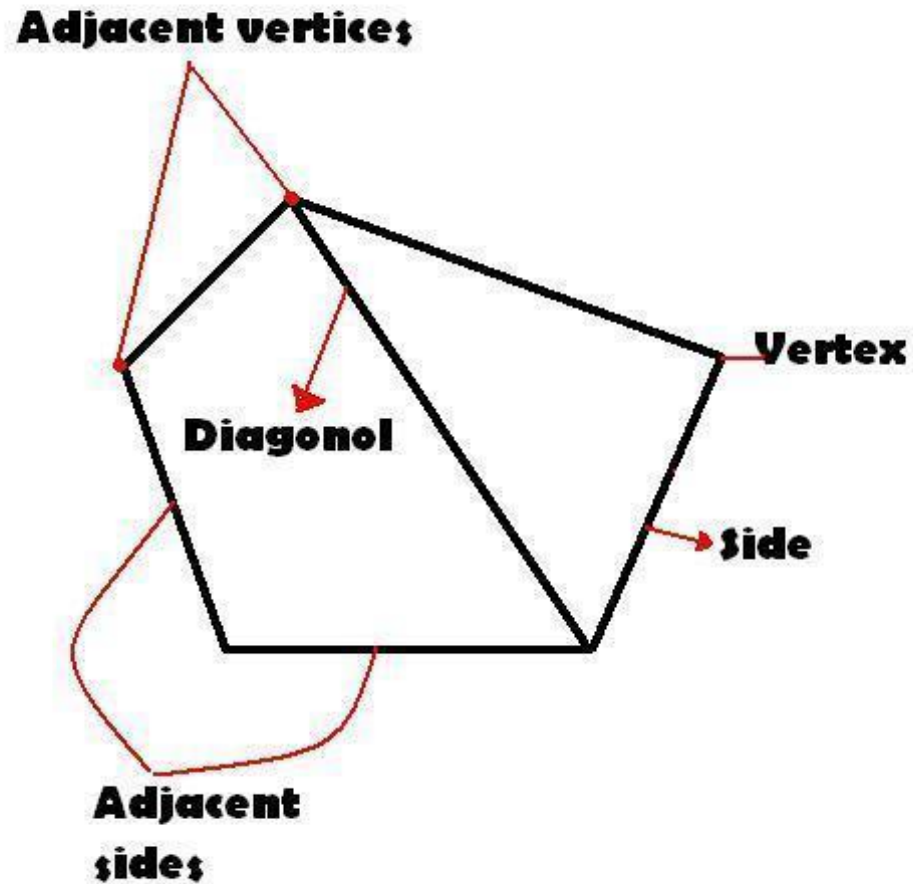


Polygons

- A **closed curve** formed of **line segments** is called a **polygon**.
- These **line segments** forming the polygon are called its **sides**.
- The **meeting point** of a pair of **sides** is called the **vertex**.
- Any two vertices which are the **endpoints** of the same line segment are called **adjacent vertices**.
- Any two sides with a **common end point** are called **adjacent sides**.
- The line segment joining any two non adjacent vertices is called a **diagonal**.

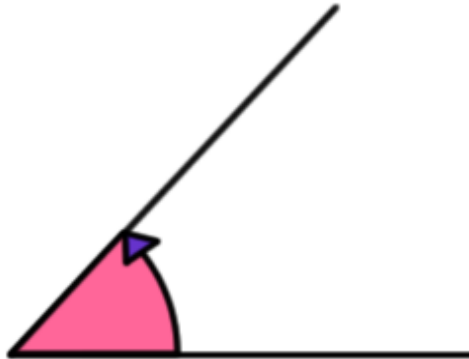
Parts of a Polygons

Parts :



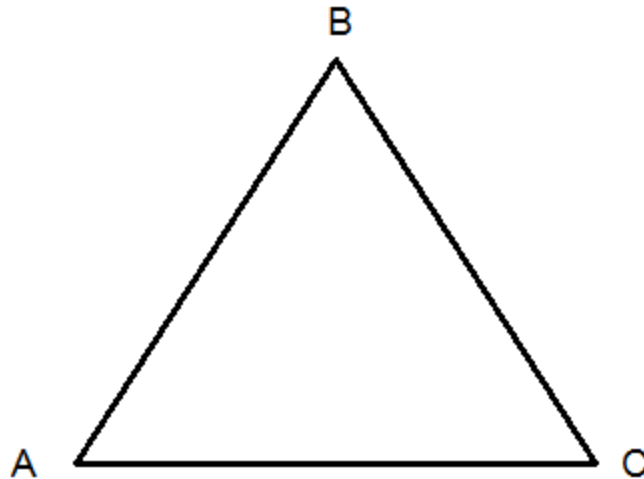
Angles

- An **angle** is formed by **two rays** that start from a **common end point**.
- The two rays are called **sides** of the angle they form.
- The **point** from which they **start** is called the **vertex** of the angle.



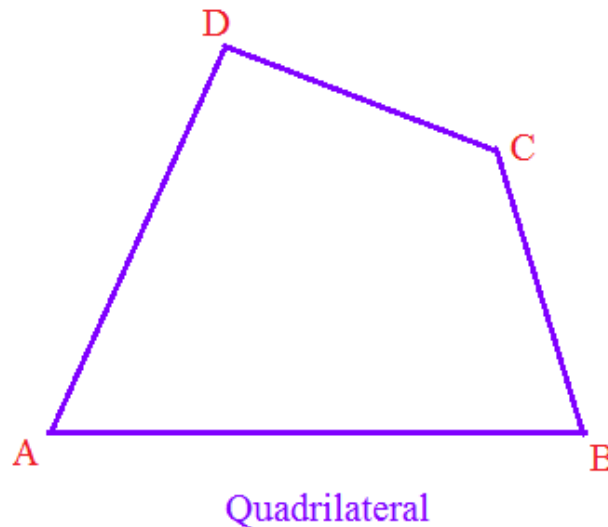
Triangle

- A triangle is a **three sided polygon**.
- It's the polygon with **least number** of sides .
 - A triangle has **three angles**.



Quadrilateral

- A **four sided polygon** is called a **quadrilateral** (Quad in Greek means 'four') .
- It has **four angles**.
- It has **two pairs of opposite sides** and two pairs of **opposite angles**.



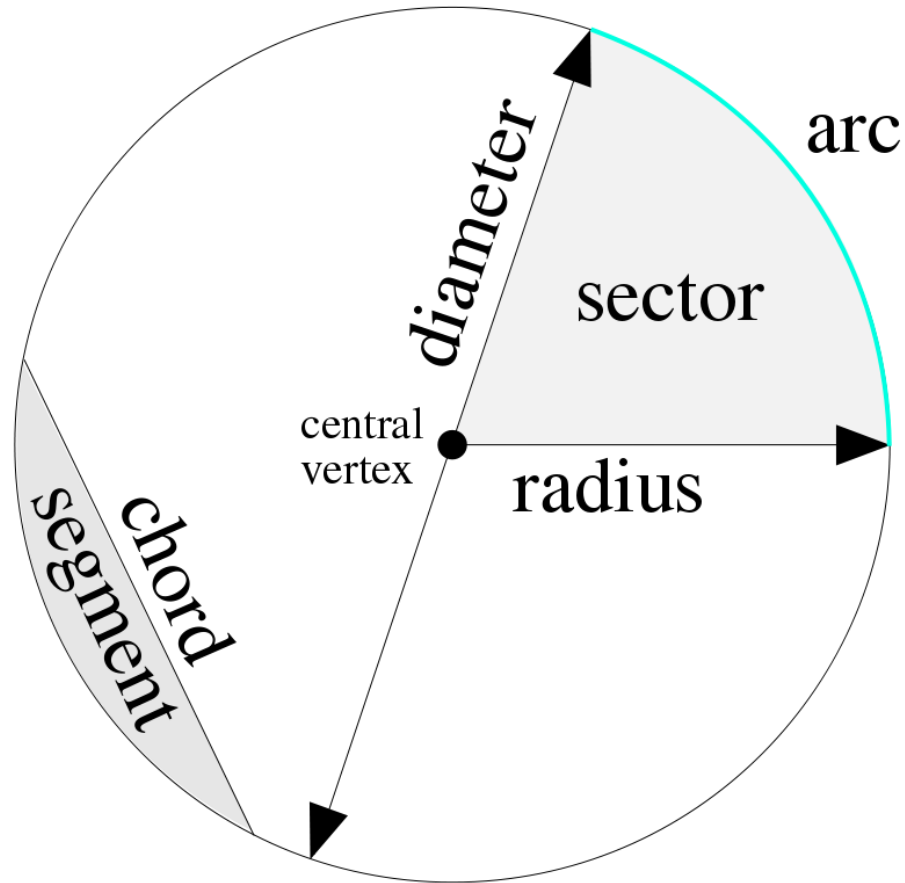
Circle

- A round shape is called a **circle**, for example a **wheel**.
- Every circle has a **point at the centre** called '**center of the circle**'.
- Every **line segment** passing through the center of a circle and its end points lying at the circle is called a **diameter**.
- **Half of the diameter** is called the **radius of the circle**. The plural form of radius is **radii**.
- A circle can have **many diameters** and **radii**, but each of them have the **same length**.
- The **path** in the circle from **two points** on the circle is called **an arc**.
- The **line segment** joining any **two points** on a circle is called a **chord**.

- The **diameter** is the **longest chord** in a circle.
- A **region inside** the circle bounded by an arc and two radius is called a **sector of the circle**.
- A region **inside the circle** bounded by an arc and a chord is called a **segment of the circle**.
- The **path around the circle** is called the **circumference of the circle**.
- Any diameter of a circle divides it into two semi-circles.

Parts of a circle

Parts :



This has introduced you to the key concepts in Chapter-IV , you are now encouraged to read the text book in detail and solve the problems there !

Thank you !