

## 1.1 Getting Started

**Lesson Objective:** The purpose of this section is to familiarize students with the basic terms of geometry. After studying this section, you will be able to:

- Recognize points
- Recognize lines
- Recognize line segments
- Recognize rays
- Recognize angles
- Recognize triangles

**Studying geometry is,**  
in a sense, like building a house.  
First you need to lay a strong foundation!  
Instead of cement and bricks, we will be using  
the following building blocks on which to build:

- **Undefined terms** – these are the fundamental concepts that cannot be fully defined, so they are described.
- **Defined terms** – these words are introduced so that we are able to use a common vocabulary as we refer to geometric figures and relationships.
- **Postulates** – statements that are based on experience and are accepted as true in the absence of proof.
- **Theorems** – a generalization that can be proven. In fact, a theorem cannot be assumed to be true unless proven first!

### Undefined Terms: POINT LINE PLANE

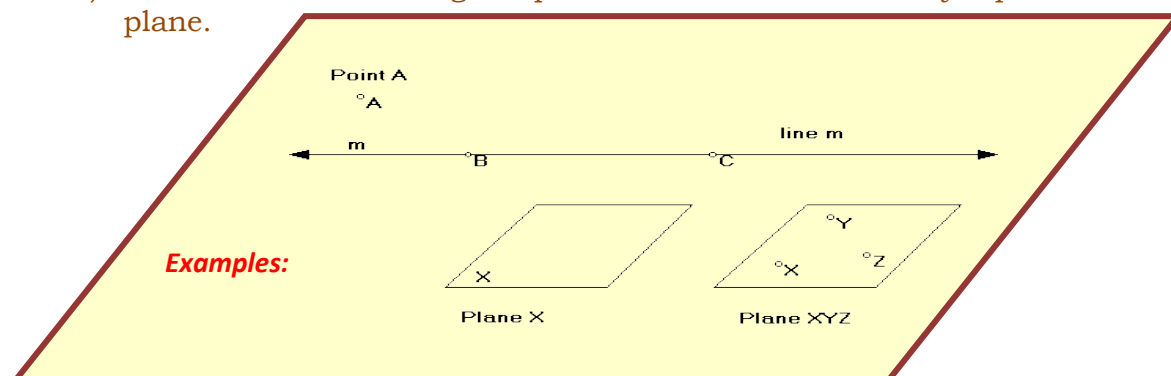
**Point** – (description) A point is a position with no size or shape (no length, width or depth)  
(representation) A point is represented by a dot and is labeled using a single capital letter.

**Line** – (description) A line is a series of continuous points that extend indefinitely in EITHER direction. The term “line” will always be understood to mean straight line.

(representation) Lines are labeled either with a lower case letter, “line  $m$ ,” or by using two points on the line with a double arrow over the top  $\overleftrightarrow{BC}$

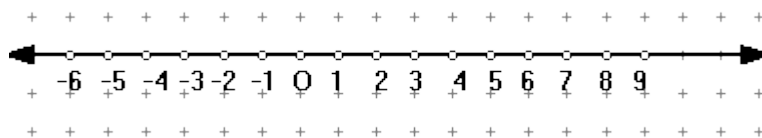
**Plane** – (description) A plane is a flat surface composed of a set of points that extend infinitely in ALL directions. A plane has NO depth!

(representation) Planes are labeled using a capital letter in the corner or by 3 points on the plane.



**Number Lines** are used to pair numbers with each point on a line.

The **coordinate of a point** is the number assigned to the point at a specific location on the number line.

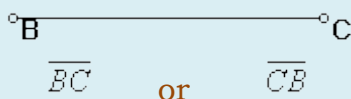


### Defined Terms

**Line segment** - a part of a line containing two points, called endpoints, and the set of all points between them. Segments have a definite beginning and end.

**Endpoints** - the two points that mark the beginning and end of a segment (boundaries)

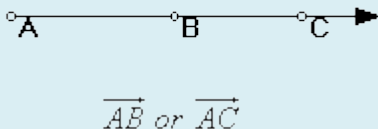
(Representation)



A **segment** is labeled using its endpoints, with a bar over the two points (**NO ARROWS!**)

**Ray** - a part of a line beginning at a given point, called the endpoint, that extends indefinitely in one direction. The endpoint is where the ray begins and the ray includes the set of all points on one side of that endpoint.

(Representation)



A **ray** is labeled by writing the endpoint **FIRST**, followed by any other point on the ray, with an arrow pointing to the right above the two letters.

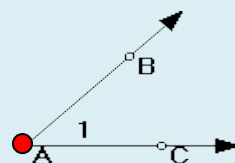
**Angle** - a figure formed by two rays with the same endpoint. An angle is the union of two rays at the same endpoint. The common endpoint is called the vertex, and the rays are called the sides of the angle.

**Vertex** - the common endpoint of the rays on the angle (*point A below*)

**Sides** - the rays that form the angle

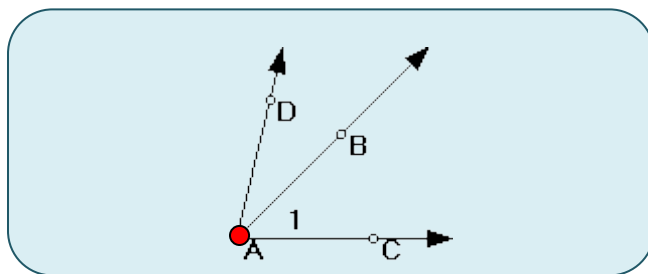
(Representation)

$\angle BAC$ ,  $\angle CAB$ ,  $\angle A$ , or  $\angle 1$



**ANGLES are labeled** by either using 3 letters, the point at the vertex, or by a number located in the interior of the angle. If using three letters, the middle letter must be the point located at the vertex of the angle.

**CAUTION!** You may not use the point at the vertex alone if more than one angle is present at that vertex. (See below how *THREE* rays begin at point A)



**Intersection** – (symbol:  $\cap$  - the place or point where two things cross each other) A POINT or set of POINTS common to two or more overlapping geometric figures.

**Union** – (symbol:  $\cup$  - to unite – the act of joining together) The smallest set that consists of all the elements of any or all of two or more given sets and no other elements. An element is counted only once even if it occurs in more than one of the given sets. Therefore, a union is the set of all points that are contained in either figure

$\cap$  Given the above figure, the intersection of  $\overrightarrow{AB}$  and  $\overrightarrow{AC}$  is point A

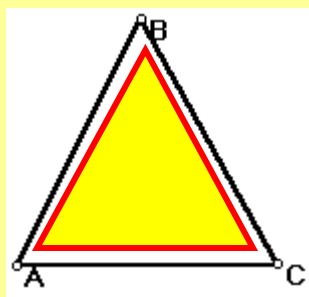
$\cup$  Given the above figure, the union of  $\overrightarrow{AB}$  and  $\overrightarrow{AC}$  is  $\angle BAC$

**Collinear** – points that lie on the same line

**Non-collinear** – points that cannot be contained on the same (straight) line.

**Triangle** - *the UNION* of the three segments that are possible when joining 3 non-collinear points.

$$\overrightarrow{AB} \cup \overrightarrow{BC} \cup \overrightarrow{CA} = \triangle ABC, \text{ or } \dots$$



**A triangle is labeled by the 3 vertices,**  
 $\triangle ABC, \triangle BAC, \triangle CAB, \triangle ACB, \triangle BCA, \triangle CBA,$

**all refer to the same triangle above.**