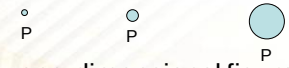
CHAPTER 1

Points, Lines, Planes and Angles

Basic Concepts

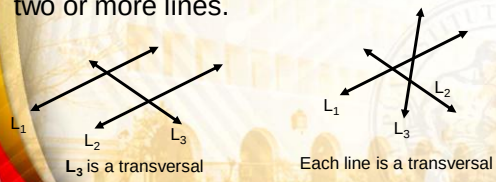
Point : zero-dimensional figure characterized only by its position (no length, no width)



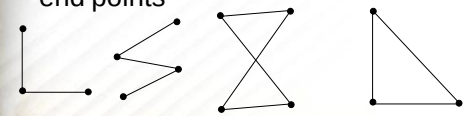
Line : one-dimensional figure, can be described by how long it is (no width, no thickness); extends infinitely on both directions

Two lines are **parallel** if they have no common point, otherwise, they are **intersecting lines.**

A **transversal** line is a line that cuts across two or more lines.

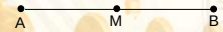


Broken Line : line segments connected at end points



Collinear Points : points lying in the same line

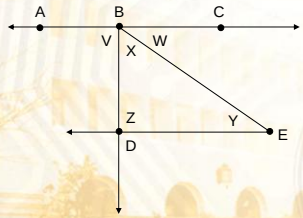
Midpoint : point exactly halfway between two endpoints of a line segment



Exercise

From the given figure, obtain the following:

a. all angles that have B as a vertex
b. the sides of angle V
c. another name for angle BED



Basic Concepts

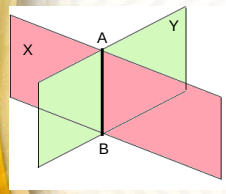
Plane : flat surface that has length and width but no thickness.

Surface with irregular shape

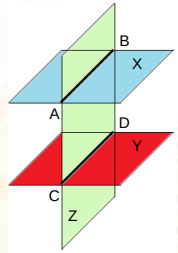
Surface with regular shape

Important Facts:

1. If two planes intersect, their intersection is a straight line.
2. The intersections of two parallel planes by a third plane are parallel lines.



Line AB is formed through the intersection of the planes X and Y

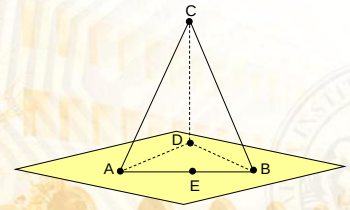


Parallel Lines AB and CD are formed through the intersections of two parallel planes X and Y and a third plane Z

Exercise

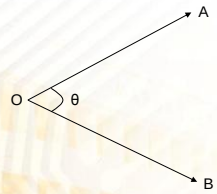
From the given figure, identify the following:

a. all planes in the figure
b. the 3 points that are collinear
c. the points that are coplanar



Basic Concepts

Angle : space formed by two rays (sides) sharing a common endpoint (vertex)



Note: **An angle is a geometric figure. Its magnitude is represented by a numeric value. To say that two angles are equal is incorrect. The correct statement should be "Two angles are congruent" or "Two angles are of equal magnitude".**

"equal" applies only to numbers,

"congruent" applies to geometric entities

Angle Measurements

1. Degree – divides 1 revolution into 360 equal parts
2. Radian – angle which intercepts an arc whose length is equal to the radius (sides) of the angle
   1 revolution = 2π rad
3. Gradient – divides 1 revolution into 400 equal parts
4. Mil – divides 1 revolution into 6400 equal parts
   - used in military science

Exercise: Convert the following angles:

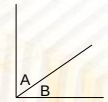
Degree	Radian	Gradient	Mil
	$\frac{\pi}{5} rad$		
		250	
			2000mil

Forms of Angles

1. Acute angle: measuring less than 90°
2. Obtuse angle: measuring more than 90° and less than 180°
3. Reflex angle: measuring more than 180° and less than 360°
4. Right angle: measuring exactly 90°
5. Straight angle: measuring exactly 180°
6. Circular angle: measuring exactly 360°

More terminologies

1. Two angles are complementary if their sum is 90°.
2. Two angles are supplementary if their sum is 180°.



$\angle A + \angle B = 90^o$

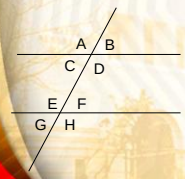
$\angle A + \angle B = 180^o$

Exercise:

1. Find the measure of the complement and supplement of the following angles:
   a. 65° b. 25° 25' c. 30° 24' 15"
2. Two angles are complementary and the measure of one angle is 40° less than the measure of the other. How many degrees are in each angle?

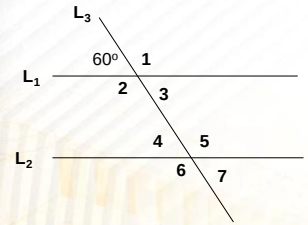
More terminologies

3. Interior and exterior angles are the angles formed by cutting two parallel lines with a transversal
4. Alternate interior angles are a pair of non-adjacent interior angles on opposite sides of the transversal. Alternate angles are congruent.
6. Corresponding angles have the same position with respect to their lines and the transversal.
7. Vertical angles are two non-adjacent angles formed by two intersecting lines.



Interior Angles: C, D, E, F
Exterior Angles: A, B, G, H
Alternate interior angles: C and C, D and E
Corresponding Angles: A and E, C and G
B and F, D and H
Vertical angles: A and D, B and C
E and H, F and G

Exercise



In the figure above, L_1 and L_2 are parallel and L_3 is a transversal. Determine the magnitude of the seven angles.