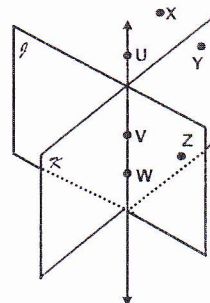


NOTES 1.1: POINTS, LINES & PLANES

TERM	DESCRIPTION	SKETCH	HOW TO NAME IT
POINT	<ul style="list-style-type: none"> names a location has no size or shape represented by a dot 	• M	Capital Letter - M, N, P
LINE	<ul style="list-style-type: none"> a straight path has no thickness goes on forever in 2 directions 		Lower-case cursive - l, m, n 2 pts on line - AB, AC, BC
PLANE	<ul style="list-style-type: none"> a flat surface has no thickness goes on forever in all directions 		Upper-case cursive - R, P, X, M 3 non-collinear points - Plane WXY
COLLINEAR	<ul style="list-style-type: none"> points that lie on the same line 		AB, & C are collinear M, N, & P are non-collinear
COPLANAR	<ul style="list-style-type: none"> points or lines that lie on the same plane 		X, Y, & W are coplanar X, Y, & D are non-coplanar

EXAMPLES:

1. Name three points that determine plane β . Points: V, W, & Z	2. Name the intersection of planes β and κ . Intersection: VW or VU or WU (all the same line)
3. Name a set of collinear points, and a set of non-collinear points. Collinear Points: U, V, & W Non-Collinear Points: V, W, & Y	4. Name a set of points, other than those in EXAMPLE 1 that are coplanar. Points: X, U, & Y



Postulates are statements that are assumed to be TRUE.

The following are postulates concerning the three basic elements in geometry.

- A line contains: **at least 2 points**
- Through any two points there is: **exactly one line**
- A plane contains at least: **3 non-collinear points**
- Through any three points there is at least one plane, and through any three

NON-COLLINEAR points there is exactly one plane.

- If two points are in a plane, then the line that contains the points is also in the plane.
- If two planes intersect, then their intersection is a line.

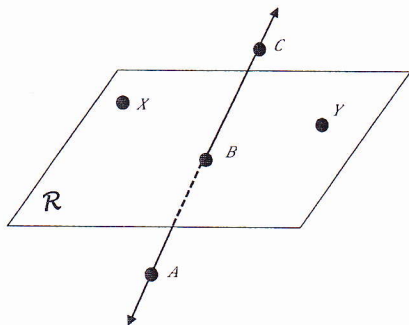
Theorems are important statements that must be proven.

The following are theorems about these basic elements in geometry.

- If two lines intersect, then they intersect at: **exactly one point**
- If two lines intersect, then: **exactly one plane contains these lines**

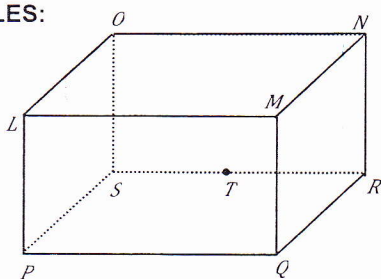
TERM	DESCRIPTION	SKETCH	HOW TO NAME IT
Line Segment	<ul style="list-style-type: none"> part of a line consists of 2 endpoints and all points between 		\overline{RT} or \overline{TR} - must use endpoints
Ray	<ul style="list-style-type: none"> part of a line has 1 endpoint goes on forever in 1 direction 		\vec{EN} or \vec{ED} - First letter must be endpoint
Opposite Rays	<ul style="list-style-type: none"> 2 rays that share the same endpoint extend indefinitely in opposite directions 		\vec{AT} & \vec{AB} are opposite rays - A is the endpoint

EXAMPLES:



- Name all line segments.
 Shown - \overline{CB} , \overline{BA} , \overline{CA}
 Not shown - \overline{XC} , \overline{CY} , \overline{XY} , \overline{BY} , \overline{AY} , \overline{AX} , \overline{BX}
- Name all rays.
 \vec{BC} , \vec{BA} , \vec{AC} , \vec{CA}
- Name a pair of opposite rays.
 \vec{BC} & \vec{BA}

EXAMPLES:



- Are points S, O, and M coplanar? **Yes**
 Why or why not? **Any 3 non-collinear points are coplanar.**
- How many "planes" are shown? **6**
- Name the intersection of planes LON and PQM: \overleftrightarrow{LM}
 Explain: **2 planes intersect at a line**
- Name the intersection of plane MQR and \overleftrightarrow{ON} . **N** Explain. **A plane and a line intersect at a point.**
- Do S and M determine a line? **Yes** Why or why not? **Any 2 points determine a line.**
- How many lines are there through points N and Q? **One** Explain. **Through any 2 points there is exactly one line.**
- How many planes are there through points S, T, and R? **Infinite** Explain. **Through any 3 points there is at least one plane.**
- Name the intersection of \overleftrightarrow{PS} and \overleftrightarrow{OS} . **S** Explain. **2 lines intersect at a point.**
- How many planes contain \overleftrightarrow{LO} and \overleftrightarrow{OS} ? **One** Explain. **If 2 lines intersect, then exactly one plane contains them.**
- Is \overleftrightarrow{OM} in plane LMN? **Yes** Why or why not? **If 2 points are in a plane, then the line that contains them is in the plane.**