Geometry Lesson 1: Points, Lines, and Planes Name:

Notes

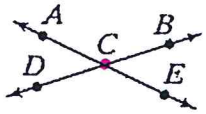
Through any two points there is exactly 1 line

Line t is the only line that passes through points A and B.

*Notation: $\overleftrightarrow{AB}$, $\overleftrightarrow{BA}$

Postulate 1-2

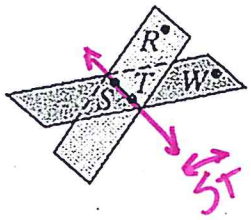
If two lines intersect, then they intersect in exactly 1 point



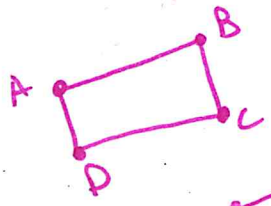
$\overleftrightarrow{AE}$ and $\overleftrightarrow{BD}$ intersect at C.

Postulate 1-3

If two planes intersect, then they intersect in 1 line



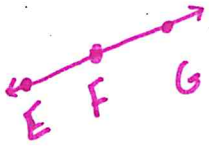
Plane RST and plane STW intersect in $\overleftrightarrow{ST}$.



Postulate 1-4

Through any three noncollinear points there is exactly 1 plane

points not on same line



A point is a precise location or place, usually represented by a dot.

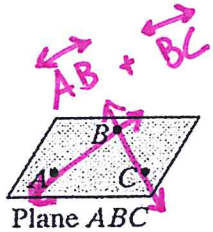
Space is the set of everything

A line is straight, connects at least 2 points and is infinite.

Collinear points are points that are on the same line (or could form a line)

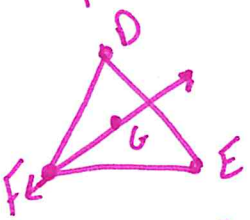
A plane is a flat surface that has no thickness (2-dimensional)

Two points or lines are coplanar if they are on the same plane.



$\overleftrightarrow{AB}$ and $\overleftrightarrow{BC}$ are coplanar.

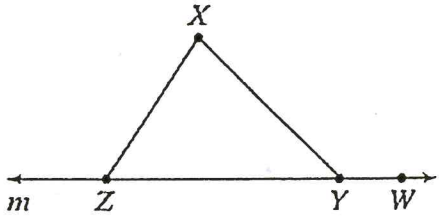
Plane DEF



But $\overleftrightarrow{AB}$ and $\overleftrightarrow{FG}$ are noncoplanar.

Examples

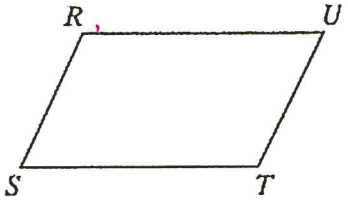
1 Identifying Collinear Points In the figure at right, name three points that are collinear and three points that are not collinear.



Points [Z], [Y], and [W] lie on a line, so they are collinear.

Any other set of three points in the figure do not lie on a line, so no other set of three points is collinear. For example, X, Y, and Z form a [triangle / plane] and are not collinear.

2 Naming a Plane Name the plane shown in two different ways.

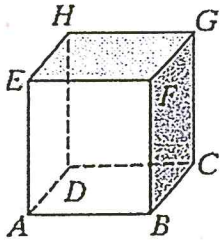


You can name a plane using [at least 3 noncollinear points.]

Some possible names for the plane shown are the following:

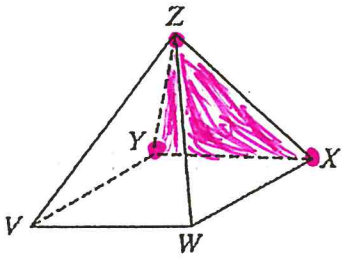
plane [RUT], plane [RUTS], plane [RSTU], plane [TURS], and plane [SRUT].

3 Finding the Intersection of Two Planes Use the diagram at right. What is the intersection of plane HGC and plane AED?

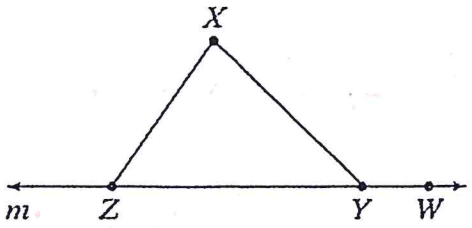


As you look at the cube, the front face is on plane $AEFB$, the back face is on plane HGC, and the left face is on plane AED. The back and left faces of the cube intersect at [ ]. Planes HGC and AED intersect vertically at [ ].

4 Using Postulate 1-4 Shade the plane that contains X, Y, and Z.



Points X, Y, and Z are the vertices of one of the four triangular faces of the pyramid. To shade the plane, shade the interior of the triangle formed by [X], [Y], and [Z].



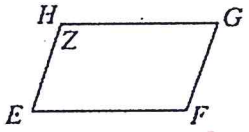
Use the above figure.

1. a. Are points W, Y, and X collinear?

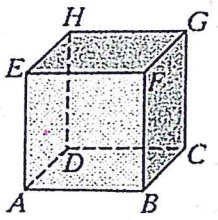
b. Name line m in three different ways.

c. **Critical Thinking** Why do you think arrowheads are used when drawing a line or naming a line such as $\overleftrightarrow{ZW}$?

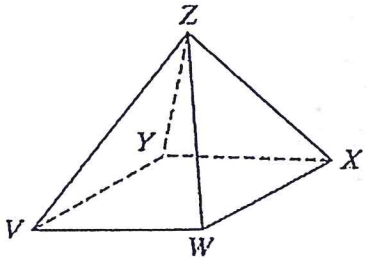
2. List three different names for plane Z.



3. Name two planes that intersect in $\overleftrightarrow{BF}$.



4. a. Shade plane VWX.

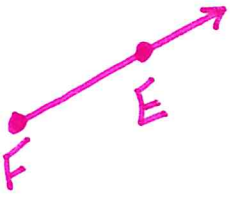


b. Name a point that is coplanar with points V, W, and X.

Vocab.

Ray: Part of a line consisting of 1 endpoint.
(other "end" is an arrow)

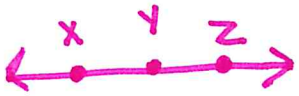
Ex. 1



*Name: $\overrightarrow{FE}$ ← Notice the notation!

*Must follow direction of endpoint to arrow.
Only 1 name in this case.

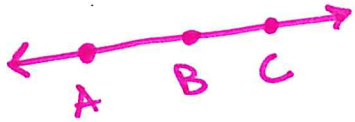
Ex. 2



Name the ray(s): $\overrightarrow{YZ}$, $\overrightarrow{YX}$
$\overrightarrow{XZ}$, $\overrightarrow{ZX}$

Segment: Part of a line consisting of 2 endpoints.
(Includes all points in between)

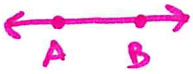
Ex. $\overleftrightarrow{AC}$



Name the segment(s): $\overline{BC}$, $\overline{AC}$, $\overline{AB}$
($\overline{CB}$) ($\overline{CA}$) ($\overline{BA}$)

← Notice the notation!

$\overleftrightarrow{AB}$ = "Line AB"



$\overrightarrow{AB}$ = "Ray AB"

$\overline{AB}$ = "Segment AB"