INTRO TO GEOMETRY

Nicola Baird

Point, Line, and Plane are Technically Undefined…

- **UNDEFINED TERM: an expression which is not assigned an interpretation or a value**

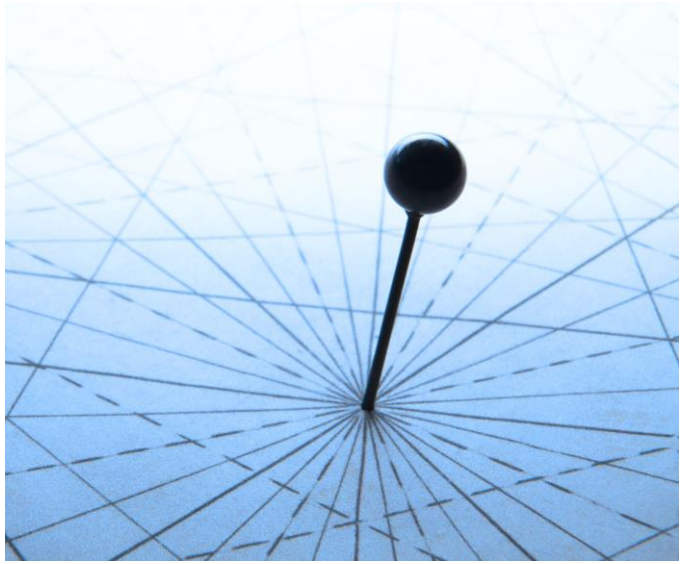
- There are no terms available to define them! The best way to conceptualize undefined terms is to describe them using physical examples!

Draw an *oval* around phrases that represent a point

Underline phrases that represent a line

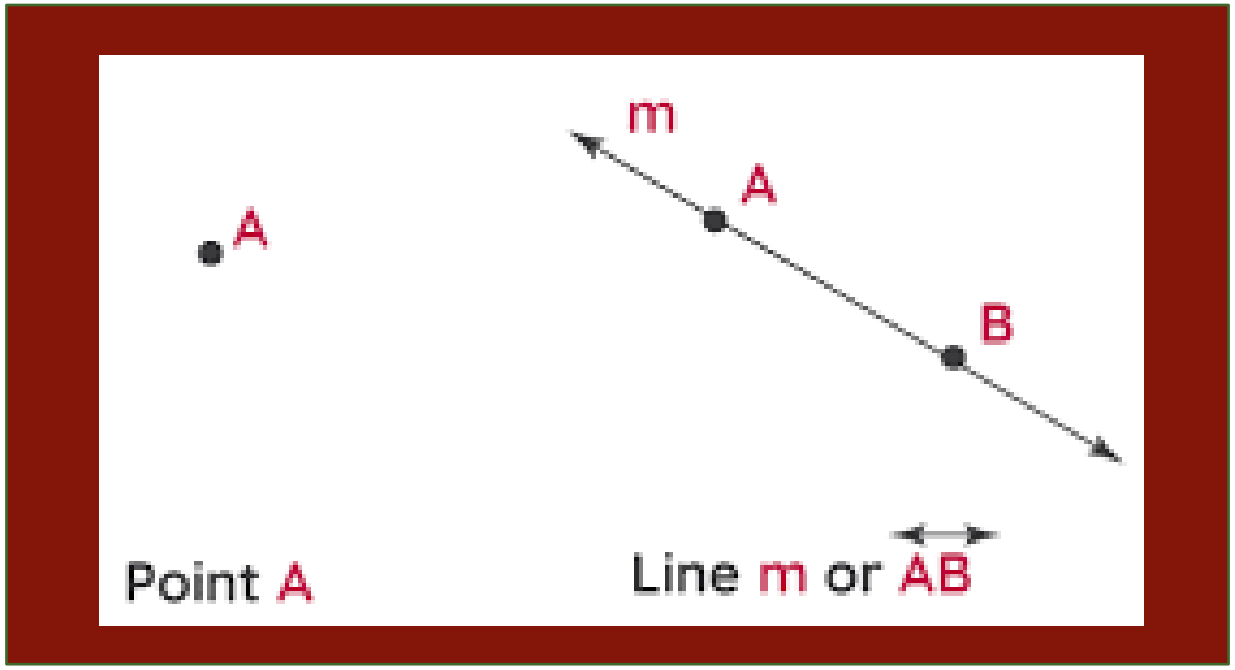
Draw a *parallelogram* around all phrases that represent a plane

star in the sky	guitar string	sheet of paper
cable	desktop	grain of sand
tip of pencil	period at the end of a sentence	thread
floor	telephone wire	flat screen
freckle	bed sheet	uncooked spaghetti



A point is represented by a small dot.

Points are named using capital letters.



What's the Point?

- A Point is a geometric element that has zero dimension (no length, breadth, depth, or height)
- A Point indicates a position or location in space—Think of plotting (2,3) on a cartesian plane.

What's a Line?

- A line has one dimension. Through any two points, there is exactly one line.
- It is represented by a straight line with two arrowheads to indicate that the line extends without ending in two directions.

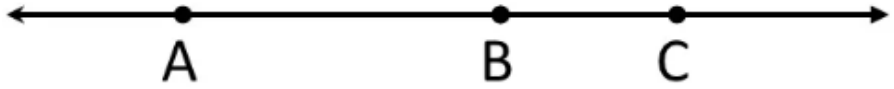
It Never Ends!!!!!!
!!!!!!!!!!!!!

How do we Name a Line?

"What's in a name? That which we call a rose by any other name would smell as sweet."

a)Two points on a line:

$\overleftrightarrow{AB}, \overleftrightarrow{AC}, \overleftrightarrow{BA}, \overleftrightarrow{BC}, etc...$

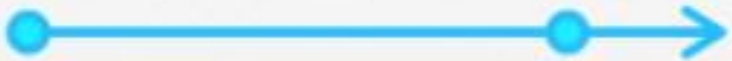


b) Single lowercase letter

Example: name the line below.

RAY in Geometry

The line that connects the two points extends in only one direction infinitely.

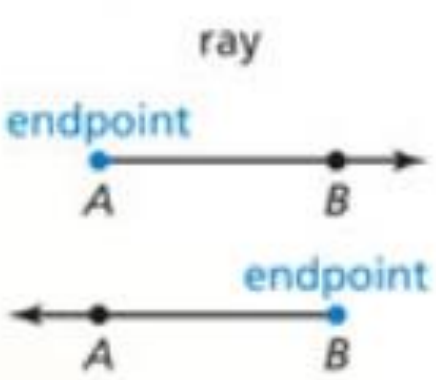


endpoint
start of a ray

signpost
a way to give the ray a name

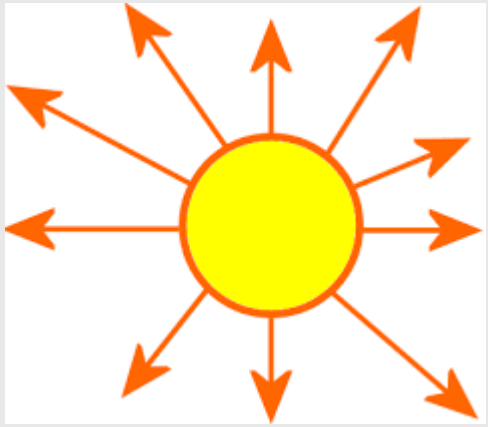
Ray The **ray** AB (written as $\overrightarrow{AB}$) consists of the endpoint A and all points on $\overrightarrow{AB}$ that lie on the same side of A as B.

Note that $\overrightarrow{AB}$ and $\overrightarrow{BA}$ are different rays.



Rays of Sunshine

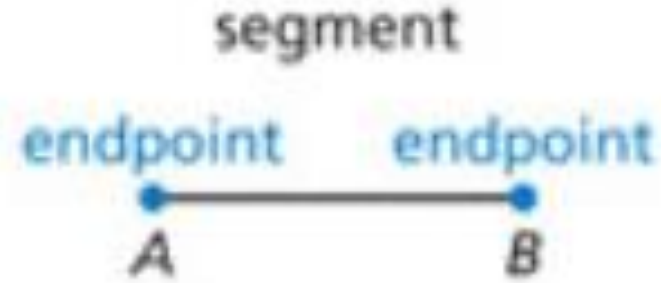
A ray is part of a line that has a starting point but no end point.



What's a Line Segment?

A portion or piece of a line with two endpoints. The length is finite and is determined by its two endpoints.

Segment The **line segment** AB, or **segment** AB, (written as $\overline{AB}$) consists of the **endpoints** A and B and all points on $\overleftrightarrow{AB}$ that are between A and B. Note that $\overline{AB}$ can also be named $\overline{BA}$.

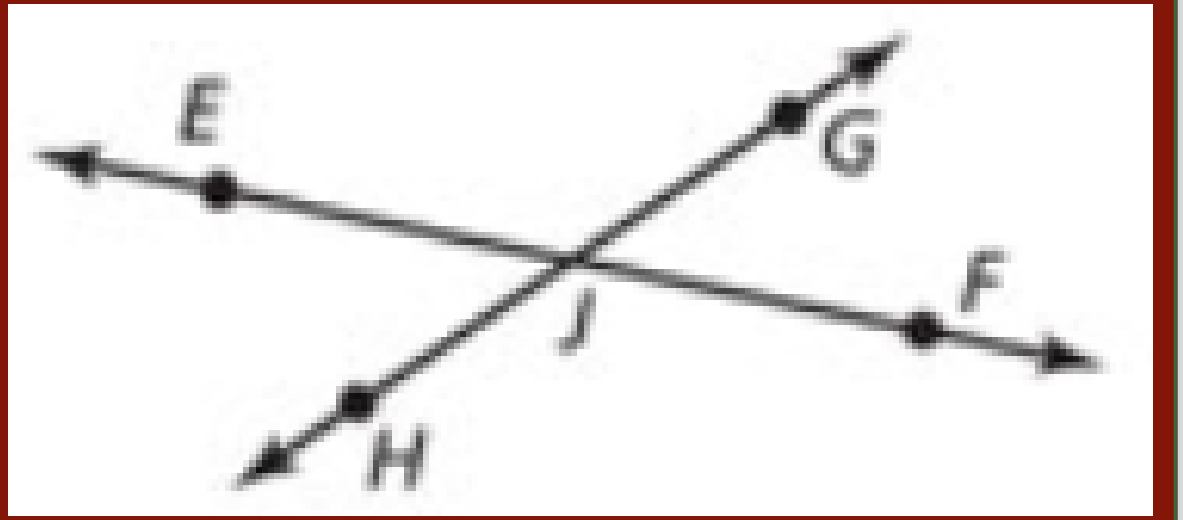


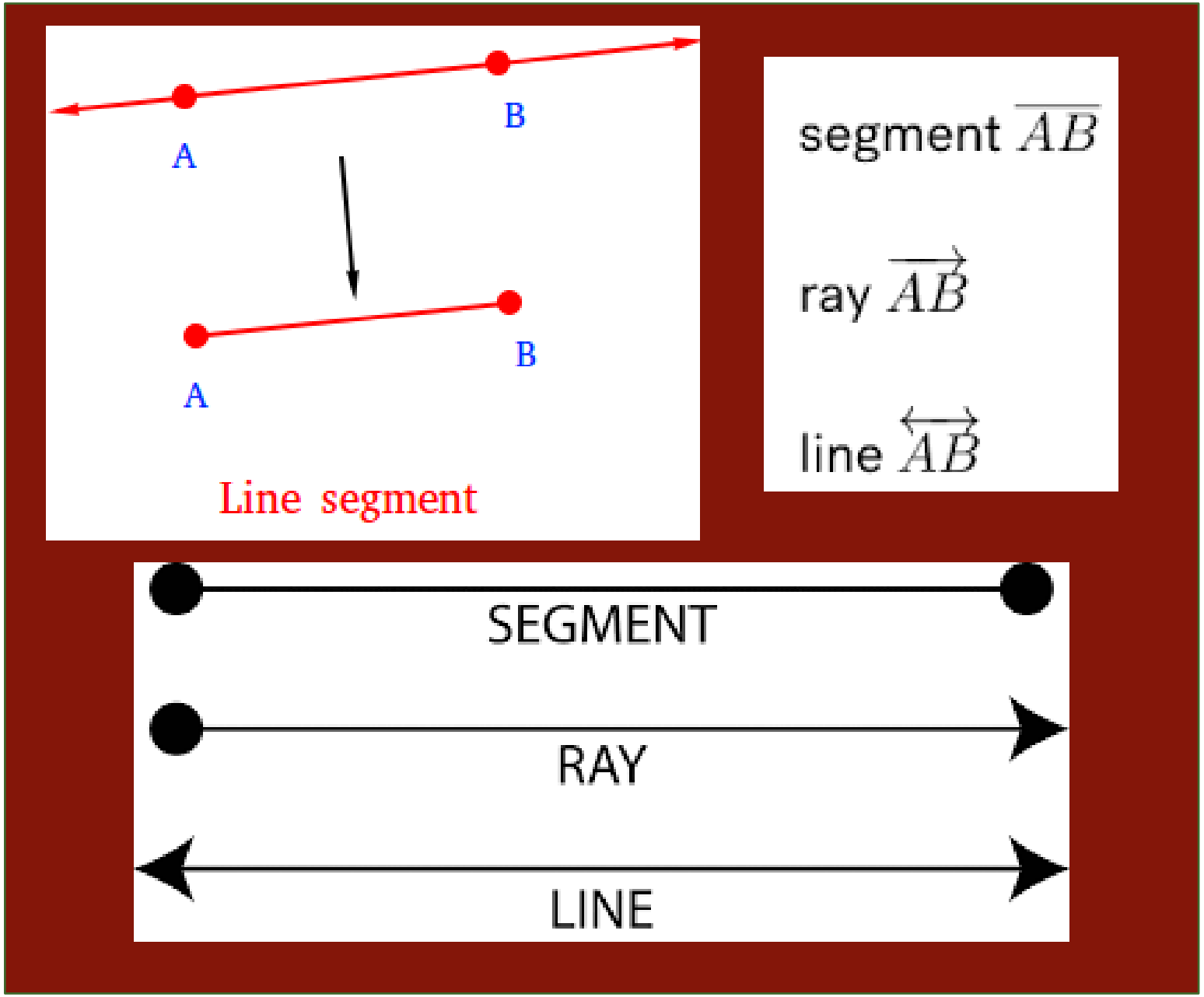
Let's Practice!

Give another name for $\overline{GH}$.

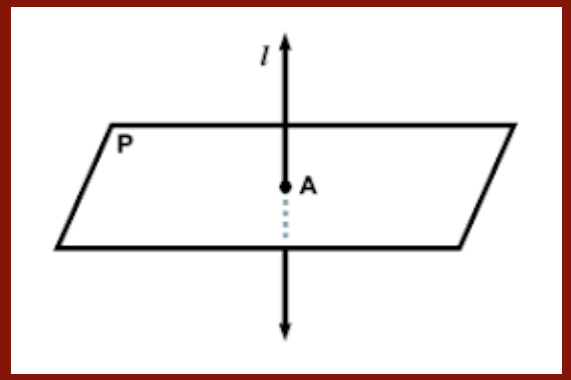
Name all rays with endpoints J.

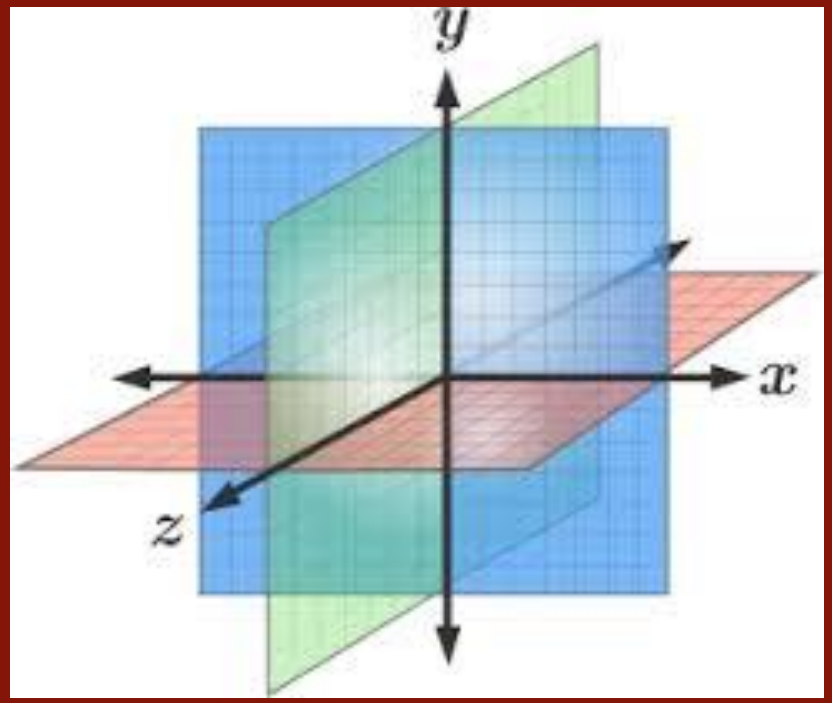
Are rays $\overrightarrow{EJ}$ and $\overrightarrow{JE}$ the same ray?





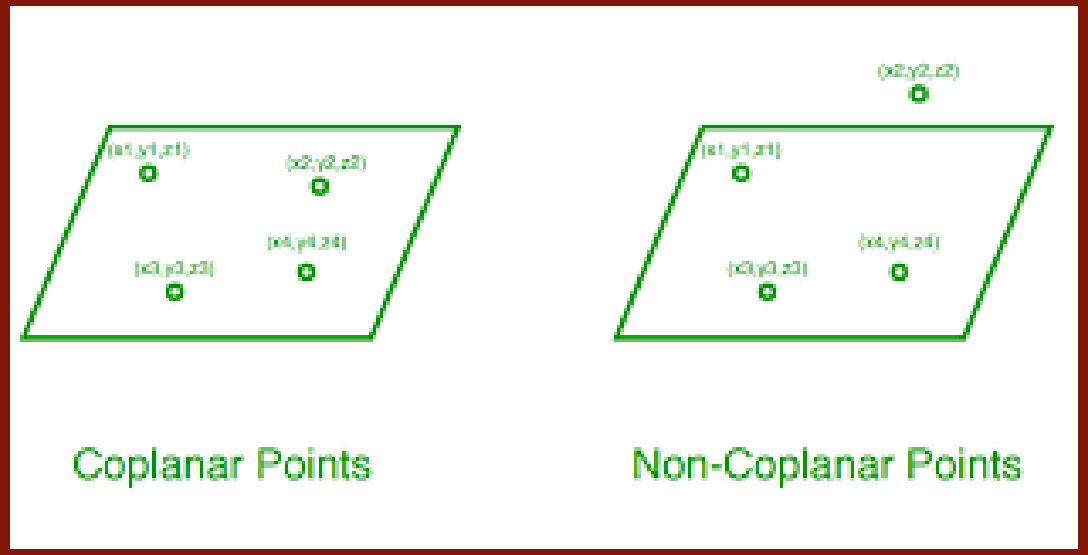
How do you tell the difference between them all?





What's a **Plane?** It's plain to see!

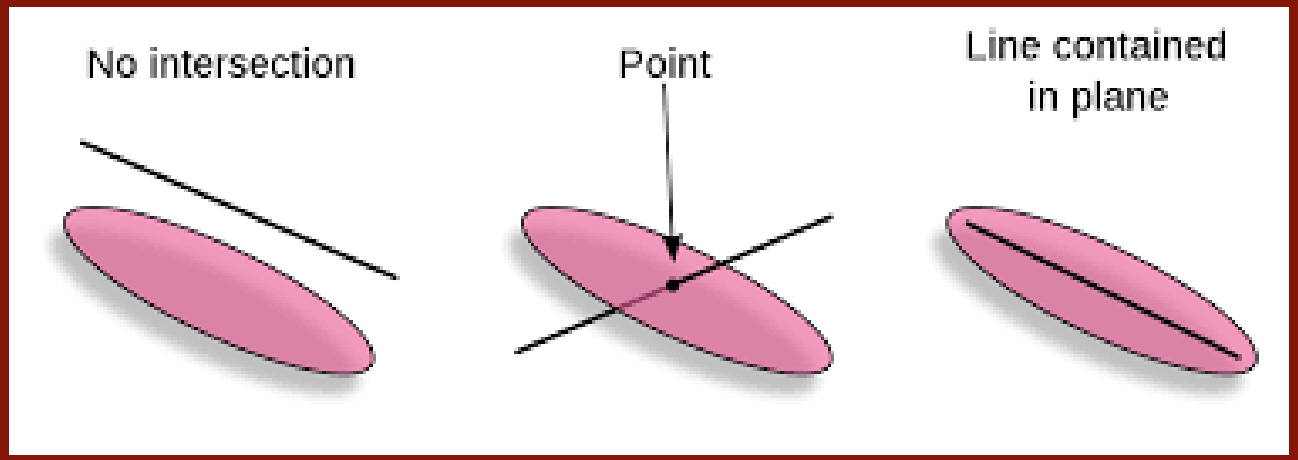
- A plane is a flat two-dimensional surface which contains points, lines, and segments (they "lie in" the plane)
- Planes go on forever, but they are represented by a shape that looks like a floor or a wall (or a parallelogram).

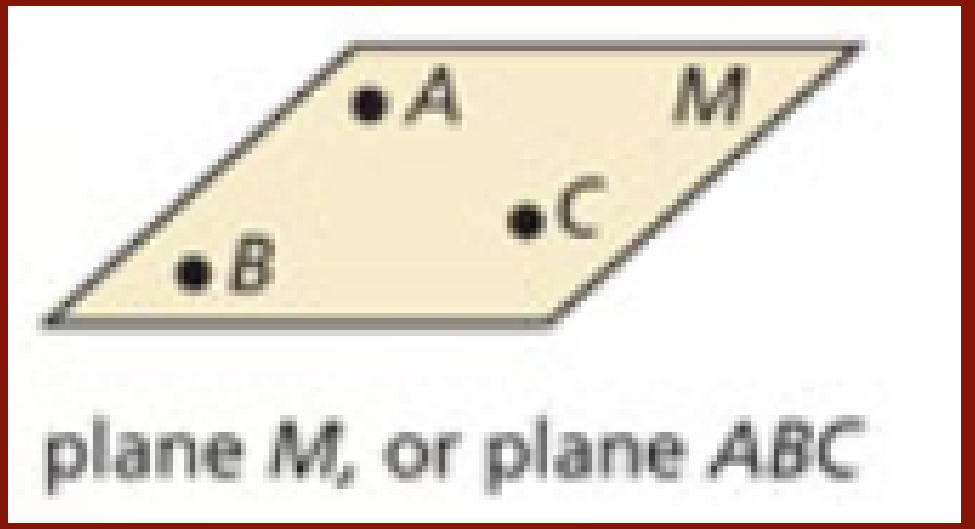


Co**linear** points: points that lie on the same line.

Co**planar** points: points that lie on the same plane.

To name the plane, you can use three points that are not all on the same line.



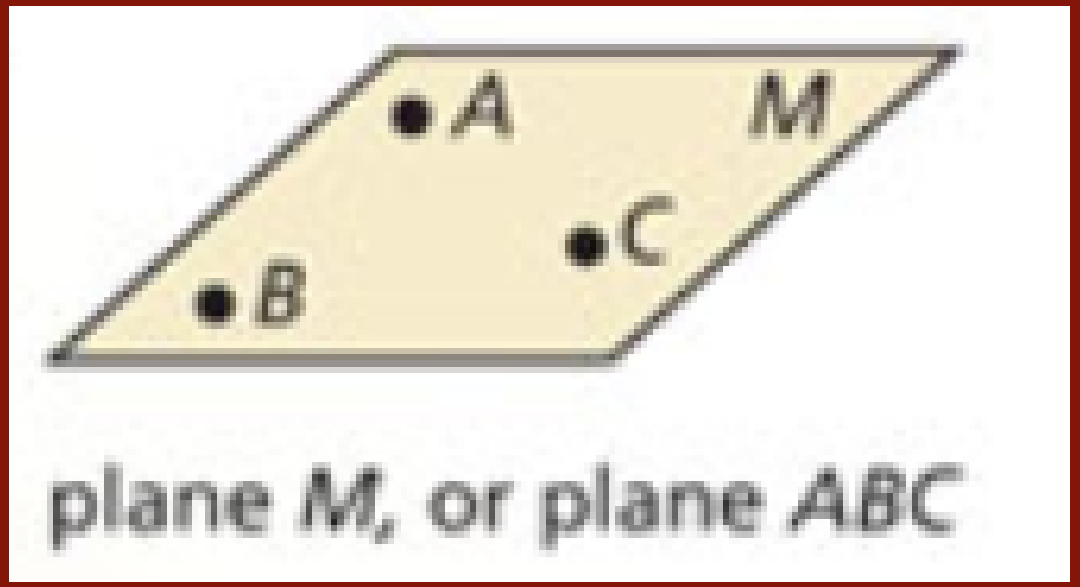


Let's Practice!

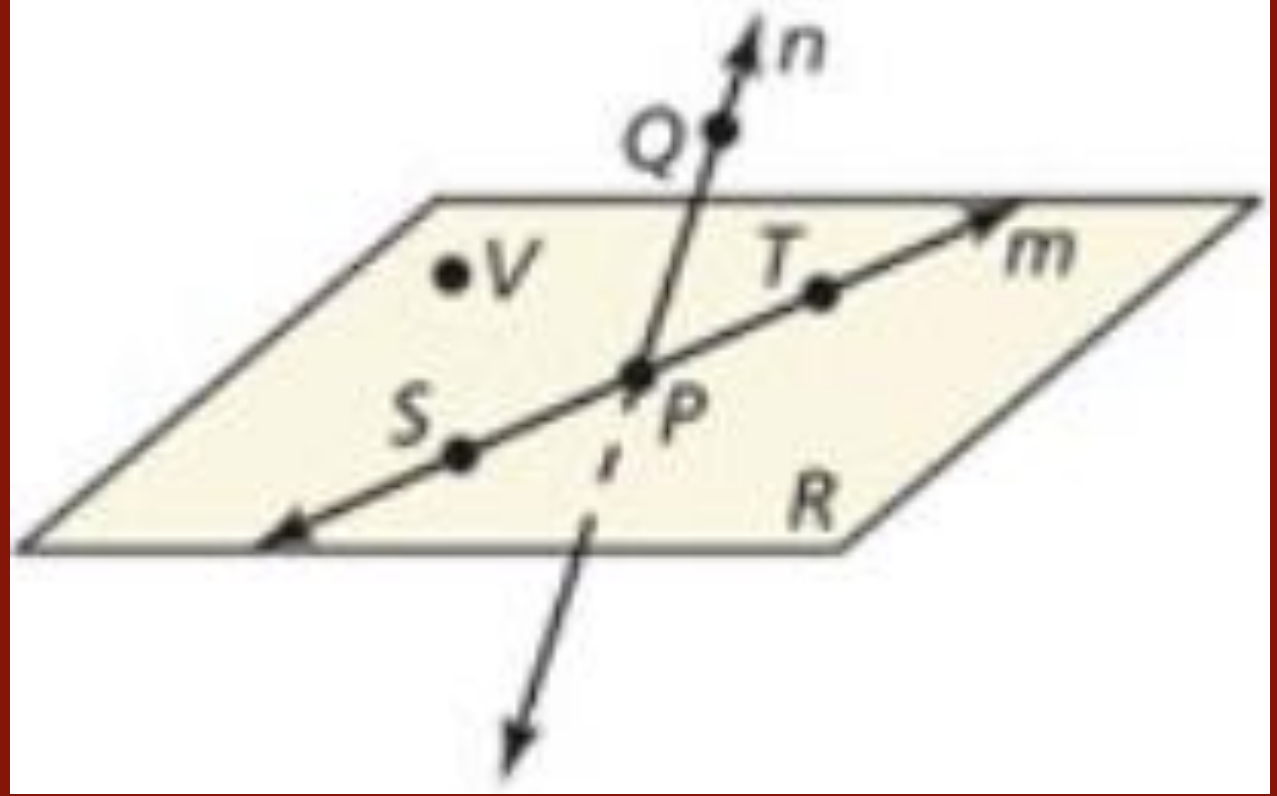
What is the difference between colinear and coplanar points?

What is another name for Plane M if points A, B, C lie on plane M?

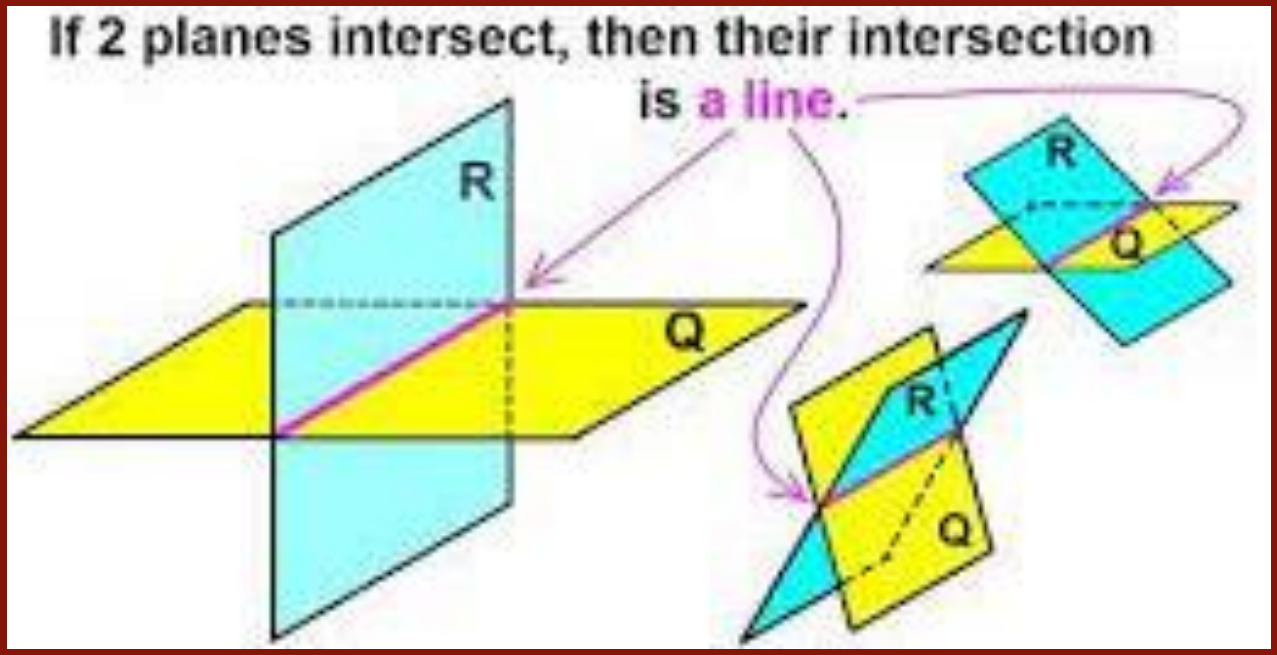
How many points do you need to name a line?

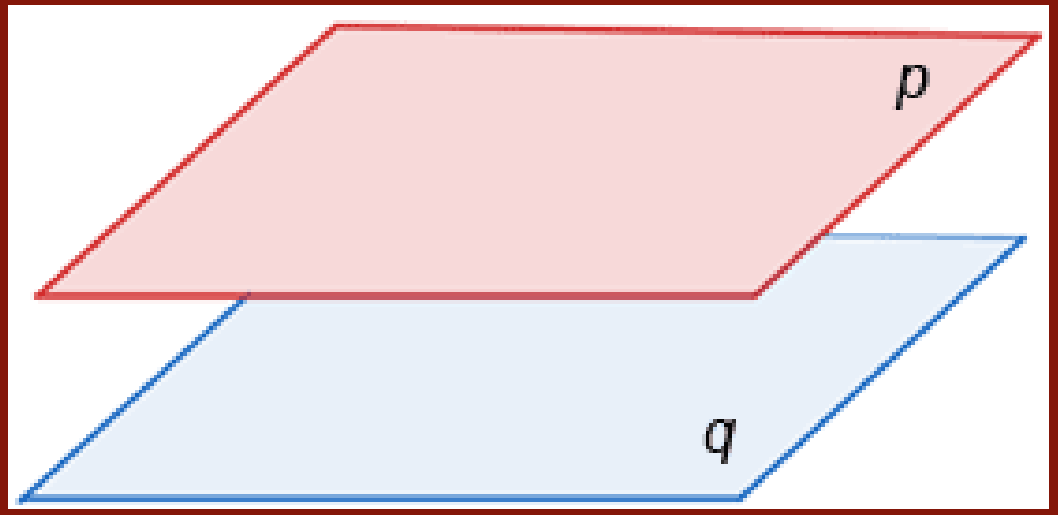


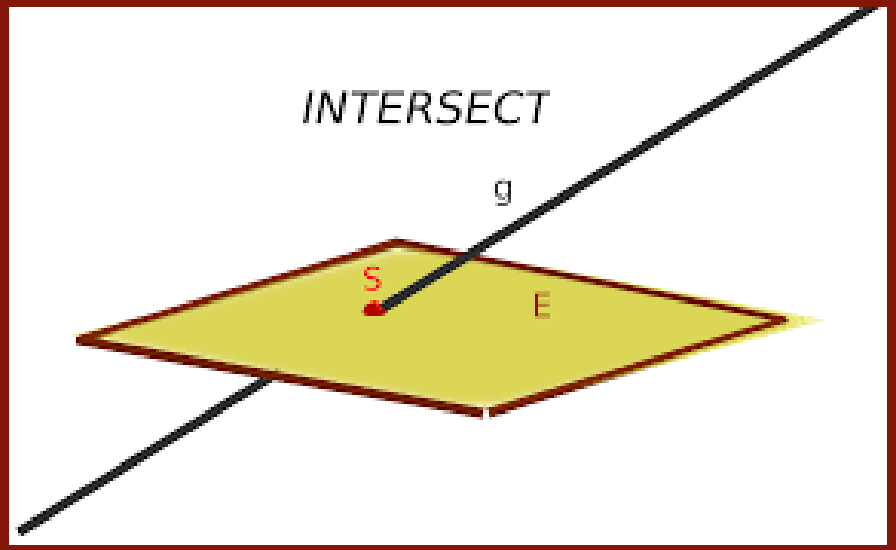
- Give two other names for $\overleftrightarrow{PQ}$
- Give two other names for plane R
- Name three points that collinear
- Name four points that are coplanar
- Give two other names for $\overleftrightarrow{ST}$
- Name a point that is NOT coplanar with points Q, S, and T



Planes can be in parallel or intersecting!

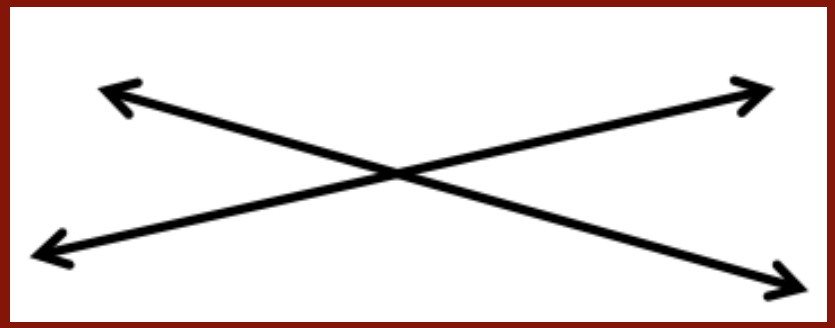




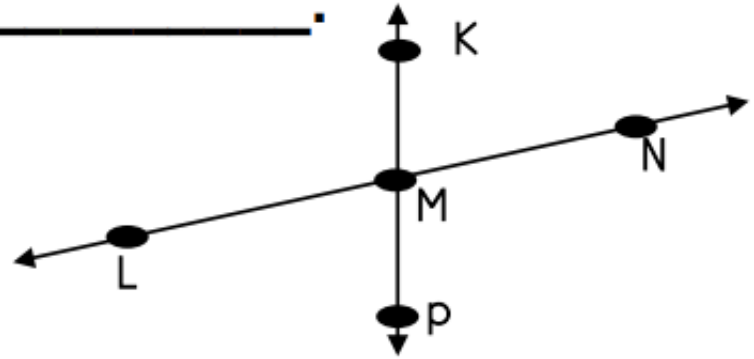


Let's Practice!

Two lines intersect at _____.

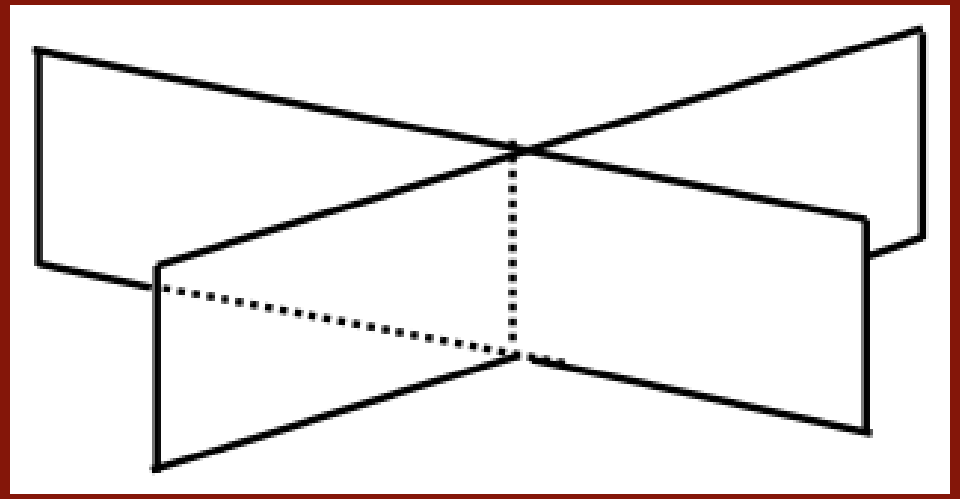


EXAMPLE: Name the intersection of $\overleftrightarrow{LM}$ and $\overleftrightarrow{PM}$: _____.

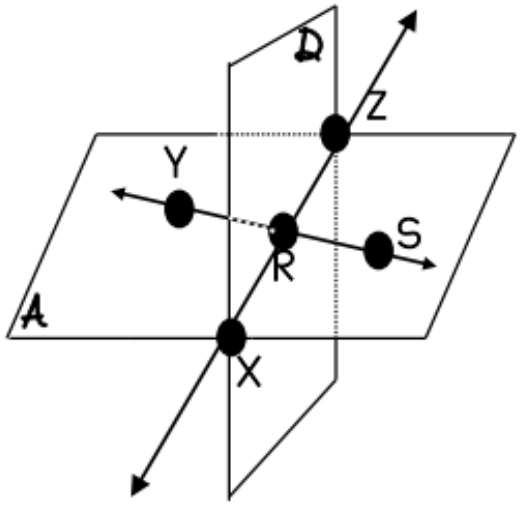


Let's Practice

Two planes intersect at _____.



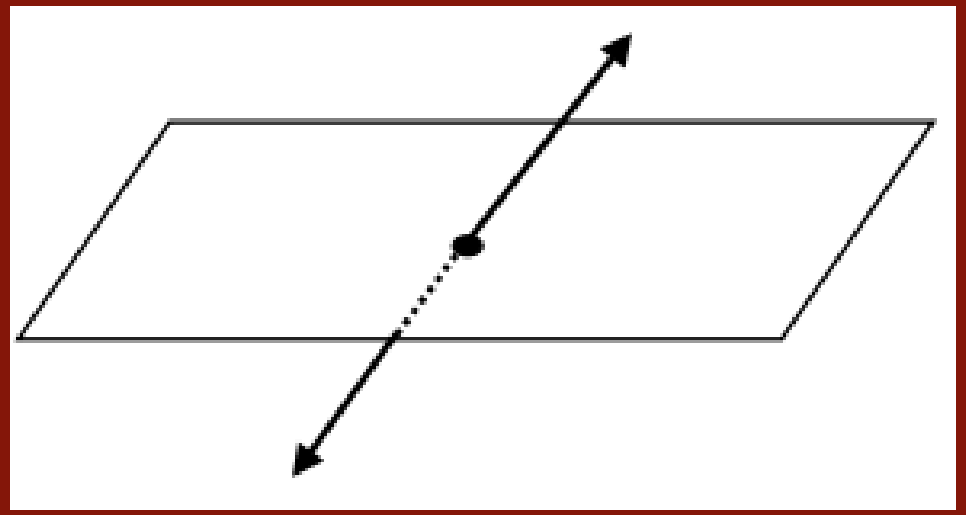
EXAMPLE: Name the intersection of plane D and plane A: _____.



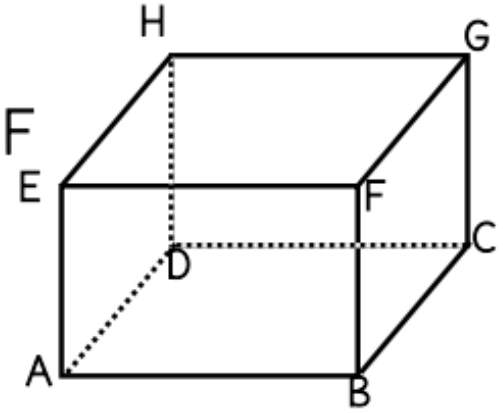
Hint: find two points that are on both planes. These will make up the intersection.

Let's Practice!

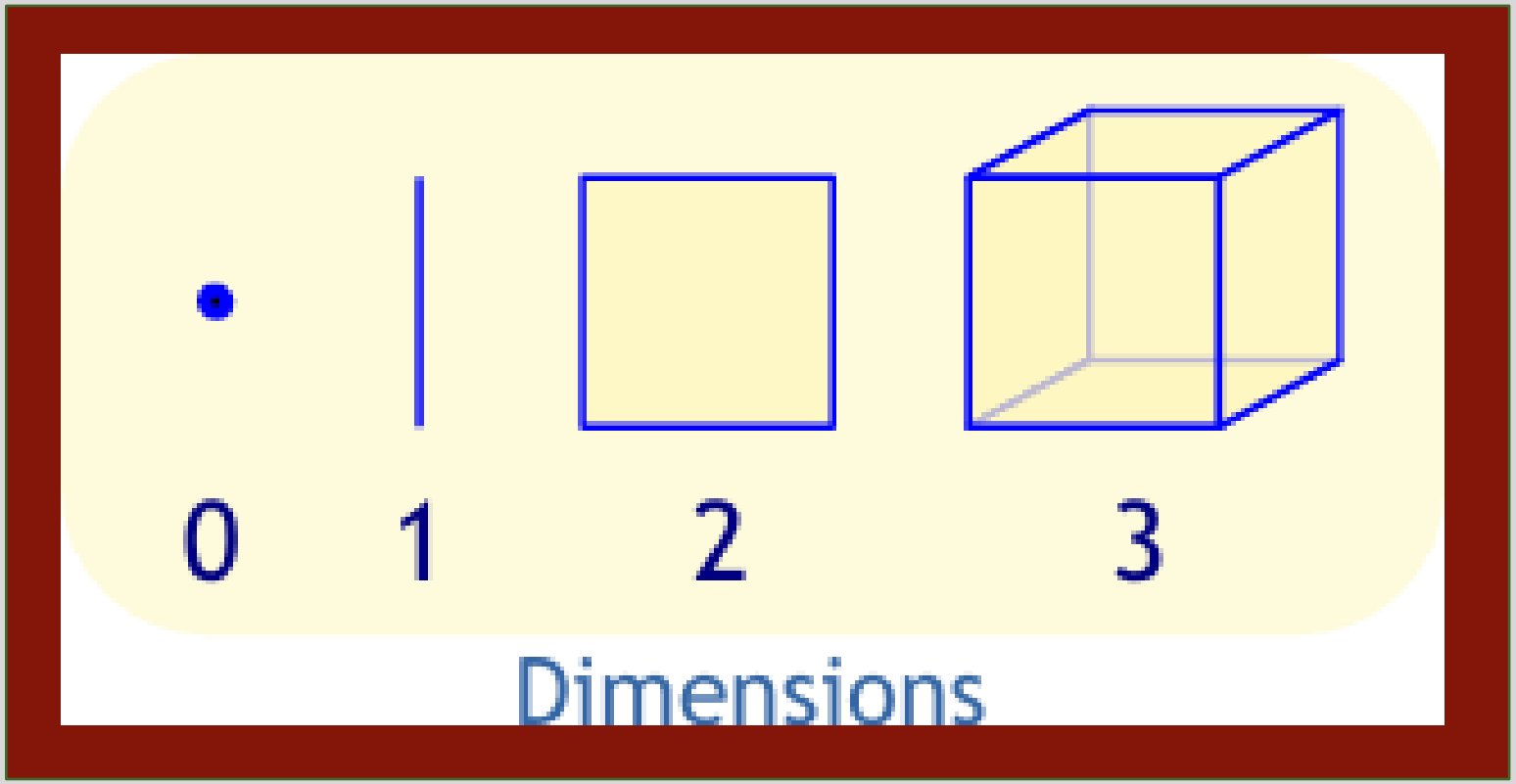
A plane and a line intersect at _____.



EXAMPLE: Name the intersection of plane HEF and $\overleftrightarrow{GC}$: _____.

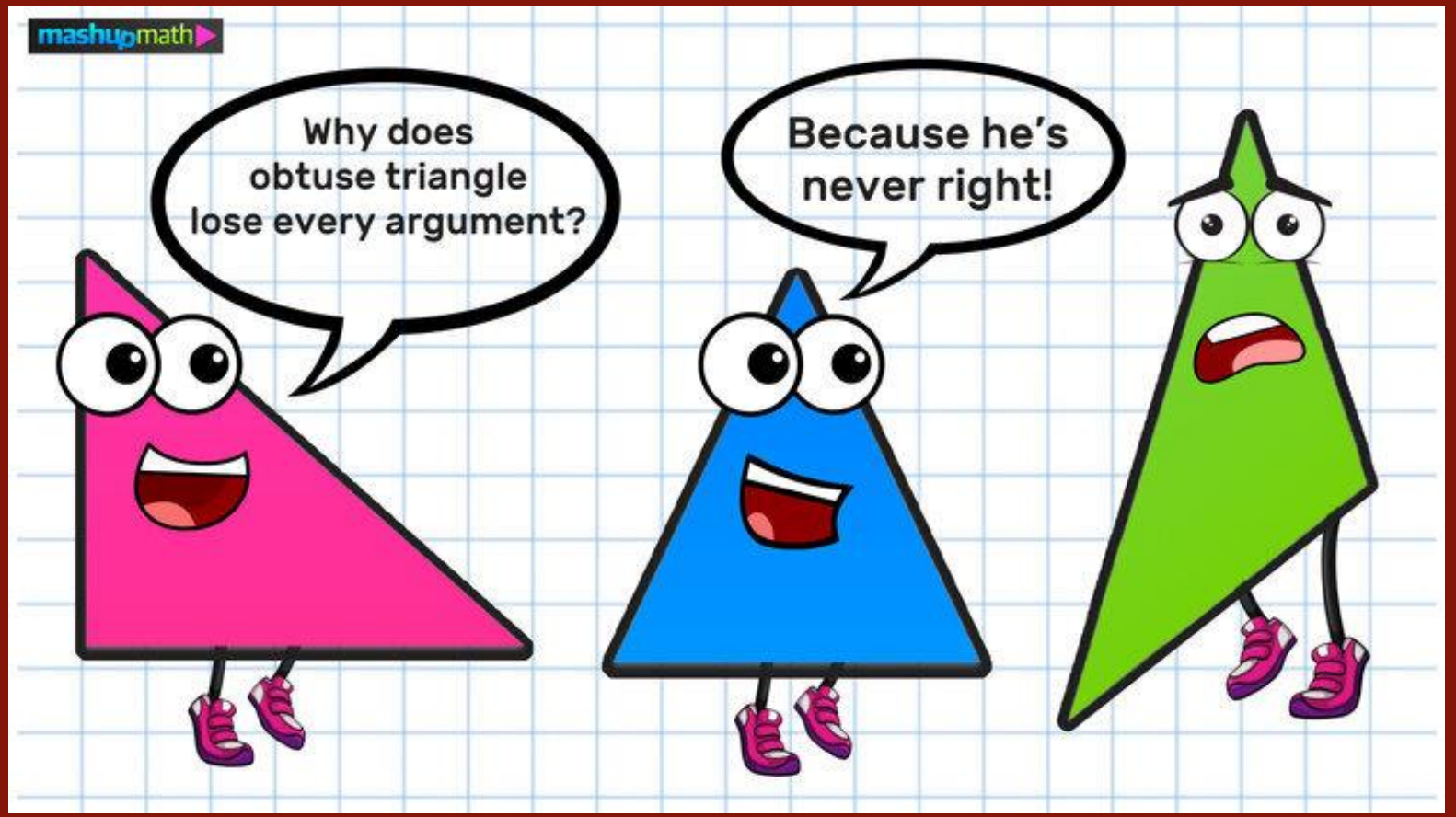


Dimensions!

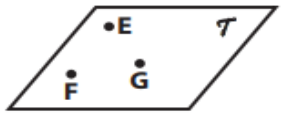


- 0 Dimension (point)
- 1 Dimension (line)
- 2 Dimension (plane)
- 3 Dimension (Depth, Breadth, Height)

Geometry Worksheet!



Points, Lines and Planes

	Description	Figure	Symbol
Point	A geometric element that has zero dimensions.	• P	P or Point P
Line	A line is a collection of points along a straight path with no end points.		$\overleftrightarrow{AB}$ or $\overleftrightarrow{BA}$
Line segment	A line segment is a part of a line that contains every point on the line between its end points.		$\overline{XY}$ or $\overline{YX}$
Ray	A ray is a line with a single end point that goes on and on in one direction.		$\overrightarrow{PQ}$
Plane	A plane is a flat surface that extends to infinity.		Plane EFG or Plane $\mathcal{T}$