Lesson 1.1 Points, Lines, Planes

Learning Intent (Target): *Today I will* use the Essentials of Geometry to identify and apply key vocabulary terms to the Real World.

Success Criteria: *I'll know I'll have it when* I can describe, name and sketch points, lines, planes, segments, and rays.
Solve real-life problems involving lines and planes.

Accountable Team Task: *Therefore, I can* define key vocabulary terms, create frayer models, flip chart interactive practice, and complete geogebra investigations.
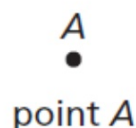
Vocabulary: Point, Line, Plane, Line Segment, Ray, Opposite Rays, Collinear Points, Coplanar Points, Intersection, Betweeness of Points, Midpoint (Midsegment)

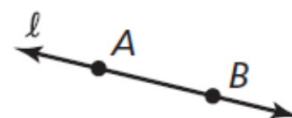https://www.mathsisfun.com/definitions/

Core Concept

Undefined Terms: Point, Line, and Plane

Point   A **point** has no dimension. A dot represents a point.

A

•

point A

**Line**   A **line** has one dimension. It is represented by a line with two arrowheads, but it extends without end.

Through any two points, there is exactly one line. You can use any two points on a line to name it.

ℓ

A

B

line ℓ, line AB ($\overleftrightarrow{AB}$), or line BA ($\overleftrightarrow{BA}$)

Plane   A **plane** has two dimensions. It is represented by a shape that looks like a floor or a wall, but it extends without end.

Through any three points not on the same line, there is exactly one plane. You can use three points that are not all on the same line to name a plane.
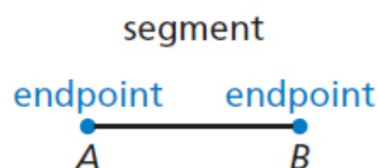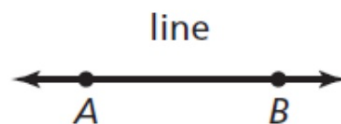
• A M

• B

• C
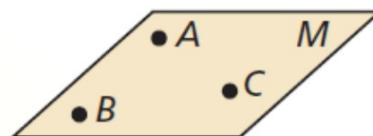
plane M, or plane ABC

Core Concept

## Defined Terms: Segment and Ray

The definitions below use line AB (written as $\overleftrightarrow{AB}$) and points A and B.

line

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 $\overline{BA}$.

segment

endpoint   endpoint

A B

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

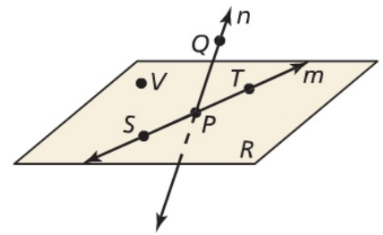Note that $\overrightarrow{AB}$ and $\overrightarrow{BA}$ are different rays.

ray

endpoint

A B

endpoint

A B
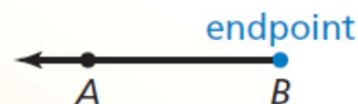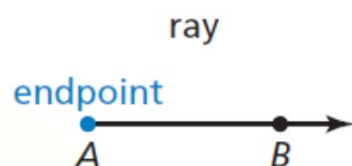
Opposite Rays If point C lies on $\overleftrightarrow{AB}$ between A and B, then $\overrightarrow{CA}$ and $\overrightarrow{CB}$ are **opposite rays**.

A C B
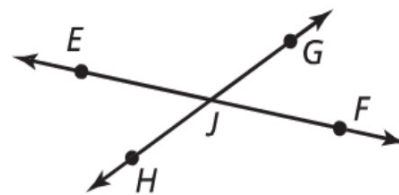
Click the example to show the next step.

a. Give two other names for $\overleftrightarrow{PQ}$ and plane R.

b. Name three points that are collinear. Name four points that are coplanar.
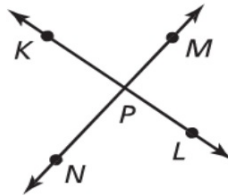
SOLUTION

1. Use the diagram in Example 1. Give two other names for $\overleftrightarrow{ST}$. Name a point that is *not* coplanar with points Q, S, and T.

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

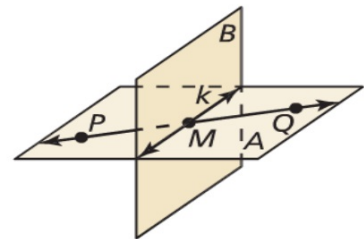**b.** Name all rays with endpoint J. Which of these rays are opposite rays?

SOLUTION

Use the diagram.

2. Give another name for $\overline{KL}$.

3. Are $\overrightarrow{KP}$ and $\overrightarrow{PK}$ the same ray? Are $\overrightarrow{NP}$ and $\overrightarrow{NM}$ the same ray? Explain.

4. Sketch two different lines that intersect a plane at the same point.

Use the diagram.

5. Name the intersection of $\overleftrightarrow{PQ}$ and line k.

6. Name the intersection of plane A and plane B.

7. Name the intersection of line k and plane A.