1.1 Identify Points, Lines, and Planes

G.CO.1: Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.

BIG IDEA! To learn how to *name* and *label* geometric figures.

1. **POINT** - Is represented by a dot. Geometric points have NO size and NO dimension.

Written Representation: By *CAPITAL letters*.

Examples: *end of a pen, pupil. . .*

Diagram: *A B C*   Points: A, B, C

2. **LINE** - Is represented by a line with two arrowheads. Geometric lines have NO thickness and they extend without end and they have ONE dimension.
Through ANY two points there is EXACTLY ONE line.

Written Representation: By a *double-headed arrow* (↔) over two points on the line, or by a single lowercase letter.
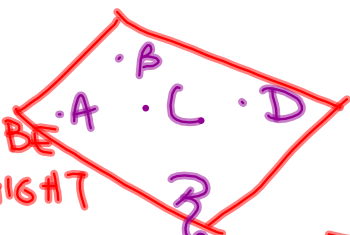
Examples: *pen, edge of a board. . . .* $l, \overleftrightarrow{AB}, \overleftrightarrow{BC}, \overleftrightarrow{AC}$

Diagram: *A B C* →l $\overleftrightarrow{BA}, \overleftrightarrow{CB}, \overleftrightarrow{CA}$

3. **PLANE** - Is represented by a shape that looks like a floor or a wall and it extends infinitely without end. 2 - DIMENSIONS

Written Representation: By *three points* **(ABC)** that are **NOT** on the same line or a *script CAPITOL letter* (*R*).

Example: *floor, wall, ceiling, paper*

Diagram:

✗ CAN'T BE A STRAIGHT LINE →

BCD, CAB, ABD, BAD, *R*
CBA, BAC, ABC, CDB
~~ACD~~

4. **COLLINEAR** - Points that lie on the same line. Any TWO points are collinear.

Examples: Stars on the flag

Diagram:

5. **COPLANAR** - Points that lie on the same plane. Any THREE points are coplanar.

Examples:

Diagram: ABCD are coplanar

EXAMPLE 1:

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

$\overleftrightarrow{QP}, n$

b. Name three points that are collinear.

TPS

c. Name four points that are coplanar.

TPSV

TRY THIS:

d. Give two other names for $\overleftrightarrow{ST}$.

$\overleftrightarrow{TS}, m, \overleftrightarrow{SP}, \overleftrightarrow{PT}, \overleftrightarrow{PS}, \overleftrightarrow{TP}$

e. Name a point that is **NOT** coplanar with points Q, S, and T.

V

6. **SEGMENT** - Part of a line. Have endpoints on each end.

Written Representation: By drawing a bar (—) over the two letters (its endpoints).

Examples:

Diagram:

$\overline{AB}, \overline{BC}, \overline{AC}$
$\overline{BA}, \overline{CB}, \overline{CA}$

7. **RAY** - **Starts at a point**, the endpoint, and **extends indefinitely** in *one direction*.

Written Representation: An arrow (→) is drawn over the two letters representing the points.

Examples: $\overrightarrow{AC}$ $\overrightarrow{AB}$

Diagram:

$\overrightarrow{AB}$ $\overrightarrow{BA}$

8. **OPPOSITE RAYS** - Have the **same endpoint** and point in opposite directions.

IOW: If point C lines on AB between A and B, then $\overrightarrow{CA}$ and $\overrightarrow{CB}$ are opposite rays.

Diagram:

$\overrightarrow{CA}$ $\overrightarrow{CB}$

A C B

EXAMPLE 2:

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

$\overrightarrow{GJ}$

b. Name all rays with endpoint J.

$\overrightarrow{JE}, \overrightarrow{JF}$ $\overrightarrow{JG}$ $\overrightarrow{JH}$
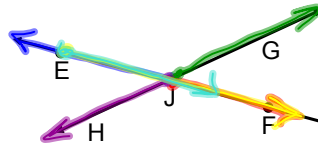
c. Which rays in "b" are opposite rays?

OPP.   OPP.

TRY THIS:

d. Give another name for $\overrightarrow{EF}$.

$\overrightarrow{EJ}$

e. Are $\overrightarrow{HJ}$ and $\overrightarrow{JH}$ the same ray? Explain.

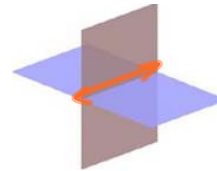NO! They have 2 diff. endpoints

9. **INTERSECTION** - Two or more geometric figures that have one or more points in common.

Diagrams: a.)   b.)
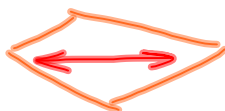
m

A

n
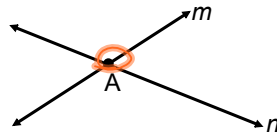
EXAMPLE 3:

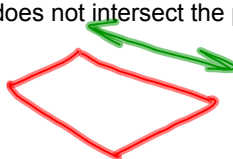a. What does the intersection of "*Diagram a*" look like?

a point

b. What does the intersection of "*Diagram b*" look like?
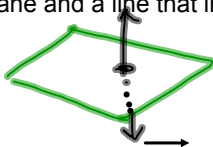
a line

c. Sketch a plane and a line that is in the plane.

d. Sketch a plane and a line that does not intersect the plane.

plane || line, above/below the plane

e. Sketch a plane and a line that intersects the plane at a point.

f. Name the intersection of $\overrightarrow{PQ}$ and line *k*.

M

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

R.

h. Name the intersection of line *k* and plane A.

k.

B

k

P

M

A

Q