Module 1b: Lines & Segments

Math Practice(s):

- Use appropriate tools strategically
-Attend to precision

Learning Target(s):

Identify, define, & draw representations of geometric objects using symbolic notation.

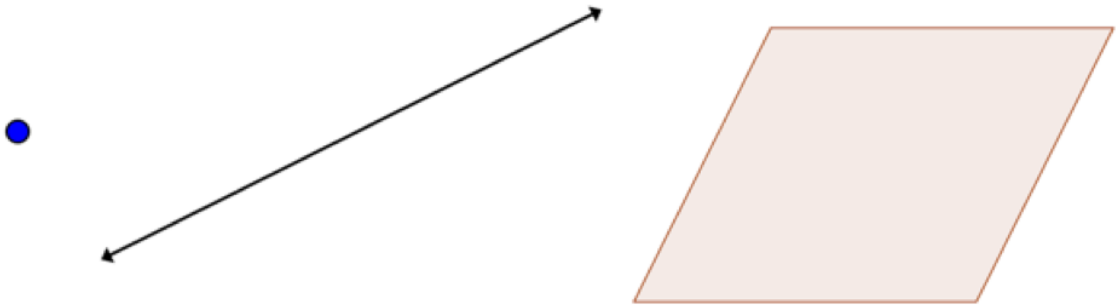
Homework:

HW #2: 1b Lines & Segments #1-8

Aug 8-12:20 PM

Points, Lines and Planes

In this section, we will begin developing an understanding of several of the most important objects that we will be using throughout this school year. We begin by describing the three most basic objects in geometry: a point, a line, and a plane.

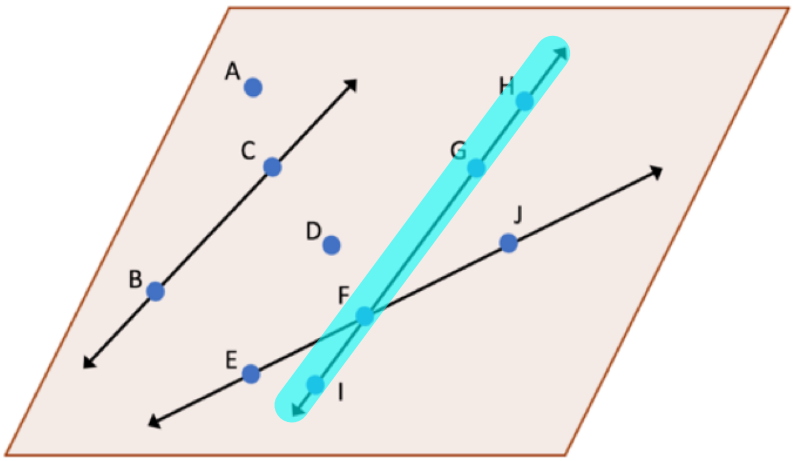


1. Work with a partner to come up with an informal definition for a point, a line, and a plane. Write down the definitions you and your partner discussed.

Geometric Object	Me and my partner's definition	Our class definition
Point	A dot that represents a specific # or location Start & end of a line	Represented by a dot, a location, has no size.
Line	Goes in one direction Goes in both directions A 1-D segment on a 2-D plane Formed by connecting point.	Represented by a string, a length that continues forever in both directions
Plane	2D-represented by a quadrilateral has an area quadrant on a graph	Has a length & width, but no thickness Represented by a piece of paper going in all directions

2. The plane to the right shows 3 lines and several points.

Work with a partner to answer the following questions.



A. How many different ways could you name the line that contains points G and H? State them all.

$\overleftrightarrow{GH}$, $\overleftrightarrow{IF}$, $\overleftrightarrow{FH}$, $\overleftrightarrow{FG}$, $\overleftrightarrow{HI}$, $\overleftrightarrow{GI}$

B. Identify a point that lies on two distinct lines shown in the plane. State the name of the point and the two lines that it lies on.

Point F lies on $\overleftrightarrow{EJ}$ & $\overleftrightarrow{IH}$

C. Will $\overleftrightarrow{BC}$ and $\overleftrightarrow{EJ}$ intersect each other? Explain why or why not.

Yes, because the lines are angled towards each other (they are not parallel).

erase to show

D. Points G and H are said to be **collinear**, because they are on the same line. Name two other sets of points are also collinear.

G & I , E & J

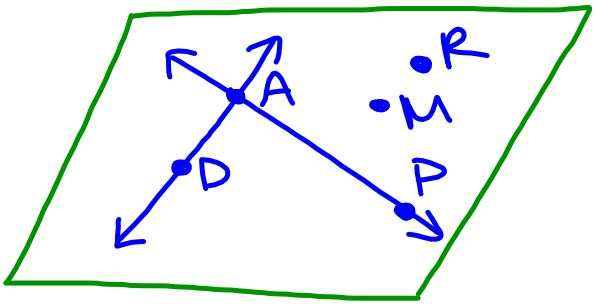
*Could a *different* plane go through the collinear points *E*, *F*, and *J*? Explain..

Yes, because 2 planes intersect to form a line.

*Could a *different* plane go through the non-collinear points *A*, *B*, and *C*? Explain.

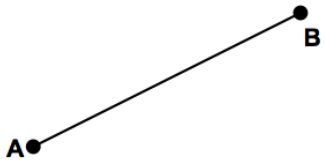
No, because 2 planes can only intersect to form a line.

E. The lines and points above are **coplanar**. This means that they are on the same plane. Draw at least 2 lines and 5 points that are coplanar.



erase to show

The figure to the right is called a line segment.



Named: $\overline{AB}$ or $\overline{BA}$

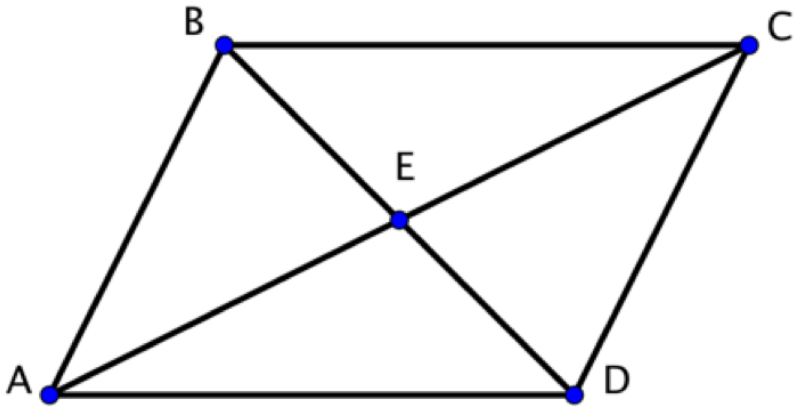
The *measure* of a segment is its length, or distance from one endpoint to the other.

- The "measure of segment *AB*" is denoted by AB (without the line on top).
- Thus, $\overline{AB}$ *is a geometric object (a line segment)*, while *AB* is a number (the length of that line segment).

Two line segments are said to be congruent if they have the same measure.

1. If $\overline{AB}$ and $\overline{CD}$ are congruent, we denote this by $\overline{AB} \cong \overline{CD}$.
2. Thus, $\overline{AB} \cong \overline{CD}$ is equivalent to $AB = CD$

Using a ruler, measure the various line segments in the quadrilateral to the right, and list them below using appropriate notation.



BD = 70 mm

CA = 110 mm

AD = 75 mm

AB = 57/58 mm

BE = 35/36 mm

DE = 36 mm

CD = 55 mm

BC = 75 mm

AE = 57 mm

CE = 57 mm

Which line segments are congruent?

$\overline{AE} \cong \overline{CE}$

$\overline{AD} \cong \overline{BC}$

erase to show

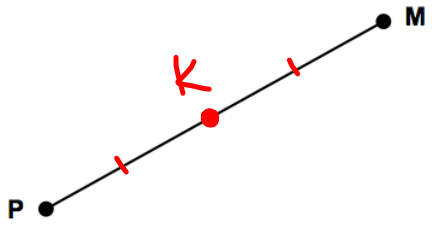
Many times, we may want to cut a segment in half.

A. Use a ruler to find *MP*. 55 53 52

MP = 55 mm 54 54

B. Use *MP* to find the midpoint of $\overline{MP}$. This is the point that cuts the segment in half.
Label the midpoint, *K*.

Figure 1



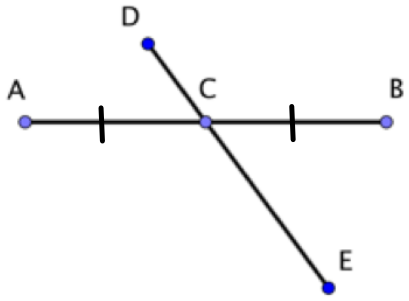
C. Find *MK* and *KP*.

MK = 27.5 mm

KP = 27.5 mm

*We use "tick marks" on the figure to denote the segments are _____.

Figure 2



D. By looking at figure 2, we know $\overline{AC}$ $\overline{BC}$ or C is the midpoint of $\overline{AB}$.

Since $\overline{DE}$ intersects $\overline{AB}$ at point C, we can say $\overline{DE}$ bisects $\overline{AB}$.

Figure 3

E. In figure 3, is C the midpoint of $\overline{AB}$? Why or why not.

No, C is not in the middle.
$\overline{AC} \neq \overline{BC}$

F. What kind of relationship do you think the three segments in the diagram, $\overline{AB}$, $\overline{AC}$, and $\overline{CB}$, have?

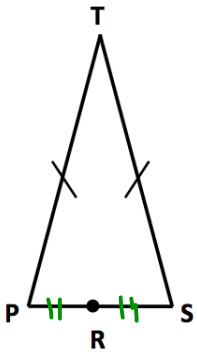
They are collinear & coplanar

Segment Addition Postulate

AC + CB = AB

Practice

1. The figure shown to the right is an isosceles triangle, and ***R*** is the midpoint of $\overline{PS}$.



A. Explain when it is appropriate to use the statement $\overline{PT} \cong \overline{TS}$.

When segments have tick marks, which means they are $\cong$.

B. Explain when it is appropriate to use the statement $PT = TS$.

When the lengths are equal.

C. Circle all of the statements below that are NOT true about the isosceles triangle above.

$\overline{SR} \cong \overline{PR}$ $\quad$ $RS = PS$ $\quad$ $\overline{SP} \cong \overline{TP}$ $\quad$ $RP = RS$

D. Name three points that are collinear.

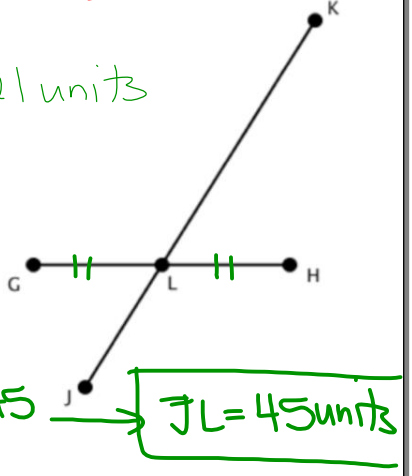
Points P, R, & S are collinear.

E. If $RP = 6.5$, what is PS?

R is midpoint $\overline{PS}$, so RP = RS

RP + RS = PS → PS = 13 units

2. In the figure to right, $\overline{JK}$ bisects $\overline{GH}$ at point ***L***.



A. If $JK = 35$ and $JL = 14$, what is KL?

JL + LK = JK

14 + LK = 35 → KL = 21 units

B. Point ***L*** is called the midpoint of $\overline{HG}$.

C. If KL is twice as long as JL, and $JK = 135$, what is JL?

JL = x

KL = 2x

JL + KL = JK

x + 2x = 135

$\frac{3x}{3} = \frac{135}{3}$

x = 45 → JL = 45 units

D. If $GL = 2x + 8$ and $HL = 5x - 7$, find GH.

GL = 2x + 8 HL = 5x − 16

GL + HL = GH

2x + 8 + 5x − 16 = GH

7x − 8 = GH

7(8) − 8 = GH

GH = 48 units

GL = HL

2x + 8 = 5x − 16

−2x −2x

+16 +16

$\frac{24}{3} = \frac{3x}{3}$

x = 8