Warm-up

Happy Monday

$6(2k+5)-3k=66$

$2(3x+5)=5(2x-4)-4x$

$6x+10=10x-20-4x$

$6x+10=6x-20$

$-6x \quad -6x$

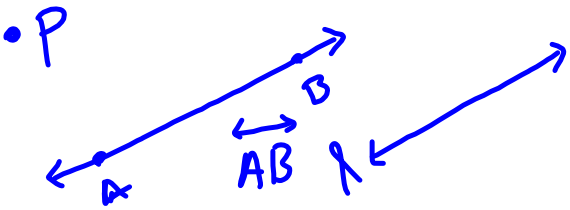
$10 \neq -20$ No solution

Name:_____ Date:_____

Geometry Notes Intro to Geo Proofs - 1: Lines and Segments

Undefined Terms

Point: A location in space; *no size*. (zero dimensions).

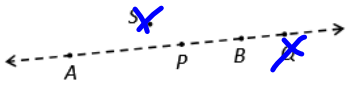


Line: A continuous "straight" set of points that extends indefinitely (forever) in two opposite directions (one dimension).

Plane: A continuous set of points forming a "flat surface" extending forever in two dimensions.

Space: All points. Three dimensions. (Not real important until the end of the course. For now, we will do everything "in a plane.")

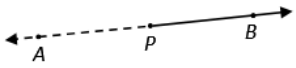
Between: In the diagram, P is between A and B; Q and S are not.



Definitions

A ***ray*** is a "half line;" it has one *endpoint* and extends indefinitely in *one* direction.

$\overrightarrow{PB}$ $\overrightarrow{PA}$



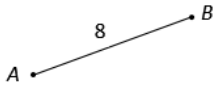
A ***line segment*** consists of two endpoints and all the points between them.

$\overline{AB}$ $\overline{BA}$

The ***measure*** (length) of a line segment is the

$AB = 8$

Line segment $\overline{AB}$ (at right) has measure (length) 8:

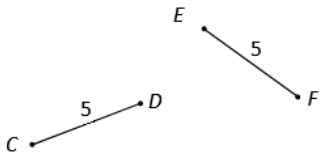


Note: $\overline{AB}$ (with the bar over it) represents the actual segment (an object);

AB (without the bar) represents the length of the segment (a number)

Two line segments are ***congruent*** ($\cong$) if

$\overline{CD} \cong \overline{EF}$

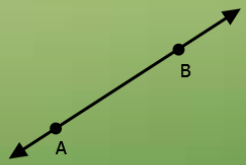


Notes

Point: Point has no length, width, or height. It merely indicates a position.

● A

Line: An infinite set of points that extends endlessly in both directions.

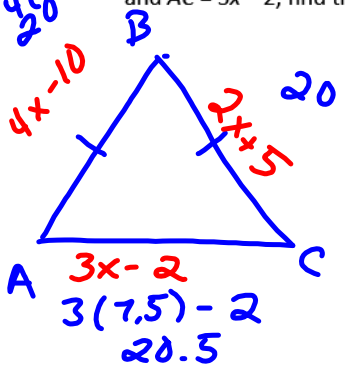


$\overleftrightarrow{AB}$ $\overleftrightarrow{BA}$

Plane: A set of points that extends infinitely across a flat surface in all directions.

Classwork

Ex: In $\triangle ABC$, $\overline{AB} \cong \overline{BC}$. If $AB = 4x - 10$, $BC = 2x + 5$ and $AC = 3x - 2$, find the perimeter of the triangle.



$4(7.5) - 10$
$30 - 10$
20

$3(7.5) - 2$
$22.5 - 2$
20.5

$4x - 10 = 2x + 5$
$-2x \quad -2x$
$2x - 10 = 5$
$+10 \quad +10$
$\frac{2x}{2} = \frac{15}{2}$
$x = 7.5$

$P = 20 + 20 + 20.5$

$\boxed{P = 60.5}$

The ***midpoint*** of a line segment cuts a segment into 2 $\cong$ segments

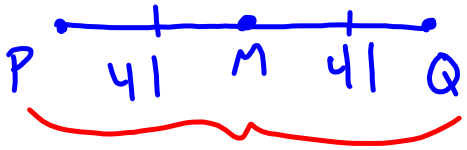
If M is the midpoint of $\overline{AB}$, then

Conversely, if $\overline{AM} \cong \overline{MB}$, then M is the midpt

A *postulate* is a statement (not a definition) that is accepted *without proof*.

Postulate: Every segment has exactly one midpoint.

Ex: M is the midpoint of line segment $\overline{PQ}$. If $PM = x^2 - 8$ and $MQ = 2x + 27$, find the numerical length of $\overline{PQ}$.



$49 - 8$
$7^2 - 8$

$14 + 27$
$2(7) + 27$

$x^2 - 8 \quad 2x + 27$

$41 + 41$

$PQ = 82$

$x^2 - 8 = 2x + 27$
$-2x - 27 \quad -2x \quad -27$

$x^2 - 2x - 35 = 0$

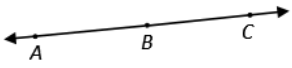
$(x + 5)(x - 7) = 0$

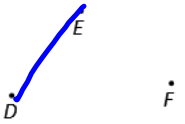
$x = -5 \quad x = 7$

* Any 2 pts are collinear

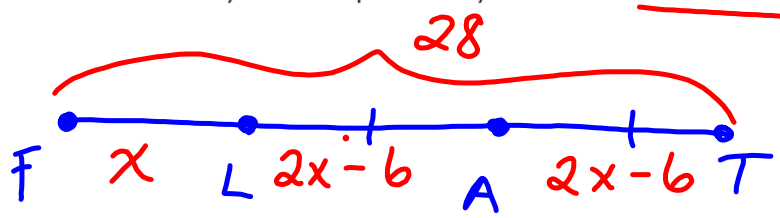
Three or more points are ***collinear*** if they are all

in a Line





Ex: Given $\overline{FLAT}$, A is the midpoint of $\overline{LT}$, $FT = 28$ and LA is 6 less than twice FL. Find the length of $\overline{AT}$.



$5x - 12 = 28$

$+12 \quad +12$

$\frac{5x}{5} = \frac{40}{5}$

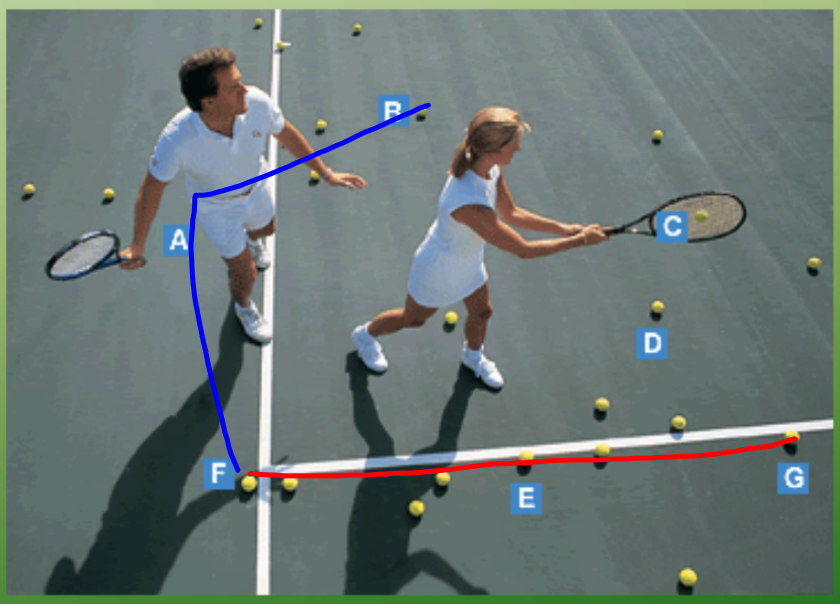
$x = 8$

$2(8) - 6$

$16 - 6$

$10 = \overline{AT}$

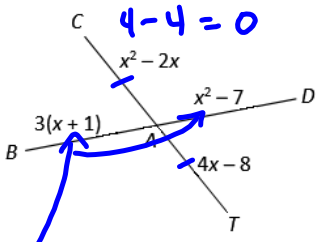
Classwork



A ***bisector*** of a segment is a line, ray or segment that intersects a segment at its midpoint. Therefore, a bisector of a segment

A bisector cuts a segment into 2 ≅ segments

Ex: $\overline{BD}$ bisects $\overline{CT}$ at A. If $BA = 3(x + 1)$, $AD = x^2 - 7$, $CA = x^2 - 2x$ and $AT = 4x - 8$, find the length of BD.



$4 - 4 = 0$

$x^2 - 2x = 4x - 8$

$-4x + 8 \quad -4x + 8$

$x^2 - 6x + 8 = 0$

$(x - 2)(x - 4) = 0$

$x = 2$ $\quad$ $x = 4$

Name:_____ Date:_____

Geometry Homework: Intro Geo Proofs – 1

1. Draw a single diagram to illustrate the following givens: $\overline{ILAT}$, $\overrightarrow{CAP}$.

   Notes: 1) Since they are written separately, you should *not* assume that *all* the points are collinear.

   2) There cannot be two different points *A* in the same problem.

2. If *M* is the midpoint of $\overline{AB}$, $AM = x^2 + 24$ and $MB = 10x$, find the length of $\overline{AB}$.

3. $\overline{PR}$ bisects $\overline{ST}$ at *Q*. $PQ = 4x + 12$, $QR = 9x - 13$, $SQ = 6x - 5$ and $QT = 3x + 16$. Find the length of $\overline{PR}$.

4. Given: $\overline{MATH}$, *A* is the midpoint of $\overline{MT}$, $MH = 21$ and $AH = 15$. Find *TH*.

5. In $\overline{RST}$, $RS = 7x - 1$, $ST = 2x + 3$ and $RT = 12x - 7$. Find the numerical value of *RT*.

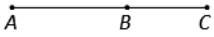
READ: Adding and Subtracting Line Segments

Everybody knows you can add and subtract numbers: 7 + 3 = 10 and 7 – 3 = 4 make perfect sense. However, adding and subtracting *people* (not *numbers* of people but actual persons) is meaningless. It is nonsense to say Devin + Bree = Ken or Devin – Bree = Thor.

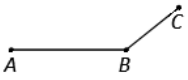
Line segments are somewhere in between. In general, you can't add or subtract just any two random line segments and get another segment. But *sometimes* it makes sense. Your job is to understand when.

IMPORTANT:

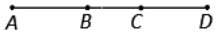
1) $\overline{AB}+\overline{BC}=\overline{AC}$ only makes sense when *A*, *B*, and *C* are collinear and *B* is between *A* and *C*. In other words, to add segments, they must be collinear and the second one must start where the first one ends.



$\overline{AB}+\overline{BC}=\overline{AC}$



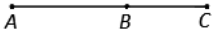
$\overline{AB}+\overline{BC}=$ nonsense



$\overline{AB}+\overline{CD}=$ nonsense

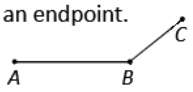
$\overline{AC}+\overline{BD}=$ nonsense

2) $\overline{AC}-\overline{BC}=\overline{AB}$ and $\overline{AC}-\overline{AB}=\overline{BC}$ only make sense when *A*, *B*, and *C* are collinear and *B* is between *A* and *C*. In other words, to subtract segments, the one being subtracted must be part of the one being subtracted from and they must share an endpoint.



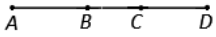
$\overline{AC}-\overline{BC}=\overline{AB}$

$\overline{AC}-\overline{AB}=\overline{BC}$



$\overline{AC}-\overline{BC}=$ nonsense

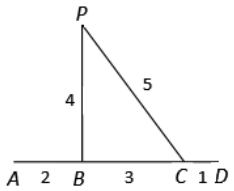
$\overline{AC}-\overline{BC}=$ nonsense



$\overline{AD}-\overline{BC}=$ nonsense

$\overline{AC}-\overline{BD}=$ nonsense

6. Based on the diagram at right, tell if each of the following is True or False. Remember the difference between $\overline{AB}$ and AB.



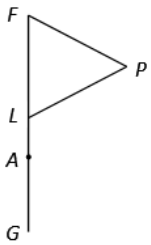
a. $AB + BC = CP$ b. $\overline{AB} + \overline{BC} = \overline{CP}$

c. $AB + BC = AC$ d. $\overline{AB} + \overline{BC} = \overline{AC}$

e. $AC - BC = AB$ f. $\overline{AC} - \overline{BC} = \overline{AB}$

g. $PC - PB = CD$ h. $\overline{PC} - \overline{PB} = \overline{CD}$

7. In the diagram at right, $\overline{FLAG}$. For each of the following, either fill in the appropriate line segment or write "nonsense."



a. $\overline{LA} + \overline{AG} =$ _____ b. $\overline{FL} + \overline{LP} =$ _____ c. $\overline{FA} + \overline{LG} =$ _____

d. $\overline{FL} + \overline{AG} =$ _____ e. $\overline{FL} + \overline{LG} =$ _____ f. $\overline{FL} + \overline{LA} + \overline{AG} =$ _____

g. $\overline{FP} + \overline{FL} =$ _____ h. $\overline{FA} + \overline{LA} =$ _____ i. $\overline{FA} - \overline{LA} =$ _____

j. $\overline{FP} - \overline{FL} =$ _____. k. $\overline{FG} - \overline{FL} =$ _____ l. $\overline{FG} - \overline{LA} =$ _____