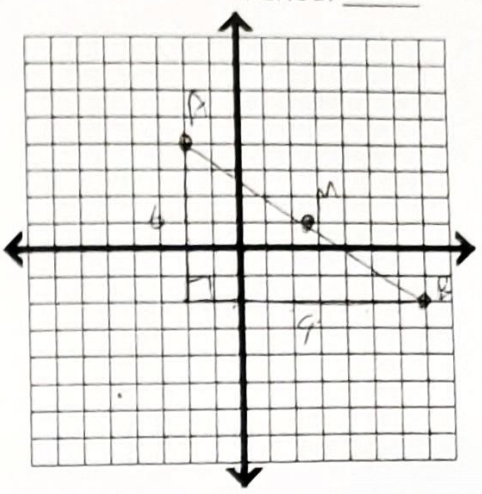
Geometry

Coordinate Geometry Review

Name: KEY

Period: ____

1.) Given the points $A(-2,4)$ and $B(7,-2)$:



a.) Find the slope of the line passing through points A and B. *$m = \frac{y_2 - y_1}{x_2 - x_1}$

$m = \frac{4-(-2)}{-2-7} = \frac{6}{-9} = \boxed{-\frac{2}{3}}$

b.) Find the midpoint of $\overline{AB}$. *Midpoint: $\left(\frac{x_2+x_1}{2}, \frac{y_2+y_1}{2}\right)$

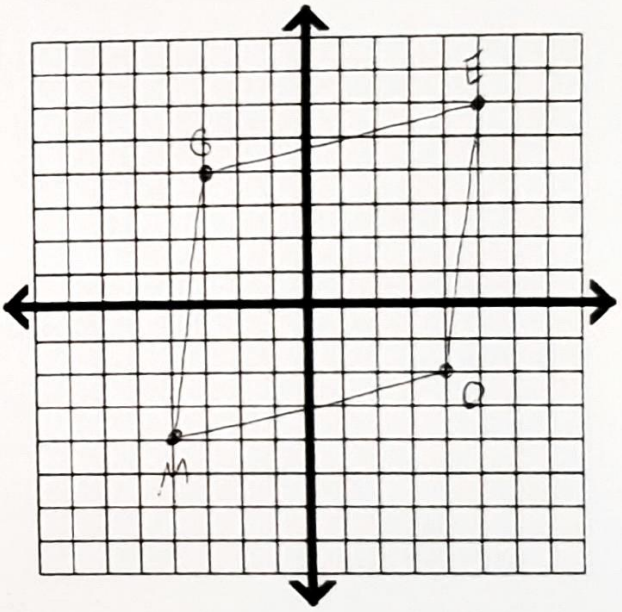
$\text{MIDPOINT} = \left(\frac{-2+7}{2}, \frac{4+(-2)}{2}\right) = \boxed{\left(2\frac{1}{2}, 1\right)}$

c.) Find the distance between points A and B. *Pythagorean Theorem $a^2 + b^2 = c^2$

$\text{DISTANCE} = \sqrt{\text{RUN}^2 + \text{RISE}^2} = \sqrt{9^2 + (-6)^2} = \sqrt{117}$ or $\boxed{10.8}$

2.) You are given quadrilateral GEOM with vertices at $G(-3,4)$ $E(5,6)$ $O(4,-2)$ $M(-4,-4)$.

a.) Plot the 4 points and find the slope of all 4 sides.



$\overline{GE}$ AND $\overline{MO} = \frac{2}{8} = \boxed{\frac{1}{4}}$

$\overline{GM}$ AND $\overline{EO} = \frac{8}{1} = 8$

b.) Find the length of all 4 sides (using the Pythagorean Theorem). Round your answers to the nearest tenth of a unit.

$\overline{GE}$ AND $\overline{MO} = \sqrt{8^2+2^2} = \sqrt{68}$ or $\boxed{8.2}$

$\overline{GM}$ AND $\overline{EO} = \sqrt{1^2+8^2} = \sqrt{65}$ or $\boxed{8.1}$

c.) What conclusions can you draw about quadrilateral GEOM based on your answers from (a) and (b)?

OPPOSITE SIDES HAVE THE SAME SLOPE.

OPPOSITE SIDES HAVE EQUAL LENGTHS.

3.) You are given **line *m*** with a slope of $2\frac{1}{4}$. $2\frac{1}{4} = \frac{9}{4}$

a.) What is the **slope** of a line **parallel** to **line *m*** written as an improper fraction?

b.) What is the **slope** of a line **perpendicular** to **line *m*** written as an improper fraction?

$\frac{9}{4}$

$-\frac{4}{9}$

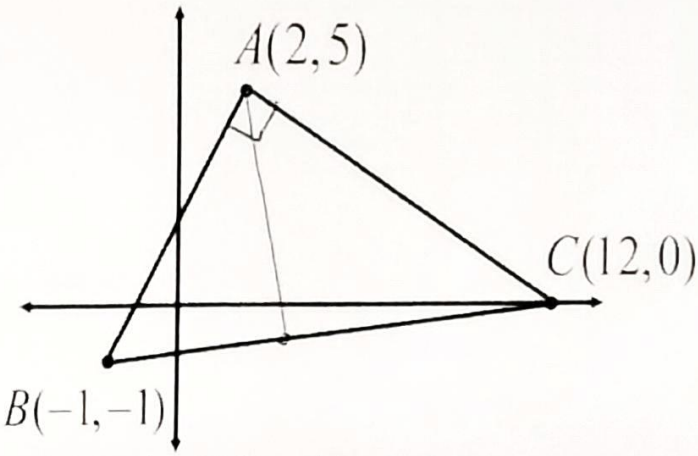
Use the diagram below for problems (4)-(8)

4.) Find the length of all 3 segments of $\triangle ABC$. Round to the nearest tenth of a unit.

$\overline{AB} = \sqrt{3^2+6^2} = \sqrt{45} = \boxed{6.7}$

$\overline{BC} = \sqrt{13^2+1^2} = \sqrt{170} = \boxed{13.0}$

$\overline{AC} = \sqrt{10^2+(-5)^2} = \sqrt{125} = \boxed{11.2}$



5.) Find the slopes of all 3 sides of $\triangle ABC$.

$\overline{AB} = \frac{6}{3} = \boxed{2}$

$\overline{BC} = \boxed{\frac{1}{13}}$

$\overline{AC} = \frac{-5}{10} = \boxed{-\frac{1}{2}}$

6.) Using your information from questions (3) and (5), is $\triangle ABC$ a right triangle? Briefly explain your answer.

YES. SIDES $\overline{AB}$ AND $\overline{AC}$ HAVE SLOPES OF 2 AND $-\frac{1}{2}$. SINCE THE SLOPES ARE OPPOSITE RECIPROCALS, $\overline{AB} \perp \overline{AC}$. THUS, $\angle BAC$ IS A RIGHT ANGLE, MAKING $\triangle ABC$ A RIGHT $\triangle$.

7.) A median is a segment drawn from one vertex of a triangle to the midpoint of the opposite side. Every triangle has 3 medians, one starting from each vertex. Find the slope of the **median** of $\triangle ABC$ to $\overline{BC}$.

MIDPOINT OF $\overline{BC} = \left(\frac{-1+13}{2}, \frac{-1+0}{2}\right) = \left(\frac{11}{2}, -\frac{1}{2}\right)$ or $\left(5\frac{1}{2}, -\frac{1}{2}\right)$

SLOPE $= \frac{5-(-\frac{1}{2})}{2-\frac{11}{2}} = \frac{\frac{11}{2}}{-\frac{7}{2}} = \frac{11}{2} \cdot -\frac{2}{7} = \boxed{-\frac{11}{7}}$

8.) An altitude is a segment drawn from one vertex of a triangle and is perpendicular to the opposite side. Every triangle has 3 altitudes, one starting from each vertex. Find the slope of the **altitude** of $\triangle ABC$ to $\overline{BC}$.

SLOPE OF $\overline{BC}$ (FROM #5) $= \boxed{\frac{1}{13}}$

SLOPE OF ALTITUDE (OPPOSITE RECIPROCAL OF $\frac{1}{13}$) $= \boxed{-\frac{13}{1} \text{ or } -13}$

9.) **Challenge Question.** Find the point where the altitude from problem (8) intersects $\overline{BC}$.

ALTITUDE: $y = mx+b$

$5 = -13(2)+b$

$b = 31$

$y = -13x+31$

(A) $13x+y = 31$

SIDE $\overline{BC}$: $y = mx+b$

$0 = \frac{1}{13}(12)+b$

$b = -\frac{12}{13}$

$y = \frac{1}{13}x - \frac{12}{13}$

(B) $x-13y = 12$

(A) $(13x+y = 31)\cdot 13 = 169x+13y = 403$

(B) $x-13y = 12$

$170x = 415$

$x = \frac{83}{34} = 2\frac{15}{34}$

$y = -\frac{25}{34}$

$\left(2\frac{15}{34}, -\frac{25}{34}\right)$

$(2.441, -0.735)$