

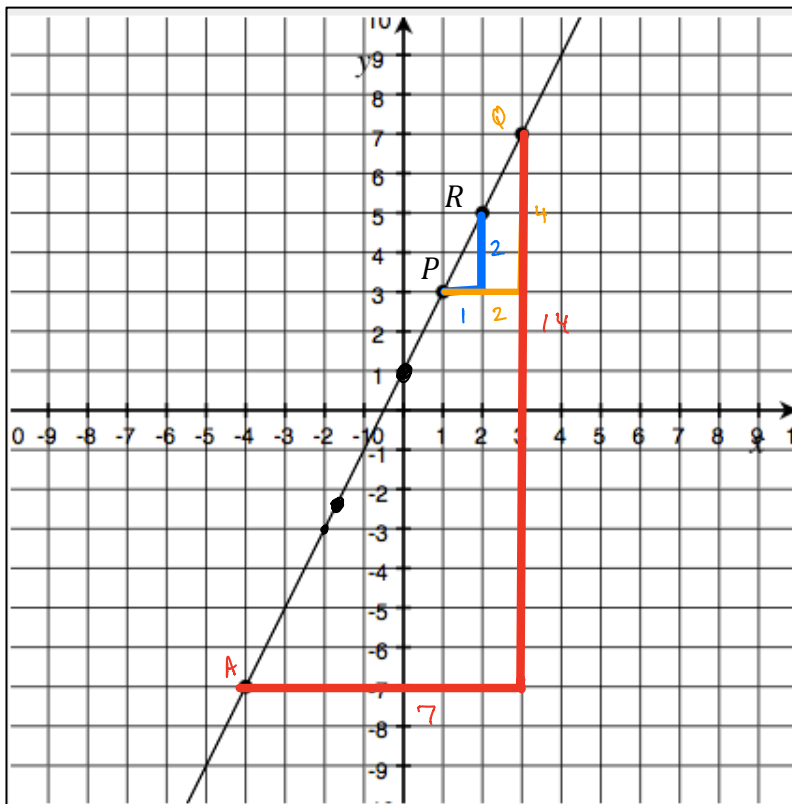
LEARNING OBJECTIVE: We will use the slope formula when computing the slope of a line and explore the concept of slope triangles. (G8M4L15)

CONCEPT DEVELOPMENT:

Slope: A measure of the steepness or slant of a line.

Slope is also the measure of the **rate of change** of a line.

$$\frac{q_2 - q_1}{p_2 - p_1} = \frac{-7 - 7}{-4 - 3} = \frac{-14}{-7} = 2$$



$$\frac{p_2 - r_2}{p_1 - r_1} = \frac{3 - 5}{1 - 2} = \frac{-2}{-1} = 2$$

$$\frac{14}{7} = \frac{4}{2} = \frac{2}{1}$$

- P → (1, 3)
- R → (2, 5)
- Q → (3, 7)
- A → (-4, -7)

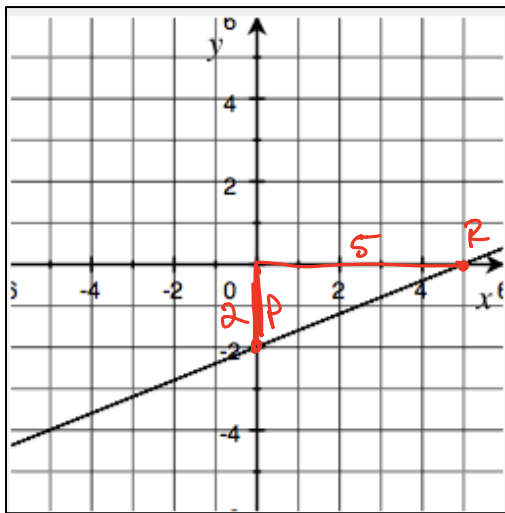
SLOPE FORMULA:

Where the coordinates of point P on a line are represented by $P = (p_1, p_2)$ and the coordinates of point R on the line are represented by $R = (r_1, r_2)$, the slope formula states that:

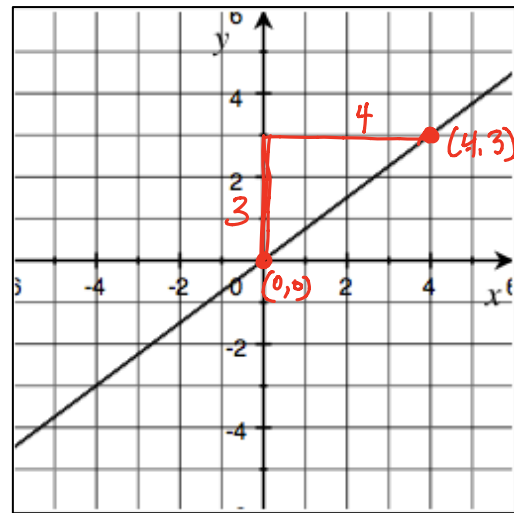
$$m = \frac{(p_2 - r_2)}{(p_1 - r_1)} = \frac{\text{rise}}{\text{run}} = \frac{\text{difference in } y \text{ - values}}{\text{difference in } x \text{ - values}}$$

GUIDED PRACTICE:**Steps for Calculating the Slope (rate of change) of a Line**

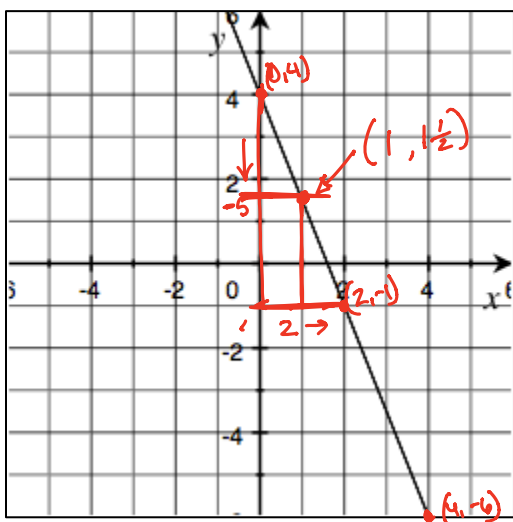
1. Select any two integer points. Label them P and R .
2. Use the slope formula ($m = \frac{p_2 - r_2}{p_1 - r_1}$) to calculate the slope.



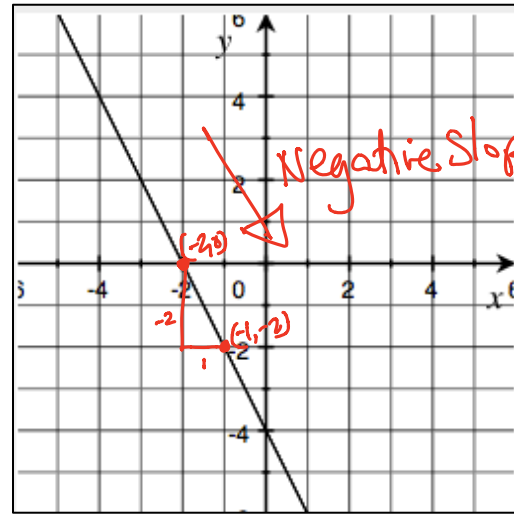
$$P = (0, -2) \\ R = (5, 0) \\ m = \frac{-2 - 0}{0 - 5} \\ = \frac{-2}{-5} \quad \boxed{m = \frac{2}{5}}$$



$$m = \frac{3 - 0}{4 - 0} = \boxed{\frac{3}{4}}$$



$$m = \frac{4 - (-1)}{0 - 2} = \frac{5}{-2} \quad \boxed{m = -\frac{5}{2}}$$



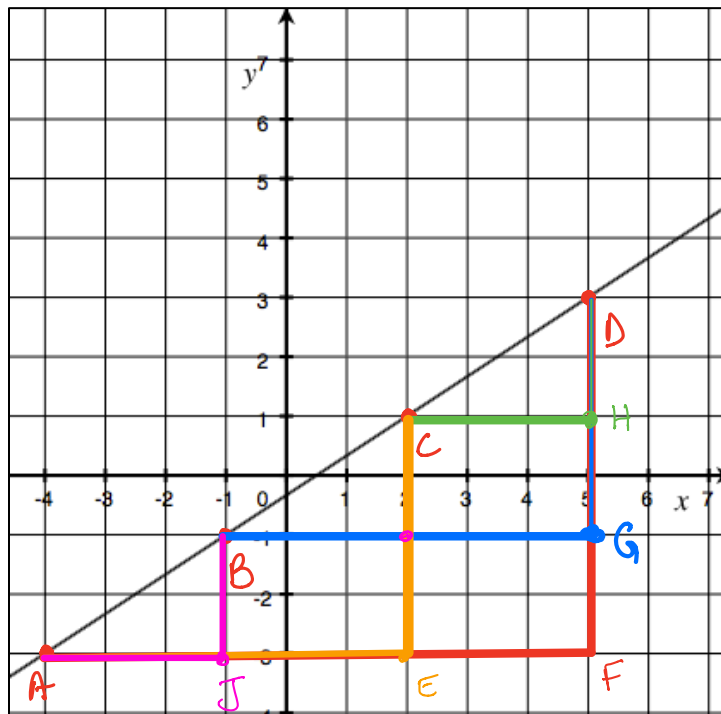
$$m = \frac{0 - (-2)}{-2 - (-1)} = \frac{2}{-1} = -2 \\ m = \frac{2}{-1} = -2$$

A Closer Look at Slope Triangles:

It doesn't matter what two points we look at. The ratio of rise to run will be the same!

What do we know about two similar triangles:

- The measures of the angles are the same
- The ratio of the corresponding sides is equal.



Identify the integer coordinates of the line above:

- A (-4, -3) C (2, 1)
 B (-1, -1) D (5, 3)

Create several right triangles (**slope triangles**) above.

Slope between 2 points is the same because of Δ similarity.

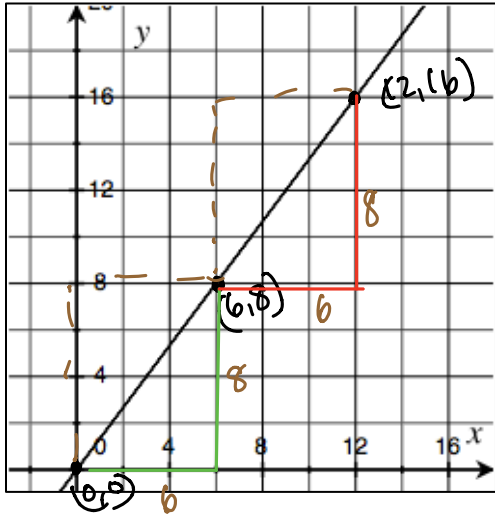
Triangles are similar if they share an angle, and if the corresponding sides are proportional.

Calculate the ratio of the corresponding sides....what do you notice?

$$\frac{DF}{AF} = \frac{DG}{BG} = \frac{DH}{CH} = \frac{CE}{AE} = \frac{BJ}{AJ}$$

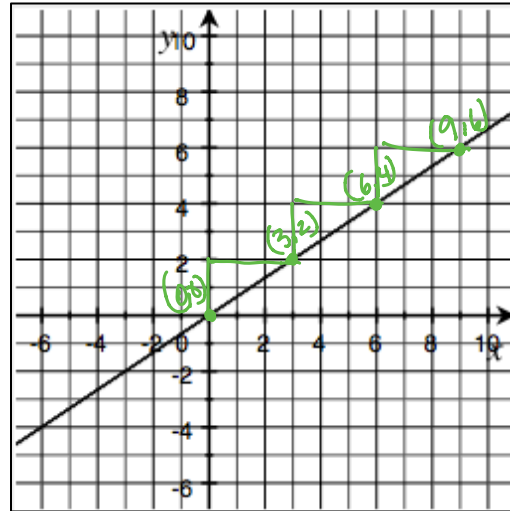
$$\frac{6}{9} = \frac{4}{6} = \frac{2}{3} = \frac{4}{6} = \frac{2}{3}$$

ON THIS PAGE, USE TWO DIFFERENT PAIRS OF POINTS TO CALCULATE THE SLOPE.



$$m = \frac{8-0}{6-0} = \frac{8}{6} = \frac{4}{3}$$

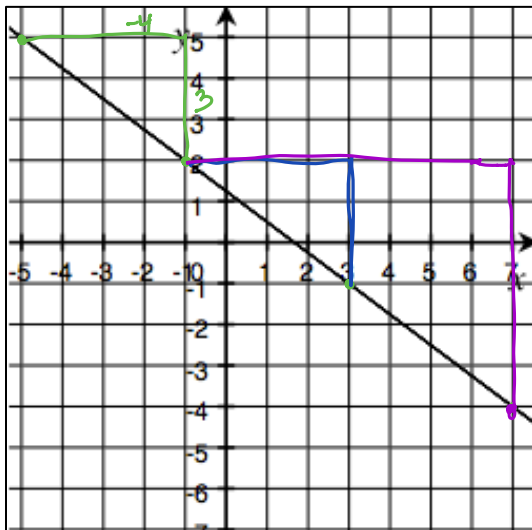
$$m = \frac{16-8}{12-6} = \frac{8}{6} = \frac{4}{3}$$



$$m = \frac{2-0}{3-0} = \frac{2}{3}$$

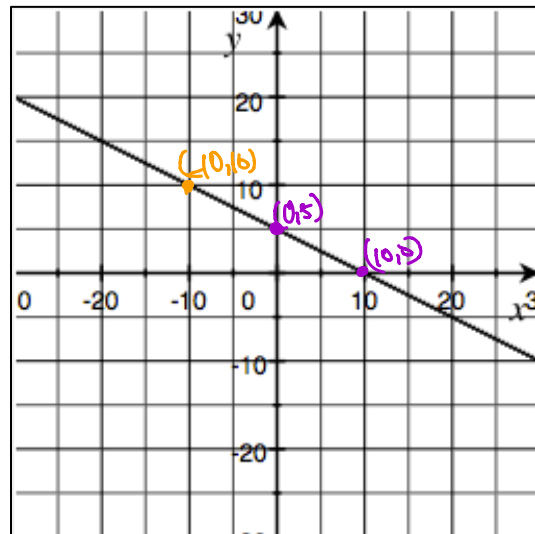
$$m = \frac{4-2}{6-3} = \frac{2}{3}$$

$$m = \frac{4-6}{6-9} = \frac{-2}{-3} = \frac{2}{3}$$



$$m = \frac{5-2}{-5-(-1)} = \frac{3}{-4} = -\frac{3}{4}$$

$$m = \frac{2-(-1)}{-1-3} = \frac{3}{-4} = -\frac{3}{4}$$



$$m = \frac{5-0}{0-10} = \frac{5}{-10} = -\frac{1}{2}$$

$$m = \frac{10-5}{-10-0} = \frac{5}{-10} = -\frac{1}{2}$$

$$m = \frac{2-(-4)}{-1-7} = \frac{6}{-8} = -\frac{3}{4}$$

NAME: _____

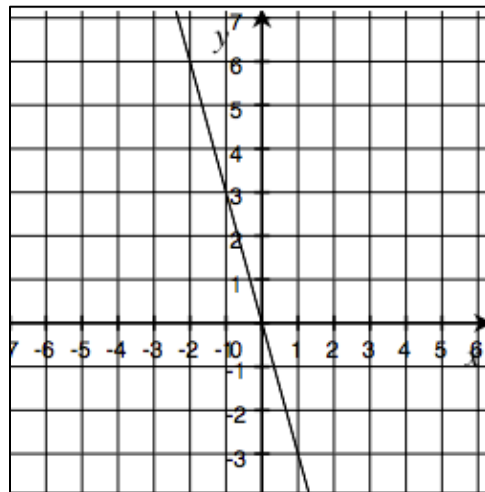
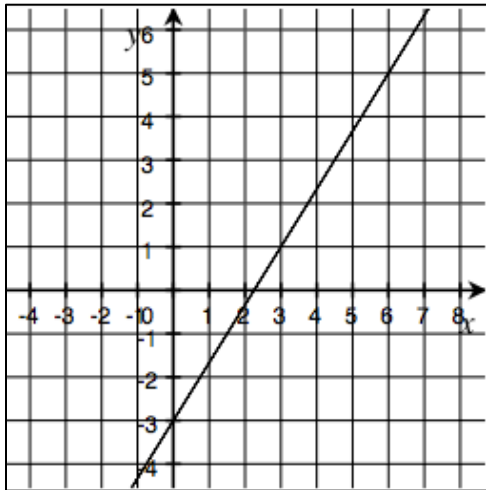
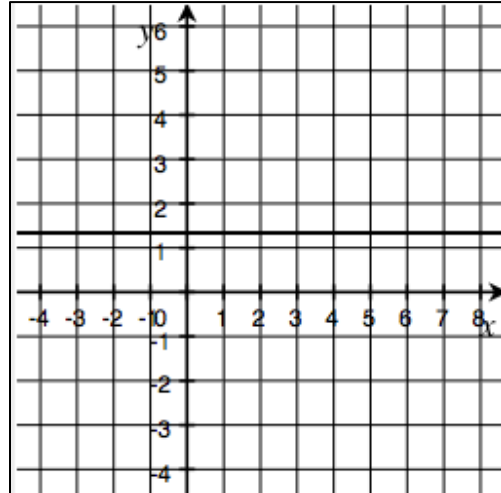
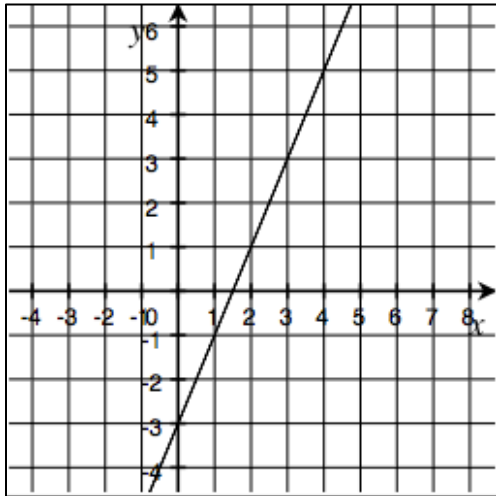
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Mr. Rogove

Date: _____

INDEPENDENT PRACTICE:

Use two different pairs of points to calculate slope below



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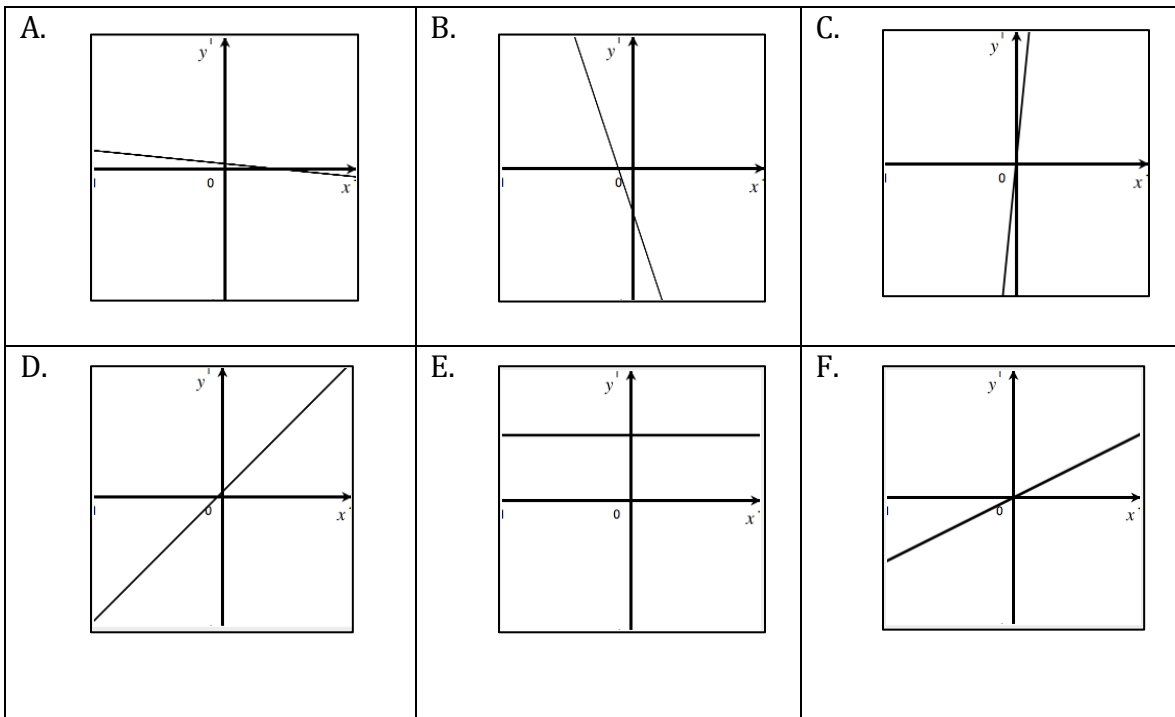
Mr. Rogove

Date: _____

ACTIVATING PRIOR KNOWLEDGE:

We can visually distinguish between lines with negative slope and lines with positive slope:

Label each graph as having positive, negative or zero slope



CLOSURE:

POINT P HAS COORDINATES OF $(3, -5)$ AND IS ON A LINE THAT HAS A SLOPE OF 4. IDENTIFY TWO OTHER COORDINATES THAT WOULD ALSO BE ON THE SAME LINE.

TEACHER NOTES:

This is lesson 16 from Module 4, grade 8.