

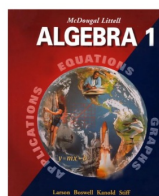
MS Algebra: 2.6.2

Warm-up

Any ?s on HW: page 230 #16-25, 35-37

Goal: I can identify properties of linear functions including slope and intercepts.

HW: page 230 #26-34, 47, 67-69

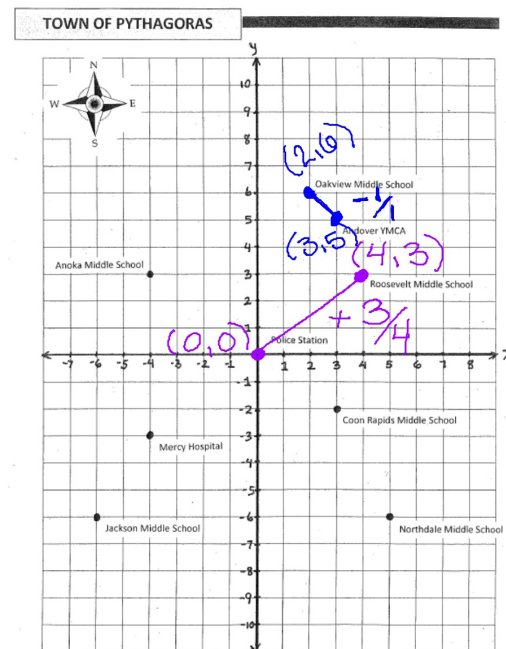


Warm- Up:

Find two locations on the map of the Town of Pythagoras...

- that have a positive slope between them.

- that have a negative slope between them.



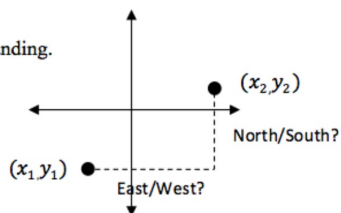
Town of Pythagoras- 2

Use the map of the Town of Pythagoras to complete this activity: In the Town of Pythagoras, the emergency dispatcher gives helicopter directions from one landmark to another by naming the slope between the two landmarks. You will recall that the slope between two points can be found by the ratio of the rise to the run. In the Town of Pythagoras, the rise can be thought of the number of north/south blocks between the two landmarks, and the run can be thought of as the number of east/west blocks between the two landmarks. **ALERT! When the line between two landmarks slants downward from left to right, the slope is negative.**

- 1) Review this question from Unit 1 when you found the number of driving blocks between locations in the Town of Pythagoras:

When given two coordinate pairs, (x_1, y_1) and (x_2, y_2) and no map to look at, how can you use *just* the coordinates to find the number of north/south blocks and the number of east/west blocks between the coordinates.

Creating an example may help to show your understanding.



- 2) The Nature Center is located outside of the Town of Pythagoras at (10, 15). Determine the helicopter directions (slope) for flying from Roosevelt Middle School (4, 3) to the Nature Center.

Questions to consider: Will the map of the Town of Pythagoras be useful for this task?

How can you use your information from problem 1 to help you?

Be ready to share your solution and explain your strategy.

- The nature center is off the map, so the map is not helpful. To find the rise, subtract the y values. To find the run, subtract the x values.

$$\frac{15 - 3}{10 - 4} = \frac{12}{6} = \frac{2}{1}$$

- 3) When given two coordinate pairs, (x_1, y_1) and (x_2, y_2) , explain what to do with the coordinates x_1, y_1, x_2, y_2 to find the helicopter distance/slope between the coordinate pairs.

- First, you subtract the y values to find the rise- the north/south distance.

Then, you subtract the x values to find the run - the east/west distance.

Then, you write the slope as a fraction of rise over run.

- 4) Use the directions you wrote in problem 3 to find the helicopter distance/**slope** between each set of coordinates. Compare your answers to those you found using the map/**graph** on the previous worksheet.

a. Anoka Middle School, $(-4, 3)$ to Oakview Middle School, $(2, 6)$

$$\bullet \quad \frac{6-3}{2-(-4)} = \frac{3}{6} = \frac{1}{2}$$

b. Anoka Middle School, $(-4, 3)$ to the Police Station, $(0, 0)$

$$\bullet \quad \frac{0-3}{0-(-4)} = \frac{-3}{4}$$

c. Coon Rapids Middle School, $(3, -2)$ to Northdale Middle School, $(5, -6)$

$$\bullet \quad \frac{-6-(-2)}{5-3} = \frac{-4}{2} = \frac{-2}{1}$$

- 5) Write an equation for your description from problem 3 using m for slope and the variables x_1, y_1, x_2, y_2 .

Slope Formula
Use to find the slope between two coordinate pairs
 (x_1, y_1) and (x_2, y_2)

$$\bullet \quad m = \frac{y_2 - y_1}{x_2 - x_1}$$

Use the slope formula you developed in problems 3 and 5 to complete problems 6 through 12.

- 6) The Water Park is located outside of the Town of Pythagoras at $(14, 12)$. Give the helicopter directions (slope) for flying from Anoka Middle School $(-4, 3)$ to the Water Park. Show all work and simplify your answer!

$$m = \frac{y_2 - y_1}{x_2 - x_1} \bullet \frac{12-3}{14-(-4)} = \frac{9}{18} = \frac{1}{2}$$

- 7) Given the two landmarks Jackson Middle School $(-6, -6)$ and Northdale Middle School $(5, -6)$:

a. Find the helicopter directions (slope) for flying between the locations. *Questions to consider: What happens when 0 is in the numerator of a ratio?*

$$m = \frac{y_2 - y_1}{x_2 - x_1} \bullet \frac{-6-(-6)}{5-(-6)} = \frac{0}{11} = 0$$

b. Find another pair of landmarks in the Town of Pythagoras with the same helicopter direction/slope. Explain how you know.

- Anoka Middle School and Roosevelt Middle School.
The change in y is 0, so the slope is 0.

- 8) Given the two landmarks Coon Rapids Middle School $(3, -2)$ and Andover YMCA $(3, 5)$:

a. Find the helicopter directions (slope) for flying between the locations. *Questions to consider: What happens when 0 is in the denominator of a ratio? Can we divide by 0?*

$$m = \frac{y_2 - y_1}{x_2 - x_1} \bullet \frac{5-(-2)}{3-3} = \frac{7}{0} = \text{undefined}$$

b. Find another pair of landmarks in the Town of Pythagoras with the same helicopter direction/slope. Explain how you know.

- Anoka Middle School and Mercy Hospital.
The change in x is 0, so the slope is an error or undefined.

Slopes

Positive: up from left to right ↗

Negative: down from left to right ↘

Zero: horizontal ↔ $\frac{0}{\text{run}} = 0$

Undefined: vertical ↑↓ $\frac{\text{rise}}{0} = \text{error}$
undefined

$$\text{Slope} = \frac{\text{rise}}{\text{run}} \rightarrow \frac{\text{north/south (y-values)}}{\text{east/west (x-values)}}$$



Given 2 points (x_1, y_1) (x_2, y_2)

$$\text{Slope} : \frac{y_2 - y_1}{x_2 - x_1} = m$$

Find the slope $(14, 12)$ and $(-4, 3)$
 x_1, y_1 x_2, y_2

$$m = \frac{3 - 12}{-4 - 14} \rightarrow \frac{-9}{-18} \rightarrow \boxed{\frac{1}{2} = m}$$

Find the slope: $(3, -2)$ and $(5, -6)$
 x_1, y_1 x_2, y_2

$$m = \frac{-6 - (-2)}{5 - 3} \Rightarrow \frac{-4}{2}$$
$$\boxed{m = -2/1}$$

Find the slope: $(-6, -6)$ and $(5, -6)$
 x_1, y_1 x_2, y_2

$$m = \frac{-6 - (-6)}{5 - (-6)} \rightarrow \frac{0}{11}$$
$$\boxed{m = 0}$$

(horizontal line)

Find the slope: $(3, -2)$ and $(3, 5)$
 x_1, y_1 x_2, y_2

$$m = \frac{5 - (-2)}{3 - 3} \rightarrow \frac{7}{0}$$
$$\boxed{m \rightarrow \text{undefined}}$$