

UNIT 6: Slope

Day 1

Slope (m) – the measure of steepness of a line as you look at it from left to right

Formula:
$$\text{Slope} = \frac{\text{Rise}}{\text{Run}} = \frac{\text{Change in } y \text{ or } \Delta y}{\text{Change in } x \text{ or } \Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$$

In an equation in **slope-intercept form**, $y = mx + b$, the slope is represented by m .

Lines with **positive slopes** rise or go up hill from left to right.

(Examples: $y = 2x - 7$, $y = \frac{1}{2}x + 4$)



Lines with **negative slopes** fall or go down hill from left to right.

(Examples: $y = -x + 9$, $y = -\frac{2}{3}x$)



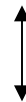
Horizontal lines have 0 slope. Remember that the word horizontal has an “o” in it, so its slope is “0.”

(Examples: $y = 1$, $y = -8$)



Vertical lines have slopes that are undefined. Remember that the word “vertical” does not contain the letter “o” in it, so it has no slope.

(Examples: $x = 3$, $x = -2$)



Linear equation – an equation with two variables whose graph in a coordinate plane is a straight line

Each variable has a power of 1, and the variables are not multiplied together. No variable can be in the denominator of a fraction.

Examples: $y = x + 1$, $y = 2x - 7$

Slope-intercept form $y = mx + b$

m is the slope of the line and b is the y -intercept

Examples: $y = 3x - 4$; $y = x + 7$

Steps for Determining Slope when Given an Equation of a Line

- 1) The equation should be written in slope-intercept form, $y = mx + b$.
If the equation is in some other form, solve for y to write the equation in this form.
- 2) The slope is represented by m or the coefficient of x .

Examples:

- 1) What is the slope of the line $y = 4 - \frac{4}{7}x$?
- 2) What is the slope of the line $y - 6 = -2(x - 4)$?
- 3) What is the slope of the line $4x - 2y = 10$?
- 4) What is the slope of the line $3y = x - 9$?
- 5) What is the slope of the line $y = -8x - 12$?

Determining the Slope when Given Ordered Pair Solutions

** use the slope formula

Slope = $\frac{y_2 - y_1}{x_2 - x_1}$ when given two ordered pairs: (x_1, y_1) and (x_2, y_2)

Steps:

- 1) Choose 2 ordered pair solutions in the form (x_1, y_1) and (x_2, y_2) .
- 2) Label each number in the ordered pairs as $x_1, y_1, x_2,$ and y_2 .
- 3) Substitute the numbers into the slope formula.

Examples:

- 1) What is the slope of the line containing the ordered pairs $(-3, 4)$ and $(-5, -1)$?

- 2) What is the slope of the line containing the ordered pairs $(-1, 4)$, $(6, 4)$, and $(3, 4)$?

- 3) A line contains the points $(-2, 2)$ and $(3, 4)$. Determine the value for x for the ordered pair $(x, 12)$ if this point lies on the same line.

- 4) What is the slope of the line through the ordered pairs $(-5, 3)$ and $(-5, 7)$?

- 5) What is the slope of the line through the ordered pairs $(-9, 10)$ and $(-3, -8)$?

- 6) A line contains the points $(-5, 0)$ and $(0, -10)$. Determine the value for y in the ordered pair $(-1, y)$ if it lies on the same line.

Closure

Given the equation $6x = 2y - 10$.

- 1) Ask each student to find an ordered pair solution that lies on the line.
- 2) Provide each student with a coordinate grid white board.
- 3) Ask students to plot their ordered pair solutions on the coordinate grid.
What is true about the ordered pair solutions?
- 4) Ask students to determine the slope of the line using the given equation.
- 5) Now, ask students to determine the slope of the line using 2 ordered pair solutions on the line.
What should be true of their slopes?
What is the slope?

Homework

Complete **Handout #3**.

Day 2

Determining the Slope when Given the Graph of a Line

two methods:

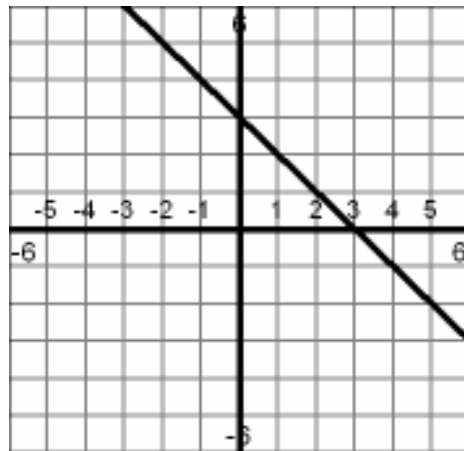
- 1) choose two ordered pairs on the line and determine the slope by using the slope formula.
- 2) Counting the “rise over run”

Method 1:

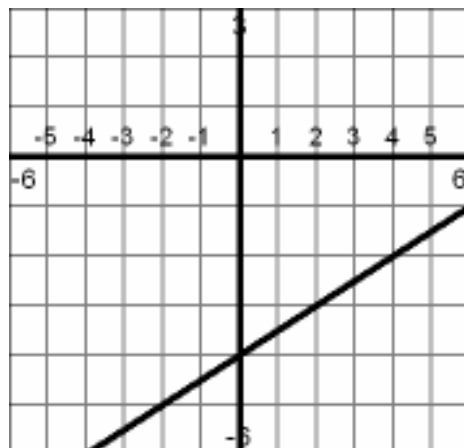
- 1) Choose 2 ordered pairs on the line. Write them in the form (x_1, y_1) and (x_2, y_2) .
- 2) Label each number in the ordered pairs as x_1 , y_1 , x_2 , and y_2 .
- 3) Substitute the numbers into the slope formula.

Examples:

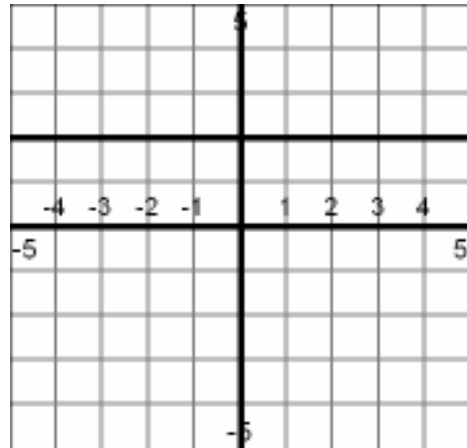
1)



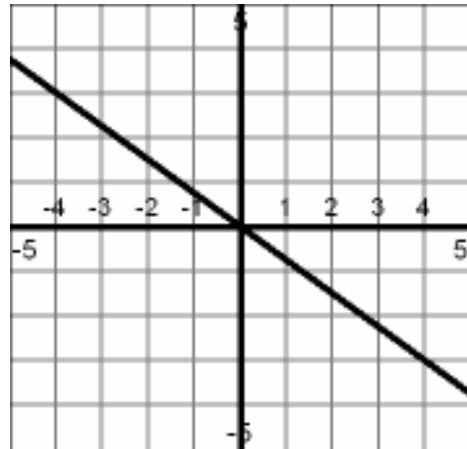
2)



3)



4)



Independent Practice/Activities

Provide students with a coordinate grid white board.

- 1) Ask them to plot the ordered pairs $(-2, -4)$; $(0, 0)$; and $(4, 8)$
- 2) Connect the ordered pairs by drawing a line.
- 3) Determine the slope of the drawn line by using the slope formula.
- 4) What is the slope?
- 5) Now, use the rise over run ($\frac{\text{rise}}{\text{run}}$) strategy

Lead students to the realization that they can calculate slope by either method—the “rise over run” method or the slope formula.

Closure

Provide students with a coordinate grid white board for the following activity.

- 1) Select 5 ordered pairs that lie in a straight line.
 - 2) Determine the slope of the line using any 2 ordered pairs and either the slope formula or the “rise over run” strategy.
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Homework

Complete **Handout #4**.

Day 3

Provide students with a coordinate grid white board for the following activity.

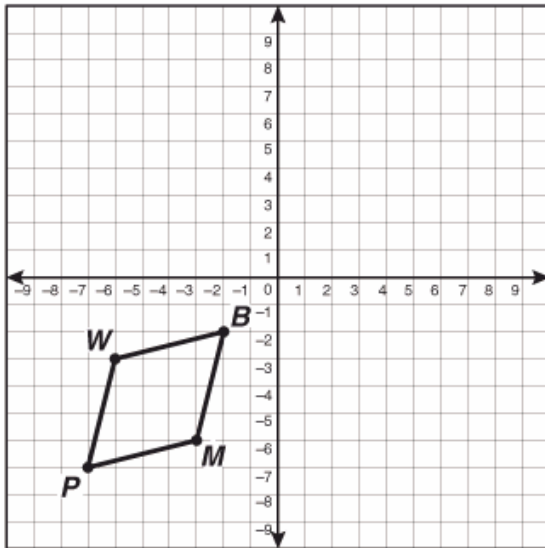
- 1) Draw a line containing the ordered pair solutions (0, -1) and (-3, 5)
- 2) Draw another line containing the ordered pair solutions (-2, 3) and (0, 4).
- 3) Determine the slopes of each line.
- 4) What do you notice about the appearance of the lines.
- 5) What do you notice about the slopes of the lines.

**** Slopes of perpendicular lines are negative reciprocals.**

- 1) Draw a line containing the ordered pair solutions (-2, -2) and (0, 4)
- 2) Draw another line containing the ordered pair solutions (0, -1) and (1, 2).
- 3) Determine the slopes of each line.
- 4) What do you notice about the appearance of the lines.
- 5) What do you notice about the slopes of the lines.

**** Slopes of parallel lines are the same**

Use slope to determine if the figure is a parallelogram:



Homework Handout #5