Study Guide

Slope 02/29/2012

Slope

<u>Slope</u> is the ratio of the vertical difference of two points on a line and the horizontal difference between the same two points. Slope is also defined as "rise over run" and is found by calculating the difference in the *y*-coordinates (rise) divided by the difference in the *x*-coordinates (run). Slope can be found either graphically or algebraically.

Finding Slope Graphically: $z_{2} = y_{4}^{10\frac{1}{7}y}$



Two points are identified on line *z*: A (- 3, 8) and B (3, 1).

To find the slope of line z, which passes through points A and B, follow these steps.

<u>Step 1</u>: Start at the left-most point (it is possible to start at either point, but it is important to be consistent), which is point A (- 3, 8).

<u>Step 2</u>: Count up (positive) or down (negative) until level with the right-most point, point B (3, 1). The count will be 7 in the downward direction, or - 7. The *rise* is - 7.

<u>Step 3</u>: Count right (positive) or left (negative) until point B is reached. The count will be 6 to the right, or +6. The *run* is 6.

<u>Step 4</u>: Using the "rise over run" definition of slope, place - 7 on top of the fraction and 6 on the bottom of the fraction.

slope = $\frac{\text{rise}}{\text{run}} = \frac{-7}{6} = -\frac{7}{6}$

Finding Slope Algebraically:

To find the slope of line *z* algebraically, follow these steps.

<u>Step 1</u>: Use the formula for the slope of a line, where m is the variable that represents slope.

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m = \frac{y_2 - y_1}{x_2 - x_1}
x_1 = -3 \quad x_2 = 3
Step 2: Let (-3, 8) be point (x<sub>1</sub>, y<sub>1</sub>), and (3, 1) be point (x<sub>2</sub>, y<sub>2</sub>).
y_1 = 8 \quad y_2 = 1
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Step 3: Substitute the given coordinate points into the slope formula and simplify the fraction.

 $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{1 - 8}{3 - (-3)} = -\frac{7}{6}$

It does not matter which method (graphically or algebraically) is used for determining slope. Regardless, the slope of a line <u>always</u> remains the same.

Example 1: Find the slope of the line between Point R (2, 4) and Point S (1, 3).

$$\begin{array}{c} & & & \\ & & & & \\ & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & \\ & & & & \\ & & & & \\ & & & & \\ & & &$$

Graphically:

<u>Step 1</u>: Start at the left-most point, which is point S (1, 3).

<u>Step 2</u>: Determine the rise (1).

<u>Step 3</u>: Determine the run (1).

<u>Step 4</u>: Using the "rise over run" definition of slope, place 1 on top of the fraction and 1 on the bottom of the fraction.

 $m = \frac{1}{1} = 1$

Answer: *m* = 1

Algebraically:

(1) (2) (3)

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$
 $m = \frac{3 - 4}{1 - 2}$ $m = \frac{-1}{-1}$
 $m = 1$

<u>Step 1</u>: Write the formula.

<u>Step 2</u>: Substitute the given points into the formula. Let $(2, 4) = (x_1, y_1)$ and $(1, 3) = (x_2, y_2)$. <u>Step 3</u>: Simplify the fraction.

Answer: *m* = 1

An activity that can reinforce the concept of slope is to have students randomly plot two points on a coordinate system and then find the slope graphically. They can check their answers by substituting the two points into the slope formula.