Name Key
8A: Algebra 1

Date _____
Period _____

Examining Slope with Ski Bird

Slope can be expressed as:

(1) change in y over change in x.

(3) or $m = \frac{y_2 - y_1}{x_2 - x_1}$ → From 2 points

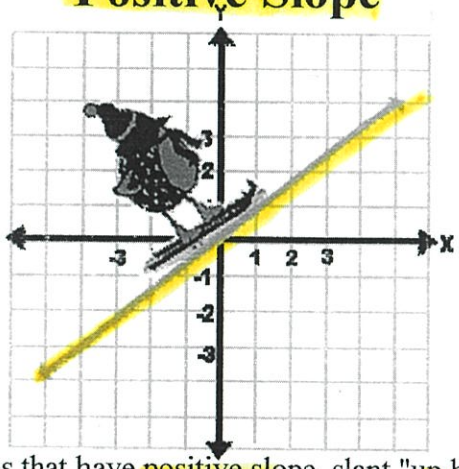
(2) or $m = \frac{\text{rise}}{\text{run}}$ → From graph

(3,2) (6,5)

Ski Bird

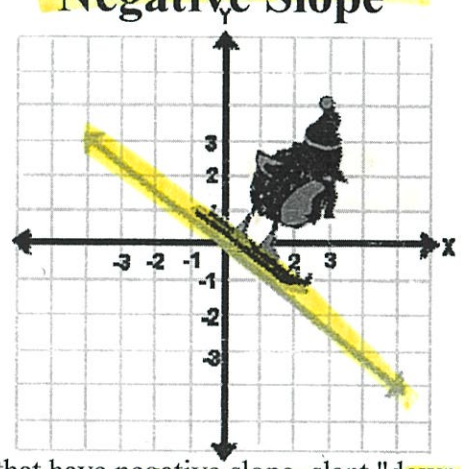
Ski Bird will try to help you remember how slope applies to straight lines.

Positive Slope



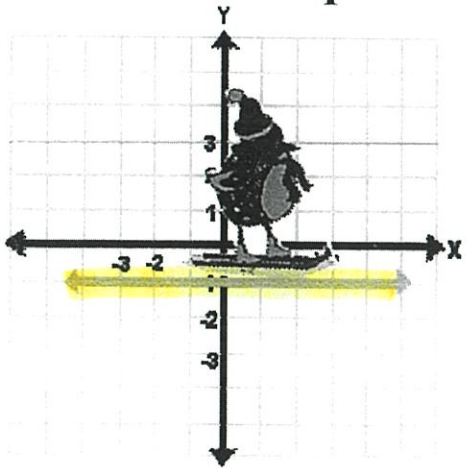
Lines that have positive slope, slant "up hill" (as viewed from left to right). Ski Bird has to work hard to make it up the hill. He needs to exert more positive (+) energy to get up the hill.

Negative Slope



Lines that have negative slope, slant "down hill" (as viewed from left to right). Ski Bird enjoys the ride down the hill. He needs to decrease (-) energy to try to slow down.

Zero Slope

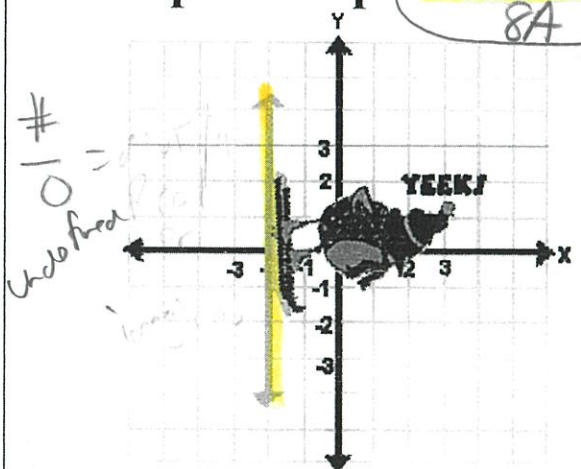


$\frac{0}{\#} = 0$

Lines that are horizontal have zero slope. Ski Bird is cross-country skiing on level ground. He is not working hard to get up a hill, nor is he trying to slow down. His energy level (and his enjoyment level) is at zero.

No Slope or Slope Undefined

8A



$\frac{\#}{0}$ = undefined

Vertical lines have no slope, or undefined slope. Ski Bird cannot ski vertically. Sheer doom awaits Ski Bird at the bottom of a vertical hill.

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Slope

SLOPE OF A LINE

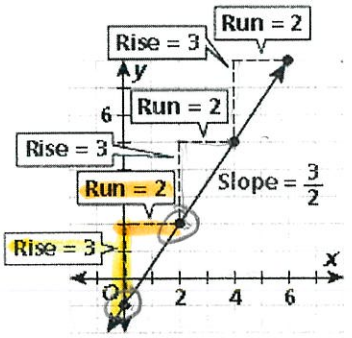
The **rise** is the **difference** of the y-values of two points on a line.

The **run** is the **difference** in the x-values of two points on a line.

The **slope** of a line is the ratio of rise to run for any two points on the line.

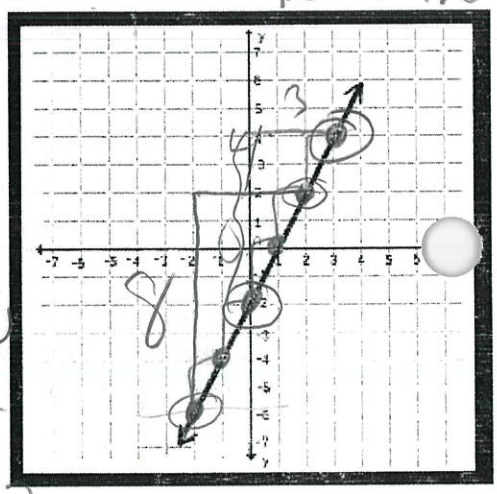
$$\text{slope} = \frac{\text{rise}}{\text{run}} = \frac{\text{change in } y}{\text{change in } x}$$

(Remember that y is the dependent variable and x is the independent variable.)



positive slope

**The slope of a line is also known as a rate of change (& ratio)



I. Slope of two coordinates

Formula: $m = \frac{y_2 - y_1}{x_2 - x_1}$ (Δy / Δx) *memorize

Steps: 1) Label the coordinates
2) Plug in the values
3) Simplify

$y = mx + b$ (m = rise, b = run)

$m = \frac{\text{rise}}{\text{run}} = \frac{2}{1} = 2$

$m = \frac{8}{4} = 2$

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

Ex: What is the slope of the graph of the line passing through the points:

1) (1, 6) & (4, 8)
$x_1\ y_1$ $x_2\ y_2$

$\frac{2}{3}$ ↑ →

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $m = \frac{8-6}{4-1}$ $m = \frac{2}{3}$

2) (5, 11) & (3, 7)
$x_1\ y_1$ $x_2\ y_2$

$\frac{2}{1}$ ↑ →

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $m = \frac{7-11}{3-5}$ $m = \frac{-4}{-2}$ $m = 2$

3) (4,10) & (6,8)
$x_1\ y_1$ $x_2\ y_2$

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $m = \frac{8-10}{6-4}$ $m = \frac{-2}{2}$ $m = -1$

$\frac{-1}{1}$ ↓ →

4) (6,7) & (9, 13)
$x_1\ y_1$ $x_2\ y_2$

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $m = \frac{13-7}{9-6}$ $m = \frac{6}{3}$

$\frac{2}{1}$ ↑ → $m = 2$

1) Find the slope of the line that contains the points (2, 1) and (5, 7) and describe the direction of the line.

$x_1\ y_1 \quad x_2\ y_2$

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $\quad m = \frac{7-1}{5-2}$ $\quad m = \frac{6}{3}$ $\quad m = 2$

points right

2) Find the slope of the line that contains the points (-10, 3) and (-8, -1) and describe the direction of the line.

$x_1\ y_1 \quad x_2\ y_2$

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $\quad m = \frac{(-1)-(3)}{(-8)-(-10)}$ $\quad m = \frac{-4}{2}$

$-8 + 10$

$m = -2$ points left

neg slope up to the left

3) Find the slope of the line y = -4x + 5 and describe the direction of the line.

$y = mx + b$

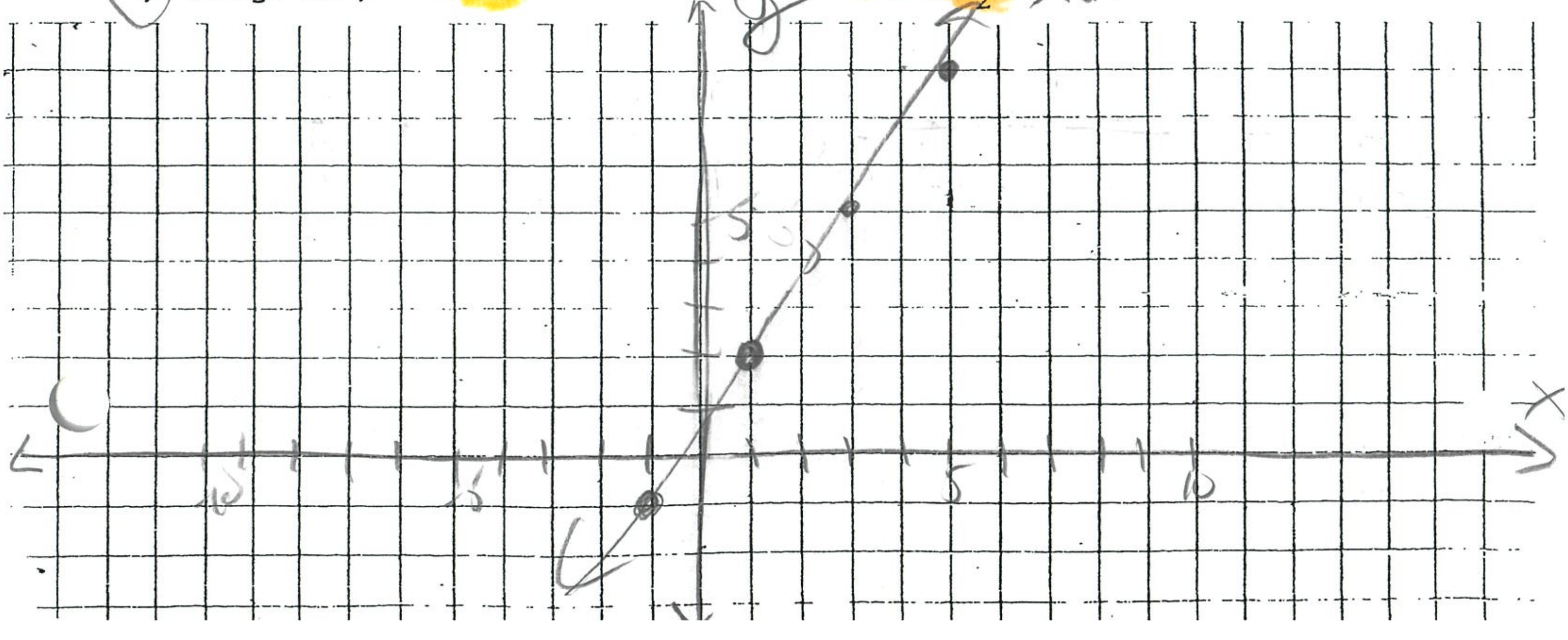
$m = -4$

points left

If it was negative $\frac{-3}{2}$

4) Through the point (1, 2) draw the line whose slope is $\frac{3}{2}$.

↑ rise → run



Math 8R

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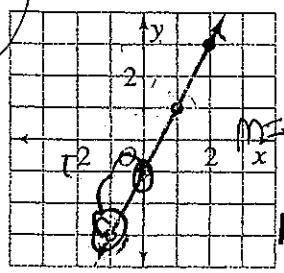
EXERCISES *On Your Own*

Find the slope of each line.

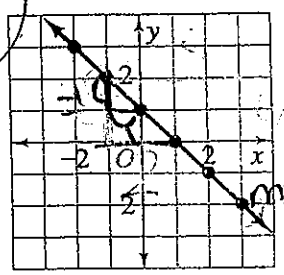
1. 

rise / run = m

$m = \frac{2}{1}$

$m = 2$

Slope = 2

2. 

$m = \frac{\text{rise}}{\text{run}}$

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

$m = -1$

Slope = −1

3. *Writing* Explain which roof is steeper: a roof with a rise of 5 and a run of 3 or a roof with a rise of 3 and a run of 5.

slope

$\frac{5}{3} = 1.6$ $\quad \frac{3}{5} = .6$

a roof w/ a rise of 5 and a run of 3

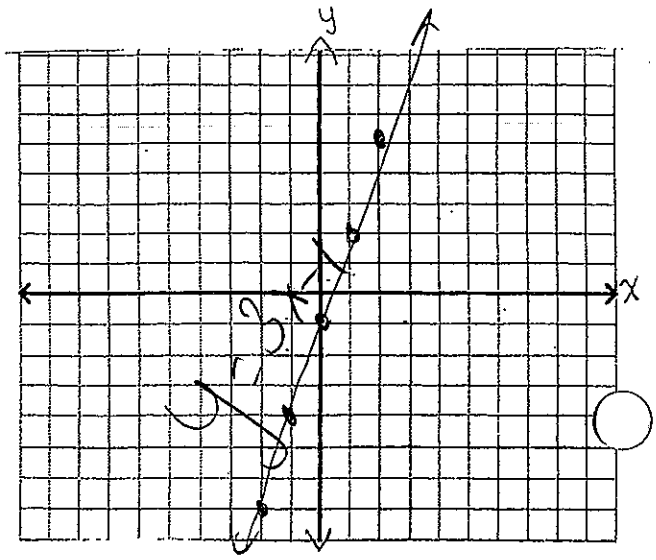
B/C it has a larger slope (larger absolute value of the number) $\quad \frac{5}{3} > \frac{3}{5}$

$1.6 > .6$

For each linear equation, make a table of solutions. Then graph the line and find the slope.

4. $y = 3x - 1$

x	y
−3	−10
−2	−7
−1	−4
0	−1
1	2
2	5



*Turn Over

5. **The points from each table lie on a line. Find the slope of the line. Then graph the line.**

x	4	5	6	7
y	-2	0	2	4

2

(6,2) (5,0)

$\frac{0-2}{5-6} = \frac{-2}{-1} = 2$

Slope = _____

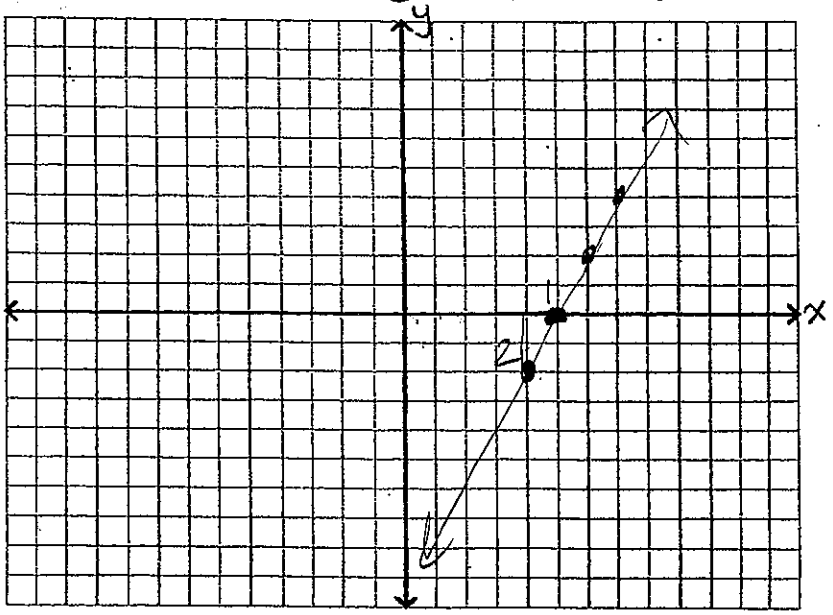
(5,0) (6,2)
$x_1\ y_1$ $x_2\ y_1$

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

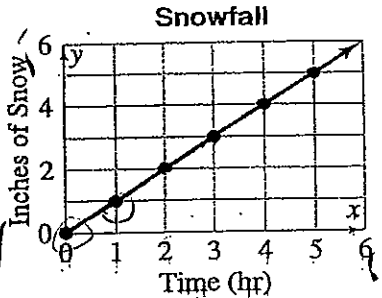
$m = \frac{2-0}{6-5}$

$m = \frac{2}{1}$

$m = 2$



6. **Find the slope of the line. Describe how one variable changes in relation to the other.** *Context



$\frac{rise}{run} = \frac{1}{1} = 1$

1

Slope = 1

One inch of snow falls per one hour.

$\frac{1}{1}\ \frac{\Delta y}{\Delta x} = \frac{\Delta \text{ Inches of Snow}}{\Delta \text{ Time (hr)}} = \frac{1}{1}$

DRY MIX