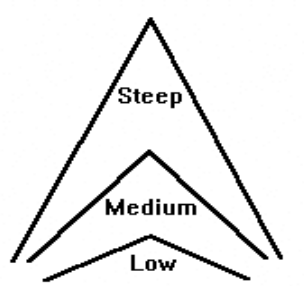
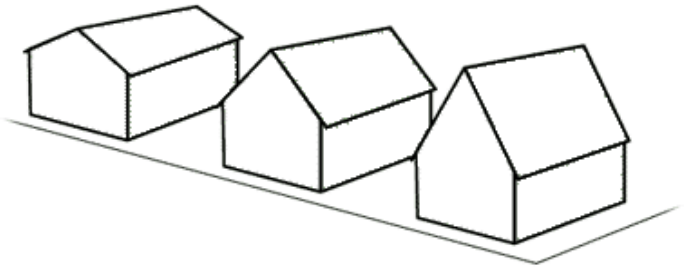
AChor/MFM2P **Name:** _____
Date: _____

Worksheet 4-2: Slope of a Line

The **steepness** of the roof of a house is referred to as the ***pitch*** of the roof by home builders.

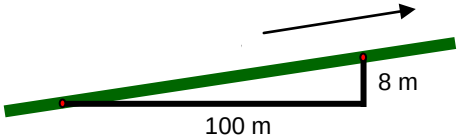




Give one reason why some houses have roofs which have a greater ***pitch***.

_____

Engineers refer to the **steepness** of a road as the ***grade***. They often refer to the grade as a percentage. If a hill has a grade of 8%, this means that for every 100 m of horizontal change, there is a vertical change of 8 m. 8 m is 8% of 100 m, so the hill has a grade of 8%.



Which hill is steeper, a hill with a grade of 6% or a hill with a grade of 10%? _____

The **slope** of a line **measures the steepness of the line.**

There are **three** ways to find the slope of a line depending on what information is given:

1. When given the **graph of a line**, use rise over run:

$$\textbf{Slope} = \frac{\text{Vertical Change}}{\text{Horizontal Change}} = \frac{\text{rise}}{\text{run}}$$

2. When given **two points** (x_1, y_1) and (x_2, y_2) on a line, use the slope formula:

$$\textbf{Slope} = \frac{\text{Change in } y}{\text{Change in } x} = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$$

3. When given **an equation of a line**, use the slope-intercept form:

$y = mx + b$ where **slope =** m and ***y*-intercept** $= b$

****y*-intercept is the *y*-coordinate of the point where the line cuts the *y*-axis.**

AChor/MFM2P **Name:** _____ WS 4-2

Date: _____

Case 1: Slope = $\frac{\text{Vertical Change}}{\text{Horizontal Change}} = \frac{\text{rise}}{\text{run}}$ when given the **graph of a line.**

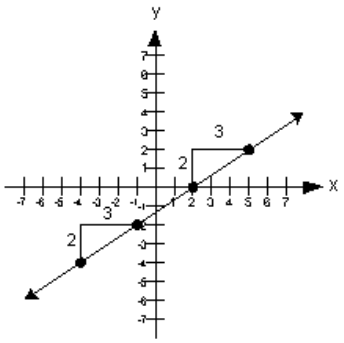
Most people remember **slope as "rise over run"**.

Rise means how many units you move **up or down from point to point**. On the graph, that would be a **change in the *y* values or** Δy **.**

Run means how many units you move **left or right from point to point**. On the graph, that would mean a **change of *x* values or** Δx **.**

Groups of Slope

Positive Slope



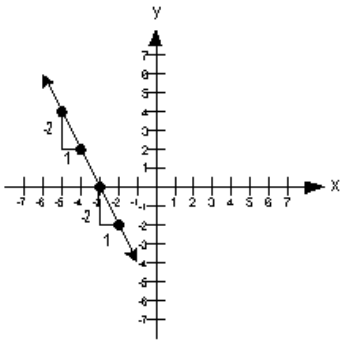
Rise = 2

Run = 3

Slope = $\frac{\text{rise}}{\text{run}} = \frac{2}{3}$

Slope = $\frac{2}{3}$

Negative Slope



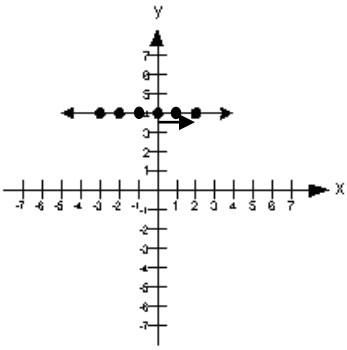
Rise = –2

Run = 1

Slope = $\frac{\text{rise}}{\text{run}} = \frac{-2}{1}$

Slope = –2

Zero Slope



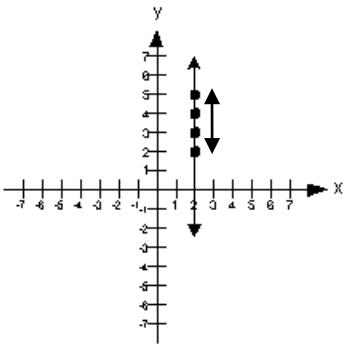
Rise = 0

Run = 2

Slope = $\frac{\text{rise}}{\text{run}} = \frac{0}{2}$

Slope = 0

Undefined Slope



Rise = 3

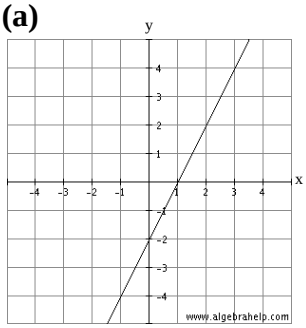
Run = 0

Slope = $\frac{\text{rise}}{\text{run}} = \frac{3}{0}$

Slope = undefined

1. Find the slope of the given lines.

(a)

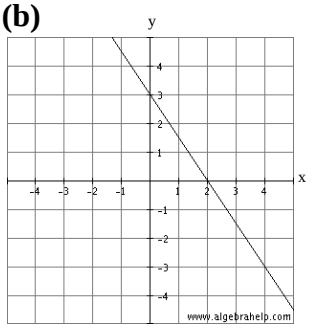


Rise =

Run =

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

(b)

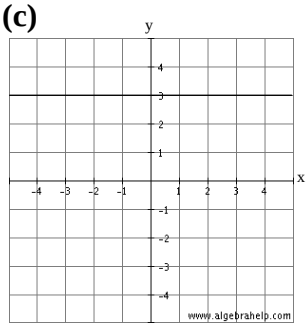


Rise =

Run =

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

(c)

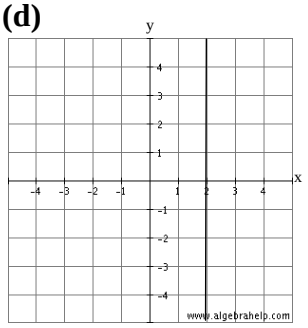


Rise =

Run =

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

(d)



Rise =

Run =

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

Case 2: Slope = $\frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$ when given **two points** (x_1, y_1) and (x_2, y_2).

The subscripts (1 and 2) just indicate that these are two different points with (x_1, y_1) as the ordered pair for point 1 and (x_2, y_2) as the ordered pair for point 2. It does not matter which one you call point 1 and which one you call point 2 as long as you are consistent when substituting the respective values into the slope formula.

2. Find the slope of each straight line that passes through the given points **without graphing the line.** Then indicate if the line through the points rises (left to right), falls (left to right), is horizontal, or is vertical.

***Make sure that you are careful when one of your values is negative and you have to subtract it such as 4 – (–2) is 4 + 2, not the same as 4 – 2.**

(a) (4, 7) and (2, 1)

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

(b) (–4, 1) and (2, –1)

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

(c) (4, 6) and (–2, 6)

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

(d) (–7, 3) and (–7, 5)

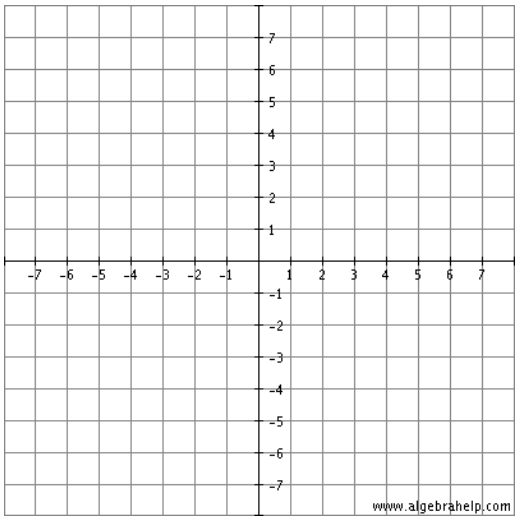
Slope = $\frac{y_2 - y_1}{x_2 - x_1}$

Answers: 1. (a) 2**, (b)** $-\frac{3}{2}$**, (c)** 0**, (d)** undefined**; 2. (a)** 3**, (b)** $-\frac{1}{3}$**, (c)** 0**, (d)** undefined

3. A line segment has one endpoint, A (–4, 2), and slope of $-\frac{5}{3}$.

Find the coordinates of another possible endpoint, B.

Method 1: Draw a graph

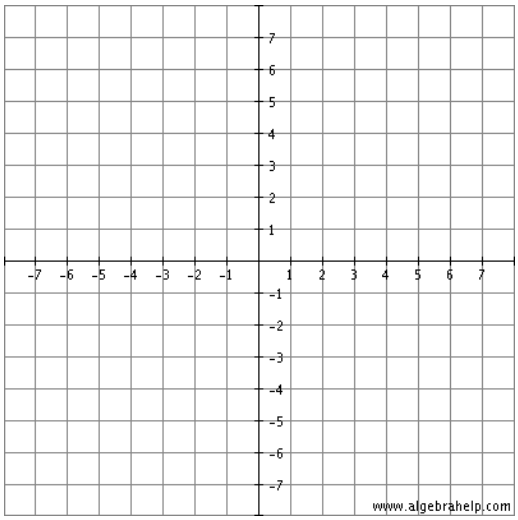


Method 2: Use the coordinates

4. A line segment has one endpoint, K (2, 1), and slope of $\frac{3}{2}$.

Find the coordinates of another possible endpoint, L.

Method 1: Draw a graph



Method 2: Use the coordinates

Answers: 3. (–1, –3)**; 4.** (4, 4)