

Slope Video Lecture

Sections 3.4

Course Learning Objective:

- 1) Identify and use connections between linear equations, their slope, their intercepts, and their graphs. (Review from Math 840)
- 2) Graph linear equations and model applications based on these equations and their graphs.

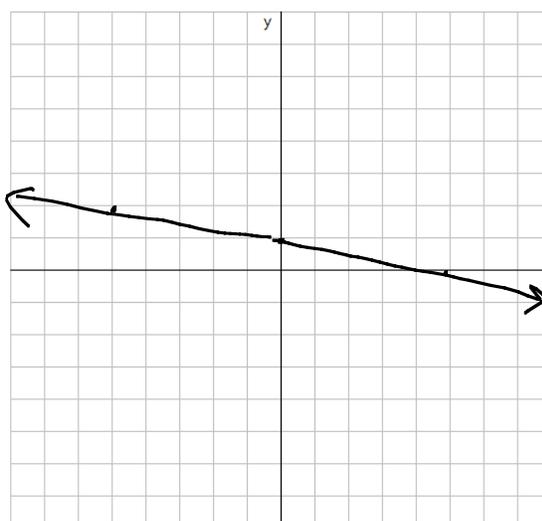
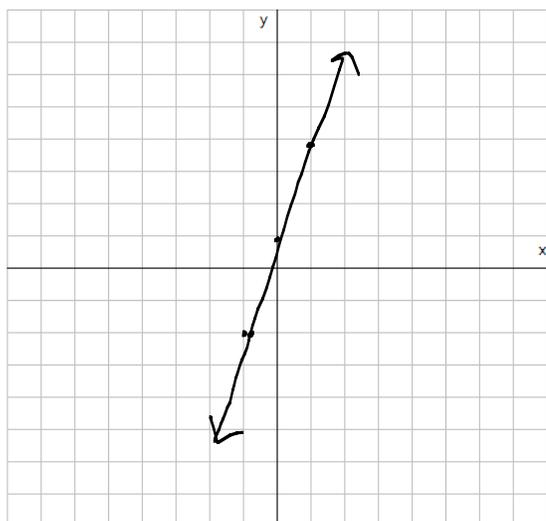
Weekly Learning Objectives:

- 1) Find the slope of a line given its graph.
- 2) Find the slope of a line given two points of the line.
- 3) Find the slope of a line given its equation.
- 4) Find the slopes of horizontal and vertical lines.
- 5) Compare the slopes of parallel and perpendicular lines.
- 6) Calculate and identify slope as a rate of change.

Slope

How to determine the slope of a line from a graph:

- 1) Pick two "good" points
- 2) Count rise/run



Lines with a positive slope are increasing and rise from left to right.

Lines with a negative slope are decreasing and fall from left to right.

Lines with zero slope are horizontal.

Lines with undefined slope are vertical.

How to find slope given two points:

Given two points: (x_1, y_1) & (x_2, y_2)

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

Find the slope between the two points:

$(4, -3)$ and $(-6, 3)$

$(2, 4)$ and $(0, 4)$

$(-1, 3)$ and $(-1, 7)$

How to find slope from an equation:

- 1) Put the equation of the line into slope-intercept form: $y = mx + b$
- 2) The slope is m , the coefficient of x

Examples: Find the slope of the given line:

$y = 2x - 4$

$y = 6$

$x = -3$

$3x - 2y = 6$

Parallel Lines have slopes that are EQUAL

Perpendicular Lines have slopes that are OPPOSITE RECIPROCAL

How to determine if two lines are parallel, perpendicular or neither:

- 1) Solve each equation for y and put into slope-intercept form: $y = mx + b$
- 2) Determine the slope from each equation: slope m will be the coefficient of x
- 3) Compare the slopes:
 - a) If the slopes are equal, then the lines are parallel
 - b) If the slopes are opposites and reciprocals, then the lines are perpendicular
 - c) If neither a) nor b), then the lines are neither

Examples: Determine whether the lines are parallel, perpendicular or neither

$$-4x + 3y = 4$$

$$-8x + 6y = 0$$

$$5x - 3y = -2$$

$$3x - 5y = -8$$

$$3x - 5y = -1$$

$$5x + 3y = 2$$

In 1990, there were 11,338,000 students enrolled in grades 9-12. In 2005, there were 14,818,000 students enrolled in grades 9-12.

Find the rate of change of enrollment over time for this data. Write the appropriate units for this rate of change and interpret its meaning.