

Lesson #15

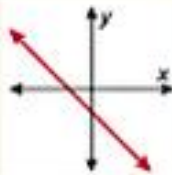
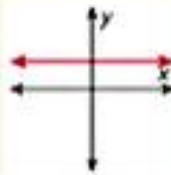
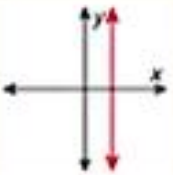
Calculating Slope

What Exactly Is Slope?

- › The slope of a line is a numerical measure of how steep the line is and in what direction it rises or falls
- › We calculate a slope given 2 ordered pairs on the line:

$$(x_1, y_1) \text{ and } (x_2, y_2)$$

- › Slopes can be positive or negative, 0 or undefined:

Summary: Slope of a Line			
Positive Slope	Negative Slope	Zero Slope	Undefined Slope
			

- › Slope can be an integer, but we often see fractions
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How Do We Calculate Slope?

Given 2 points (x_1, y_1) and (x_2, y_2) , the **Slope Formula** is:

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

Important Slope Facts

- › Parallel Lines have the same slope
- › Perpendicular Lines have “opposite reciprocal” slopes

Example: If one line has a slope of $-4/5$, the perpendicular line has a slope of $5/4$

Common Slope Mistakes

- › Inserting the variables in the wrong place (ex: x 's on top)
 - › Adding and subtracting numbers incorrectly
 - › Not checking to see if you are asked to find a parallel or perpendicular slope.
 - › Forgetting that $\frac{0}{a \text{ number}} = 0$ & that $\frac{a \text{ number}}{0} = \text{undefined}$
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Using the Slope Formula

Sample Question: What is the slope of the line containing the points $(-6, 4)$ and $(3, -7)$?

Solution: Use the slope formula with $x_1 = -6$, $y_1 = 4$, $x_2 = 3$, and $y_2 = -7$

$$\begin{aligned}\text{Slope} = m &= \frac{y_2 - y_1}{x_2 - x_1} \\ &= \frac{-7 - 4}{3 - (-6)} \\ &= \frac{-11}{9} \\ &= -\frac{11}{9}\end{aligned}$$

Sample Question: A line contains the points (0, -2) and (3, 7). What is the slope of a line perpendicular to this line?

Solution: Use the slope formula with $x_1 = 0$, $y_1 = -2$, $x_2 = 3$, and $y_2 = 7$

$$\text{Slope of this line} = m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{7 - (-2)}{3 - 0}$$

$$= \frac{9}{3}$$

$$= 3$$

$$\text{Perpendicular slope} = -\frac{1}{3}$$