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Rate of Change and Slope

Unit 5 Lesson 1

Students will be able to:

Understand the concept of Rate of change and slope of a line

Key Vocabulary:

- Rate of Change
- Slope, Run, Rise
- Slope formula

Rate of Change

The rate of change represents a relationship between changing quantities.

$$Rate\ of\ Change = \frac{Change\ in\ dependent\ variable}{Change\ in\ independent\ variable}$$

The rate of change can both be **positive** or **negative**, depending on the change in the dependent variable with respect to the independent variable.

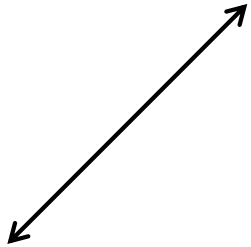
Slope

The rate of vertical change to the horizontal change between two points on a line is called the slope of a line.

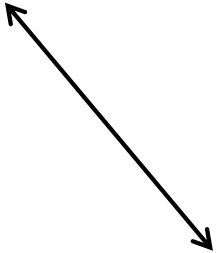
$$Slope = \frac{vertical\ change}{horizontal\ change} = \frac{rise}{run}$$

Depending on the vertical or horizontal change, the slope can be **positive, negative, zero or undefined**.

Models of Slope



Positive Slope



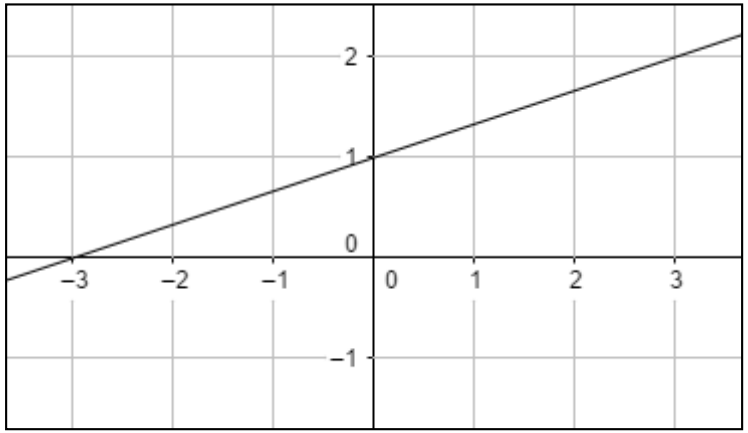
Negative Slope

Zero Slope

Undefined Slope

RATE OF CHANGE AND SLOPE

Problem 1: What is the slope of the line shown in the graph? Is the slope positive or negative?



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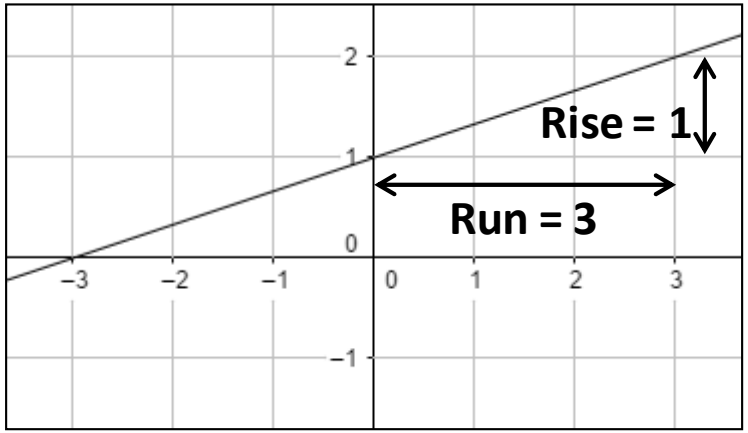


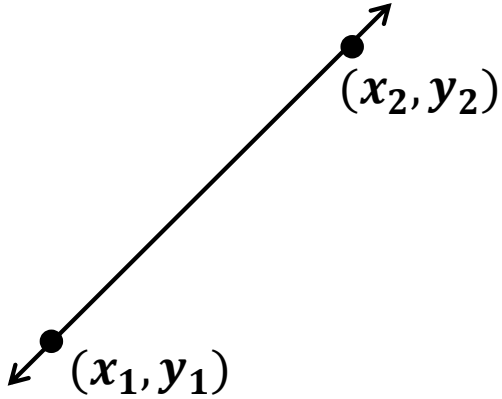
$$Slope = \frac{rise}{run} = \frac{1}{3}$$

The slope is positive. The line is slanting upwards from left to right.

Slope formula

Let (x_1, y_1) and (x_2, y_2) be two points on a line. Then the slope of the line is given by:

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



Problem 2: What is the slope of the line passing through $(2, 5)$ and $(-1, 8)$?

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$y_2 = 8\ , y_1 = 5\ , x_2 = -1\ , x_1 = 2$

$$Slope\ m = \frac{8 - 5}{-1 - 2}$$

$$Slope\ m = \frac{3}{-3} = -1$$