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## Rate of Change and Slope

Unit 5 Lesson 1

# RATE OF CHANGE AND SLOPE

## 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 AND SLOPE

## Rate of Change

The rate of change represents a relationship between changing quantities.

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

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

## RATE OF CHANGE AND SLOPE

### Slope

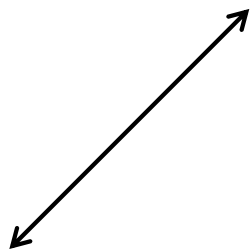
The rate of vertical change to the horizontal change between two points on a line is called the slope of a line.

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

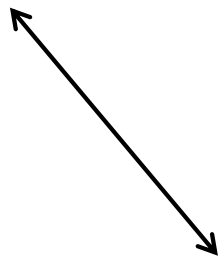
Depending on the vertical or horizontal change, the slope can be **positive, negative, zero or undefined**.

# RATE OF CHANGE AND SLOPE

## Models of Slope



**Positive Slope**



**Negative Slope**



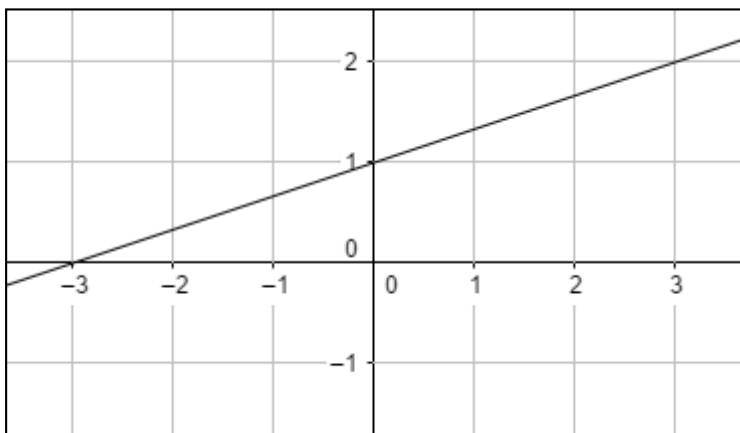
**Zero Slope**



**Undefined Slope**

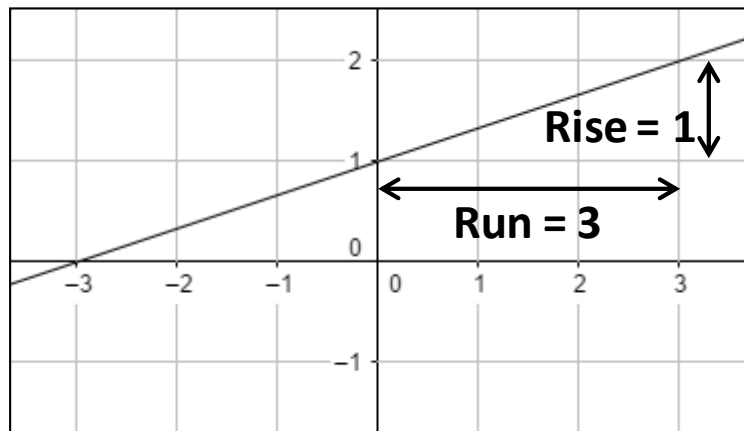
# RATE OF CHANGE AND SLOPE

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



## RATE OF CHANGE AND SLOPE

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



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

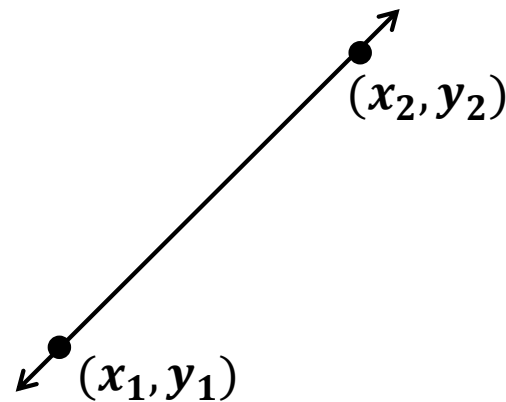
The slope is positive. The line is slanting upwards from left to right.

## RATE OF CHANGE AND SLOPE

### 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:

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





## RATE OF CHANGE AND SLOPE

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

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

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

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