

Lesson 7.4: Slope as a Rate of Change

Date: _____

Learning Goal: We are learning to connect rate of change to the slope of a line.

To explore what “rate of change” is, we first need to refamiliarize ourselves with “rate”. A **rate** is a comparison of two quantities expressed as different units:

Examples:

A line on a graph is always changing (unless it is flat or $m = 0$). Rate of change, then, is the rate at which a line on a graph is changing. Thankfully, we know how to calculate this change by calculating the slope! Thus,

$$\text{Rate of change} = m = \frac{\text{Rise}}{\text{Run}}$$

Example 1: Given the graph to the right:

a) Calculate the rate of change. Include the units (always include units).

b) What does the rate of change represent?



c) How much would 7 cookies cost? If I spent one dollar, how many cookies would I get?

d) The information for question c) was in the graph. The rate of change allows us to go beyond the graph. How much would 20 cookies cost?

Rate of Change Without a Graph

Having a graph is great as it allows us to visualize the information and actually see the steepness (or its flatness, yes, that's a word). However, we do not always have a graph:

Example 1: A climber is on a hike. After 2 hours, he is at an altitude of 400 feet. After 6 hours, he is at an altitude of 700 feet. What is the average rate of change?

Wait—why are we asking for the average rate of change?

Since rate of change = slope, the rate of change is also $m = \frac{y_2 - y_1}{x_2 - x_1}$. If we could create two points, we could then calculate the slope/RoC!

Solve Example 1:

Example 2: A rocket is 1 mile above the earth in 30 seconds and 5 miles above the earth in 2.5 minutes. What is the rocket's rate of change in miles per second? What about miles per minute?

Success Criteria

- I can recognize that slope and rate of change are the same thing
- I can find rate of change on a graph, by finding its slope
- I can create two ordered pairs from a given scenario