

Math 9 – Unit 6: Coordinate Geometry

Name: Mr. Hagen
Date: March 4, 2019

Lesson #4: Slope as a Rate of Change Part 1

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:

$$80 \text{ km/h} \quad \$0.30/4 \text{ oranges} \approx \$0.07/\text{orange}$$

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,

$$\text{Rate of change} = \text{slope} = m = \frac{\text{Rise}}{\text{Run}} = \frac{y_2 - y_1}{x_2 - x_1} = \text{Rate of change}$$

Example 1: Given the graph to the right:

a) Calculate the ^{slope} rate of change. Include the units (always include units).

$$m = \frac{\text{Rise}}{\text{Run}} = \frac{\$1}{4 \text{ cookies}} = \$0.25/\text{cookie}$$

b) What does the rate of change represent?

It is the cost of a cookie.



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

$$\$0.25/\text{cookie} \times 7 \text{ cookies} = \$1.75$$

$$\$1.00 \div 0.25 = 4 \text{ cookies}$$

Interpolation

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?

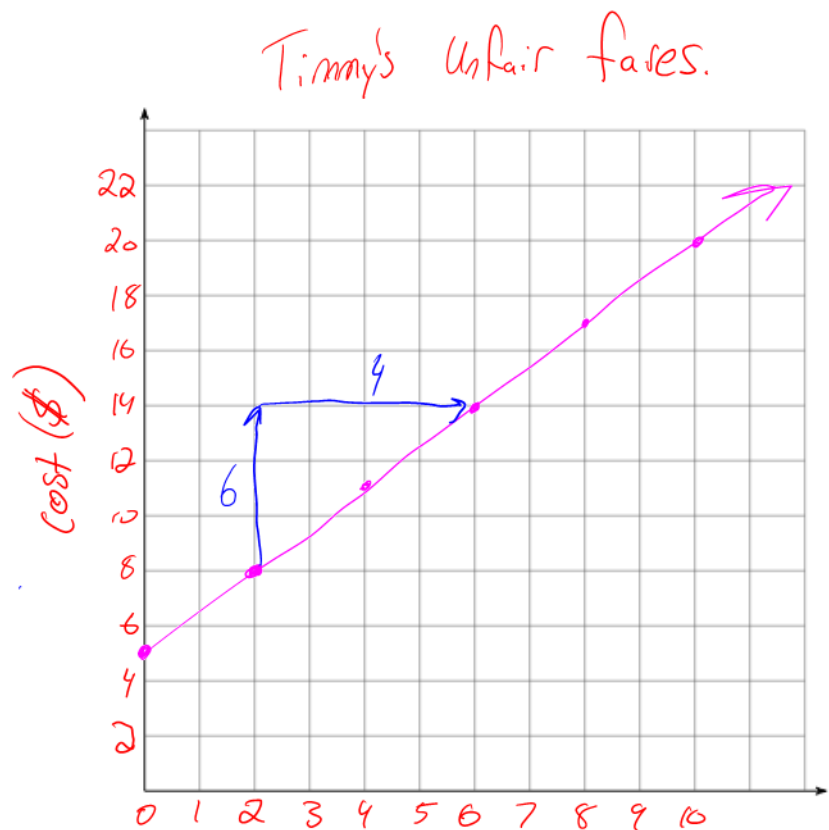
Extrapolation

$$\begin{aligned} & \$0.25/\text{cookie} \times 20 \text{ cookies} \\ & = \$5.00 \end{aligned}$$

Example 2: Timmy drives a cab. He charges \$5 for every trip plus \$1.50 for every kilometer driven.

a) Create a table to represent 0 to 10 kilometers, then graph the table. Label the axes and give the graph a title.

X Distance (km)	Y Cost (\$)
0	5
1	6.50
2	8.00
3	9.50
4	11
5	12.50
6	14
7	15.5
8	17
9	18.50
10	20



b) What is the rate of change, and what does it represent?

$$m = \frac{\text{Rise}}{\text{Run}} = \frac{\$6.00}{4 \text{ km}} = \$1.50/\text{km}$$

This is the cost of a kilometer.

c) What is the cost of a 7.5km cab ride with Timmy?

$$\begin{array}{r} \$1.50 \times 7.5 = \$11.25 \\ + \$5 \\ \hline \$16.25 \end{array}$$

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 find the rate of change in a table of values, by finding the common difference