Math 9 – Coordinate Geometry Name: Mr. Hagen

Lesson #4: Slope as a Rate of Change Part 1 - Notes Date: March 5, 2018

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:

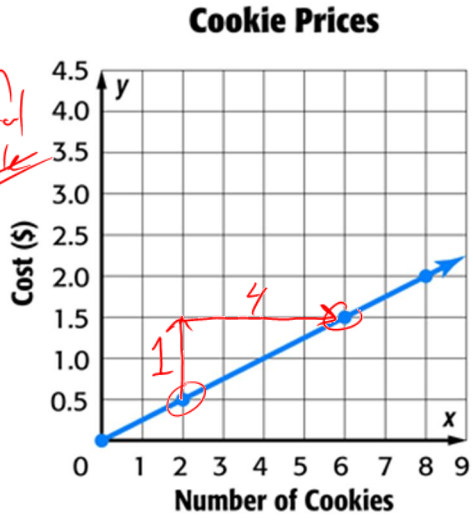
Examples: $80\ km/1h$ $\$1.20/1\ litre$

$-100\ people/1\ year$

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,

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

Example 1: Given the graph to the right:



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

$R.o.C = m = \frac{Rise}{Run} = \frac{\$1}{4\ cookies}$

$= \$0.25/cookie$

Be mindful of the scale

b) What does the rate of change represent?

It means the cost of one cookie is $0.25.

c) How much would 7 cookies cost?

$7 \times \$0.25$

$= \$1.75$

If I spent one dollar, how many cookies would I get?

$\frac{\$1.00}{\$0.25} = 4$ 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

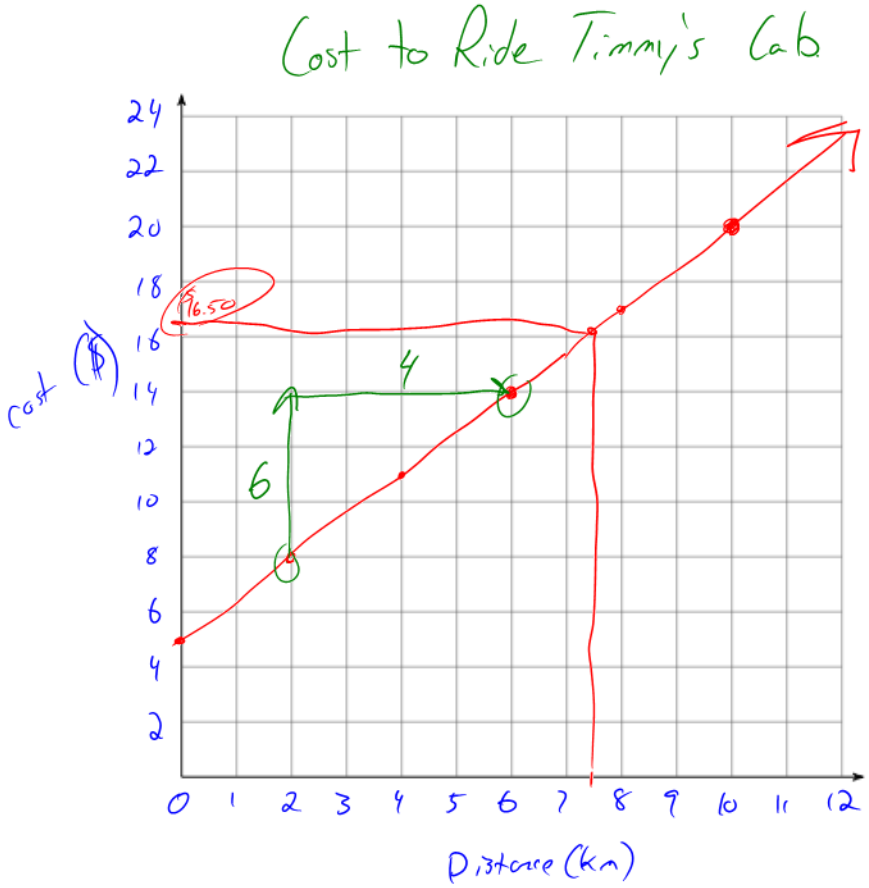
$20 \times \$0.25$

$= \$5.00$

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.

Distance (km)	Cost ($)
0	5
1	6.50
2	8.00
3	9.50
4	11.00
5	12.50
6	14.00
7	15.50
8	17.00
9	18.50
10	20.00



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

$m = \frac{\text{Rise}}{\text{Run}} = \frac{\$6}{4\text{ km}} = \$1.50/\text{km}$

This is the cost of every km

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

① By using the graph, it costs $16.50.

② Algebra. $7.5 \times \$1.50 = \$11.25 + 5 = \$16.25$