NAME:_____ Math _____ , Period _____

Mr. Rogove Date:_____

LEARNING OBJECTIVE: We will explore the concept of a function and inspect the average rate of change over time intervals to determine if the rate is constant. (G8M5L1)

CONCEPT DEVELOPMENT:

Functions are used to make predictions about real life situations. We can predict the distance an object has traveled for ***any* given time interval**.

Can we assume a constant rate?

Suppose a moving object travels 256 feet in 4 seconds. Assume that the object travels at a constant speed. Write a linear equation in two variables to represent the situation, and use it to make predictions about the distance traveled over various intervals of time.

- 64 is distance traveled in 1 second.
- Speed in ft./sec.
- Unit Rate
- Slope

Number of seconds (x)	Distance traveled in feet (y)
1	64
2	128
3	192
4	256

EQUATION: $y = 64x$

The object is actually a stone that has been dropped from a height of 256 feet. It take exactly 4 seconds for the stone to hit the ground.

How far does it travel in the first three seconds?

144 ft.

How far does it travel in the last three seconds?

240 ft.

Can we express this as a linear equation?

No! Rate not constant

Number of seconds (x)	Distance traveled in feet (y)
1	16
2	64
3	144
4	256

Not all functions are linear!

$$\textbf{Average Speed} = \frac{\textbf{distance traveled over a given time interval}}{\textbf{time interval}}$$

NAME:_____ Math _____ , Period _____

Mr. Rogove Date:_____

Guided / Independent Practice:

Use the table to answer the questions below.

Number of seconds (x)	Distance traveled in feet (y)
0.5	4
1	16 +16
1.5	36
2	64 +48
2.5	100
3	144 +80
3.5	196
4	256 +112
5	400

1. What is the average speed of the stone between 0 and 3 seconds?

$\frac{144}{3} = 48 ft/sec.$

2. Look at the distance the stone falls each second. Do you notice anything interesting?

$y = 16x^2$

3. How many feet did the stone fall between 0-1 second? 16

How about between 1-2 seconds? 48

How about between 2-3 seconds? 80

How about between 3-4 seconds? 112

4. What is the average speed for each half-second interval?

Interval between 0-0.5 seconds	8ft./sec
Interval between 0.5-1 second	24ft./sec.
Interval between 1-1.5 seconds	40ft./sec
Interval between 1.5-2 seconds	56
Interval between 2-2.5 seconds	72
Interval between 2.5-3 seconds	88
Interval between 3-3.5 seconds	104
Interval between 3.5-4 seconds	120

Avg speed increases 16ft. per $\frac{1}{2}$ sec.

NAME:_____ Math _____ , Period _____

Mr. Rogove Date:_____

Apples bought in lbs.(x)	Price paid in dollars (y)
0.5	0.40
1	0.80
2.5	2.00
3	2.40
3.75	3.00

Is the rate constant? How do you know?

$\frac{.4}{.5} = .8$ $\frac{.8}{1} = .8$

$\frac{2}{2.5} = .8$ $\frac{2.4}{3} = .8$

Write the rule:

$y = 0.8x$

Time in minutes (x)	Distance in miles (y)
60	65
120	130
150	162.5
180	195
270	292.5

Is the rate constant? How do you know?

Yes $\frac{65}{60} = \frac{13}{12}$ $\frac{130}{120}$ $\frac{162.5}{150} =$

Write the rule:

$y = \frac{13}{12}x$

Time in days (x)	Total number of eggs laid (y)
1	3
2	4
3	6
4	9
7	16

Is the rate constant? How do you know?

No! $\frac{3}{1} \neq \frac{4}{2}$

Predict how many eggs laid after 20 days

≈45

Time in hours(x)	Viral cells found in lab dish (in millions)(y)
1	2
2	8
3	18
5	50
6	72
7.5	112.5

Is the rate constant? How do you know?

No! $\frac{2}{1} \neq \frac{8}{2}$

Predict how many cells after 10 hours

$y = 2x^2$ 200m

NAME:_____ Math _____ , Period _____

Mr. Rogove Date:_____

Answer the questions based on the scenario presented in bold.

A football is thrown down field and eventually lands on the ground.

a. Is the football traveling at a constant speed?

No!

b. If the football is in the air for 8 seconds, after how many seconds do you think it reached its peak?

4sec

c. Name one other prediction/ conclusion you can make about the flight of the football.

In 4sec., maybe it completes $\frac{1}{2}$ of its journey.

An electric car (TESLA) travels down a nearly empty road at a consistent speed of 65 miles per hour.

a. Is the car traveling at a constant rate?

Yes.

b. How far does the car travel in 3.5 hours? How can you know?

227.5 miles

c.

By accident, I left the water running in the sink this morning when I left my house.

a. Is the water flowing out of the sink at a constant rate?

Yes!

b. Will there be more running out (per minute) at 9AM, noon, or 3PM?

Same

c. Make one other prediction/ comment about the running water.

Every week, the number of Instagram followers I have doubles.

a. Does my Instragram popularity grow at a constant rate?

b. Is this growth sustainable (can I continue to double my followers?) Why or why not?

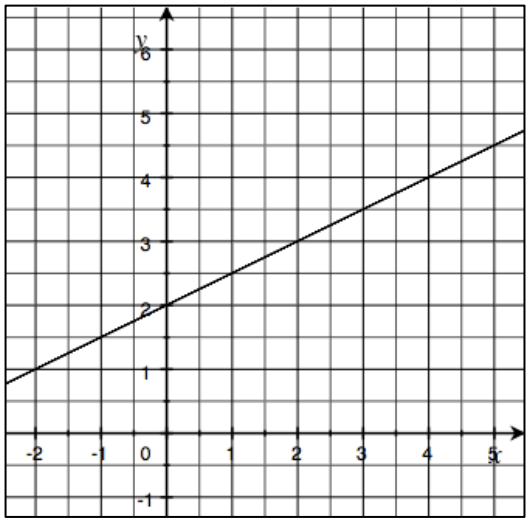
c. Make one other prediction/ draw one conclusion about the number of followers I have.

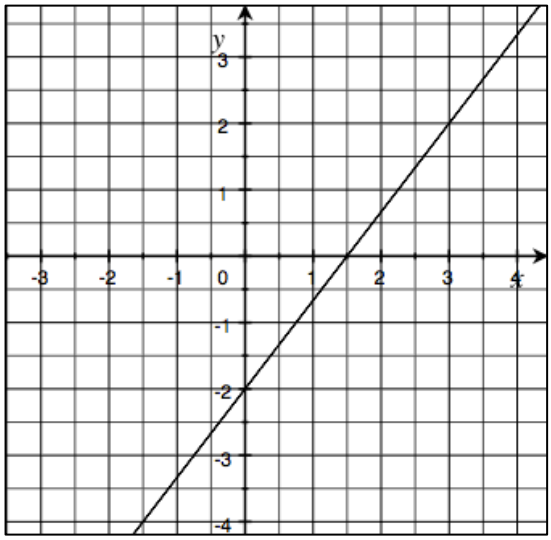
NAME:_____ Math _____ , Period _____

Mr. Rogove Date:_____

Activating Prior Knowledge:

We can write linear equations from graphs





Closure: