



Unit 2 Lesson 9

Average Rate of Change

Objectives:

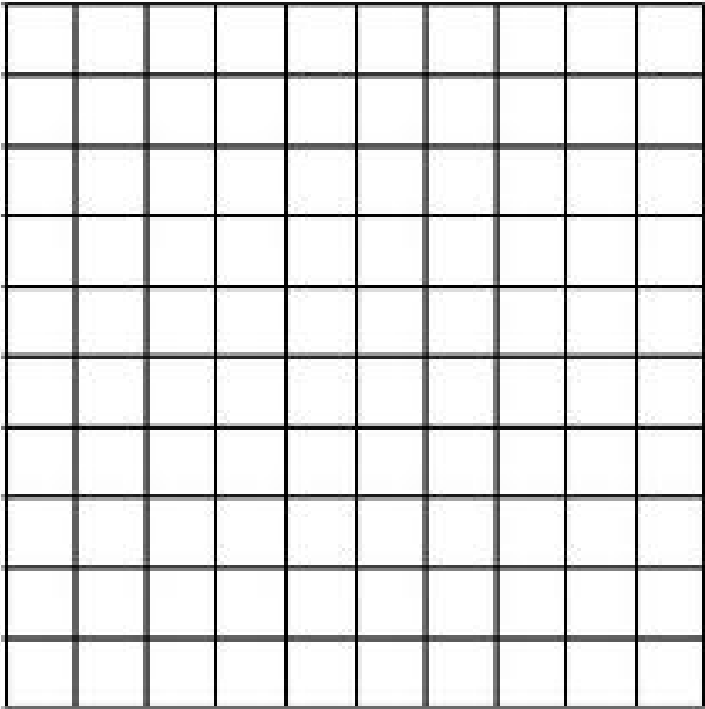
- *I can find the average rate of change.
- *I can compare the average rates of change.



Warm Up:

The table below compares the number of hours a cashier works x to her total earnings, in dollars. Write a linear equation to y represent the cashier's earnings and then graph it.

Cashier's Earnings	
Time in hours, x	Earnings in \$, y
0	0
2	15
4	30





Think back...what do you remember about **slope**?

Speed



Rate of change

shows how one quantity changes relative to another quantity.

Slope

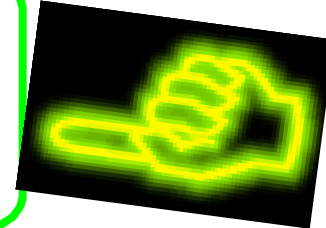


To calculate rate of change between two points (x_1, y_1) and (x_2, y_2) use the formula:

$$m = \frac{(y_2 - y_1)}{(x_2 - x_1)}$$

$$\begin{matrix} (x_1, y_1) & (x_2, y_2) \\ (1, 1) & (4, 0) \end{matrix}$$

$$m = \frac{(0 - 1)}{(4 - 1)} = \frac{-1}{3}$$



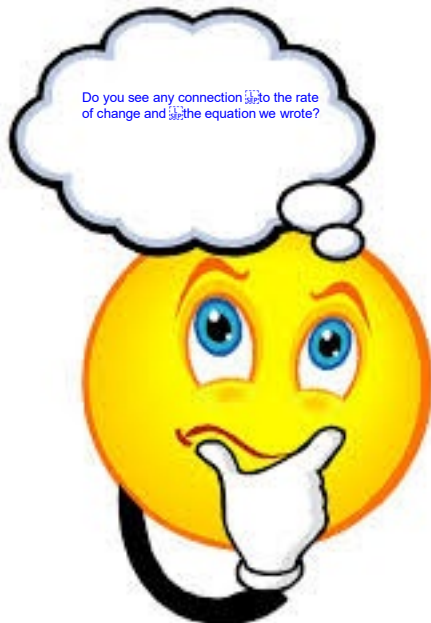
Let's go back to our warm up problem...

Choose two ordered pairs, and find the average rate of change.

Cashier's Earnings

Time in hours, x	Earnings in \$, y
0	0
2	15
4	30

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



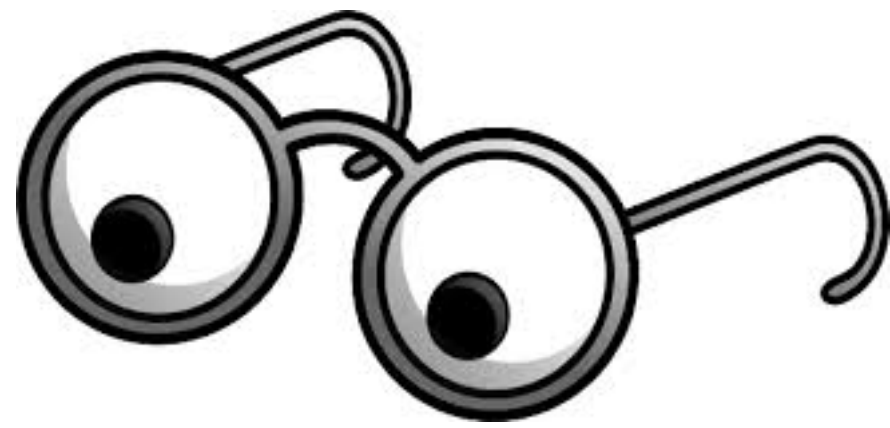


Let's Try...

Choose a pair of points on the graph in your notes and find the $\frac{\Delta y}{\Delta x}$ average rate of change between them.

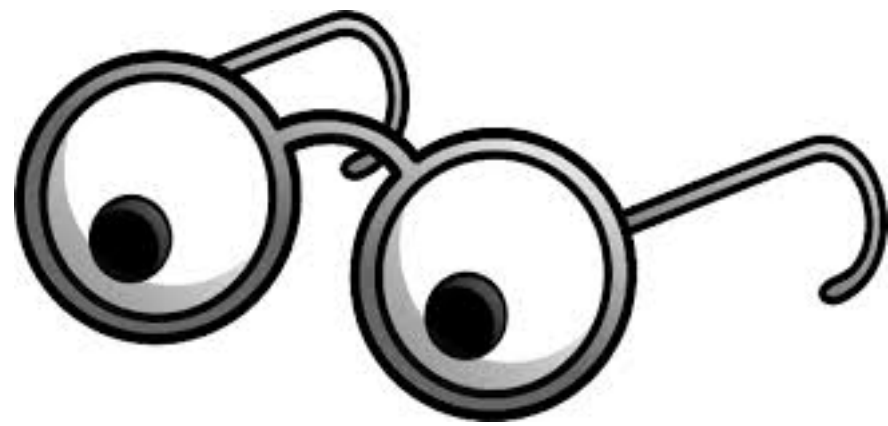
Determine the average rate of change between $(-3, 7)$ and $(4, 2)$

You Try...



Find the average rate of change between $(19, 0)$ and $(-2, -5)$

You Try...



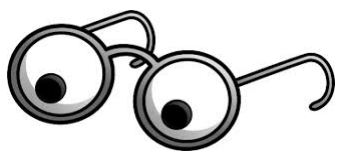
Find the average rate of change between $(8, -8)$ and $(-1, -4)$

Let's Try...

A basketball championship begins with 64 teams. Every time a team wins a game, it goes on to the next round. Once a team loses a game it is eliminated from competition and does not play any more games. The number of teams in each round of the championship is a function of the round. That function is represented on the graph in your notes.

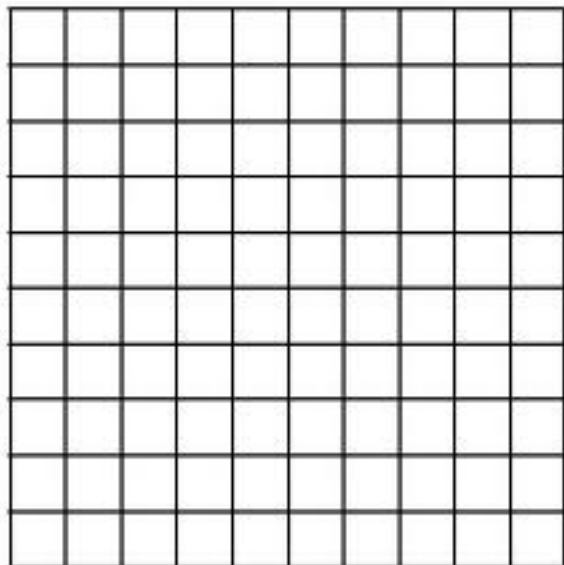
Compare the rate of change between rounds 1 and 2 to the rate of change between rounds 2 and 3.





You Try...

Graph $f(x) = 2x + 1$. Find the average rate of change between any 2 ^[L]_[SEP] consecutive x values.



Rate of change:



Compare your rate of change with someone near you. ^[L]_[SEP] What do you notice?



Let's look at the rate of change of a ^L_{SEP} **LINEAR FUNCTION**.

x	0	1	2	3
f(x)				

What do you notice?

What part of a linear equation is rate of change?



Remember....

An exponential function has a graph that is a curve.

An exponential growth function is always _____, while an exponential decay function is always _____.

x	0	1	2	3
f(x)				

Let's Try...

Find and describe the average rate of change for four consecutive pairs of x values in the table.

x	-3	-2	-1	0	1
$f(x)$	64	16	4	1	$\frac{1}{4}$



Let's Try...

Determine the average rate of change between 3 consecutive pairs of points for the function $f(x) = -3x + 2$.

x			
f(x)			

What type of function is this?



You Try...



Find the average rate of change for 3 intervals of $f(x)$.

x	$f(x)$
-1	$\frac{1}{3}$
0	1
1	3
2	9

What type of function is this?



Compare the rates of change for $f(x) = 10x^{\frac{1}{10}}$ and function g , represented in the table.

What is the same?

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x	$g(x)$
-1	$\frac{1}{8}$
0	1
1	8
2	64
3	512

