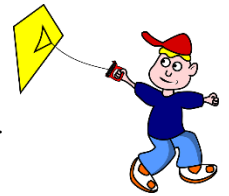


Essential Question: How do we calculate and interpret the rate of change?

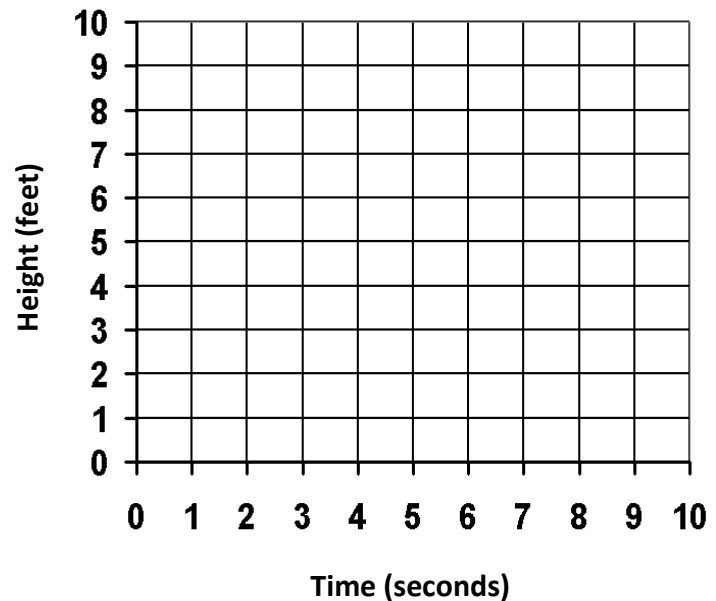
Do Now:

A person is flying a kite in a park. The height of the kite as the string is let out can be modeled by the equation $y = 0.5x + 4$ where y represents the height of the kite in feet and x represents the number of seconds that passes as the string is let out.



a) Complete the table of values.

Seconds (x)	Height (y)
0	
2	
4	
6	
8	
10	



b) Graph the relationship between height and time.



Let's take a closer look at the linear relationship from the Do Now.

What is the y -intercept? What does it mean in the context of the situation?

What is the slope of the line? What does it mean in the context of the situation?

Calculating and Interpreting a Rate of Change

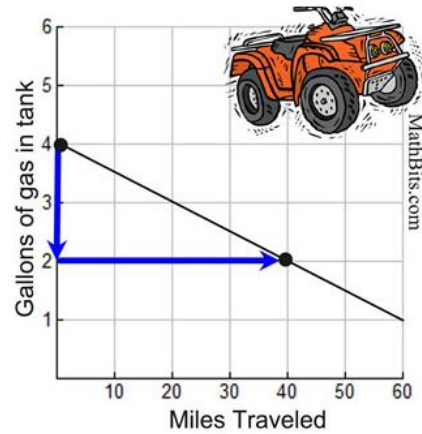
The **rate of change** is a ratio that compares the amount of change in a dependent variable (Δy) to the amount of change in an independent variable (Δx). Linear Relationships show a **constant** rate of change.

$$\frac{\Delta y}{\Delta x} = \frac{\text{vertical change}}{\text{horizontal change}}$$

1) Courtney's ATV had 4 gallons of gasoline in the tank on Monday. After driving a total of 40 miles during the week, she had 2 gallons of gas remaining.

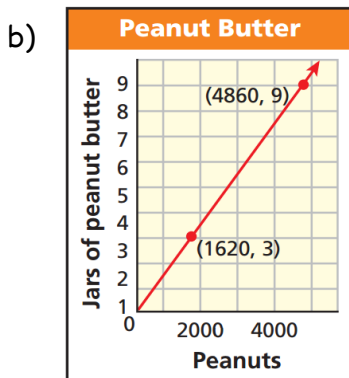
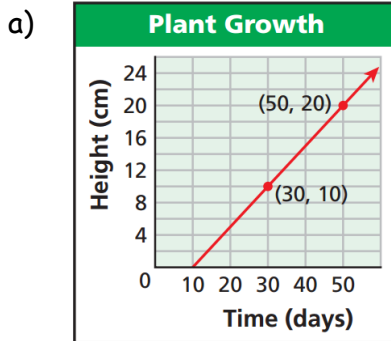
a) Calculate the *rate of change* of the line.

$$\frac{\Delta y}{\Delta x}$$

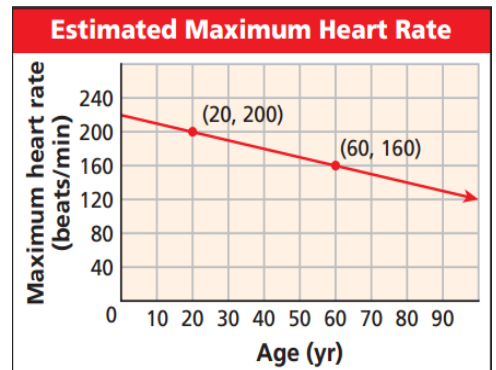


b) What does the rate of change tell us?

2) Calculate the rate of change of each line. What does the ratio tell us?



3) The graph shows a relationship between a person's age and his or her estimated maximum heart rate in beats per minute. Determine the rate of change and explain what the rate of change means in the context of the situation.

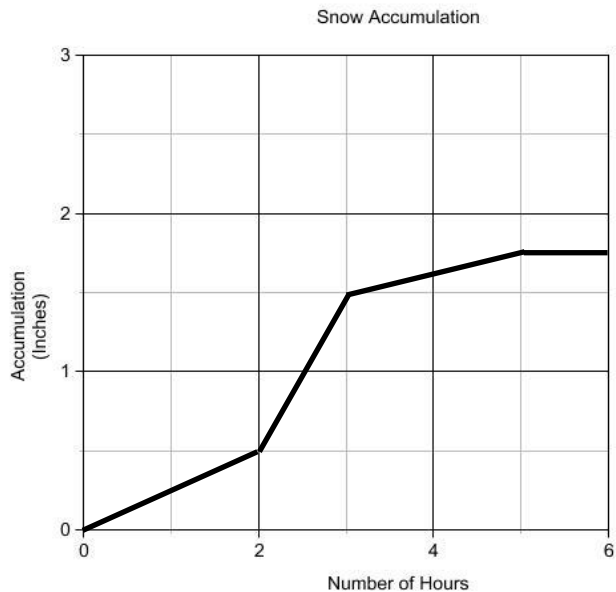


Think about this... *Is the rate of change always constant?*



Not every situation has a constant rate of change. Sometimes we need to calculate the **average** rate of change.

Consider the graph below which shows snow accumulation over a six hour period of time. What is the *average rate of change* of snow accumulation from 0 - 3 hours?



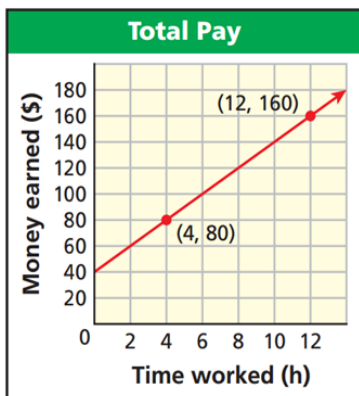
- 4) Within 10 seconds of a dive, a scuba instructor finds himself 30 feet below the surface of the water. After 40 seconds, he reaches a depth 100 feet below the surface of the water. Determine the average rate at which the diver descends.

The **TAKEAWAY**

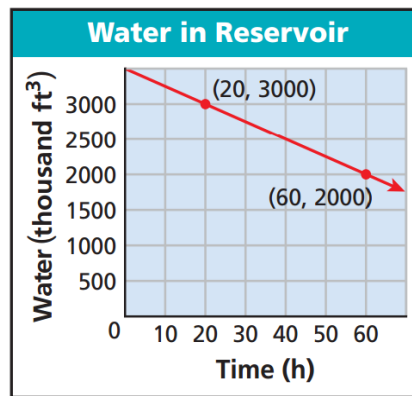
Use _____ to find the rate of change. The graph that displays a constant rate of change is always a picture of a _____. If the graph is not a straight line, we can calculate the _____ rate of change over a specific interval.

For each graph below, calculate the rate of change and explain its meaning.

1)



2)



- 3) Liam, the terrible toddler, was playing with the bathtub faucet when no one was looking. After two minutes, he had filled the tub with 12 gallons of water and after 4 minutes, the tub was filled with 20 gallons of water. Calculate the average rate at which water was entering the bathtub from 2 to 4 minutes.