

Key

Math 1

Name _____

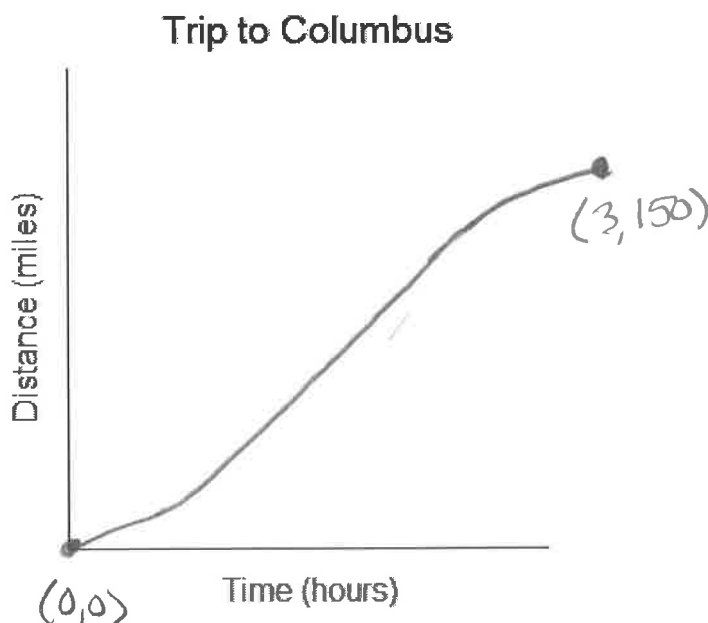
Lesson 1-4 Average Rate of Change 1

Date _____

Learning Goals:

- I can define and calculate the average rate of change of a function and explain the connection between average rate of change and slope.

- Suppose you take a trip to Columbus to see the Bluejackets play the Pittsburgh Penguins. The Bluejackets' arena is about 150 miles from your house and the trip takes 3 hours. Sketch a graph showing the distance from your house over the number of hours driven.



- Describe what your graph tells you about the trip.

Start + end at a lower speed, but quicker on the freeway, hence the steeper middle portion.

The **average rate of change** over an interval is given by $\frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$. You probably know this as **slope**.

- Use the formula above to calculate the average rate of change for your trip to Columbus. Make sure to include units in your answer.

$$\frac{150 - 0}{3 - 0} = \frac{150}{3} = \boxed{50 \text{ miles per hour (mph)}}$$

- Would you expect the rest of your classmates to get the same average rate of change for Number 3 regardless of how their graph looks? Why or why not?

Yes! Everyone traveled the same distance in the same amount of time & everyone started at (0,0).

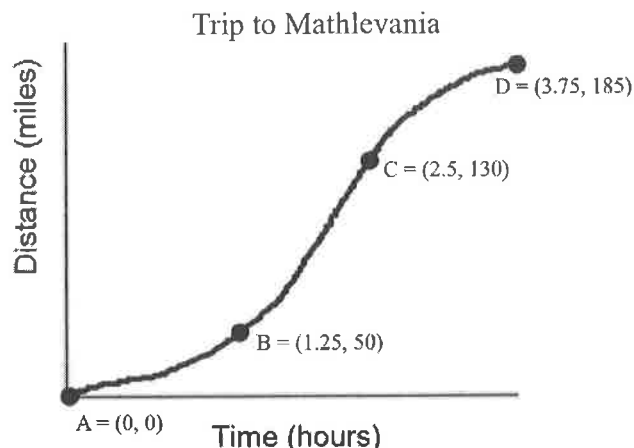
5. The graph below represents a trip from Mayfield High School to everyone's favorite theme park, Mathlevania.

- a. How far from the high school is Mathlevania?
How long did the trip take?

185 miles
3.75 hours

- b. How would you describe the trip?

Started traveling slower,
Sped up until about the 130 mile
mark, slowed down until the end.



- c. Calculate the average rate of change from the start of the trip (point A) to Point B. Include units in your answer.

$$= \frac{50 - 0}{1.25 - 0} = \frac{50}{1.25} = \boxed{40 \text{ miles per hour (mph)}}$$

- d. Calculate the average rate of change from point B to Point C. Include units in your answer.

$$= \frac{130 - 50}{2.5 - 1.25} = \frac{80}{1.25} = \boxed{64 \text{ mph}}$$

- e. Calculate the average rate of change from point C to Point D. Include units in your answer.

$$= \frac{185 - 130}{3.75 - 2.5} = \frac{55}{1.25} = \boxed{44 \text{ mph}}$$

- f. At which interval of your trip were you driving the fastest? How is shown in the graph?
How is this shown in your calculations above?

From B-C. The line is the steepest between those two points. Ave. rate of change (AROC) is highest between those points.

- g. Calculate the average rate of change from the start of the trip (point A) to the end. Include units in your answer. Compare this answer to your calculations from Parts c-e to explain why we call this the average rate of change.

$$\frac{185 - 0}{3.75 - 0} = \boxed{49.3 \text{ mph}} \quad \frac{40 + 64 + 44}{3} = 49.3$$

Average of the 3 rates of changes is our AROC for the entire graph.