$$\frac{f(b)-f(a)}{b-a}$$

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Algebra II

Average Rate of Change with Context

"On average, from a to b, the y topic is increasing/decreasing by AROC y units per x unit"

1. The distance needed to stop a car after applying the brakes varies directly with the square of the car's speed. The table below shows stopping distances for various speeds.
Determine the average rate of change in braking distance, in ft/mph, between one car traveling at 50 mph and one traveling at 70 mph. Explain what this rate of change means as it relates to braking distance.

Speed (mph)	10	20	30	40	50	60	70
Distance (ft)	6.25	25	56.25	100	156.25	225	306.25

x	y
50	156.25
70	306.25

$$\frac{306.25-156.25}{70-50}=7.5$$

On average, from 50mph to 70mph, the braking distance increases by 7.5 ft per mph.

2. The average monthly high temperature in Buffalo, in degrees Fahrenheit, can be modeled by the function $B(t) = 25.29\sin(0.4895t - 1.9752) + 55.2877$, where t is the month number (January = 1). State, to the *nearest tenth*, the average monthly rate of temperature change between August and November. Explain its meaning in the given context. → type into Y=

8 11

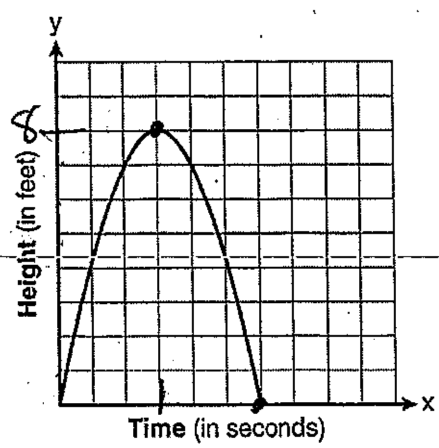
x	y
8	78.866
11	48.598

$$\frac{48.598-78.866}{11-8}$$

-10.1

On average, from August to November, the average monthly high temperature in Buffalo decreases by 10.1 °F per month.

3. The graph below represents the parabolic path of a ball kicked by a young child. Find the average rate of change from 3 to 6 seconds. Explain its meaning in the context of the problem.



x	y
3	8
6	0

$$\frac{0-8}{6-3}=-\frac{8}{3}$$

On average, from 3 seconds to 6 seconds, the height of the ball decreased by $\frac{8}{3}$ ft per second.

Type into Y=

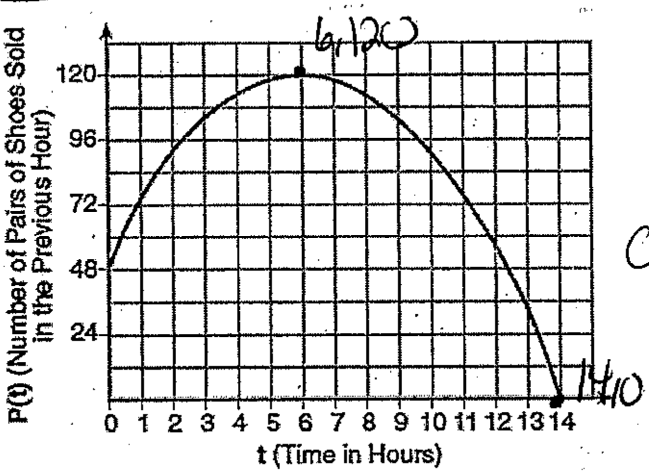
4. The population, $P(t)$, of a town increased according to the function $P(t) = 12,000(1.03)^t$, where t is the number of years since 2000. Find the average rate of change from $t = 10$ to $t = 20$ rounding to the nearest integer. Explain its meaning in the context of the problem.

x	y
10	16127
20	21673

$$\frac{21673-16127}{20-10} \quad \frac{2773}{5} = 555$$

On average, from 2010 to 2020, the population of a town increased by 555 people per year.

5. A manager wanted to analyze the online shoe sales for his business. He created a graph to model the data, as shown below. Determine the average rate of change between the sixth and fourteenth hours, and explain what it means in the context of the problem.



x	y
6	120
14	0

$$\frac{0-120}{14-6} = -15$$

On average, from hour 6 to hour 14, the number of pairs of shoes sold decreased by 15 pairs per hour.

6. The table below shows the number of hours of daylight on the first day of each month in Rochester, NY. Given the data, what is the average rate of change in hours of daylight per month from January 1st to April 1st? Interpret what this means in the context of the problem.

	Month	Hours of Daylight
1	Jan.	9.4
2	Feb.	10.6
3	March	11.9
4	April	13.9
	May	14.7
	June	15.4
	July	15.1
	Aug.	13.9
	Sept.	12.5
	Oct.	11.1
	Nov.	9.7
	Dec.	9.0

x	y
1	9.4
4	13.9

$$\frac{13.9-9.4}{4-1} = 1.5$$

On average, from Jan 1 to April 1, the number of hours of daylight increases by 1.5 hours per month.