

Math II
Average Rate of Change

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

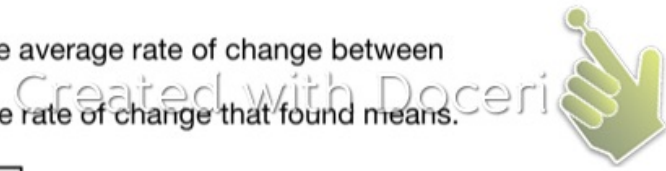
1. Look at the graph of $f(x) = x^2 + 1$. What is the average rate of change between $[-1, 3]$? Draw a line between the two points and explain what the rate of change that found means.

The graph shows a parabola opening upwards with its vertex at (0, 1). A purple secant line connects the points $(-1, 2)$ and $(3, 10)$. The point $(-1, 2)$ is labeled with x_1, y_1 and the point $(3, 10)$ is labeled with x_2, y_2 .

$$\frac{10 - 2}{3 - (-1)} = \frac{8}{4} = \boxed{2}$$

2. Look at the graph of $f(x) = -(x+3)^2 + 4$. What is the average rate of change between $[-5, -3]$? Draw a line between the two points and explain what the rate of change that found means.


			$(-3, 4)$				



2. Look at the graph of $f(x) = -(x+3)^2 + 4$. What is the average rate of change between $[-5, -3]$?
Draw a line between the two points and explain what the rate of change that found means.

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

$$\frac{4 - 0}{-3 - (-5)} = \frac{4}{2} = 2$$

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3. Look at the table below. What is the average rate of change between $[-1, 3]$?

x	y
-2	-22
-1 x_2	-11 y_2
0	-6
3 x_1	-27 y_1

$$\frac{-11 + (+27)}{-1 - 3} = \frac{16}{-4} = \boxed{-4}$$

4. Look at the table below. What is the average rate of change between $[-4, 4]$?

x	y
-4 x_1	16 y_1
-2	4
0	0
4 x_2	16 y_2


$$\frac{16 - 16}{4 - (-4)} = \frac{0}{8} = \boxed{0}$$

For the following functions, is the average rate of change greater between $x = -2$ and $x = 0$ or between $x = 0$ and $x = 2$?

5. $f(x) = \frac{1}{2}(x+2)^2 + 3$

6. $g(x) = -x^2 + 8x + 3$

7. $h(x) = 5x^2 - 6x + 4$

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For the following functions, is the average rate of change greater between $x = -2$ and $x = 0$ or between $x = 0$ and $x = 2$?

5. $f(x) = \frac{1}{2}(x+2)^2 + 3$

$(-2, 3)$ $(0, 5)$
 x_1, y_1 x_2, y_2

$$\frac{5-3}{0-(-2)} = \frac{2}{2} = \boxed{1}$$

$(0, 5)$ $(2, 11)$
 x_1, y_1 x_2, y_2

$$\frac{11-5}{2-0} = \frac{6}{2} = \boxed{3}$$

G.R.O.C.

6. $g(x) = -x^2 + 8x + 3$

$(-2, -17)$ $(0, 3)$
 x_1, y_1 x_2, y_2

$$\frac{3-(-17)}{0-(-2)} = \frac{20}{2} = \boxed{10}$$

$(0, 3)$ $(2, 15)$
 x_1, y_1 x_2, y_2

$$\frac{15-3}{2-0} = \frac{12}{2} = \boxed{6}$$

G.R.O.C.

7. $h(x) = 5x^2 - 6x + 4$

$(-2, 36)$ $(0, 4)$

$$\frac{4-36}{0-(-2)} = \frac{-32}{2} = \boxed{-16}$$

$(0, 4)$ $(2, 12)$

$$\frac{12-4}{2-0} = \frac{8}{2} = \boxed{4}$$

G.R.O.C.

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Math II Average Rate of Change

8. A drop of rain falls from a height of 1,400 feet above the ground. The function $h(t) = -16t^2 + 1400$ is used to model the raindrop's height, $h(t)$, in feet t seconds after it starts to fall. What is the raindrop's average rate of change 2 to 3 seconds after it falls? USE CORRECT UNITS

$-16(2)^2 + 1400$ $-16(3)^2 + 1400$
 $(2, 1336)$ $(3, 1256)$


$$\frac{1256 - 1336}{3 - 2} = \frac{-80}{1} = -80 \text{ ft per sec.}$$

9. The table below gives the velocity of a skydiver t seconds into free fall.

Time in seconds	0	10	20	30	40	50	60
Velocity in fps	0	147	171	175	175.8	176	176

A. Find the average rate of change of velocity for each ten second interval.

B. During which interval was the average

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9 The table below gives the velocity of a skydiver t seconds into free fall.

Time in seconds	0	10	20	30	40	50	60
Velocity in fps	0	147	171	175	175.8	176	176

x

y


A. Find the average rate of change of velocity for each ten second interval.

B. During which interval was the average rate of change the highest? **0:10**

C. Use the average rate of change from 10 seconds to 20 seconds to approximate the skydiver's velocity 15 seconds into free fall. **≈ 160 fps**

D. Use the average rate of change from 0 seconds to 10 seconds to approximate the skydiver's velocity 8 seconds into free fall. **≈ 117.6 fps**

Interval	R.O.C.
0:10	14.7
10:20	2.4
20:30	.4
30:40	.08
40:50	.02
50:60	0

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