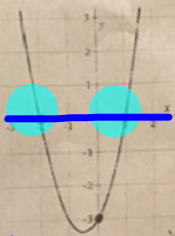


Average Rate of Change

The average of slopes over a given interval. To calculate, you need **2 points** (2 x's and their corresponding y's)

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

$f(x_1)$ = The first y-value you get when you use your first x-value using a graph, table, or equation
 $f(x_2)$ = The second y-value you get when you use your second x-value using a graph, table, or equation



Example 1: Calculate the average rate of change using the interval $-2 < x < 0$
 (-2, 0) $\frac{0 - (-3)}{-2 - 0} = \frac{3}{-2} = -\frac{3}{2}$ or -1.5
 (0, -3)

Example 2: Calculate the average rate of change using the interval $0 < x < 1$
 (0, -3) $\frac{-3 - 0}{0 - 1} = \frac{-3}{-1} = 3$
 (1, 0)

Example 3: Calculate the average rate of change using the interval $-2 < x < 1$
 (-2, 0) (1, 0) $\frac{0 - 0}{1 - (-2)} = \frac{0}{3} = 0$

HOY

$y = 2x^2 - 5x + 4$

Example 4: Calculate the average rate of change using the interval $-2 < x < 0$
 (-2, 22) (0, 4) $\frac{4 - 22}{0 - (-2)} = \frac{-18}{2} = -9$
 $y = 2(-2)^2 - 5(-2) + 4 = 22$ $y = 2(0)^2 - 5(0) + 4 = 4$

Example 5: Calculate the average rate of change using the interval $1 < x < 4$
 (1, 1) (4, 16) $\frac{16 - 1}{4 - 1} = \frac{15}{3} = 5$
 $y = 2(1)^2 - 5(1) + 4 = 1$ $y = 2(4)^2 - 5(4) + 4 = 16$

$y = -\frac{1}{2}(x-4)^2 + 3$

Example 6: Calculate the average rate of change using the interval $-2 < x < 0$
 (-2, -15) (0, -5) $\frac{-5 - (-15)}{0 - (-2)} = \frac{10}{2} = 5$
 $y = -\frac{1}{2}(-2-4)^2 + 3 = -15$ $y = -\frac{1}{2}(0-4)^2 + 3 = -5$

Example 7: Calculate the average rate of change using the interval $-8 < x < 4$
 (-8, -69) (4, 3) $\frac{3 - (-69)}{4 - (-8)} = \frac{72}{12} = 6$
 $y = -\frac{1}{2}(-8-4)^2 + 3 = -69$ $y = -\frac{1}{2}(4-4)^2 + 3 = 3$