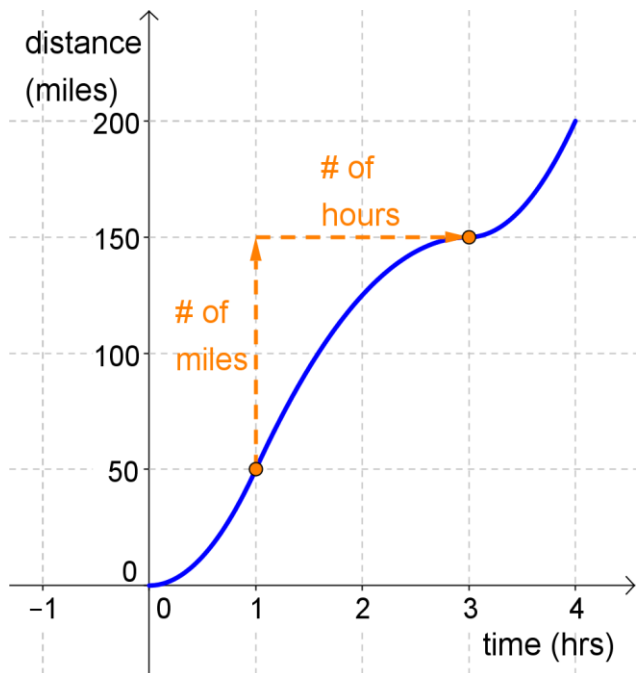# Average Rate of Change
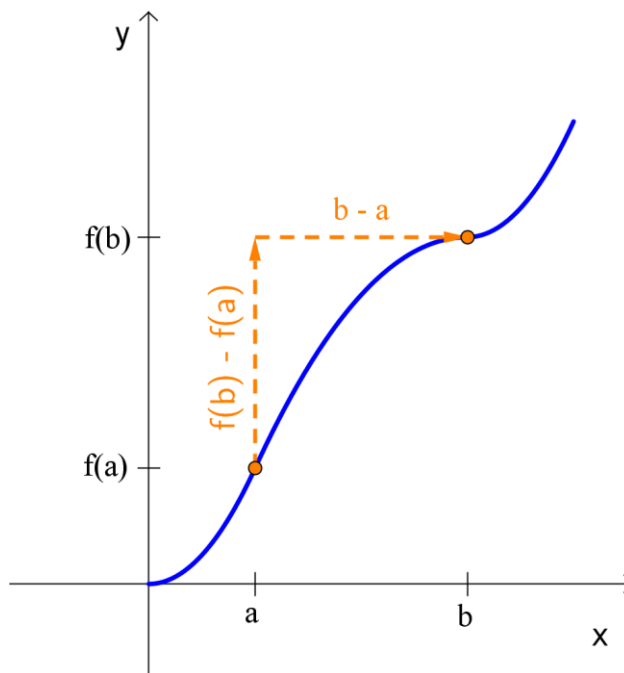
(covers part of Sullivan 2.3)

If you drive 100 miles in 2 hours, what's your average speed? _____

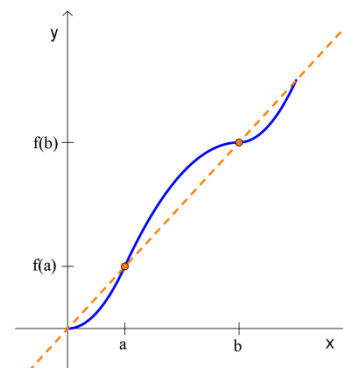**Average speed**   **Average rate of change**

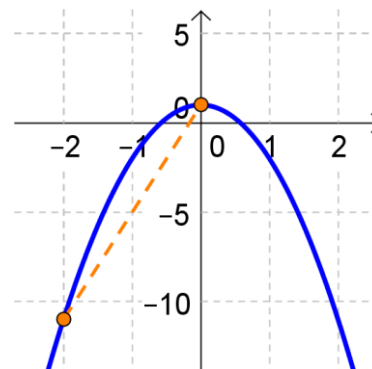The **average rate of change** of the function $y = f(x)$ between $x = a$ and $x = b$ is

$$\text{average rate of change } = \frac{\Delta y}{\Delta x} = \frac{\text{change in } y}{\text{change in } x} = \frac{f(b) - f(a)}{b - a}$$

Note: The average rate of change is also the slope of the secant line.

Ex 1.

Find the average rate of change of $f(x) = 1 - 3x^2$ between $x = -2$ and $x = 0$.

Ex 2.

Here are the U.N.'s 2012 medium projections of the world's population.

What is the average rate of change of population between 2010 and 2030?

Year	World Population (in millions)
2010	6,916
2020	7,717
2030	8,425
2040	9,039
2050	9,551
2060	9,957

What is the average rate of change of population between 2030 and 2050?

Note: Linear functions have a constant rate of change. This makes sense because the slope of any secant line (that is, the average rate of change) will be the slope of the linear function. For example, the rate of change of $f(x) = -2x + 3$ is _____.