

# Average Rate of Change & Secant Line

$$\text{Average Rate of Change} = \frac{f(x_2) - f(x_1)}{x_2 - x_1} = \frac{f(x_1) - f(x_2)}{x_1 - x_2}$$

Average Rate of Change is a single number indicating a rough amount computed for some measurable entity that changes or varies with time.

A **Secant Line**, also simply called a secant, is a line passing through two points of a curve.

Therefore **slope of a secant line** is the same as the Average Rate of Change.

Equation for Secant Line, if **A** indicates Average Rate of Change

while **f(x)** indicates horizontal axis value for secant line

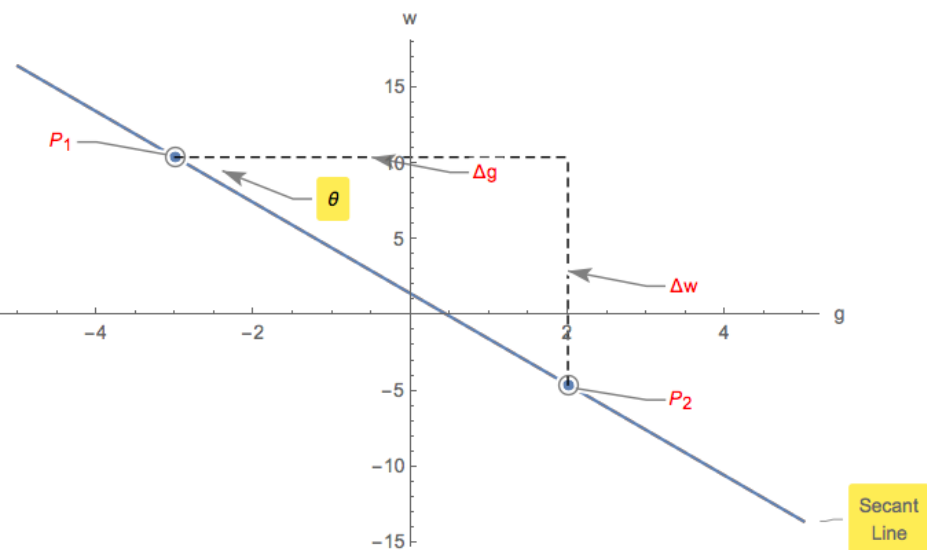
computes as follows:

$$A = \frac{f(x) - f(x_1)}{x - x_1} \Rightarrow A(x - x_1) = f(x) - f(x_1) \Rightarrow A(x - x_1) + f(x_1) = f(x)$$

$$f(x) = Ax + (f(x_1) - Ax_1)$$

## Example 1.

$$w = \frac{7}{5} - 3g \text{ average between } -3, 2$$



$$\Delta w = w(2) - w(-3) = \frac{7}{5} - 3(2) - \left( \frac{7}{5} - 3(-3) \right) = -15$$

$$\text{Secant Slope} = \tan(\theta) = \frac{w(2) - w(-3)}{2 - (-3)} = -3$$

$$\text{Average Rate of Change} = A = -3$$

$$\text{Secant Line: } w = -3g + \frac{7}{5}$$

$w$  could be temperature of a cup of tea and  $g$  time.

$w$  could be speed of a car and  $g$  time.

$w$  could be gasoline amount and  $g$  distance traveled.