Average Rate of Change & Secant Line

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 measurablte 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.

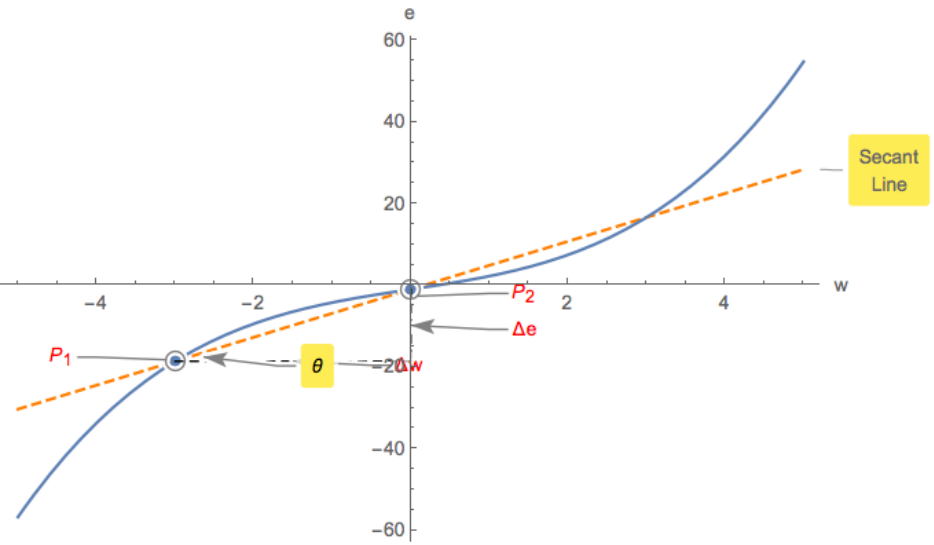
Equation for Secant Line, if **A** indicates Average Rate of Change while **f**(x) indicates horizontal axis value for secant line computes as follows:

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

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

Example 1.

$e = \frac{33\,w^3}{100} + \frac{29\,w}{10} - 1$ average between -3, 0



$$\Delta e = e(0) - e(-3) = \frac{33\,(0)^3}{100} + \frac{29\,(0)}{10} - 1 - \left(\frac{33\,(-3)^3}{100} + \frac{29\,(-3)}{10} - 1\right) = \frac{1761}{100}$$

Secant Slope $= \text{Tan}(\theta) = \frac{e(0)-e(-3)}{0-(-3)} = \frac{587}{100}$

Average Rate of Change $= A = \frac{587}{100}$

Secant Line: $e = \frac{587}{100} w + (-1)$

e could be temperature of a cup of tea and w time.
e could be speed of a car and w time.
e could be gasoline amount and w distance traveled.