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.

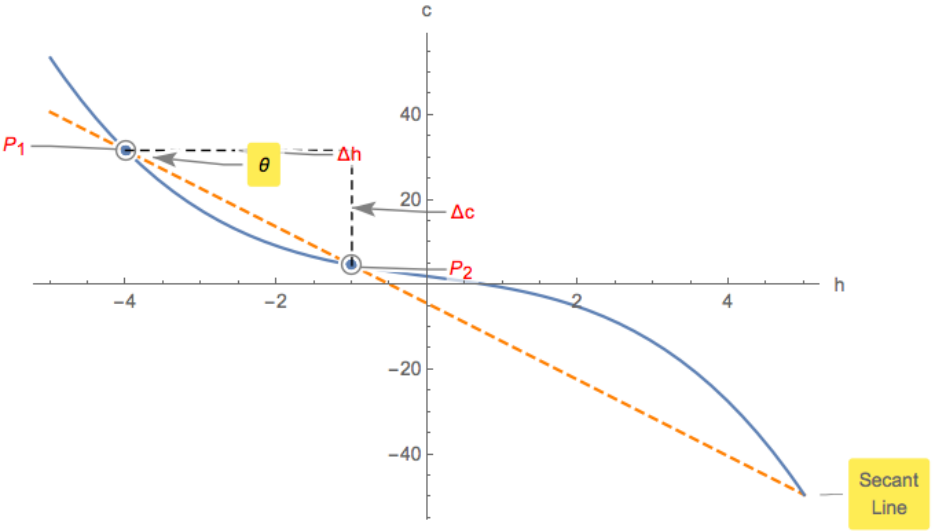
Equation for Secant Line, if **A** indicates Average Rate of Change while **f**(x) indicates horizontal axis value for secant line computes as follows:

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

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

Example 1.

$c = -\frac{8h^3}{25} - \frac{23h}{10} + 2$ average between -4, -1



$$\Delta c = c(-1) - c(-4) = -\frac{8}{25}(-1)^3 - \frac{23(-1)}{10} + 2 - \left(-\frac{8}{25}(-4)^3 - \frac{23(-4)}{10} + 2\right) = -\frac{1353}{50}$$

Secant Slope $= \text{Tan}(\theta) = \frac{c(-1)-c(-4)}{(-1)-(-4)} = -\frac{451}{50}$

Average Rate of Change $= A = -\frac{451}{50}$

Secant Line: $c = -\frac{451}{50}h + \left(-\frac{22}{5}\right)$

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