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.

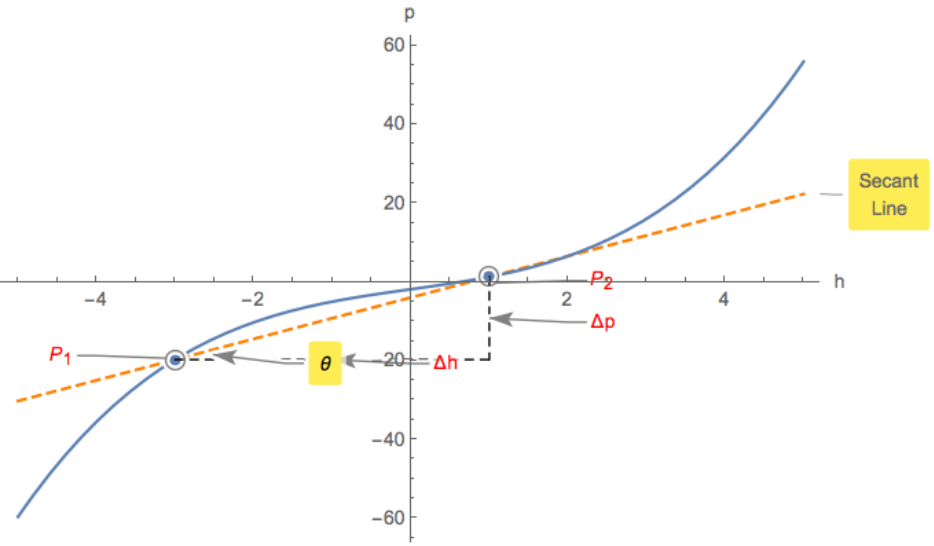
Equation for Secant Line, if **A** indicates Average Rate of Change while **f**(x) indicates horizontal axis value for secant line computes as follows:

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

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

Example 1.

$p = \frac{7h^3}{20} + \frac{14h}{5} - \frac{19}{10}$ average between -3, 1



$$\Delta p = p(1) - p(-3) = \frac{7(1)^3}{20} + \frac{14(1)}{5} - \frac{19}{10} - \left(\frac{7(-3)^3}{20} + \frac{14(-3)}{5} - \frac{19}{10}\right) = 21$$

Secant Slope $= \text{Tan}(\theta) = \frac{p(1)-p(-3)}{1-(-3)} = \frac{21}{4}$

Average Rate of Change $= A = \frac{21}{4}$

Secant Line: $p = \frac{21}{4}h + (-4)$

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