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.

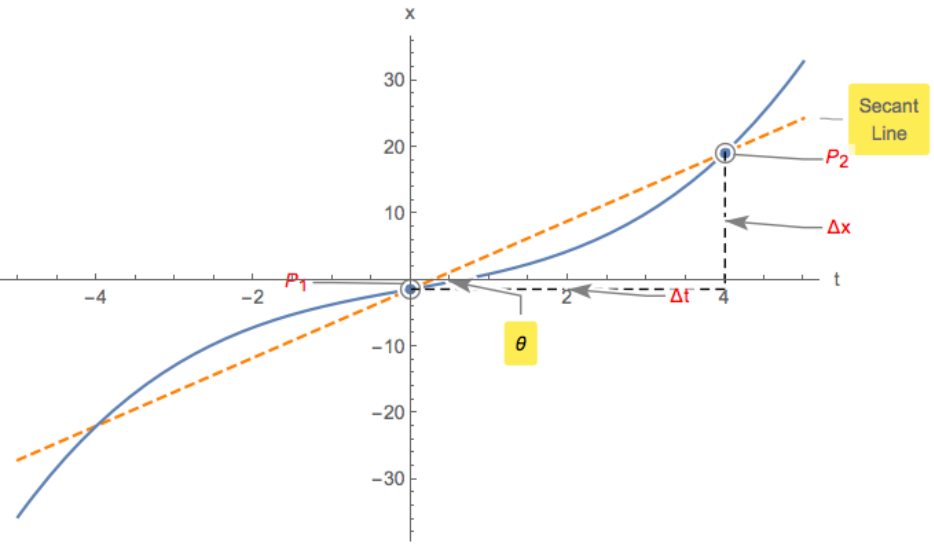
Equation for Secant Line, if **A** indicates Average Rate of Change while **f**(x) indicates horizontal axis value for secant line computes as follows:

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

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

Example 1.

$x = \frac{19\,t^3}{100} + \frac{21\,t}{10} - \frac{7}{5}$ average between 0, 4



$\Delta x = x(4) - x(0) = \frac{19\,(4)^3}{100} + \frac{21\,(4)}{10} - \frac{7}{5} - \left(\frac{19\,(0)^3}{100} + \frac{21\,(0)}{10} - \frac{7}{5}\right) = \frac{514}{25}$

Secant Slope $= \text{Tan}(\theta) = \frac{x(4)-x(0)}{4-0} = \frac{257}{50}$

Average Rate of Change $= A = \frac{257}{50}$

Secant Line: $x = \frac{257}{50}t + \left(-\frac{7}{5}\right)$

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