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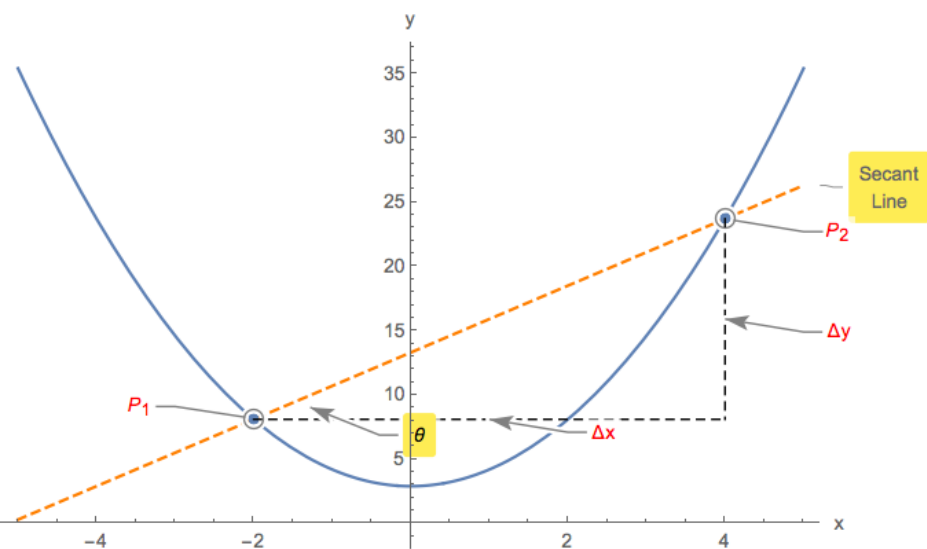
$A = \frac{f(x) - f(x_1)}{x - x_1} \Longrightarrow A(x - x_1) = f(x) - f(x_1) \Longrightarrow A(x - x_1) + f(x_1) = f(x)$

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

Example 1.

$y = \frac{13\,x^2}{10} + \frac{29}{10}$ average between -2, 4

$\Delta y = y(4) - y(-2) = \frac{13\,(4)^2}{10} + \frac{29}{10} - \left(\frac{13\,(-2)^2}{10} + \frac{29}{10} \right) = \frac{78}{5}$

Secant Slope $= Tan(\theta) = \frac{y(4) - y(-2)}{4 - (-2)} = \frac{13}{5}$

Average Rate of Change $= A = \frac{13}{5}$

Secant Line: $y = \frac{13}{5} x + \frac{133}{10}$

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