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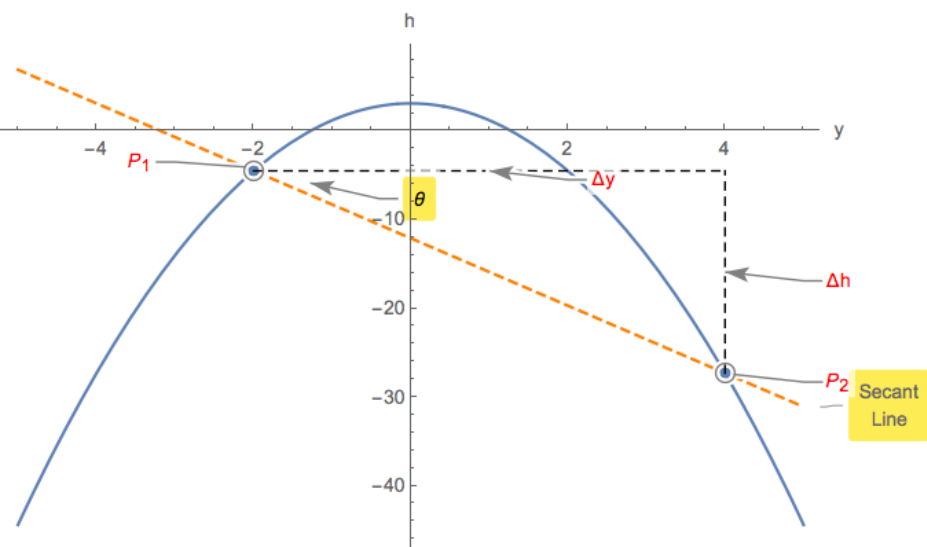
$A = \frac{f(x) - f(x_1)}{x - x_1} \Longrightarrow A(x - x_1) = f(x) - f(x_1) \Longrightarrow A(x - x_1) + f(x_1) = f(x)$

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

**Example 1.**

$h = \frac{31}{10} - \frac{19 \, y^2}{10}$ average between $-2$, $4$



$\Delta h = h(4) - h(-2) = \frac{31}{10} - \frac{19 \, (4)^2}{10} - \left( \frac{31}{10} - \frac{19 \, (-2)^2}{10} \right) = -\frac{114}{5}$

**Secant Slope** $= \text{Tan}(\theta) = \frac{h(4) - h(-2)}{4 - (-2)} = -\frac{19}{5}$

**Average Rate of Change** $= A = -\frac{19}{5}$

**Secant Line**: $h = -\frac{19}{5} \, y + \left( -\frac{121}{10} \right)$

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