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.

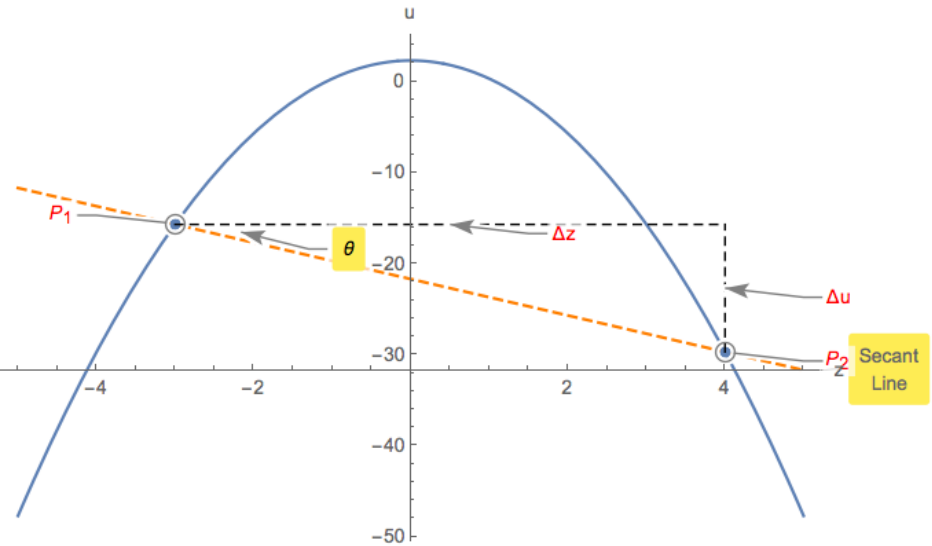
Equation for Secant Line, if **A** indicates Average Rate of Change while **f**(x) indicates horizontal axis value for secant line computes as follows:

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

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

Example 1.

$u = \frac{23}{10} - 2z^2$ average between -3, 4



$$\Delta u = u(4) - u(-3) = \frac{23}{10} - 2(4)^2 - \left(\frac{23}{10} - 2(-3)^2\right) = -14$$

Secant Slope $= \text{Tan}(\theta) = \frac{u(4)-u(-3)}{4-(-3)} = -2$

Average Rate of Change $= A = -2$

Secant Line: $u = -2z + \left(-\frac{217}{10}\right)$

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