

Average Rate of Change & Secant Line

$$\text{Average Rate of Change} = \frac{f(x_2) - f(x_1)}{x_2 - x_1} = \frac{f(x_1) - f(x_2)}{x_1 - x_2}$$

Average Rate of Change is a single number indicating a rough amount computed for some measurable 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.

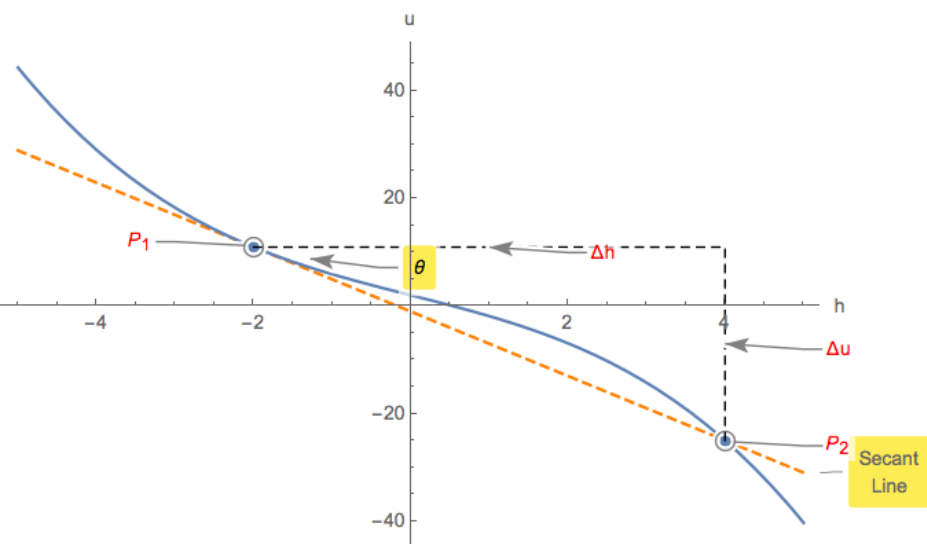
Equation for Secant Line, if **A** indicates Average Rate of Change while **f(x)** indicates horizontal axis value for secant line computes as follows:

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

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

Example 1.

$$u = -\frac{19h^3}{100} - \frac{37h}{10} + 2 \text{ average between } -2, 4$$



$$\Delta u = u(4) - u(-2) = -\frac{19(4)^3}{100} - \frac{37(4)}{10} + 2 - \left(-\frac{19(-2)^3}{100} - \frac{37(-2)}{10} + 2\right) = -\frac{897}{25}$$

$$\text{Secant Slope} = \tan(\theta) = \frac{u(4) - u(-2)}{4 - (-2)} = -\frac{299}{50}$$

$$\text{Average Rate of Change} = A = -\frac{299}{50}$$

$$\text{Secant Line: } u = -\frac{299}{50}h + \left(-\frac{26}{25}\right)$$

u could be temperature of a cup of tea and h time.

u could be speed of a car and h time.

u could be gasoline amount and h distance traveled.