

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

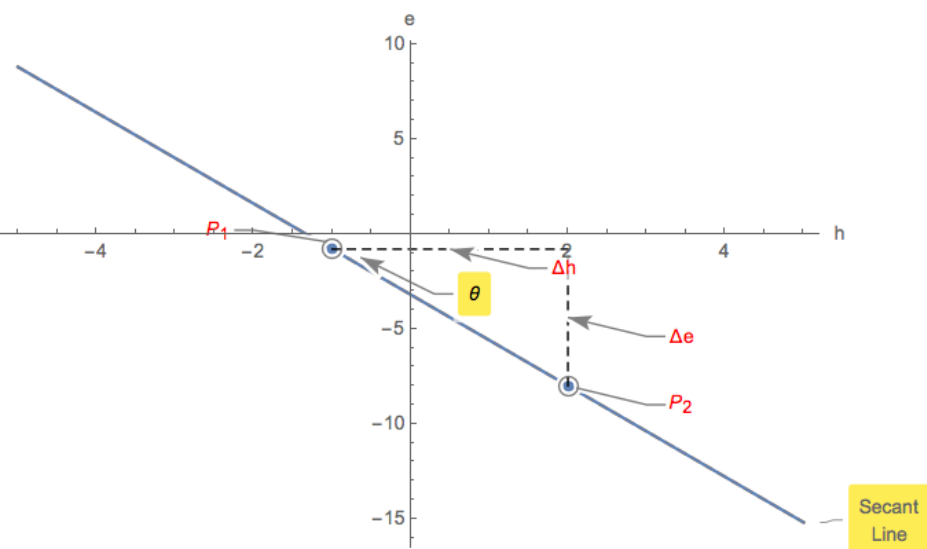
computes as follows:

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

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

Example 1.

$$e = -\frac{12}{5}h - \frac{16}{5} \text{ average between } -1, 2$$



$$\Delta e = e(2) - e(-1) = -\frac{12}{5}(2) - \frac{16}{5} - \left(-\frac{12}{5}(-1) - \frac{16}{5}\right) = -\frac{36}{5}$$

$$\text{Secant Slope} = \tan(\theta) = \frac{e(2) - e(-1)}{2 - (-1)} = -\frac{12}{5}$$

$$\text{Average Rate of Change} = A = -\frac{12}{5}$$

$$\text{Secant Line: } e = -\frac{12}{5}h + \left(-\frac{16}{5}\right)$$

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

e could be speed of a car and h time.

e could be gasoline amount and h distance traveled.