

# 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

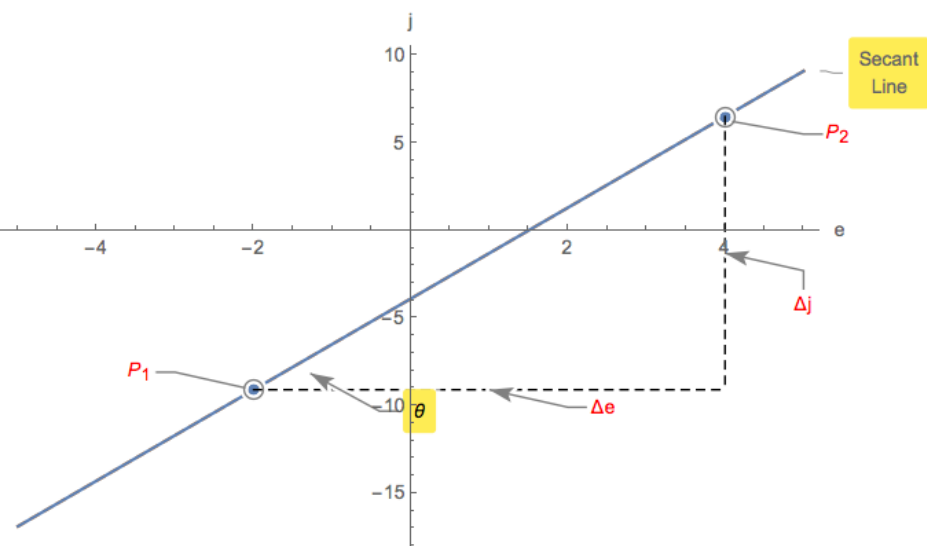
computes as follows:

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

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

## Example 1.

$$j = \frac{13}{5}e - \frac{39}{10} \text{ average between } -2, 4$$



$$\Delta j = j(4) - j(-2) = \frac{13}{5}(4) - \frac{39}{10} - \left( \frac{13}{5}(-2) - \frac{39}{10} \right) = \frac{78}{5}$$

$$\text{Secant Slope} = \tan(\theta) = \frac{j(4) - j(-2)}{4 - (-2)} = \frac{13}{5}$$

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

$$\text{Secant Line: } j = \frac{13}{5}e + \left(-\frac{39}{10}\right)$$

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

j could be speed of a car and e time.

j could be gasoline amount and e distance traveled.