

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

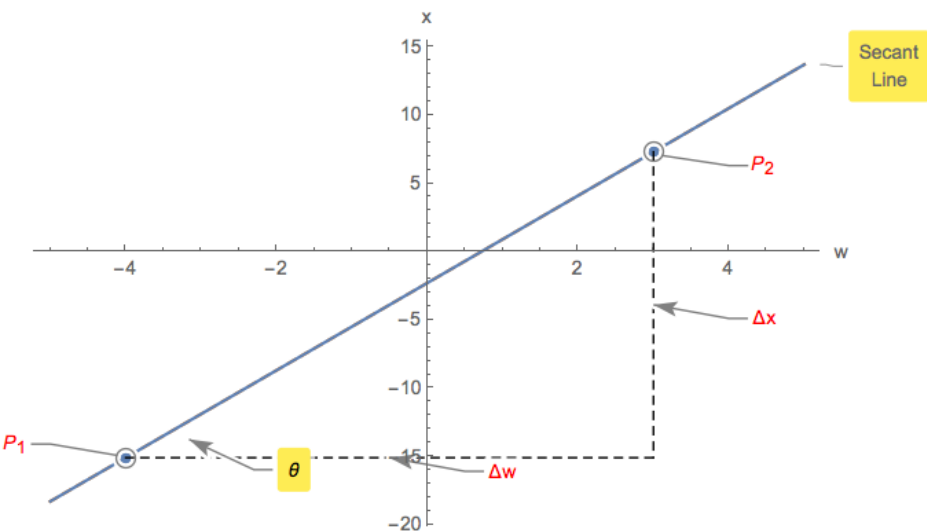
while **f(x)** indicates horizontal axis value for secant line computes as follows:

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

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

Example 1.

$$x = \frac{16w}{5} - \frac{23}{10} \text{ average between } -4, 3$$



$$\Delta x = x(3) - x(-4) = \frac{16(3)}{5} - \frac{23}{10} - \left(\frac{16(-4)}{5} - \frac{23}{10} \right) = \frac{112}{5}$$

$$\text{Secant Slope} = \tan(\theta) = \frac{x(3) - x(-4)}{3 - (-4)} = \frac{16}{5}$$

$$\text{Average Rate of Change} = A = \frac{16}{5}$$

$$\text{Secant Line: } x = \frac{16}{5}w + \left(-\frac{23}{10}\right)$$

x could be temperature of a cup of tea and w time.

x could be speed of a car and w time.

x could be gasoline amount and w distance traveled.