

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

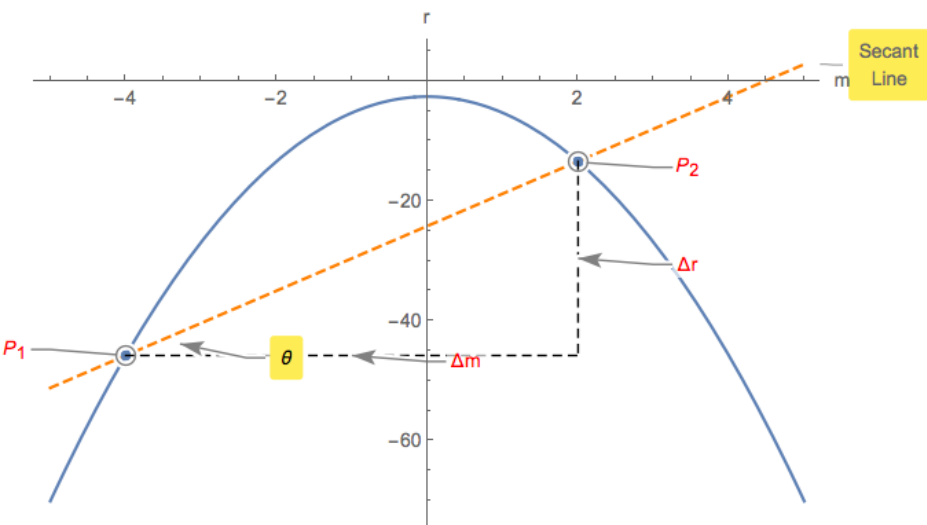
computes as follows:

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

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

Example 1.

$$r = -\frac{27m^2}{10} - \frac{13}{5} \text{ average between } -4, 2$$



$$\Delta r = r(2) - r(-4) = -\frac{27(2)^2}{10} - \frac{13}{5} - \left(-\frac{27}{10}(-4)^2 - \frac{13}{5}\right) = \frac{162}{5}$$

$$\text{Secant Slope} = \tan(\theta) = \frac{r(2) - r(-4)}{2 - (-4)} = \frac{27}{5}$$

$$\text{Average Rate of Change} = A = \frac{27}{5}$$

$$\text{Secant Line: } r = \frac{27}{5}m + \left(-\frac{121}{5}\right)$$

r could be temperature of a cup of tea and m time.

r could be speed of a car and m time.

r could be gasoline amount and m distance traveled.