

Average Rate of Change Formulas

There are two commonly used formulas to calculate the average rate of change, and they are essentially the same concept expressed in slightly different forms.

Formula 1:

$$\delta y = \frac{y_2 - y_1}{x_2 - x_1}$$

This formula is often used when you have two specific points (x_1, y_1) and (x_2, y_2) on a graph and you want to find the average rate of change between two points.

Example:

1. Identify

$$x_1 = 1$$

$$y_1 = 2$$

$$x_2 = 3$$

$$y_2 = 4$$

2. Plug these into the formula.

$$\delta y = \frac{4 - 2}{3 - 1} = \frac{2}{2} = 1$$

The average rate of change between points A and B is 1.

Formula 2:

$$\frac{f(b) - f(a)}{b - a}$$

This formula is used when you have a function $f(x)$ and you want to find the average rate of change over the interval $[a, b]$.

Example:

1. Identify $a = 1, b = 3$

2. Find $f(a) = f(1) = 1^2 = 1$ and $f(3) = 3^2 = 9$

3. plug these into the formula.

$$\frac{9 - 1}{3 - 1} = \frac{8}{2} = 4$$

The Average rate of change of $f(x) = x^2$ from $x = 1$ to $x = 3$ is 4.

Which Formula to Use?

1. Use the first formula when you have two specific points and you don't have a function that describes the relationship between x and y .
2. Use the second formula when you have a function $f(x)$ and you want to find the average rate of change over a specific interval $[a, b]$.

Both formulas essentially serve the same purpose but are used in different contexts. The choice between them depends on the information you have at hand.