

Arithmetic Mean or just Mean

⇒ For a **raw data**

Formula:

For a population:	For a sample:
$\mu = \frac{\sum_1^n x_i}{n} = \frac{(x_1 + x_2 + \dots + x_n)}{n}$	$\bar{X} = \frac{\sum_1^n x_i}{n} = \frac{(x_1 + x_2 + \dots + x_n)}{n}$

Example. Calculate the average age of 5 people.

$$X = \{10, 13, 24, 47, 50\}$$

Resolution steps:

1- Sum all the ages and divide by the number of observations (n)

$$\bar{X} = \frac{10 + 13 + 24 + 47 + 50}{5} = \frac{144}{5} = 28,8 \text{ anos}$$

⇒ For a **Tabulated Data**¹

Formula:

For a population:	For a sample:
$\mu = \frac{\sum_1^n x_i f_i}{n} = \frac{(x_1 f_1 + x_2 f_2 + \dots + x_n f_n)}{n}$	$\bar{X} = \frac{\sum_1^n x_i f_i}{n} = \frac{(x_1 f_1 + x_2 f_2 + \dots + x_n f_n)}{n}$

Example. Suppose in the table below it was represented the test grade of a class. Calculate the mean.

X_i	f_i
1	5
2	12
3	8
4	10

¹ Read our article “Tabulated Data” to understand the table information.

Resolution steps:

1- Calculate the number of observations (n)

$$n = \sum f_i = (5+12+8+10) = 35 \quad n=35$$

2- Use the formula to calculate the mean for tabulate data:

$$\bar{X} = \frac{\sum (f_i x_i)}{n} = \frac{[(5 \times 1) + (12 \times 2) + (8 \times 3) + (10 \times 4)]}{35} = \frac{93}{35} = 2,6$$

⇒ For a **Frequency Distribution**²

Formula:

For a population:	For a sample:
$\mu = \frac{\sum_{i=1}^n f_i PM_i}{n} = \frac{(f_1 PM_1 + f_2 PM_2 + \dots + f_n PM_n)}{n}$	$\bar{X} = \frac{\sum_{i=1}^n f_i PM_i}{n} = \frac{(f_1 PM_1 + f_2 PM_2 + \dots + f_n PM_n)}{n}$

Example. Suppose the table below represent the ages of a bus passengers group, calculate the mean age:

Class	f _i
0 — 10	20
10 — 20	30
20 — 30	40
30 — 40	10
	n=100

Resolution steps:

1- Find the mid point (PM) of each class:

$$PM_{Classe1} = \frac{(Lim_{(superior)} + Lim_{(inferior)})}{2} = \frac{10 + 0}{2} = 5$$

Repeat this step for all the classes.

² Read our article “Distribution Frequency” to understand the table information.

2- Multiply the mid point of a class by it absolute frequency. ($f_i \cdot PM$)

Classe	f_i	PM	$f_i \cdot PM$
0 — 10	20	5	(20x5) = 100
10 — 20	30	15	450
20 — 30	40	25	1000
30 — 40	10	35	350
	n=100		$\sum f_i \cdot PM = 1900$

3- Apply the frequency distribution formula to calculate the mean:

$$\bar{X} = \frac{\sum_{i=1}^n f_i PM}{n} = \frac{1900}{100} = 19$$