

Averages

An **averages** of a list of data is the expression of the central value of a set of data. Mathematically, it is defined as the ratio of summation of all the data to the number of units present in the list. For example, the average of 2,3 and 4 is $(2+3+4)/3 = 9/3 = 3$. So here 3 is the central value of 2,3 and 4. It is also termed as mean of the given values in statistics. Learn to calculate average value here.

Definition of Averages

The average is defined as the mean value which is equal to the ratio of sum of number of given set of values to the total number of values present in the set.

The average formula has many applications both in real-life. Suppose if we have to find the average age of men or women in a group or average male height in India, then we calculate it by adding all the values and dividing it by the number of values. Below is the formula to evaluate the average of given set of numbers.

$$\text{Average} = \frac{\text{Sum of Numbers}}{\text{Number of Units}}$$

Average Symbol

The average is basically mean of the values which are represented by \bar{x} . It is also denoted by the symbol ' μ '.

Averages Formula in Maths

The formula to find the average of given numbers or values is very easy. We just have to add all the numbers and then divide the result by the number of values given. It can be expressed as:

Averages = Sum of Values/ Number of values

Suppose, we have given with n number of values such as $x_1, x_2, x_3, \dots, x_n$. The average or the mean of the given data will be equal to:

Averages = $(x_1+x_2+x_3+\dots+x_n)/n$

The Arithmetic mean is the most common type of Average. If n numbers are given, each number denoted by a_i (where $i = 1, 2, \dots, n$), the arithmetic mean is the sum of the a_i as divided by n, then:

$$AM = \frac{1}{n} \sum_{i=1}^n a_i = \frac{1}{n} (a_1 + a_2 + a_3 + \dots + a_n)$$

where,

- n is the number of observation
- i represent index of summation
- and a_i = data value for the given index

How to Calculate Average?

We can easily calculate the average for a given set of values. We just have to add all the values and divide the outcome by the number of given values. Let us understand with an example.

If there are a group of numbers say, 20, 21, 23, 22, 21, 20, 23. Then find the average of these values.

By average formula, we know,

Average = (Sum of values)/No. of values

$$= (20+21+23+22+21+20+23)/7$$

$$= 150/7$$

$$= 21.42$$

Average of Negative Numbers

If there are negative numbers present in the list, then also the process or formula to find out the average is the same. Let's understand this with an example.

Example: Find the average of 3, -7, 6, 12, -2

Solution:- The sum of these numbers

$$= 3 + (-7) + 6 + 12 + (-2)$$

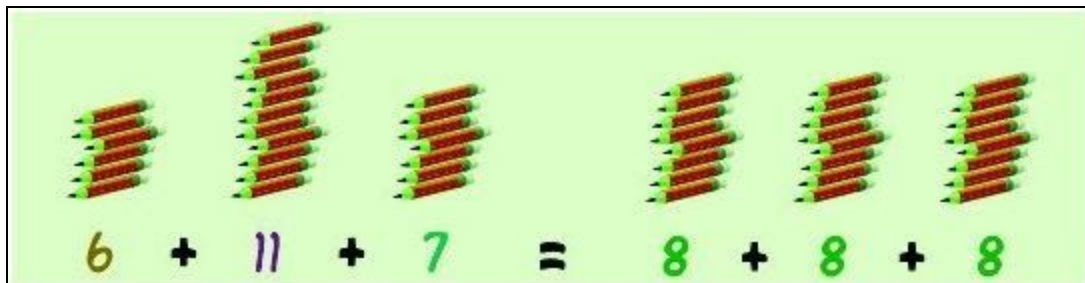
$$= 3 - 7 + 6 + 12 - 2$$

$$= 12$$

$$\text{Total Units} = 5$$

$$\text{Hence, average} = 12/5 = 2.4$$

How does this whole idea of average or mean work? Average helps you to calculate on how to make all the units present in a list equal.



Average Examples

1) Find the average of 2, 4, 6, 8.

Solution:-

Add the numbers = $2 + 4 + 6 + 8 = 20$

Total Units = 4

Hence, average = $20/4 = 5$

2) Find the average of 6, 13, 17, 21, 23

Solution:-

Add the numbers =

= $6 + 13 + 17 + 21 + 23 = 80$

Total units = 5

Hence, average = $80/5 = 16$

3) If the age of 9 students in a team is 12, 13, 11, 12, 13, 12, 11, 12, 12. Then find the average age of students in the team.

Solution: Given, the age of students are 12, 13, 11, 12, 13, 12, 11, 12, 12.

Average = Sum of ages of all the students/Total number of students

$A = (12+13+11+12+13+12+11+12+12)/9$

$A = 108/9$

$A = 12$

Hence, the average age of students in a team is 12 years.

4) If the heights of males in a group are 5.5, 5.3, 5.7, 5.9, 6, 5.10, 5.8, 5.6, 5.4, 6. Then find the average height.

Solution:

Given the height of males: 5.5, 5.3, 5.7, 5.9, 6, 5.10, 5.8, 5.6, 5.4 and 6

Average = Sum of heights of males/total number of males

$$A = (5.5+5.3+5.7+5.9+6+5.10+5.8+5.6+5.4+6)/10$$

$$A = 56.3/10$$

$$A = 5.63$$

Averages Questions with Answers

Q.1. Find the average of numbers 87, 84, 86, 90, 82, 88, 78.

A. 85

B. 84

C. 83

D. 82

Answer & Explanation

Sol : Option A

The sum of all the observations here is $87 + 84 + 86 + 90 + 82 + 88 + 78 = 595$

Number of observations = 7

So, Average = $595/7 = 85$

Q.2. The average of 4 terms is 20 and the 1st term is $\frac{1}{3}$ of the remaining terms. What will be the first number?

- A. 30
- B. 20
- C. 60
- D. 80

Answer & Explanation

Sol : Option B

Average of 4 terms = 20

Hence, the total sum of 4 terms = 80

Let terms be A,B,C,D

So, the sum will be $A+B+C+D = 80$

Given, $3A = B+C+D$

So, $4A = 80$,

$A = 20$

Q.3. The average age of A, B and C was 25 years and that of B and C was 25 years. A's present age is:

A. 30 years

B. 25 years

C. 40 years

D. 42 years

Answer & Explanation

Sol : Option B

Average of A,B,C is 25

So, sum of their ages =75

Now, the sum of B and C will be 50 (because their average is 25)

So age of A =75 - 50 = 25 years

Q.4. The average of 7 consecutive numbers is n . If the next two numbers are included, the average will

- A. increased by 2
- B. remains the same
- C. increased by 1
- D. increased by 2

Answer & Explanation

Sol : Option C

The average of 7 consecutive numbers is n implies that the 4th term is equal to n .

Now if we include next two terms then the average of 9 terms will be the 5th term. Now as the terms are consecutive, so the 5th term will be $n + 1$.

Q.5. For 9 innings, Boman has an average of 75 runs. In the tenth inning, he scores 100 runs, thus increasing his average . His new average is

- A. Rs. 75
- B. Rs. 100
- C. Rs. 72
- D. Rs. 77.5

Answer & Explanation

Sol : Option D

Total score for 9 innings is $75 \times 9 = 675$

Total score after 10th innings = $675 + 100 = 775$

So, average = $775 / 10 = 77.5$

Q.6. For 9 innings, Roman has an average of 65 runs. In the tenth inning, he scores 200 runs, thus increasing his average . His average increased by

A. 78.5

B. 72

C. 13.5

D. 77.5

Answer & Explanation

Sol : Option C

Total score for 9 innings = $65 \times 9 = 585$

Total score after 10th innings = $585 + 200 = 785$

So, the new average is $785/10 = 78.5$

So, the increment is of 13.5

Q.7. In a family of 8, the men eat on average 72kg of food and women eat on an average 50kg of food. The men and women are equal in number. A hungry woman named Neetu joined the family for dinner and the average consumption became 67. How much did Neetu eat (in kgs)?

- A. Rs. 115
- B. Rs. 80
- C. Rs. 90
- D. Rs. 85

Answer & Explanation Sol : Option A

As men and women are equal so , there are 4 women and 4 men so, total consumption will be $72 \times 4 = 288$ (by men) and $50 \times 4 = 200$ (by women)

Total consumption = 488.

But after including Neetu the average consumption for 9 people is given to be 67. So the total consumption will be $67 \times 9 = 603$. So, Neetu's consumption will be = $603 - 488 = 115$

Q8. In a hotel, the tariff for every odd dates is Rs.1000 and for even dates is Rs. 2000. If the man paid total of 30000 in all. For how many days did he stay in the hotel given that the first day is 5th date of the month?

A. 50

B. 20

C. 40

D. 60

Answer & Explanation Sol : Option B

Total tariff = 30000

So, for odd dates (5th , 7th , and so on) = 1000

And for even dates (6th , 8th and so on) = 2000

So, the average amount of money for 2 days is Rs. 1500.

So, total amount paid = 30000

So , number of days he stayed in the hotel = $30000/1500 = 20$.

Q9. The average of 5 terms is 50. If the first 4 terms are 45, 42, 119, and 84, what will be the last term?

A. 56

B. -20

C. -40

D. -50

Answer & Explanation

Sol : Option C

Sum of all the terms = 250

Sum of first four terms = $45+42+119+84 = 290$

So, the 5th term should be $250 - 290 = -40$.

Q10. If the average number of 8 terms is given to be 40 and the average of first 6 terms is given to be 35. What is the average of the remaining 2 terms?

A. 30

B. 55

C. 40

D. 42

Answer & Explanation

Sol : Option B

Sum of all the 8 terms = 320.

The sum of first 6 terms = 210

Now , the sum of remaining terms = $320 - 210 = 110$

So , the average of 2 terms would be = $110/2 = 55$