



Learn the Basics of Averages for WBP Constable Exam

In your journey to ace the **WBP Constable Exam**, a solid grasp of mathematical concepts is essential. Among these, **averages** are a fundamental pillar. Understanding averages not only forms the basis of various mathematical problems but also equips you with a practical tool for real-life situations. From calculating the average score in a sports game to determining the mean income in a group, averages are omnipresent.

This introductory guide will unravel the basics of averages, simplifying complex problems, and offering insights to tackle them effectively during your exam. So, let's embark on a journey to master this mathematical concept, which will not only boost your exam performance but also enhance your quantitative skills in various scenarios. Whether you are new to averages or need a refresher, this guide is your key to success.

So, let's start learning this topic with the **definition of Average**.

## Average

An **average** or **arithmetic mean** of given data is the sum of the given observations divided by the number of observations.

It means,

$$\text{Average (A)} = [\text{Sum of given observation(S)}] / [\text{Number of observation(N)}]$$

The average is also called the **mean**.

Let's take an example to understand this better.

**E.g.** Find the average of 10, 15, 20, 25, and 30.

**Sol: Step 1:** First calculate the sum of all the quantities (S)

$$\Rightarrow 10 + 15 + 20 + 25 + 30 = 100$$

**Step 2:** Now count the number of quantities (N)

That is five in this case

**Step 3:** According to formula divide the sum by number of quantities

$$A = S / N$$

$$A = 100 / 5 = 20$$

So we got 20 as the average of all the five quantities. **(Ans.)**

Let's first deal with some **properties of averages** to get some clarity of thought on averages.

## Properties of Averages

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The some properties of Averages are:

- The average of a given data is less than the greatest observation and greater than the smallest observation of the given data. We saw in our last example that the average (20) is between 10 and 30.
- If all the numbers get increased by "a", then their average must be increased by "a".
- Similarly, If all the numbers get decreased by "a", then their average must be decreased by "a".
- If all the numbers are multiplied by "a", then their average must be multiplied by "a".
- Similarly, If all the numbers are divided by "a", then their average must be divided by "a".

Let's take a look at these examples.

**E.g.** The weight of A is 60 kg, Weight of B is 45 kg, and the average weight of A, B, and C is 53 kg, find the weight of C.

**Sol:** Let the weight of C be "x"

**Step 1:** the sum of all the weights is

$$\Rightarrow 60 + 45 + x$$

**Step 2:** the number of quantities is 3

and as given the average of them is 53

**Step 3:** so by the formula of averages

$$\Rightarrow 53 = (60 + 45 + x) / 3$$

$$\Rightarrow 53 \times 3 = 60 + 45 + x$$

$$\Rightarrow 159 = 105 + x$$

$$\Rightarrow x = 159 - 105$$

$$\Rightarrow x = 54 \text{ kg (Ans.)}$$

**E.g.** A, B, C, D, and E are the five electronic shops in the Naza market. Which have 20, 30, 60, 80 and 50 T.V. sets with them respectively if each of them has imported 12 new T.V. sets then the average of T.V. set is \_\_\_\_\_.

**Sol:** First, find out the average without considering the imports of T.V.

According to formula

$$\Rightarrow A = S / N$$

$$\Rightarrow A = (20 + 30 + 60 + 80 + 50) / 5$$

$$\Rightarrow A = 240 / 5$$



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$$\Rightarrow A = 48$$

As we learned in the properties of the average new average would be  $= 48 + 12 = 60$  (Ans.)

**E.g.** The average of four numbers is 80. The first number is  $\frac{1}{3}$  of the sum of three numbers. What would be the first number?

**Sol:** By rearranging the formula of averages we found that

Sum of all the observations = Average  $\times$  number of observations

$$\Rightarrow S = A \times N$$

So according to formula

$$\Rightarrow S = 80 \times 4 = 320$$

Now let the sum of three numbers excluding the first number be "g"

So, sum of all the four numbers =  $g + \frac{g}{3}$

$$\Rightarrow g + \frac{g}{3} = 320$$

$$\Rightarrow \frac{4g}{3} = 320$$

$$\Rightarrow g = 320 \times \frac{3}{4} = 240$$

So, the first number would be  $\frac{g}{3} = \frac{240}{3} = 80$  (Ans.)

Now, let's move on to our next topic i.e. **Weighted Average**.

## Weighted Average

When the average of groups or sets, instead of individuals, having different numbers of elements is being calculated then it is called weighted average.

$$\text{Weighted Average} = \frac{(M_1V_1 + M_2V_2)}{(M_1 + M_2)}$$

**$M_1$  and  $M_2$ :** These represent the weights assigned to the respective data points. Weights indicate the relative importance or significance of each data point in calculating the weighted average.

**$V_1$  and  $V_2$ :** These represent the values or observations of the corresponding data points. These are the actual numerical values that are being averaged, taking into account the assigned weights.

Let's look at some examples to understand this concept.

**E.g.** The average weight of 17 girls is 20 kg and the average weight of 23 boys is 22 kg. Find the average weight of the class.

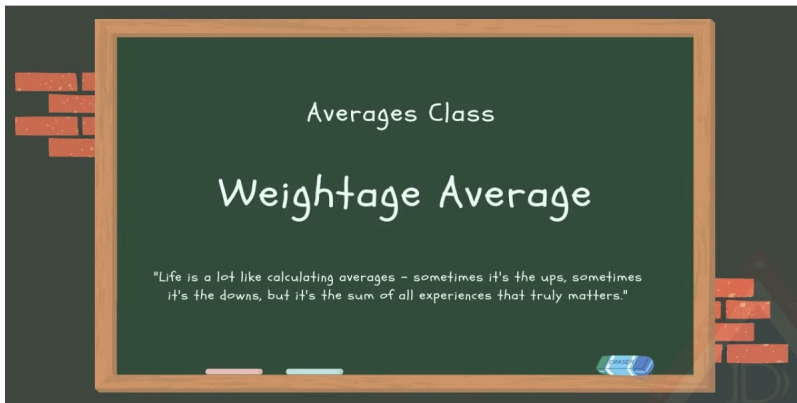
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**Sol:** So, there are two groups of people boys and girls that's why we will use weighted average concept. Here,  $M_1 = 17$ ,  $V_1 = 20$ ,  $M_2 = 23$  and  $V_2 = 22$ .

By putting the values in the formula

$$\Rightarrow A = (17 \times 20 + 22 \times 23) / (17 + 23)$$

$$\Rightarrow A = (340 + 506) / 40 = 846 / 40 = 21.15 \text{ kg (Ans.)}$$



**E.g.** In Plutarch enterprise, 70% of the employees are marketers, 20% are engineers, and the rest are the managers. Marketers make an average salary of Rs. 50,000 a year and engineers make an average of Rs. 80,000. What is the average salary of managers if the average for all employees is also Rs. 80,000?

**Sol:** Let the average salary of managers be "x".

Multiply each group average by the percent expressed as a decimal:

$$\text{Marketers} = 0.70 \times 50,000 = 35,000$$

$$\text{Engineers} = 0.20 \times 80,000 = 16,000$$

$$\text{Managers} = 0.10 \times x = 0.1x$$

This should add up to the average for all employees

$$\Rightarrow 35,000 + 16,000 + 0.1x = 80,000$$

$$\Rightarrow 0.1x = 80,000 - 51,000$$

$$\Rightarrow 0.1x = 29,000$$

$$\Rightarrow x = 290,000 \text{ rs. (Ans.)}$$

Let us look at few examples and if you are now confident about this section, just try these questions by yourself before looking at my solution. Some of these questions were asked in the **WBP Constable** Exam. So, please take this section very seriously.

## Examples on Averages for Better Understanding

**E.g.** A total of 9 students took a test and their average score was 86. If the average score of 4 students was 81, what was the average score for the remaining 5 students? **[WBP Constable Exam 2015]**

**Sol:** Average = Sum of score/Total students

9 students took a test and their average score was 86.

Sum of score of 9 students =  $86 \times 9 = 774$  ... (1)

The average score of 4 students was 81.

Sum of score of 4 students =  $81 \times 4 = 324$  ... (2)

From (1) and (2) we get

Sum of score of 5 students =  $774 - 324 = 450$ .

Average score of remaining 5 students =  $450/5 = 90$  (Ans.)

**E.g.** The Average of the first 15 odd numbers is: **[WBP Constable Exam 2013]**

**Sol:** 15 first odd numbers = 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29

Their sum =  $1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19 + 21 + 23 + 25 + 27 + 29 = 225$

Average of 15 first odd numbers =  $225/15 = 15$  (Ans.)

**E.g.** The average age of 30 girls is 13 years. Of them average of 18 girls is 15 years. What is the average of the rest 12 girls? **[WBP Constable Exam 2013]**

**Sol:** Average age of 30 girls = 13 years

Average = (sum of girls age) / (number of girls)

Sum of 30 girls age = 390

Average age of 18 girls = 15 years

Sum of 18 girls age = 270

Sum of rest 12 girls age =  $390 - 270 = 120$

Average of rest 12 girls age =  $120/12 = 10$  years (Ans.)



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Mastering the basics of averages is an essential step in your WBP Constable Exam preparation. Averages are a foundational mathematical concept that transcends exams and finds applications in everyday life. Through this guide, you've gained valuable insights into how to calculate and interpret averages.

This knowledge is not only integral to acing your quantitative aptitude test but also equips you with practical skills for various real-life scenarios. As you move forward in your exam preparation, remember that a strong understanding of averages will not only boost your scores but also enhance your problem-solving capabilities. So, embrace this foundational skill and excel in both your exams and daily life.

So, this is all for today. In our next blog, we will discuss the [Change in Averages](#). Till then, stay tuned! If you like this blog, do check out our latest blog on [Percentages](#).

