Averages

THEORY

The average of a number is a measure of the central tendency of a set of numbers. In other words, it is an estimate of where the center point of a set of numbers Lies.

The basic formula for the average of n numbers $x_1, x_2, x_3, \ldots. x_n$ is

$A_n = (x_1 + x_2 + x_3 + \ldots + x_n)/n$ = (Total of set of n numbers)/n)

This also means A_n x n = total of the set of numbers.

The average is always calculated for a set of numbers.

Concept of Weighted Average: when we have 2 or more groups whose individual average are known, then to find the combined average of all the elements of all the groups we use weighted average. Thus, if we have k groups with averages $A_1, A_2 \ldots A_k$ and having n_1, n_2 elements then the weighted average is given by the formula:

$A_w = n_1, A_1 + n_2 A_2 + n_3 A_3 + \ldots + n_k A_k / n_1 + n_2 + n_3 + \ldots. + n_k$

Another meaning of average The average [also known as arithmetic mean. (AM)] of a set of number can also be defined as the number by which we can replace each and avery number of the set without changing the total of the set of numbers.

Properties of average (AM) The properties of averages [arithmetic mean] can be elucidated by the following examples:

Example 1: The average of 4 numbers 12, 13, 17 and 18 is:

Solution: required average = (12 + 13 + 17 + 18)/4 = 60/4 = 15

This means that if each of the 4 numbers of the set were replaced by 15 each, there would be no change in the total. This is an important way to look at averages. In fact, whenever you come across any situation where the average of group of 'n' numbers is given, you should visualise that there are 'n' numbers, each of whose value is the average of the group. This view is a very important way to visualise averages.

Averages

This can be visualised as

12 → + 3 → 15

13→ + 2 → 15

17 → - 2 → 15

18 → - 3 → 15

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60 → + 0 → 60

In the above, we used 'solving'-while-reading' and 'option based' approaches.

These two approaches are very important and by combining the two, you can reach amazing speeds in solving the question.

You are advised to practice both these approaches while solving questions, which will surely improve your efficiency and speed. You will see that, with practice, you will be able to arrive at the solution to most of the LOD I problems (given later in this chapter) even as you finish reading the questions. And since it is the LOD I level problems that appear in most examinations (like CET Maharashtra, Bank PO, MAT,Indo MAT,NMIMS, NIFT,NLS and most other attitude exams) you will gain a significant advantage in solving these problems.

On LOD II, LOD III and CAT type problems, you will find that using solving-while-reading and option-based approaches together would take you the through anywhere between 30-70% of the question by the time you finish reading the question for the first time.

This will give you a tremendous time advantage over the other students appearing in the examination