Averages

Basic Formulae for average of n numbers x1, x2, x3....xn is given by

An=(x1+x2+x3+.........xn)/n=Total of n numbers/n

This also means that (An)*n =Total of the numbers

Weighted Average Concept

Aw=(n1A1+n2A2+n3A3.......nkAk)/(n1+n2+n3......nk)

Ages and Average

Average age of a group of person is x years today then after n years their age will be (x+n)

Average age of a group of person is x years today then n years ago their age will be (x+n)

Average Speed of Journey

Average Speed=Total Distance /Total Time

Alligations

Introduction

Alligation is a faster technique to solve questions based on weighted average. Be careful to understand the concept of allegation in depth so that you are able to solve the question quite fast.

Theory

Please refer to the below table which represent the averages of respective groups along with number of elements.

Serial Number	Average of Group	Number of elements
1	A1	N1
2	A2	N2
3	A3	N3
4	A4	N4
5	A5	N5

Weighted Average is given by below formulae

(Aw)=(N1A1+N2A2+N3A3+N4A4+N5A5)/(N1+N2+N3+N4+N5)

When just two groups are mixed, we can write the above equation as

(Aw)= (N1A1+N2A2)/(N1+N2)

Rewriting the above equation we will get the following equation

$$N_1/N_2 = (A_2 - A_w)/(A_w - A_1)$$

Alligation Equation

When to use Alligation

When two groups of elements are mixed together to form a third group containing the elements of both the groups. A_1, A_2 is average of first group of N_1, N_2 elements. We take $A_1 < A_2$, then by principal of average $A_1 < A_w < A_2$.

Graphical Representation of Alligation

A1   A2

                Aw

A2-Aw   Aw-A1
N1   N2
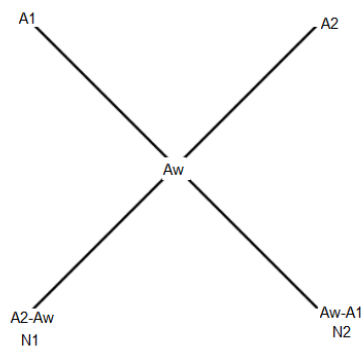
Straight Line Approach

We will now modify the graphical approach method shown in the above diagram to tackle all types of questions. Consider the diagram shown below which represent straight line method.

A1   Aw   A2

N1   N2