COMPARATIVE STUDY OF CONVENTIONAL METHOD WITH EFFICIENT ALLIGATION METHOD

S. PRATHIBA JEYAKUMARI[1] & P. BALACHANDIRAN[2]

[1]Assistant Professor, Department of Mathematics, Valliammai Engineering College, Kanchipuram, Tamil Nadu, india

[2] Department of Mathematics, Valliammai Engineering College, Kanchipuram, Tamil Nadu, India

ABSTRACT

Alligation is a faster technique or a shortcut method for solving some problems in aptitude level. The name aptitude itself tells us it needs a time management. We cannot solve all the problems in the normal method because we don't have much time to solve the problems in normal method, so we need to identify some useful shortcuts for solving the same. Under those shortcuts the important one is Alligation. This method can be applied for some kind of partnership problems, Profit loss problems, average problems etc. Briefly says that, this method can be effectively used to find

- The ratio of deposited amounts is to be divided into two people yielding various returns from the specific overall return.

- The ratio of the number of boys and girls in the class, given their average marks for the boys, girls and the overall class.

- etc.

The main use of Alligation method is to solve mixtures and solutions problems ie the problems based on the weighted average situation as applied to the case of two group being mixed together. Mixtures are nothing but two groups of elements with the same unit are mixed together to form a third group containing the elements of the both groups. The word Alligation means linking or joining something [1]. This implies that the method links the question part to the answer part.

KEYWORDS: Alligation, Resultant, Solution

INTRODUCTION

Alligationis a short-cut often used by pharmacy techs and pharmacy students. You'll want to be able to recognize when and how to use it if studying for the national exam. Outside of pharmacy, it's mostly a method, used as an alternative to standard algebra when calculating the volumes for a mixture made from different strengths of a similar chemical[2].

First we need to know the graphical representation of Alligation method. It contains two parts ie., Question part and Answer part which are linked by some lines.
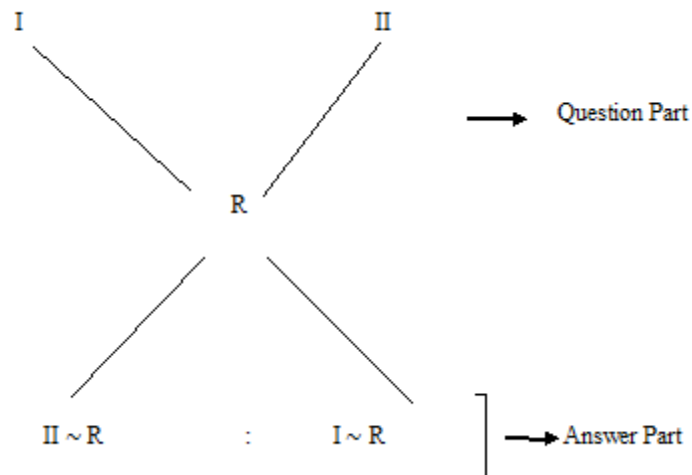
Figure 1

Where,

I is the proportion or concentration of any one of the components from the first group

II is the is proportion or concentration of any one of the components from the second group

R is the is proportion or concentration of any one of the components from the resultant (mixture of I & II)

II ~ R is the difference between the values of II and R

I ~ R is the difference between the values of I and R

The value of R is always lies between I and II. We will get the answer part in the ratio form.

COMPARISON OF NORMAL METHOD AND ALLIGATION METHOD

Let us start with an example,

In what ratio should a X liters of milk water solution in the ratio 3:2 be mixed with another solution of Y liters with milk to water ratio as 7: 13, so that the resultant mixture would have milk and water in the ratio 2 : 3?
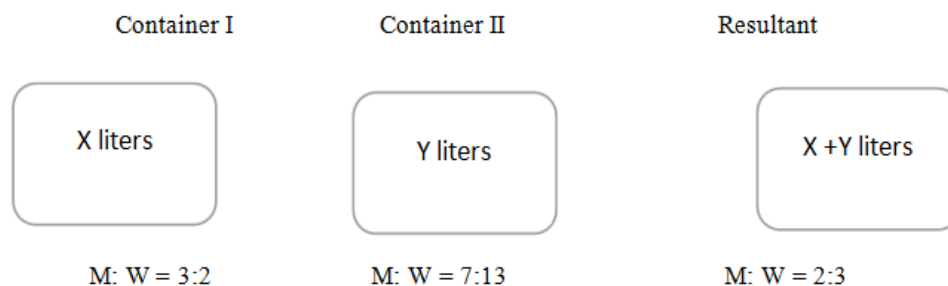

Figure 2

From the question we can identify so many things,

- The quantities of I, II and the Resultant are X liters, Y liters and X + Y liters respectively.

- The quantities of milk in I, II and Resultant are $\frac{3}{5}X$, $\frac{7}{20}Y$ and $\frac{2}{5}(X+Y)$ respectively.

- The quantities of water in I, II and Resultant are $\frac{2}{5}X$, $\frac{13}{20}Y$ and $\frac{3}{5}(X+Y)$ respectively.

- The proportion or concentration of milk in I, II and Resultant are $\frac{3}{5}$, $\frac{7}{20}$ and $\frac{2}{5}$ respectively.

- The proportion or concentration of water in I, II and Resultant are $\frac{2}{5}$, $\frac{13}{20}$ and $\frac{3}{5}$ respectively.

These are the information's or data's from the question.

CONVENTIONALMETHOD

$$\frac{3}{5}X + \frac{7}{20}Y = \frac{2}{5}(X+Y)$$

$$\frac{3}{5}X + \frac{7}{20}Y = \frac{2}{5}X + \frac{2}{5}Y$$

$$\frac{3}{5}X - \frac{2}{5}Y = \frac{2}{5}Y - \frac{7}{20}X$$

$$\frac{X}{Y} = \frac{1}{4}$$

The ratio between X and Y is 1:4

This method takes 1.7 minutes to get an answer.

ALLIGATION METHOD

In the question part we can consider either the first liquid milk or the second liquid water. But we need to remember one important thing here ie., if we take proportion or concentration of milk from the Container I then we must take the proportion or concentration of milk from the Container II and Resultant and vice versa. Let's check both the cases.
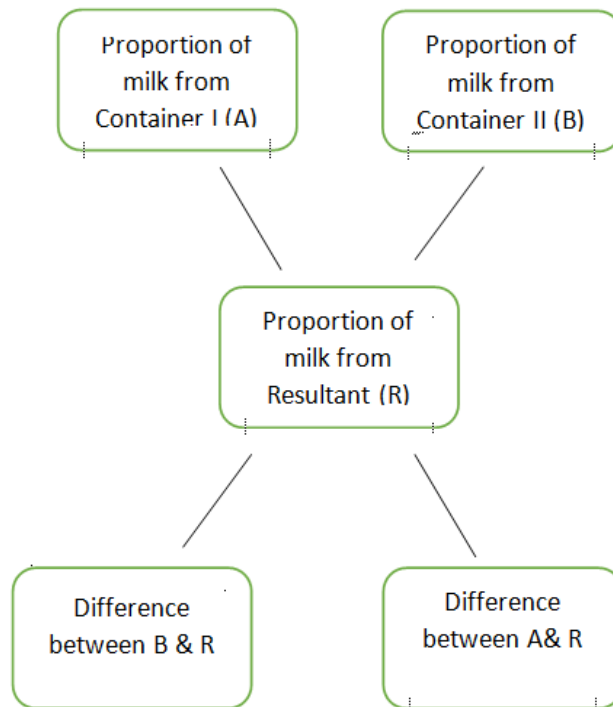
Case (i) (First Liquid Milk)

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┌─────────────────┐         ┌─────────────────┐
│  Proportion of  │         │  Proportion of  │
│   milk from     │         │   milk from     │
│ Container I (A) │         │ Container II (B)│
└─────────────────┘         └─────────────────┘
            \                     /
             \                   /
          ┌───────────────────────┐
          │     Proportion of     │
          │      milk from        │
          │     Resultant (R)     │
          └───────────────────────┘
             /                   \
            /                     \
┌─────────────────┐         ┌─────────────────┐
│   Difference    │         │   Difference    │
│ between B & R   │         │ between A & R   │
└─────────────────┘         └─────────────────┘
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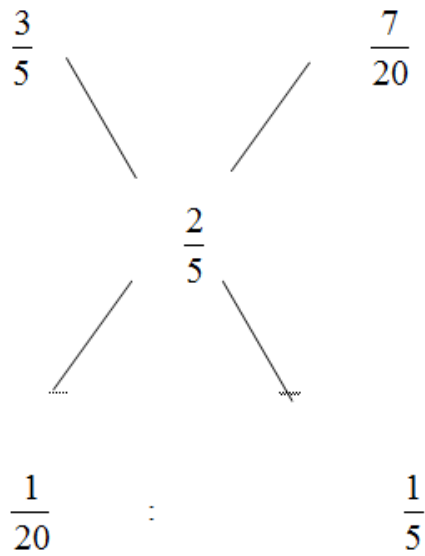
Figure 3

This implies that

$$\dfrac{3}{5} \qquad\qquad \dfrac{7}{20}$$

$$\dfrac{2}{5}$$

$$\dfrac{1}{20} \qquad : \qquad \dfrac{1}{5}$$

Figure 4

1:4

The ratio between X and Y is 1:4

Case (ii) (Second Liquid Water)

Figure 5

This implies that

$$\frac{2}{5} \qquad\qquad \frac{13}{20}$$
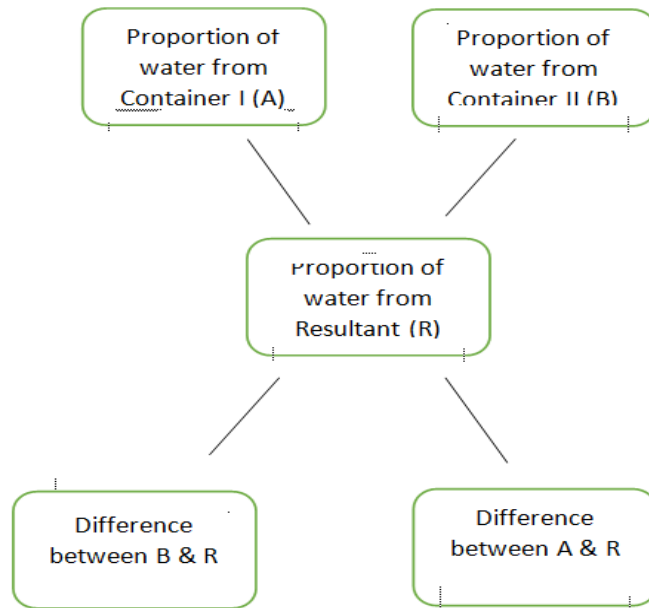
$$\frac{3}{5}$$

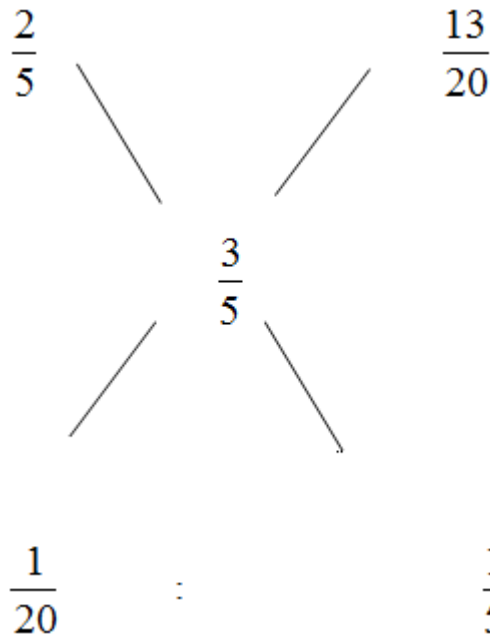$$\frac{1}{20} \qquad : \qquad \frac{1}{5}$$

Figure 6

1:4

The ratio between X and Y is 1:4

This method takes 50 seconds to get an answer.

From case (i) and case (ii),

We conclude that we can use either first liquid or second liquid we end up with the same answer.

CONCLUSIONS

This paper highlights that time comparison between conventional method and Alligation. We can solve problems using conventional method in regular exams. But in the rare case like aptitude test, the students cannot leisurely sit and solve problems in the above mentioned method. Because time allotment for each and every question is only 1.5 minutes or less than 1.5 minutes. In these situations we can use Alligation method. Till date we test this method only for few topics, we extend the use of Alligation method to other topics in future.

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