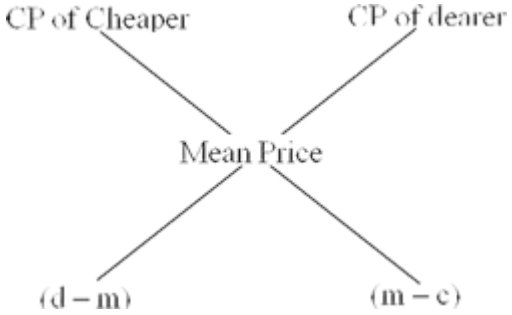
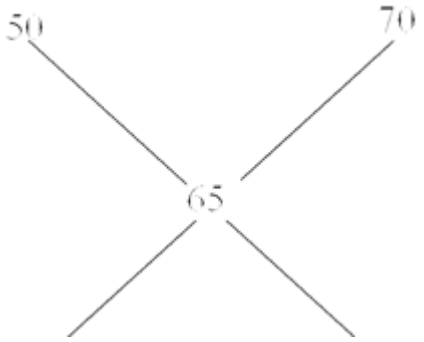
Alligation Method 1:

- The above formula can be represented with the help of diagram which is easier to understand.Here 'd' is the cost of dearer ingredient, 'm' is mean price and 'c' is the cost of cheaper ingredient.



$$\text{Hence } \frac{\text{Cheaper Quantity}}{\text{Dearer Quantity}} = \frac{(d-m)}{(m-c)}$$

Take Test :
Know where you stand in Mixture and Alligation by taking this test now.
Example 1: In what ratio must a shopkeeper mix two types of rice worth Rs. 50 kg and Rs. 70 kg, so that the average cost of the mixture is Rs. 65 kg?
Solution: By Rule of alligation,



$$\frac{Cheaper\ quantity}{Dearer\ quantity} = \frac{(70-65)}{(65-50)} = \frac{5}{15} = 1:3 \qquad \text{OR}$$

Hence the answer is 5:15 or 1:3.
Alligation Method 2: Repeated Dilution

- This is used to calculate pure quantity left after 'n' number of processes of repeated replacement is done on the pure quantity. Suppose, a container contains 'x' units of a liquid from which 'y' units are taken out and replaced by water. After 'n' operations quantity of pure

$$x\left(1-\frac{y}{x}\right)^n$$

Take Test :
Practice the actual exam questions . Accelerate your preparation.
Example 2: A container contains 50 litres of milk. From this container, 10 litres of milk was taken out and replaced by water. This process is repeated one more time.
How much milk is now left in the container?

1. 24
2. 32
3. 30
4. 36

Solution: Applying the Replacement Method: Amount of milk after 2 operations =

$$\left[50\left(1-\frac{10}{50}\right)^2\right] \quad =50\times\frac{4}{5}\times\frac{4}{5}=32\,\text{litres}$$

Suggested Video :
Watch our Achievers video to master all concepts of Mixture & Alligation

Type-1: If a mixture contains two liquids in the ratio **a:b** and if **x** litre of **b** is added to the mixture, then ratio of two liquids becomes **a:c**, then quantity of liquid **a** in the mixture is given by
[a**x**/(c-b)] and that of liquid b is given by [b**x**/(c-b)].

Example: A mixture contains milk and water in ratio 4:3. If 5 litre of water is added to the mixture. The ratio becomes 4:5. The quantity of milk [(4×5)/(5-3)]= 20/2= 10 litre.

Type-2: A container initially contains **x** unit of liquid and **a** unit of liquid is taken out and it is filled with **a** unit of water repeatedly up to n times, then the final quantity of the original liquid in the container is given as

$$\left[x\left(1-\frac{a}{x}\right)^n\right]\text{units.}$$

Example: A container has 60 litre of milk, from this container, 4 litre of milk is taken out and replaced with water. If this process is repeated 3 times, then quality of milk in container left

$$=60\left(1-\frac{4}{60}\right)^3=60\left(\frac{15-1}{15}\right)^3=60\times\frac{14\times14\times14}{15\times15\times15}=48.78\,\text{L}$$

Type-3: A Container has milk and water in the ratio **a:b**, a second container has milk and water in the ratio **c:d**. If both the mixture are emptied into a third container, then the ratio of milk to water in third container is given by

$$\left(\frac{a}{a+b}+\frac{c}{c+d}\right):\left(\frac{b}{a+b}+\frac{d}{c+d}\right)$$

Example: 3 Container has milk and water in the ratio 2:1, 3:1, 3:2 respectively and all three containers are emptied into a bigger container, then ratio of milk to water in bigger container.

$$=\left(\frac{2}{2+1}+\frac{3}{3+1}+\frac{3}{3+2}\right):\left(\frac{1}{2+1}+\frac{1}{3+1}+\frac{2}{3+2}\right)$$

$$=\left(\frac{2}{3}+\frac{3}{4}+\frac{3}{5}\right):\left(\frac{1}{3}+\frac{1}{4}+\frac{2}{5}\right)$$

$$=\frac{40+45+36}{60}:\frac{20+15+24}{60}=121:59$$