{QUANTITATIVE ABILITY - AVERAGES, MIXTURES & ALLEGATION}

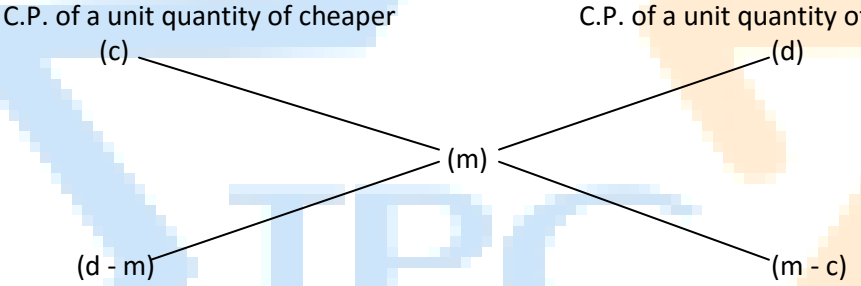
CONCEPTS

Allegation: It is the rule that enables us to find the ratio in which two or more ingredients at the given price must be mixed to produce a mixture of a desired price.
Mean Price: The cost price of a unit quantity of the mixture is called the mean price.

Rule of Allegation: If two ingredients are mixed, then

$$\frac{(\text{Quantity of cheaper})}{(\text{Quantity of dearer})} = \frac{(\text{C.P.of dearer}) - (\text{Mean price})}{(\text{Mean price}) - (\text{C.P.of cheaper})}$$

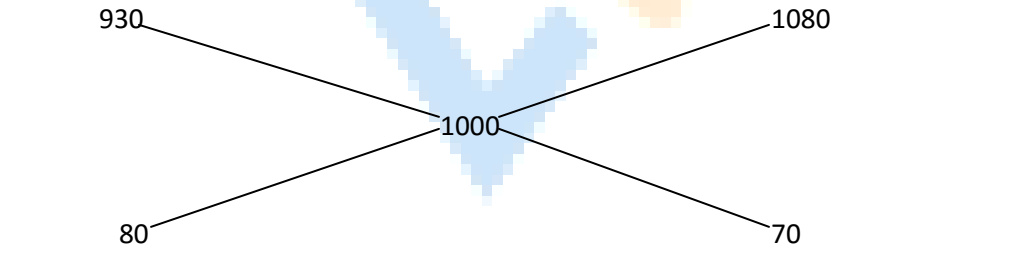
We present as under:



Therefore, (Cheaper quantity) : (Dearer quantity) = (d - m) : (m - c).

Suppose a container contains x units of liquid from which y units are taken out and replaced by water. After n operations the quantity of pure liquid = $[x(1 - \frac{y}{x})^n]$ units.

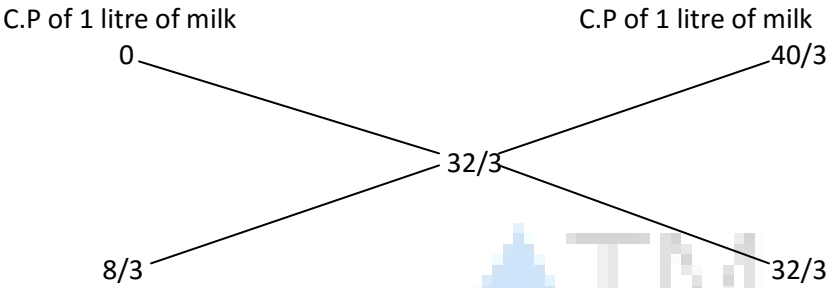
EXAMPLE 1: In what ratio must rice at Rs. 9.30 per kg be mixed with rice at Rs. 10.80 per kg so that the mixture be worth Rs. 10 per kg?
Solution: By the rule of alligation, we have:



Hence, Required ratio = 80 : 70 = 8 : 7.

EXAMPLE 2: How much water must be added to 60 litres of milk at 1 ½ litres for Rs. 20 so as to have a mixture worth Rs.32/3 a litre?

Solution: C.P. of 1 litre of milk = Rs. (20 x 2/3) = Rs. 40/3



Ratio of water and milk =8 : 32 = 8 : 32 = 1 : 4

Quantity of water to be added to 60 litres of milk = [1/4 X 60]litres =15 litre

Averages:

The average of a set number is the value that represents the entire set. Averages are the measures of the central tendency of data.

Arithmetic Mean

The most commonly used average is the AM, which is also simply referred to as the average.

Arithmetic Mean (A.M.) = (Sum of all quantities)/(Number of quantities)

Weighted Average:

If the values in a data set x1, x2, …., xn are assigned weights w1, w2, …., wn. Then

Weighted average = $\frac{w1.x1+w2.x2+\cdots+wn.xn}{w1+w2+\cdots wn}$

Geometric Mean

Geometric mean of A, B, C,.....N will be = $\sqrt[1/n]{A.B.C\ldots..N}$

Harmonic Mean:

Harmonic mean of A, B, C,...,N = $\frac{N}{\frac{1}{A}+\frac{1}{B}+\cdots\frac{1}{N}}$