RATIO & PROPORTION

FACTS TO REMEMBER: RATIO

1. The ratio of two quantities 'a' & 'b' in the same units is the fraction $\frac{a}{b}$ and we write it as a : b.

In the ratio a : b , a & b are called the TERMS of the ratio.

'a' – First Term (Antecedent)

'b' – Seconf Term (Consequent)

2. Compound Ratio – Two ratios are compounded by multiplying together the antecedents for a new antecedent and the consequents for a new consequent.
3. DUPLICATE RATIO of a : b is $a^2 : b^2$
4. TRIPLICATE RATIO of a : b is $a^3 : b^3$
5. SUBDUPLICATE RATIO of a : b is $\sqrt{a} : \sqrt{b}$
6. SUBTRIPLICATE RATIO of a : b is $\sqrt[3]{a} : \sqrt[3]{b}$
7. Componendo & Dividendo rule – If $\frac{a}{b} = \frac{c}{d}$ then $\frac{(a+b)}{(a-b)} = \frac{(c+d)}{(c-d)}$
8. If ratio between first and second quantity is **a : b**

and the ratio between second and third quantity is **c : d**

then the ratio among first, second & third quantities is **ac : bc : bd**

a : b

c : d

9. Similarly if a : b , c : d , e : f are the ratios between first & second , second & third , third & fourth quantities respectively then ratio among all four is

ace : bce : bde : bdf

a : b

c : d

e : f

10. If the ratio of any quantities be a : b : c : d, then the ratio of other quantities which are

inversely proportional to that is given by $\frac{1}{a}:\frac{1}{b}:\frac{1}{c}:\frac{1}{d}$

11. If the sum of two numbers is A and their difference is B, then the ratio of numbers is given by A+B : A – B

12. A number which, when added to the terms of the ratio a : b makes it equal to the ratio c :

d is $\frac{(ad-bc)}{(c-d)}$

13. A number which, when subtracted from the terms of the ratio a : b makes it equal to the

ratio c : d is $\frac{(bc-ad)}{(c-d)}$

14. In any two 2 – dimensionsal figures, if the corresponding sides are in the ratio a : b, then

their areas are in the ratio $a^2:b^2$

15. In any two 3 – dimensionsal figures, if the corresponding sides or other measuring lengths are in the ratio a : b, then their volumes are in the ratio

16. A mixture contains milk and water in the ratio a : b. If 'x' ltrs. Of water is added to the mixture, milk & water become in the ratio a : c. Then the quantity of milk in the mixture is given by $\frac{ax}{(c-b)}$ and that of water is given by $\frac{bx}{(c-b)}$

17. If in 'x' ltrs mixture of milk and water , the ratio of milk and water is a : b , the quantity

of water to be added in order to make it c : d is $\frac{[x(ad-bc)]}{[c(a+b)]}$

FACTS TO REMEMBER: PROPORTION

1. The equality of two ratios is called PROPORTION.

e.g. 6 : 18 :: 8 : 24 (6 is to 18 as 8 is to 24)

Another ways to represent a proportion are

6 : 18 = 8 : 24

$$\frac{6}{18}=\frac{8}{24}$$

Here - 6 is the 1st term [6 & 24 are the extremes , 18 & 8 are the means]

18 is the 2nd term

8 is the 3rd term

24 is the 4th term

2. If four quantities are in proportion , the product of extremes is equal to the product of means.
3. Three quantities of the same kind are said to be in CONTINUED PROPORTION when the ratio of the 1st to 2nd is equal to the ratio of the 2nd to 3rd .
4. Here the 2nd quantity is called the MEAN PROPORTIONAL between 1st & 3rd
5. Hence the mean proportional between two nos. Is equal to the square root of their product.

ALLIGATION

FACTS TO REMEMBER:

1. The word Alligation means LINKING.
2. Alligation method is applied for PERCENTAGE VALUE, RATIO, RATE, PRICES, SPEED etc. And not for absolute values
3. It is the rule that enables us

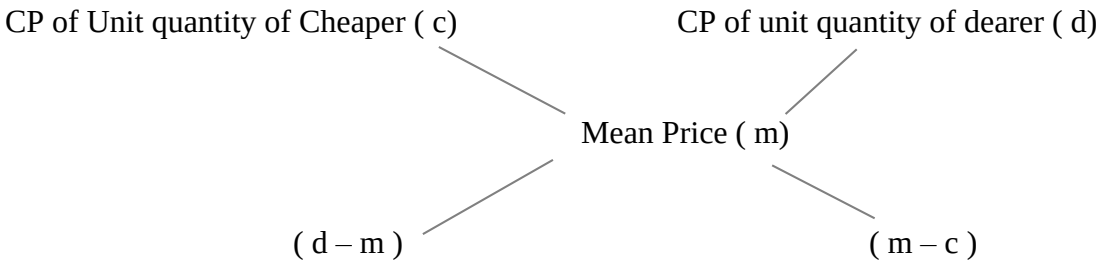
(a) to find the mean (average) value of a mixture , when the prices of two or more ingredients (which may be mixed) and the proportion in which they are mixed is given. (ALLIGATION MEDIAL)

(b) to find the proportion in which the ingredients at given prices must be mixed to produce a mixture at a given price (ALLIGATION ALTERNATE)

4. RULE OF ALLIGATION :

$$\frac{(Quantity\ of\ cheaper)}{(Quantity\ of\ dearer)} = \frac{(CP\ of\ dearer - mean\ price)}{(Mean\ price - CP\ of\ cheaper)}$$

It is represented as under :



then (CHEAPER QUANTITY : DEARER QUANTITY) = (d – m) : (m – c)