

CHAPTER 10

Direct and Inverse Proportions

Compound proportion:

Sometimes, change in a quantity depends upon the changes in two or more other quantities in some proportion. Then we equate the ratio of the first quantity to the compound ratio of the other two quantities.

i.e.

- One quantity may be in direct proportion with the other two quantities.
- One quantity may be in inverse proportion with the other two quantities.
- One quantity may be indirect proportion with the one of the two quantities and in inverse proportion with the remaining quantity.

Example:

Consider the mess charges for 35 students for 24 days in Rs. 6300. How much will be the mess charges for 25 students for 18 days.

Sol.

Here, we have 3 quantities i.e. mess charges, number of students and number of days.

Mess charges in Rs.	No. of students	No. of days
6300	35	24
? (x)	25	18
6300 : x	35 : 25 = 7 : 5	24 : 18 = 4 : 3

Mess charges is directly proportional to number of students.

i.e. Mess charges $\propto$ Number of students

$$6300 : x = 7 : 5$$

Again, mess charges are directly proportional to number of days.

i.e. Mess charges $\propto$ Number of days

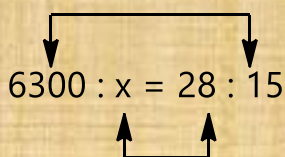
$$6300 : x = 4 : 3$$

Since, mess charges depends upon both the value i.e. number of students and number of days so we will take a compound ratio of these two variables.

Mess charges $\propto$ Compound ratio of ratio of number of students and ratio of number of days.

i.e. $6300 : x =$ Compound ratio of $7 : 5$ and $4 : 3$

$$6300 : x = 7 \times 4 : 5 \times 3$$



$$6300 : x = 28 : 15$$

Product of means = Product of extremes

$$28 \times x = 15 \times 6300$$

$$x = \frac{15 \times 6300}{28}$$

$$x = \text{Rs. } 3375$$

Hence, the requires mess charges is Rs. 3375

Example:

If 36 workers can build a wall in 12 days, how many days will 16 workers take to build the same wall? (Assuming the number of working hours per day is constant)

Sol.

Let the days taken be 'x'.

No. of workers	36	16
No. of days	12	x

If the number of workers decreases, the time to taken built the wall increases in the same proportion.

Clearly, number of workers varies inversely to the number of days.

$$36 \times 12 = 16 \times x$$

$$\Rightarrow x = \frac{\cancel{36}^{\frac{9}{\cancel{4}}} \times \cancel{12}^{\frac{3}{\cancel{4}}}}{\cancel{16}^{\frac{2}{\cancel{4}}}} = 27 \text{ days}$$

Therefore, 27 workers will build the same wall in 27 days.