INVERSE VARIATION: Two quantities a and b are said to vary inversely if the product ab remains constant.

EXAMPLE: 1. Suppose a car covers a certain distance at a uniform speed. Then we can say for certain that more is the speed of the car, less is the time taken to cover this distance. Thus, speed varies inversely as the time taken to cover a certain distance.

2. Suppose a given mass of a gas is subjected to pressure. As the pressure increases, the volume of the gas decreases. Thus, for a given mass of a gas, pressure varies inversely as its volume.

Rule of Inverse Variation If a and b vary inversely then the ratio of any two values of a is equal to the inverse ratio of the corresponding values of b. => $x_1 \times y_1 = x_2 \times y_2$ = constant

1. If 48 men can dig a trench in 14 days, how long will 28 men take to dig a similar trench?

$48 \, x \, 14 \, = \, 28 \times x \quad => \frac{48 \, x \, 14}{28} = \, 24 \, days$

2. 16 men can reap a field in 30 days. How many men must be engaged to reap the same field in 24 days?

$16 \times 30 = x \times 24 \quad => x = \frac{16 \times 30}{24} = \, 20 \, men$

3. 45 cows can graze a field in 13 days. How many cows will graze the same field in 9 days?

$45 \times 13 = x \times 9$

4. 16 horse can consume a certain quantity of corn in 25 days. In how many days would the same quantity be consumed by 40 horses?

$16 \times 25 = \, 40 \times x$

5. A girl can finish a book in 25 days if she reads 18 pages of it every day. How many days will she take to finish it, if she reads 15 pages every day?

$25 \times 18 = x \times 15$

6. Reeta types 40 words per minute and takes 24 minutes to type a certain document. Her friend Geeta has a typing speed of 48 words per minute. In how much time, will she be able to type the same document?

$40 \times 24 = 48 \times x$

7. A bus covers a certain distance in 3 hours 20 minutes at an average speed of 45 km/h. How long will it take to cover the same distance at a speed of 36 km/h?

$\frac{10}{3} \times 45 = x \times 36 \quad => x = \frac{150}{36} = \frac{25}{6} \, hrs$ = 4hr + $\frac{1}{6} \times 60 min$ = 4hr 10 min

8. At the beginning of a month, a factory has enough materials to make 240 tonnes of steel in a month. If 60 more tonnes of steel are to be made that month, how long will the materials last?

$30 : 240 = x : (240 + 60)$ => x = $\frac{30 \times 240}{300}$ = 24 days

9. A contractor employed 210 men to build a house in 60 days. **After 12 days**, he was **joined by 70 more** men. In how many days will the remaining work be finished?

Hint. $210 \times (60 - 12) = (210 + 70) \times x$ => $x = \frac{210 \times 48}{280} = 36 \, days$

10. A military camp has provisions for 630 men to last for 25 days. How many men must be transferred to another camp so that the food lasts for 30 days?

$630 \times 25 = x \times 30$ $x = \frac{630 \times 25}{30} = 525$ Hence, 630 – 525 = 105 men transferred to another camp

11. A group of 120 men had provisions for 200 days. **After 5 days, 30 men died** due to an epidemic. How long will the remaining food last?

$120 \times (200 - 5) = (120 - 30) \times x$ => $120 \times 195 = 90 \times x$ => x $\frac{120 \times 195}{90} = 260 \, days$

12. 1200 soldiers in a fort had enough food for 28 days. **After 4 days,** some soldiers were transferred to another fort and thus the food lasted for an extra 32 days. How many soldiers left the fort?

$1200 \times (28 - 4) = x \times 32$ => $\frac{120 \times 24}{32} = 900$ So, soldiers left the fort = 1200 - 900 = 300

13. If 36 men can finish a piece of work in 25 days, how many days will 15 men take to do it?

$36 \, x \, 25 = 15 \times x$

14. A contractor has a workforce of 420 men who can finish a certain piece of work in 9 months. How many extra men must he employ to complete the job in 7 months?

$420 \times 9 = x \times 7$

15. A garrison of 500 men had provisions for 24 days. However, a reinforcement of **300 men arrived**. For how many days will the food last now?

$500 \times 24 = (500 + 300) \times x$ => $x = \frac{500 \times 24}{800} = 15 \, days$