

3 new created Maths Formulas to solve all Inverse Proportion Problem

e.g.1 8 men working 6 hours a day can complete a job in 20 days. If the number of men increased to 12, find the number of days they will take to complete the job if they work 5 hours a day.

Solution : Created formulae 1 : $M_1 \times D_1 \times H_1 = M_2 \times D_2 \times H_2$

Subst. values in $8 \times 20 \times 6 = 12 \times D_2 \times 5$

$$D_2 = 16 \text{ days}$$

Ans : They will take 16 days to complete the job.

e.g. 2 If 12 men take 15 days to do $\frac{5}{8}$ of a job, how many more men are needed to complete the job in 6 more days?

Solution : Created Formulae 2 : $\frac{Job_1 \text{ done}}{M_1 \times D_1} = \frac{Job_2 \text{ done}}{M_2 \times D_2}$

Subst. values in $\frac{\frac{5}{8}}{12 \times 15} = \frac{\frac{3}{8}}{6 \times M_2}$, $\rightarrow \frac{5}{8} \times \frac{1}{12 \times 15} = \frac{3}{8} \times \frac{1}{6 \times M_2} \rightarrow 5 \times 8 \times 6 M_2 = 3 \times 8 \times 12 \times 15$

$$M_2 = 18$$

Answer : $18 - 12 = 6$ more men are needed

e.g. 3 6 men (M_1) working 8 hours (H_1) each day took 12 days (D_1) to make 4000 toys (J_1). Working how many hours (H_2) each day would it take 3 men (M_2) to make 1000 toys (J_2) in 8 days (D_2) of the same kinds?

Solution : Created formulae 3 : $\frac{J_1}{M_1 D_1 H_1} = \frac{J_2}{M_2 D_2 H_2}$

Substitute values in : $\frac{4000}{6 \times 12 \times 8} = \frac{1000}{3 \times 8 \times H_2}$

Cross multiply $4000 \times 3 \times 8 \times H_2 = 1000 \times 6 \times 12 \times 8$

$$H_2 = \frac{1000 \times 6 \times 12 \times 8}{4000 \times 3 \times 8} = 6 \text{ hours.(Ans.)}$$

Other examples of Inverse Proportion questions

e.g. 1 It take 8 men 32 hours to paint a wall. Given all the men work at the same rate. Find how long it would take 10 men to paint 2 identical walls.

Solution : Use formulae $\frac{J_1}{M_1 \times H_1} = \frac{J_2}{M_2 \times H_2}$

$$\text{(a wall = 1 wall)} \quad \frac{1}{8 \times 32} = \frac{2}{10 \times H_2}$$

$$\text{Cross X} \quad 1 \times 10 \times H_2 = 8 \times 32 \times 2$$

$$H_2 = 51.2 \text{ hours (Ans.)}$$

e.g. 2 A machine can pack 5 packets of sugars in 3 minutes. If a factory needs to produce 120 packets of sugars in 18 minutes, how many machine will be needed?

Solution : Use formulae $\frac{J_1}{Mac_1 \times Time_1} = \frac{J_2}{Mac_2 \times Time_2}$

$$\frac{5}{1 \times 3} = \frac{120}{Mac_2 \times 18} \quad \text{(a machine = 1 machine)}$$

$$Mac_2 \times 18 \times 5 = 120 \times 1 \times 3$$

$$Mac_2 = 4 \text{ machines (Ans.)}$$

e.g. 3 If 12 men can build a road in 20 days, how many days would it take 15 men to build 2 of the same length of road, assuming that they work at the same rate?

Solution : Use formulae $\frac{J_1}{M_1 \times D_1} = \frac{J_2}{M_2 \times D_2}$

$$\frac{1}{12 \times 20} = \frac{2}{15 \times D_2} \quad \text{(a road = 1 road)}$$

$$1 \times 15 \times D_2 = 2 \times 12 \times 20$$

$$D_2 = 32 \text{ days (Ans.)}$$