



Time and Work

- Work Done = Time Taken \times Rate of Work
- Rate of Work = $1 / \text{Time Taken}$
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- If a piece of work is done in x number of days, then the work done in one day = $1/x$
- Total Work Done = Number of Days \times Efficiency

1) If a man can do a piece of work in n days, work done by him in one day = $\frac{1}{n}$ part of total work or he will finish $\frac{1}{n}$ th work in one day.

2) If a man completes $\frac{1}{n}$ th work in one day, he will complete the entire work in n days.

3) If A can complete a piece of work in X days and B can complete the same work in Y days, both A and B working together can finish the same work in $\frac{XY}{X+Y}$ days.

4) If A is thrice as good as workman as B or A can work three times faster than B, the ratio of work done by A and B for the same duration of time will be = 3 : 1. And the ratio of time taken by A and B to finish the same amount of work will be = 1: 3.

5) A, B and C can do a work in D1, D2 and D3 days respectively. If they work for X1, X2 and X3 days respectively;

- Work done by A in X1 days = $\frac{X1}{D1}$
- Work done by B in X2 days = $\frac{X2}{D2}$
- Work done by C in X3 days = $\frac{X3}{D3}$

6) If A, B, C can do a piece of work in X, Y, and Z days respectively, if they work together, they can do the same work in $\left(\frac{XYZ}{XY+YZ+ZX}\right)$ days.

7) A and B working together can do a work in X days. If A alone can do the same work in Y days, B alone can do the same work in $\left(\frac{XY}{Y-X}\right)$ days.

8) A and B working together can finish a piece of work in X days, B and C working together can finish the same work in Y days and C and A in Z days. Then;

- A, B and C working together will finish the work in $\left(\frac{2XYZ}{XY+YZ+ZX}\right)$ days.
- A alone will finish the work in $= \left(\frac{2XYZ}{XY+YZ-ZX}\right)$ days.
- B alone will finish the work in $= \left(\frac{2XYZ}{YZ+ZX-XY}\right)$ days.
- C alone will finish the work in $= \left(\frac{2XYZ}{ZX+XY-YZ}\right)$ days.

9) A can do a work in X days. If B is P times efficient than A, A and B working together can do the work in $\left(\frac{X}{1+P}\right)$ days.

10) A and B working together can complete a work in X days. If B is P times efficient than A;

- A alone can complete the work in (P + 1) X days.
- B alone can complete the work in $\left(\frac{P+1}{P}\right)$ X days.

11) P working alone takes X days more to do a work than P and Q working together takes to do the same work. And, Q working alone takes Y days more to do the same

work than P and Q working together takes to finish the same work. Then P and Q working together can finish the same work in \sqrt{XY} days.

12) A is P times more efficient than B and able to finish the work in X days less than B, then

- A and B working together can finish the work in $\left(\frac{PX}{P+P-X}\right)$ days.
- A alone can finish the work in $\left(\frac{X}{P-X}\right)$ days.
- B alone can finish the work in $\left(\frac{PX}{P-X}\right)$ days.

13) If A completes $\frac{a}{b}$ part of a work in X days, $\frac{c}{d}$ part of the same work he can complete in $\left(\frac{b+cX}{a+d}\right)$ days.

14) There are two groups of workers with same efficiency. In one group M1 workers can do W1 work in D1 days or time. In the second group M2 workers can do W2 work in D2 days or time. Then

$$M1 * D1 * W2 = M2 * D2 * W1$$

15) There are two groups of workers with the same efficiency. In one group M1 workers can do W1 work in D1 time or days working T1 hours a day. In the second group, M2 workers can do W2 work in D2 time or days working T2 hours in a day. Then;

$$M1 * D1 * T1 * W2 = M2 * D2 * T2 * W1$$

- If the efficiency of the workers is different in these groups i.e., E1 and E2, then

$$M1 * D1 * T1 * E1 * W2 = M2 * D2 * T2 * E2 * W1$$

- Also remember that efficient person takes less time to complete a given work. So, we can say that efficiency (E) is indirectly proportional to the number of days (D) taken to complete the given work.

Therefore, $ED = \text{constant}$

$$E1 * D1 = E2 * D2$$

More men will take fewer days and fewer men will take more days to complete a given work.

16) Wages are directly proportional to the work done by the individual and inversely proportional to the time taken by the individual.

Total wages = One person's one day's wage * number of persons* number of days

A's share: B's share: C's share = B's time*C time: A's time*C's time: A's time * B's time.