



Time and Work

Suganth Singaravelu

1. Different Efficiency.
2. Same Efficiency.

A B

7m

14w

8 boys



Time and Work

Suganth Singaravelu

- ✓ 1. Different Efficiency.
- 2. Same Efficiency

Example'

$$T = 30$$
$$T = 11$$

→ eating

Ram and Laxman can do a work in 10 and 15 days respectively. In how many days will both finish the work?

$$R \rightarrow 10$$

$$L \rightarrow 15$$

$$\underline{\underline{10}} \rightarrow$$

$$3$$

$$\underline{2}$$

$$\underline{5}$$

$$\frac{30}{5} = 6 \text{ days.}$$



Example

Ram and Laxman can do a work in 10 and 15 days respectively. In how many days will both finish the work?

	Days	Efficiency (per day work)
Ram	10	
Laxman	15	
Ram + Laxman		

$$\text{Number of days} = \frac{\text{Total work done}}{\text{Efficiency}}$$

$$\frac{30}{5} = 6 \text{ d}$$

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Example

$$T = 100$$

A can paint the walls in 25 days whereas B can paint the same walls in 20 days. If both paint together then, in how many days the walls can be painted?

$$A \rightarrow 25$$

$$B \rightarrow 20$$

$$\underline{\underline{100}}$$

$$4$$

$$\underline{5}$$

$$\underline{9}$$

$$\frac{100}{9} = 11.11$$

$$\text{or } 11 \frac{1}{9}$$



Example

A can paint the walls in 25 days whereas B can paint the same walls in 20 days. If both paint together then, in how many days the walls can be painted?

	Days	Per day
A	25	
B	20	
A+B		



Example

Ellen and Sophia can complete a work in 20 days and 10 days respectively. But after working together for 4 days Ellen left, and the rest work was completed by Sophia. In how many days the total task will be completed?



$$-1 = (20) - 12$$

	Days	Efficiency
Ellen ✗	20	1
Sophia ✓	10	2
Ellen + Sophia		3

Work done in 4 days = 12

$$\text{Remaining Work} = \frac{8}{2} = 4 \text{ days.}$$

⇒ 8 days.

Example

$$T = \underline{\underline{60}}$$



Ellen and Sophia can complete a work in 12 days and 15 days respectively. In how many days the total task will be completed if they work alternatively starting with Ellen.

	Days	Efficiency
Ellen	12	5
Sophia	15	4

Handwritten solution:

1st 2nd

$\begin{matrix} \text{S} \\ \text{E} \end{matrix}$ $\begin{matrix} 4 \\ 5 \end{matrix}$

$\times 6$

2d = 9 units.

12d = 54 units.

13th = 59 units.

14th = $\frac{1}{4}$

13 $\frac{1}{4}$ days.

Efficiency and Time

Efficiency is inversely proportional to time.

Example:

If Ram is twice efficient as Laxman,
then Ram will take half of the time to finish the same job
as Laxman.



Example

Anjali takes 10 days to complete a task whereas Rahul takes 5 days to complete the same task. What is the ratio of their efficiency and who is less efficient.

	Time	Efficiency
Rahul	5	2
Anjali	10	1

Pipe P takes 10 hours to fill the tank where as Pipe Q takes 15 hours to fill the tank and Pipe R can empty the tank in 12 hour. How much time will be required for the tank to be filled if the Pipes were opened together simultaneously?



	Hours	Rate of Filling
P	10	6
Q	15	4
R	12	5
P+Q-R		5

$$T =$$

$$\frac{60}{5} = 12 \text{ hrs.}$$

$$\text{Number of hours} = \frac{\text{Total capacity}}{\text{Rate of filling}}$$

P, Q and R can complete a work in 6, 8, and 12 days respectively. All work together and after the completion of $(3/4)^{\text{th}}$ work Q left and the remaining work is completed by P and R together. Then in how many days the total work will be completed?



	No. of days	Efficiency
P	6	8
Q	8	6
R	12	4

18

$$\frac{3}{4} \times 48 = 36$$

$$1 = 48$$

2 days \rightarrow 36

Total work	$(3/4)^{\text{th}}$ th of work
48	36

$$- \frac{12 \text{ units}}{12} = 1 \text{ day}$$

A can do a piece of work in 20 days, B in 24 days and C in 30 days. They all start the work together, but A leaves after 4 days and B leaves 6 days before the work is completed. How many days did the work last?



	Days	Efficiency
A	20	6
B	24	5
C	30	4
A+B+C		15

$$T = 120$$

<u>A+B+C</u>	<u>B+C</u>	<u>C</u>
60	36	24
4d	4d	6d

14 days.

Application of Inverse Proportion



$$M_1 \times D_1 = M_2 \times D_2$$

$$\frac{M_1 \times D_1 \times H_1}{W_1} = \frac{M_2 \times D_2 \times H_2}{W_2}$$

$$M_1 \rightarrow D_1 \rightarrow h_1$$

$$M_2 \rightarrow D_2 \rightarrow h_2$$

$$M_1 d_1 h_1 = M_2 d_2 h_2$$

$$\begin{array}{ccc} M_1 d_1 h_1 & \nearrow & w_1 \\ M_2 d_2 h_2 & \searrow & w_2 \end{array}$$

\Rightarrow

$$M_1 d_1 h_2 w_2 = M_2 d_2 h_2 w_1$$

$$\frac{M_1 d_1 h_1}{w_1} = \frac{M_2 d_2 h_2}{w_2}$$

Example

If 20 boys can complete a task in 7 days, then how many boys can complete the same task in 28 days.

$$M_1 \times D_1 = M_2 \times D_2 = \text{Work done}$$

$$20 \times 7 = M_2 \times 28$$



Example

If 12 friends can drink 12 Dalgona coffees in 12 minutes, how long will 27 friends take to drink 27 such Dalgona coffees?

$$\frac{M_1 \times D_1 \times H_1}{W_1} = \frac{M_2 \times D_2 \times H_2}{W_2}$$

$$\frac{12 \times 12 \times 12}{12} = \frac{27 \times H_2}{27} \quad = 12 \text{ min.}$$

Question

I am twice as good as you and therefore able to finish my assignment in 30 days less than you. In how many days we can complete the whole work, working together.

(Placement Question)

	Efficiency
Me	2
You	1

3

$$T = x$$

Eff

$$T = \frac{60}{3} = 20 \text{ days}$$

$$\frac{x}{1}$$

$$\frac{x}{2}$$

$$\frac{x}{1} - \frac{x}{2} = 30 \text{ days}$$

$$\frac{2x - x}{2} = 30 \Rightarrow x = 60$$



$$T = 30$$



Sheena can build a wall in 10 days and Beena can demolish the same wall in 15 days. If they work alternatively starting from Sheena, then when will the wall build for the very first time? (Placement Question)

1st 2nd
3 -2

	No. of days	Efficiency
✓ Sheena	10	✓ 3
Beena	15	-2

2 days = $\times (1 \text{ unit})$ 27

54 days

55th

27 units.

30 units

55 days