

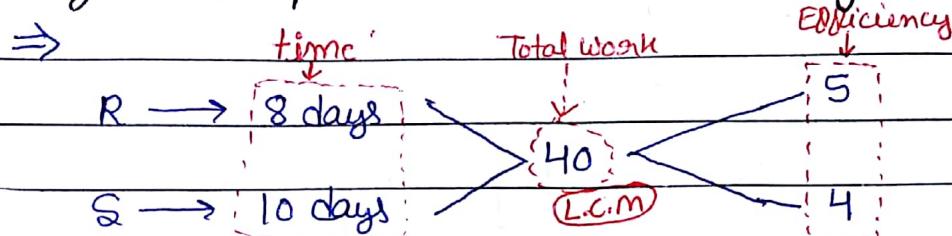
# TIME & WORK

SAGAR DAGAR

Q Ram can do a piece of work in 8 days

And Shyam can do the same work in 10 days.

If they are working together, the work will get completed in how many days?



$$R+S \rightarrow \frac{\text{Total Work}}{\text{Efficiency of } R \text{ and } S} = \frac{40}{5+4} = \frac{40}{9} = \underline{\underline{4\frac{4}{9} \text{ days}}}$$

Q A and B together can do a work in 12 days, which A alone can do in 30 days.

In how many days B alone will do it?

$\Rightarrow$

$$\begin{aligned} A+B &\rightarrow 12 \quad \text{Efficiency of } A+B \\ A &\rightarrow 30 \quad \text{Efficiency of } A \end{aligned}$$

$$\begin{aligned} \text{Total work} &= 60 \\ B &\rightarrow \frac{60}{3} = \underline{\underline{20 \text{ days}}} \\ \text{Eff. of } B &\rightarrow 5-2=3 \end{aligned}$$

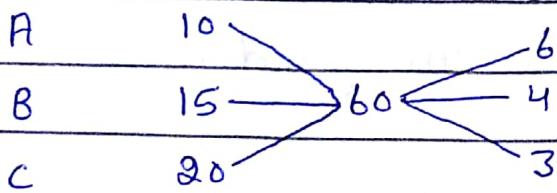
Q A can do a work in 25 days and B in 30 days. Both work together for 5 days then A left. How many days will B take to complete the work?

$$\begin{aligned} A &\rightarrow 25 \quad \text{Eff. of } A \\ B &\rightarrow 30 \quad \text{Eff. of } B \end{aligned}$$

$$B \rightarrow \frac{100-9 \times 5}{5} = \frac{55}{5} = \underline{\underline{11 \text{ days}}}$$

Q A, B and C can do a work in 10, 15 and 20 days respectively. If they are working together, in how many days the work will complete.

⇒



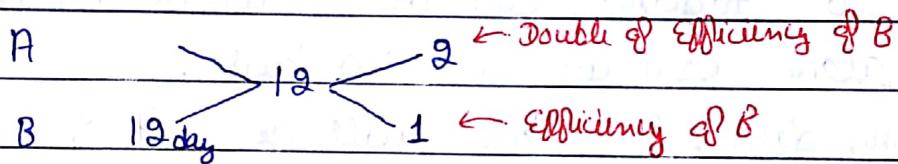
$$A+B+C \rightarrow \frac{60}{6+4+3} = \frac{60}{13} = 4\frac{8}{13} \text{ days}$$

Ans

Q A's efficiency is twice of B's efficiency.

B alone can do it in 12 days, if they are working together, in how many days will work complete.

⇒



$$A+B \rightarrow \frac{12}{2+1} = \frac{12}{3} = 4 \text{ days}$$

OR

|                |          |                            |                   |
|----------------|----------|----------------------------|-------------------|
| A              | B        | Both                       | (A+B) efficiency. |
| Efficiency → 2 | 1        | $1 \times 12 = 3 \times ?$ |                   |
|                |          |                            | $? = 4$           |
|                | ↓        |                            | <u>Ans</u>        |
|                | 12 days. |                            |                   |

Q A's capacity is 40% more than B's capacity.

B alone can finish a work in 14 days.

then A alone will finish same work in ?.

⇒

$$40\% \rightarrow \frac{2}{5} \leftarrow B \text{ efficiency.}$$

$$\text{Efficiency of A} \rightarrow 7$$

$$5 \times 14 = 7 \times ?$$

$$? = 10 \text{ days}$$

Q A is 50% more efficient than B. C does half of the work done by A and B together.

Q C alone can finish work in 40 days, in how many days A, B, C together do it?

$$\Rightarrow \frac{1}{C} = \frac{1}{A+B}$$

$$\text{Efficiency} \quad \frac{1}{\downarrow} : 2 \\ 40 \text{ days}$$

$$1 \times 40 = 3 \times ?$$

$$? = \frac{40}{3} = \underline{\underline{13\frac{1}{3} \text{ days}}}$$

Q A's capacity is thrice of B, so A takes 60 days less than B to complete work. If they are working together, in how many days the work will be completed?

$$\Rightarrow A \quad B$$

$$\text{Efficiency} \rightarrow 3 : 1$$

$$\text{time} \rightarrow 1 : 3$$

30 days

$$\begin{array}{ccc} A & 30 & \nearrow 3 \\ & 90 & \searrow 1 \end{array}$$

$$A+B \rightarrow \frac{90}{4} = 22\frac{3}{4} = \underline{\underline{22\frac{1}{2} \text{ days}}}$$

Ans

Q B's capacity is thrice of A,

so A takes 12 days more than B.

Q they are working together, in how many days the work will finish.

$$\Rightarrow B \quad A$$

$$\text{Efficiency} \rightarrow 3 : 1$$

$$\text{time} \rightarrow 1 : 3 \rightarrow 18 \text{ days}$$

6 days

$$\begin{array}{ccc} B & 6 & \nearrow 3 \\ & 18 & \searrow 1 \end{array}$$

$$A+B \rightarrow \frac{18}{4} = \underline{\underline{4\frac{1}{2} \text{ days}}}$$

Ans

$$\text{Total work} = \text{Time} \times \text{Efficiency}$$

Q A starts a work and after working on it for 4 days, he leaves and B finish the remaining work in 18 days. If A work for 6 days and B finish remaining work in 12 days, in what time A and B will finish work, working individually.

⇒

|    | A           | B           |
|----|-------------|-------------|
| I  | 4 days      | 18 days     |
| II | 6 days      | 12 days     |
|    | 2 days more | 6 days less |

A 2 day → B 6 days

A 1 day → B 3 days

| A            | B | A                                   | B      |
|--------------|---|-------------------------------------|--------|
| time = 1 : 3 |   | 4 day                               | 18 day |
| Eff. 3 : 1   |   | Total work = $4 \times 3 + 18 = 30$ |        |

$A \rightarrow \frac{30}{3} = 10 \text{ days}$

$B \rightarrow \frac{30}{1} = 30 \text{ days}$

Q A takes 4 days more and B takes 9 days more than the total time taken by A and B working together to finish the work. In how many days will A and B finish the work working together.

⇒

A 4 day more than A+B

B 9 day more than A+B

$$A+B \rightarrow \sqrt{4 \times 9} = \sqrt{36} = 6 \text{ days}$$

(Alternate days) →

- Q A can do a work in 10 days and B can do the same work in 15 days. If they are working alternate days, in how many days the work will finish?

$$\Rightarrow \begin{array}{l} A \text{ 10 day} \\ B \text{ 15 day} \end{array} \rightarrow 30 \leftarrow \frac{3}{2}$$

$$\frac{30}{5} = 6 \text{ days} \rightarrow 12 \text{ days } \underline{\text{Ans}}$$

- Q A can do a work in 12 days, B in 18 days. If working alternate days, in how many days work will finish.

$$\Rightarrow \begin{array}{l} A \text{ 12} \\ B \text{ 18} \end{array} \rightarrow 36 \leftarrow \frac{3}{2}$$

$$\frac{36}{5} = 7 + \text{Extra} \rightarrow 14 \text{ days}$$

$$\left( \frac{1}{3} \text{ days} \right) = 14 + \frac{1}{3} = 14\frac{1}{3} \text{ days } \underline{\text{Ans}}$$

- Q A and B complete a work in 8 and 12 days respectively. If A starts the work and they working alternate days, in how many days work finish.

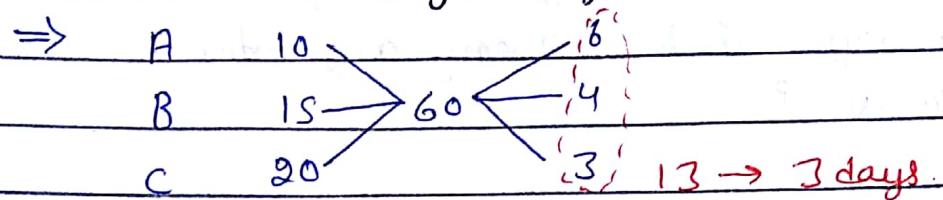
$$\Rightarrow \begin{array}{l} A \text{ 8} \\ B \text{ 12} \end{array} \rightarrow 24 \leftarrow \frac{3}{2}$$

$$\frac{24}{5} = 4 \text{ day} + \frac{4}{5} \text{ Extra.}$$

$$\frac{3}{3} + \frac{1}{2} = 1\frac{1}{2} \text{ day} \rightarrow 8 \text{ days}$$

$$8 \text{ day} + 1\frac{1}{2} \text{ day} = 9\frac{1}{2} \text{ days } \underline{\text{Ans}}$$

Q A, B, C can complete work in 10, 15, 20 days respectively. If they are working alternate days, in how many days work will finish?



$$\frac{60}{13} = 4 + \frac{8}{13} \leftarrow \text{Extra } 8$$

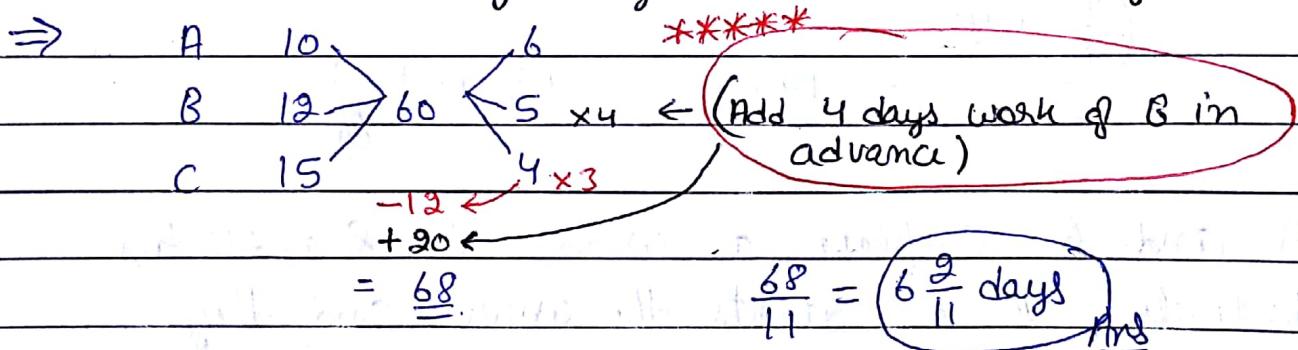
(12 days)

$$\frac{6}{6} + \frac{9}{9} = 1\frac{1}{2} \text{ days.}$$

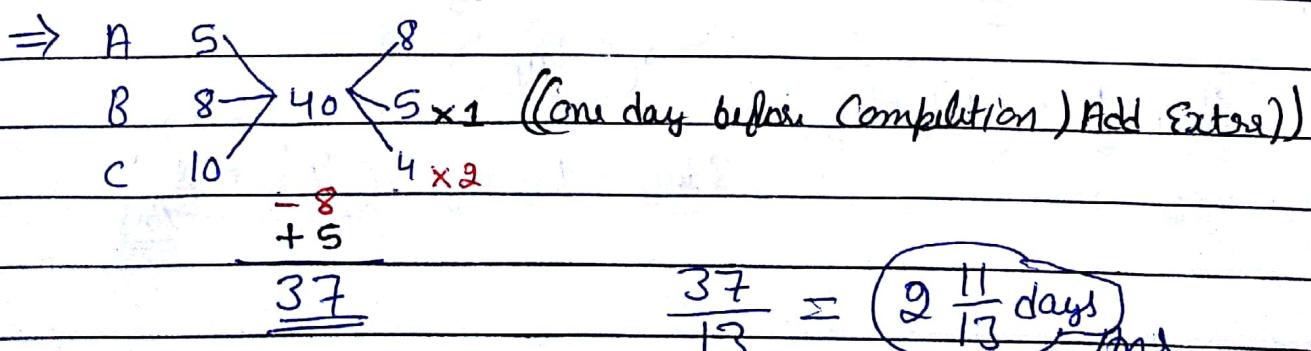
$$12 + 1\frac{1}{2} = 13\frac{1}{2} \text{ days. Ans}$$

Q A, B, C can do a piece of work in 10, 12, 15 days respectively. They start working together but C leaves after working for 3 days and B 4 days before its completion.

In how many days the work was finished



Q A, B, C can finish work in 5, 8, 10 days. They start working together but C left after 2 days and B 1 day before its completion. In how many days work will finish.



Q A and B can finish a work in 12 days. B and C finish in 16 days. A work for 5 days, B work for 7 days and C work for 13 days.

In how many days, C alone can do it?

$$\Rightarrow A+B \quad 12 > 48 < 4 \\ B+C \quad 16$$

A 5 day  
B 7 day  
C 13 day

$$(A+B) 5 \text{ day} + (B+C) 2 \text{ day} + 11C = 48$$

$$4 \times 5 + 2 \times 3 + 11C = 48$$

$$11C = 22$$

$$C \text{ 11 day} \rightarrow 22$$

$$22 \rightarrow 11 \text{ days}$$

$$48 \rightarrow \frac{11}{22} \times 48 = (24 \text{ days}) \text{ Ans}$$

### CHAIN RULE $\Rightarrow$

$$\frac{m_1 d_1 h_1}{w_1} = \frac{m_2 d_2 h_2}{w_2}$$

$m_1, m_2 \rightarrow$  no. of men / women / children

$d_1, d_2 \rightarrow$  Day

$w_1, w_2 \rightarrow$  work

Q  $\frac{1}{48}$ th of work is completed in half day by 5 person, then  $\frac{1}{40}$ th of the work can be completed by 6 persons in how many days?

$$\Rightarrow \frac{1}{2} \times 5 \times 48 = \frac{40}{1} \times 6 \times d$$

$$d = \left(\frac{1}{2} \text{ day}\right) \text{ Ans}$$

Q 120 workers can complete a piece of work in 85 days and each worker works 10 hours per day. All workers start the work, after 10 days all goes to strike. Due to strike 25 days work remains stop.

How many more workers should be employed to finish the remaining work if each worker work 8 hours per day.

⇒

$$120 \times 85 \times 10 = 120 \times 10 \times 10 + 120 \times 75 \times 10$$

Total Work

If there is no strike

$$\frac{15}{120} \times 75 \times 10 = (120+m) \times 50 \times 8$$

$$225 = 120 + m \Rightarrow m = 105$$

Ans

Q 40 workers can complete a piece of work in 36 days and each worker works 8 hours per day. All workers start the work, after 20 days all goes to strike.

Due to strike 6 days work remain stop and 10 workers left the work. How many more workers should be employed to finish the remaining work. If each a worker work 4 hours per day.

$$\Rightarrow 40 \times 36 \times 8 = 40 \times 8 \times 20 + (40 \times 8 \times 16)$$

Total Work

If there is no strike

$$40 \times 8 \times 16 = (30+m) \times 10 \times 4$$

$$128 - 30 = m$$

$$m = 98 \text{ more men}$$

Ans

① In an army camp Ration(Food) is available for 100 soldiers for 10 days. After 2 days 60 more soldier joins. Find in how many days remaining Ration(Food) lasts?

$$\Rightarrow \frac{100 \times 10}{\text{Total Food}} = 100 \times 2 + \frac{100 \times 8}{\text{if No one comes Extra}}$$

$$100 \times 8 = 160 \times D$$

$$D = \boxed{5 \text{ days}} \text{ Ans}$$

② 6 men and 8 boys can complete a work in 10 days. Where 26 men and 48 boys can complete it in 2 days. How many days will 10 men and 20 boys take to finish the same work.

$$\Rightarrow (6m + 8b) 10 = (26m + 48b) 2$$

$$30m + 40b = 26m + 48b$$

$$4m = 8b \quad , \quad m = 2b$$

$$(10m + 20b) D = (6m + 8b) 10 \quad \boxed{\text{put } m=2b}$$

$$40b D = 20b \quad \boxed{D = 5 \text{ days}} \text{ Ans}$$

③ 2 men and 3 boy can complete a work in 10 days. Where as 8 men and 2 boy can complete it in 5 days.

How many days will 2 men and 8 boy take to finish same.

$$\Rightarrow (2m + 3b) 10 = (8m + 2b) 5$$

$$\Rightarrow 4m + 6b = 8m + 2b$$

$$\boxed{b = m}$$

$$(2m + 8b) D = (8m + 2b) 5 \quad \boxed{\text{but } m=b}$$

$$D = \boxed{5 \text{ days}} \text{ Ans}$$

Q 12 men or 15 boys can do a work in 10 days.  
Find in how many days 4 men and 10 boys will do the same work.

$$\Rightarrow 12m = 15b \Rightarrow 4m = 5b$$

$$(4m + 10b) D = 15b \times 10$$

$$(5b + 10b) D = 15b \times 10$$

$$D = 10 \text{ Days } \text{Ans}$$

Q A and B together can do double the work then C, whereas B and C together can do twice the work done by A.  
If together they can finish a work in 12 days, in how many days A alone will do it.

$$\Rightarrow B+C : A \\ 3 : 1$$

$$(A+B+C) 12 = A \times D$$

$$4A \times 12 = A \times D$$

$$D = 48 \text{ Days } \text{Ans}$$

Q 1 man or 2 women or 3 boys can finish a work in 44 days. 1 man and 2 women and 3 boys will do the same work in how many days?

$$\Rightarrow 1m = 2w = 3b \rightarrow 44 \text{ days}$$

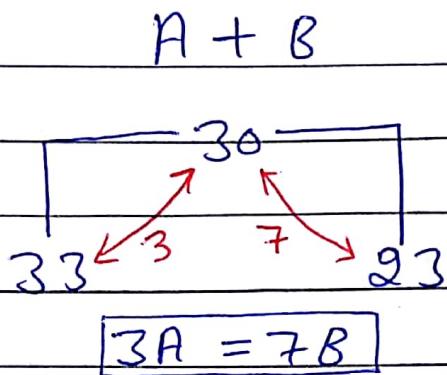
$$(1m + 2w + 3b) D = 3b \times 44$$

$$(3b + 3b + 3b) D = 3b \times 44$$

$$D = \frac{44}{3} = 14 \frac{2}{3} \text{ days } \text{Ans}$$

Q A and B complete a work in 30 days. They start work together. After 23 days B left the work and the work was completed in 33 days. In how many days A alone will do it?

⇒



$$3A = 7B$$

$$(A+B)30 = A \times D$$

$$\left(A + \frac{3A}{7}\right)30 = A \times D$$

$$\frac{10A}{7} \times 30 = A \times D$$

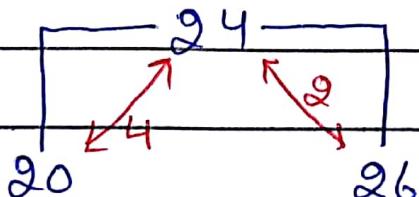
$$D = \frac{300}{7} = 42\frac{6}{7} \text{ days}$$

Ans

Q A and B do a work in 24 days, in how many days A alone complete  $\frac{2}{3}$ rd of the total work, if they are working together and after 20 days A left the work and work completed in 26 days by B.

⇒

A + B



$$4A = 2B \Rightarrow 2A = B$$

$$(A+B)24 = \frac{A \times 3 \times D}{2}$$

$$(2A)24 \times \frac{2}{3} = A \times D$$

$$D = 48 \text{ days}$$

Ans

# Pipe & Cistern

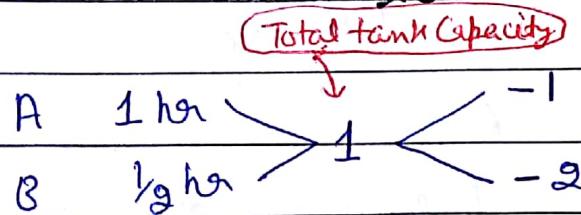
Q A tap can empty a tank in 1 hour.

A second tap can empty it in 30 minutes.

If both taps are opened simultaneously.

How much time is needed to empty the tank?

$\Rightarrow$



$$\frac{1}{3} \text{ hour} \Rightarrow \frac{1}{3} \text{ hr} \Rightarrow \underline{\text{20 minutes}}$$

Q Two pipes can fill a cistern separately in 10 hours and 15 hours. They can together fill the cistern in ?

$$\Rightarrow A \quad 10 \quad B \quad 15 \quad \frac{30}{5} = \underline{6 \text{ hours}}$$

Q If three fifth of a system is filled in 1 minute, the time needed to fill the rest is .

$$\Rightarrow \frac{3}{5} \text{ th} \rightarrow 1 \text{ minute}$$

$$\frac{2}{5} \text{ th} \rightarrow ?$$

$$1 \text{ min} \times \frac{2}{5} = \frac{3}{5} \times T$$

$$T = \frac{2}{3} \text{ minute} = \underline{40 \text{ seconds}}$$

Q A pipe can fill a tank with water in 3 hours. Due to leakage in bottom, it takes 3.5 hours to fill it. In what time the leak will empty the fully filled tank?

$\Rightarrow$

$$\begin{array}{ccc} A & 3 \text{ hr} & \rightarrow 21 \leftarrow 7 \xleftarrow{\text{A efficiency}} \\ A+B & \frac{7}{2} \text{ hr} & \rightarrow 21 \leftarrow 6 \end{array}$$

$$B \text{ efficiency} = -1$$

$$B \rightarrow \frac{21}{-1} = \underline{\underline{21 \text{ hours}}}$$

Q a cistern is normally filled in 8 hours but takes another 2 hours longer to fill because of a leak in its bottom. If the cistern is full, the leak will empty it in

$\Rightarrow$

$$\begin{array}{ccc} A & 8 & \rightarrow 40 \leftarrow 5 \xleftarrow{\text{A efficiency}} \\ A+B & 10 & \rightarrow 40 \leftarrow 4 \end{array}$$

$$B \text{ efficiency} = -1$$

$$\frac{40}{-1} = \underline{\underline{40 \text{ hours}}}$$