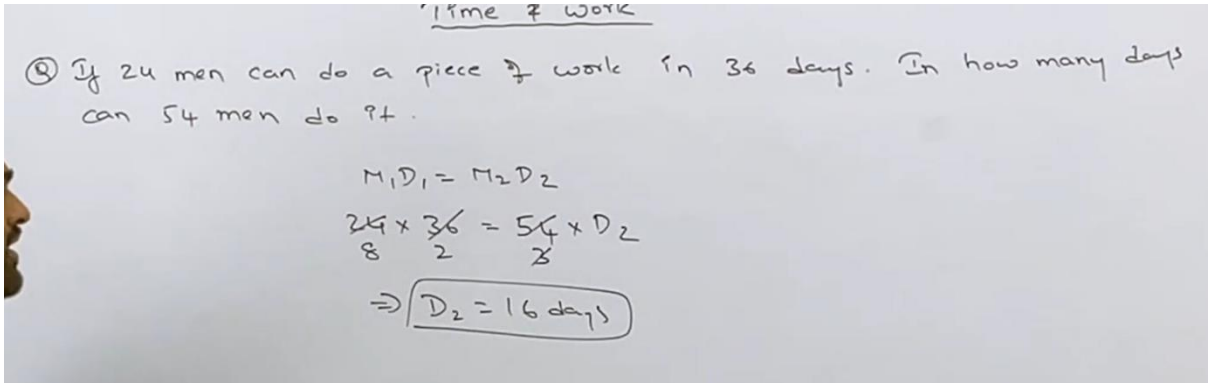
TIME &WORK



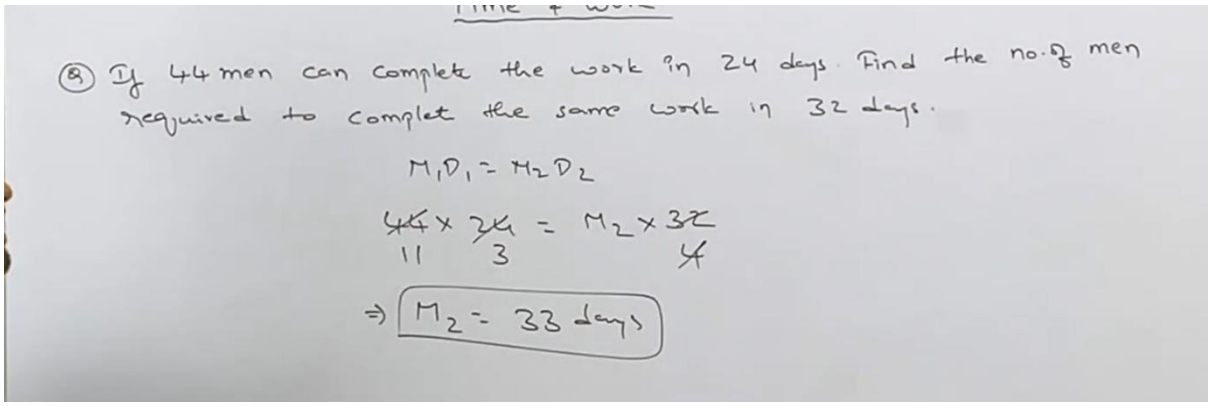
Time & work

Q) If 24 men can do a piece of work in 36 days. In how many days can 54 men do it.

$M_1D_1 = M_2D_2$

$24 \times 36 = 54 \times D_2$

$\Rightarrow D_2 = 16$ days

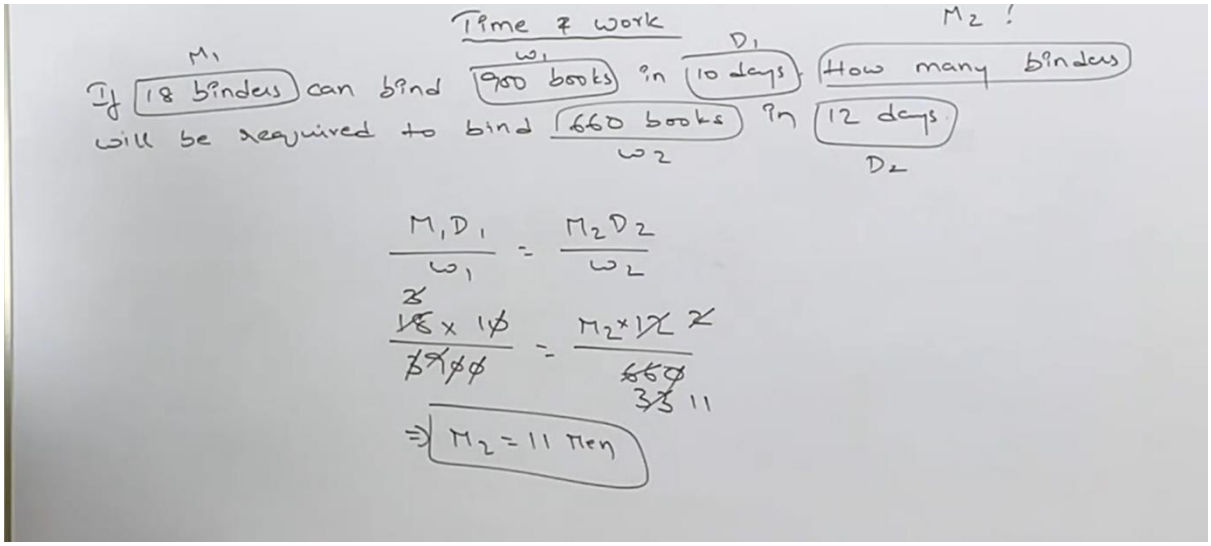


Q) If 44 men can complete the work in 24 days. Find the no. of men required to complete the same work in 32 days.

$M_1D_1 = M_2D_2$

$44 \times 24 = M_2 \times 32$

$\Rightarrow M_2 = 33$ days



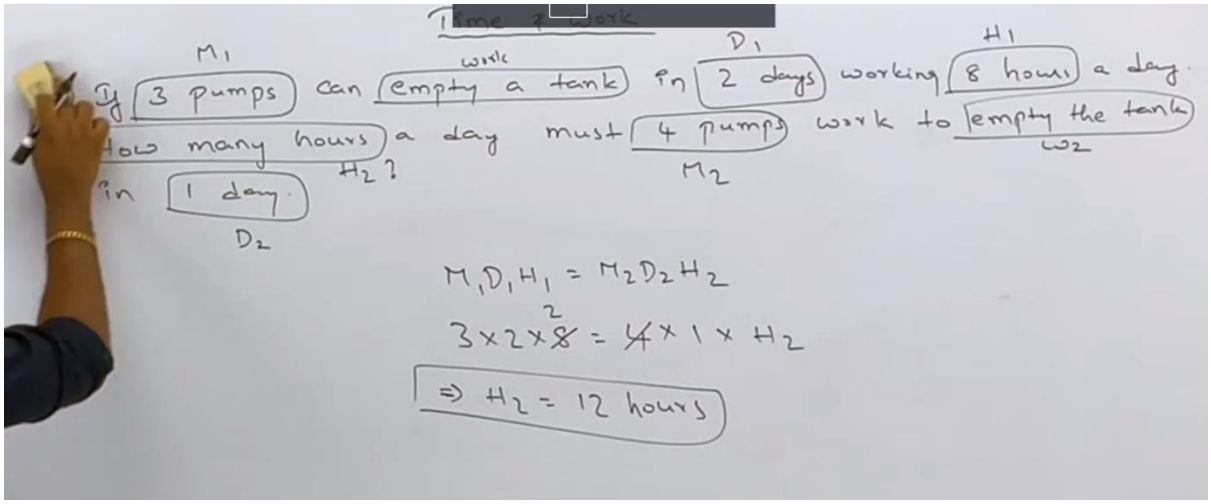
Time & work

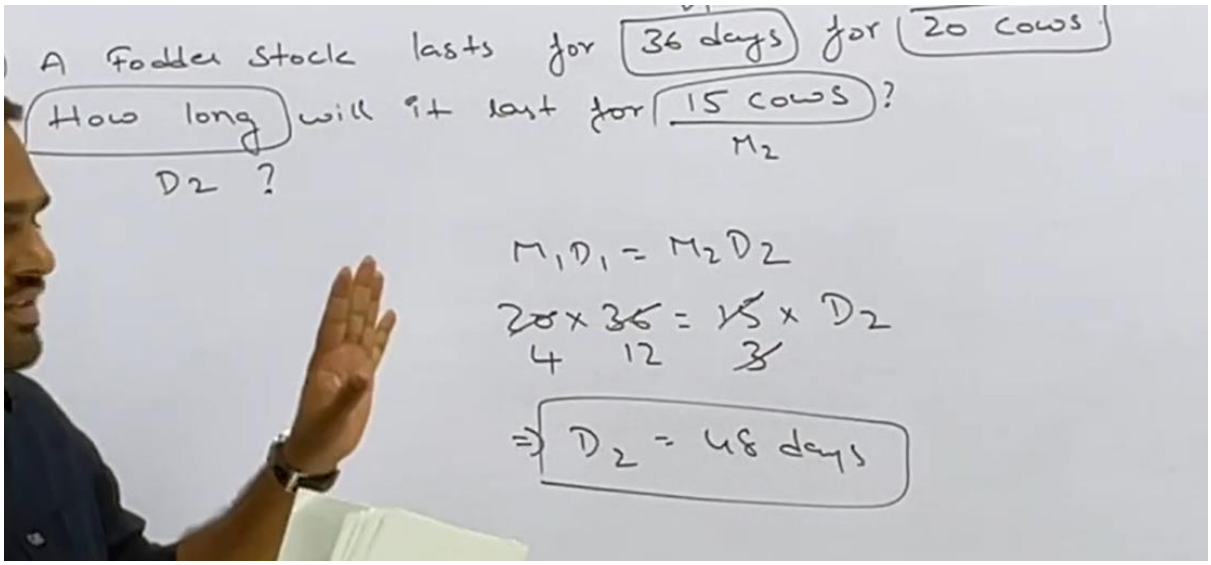
If 18 binders (M_1) can bind 900 books (W_1) in 10 days (D_1). How many binders (M_2) will be required to bind 660 books (W_2) in 12 days (D_2)

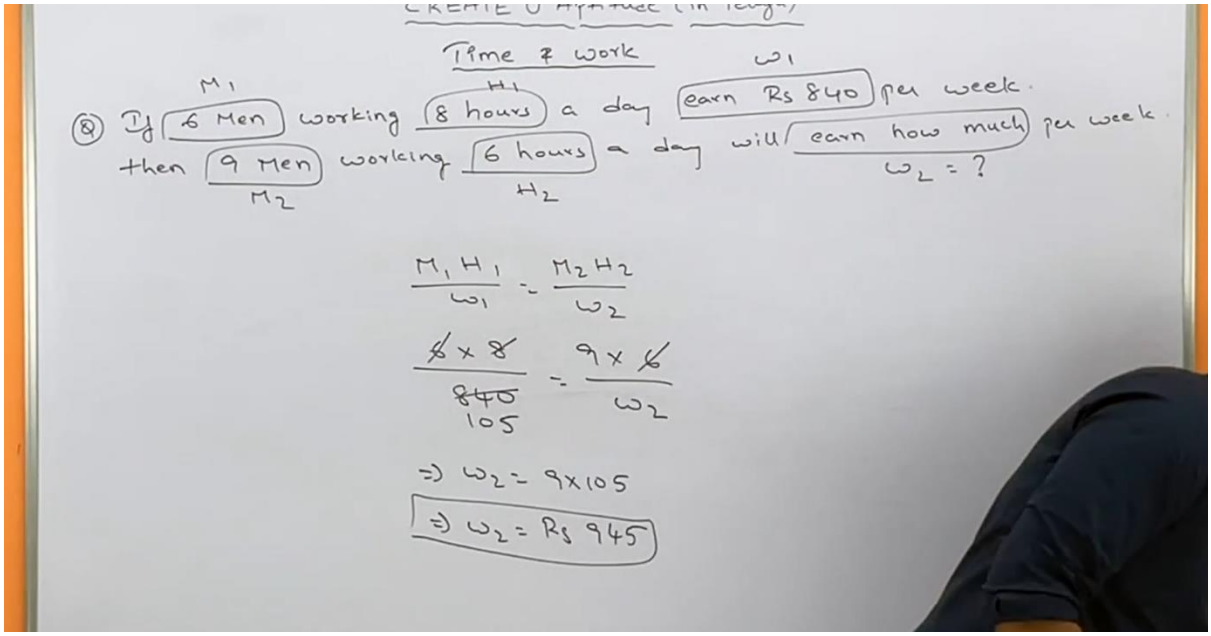
$\frac{M_1D_1}{W_1} = \frac{M_2D_2}{W_2}$

$\frac{18 \times 10}{900} = \frac{M_2 \times 12}{660}$

$M_2 = 11$ men


Time & Work
If 3 pumps (M_1) can empty a tank (work) in 2 days (D_1) working 8 hours (H_1) a day.
How many hours (H_2) a day must 4 pumps (M_2) work to empty the tank (W_2) in 1 day (D_2)
$M_1D_1H_1 = M_2D_2H_2$
$3 \times 2 \times 8 = 4 \times 1 \times H_2$
$\Rightarrow H_2 = 12$ hours


A Fodder stock lasts for 36 days (D_1) for 20 cows (M_1).
How long (D_2) will it last for 15 cows (M_2)?
$M_1D_1 = M_2D_2$
$20 \times 36 = 15 \times D_2$
$\Rightarrow D_2 = 48$ days


Time & work
(8) If 6 Men (M_1) working 8 hours (H_1) a day earn Rs 840 (W_1) per week.
then 9 Men (M_2) working 6 hours (H_2) a day will earn how much ($W_2 = ?$) per week.
$\frac{M_1H_1}{W_1} = \frac{M_2H_2}{W_2}$
$\frac{6 \times 8}{840} = \frac{9 \times 6}{W_2}$
$\Rightarrow W_2 = 9 \times 105$
$\Rightarrow W_2 = Rs\ 945$

Time & Work

① 16 Men (M_1) can do a job in 30 Days (D_1). Till 10 days 16 Men — After 10 days, 6 Men left.
In how many days, the remaining work will be finished ?

$M_1D_1 = M_2D_2$ (−6 Men)

$16 \times 30 = (16 \times 10) + (10 \times D_2)$

$480 = 160 + 10D_2$

$\Rightarrow 10D_2 = 480 - 160$

$\Rightarrow 10D_2 = 320$

$\Rightarrow D_2 = \frac{320}{10} = 32$ days

$M_1D_1 = M_2D_2$,

$16 \times 30 = (16 \times 10) + (10 \times D_2)$

$480 = 160 + (10 \times D_2)$

$10 \times D_2 = 320$

$D_2 = 32$ days

Time & Work

② 12 Men (M_1) can complete the work in 8 days (D_1). 3 Days after they started the work, 3 more men joined them.
In how many days, remaining work will be completed.

$M_1D_1 = M_2D_2$ (+3M)

$12 \times 8 = (12 \times 3) + (15 \times D_2)$

$96 = 36 + (15 \times D_2)$

$15 \times D_2 = 96 - 36$

$15 \times D_2 = 60^4$

$\Rightarrow D_2 = 4$ days

Time & work

(Q) A certain work can be done in a certain time by 36 Men. But, had there been 9 men more, it could have been done in 5 days less. In how many days, 20 Men can do the same work?

$M_1D_1 = M_2D_2$

$36 \times D_1 = (36+9) \times (D_1 - 5)$

$36D_1 = 45(D_1 - 5)$

$36D_1 = 45D_1 - 225$

$\Rightarrow 45D_1 - 36D_1 = 225$

$\Rightarrow 9D_1 = 225$

$\Rightarrow D_1 = 25$ days

$M_1D_1 = M_2D_2$

$36 \times 25 = 20 \times D_2$

$D_2 = 45$ days

(Q) 3M or 4W can complete the work in 43 days. How long will 7M and 5W take to complete it.

Sol: $\dfrac{\text{No of Days}}{\frac{QM}{IM} + \frac{QW}{IW}} = \dfrac{43}{\frac{7}{3} + \frac{5}{4}}$

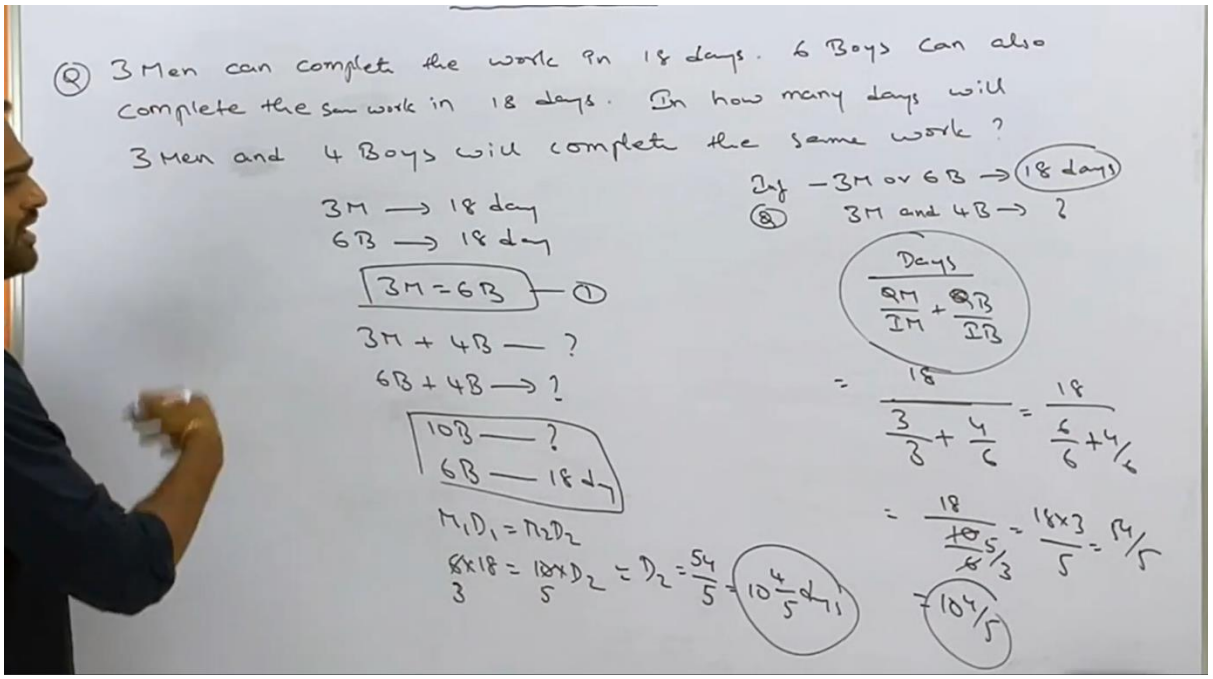
$= \dfrac{43}{\frac{28+15}{12}}$

$= \dfrac{43}{\frac{43}{12}} \Rightarrow 12$ days

Q) If 10 Men (or) 12 women can do a work in 16 days.
In how many days can 15 Men (and) 6 women together do it?

$$\frac{\text{Days}}{\frac{\text{Q}_M}{\text{I}_M}+\frac{\text{Q}_W}{\text{I}_W}} = \frac{16}{\frac{3\cancel{15}}{\cancel{10}_2}+\frac{1\cancel{6}}{\cancel{12}_2}} = \frac{16}{\frac{\cancel{4}}{\cancel{2}}2} = \frac{16}{2}$$

$= 8$ days



Q) 3 Men can complete the work in 18 days. 6 Boys can also complete the same work in 18 days. In how many days will 3 Men and 4 Boys will complete the same work?

Inf $-$ 3M or 6B $\rightarrow$ (18 days)

Q) 3M and 4B $\rightarrow$?

3M $\longrightarrow$ 18 day
6B $\longrightarrow$ 18 day

$3M = 6B$ — (1)

3M + 4B — ?
6B + 4B $\longrightarrow$?

10B — ?
6B — 18 d

$M_1D_1 = M_2D_2$

$\frac{6}{3}\times 18 = 10\times D_2 \Rightarrow D_2 = \frac{54}{5} = 10\frac{4}{5}$ days

$$\frac{\text{Days}}{\frac{\text{Q}_M}{\text{I}_M}+\frac{\text{Q}_B}{\text{I}_B}} = \frac{18}{\frac{3}{3}+\frac{4}{6}} = \frac{18}{\frac{6}{6}+\frac{4}{6}}$$

$$= \frac{18}{\frac{10}{6}\,5/3} = \frac{18\times 3}{5} = 14/5$$

$= 10\frac{4}{5}$

A = 20

B = 30

$A+B \rightarrow \frac{\text{Product}}{\text{Sum}} = \frac{P}{S}$

$\rightarrow \frac{20\times30}{20+30} = \frac{\overset{4}{\cancel{20}}\times\cancel{30}}{\cancel{50}} = 12 \text{ days}$

$A+B \rightarrow$ 12 days

$A \rightarrow$ 20 days

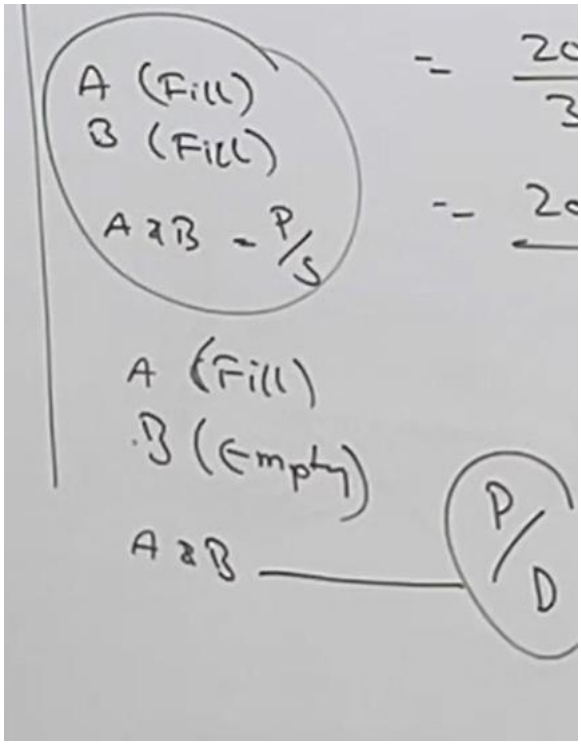
$B \rightarrow$?

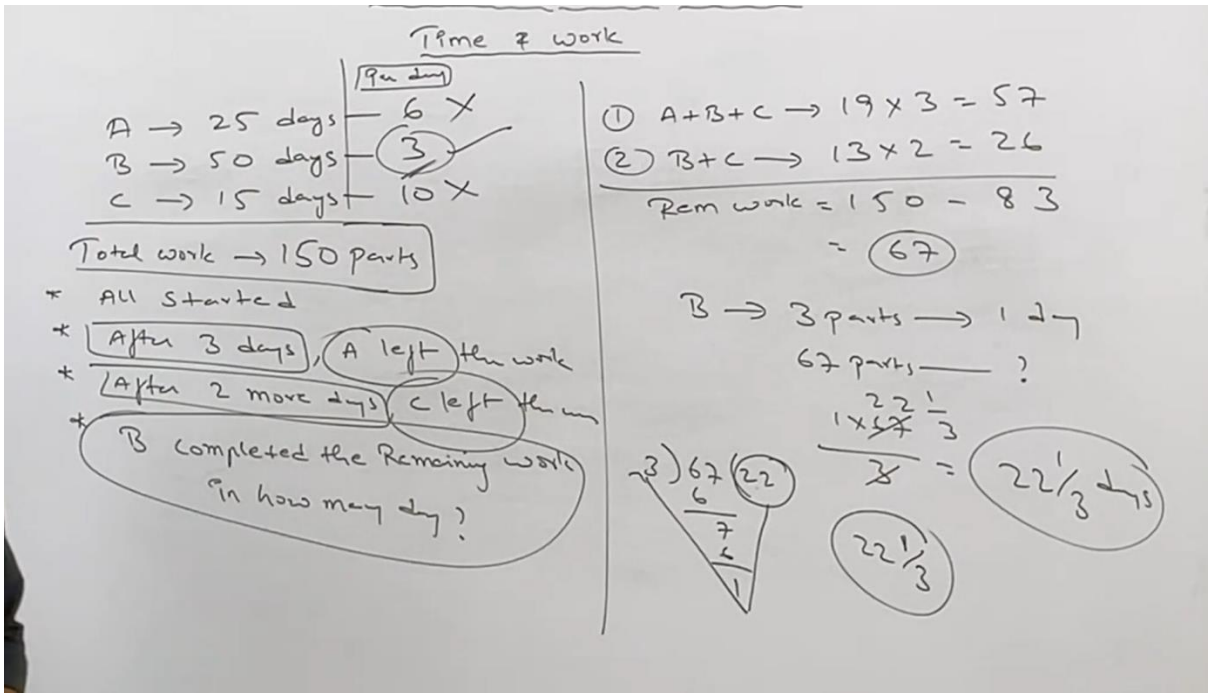
$B \rightarrow \frac{\text{Product}}{\text{Dif}} = \frac{P}{D}$

$\rightarrow \frac{20\times12}{20-12}$

$\rightarrow \frac{\overset{10}{\cancel{20}}\times12\times3}{\cancel{8}_{2}}$

$B \Rightarrow$ 30 days


A (Fill)
B (Fill)
A & B - P/S
A (Fill)
B (Empty)
A & B
P/D


Time & work
Rem day
A → 25 days — 6 X
B → 50 days — 3
C → 15 days — 10 X
Total work → 150 parts
* All started
* After 3 days, A left the work
* After 2 more days, C left the work
* B completed the Remaining work
In how many day?
① A+B+C → 19 × 3 = 57
② B+C → 13 × 2 = 26
Rem work = 150 − 83
= 67
B → 3 parts → 1 day
67 parts → ?
22 1/3
1 × 67/3 = 22 1/3 days
3) 67 (22
6
7
6
1
22 1/3

Time & Work

(Q) A can complete the work in 18 days, B alone can do it in 30 days, 'C' can complete it in 15 days. All three started the work together, but after 4 days, C left the work. After 3 more days, A also has left the work.

(Q) B completed the Remaining work in how many days?

(Q) Total work got completed in how many days?

Sol

		Per day
A	18 d	5 X
B	30 d	3
C	15 d	6 X

Total work = 90 parts

① A+B+C → 14 × 4 = 56

② A+B → 8 × 3 = 24

Rem work → 90 − 80

Rem — $10/3 = 3\frac{1}{3}$ days — Rem work

Total work — $3\frac{1}{3} + 4 + 3 = 10\frac{1}{3}$ days — Total work

Time & Work

① A, B, C & D can complete the work in 20, 25, 50 & 40 days respectively. A & B together started the work. But after 3 days, C joined. After 2 more days, D joined. After 2 more days, A & B left the work.

(Q) C & D completed the Remaining work in how many day?

(Q) Total work got completed in how many days?

Sol

		Per day
A	20	10 X
B	25	8 X
C	50	4
D	40	5

T.W → 200

① A+B → 18 × 3 = 54

② A+B+C → 22 × 2 = 44

③ A+B+C+D → 27 × 2 = 54

C+D → 9 — 1 day

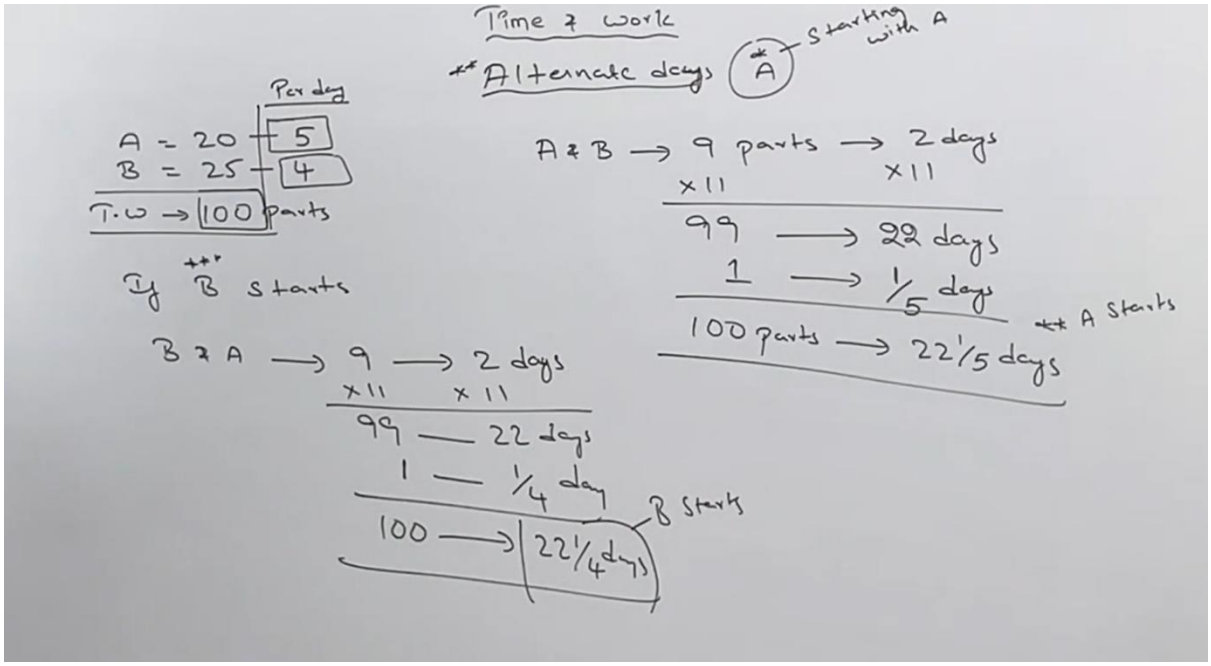
R.W → 48 — ?

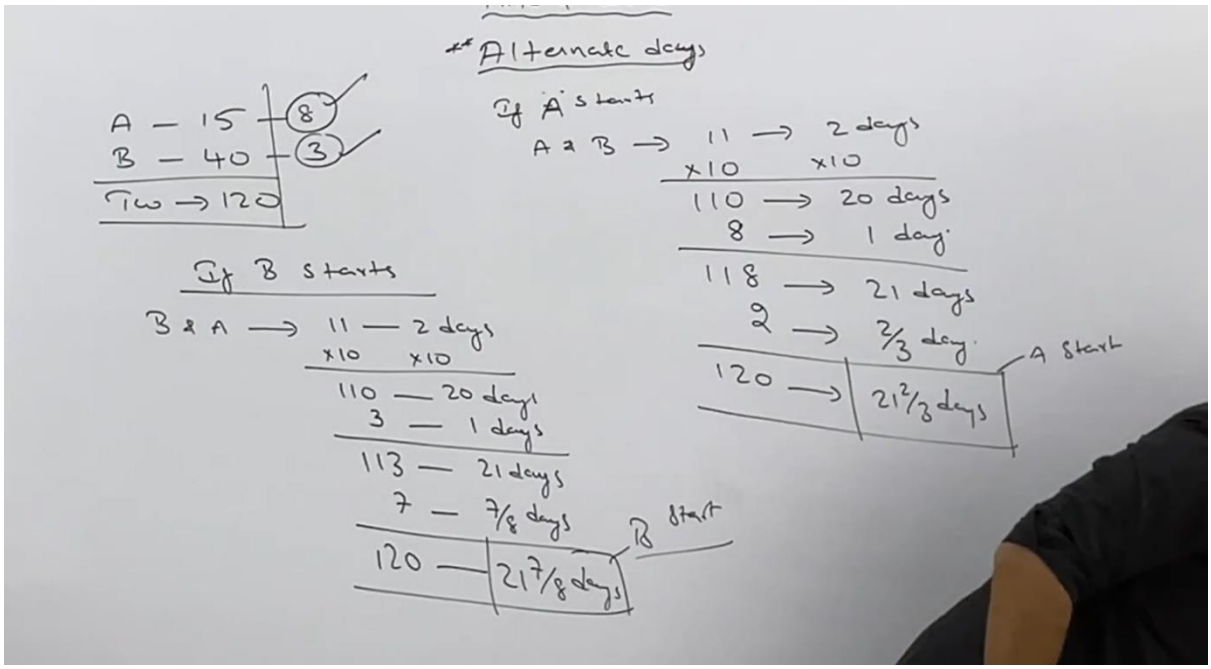
48 × 1 / 9

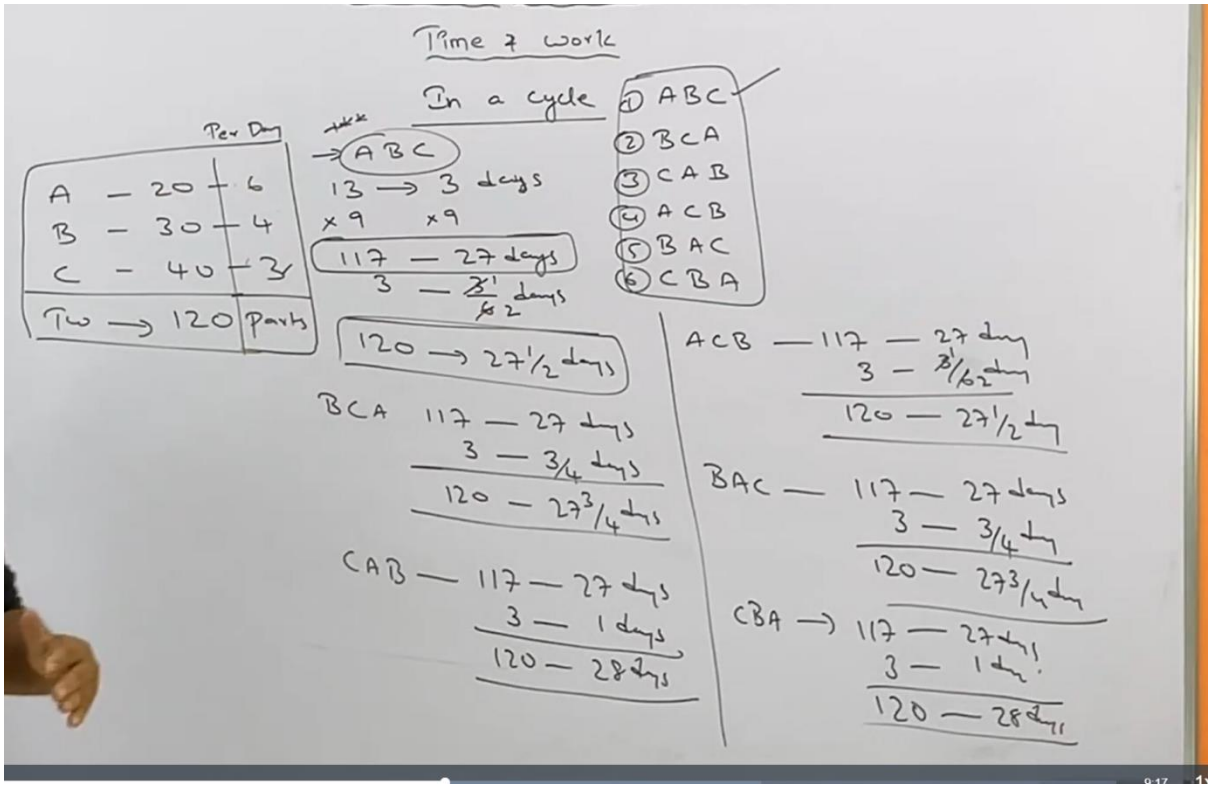
(Q) Rem work → 200 − 152 = 48

$48/9 = 5\frac{1}{3}$ days — Rem work

(Q) Total work → $5\frac{1}{3} + 3 + 2 + 2 = 12\frac{1}{3}$ days — Total work


Time & work
** Alternate days
A
starting with A
Per day
A = 20 — 5
B = 25 — 4
T.W → 100 parts
If B starts
A & B → 9 parts → 2 days
×11 ×11
99 → 22 days
1 → 1/5 days
100 parts → 22 1/5 days
** A starts
B & A → 9 → 2 days
×11 ×11
99 — 22 days
1 — 1/4 day
100 → 22 1/4 days
B starts


** Alternate days
A — 15 — 8
B — 40 — 3
Tw → 120
If A starts
A & B → 11 → 2 days
×10 ×10
110 → 20 days
8 → 1 day
118 → 21 days
2 → 2/3 day
120 → 21 2/3 days
A start
If B starts
B & A → 11 — 2 days
×10 ×10
110 — 20 days
3 — 1 days
113 — 21 days
7 — 7/8 days
120 — 21 7/8 days
B start


Time & Work
In a cycle
Per Day
A — 20 — 6
B — 30 — 4
C — 40 — 3
Tw → 120 Parts
ABC
13 → 3 days
×9 ×9
117 — 27 days
3 — 3/2 days
120 → 27 1/2 days
1. ABC
2. BCA
3. CAB
4. ACB
5. BAC
6. CBA
BCA 117 — 27 days
3 — 3/4 days
120 — 27 3/4 days
CAB — 117 — 27 days
3 — 1 days
120 — 28 days
ACB — 117 — 27 days
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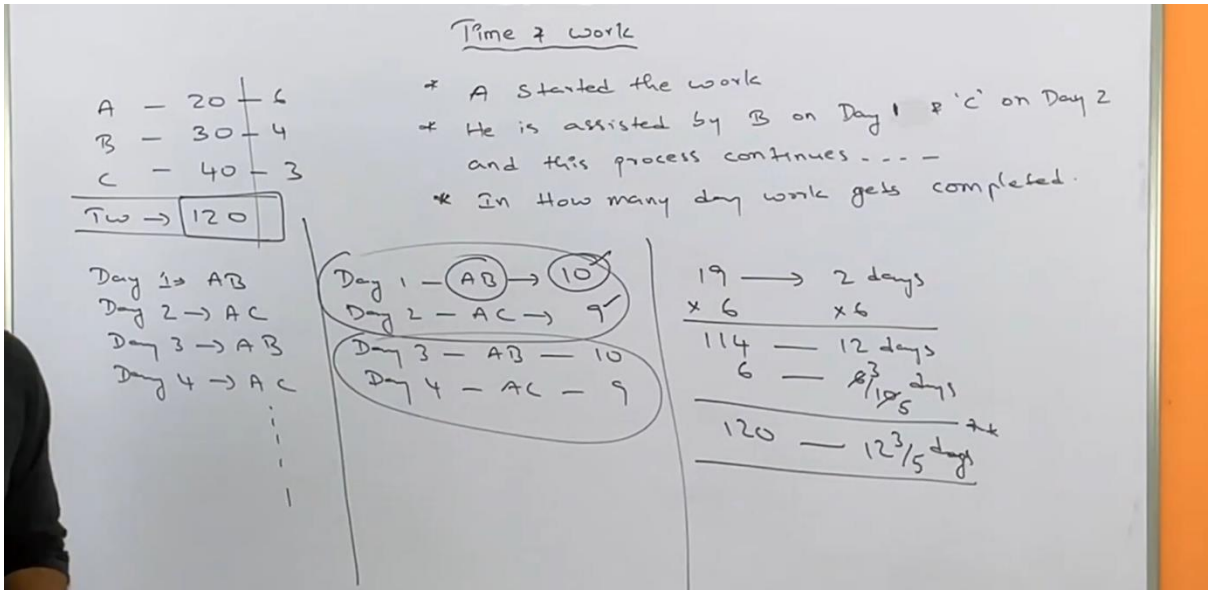
Time & Work
A — 20 — 6
B — 30 — 4
C — 40 — 3
Tw → 120
* A started the work
* He is assisted by B on Day 1 & 'C' on Day 2
and this process continues. . . .
* In How many day work gets completed.
Day 1 → AB
Day 2 → AC
Day 3 → AB
Day 4 → AC
Day 1 — AB → 10
Day 2 — AC → 9
Day 3 — AB — 10
Day 4 — AC — 9
19 → 2 days
×6 ×6
114 — 12 days
6 — 3/5 days
120 — 12 3/5 days

Time & work

	Per day
A → 25 days	6 X
B → 50 days	3
C → 15 days	10 X

Total work → 150 parts

* All started
* After 3 days, A left the work
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① A+B+C → 19 × 3 = 57

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Rem work = 150 − 83

= 67

B → 3 parts → 1 day

67 parts → ?

$1 \times \frac{67}{3} = \frac{67}{3} = 22\frac{1}{3}$ days

3) 67 (22
6
7
6
1

$22\frac{1}{3}$

Time & work

(Q) A can complete the work in 18 days, B alone can do it in 30 days, 'C' can complete it in 15 days. All three started the work together, but after 4 days, C left the work. After 3 more days, A also has left the work.

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(Q) Total work got completed in how many days?

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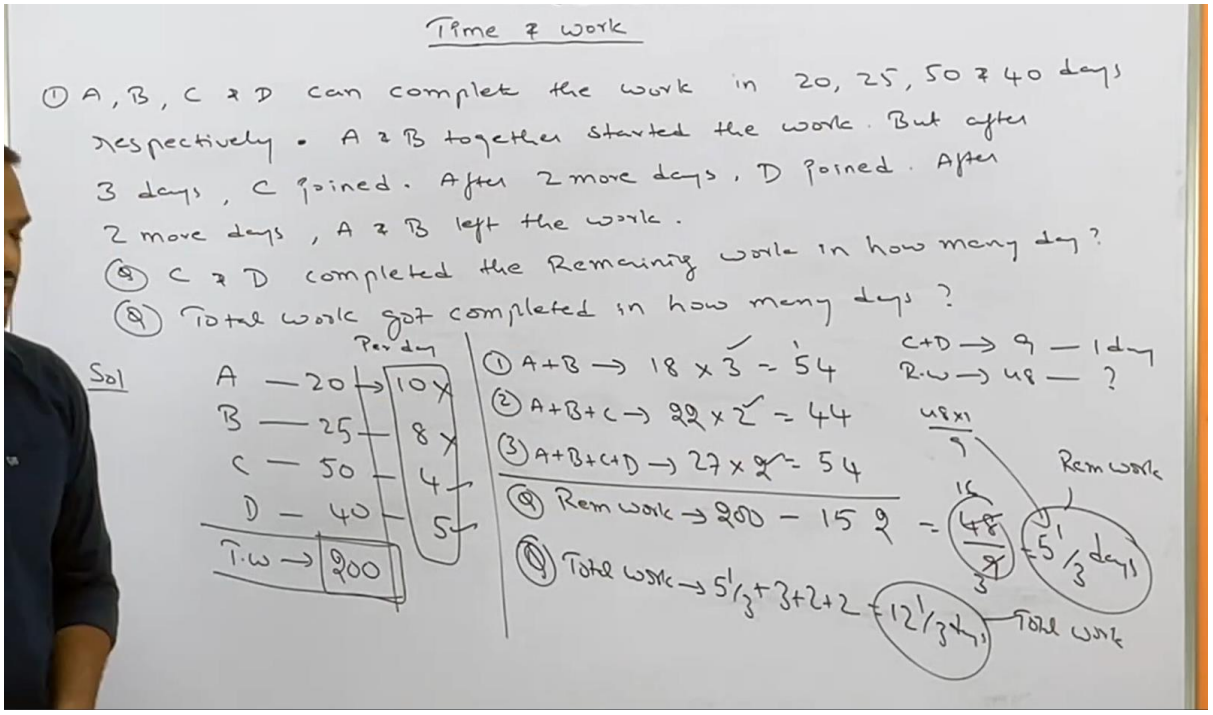
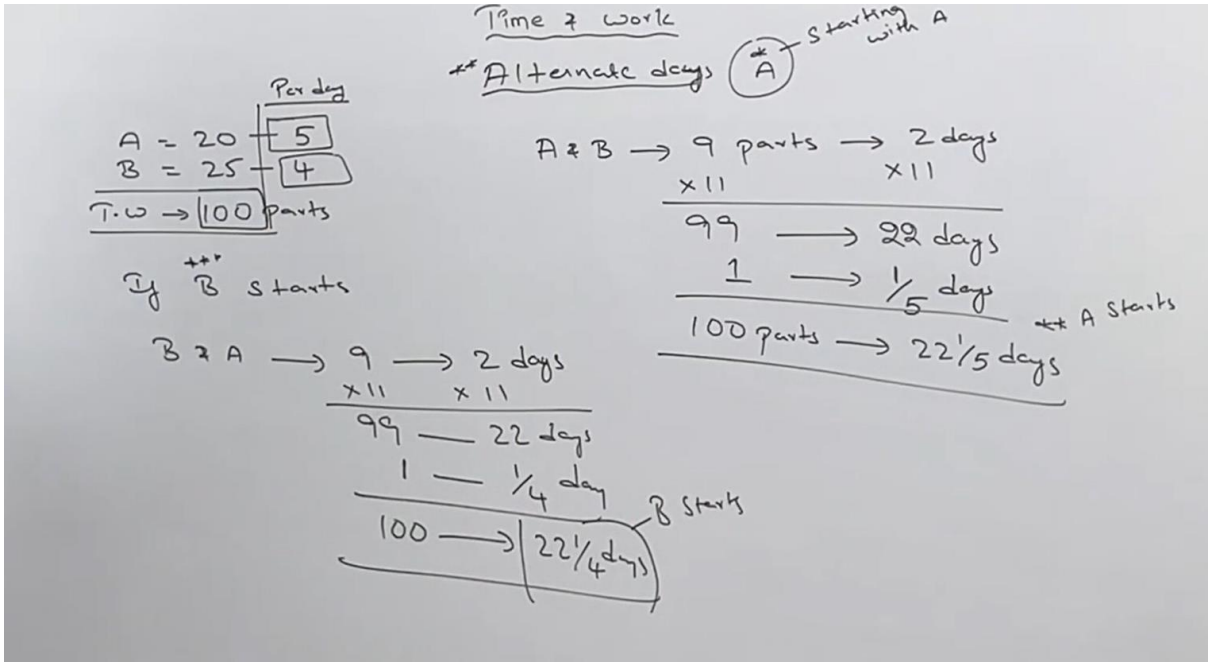

Time & work
① A, B, C & D can complete the work in 20, 25, 50 & 40 days respectively. A & B together started the work. But after 3 days, C joined. After 2 more days, D joined. After 2 more days, A & B left the work.
(a) C & D completed the Remaining work in how many day?
(b) Total work got completed in how many days?
Sol
Per day
A — 20 → 10
B — 25 → 8
C — 50 → 4
D — 40 → 5
T.W → 200
① A+B → 18 × 3 = 54
② A+B+C → 22 × 2 = 44
③ A+B+C+D → 27 × 2 = 54
④ Rem work → 200 − 152 = 48
⑤ Total work → 5 1/3 + 3 + 2 + 2 = 12 1/3 days
C+D → 9 — 1 day
R.W → 48 — ?
48 × 1/9
Rem work
= 5 1/3 days
Total work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100 → 22 1/4 days
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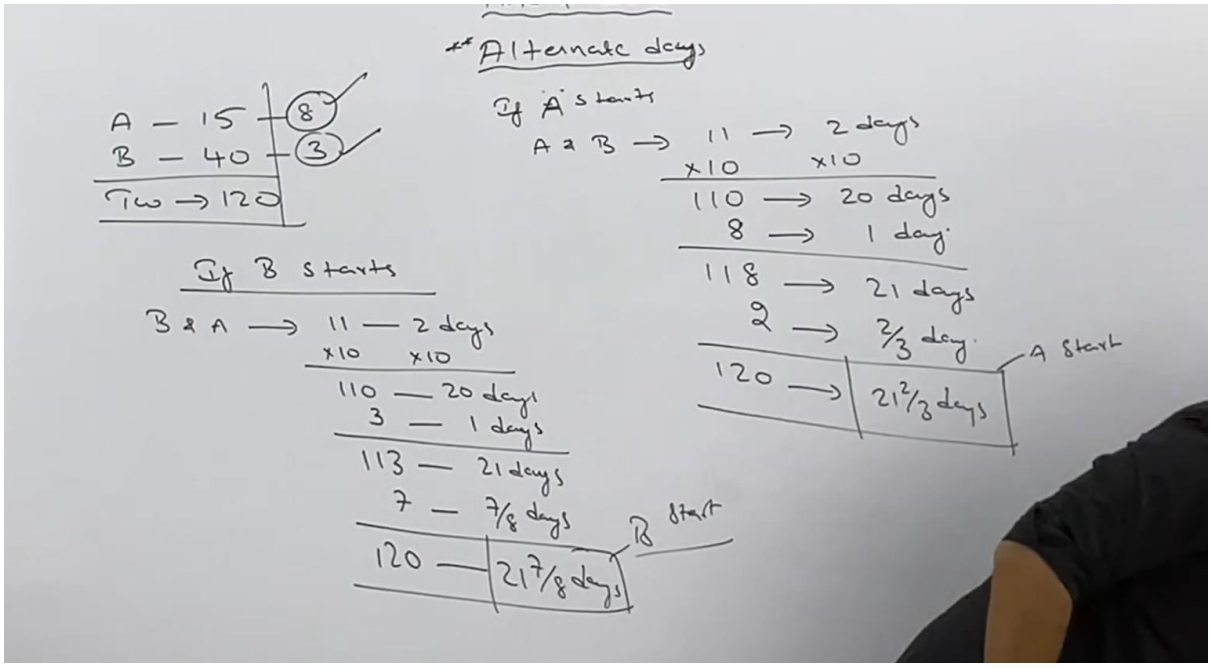
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120 — 21 7/8 days
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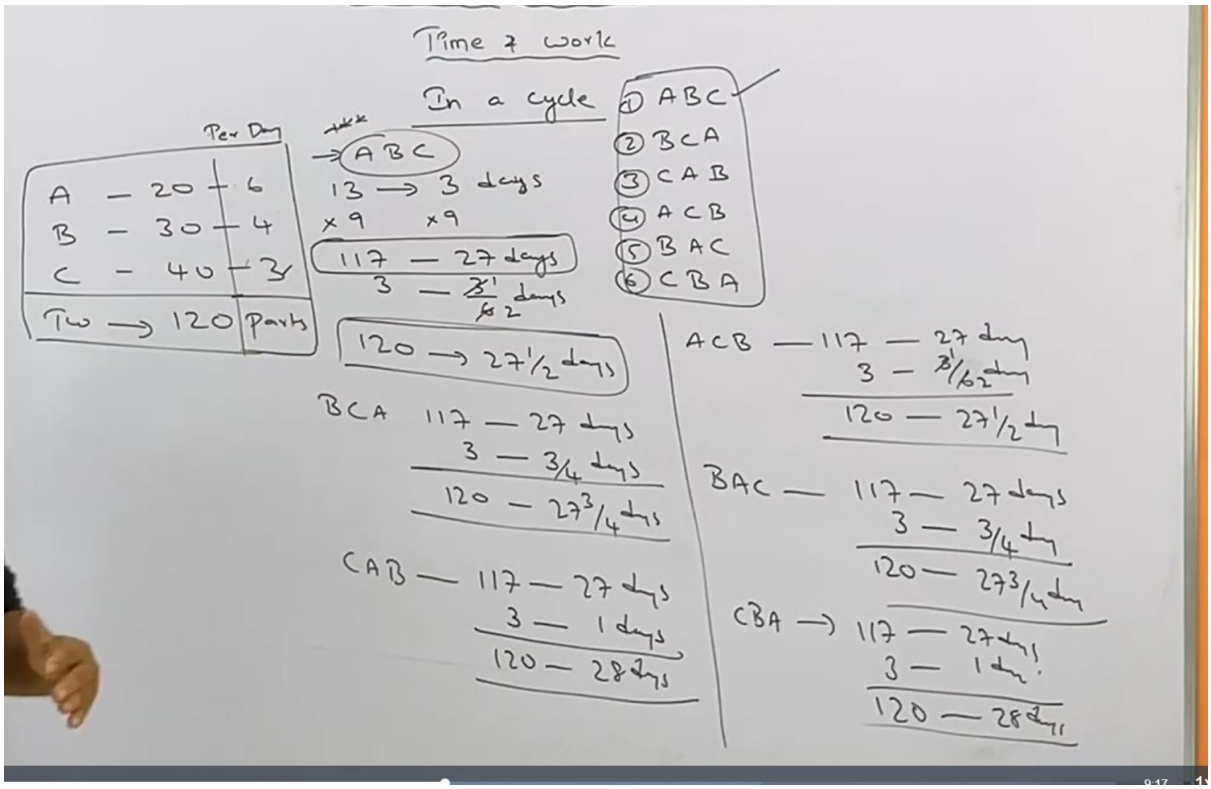
Time & work
In a cycle
Per Day
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C — 40 — 3
Tw → 120 — Parts
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13 → 3 days
×9 ×9
117 — 27 days
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3 — 1 days
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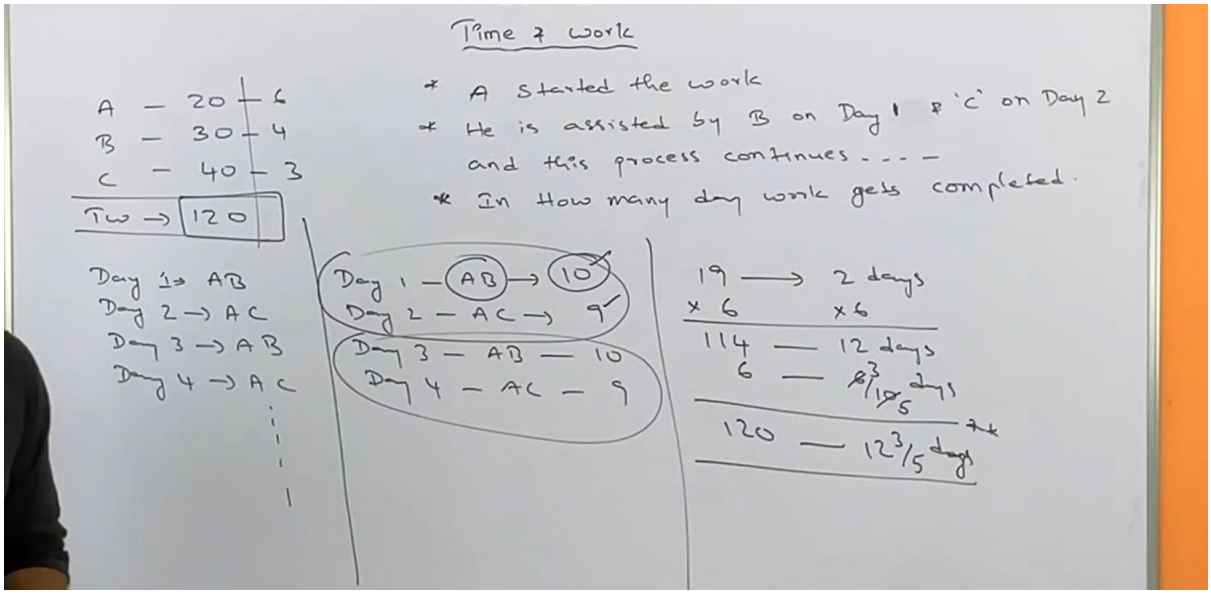
120 — 28 days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x 6 x 6
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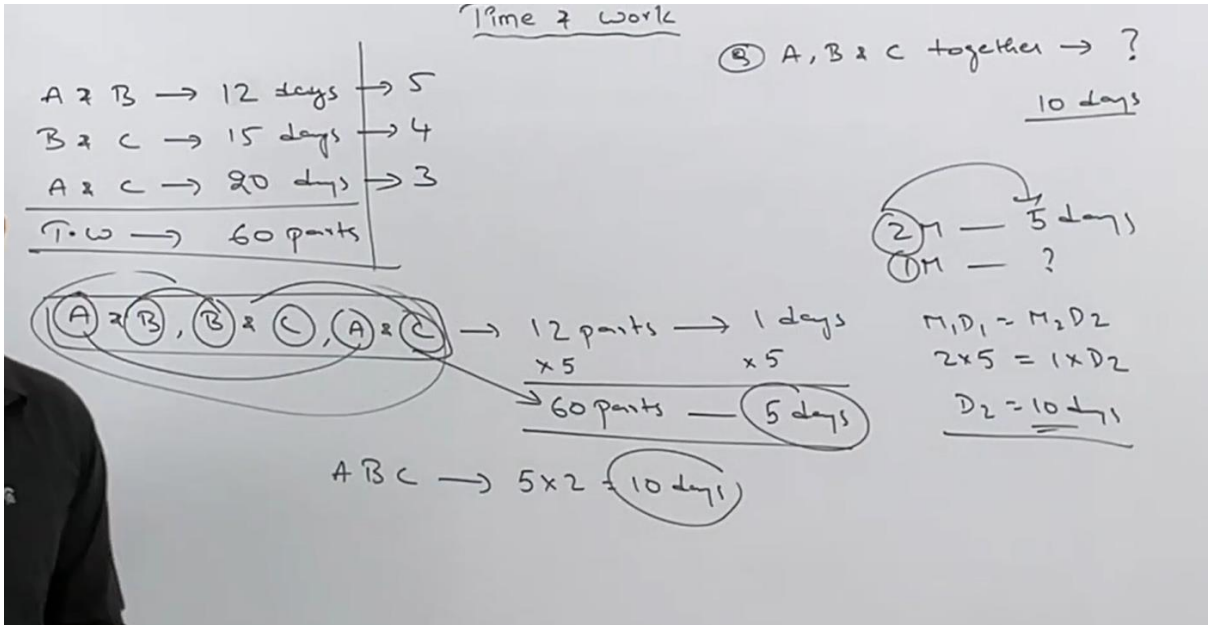
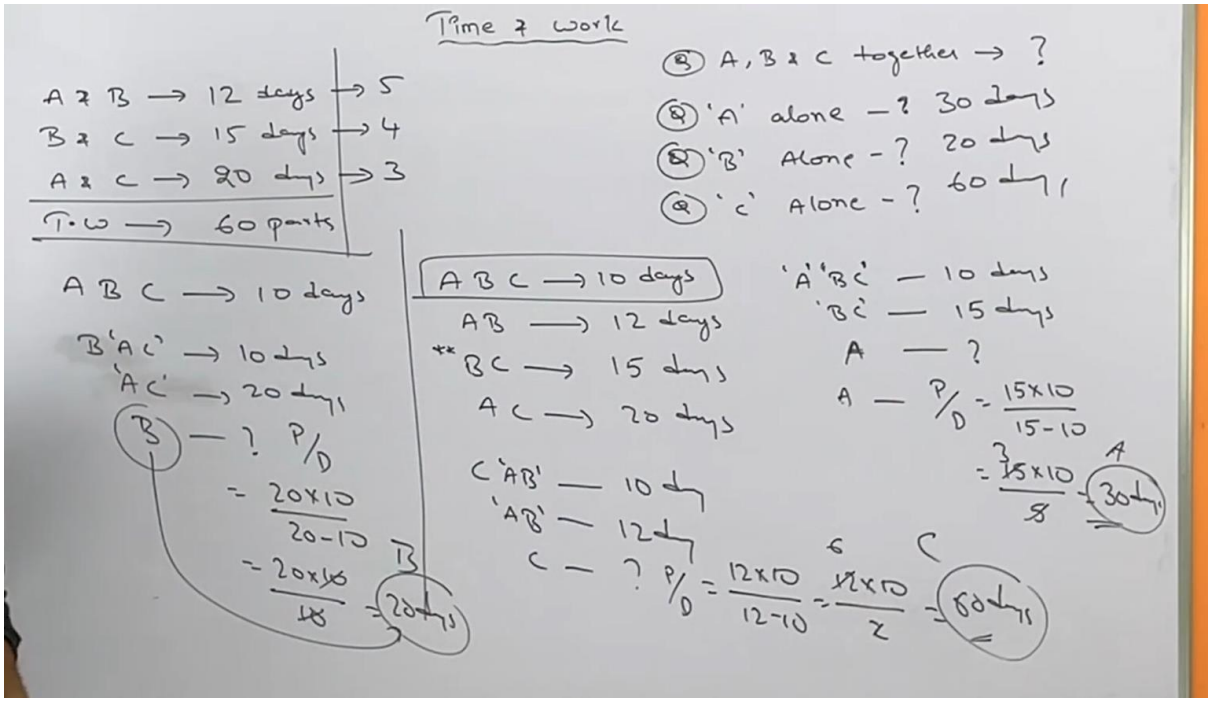
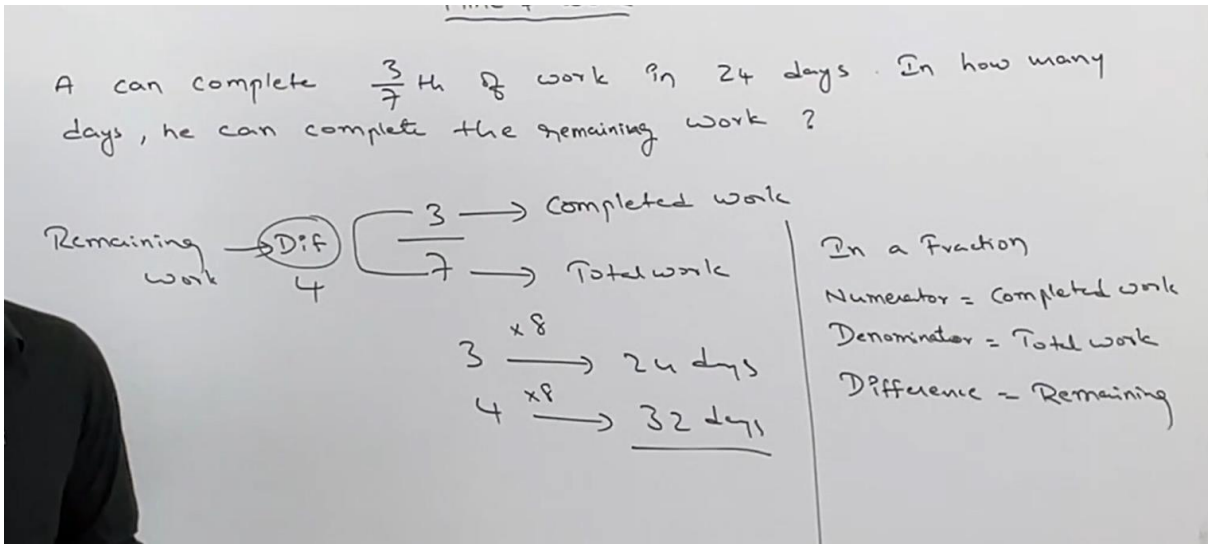

Time & Work
A & B → 12 days → 5
B & C → 15 days → 4
A & C → 20 days → 3
T.W → 60 parts
(3) A, B & C together → ?
10 days
2M — 5 days
1M — ?
M1D1 = M2D2
2x5 = 1xD2
D2 = 10 days
A & B, B & C, A & C → 12 parts → 1 days
x5 x5
60 parts — 5 days
ABC → 5x2 = 10 days



A can complete $\frac{3}{7}$ th of work in 24 days. In how many days, he can complete the entire work ?

Completed work — 3 — ×8 — 24 (Numerator)

Total work — 7 — ×8 — ? 56 days



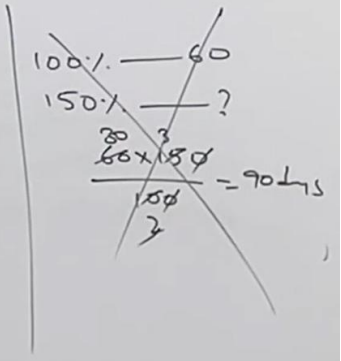
(Q) A can complete the work in 60 days. If B is 50% more efficient than A, then 'B' can complate the work in how many days?

	M_1	D_1
A →	100%	→ 60 days
B →	150%	→ ?
	M_2	D_2

$M_1 \times D_1 = M_2 \times D_2$

$100 \times 60 = 150 \times D_2$

$D_2 = 40$ days



(Q) A can complete the work in 60 days. If B is 20% less efficient than A, then 'B' can complate the work in how many days?

A → 100% — 60 d

B → 80% — ?

100M — 60 d

80M — ?

$M_1D_1 = M_2D_2$

$100 \times 60 = 80 \times D_2$

$D_2 = 75$ days

A = 30 days

B is 50% more efficient than A

A & B = ? days

A — 100%
B — 150%
A+B → 250%

A → 100% —— 30 days
A+B → 250% —— ?

100M —— 30 days
250M —— ?

$M_1D_1 = M_2D_2$

$\cancel{100} \times 30 = \cancel{250} \times D_2$
4

$\Rightarrow D_2 = 12$ days

A → 188 days

* B is 20% more efficient than A.
* C is 30% more efficient than B.

50 days

Find A, B & C together can complete the work in how many days?

A —— 100%
20% (20% of 100)
B —— 120%
36% (30% of 120)
C —— 156%

A+B+C → 100+120+156

A+B+C = 376%

A → 100% —— 188 days
A+B+C → 376% —— ?

100M —— 188 Days
376M —— ?

$M_1D_1 = M_2D_2$

$\cancel{100} \times \cancel{188} = \cancel{376} \times D_2$
50 2

$\Rightarrow D_2 = 50$ days

A does $\frac{4}{5}$ of the work in 20 days. He then calls in B & the together finish the remaining work in 3 days.
How long would B alone take to do the whole work?

Sol:-

$4 \xrightarrow{\times 5} 20$

$5 \xrightarrow{\times 5} ?$ → 25 days

A — 25 days

$A+B \longrightarrow 1 \xrightarrow{\times 3} 3$ days

$A+B \longrightarrow 5 \xrightarrow{\times 3} 15$ days

A+B — 15 days

A — 25 days

B — ?

$\Rightarrow B = \frac{\text{Prod}}{\text{Dif}} = \frac{25 \times 15}{25-15} = \frac{25 \times 15}{10} = \frac{375}{10}$

$\Rightarrow 37.5$ days $\Rightarrow 37\frac{1}{2}$ days

A — 20 days

B — 30 days

$\frac{A}{S} = \frac{4}{5}$ ~~$\frac{20 \times 30}{80} = 12 - 3 = 9$~~

* Both started work together
* But, before 3 days of completion, B left the work.
* Total work — ?

$\Rightarrow$ 3 days, A worked Alone

A — 20	→ 3	
B — 30	→ 9	
T.W — 60		

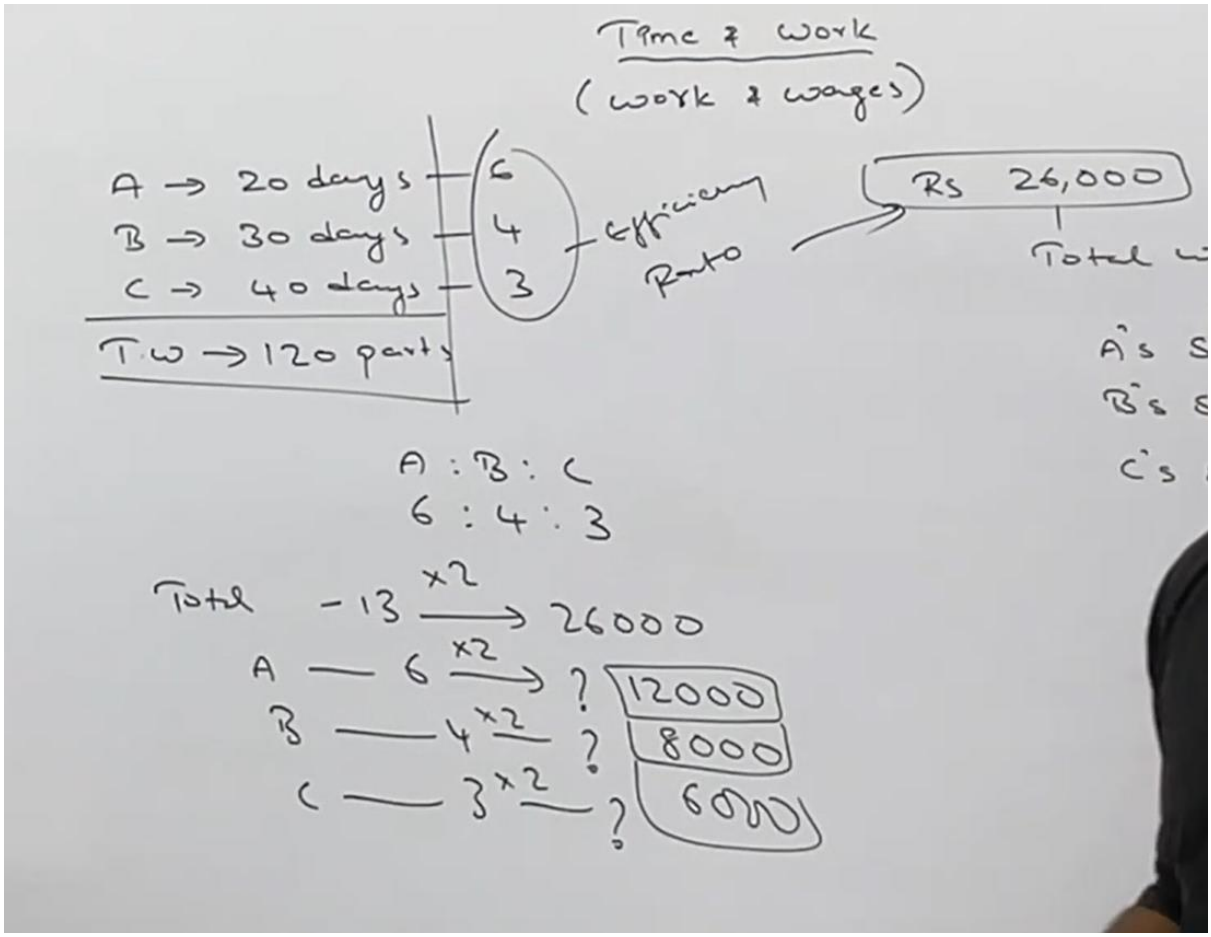
* (A+B) = 5 × ?
* A → 3 × 3 = 9

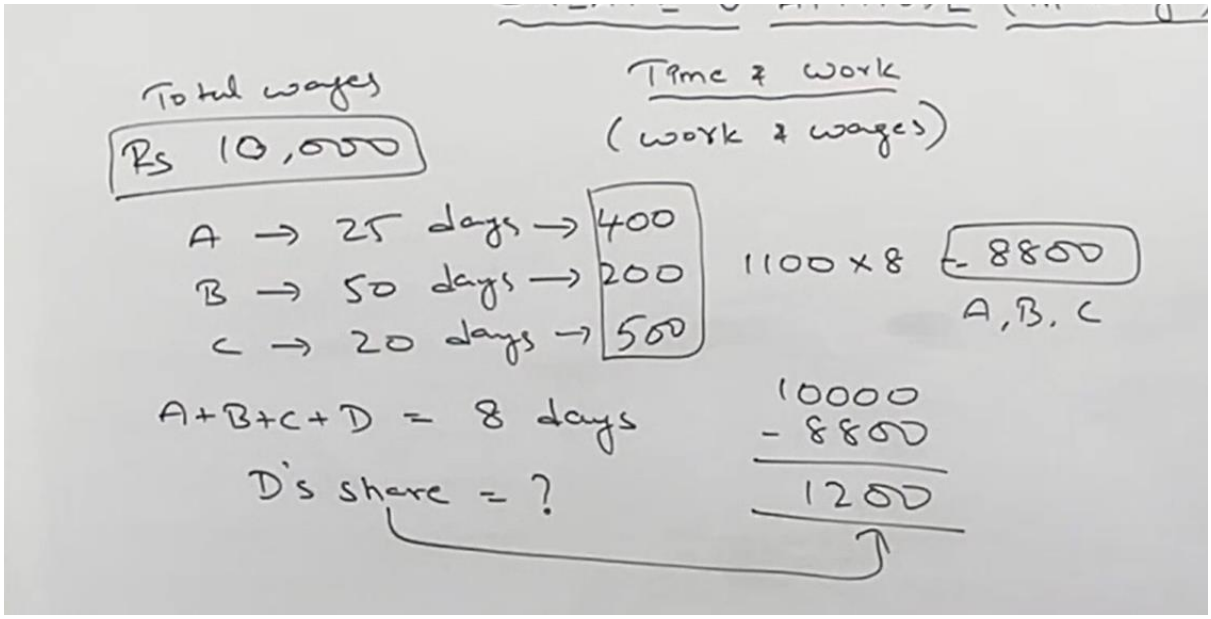
Total ⇒ 60 − 9 = 51 parts

$51/5 = 10\frac{1}{5}$ days — A+B

3 — A

$13\frac{1}{5}$ d


Time & work
(work & wages)
A → 20 days — 6
B → 30 days — 4
C → 40 days — 3
Efficiency Ratio
T.W → 120 parts
Rs 26,000
A : B : C
6 : 4 : 3
Total -13 ×2 → 26000
A — 6 ×2 → ? 12000
B — 4 ×2 → ? 8000
C — 3 ×2 → ? 6000


Total wages
Rs 10,000
Time & work
(work & wages)
A → 25 days → 400
B → 50 days → 200
C → 20 days → 500
1100 × 8 = 8800
A, B, C
A+B+C+D = 8 days
D's share = ?
10000
- 8800
1200