

Time & Work

$\left\{ \begin{array}{l} A \\ B \end{array} \right.$ can do work \rightarrow 10 days
 \rightarrow 15 days
 $A+B$ \rightarrow how many days \rightarrow 6 days

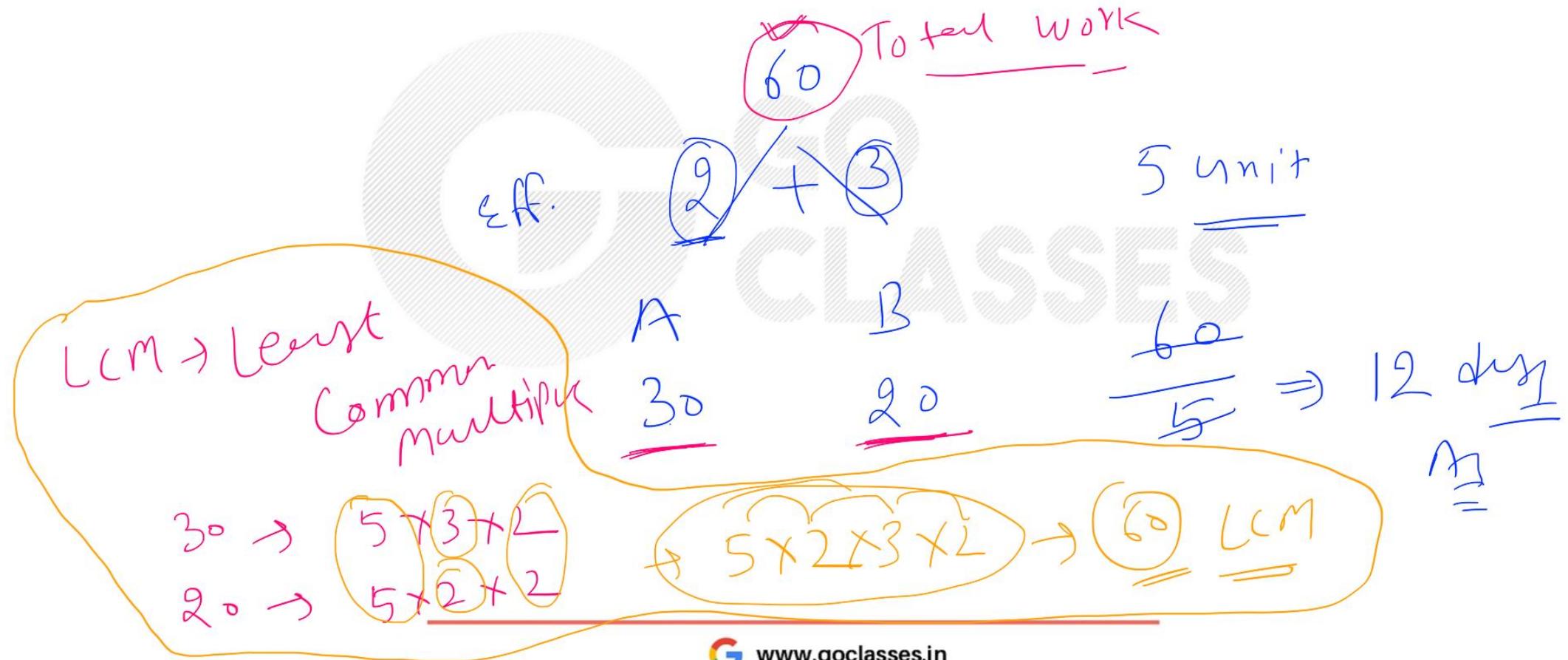
$\left\{ \begin{array}{l} A \\ B \end{array} \right.$ In 1 day \rightarrow $\frac{1}{10}$ part
 \rightarrow $\frac{1}{15}$ part
 $\Rightarrow \frac{1}{10} + \frac{1}{15} = \frac{3+2}{30} = \frac{5}{30} = \frac{1}{6}$ part

www.goclasses.in

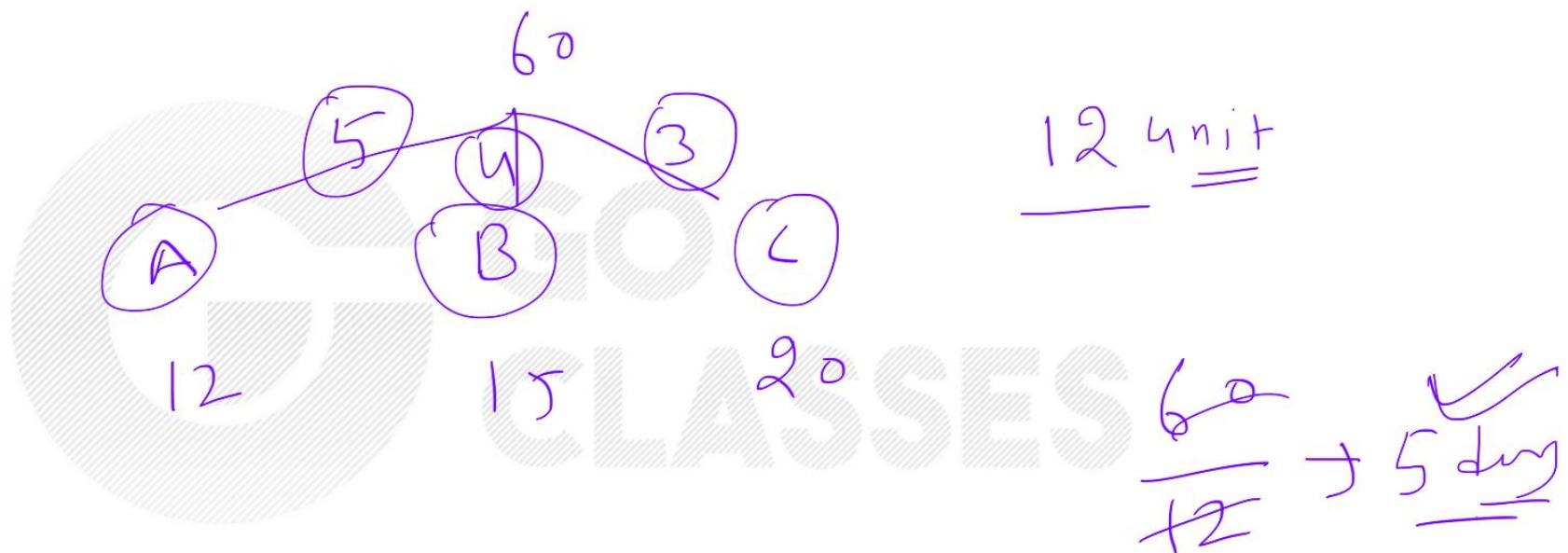
Eff. \rightarrow 30 Total work
 $\left\{ \begin{array}{l} 3 \\ 2 \end{array} \right.$
 A \rightarrow 10 days
 B \rightarrow 15 days

$A+B$ \rightarrow 5 unit
 \rightarrow 30 \Rightarrow 6 days

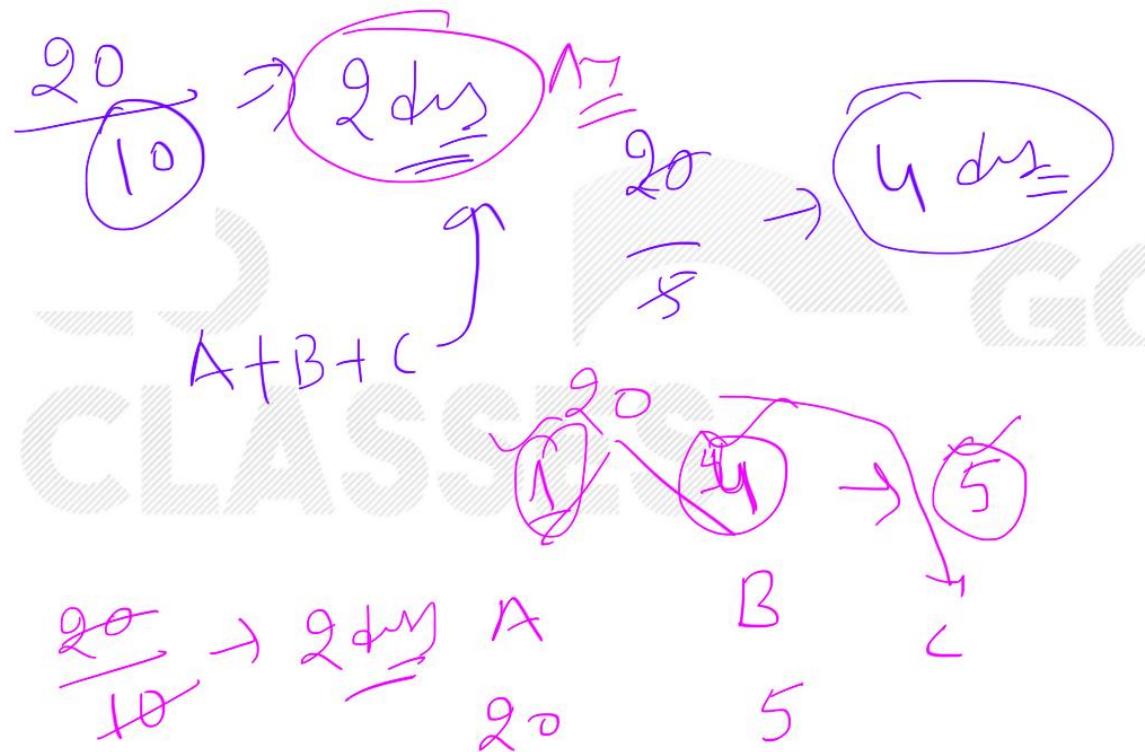
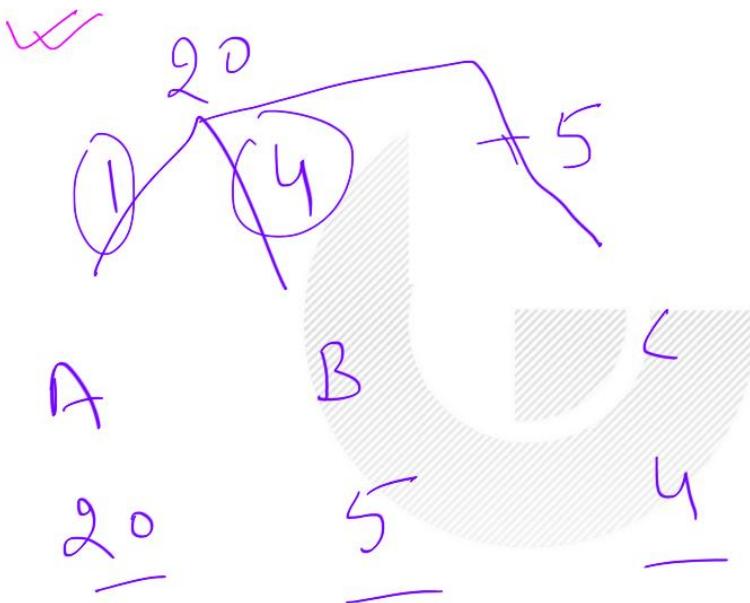
Eg.1 A and B can complete a work in 30 days and 20 days respectively. In how many days together they complete the work.



Eg.2 A, B and C can complete a work in 12 days, 15 days and 20 days respectively. In how many days they together can complete the whole work.



Eg.3 A and B can complete a work in 20 days and 5 days respectively. C takes as much time as A & B together takes. Then In how many days A,B&C together complete the work.



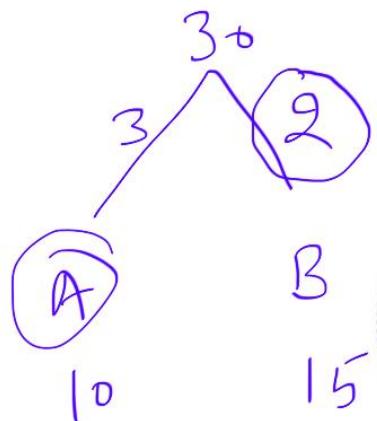
Eg.4 A & B can complete a work in 10 days and 12 days respectively. A & B start working together and after 3 days A left the work then find in how many days work will be completed.

Diagram illustrating the work rates and remaining work:

- A's work rate: $\frac{1}{10}$ per day
- B's work rate: $\frac{1}{12}$ per day
- Combined work rate: $\frac{1}{10} + \frac{1}{12} = \frac{11}{60}$ per day
- Work done by A & B in 3 days: $3 \times \frac{11}{60} = \frac{33}{60}$
- Remaining work: $1 - \frac{33}{60} = \frac{27}{60}$
- Time taken by B to complete the remaining work: $\frac{27}{60} \times 12 = \frac{27}{5}$ days
- Final answer: $5 \frac{2}{5}$ days

Below the diagram, there is a separate calculation involving a triangle and a circle, which appears to be a different part of the problem or a related exercise.

Eg.5 A & B can complete a work in 10 days and 15 days respectively. A&B start working together but after some days A left the work and the whole work will be completed in 9 days. Then find after how many days A left the work



$$9 \times 2 \rightarrow 18$$

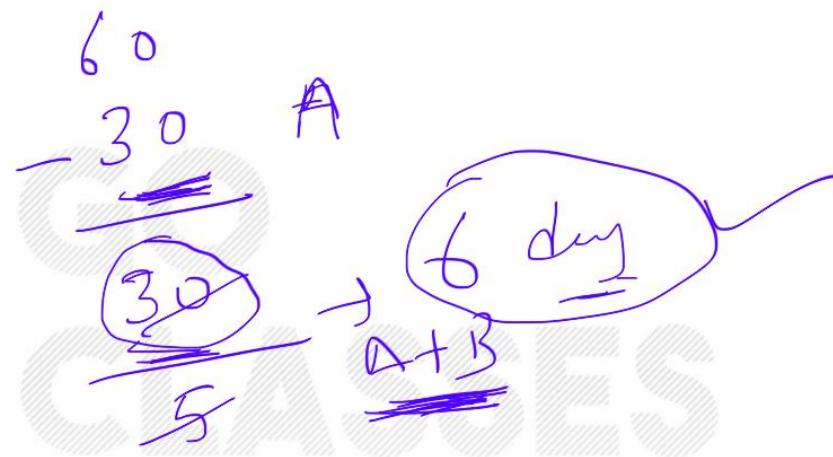
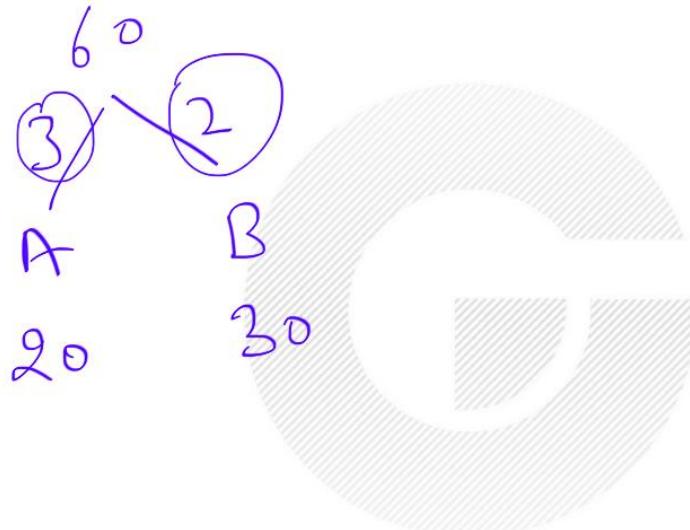
$$\begin{array}{r} 30 \\ - 18 \\ \hline 12 \text{ unit} \end{array}$$

A Left After 4 days

B → 9 days

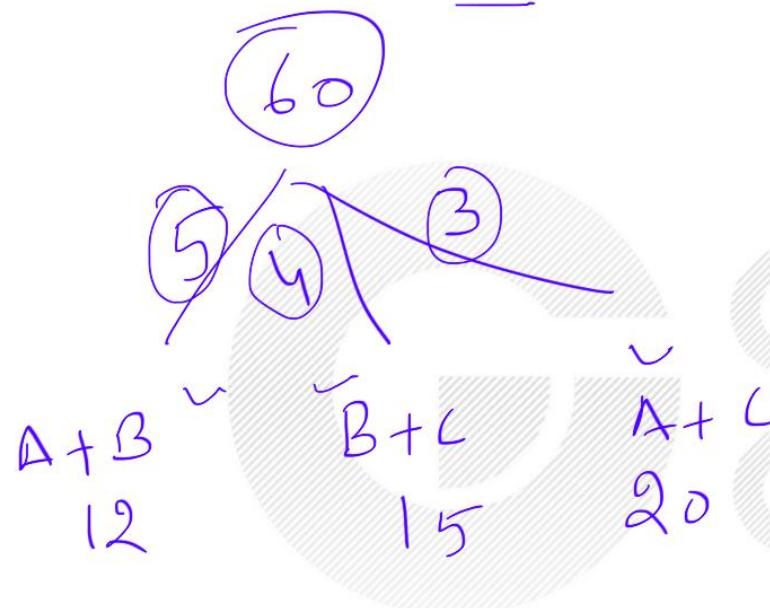
$$A \Rightarrow \frac{12}{3} = 4 \text{ days}$$

Eg.6 A & B can complete a work in 20 days and 30 days respectively. A&B start working together but after some days B left the work and the rest work will be completed by A in 10 days. Then find after how many days B left the work



After 6 day

Eg.7 A+B, B+C and C+A can complete a work in 12 days, 15 days and 20 days respectively. In how many days they together can complete the whole work.



$$5 + 4 + 3 \Rightarrow 12$$

$$2(A+B+C) \Rightarrow 12$$

$$A+B+C \Rightarrow 6$$

$$\frac{60}{6} \Rightarrow 10 \text{ days}$$

Eg.8 A+B, B+C and C+A can complete a work in 10 days, 12 days and 20 days respectively. In how many days each individual can complete the work?

$$\begin{array}{c} \text{A} + \text{B} = \frac{1}{10} \\ \text{B} + \text{C} = \frac{1}{12} \\ \text{C} + \text{A} = \frac{1}{15} \end{array}$$

$$(\text{A} + \text{B}) + \text{C} = \frac{1}{15} + \text{C}$$

$$\text{C} = \frac{15}{2} - 6$$

$$4 - \frac{3}{2} = \frac{5}{2}$$

$$\text{C} = \frac{3}{2}$$

$$\text{C} = \frac{5}{2}$$

$$\text{A} \rightarrow$$

$$\frac{60}{5} \times 2 \rightarrow 24 \text{ days}$$

$$\text{B} \rightarrow \frac{60}{7} \times 2 \rightarrow 20 \text{ days}$$

$$\text{C} \rightarrow \frac{60}{3} \times 2 \rightarrow 40 \text{ days}$$

$$\begin{array}{l} \text{A} \rightarrow 5/2 \\ \text{B} \rightarrow 7/2 \end{array}$$



Eg.9 1 Man + 3 Women + 4 Children can complete a work in 96 hrs while 2 Men + 8 Children can complete the same work in 80 hrs, while 2 Men + 3 Women can complete the same work in 120 hrs then find ~~5 Men+16 Children~~ can do the same work in how time?

$$2M \rightarrow 2$$

$$1M \rightarrow 1$$

$$1C \rightarrow 4$$

$$8C \rightarrow 4$$

$$1C \rightarrow \frac{1}{8} = \frac{1}{2}$$

$$5+8 = 13$$

$$2M+8C = 6$$

$$1M+4C = 3$$

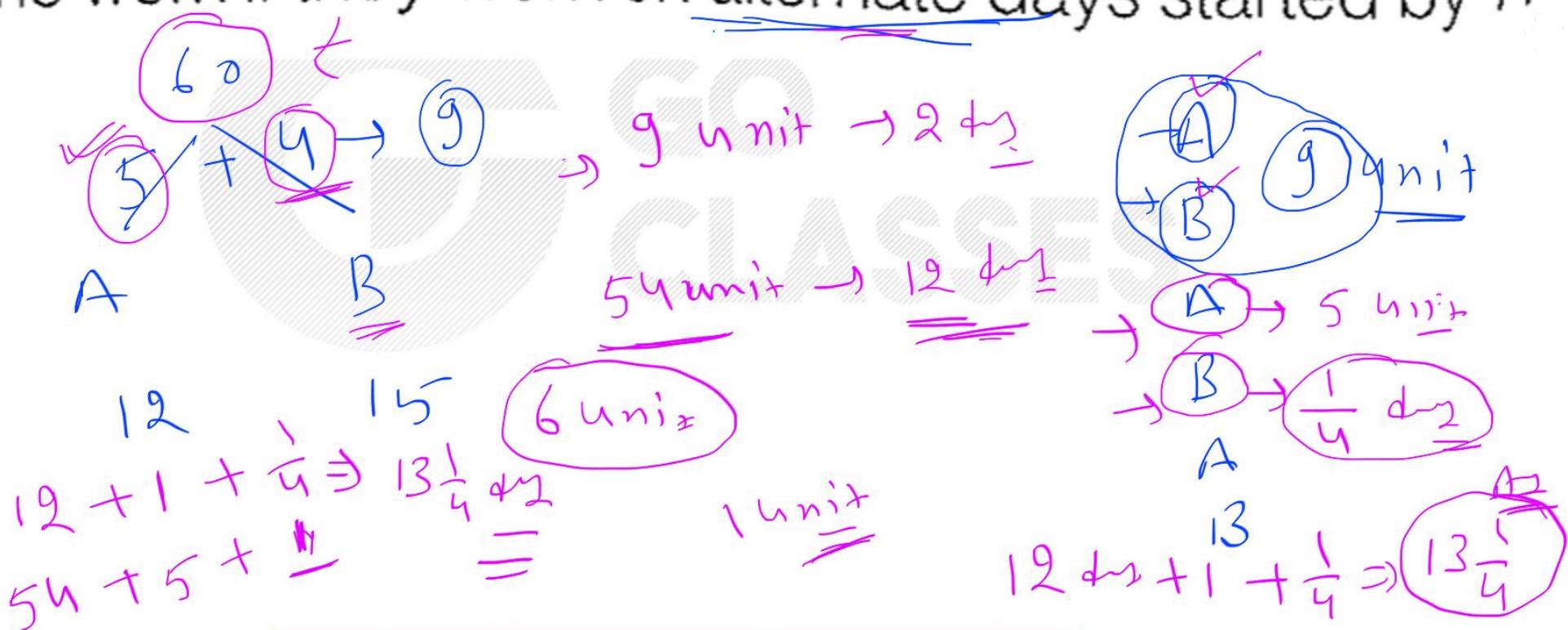
$$1M+3W+4C = 96$$

$$2M+8C = 80$$

$$2M+3W = 120$$

$$\frac{480}{13} = 37.5 \text{ Ans}$$

Eg. 10 A can finish a task in 12 days while B can finish a task in 15 days. In how many days both of them will finish the work if they work on alternate days started by 'A'



Eg.11 5 man or 3 women finishes a work in 10 days if 6 women finishes the work along with 7 man then find out the wages received by them if the total work costs Rs. 3000.

{ more efficient
more money }

$$30 : 24$$

$$\checkmark \frac{10}{17} : 7$$

$$\checkmark \frac{10}{17} \times 3000$$

effici

$$\checkmark \frac{7}{17} \times 3000$$

$$\frac{5m}{10} = \frac{3w}{15}$$

$$1M \rightarrow 3 \\ 1W \rightarrow 5$$

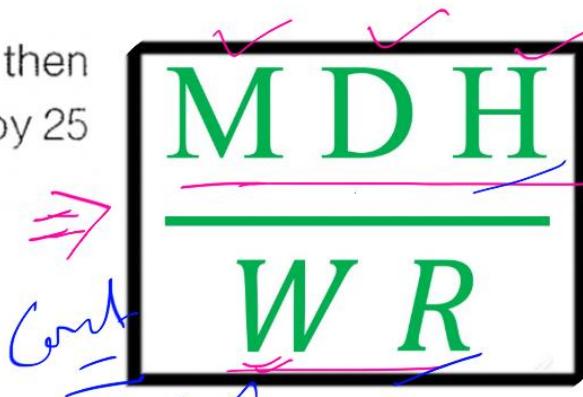
$$\frac{150}{15} = 15$$

$$\frac{6w + 7M}{30} = \frac{21}{21}$$

Let 100 workers can finish the task in 50 days, then how many days are required to finish the task by 25 workers?

$$100 \times 50 = 25 \times D$$

$D = 200 \text{ days}$



- M → No. of Man
- D → No. of days
- H → No. of hours
- W → Work
- R → Rupees

$$\frac{3}{100} \text{ cut} \quad \frac{3}{100} \text{ Lt} \quad \frac{3}{100} \text{ days}$$

$$\frac{100}{3} \text{ cut} \quad \frac{100}{3} \text{ Lt} \quad \frac{100}{3} \text{ days}$$

$$= \frac{100 \times D}{100} \quad D = 3 \text{ days}$$

Eg.12 Let 100 workers can finish the task in 50 days. 100 workers started the task and working for 20 days. Now because of unforeseen situations 80 workers have to leave the work. Find total number of days required to complete the task.

$$\frac{100 \times 50}{20} \text{ works} =$$
$$\frac{100 \times 30}{D} = \frac{20 \times D}{2}$$
$$D = 150 \text{ days}$$

Pipe & Cistern



Time & work

Pipe A fill \rightarrow 10 days

B \rightarrow 15 days

Pipe C empty \rightarrow 20 days



A	B	C
10	15	20

A B C ✓
— — —

$$A+B+C \Rightarrow 6+4-\underline{3}$$

$\Rightarrow 7$
 $\frac{60}{7} \text{ days}$

$$2X + 2Y = \textcircled{5} 10$$

$$\frac{X}{2} + 2Y = 8$$

$$\frac{3}{2}X = 2$$

$$X = \frac{4}{3}$$

Q.1 X bullocks and Y tractors take 8 days to plough a field. If we have half the number of bullocks and double the number of tractors, it takes 5 days to plough the same field. How many days will it take X bullocks alone to plough the field?

- A. 30
- B. 35
- C. 40
- D. 45

GATE 2017 ME

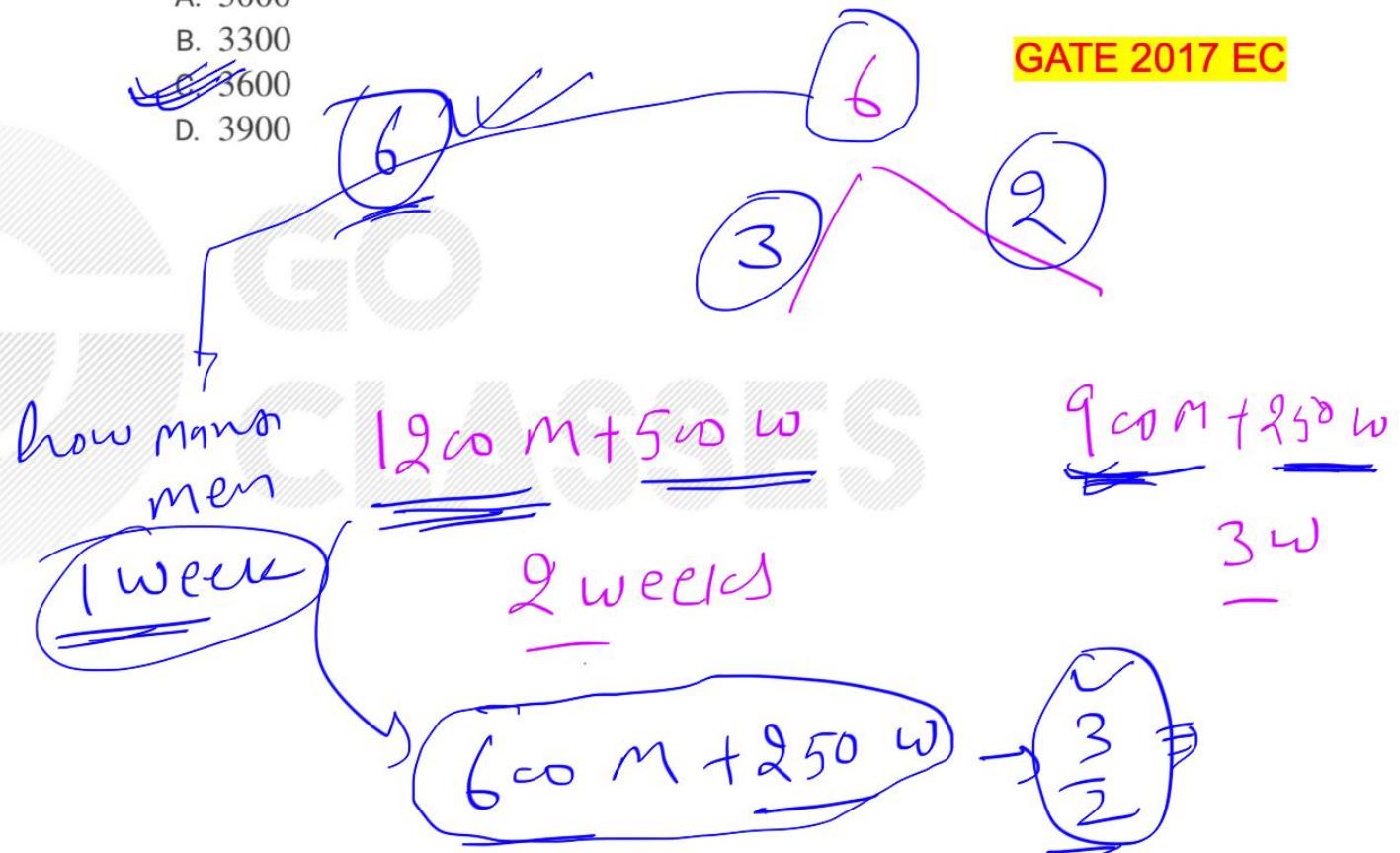
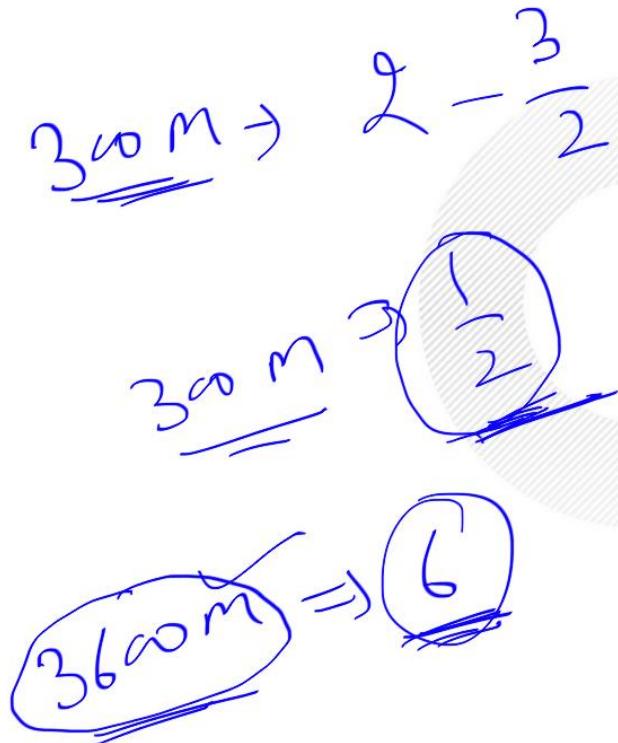
$$\begin{array}{c} 40 \\ \swarrow 5 \quad \searrow 8 \end{array}$$

$$\begin{array}{rcl} \frac{X+Y}{8} & & \frac{\frac{X}{2} + 2Y}{5} \\ \times 3 & \rightarrow & 30 \cancel{+ 2Y} \end{array}$$

Q.2 1200 men and 500 women can build a bridge in 2 weeks. 900 men and 250 women will take 3 weeks to build the same bridge. How many men will be needed to build the bridge in one week?

- A. 3000
- B. 3300
- C. 3600
- D. 3900

GATE 2017 EC



Q.3 5 skilled workers can build a wall in 20 days; 8 semi-skilled workers can build a wall in 25 days; 10 unskilled workers can build a wall in 30 days. If a team has 2 skilled, 6 semi-skilled and 5 unskilled workers, how long it will take to build the wall?

- A. 20 days
- B. 18 days
- C. 16 days
- D. 15 days

GATE 2010 CSE

$$\begin{array}{ccccccc}
 & 300 & & & & & \\
 & \cancel{15} / \cancel{12} & 10 & & & & \\
 \hline
 5 \text{ skilled} & 8 \text{ semis} & 10 \text{ un} & \xrightarrow{\text{Avg}} & 2 \text{ s} & + 6 \text{ ss} & + 5 \text{ un} \\
 20 & 25 & 30 & & & & \\
 & & & & 6 & + 9 & + 5 \\
 & & & & & & \\
 1 \text{ Skilu} \rightarrow 3 & & & & & & \\
 1 \text{ ss} \rightarrow \frac{12}{20} = \frac{3}{5} & & & & & & \\
 1 \text{ un} \rightarrow \underline{1} & & & & & & \\
 \hline
 & 20 \Rightarrow \frac{300}{20} = 15 \text{ days} & & & & &
 \end{array}$$

Q.4 Seven machines take 7 minutes to make 7 identical toys. At the same rate, how many minutes would it take for 100 machine to make 100 toys?

- A. 1
B. 7
C. 100
D. 700

$$\frac{7 \times 7}{7} = \frac{100 \times H}{100}$$

$$H \Rightarrow 7 \text{ min}$$

$$\frac{(M \times H)}{W.R}$$

GATE 2018 ME

Q.5 A contract is to be completed in 52 days and 125 identical robots were employed, each operational for 7 hours a day. After 39 days, five-seventh of the work was completed. How many additional robots would be required to complete the work on time, if each robot is now operational for 8 hours a day?

- A. 50
B. 89
C. 146
D. 175

$$\frac{25}{125} \times \frac{3}{7} = \frac{2 \times 13 \times 8}{2 \times 7}$$

Bow

GATE 2018 ME

125 R

52 dy m

$$(n) = \frac{25+3+7}{4} = 131.25$$

$$\frac{131.25}{125} = \underline{\underline{6.25}}$$

MDR
WR

$$13 \\ 52 \times 10 = 49 \times D$$

$$D = 13 \text{ days}$$

Q.6 IT was estimated that 52 men can complete a strip in a newly constructed highway connecting cities P and Q in 10 days, Due to an emergency, 12 men were sent to another project. How many number of days, more than the original estimate, will be required to complete the strip?

- A. 3 days
B. 5 days
C. 10 days
D. 13 days

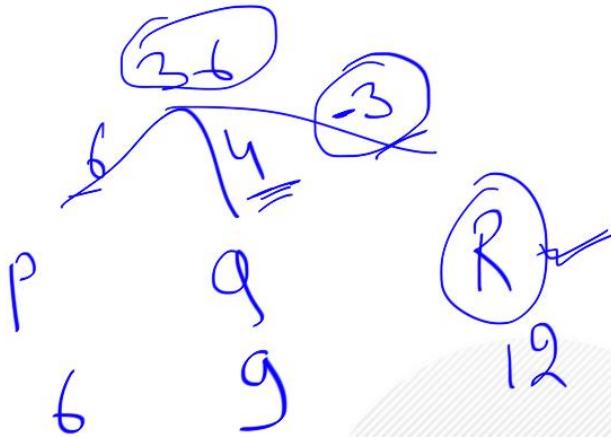
C
A
M

GATE 2020 ME

52

(10)

40



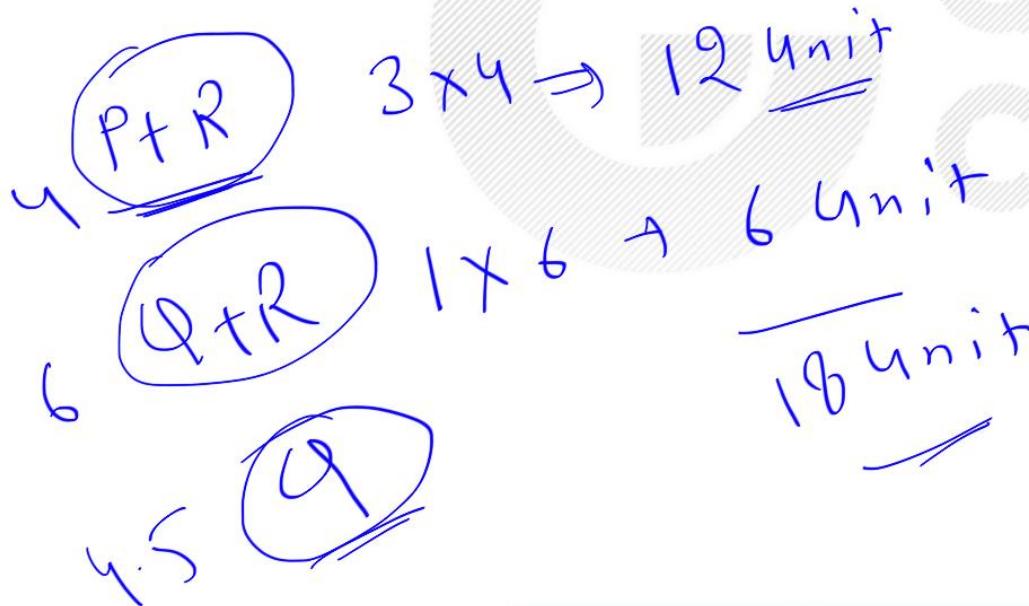
Q.7

Two pipes P and Q can fill a tank in 6 hours and 9 hours respectively, while a third pipe R can empty the tank in 12 hours. Initially, P and R are open for 4 hours. Then P is closed and Q is opened. After 6 more hours R is closed. The total time taken to fill the tank (in hours) is

- A. 13.50
- B. 14.50
- C. 15.50
- D. 16.50

$$4 + 6 + 4.5$$

GATE 2019 ME



$$\begin{array}{r} 3 \\ 6 \\ 18 \\ \hline (18) \end{array}$$

$$\frac{18}{4} \Rightarrow 4.5 \text{ hr}$$

X 2
 Y 4
 $X+Y = 3$

3 unit
 $\frac{1}{3}$ hr

Q.8 It takes two hours for a person X to mow the lawn. Y can mow the same lawn in four hours. How long (in minutes) will it take X and Y , if they work together to mow the lawn?

- A. 60
 B. 80
 C. 90
 D. 120
-

$\frac{1}{3} + \frac{1}{4} = \frac{7}{12}$
 $\frac{7}{12} \times 60 = 35$

GATE 2019 EE

$\frac{1}{5}$ $\frac{1}{4}$
 $\frac{1}{5} + \frac{1}{4} = \frac{9}{20}$
 $\frac{1}{\frac{9}{20}} = \frac{20}{9}$ hours

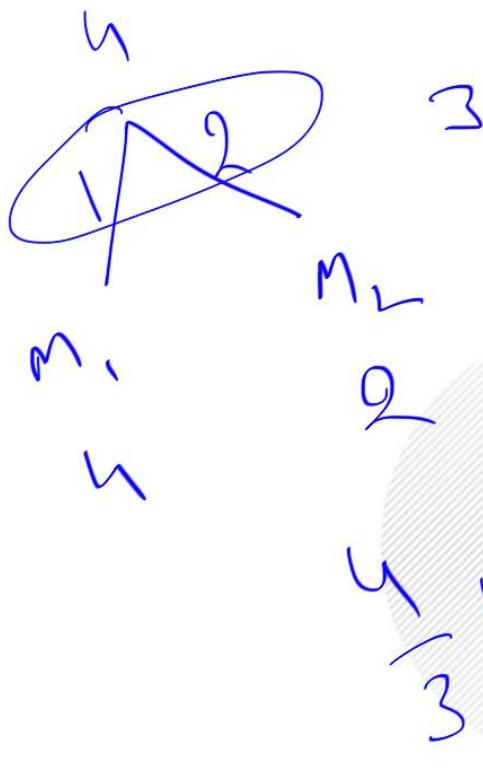
$\frac{1}{5} + \frac{1}{4} - 1 \Rightarrow \frac{9}{20} - 1 = \frac{11}{20}$ unit
 $\frac{1}{\frac{11}{20}} = \frac{20}{11}$ hours

Q.9

An oil tank can be filled by pipe X in 5 hours and pipe Y in 4 hours, each pump working on its own. When the oil tank is full and the drainage hole is open, the oil is drained in 20 hours. If initially the tank was empty and someone started the two pumps together but left the drainage hole open, how many hours will it take for the tank to be filled? (Assume that the rate of drainage is independent of the Head)

- A. 1.50
- B. 2.00
- C. 2.50
- D. 4.00

GATE 2019 CE



Q.10 It would take one machine 4 hours to complete a production order and another machine 2 hours to complete the same order. If both machines work simultaneously at their respective constant rates, the time taken to complete the same order is _____ hours.

- A. $\frac{2}{3}$
 - B. $\frac{3}{4}$
 - C. $\frac{4}{3}$
 - D. $\frac{7}{3}$
- A₂

GATE 2019 EC

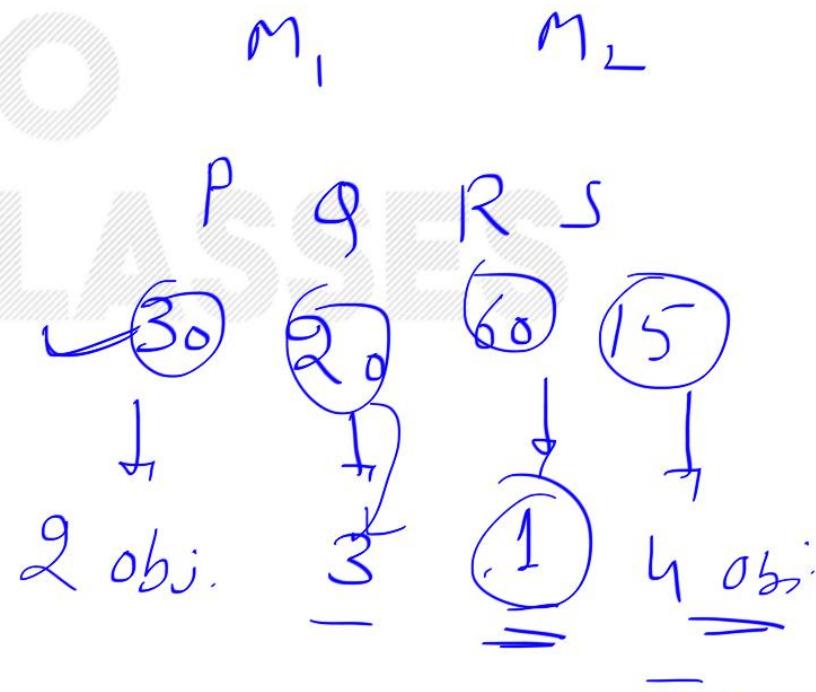
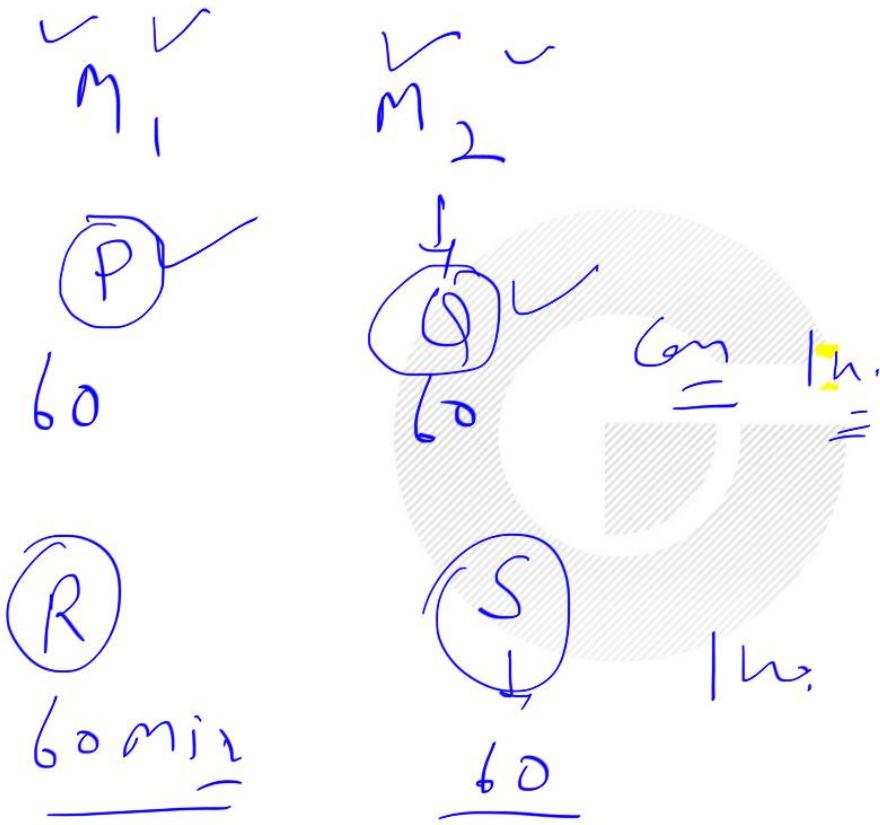


Q.11

Two machine M_1 and M_2 are able to execute any of four jobs P, Q, R and S . The machines can perform one job on one object at a time. Jobs P, Q, R and S take 30 minutes, 20 minutes, 60 minutes and 15 minutes each respectively. There are 10 objects each requiring exactly 1 job. Job P is to be performed on 2 objects. Job Q on 3 objects, Job R on 1 object and Job S on 4 objects. What is the minimum time needed to complete all the jobs?

- A. 2 hours
B. 2.5 hours
C. 3 hours
D. 3.5 hours

GATE 2017 CE



M D H
W R

$$\frac{\checkmark}{\cancel{y+4x}} = \frac{\checkmark}{\cancel{y+10x}}$$

$$\frac{3 \times 10}{y+10x} \cong$$

x daily

$$28y + 280x = 30y + 120x$$

$$160x = 2y$$

$y = 80x$

- Q.12 A transporter receives the same number of orders each day. Currently, he has some pending orders (backlog) to be shipped. If he uses 7 trucks, then at the end of the 4th day he can clear all the orders. Alternatively, if he uses only 3 trucks, then all the orders are cleared at the end of the 10th day. What is the minimum number of trucks required so that there will be no pending order at the end of 5th day?

- A. 4
B. 5
C. 6
D. 7

T \Rightarrow 5.6

GATE 2010 CSE

$$\begin{array}{c} 5x+y \\ \textcircled{B} 5x \end{array}$$

② Pending

$$\frac{T \times 5}{85x} = \frac{17}{17}$$

w/ 17 3

$$\frac{7 \times 4}{84x} = \frac{21}{3}$$

Q.13 The current erection cost of a structure is Rs. 13,200. If the labour wages per day increase by 1/5 of the current wages and the working hours decrease by 1/24 of the current period, then the new cost of erection in Rs. is

- A. 16,500
- B. 15,180 15180
- C. 11,000
- D. 10,120

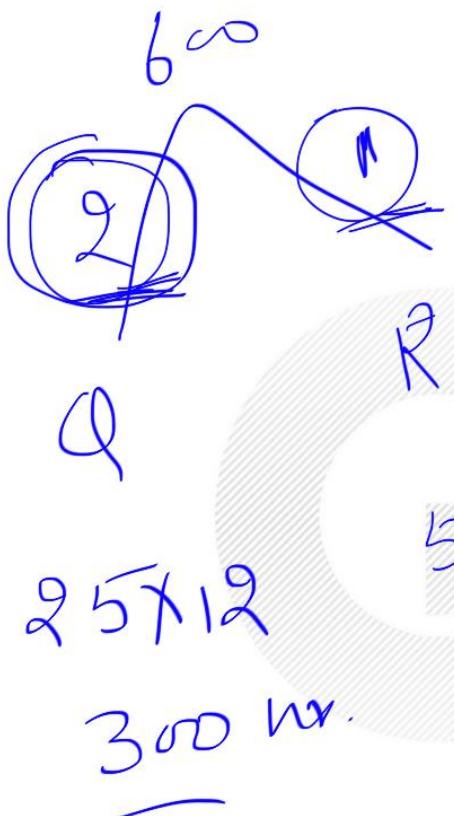
GATE 2013 CE

$$\begin{aligned}5 \times 24 &\neq 13200 \\3300 &600 \\13200 & \\6 \times 23 &\Rightarrow \underline{13200} \times 6 \times 23 \\5 \times 24 &= \underline{\underline{15180}}\end{aligned}$$

Q.14 P, Q, R and S are working on a project. Q can finish the task in 25 days, working alone for 12 hours a day. R can finish the task in 50 days, working alone for 12 hours per day. Q worked 12 hours a day but took sick leave in the beginning for two days. R worked 18 hours a day on all days. What is the ratio of work done by Q and R after 7 days from the start of the project?

- A. 10 : 11
- B. 11 : 10
- C. 20 : 21
- D. 21 : 20

GATE 2016 EC



Q $12 \text{ hr} \times 5 = 60 \text{ hr}$

R $18 \text{ hr} \times 7 = 126 \text{ hr}$

$$\frac{120}{50} : \frac{126}{42}$$

$20 : 21$

Q.15 S, M, E and F are working in shifts in a team to finish a project. M works with twice the efficiency of others but for half as many days as E worked. S and M have 6 hour shifts in a day, whereas E and F have 12 hours shifts. What is the ratio of contribution of M to contribution of E in the project?

- A. 1 : 1
- B. 1 : 2 A2
- C. 1 : 4
- D. 2 : 1

GATE 2016 EC

Efficiency

	<u>S</u>	<u>M</u>	<u>E</u>	<u>F</u>
Efficiency	1	2	1	1
Days	<u>x</u>	<u>$2x$</u>		
Hours	<u>6 hr</u>	<u>12 hr</u>		
	<u>$2x \times 6$</u>	<u>$1 \times 2x \times 12$</u>		

$2x \times 6$: $1 \times 2x \times 12$

(1)
 (2)
 (3) → Page

Q.16 Ananth takes 6 hours and Bharath takes 4 hours to read a book. Both started reading copies of the book at the same time. After how many hours is the number of pages to be read by Ananth, twice that to be read by Bharath? Assume Ananth and Bharath read all the pages with constant pace.

A. 1

B. 2

C. 3

D. 4

GATE 2016 CE

A B
 6 4

2n
 18w
 $\frac{12 - 2h}{12 - 3h}$

2 Page

A $\rightarrow 12 - 2h$
 B $\rightarrow 12 - 3h$

$\left\{ \begin{array}{l} A \rightarrow 2x \\ B \rightarrow x \end{array} \right.$

$= \frac{2}{1} \quad h = 3$

$$12 - 2h = 24 - 6h$$

$$4h = 12$$