

GATE

CRASH COURSE

ALL BRANCH

Subject

General Aptitude

Lec 04 Time and Work

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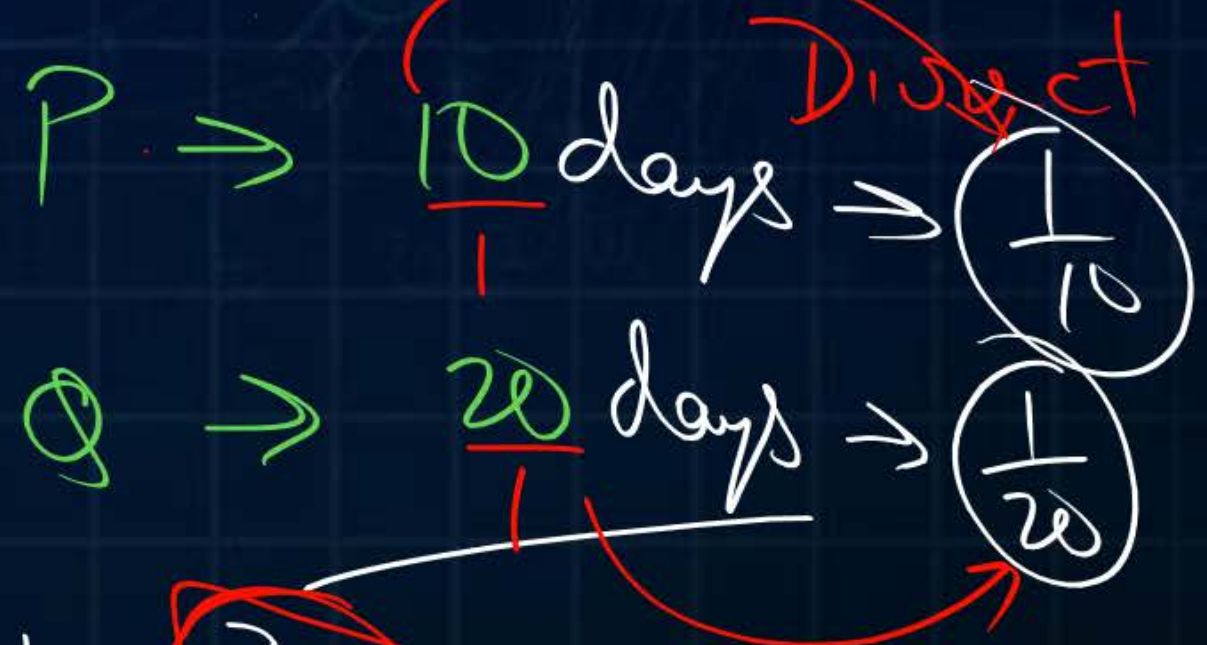
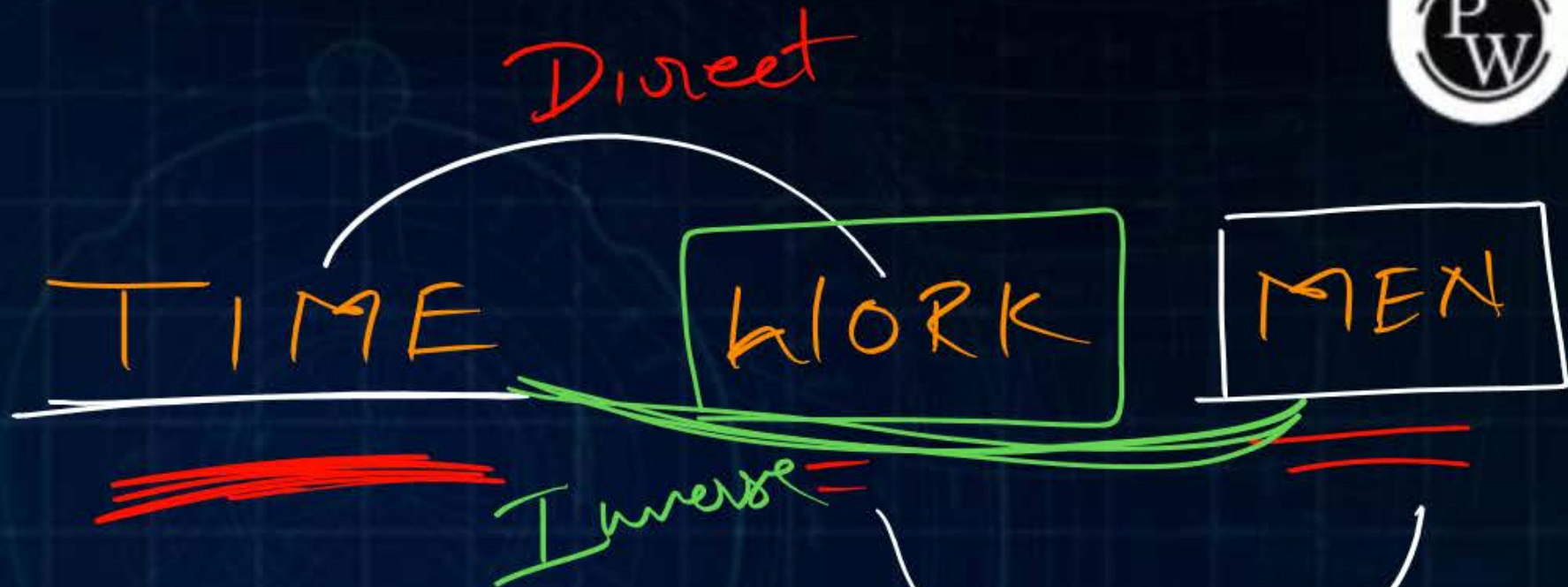
Topics *to be covered*



1

TIME & WORK





$$= 6.5 \text{ days}$$

$$6.5 \text{ days}$$

$$P_{\text{eq}} = \frac{1}{10} + \frac{1}{20} = \frac{3}{20}$$

A - 20

B - 30

↓
 $\frac{60}{5} = \underline{\underline{12}}$

P → 25

Q → 40

↓
 $15 \frac{5}{13}$ OR 15.38

A → 60 day A & B → 40 day B → ? = 120 day

Question

1 B 2 A 3 B ... 31 days

1 A 2 B 3 A 4 B 5 A ... 30 ⁵/₈



A can do a work in 25 days whereas B in 40 days. They started working on alternate days, i.e. 1st day 'A', 2nd day 'B', 3rd day 'A'.....so on. Then in how many days the work would be completed?

$$\frac{1}{25} + \frac{1}{40} = ?$$

$$A = \frac{1}{25}$$

$$B = \frac{1}{40}$$

$$\frac{1}{25} + \frac{1}{40} = \frac{13 \times 15}{200} \Rightarrow 2 \text{ days} \times 15$$

$$1 \text{ work } A = 25$$

$$\frac{1}{40} \text{ " } A = \frac{5}{25} \times \frac{1}{40} = \frac{5}{8}$$

$$= \frac{195}{200} \rightarrow 30 \text{ days}$$

$$30 \frac{5}{8} = 30 - 625$$

Question



1 2 3 4
B A B A ...

To complete a task, A takes 15 days whereas B takes 21 days. If they work alone on alternate days by turn, B starting on the first day, the number of days required to complete the task is

(15, 21)

A

$$8\frac{3}{35}$$

B

$$16\frac{3}{35}$$

C

$$18\frac{2}{5}$$

D

$$17\frac{4}{7}$$

$$\frac{9 \times 3}{105} = \frac{3}{35}$$

$$A = \frac{1}{15} \quad | \quad B = \frac{1}{21}$$

$$\frac{1}{21} + \frac{1}{15} = \frac{5+7}{105} = \frac{12}{105} \xrightarrow{\times 8} 2 \text{ days}$$

$$17\frac{4}{7}$$

$$\frac{3}{35} - \frac{1}{21} = \frac{9-5}{105} = \frac{4}{105}$$

$$\frac{96}{105} \rightarrow 16 \text{ days}$$

$$\frac{4}{105} \times 15 = \frac{4}{7}$$

Question



P completes 80% of a certain work in 20 days. Then with the help of Q, he is able to finish it in 3 more days. How many days will Q take to finish the work, if he works alone?

A

37.5

C

35

B

36.5

D

40

~~P~~

80% \rightarrow 20

$$100\% \rightarrow 20 \times \frac{100}{80} = 25 \text{ days}$$

$$\frac{75}{2} = 37.5$$

P & Q

20% \rightarrow 3

$$100\% \rightarrow 3 \times \frac{100}{20} = 15$$

$$\frac{1}{15} - \frac{1}{25} = Q$$
$$\frac{5-3}{75} = \frac{2}{75}$$

Question



P and Q can individually do some work in 60 and 75 days respectively. They started working together. But P left after some time. Q completed the work in another 30 days. In how many days after starting the work did P leave?

A 25 days

B 24 days

C 20 days

D 32 days

$$P = \frac{1}{60} \quad | \quad Q = \frac{1}{75}$$

'x' days

$$\therefore x = \frac{180}{9} = 20$$

$$\frac{x}{60} + \frac{x}{75} + \frac{30}{75} = 1$$

$$5x + 4x + 120 = 300$$

$$9x = 180$$

Question



$$P = \underline{x} \text{ days}$$

P and Q together can do a job in 7 days. P is twice as efficient as Q. in how many days can P alone do the job?

$$Q = \underline{2x} \text{ days}$$

A 12

C 15

B 10.5

D 21

$$P + Q = \frac{1}{7}$$

$$\frac{1}{x} + \frac{1}{2x} = \frac{1}{7}$$

$$\frac{2+1}{2x} = \frac{1}{7}$$

$$\Rightarrow 2x = 21$$

$$x = \frac{21}{2} = 10.5$$

Question



P can complete a work in 6 days. Working with the help of Q, the job is completed in 7 days, if P starts the work and P and Q work on alternate days. In how many days can Q alone complete the job?

$$P = \frac{1}{6} \quad | \quad Q = \frac{1}{x}$$

P Q P Q P Q P

A 10 days

B 8 days

C 9 days

D 12 days

$$\frac{4}{6} + \frac{3}{x} = 1$$

$$\Rightarrow \frac{4x + 18}{6} = 6x$$

$$2x = 18 \quad x = 9$$

Question

$$P = \frac{15x}{3}$$

$$Q = \frac{10x}{2}$$



P takes 50% more time than Q. If they work together, the work will be done in 18 days. In how many days will Q alone complete the work?

$$P = 3x$$

$$Q = 2x$$

$$2 \times 15 = 30$$

A 15 days

C 25 days

$$\frac{1}{3x} + \frac{1}{2x} = \frac{1}{18}$$

B 24 days

D 30 days

$$\frac{2+3}{6x} = \frac{1}{18}$$

$$\Rightarrow x = 15$$

Question



$$S = \frac{1}{15} \quad | \quad \text{Ramesh} = \frac{1}{9} \quad | \quad \text{Ravi} = \frac{1}{x}$$

Srinivas can do a job in 15 days and Ramesh can do the same job in 9 days. With the help of Ravi, they did the job in 3 days. In how many days can Ravi alone do the same job?

A $6\frac{2}{5}$ days

B 10 days

C $6\frac{1}{5}$ days

D $6\frac{3}{7}$ days

$$\frac{1}{15} + \frac{1}{9} + \frac{1}{x} = \frac{1}{3}$$

$$\therefore x = \frac{45}{7} = \underline{\underline{6\frac{3}{7}}}$$

$$\Rightarrow \frac{1}{x} = \frac{1}{3} - \left(\frac{3+5}{45} \right)$$

$$\Rightarrow \frac{1}{x} = \frac{15-8}{45} = \frac{7}{45}$$

Question



12 men can do a work in 15 days working 8 hours a day. In how many days can 9 men do the same work, working 10 hours a day?

Men Days hrs

✓ 12 15 8

 ? 10

$$\frac{1}{3} \times \frac{8}{10} \times \frac{12}{9} = 16 \text{ days}$$



Chain Rule:



$$\uparrow \textcircled{1} \times \frac{5}{3}$$

$$\downarrow \textcircled{1} \times \frac{3}{5}$$

1.	No
<u>45</u> %	$\rightarrow 97$
<u>62</u> %	$\rightarrow ?$

$$97 \times \frac{62}{45}$$

$$45\% \text{ of } x = 97$$

$$\checkmark x = 97 \times \frac{100}{45}$$

$$\checkmark 62\% \text{ of } x = \frac{62}{100} \times 97 \times \frac{100}{45}$$

Question



If 20 men can build a wall of 56 m long in 6 days, then what length of wall can be built by 35 men in 3 days?

A 36 meter

B 49 meter

C 52 meter

D 60 meter

Men	Wall	Days
20	56m	6
35	?	3

$$56 \times \frac{3}{6} \times \frac{35}{20} = 49m$$

Question

Six typists can type a given data in 16 days. How many days will four typists will take to do the same work?

A 20 days

C 22 days

Typ
✓ 6
✓ 4

Days

16

?

B

24 days

D

18 days

$$\frac{4}{16} \times \frac{6}{4} = 24$$

Question

A contractor undertook to finish a certain work in 124 days and employed 120 men on it. After 64 days, he found that he had already done $\frac{2}{3}$ rd of the work. How many men he can discharge now so that the work may finish in time?

A 56

B 24

C 80

D 64

$$120 - 64$$

$$= 56$$

Men	Days	Work
120	64	$\frac{2}{3}$
?	60	$1 - \frac{2}{3} = \frac{1}{3}$

$$120 \times \frac{1}{3} \times \frac{3}{2} \times \frac{64}{60}$$

$$= 64$$

Question (PYQ GATE Exam 2018 ME)



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?

$$131.25 - 125 = 6.25$$

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

MATA

Work
 $\frac{5}{7}$

Robots

$$\frac{125}{131.25}$$

hrs

7

Days

39

8

13

$$125 \times \frac{39}{52} \times \frac{7}{8} \times \frac{2}{7} \times \frac{7}{8}$$

$$\frac{75 \times 7}{4} = \frac{525}{4} = 131.25$$

Question (PYQ GATE Exam 2019 EC)



H. Hand

$\frac{1}{2}^\circ/\text{min}$
 $1^\circ/2\text{min}$

Two design consultants, P and Q, started working from 8AM for a client. The client budgeted a total of USD 3000 for the consultants. P stopped working when the hour hand moved by 210 degrees on the clock. Q stopped working when the hour hand moved by 240 degrees. P took two tea breaks of 15 minutes each during her shift, but took no lunch break. Q took only one lunch break for 20 minutes, but no tea breaks. The market rate for consultants is USD 200 per hour and breaks are not paid. After paying the consultants, the client shall have USD _____ remaining in the budget.

A

000.00

C

300.00

B

166.67

D

433.33

$$P \rightarrow 210 \times 2 = 420 \text{ min}$$

$$= \frac{420}{60} = 7 \text{ hrs}$$

$$Q \rightarrow 240 \times 2 = 480 \text{ min}$$

$$= \frac{480}{60} = 8 \text{ hrs}$$

$$\rightarrow \frac{8500}{3} \text{ USD}$$

$$2833.33$$

$$15 \text{ hrs} - \left(\frac{1}{2} \text{ hr} + \frac{1}{3} \text{ hr} \right)$$

$$15 - \frac{5}{6}$$

$$\frac{90-5}{6} = \frac{85}{6} \times 200$$

$$\begin{array}{r} 3000 \\ - 2833.33 \\ \hline 166.67 \end{array}$$

Question (PYQ GATE Exam 2019 EC)



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 $\frac{7}{3}$

$$M_1 = \frac{1}{4}$$

$$M_2 = \frac{1}{2}$$

$$\frac{1}{4} + \frac{1}{2} = \frac{1+2}{4} = \frac{3}{4}$$

$$\frac{4}{3}$$

Question (PYQ GATE Exam 2017 ME)



X bullocks and Y tractors take 8 days to plough a field. If we halve 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

C 40

$$(X + Y = \frac{1}{8}) \times 2$$

B 35

$$\frac{X}{2} + 2Y = \frac{1}{5}$$

D 45

$$2X + 2Y = \frac{1}{4}$$

$$\frac{X}{2} + 2Y = \frac{1}{5}$$

$$\frac{3}{2}X = \frac{1}{4} - \frac{1}{5}$$

$$\Rightarrow \frac{3}{2}X = \frac{1}{20}$$

$$X = \frac{1}{20} \times \frac{2}{3}$$

$$X = \frac{1}{30}$$

30

Question (PYQ GATE Exam 2016 CE)

$$A = \frac{1}{6}$$

$$B = \frac{1}{4}$$



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

'x' hrs

$$\left(1 - \frac{x}{6}\right) = 2 \left(1 - \frac{x}{4}\right)$$

$$\Rightarrow \frac{6-x}{6} = 2 \left(\frac{4-x}{4}\right)$$

$$\frac{6-x}{3} = \frac{4-x}{1}$$

$$\Rightarrow 12 - 3x = 6 - x$$

$$\Rightarrow 2x = 6$$

$$x = \frac{6}{2} = 3$$

Question (PYQ GATE Exam 2017 ME)

$$Q = \frac{1}{25}$$

$$R = \frac{1}{50} \times \frac{18}{12}$$



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

$$Q \rightarrow \frac{5}{25}$$

$$R \rightarrow \frac{3 \times 7}{100} \rightarrow \frac{21}{100}$$

$$Q : R = \frac{5}{25} : \frac{21}{100} = 20 : 21$$

Question (PYQ GATE Exam 2010 CS)



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 will it take to build the wall?

A 20 days

B 18 days

C 16 days

D 15 days

15 days

$$5 sk = \frac{1}{20} \Rightarrow sk = \frac{1}{100}$$

$$8 sk = \frac{1}{25} \Rightarrow sk = \frac{1}{200}$$

$$10 wk = \frac{1}{30} \Rightarrow wk = \frac{1}{300}$$

$$\frac{2}{100} + \frac{6}{200} + \frac{5}{300} = \frac{12 + 18 + 10}{600} = \frac{40}{600} = \frac{1}{15}$$



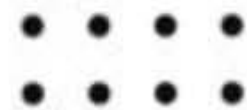
Summary



Time & Work

The word 'Thank' is written in a large, yellow, cursive script. A yellow arrow starts from the top of the 'T', extends horizontally to the right, and then curves downwards to point at the end of the word.

THANK



Keep Hustling!