17 Time and Work

IMPORTANT FACTS AND FORMULAE

I. If A can do a piece of work in n days, then A's 1 day's work = $\frac{1}{n}$.

II. If A's 1 day's work = $\frac{1}{n}$, then A can finish the work in n days.

II. If A is thrice as good a workman as B, then :

Ratio of work done by A and B = 3 : 1.

Ratio of times taken by A and B to finish a work = 1 : 3.

ILLUSTRATIVE EXAMPLES

Ex. 1. *If Roger can do a piece of work in 8 days and Antony can complete the same work in 5 days, in how many days will both of them together complete it?* (L.I.C., 2008)

Sol. Roger's 1 day's work = $\frac{1}{8}$; Antony's 1 day's work = $\frac{1}{5}$.

(Roger + Antony)'s 1 day's work = $\left(\frac{1}{8}+\frac{1}{5}\right)=\frac{13}{40}$.

$\therefore$ Both Roger and Antony will complete the work in $\frac{40}{13}=3\frac{1}{13}$ days.

Ex. 2. *A and B together can complete a piece of work in 15 days and B alone in 20 days. In how many days can A alone complete the work?* (S.S.C., 2010)

Sol. (A + B)'s 1 day's work = $\frac{1}{15}$; B's 1 day's work = $\frac{1}{20}$.

$\therefore$ A's 1 day's work = $\left(\frac{1}{15}-\frac{1}{20}\right)=\frac{1}{60}$.

Hence, A alone can complete the work in 60 days.

Ex. 3. *A alone can complete a piece of work of ₹ 300 in 6 days; but by engaging an assistant, the work is completed in 4 days. Find the share to be received by the assistant.* (Section Officer's, 2008)

Sol. Assistant's 1 day's work = $\frac{1}{4}-\frac{1}{6}=\frac{1}{12}$.

$\therefore$ A's share : Assistant's share = Ratio of their 1 day's work = $\frac{1}{6}:\frac{1}{12}=2:1$.

Hence, assistant's share = $₹\left(300\times\frac{1}{3}\right)=₹\,100$.

Ex. 4. *A can do a work in 4 days, B in 5 days and C in 10 days. Find the time taken by A, B and C to do the work together.* (P.C.S., 2006)

Sol. A's 1 day's work = $\frac{1}{4}$; B's 1 day's work = $\frac{1}{5}$; C's 1 day's work = $\frac{1}{10}$.

(A + B + C) 's 1 day's work = $\left(\frac{1}{4}+\frac{1}{5}+\frac{1}{10}\right)=\frac{11}{20}$.

Hence, A, B and C together can do the work in $\frac{20}{11}=1\frac{9}{11}$ days.

Ex.5. ***A and B undertake to do a piece of work for ₹ 600. A alone can do it in 6 days while B alone can do it in 8 days. With the help of C, they finish it in 3 days. Find the share of each.***

Sol. C's 1 day's work = $\frac{1}{3}-\left(\frac{1}{6}+\frac{1}{8}\right)=\frac{1}{24}$.

$\therefore$ A : B : C = Ratio of their 1 day's work $\frac{1}{6}:\frac{1}{8}:\frac{1}{24}=4:3:1$.

$\therefore$ A's share = ₹$\left(600\times\frac{4}{8}\right)$ = ₹ 300, B's share = ₹$\left(600\times\frac{3}{8}\right)$ = ₹ 225.

C's share = ₹ [600 − (300 + 225)] = ₹ 75.

Ex. 6. ***A can do a piece of work in 7 days of 9 hours each and B can do it in 6 days of 7 hours each. How long will they take to do it, working together $8\frac{2}{5}$ hours a day?***

Sol. A can complete the work in (7 × 9) = 63 hours.

B can complete the work in (6 × 7) = 42 hours.

$\therefore$ A's 1 hour's work = $\frac{1}{63}$ and B's 1 hour's work = $\frac{1}{42}$.

(A + B)'s 1 hour's work = $\left(\frac{1}{63}+\frac{1}{42}\right)=\frac{5}{126}$.

$\therefore$ Both will finish the work in $\left(\frac{126}{5}\right)$hrs.

Number of days of $8\frac{2}{5}$ hrs each $=\left(\frac{126}{5}\times\frac{5}{42}\right)=3$ days.

Ex. 7. ***Rahul takes twice as much time as Manick and thrice as much time as Sachin to complete a job. If working together, they can complete the job in 4 days, find the time taken by each of them separately to complete the work.*** **(I.I.F.T., 2005)**

Sol. Suppose Rahul takes x hours to complete the job.

Then, Manick takes $\frac{x}{2}$ hours and Sachin takes $\frac{x}{3}$ hours to do the job.

Rahul's 1 hour's work = $\frac{1}{x}$; Manick's 1 hour's work = $\frac{2}{x}$; Sachin's 1 hour's work = $\frac{3}{x}$.

$\therefore$ $4\left(\frac{1}{x}+\frac{2}{x}+\frac{3}{x}\right)=1\Rightarrow\frac{6}{x}=\frac{1}{4}\Rightarrow x=24$.

Hence, Rahul takes 24 hours, Manick takes 12 hours and Sachin takes 8 hours to complete the job.

Ex. 8. ***A and B can do a piece of work in 9 days; B and C can do it in 12 days; A and C can do it in 18 days. In how many days will A, B and C finish it, working together and separately?*** **(S.S.C., 2007)**

Sol. (A + B)'s 1 day's work = $\frac{1}{9}$; (B + C)'s 1 day's work = $\frac{1}{12}$;

(A + C)'s 1 day's work = $\frac{1}{18}$.

Adding, we get: 2 (A + B + C)'s 1 day's work = $\left(\frac{1}{9}+\frac{1}{12}+\frac{1}{18}\right)=\frac{9}{36}=\frac{1}{4}$.

$\therefore$ (A + B + C)'s 1 day's work = $\frac{1}{8}$.

Thus, A, B and C together can finish the work in 8 days.

Now, A's 1 day's work = [(A + B + C)'s 1 day's work − (B + C)'s 1 day's work]

$= \left(\frac{1}{8} - \frac{1}{12}\right) = \frac{1}{24}$.

$\therefore$ A alone can finish the work in 24 days.

Similarly, B's 1 day's work

$= [(A + B + C)\text{'s 1 day's work} - (A + C)\text{'s 1 day's work}] = \left(\frac{1}{8} - \frac{1}{18}\right) = \frac{5}{72}$.

$\therefore$ B alone can finish the work in $\frac{72}{5} = 14\frac{2}{5}$ days.

And, C's 1 day's work

$= [(A + B + C)\text{'s 1 day's work} - (A + B)\text{'s 1 day's work}] = \left(\frac{1}{8} - \frac{1}{9}\right) = \frac{1}{72}$.

$\therefore$ C alone can finish the work in 72 days.

Ex. 9. ***A is twice as good a workman as B and together they finish a piece of work in 18 days. In how many days will A alone finish the work ?***

Sol. (A's 1 day's work) : (B's 1 day's work) = 2 : 1.

(A + B)'s 1 day's work $= \frac{1}{18}$. Divide $\frac{1}{18}$ in the ratio 2 : 1.

$\therefore$ A's 1 day's work $= \left(\frac{1}{18} \times \frac{2}{3}\right) = \frac{1}{27}$.

Hence, A alone can finish the work in 27 days.

Ex. 10. ***A can do a certain job in 12 days. B is 60% more efficient than A. How many days does B alone take to do the same job ?***

Sol. Ratio of times taken by A and B = 160 : 100 = 8 : 5.

Suppose B alone takes x days to do the job.

Then, $8 : 5 :: 12 : x \Rightarrow 8x = 5 \times 12 \Rightarrow x = 7\frac{1}{2}$ days.

Ex. 11. ***A can do a piece of work in 80 days. He works at it for 10 days and then B alone finishes the remaining work in 42 days. In how much time will A and B, working together, finish the work ?***

Sol. Work done by A in 10 days $= \left(\frac{1}{80} \times 10\right) = \frac{1}{8}$. Remaining work $= \left(1 - \frac{1}{8}\right) = \frac{7}{8}$.

Now, $\frac{7}{8}$ work is done by B in 42 days.

Whole work will be done by B in $\left(42 \times \frac{8}{7}\right) = 48$ days.

$\therefore$ A's 1 day's work $= \frac{1}{80}$ and B's 1 day's work $= \frac{1}{48}$.

$\therefore$ (A + B)'s 1 day's work $= \left(\frac{1}{80} + \frac{1}{48}\right) = \frac{8}{240} = \frac{1}{30}$.

Hence, both will finish the work in 30 days.

Ex. 12. ***A can do a piece of work in 10 days and B in 20 days. They work together but 2 days before the completion of the work, A leaves. In how many days was the work completed ?*** **(S.S.C., 2008)**

Sol. B's 2 days' work $= \left(\frac{1}{20} \times 2\right) = \frac{1}{10}$. Remaining work $= \left(1 - \frac{1}{10}\right) = \frac{9}{10}$.

(A + B)'s 1 day's work $= \left(\frac{1}{10} + \frac{1}{20}\right) = \frac{6}{40} = \frac{3}{20}$.

Now, $\frac{3}{20}$ work is done by A and B in 1 day.

$\therefore$ $\frac{9}{10}$ work is done by A and B in $\left(\frac{20}{3}\times\frac{9}{10}\right)$ = 6 days.

Hence, total time taken = (2 + 6) days = 8 days.

Ex. 13. ***A can complete a work in 10 days, B in 12 days and C in 15 days. All of them began the work together, but A had to leave the work after 2 days of the start and B, 3 days before the completion of the work. How long did the work last?*** **(S.S.C., 2005)**

Sol. A, B and C work together for 2 days. C alone works for 3 days and the remaining work is done by B and C together.

Now, (A + B + C)'s 2 days' work = $2\left(\frac{1}{10}+\frac{1}{12}+\frac{1}{15}\right)=\left(2\times\frac{15}{60}\right)=\frac{1}{2}$.

C's 3 days' work = $\left(3\times\frac{1}{15}\right)=\frac{1}{5}$. Remaining work = $1-\left(\frac{1}{2}+\frac{1}{5}\right)=\frac{3}{10}$.

But, (B + C)'s 1 day's work = $\left(\frac{1}{12}+\frac{1}{15}\right)=\frac{27}{180}=\frac{3}{20}$.

Now, $\frac{3}{20}$ work is done by (B + C) in 1 day.

$\therefore$ $\frac{3}{10}$ work is done by (B + C) in $\left(\frac{20}{3}\times\frac{3}{10}\right)=2$ days.

Hence, total time taken = (2 + 3 + 2) days = 7 days.

Ex. 14. ***A and B can do a piece of work in 45 and 40 days respectively. They began the work together but A leaves after some days and B finished the remaining work in 23 days. After how many days did A leave?*** **(M.B.A., 2009)**

Sol. B's 23 days' work = $\left(23\times\frac{1}{40}\right)=\frac{23}{40}$. Remaining work = $\left(1-\frac{23}{40}\right)=\frac{17}{40}$.

Now, (A + B)'s 1 day's work = $\left(\frac{1}{45}+\frac{1}{40}\right)=\frac{17}{360}$.

Thus, $\frac{17}{360}$ work is done by (A + B) in 1 day.

$\therefore$ $\frac{17}{40}$ work is done by (A + B) in $\left(\frac{360}{17}\times\frac{17}{40}\right)=9$ days.

Hence, A left after 9 days.

Ex. 15. ***A and B working separately can do a piece of work in 9 and 12 days respectively. If they work for a day alternately, A beginning, in how many days, the work will be completed ?***

Sol. (A + B)'s 2 days' work = $\left(\frac{1}{9}+\frac{1}{12}\right)=\frac{7}{36}$.

Work done in 5 pairs of days = $\left(5\times\frac{7}{36}\right)=\frac{35}{36}$.

Remaining work = $\left(1-\frac{35}{36}\right)=\frac{1}{36}$.

On 11th day, it is A's turn. $\frac{1}{9}$ work is done by him in 1 day.

$\frac{1}{36}$ work is done by him in $\left(9\times\frac{1}{36}\right)=\frac{1}{4}$ day.

$\therefore$ Total time taken = $\left(10+\frac{1}{4}\right)$days $=10\frac{1}{4}$ days.

Ex. 16. ***A can do a piece of work in 120 days and B can do it in 150 days. They work together for 20 days. Then, B leaves and A alone continues the work. 12 days after that C joins A and the work is completed in 48 days more. In how many days can C do it, if he works alone?***

Sol. [(A + B)'s 20 days' work] + (A's 12 days' work) = $20\left(\frac{1}{120}+\frac{1}{150}\right)+\left(12\times\frac{1}{120}\right)=\frac{2}{5}$.

Remaining work = $\left(1-\frac{2}{5}\right)=\frac{3}{5}$ = (A + C)'s 48 days' work.

$\therefore$ (A + C)'s 1 day's work = $\left(\frac{3}{5}\times\frac{1}{48}\right)=\frac{1}{80}$. C's 1 day's work = $\left(\frac{1}{80}-\frac{1}{120}\right)=\frac{1}{240}$.

Hence, C alone can finish the work in 240 days.

Ex. 17. ***A and B can do a piece of work in 12 days. B and C together can do it in 15 days. If A is twice as good a workman as C, find in what time B alone can do it.***

Sol. A's 1 day's work = C's 2 days' work.

$\therefore$ (A + B)'s 1 day's work = (B's 1 day's work) + (C's 2 days' work)

$\Rightarrow$ (B's 1 day's work) + (C's 2 days' work) = $\frac{1}{12}$ ...(*i*)

But (B's 1 day's work) + (C's 1 day's work) = $\frac{1}{15}$ ...(*ii*)

Subtracting (*ii*) from (*i*), we get: C's 1 day's work = $\left(\frac{1}{12}-\frac{1}{15}\right)=\frac{1}{60}$.

$\therefore$ B's 1 day's work = $\left(\frac{1}{15}-\frac{1}{60}\right)=\frac{3}{60}=\frac{1}{20}$.

Hence, B alone can finish the work in 20 days.

Ex. 18. ***45 men can complete a work in 16 days. Six days after they started working, 30 more men joined them. How many days will they now take to complete the remaining work ?***

Sol. (45 × 16) men can complete the work in 1 day.

$\therefore$ 1 man's 1 day's work = $\frac{1}{720}$. 45 men's 1 days' work = $\frac{45}{720}=\frac{1}{16}$

45 men's 6 days' work = $\left(\frac{1}{16}\times 6\right)=\frac{3}{8}$. Remaining work = $\left(1-\frac{3}{8}\right)=\frac{5}{8}$.

75 men's 1 day's work = $\frac{75}{720}=\frac{5}{48}$.

Now, $\frac{5}{48}$ work is done by them in 1 day.

$\therefore$ $\frac{5}{8}$ work is done by them in $\left(\frac{48}{5}\times\frac{5}{8}\right)=6$ days.

Ex. 19. ***10 persons begin to work together on a job but after some days 4 persons leave. As a result, the job which could have been completed in 40 days is completed in 50 days. How many days after the commencement of the work did the 4 persons leave?*** **(S.S.C., 2004)**

Sol. 10 persons can complete the work in 40 days.

$\therefore$ 1 person's 1 day's work = $\frac{1}{40\times 10}=\frac{1}{400}$.

Suppose 4 persons left after x days.

Then, $\frac{1}{400}\times 10\times x+\frac{1}{400}\times 6\times(50-x)=1 \Rightarrow \frac{1}{40}x+\frac{3}{200}(50-x)=1$

$\Rightarrow$ $\frac{1}{40}x+\frac{3}{4}-\frac{3}{200}x=1\Rightarrow\frac{1}{100}x=\frac{1}{4}\Rightarrow x=25.$

Hence, 4 persons left 25 days after the commencement of the work.

Ex. 20. ***9 children can complete a piece of work in 360 days. 18 men can complete the same piece of work in 72 days and 12 women can complete it in 162 days. In how many days can 4 men, 12 women and 10 children together complete the piece of work?*** **(Bank. P.O., 2006)**

Sol. 1 man's 1 day's work = $\frac{1}{72\times 18}=\frac{1}{1296}$.

1 woman's 1 day's work = $\frac{1}{162\times 12}=\frac{1}{1944}$.

1 child's 1 day's work = $\frac{1}{360\times 9}=\frac{1}{3240}$.

(4 men + 12 women + 10 children)'s 1 day's work

$$=\left(4\times\frac{1}{1296}+12\times\frac{1}{1944}+10\times\frac{1}{3240}\right)=\left(\frac{1}{324}+\frac{1}{162}+\frac{1}{324}\right)=\frac{4}{324}=\frac{1}{81}.$$

Hence, 4 men, 12 women and 10 children can complete the work in 81 days.

Ex. 21. ***2 men and 3 boys can do a piece of work in 10 days while 3 men and 2 boys can do the same work in 8 days. In how many days can 2 men and 1 boy do the work?***

Sol. Let 1 man's 1 day's work = x and 1 boy's 1 day's work = y.

Then, $2x + 3y = \frac{1}{10}$ and $3x+2y=\frac{1}{8}$.

Solving, we get : $x = \frac{7}{200}$ and $y=\frac{1}{100}$.

$\therefore$ (2 men + 1 boy)'s 1 day's work = $\left(2\times\frac{7}{200}+1\times\frac{1}{100}\right)=\frac{16}{200}=\frac{2}{25}$.

So, 2 men and 1 boy together can finish the work in $\frac{25}{2}=12\frac{1}{2}$ days.

Ex. 22. ***3 men and 4 women can earn ₹ 3780 in 7 days. 11 men and 13 women can earn ₹ 15040 in 8 days. In what time will 7 men and 9 women earn ₹ 12400?***

Sol. Let 1 man's 1 day's earning be ₹ x and 1 woman's 1 day's earning be ₹ y.

Then, $3x + 4y = \frac{3780}{7}=540$ ... (i)

And, $11x + 13y = \frac{15040}{8}=1880$ ...(ii)

Solving (i) and (ii), we get: $x = 100$, $y = 60$.

(7 men + 9 women)'s 1 day's earning = ₹ (7 × 100 + 9 × 60) = ₹ 1240.

Hence, required time = $\left(\frac{12400}{1240}\right)$ days $= 10$ days.

EXERCISE

(OBJECTIVE TYPE QUESTIONS)

Directions: ***Mark (✓) against the correct answer:***

1. Ayesha can complete a piece of work in 16 days. Amita can complete the same piece of work in 8 days. If both of them work together in how many days can they complete the same piece of work? **(Bank P.O., 2010)**

(a) $4\frac{2}{5}$ days (b) $5\frac{1}{3}$ days

(c) 6 days (d) 12 days

(e) None of these

2. A can complete a certain work in 4 minutes, B in 5 minutes, C in 6 minutes, D in 10 minutes and E in 12 minutes. The average number of units of work completed by them per minute will be **(P.C.S., 2009)**

(a) 0.16 (b) 0.40

(c) 0.80 (d) None of these

3. A can finish a work in 18 days and B can do the same work in half the time taken by A. Then, working together, what part of the same work they can finish in a day ? **(S.S.C., 2002)**

(a) $\frac{1}{6}$ (b) $\frac{1}{9}$

(c) $\frac{2}{5}$ (d) $\frac{2}{7}$

4. A tyre has two punctures. The first puncture alone would have made the tyre flat in 9 minutes and the second alone would have done it in 6 minutes. If air leaks out at a constant rate, how long does it take both the punctures together to make it flat ?

(*a*) $1\frac{1}{2}$ minutes (*b*) $3\frac{1}{2}$ minutes

(*c*) $3\frac{3}{5}$ minutes (*d*) $4\frac{1}{4}$ minutes

5. A can knit a pair of socks in 3 days. B can knit the same pair in 9 days. If they are knitting together, then in how many days will they knit two pairs of socks? **(R.R.B., 2004)**

(*a*) 3 days (*b*) 4 days

(*c*) $4\frac{1}{2}$ days (*d*) 5 days

6. A can complete a work in 6 days while B can complete the same work in 12 days. If they work together and complete it, the portion of the work done by A is

(*a*) $\frac{1}{3}$ (*b*) $\frac{1}{4}$

(*c*) $\frac{1}{2}$ (*d*) $\frac{2}{3}$

7. A can do a piece of work in 8 days and B can do the same piece of work in 12 days. A and B together complete the same piece of work and get ₹ 200 as the combined wages. B's share of the wages will be

(*a*) ₹ 75 (*b*) ₹ 80

(*c*) ₹ 85 (*d*) ₹ 90

8. George takes 8 hours to copy a 50-page manuscript while Sonia can copy the same manuscript in 6 hours. How many hours would it take them to copy a 100-page manuscript, if they work together? **(M.A.T., 2005)**

(*a*) $6\frac{6}{7}$ (*b*) 9

(*c*) $9\frac{5}{7}$ (*d*) 14

9. A and B together complete a piece of work in T days. If A alone completes the work in T + 3 days and B alone completes the piece of work in T + 12 days, what is T? **(S.B.I.P.O., 2008)**

(*a*) 3 days (*b*) 9 days

(*c*) 12 days (*d*) Cannot be determined

(*e*) None of these

10. Reena, Aastha and Shloka can independently complete a piece of work in 6 hours, 4 hours and 12 hours respectively. If they work together, how much time will they take to complete that piece of work? **(Bank P.O., 2004)**

(*a*) 2 hours (*b*) 5 hours

(*c*) 6 hours (*d*) 8 hours

(*e*) None of these

11. A man can do a job in 15 days. His father takes 20 days and his son finishes it in 25 days. How long will they take to complete the job if they all work together?

(*a*) Less than 6 days

(*b*) Exactly 6 days

(*c*) Approximately 6.4 days

(*d*) More than 10 days

12. Amit and Sumit can plough a field in 4 days. Sumit alone can plough the field in 6 days. In how many days will Amit alone plough the field? **(R.R.B., 2006)**

(*a*) 10 days (*b*) 12 days

(*c*) 14 days (*d*) 15 days

13. Two spinning machines A and B can together produce 3,00,000 metres of cloth in 10 hours. If machine B alone can produce the same amount of cloth in 15 hours, then how much cloth can machine A produce alone in 10 hours? **(M.A.T., 2005)**

(*a*) 50,000 metres (*b*) 1,00,000 metres

(*c*) 1,50,000 metres (*d*) 2,00,000 metres

14. X, Y and Z complete a work in 6 days. X or Y alone can do the same work in 16 days. In how many days Z alone can finish the same work? **(R.R.B., 2006)**

(*a*) 12 (*b*) 16

(*c*) 24 (*d*) 36

15. A can lay railway track between two given stations in 16 days and B can do the same job in 12 days. With the help of C, they did the job in 4 days only. Then, C alone can do the job in : **(S.S.C., 2003)**

(*a*) $9\frac{1}{5}$ days (*b*) $9\frac{2}{5}$ days

(*c*) $9\frac{3}{5}$ days (*d*) 10 days

16. A can complete $\frac{1}{3}$ of a work in 5 days and B, $\frac{2}{5}$ of the work in 10 days. In how many days both A and B together can complete the work? **(S.S.C., 2010; P.C.S., 2009)**

(*a*) $7\frac{1}{2}$ (*b*) $8\frac{4}{5}$

(*c*) $9\frac{3}{8}$ (*d*) 10

17. X can do $\frac{1}{4}$ of a work in 10 days, Y can do 40% of the work in 40 days and Z can do $\frac{1}{3}$ of the work in 13 days. Who will complete the work first ?

(*a*) X (*b*) Y
(*c*) Z (*d*) X and Z both

18. A man and a boy together can do a certain amount of digging in 40 days. Their speeds in digging are in the ratio of 8 : 5. How many days will the boy take to complete the work if engaged alone? **(R.R.B., 2005)**

(*a*) 52 days (*b*) 68 days
(*c*) 80 days (*d*) 104 days

19. A takes twice as much time as B or thrice as much time as C to finish a piece of work. Working together, they can finish the work in 2 days. B can do the work alone in : **(S.S.C., 2002)**

(*a*) 4 days (*b*) 6 days
(*c*) 8 days (*d*) 12 days

20. Work done by A in one day is half of the work done by B in one day. Work done by B is half of the work done by C in one day. If C alone can complete the work in 7 days, in how many days can A, B and C together complete the work? **(S.B.I.P.O., 2008)**

(*a*) 4 (*b*) 14
(*c*) 21 (*d*) 28
(*e*) None of these

21. Rosa can eat 32 rosogollas in one hour. Her sister Lila needs three hours to eat the same number. How much time will they take to eat 32 rosogollas together? **(R.R.B., 2005)**

(*a*) 45 minutes (*b*) 75 minutes
(*c*) 90 minutes (*d*) None of these

22. A conveyor belt delivers baggage at the rate of 3 tons in 5 minutes and a second conveyor belt delivers baggage at the rate of 1 ton in 2 minutes. How much time will it take to get 33 tons of baggage delivered using both the conveyor belts together? **(P.C.S., 2006)**

(*a*) 25 min 30 sec (*b*) 30 min
(*c*) 35 min (*d*) 45 min

23. A manufacturer builds a machine which will address 500 envelopes in 8 minutes. He wishes to build another machine so that when both are operating together they will address 500 envelopes in 2 minutes. The equation used to find how many minutes x it would require the second machine to address 500 envelopes alone, is **(M.B.A., 2011)**

(*a*) $8 - x = 2$ (*b*) $\frac{1}{8}+\frac{1}{x}=\frac{1}{2}$
(*c*) $\frac{500}{8}+\frac{500}{x}=500$ (*d*) $\frac{x}{2}+\frac{x}{8}=1$

24. Computer A takes 3 minutes to process an input while computer B takes 5 minutes. If computers A, B and C can process an average of 14 inputs in one hour, how many minutes does computer C alone take to process one input? **(M.C.A., 2009)**

(*a*) 4 (*b*) 6
(*c*) 10 (*d*) None of these

25. Bob and David are two typists. One afternoon, they were each given 40 pages for typing. They divided the work equally but David finished 20 minutes before Bob who took 2 hours for the same. The next afternoon, they were again given 77 pages to type. However, this time they decided to divide the work such that they finished typing simultaneously. How many pages did Bob have to type?

(*a*) 35 (*b*) 36
(*c*) 40 (*d*) 42

26. P, Q and R are three typists who working simultaneously can type 216 pages in 4 hours. In one hour, R can type as many pages more than Q as Q can type more than P. During a period of five hours, R can type as many pages as P can during seven hours. How many pages does each of them type per hour ? **(M.A.T., 2005)**

(*a*) 14, 17, 20 (*b*) 15, 17, 22
(*c*) 15, 18, 21 (*d*) 16, 18, 22

27. Ronald and Elan are working on an assignment. Ronald takes 6 hours to type 32 pages on a computer, while Elan takes 5 hours to type 40 pages. How much time will they take, working together on two different computers to type an assignment of 110 pages? **(SCMHRD, 2002)**

(*a*) 7 hours 30 minutes (*b*) 8 hours
(*c*) 8 hours 15 minutes (*d*) 8 hours 25 minutes

28. Cloth Makers Inc. has p spindles, each of which can produce q metres of cloth on an average in r minutes. If the spindles are made to run with no interruption, then how many hours will it take for 20,000 metres of cloth to be produced? **(M.A.T., 2004)**

(*a*) $\frac{20000\,pq}{r}$ (*b*) $\frac{20000\,rq}{p}$
(*c*) $\frac{20000\,r}{pq}$ (*d*) $\frac{20000\,r}{60\,pq}$

29. Two workers A and B are engaged to do a work. A working alone takes 8 hours more to complete the job than if both worked together. If B worked alone, he would need $4\frac{1}{2}$ hours more to complete the job than they both working together. What time would they take to do the work together ? **(M.A.T., 2010)**

(*a*) 4 hours (*b*) 5 hours
(*c*) 6 hours (*d*) 7 hours

30. Three friends Anne, Bob and Chris work together to do a certain job. The time it takes them to do the work together is 6 hours less than Anne would have take alone, 1 hour less than Bob would have

taken alone and half the time Chris would have taken working alone. How long did it take them to complete the job, working together? (M.B.A., 2010)

(*a*) 20 min (*b*) 30 min

(*c*) 40 min (*d*) 50 min

31. To do a piece of work, B takes 3 times as long as A and C together and C twice as long as A and B together. If A, B and C together can complete the work in 10 days, how long would A take alone to complete it?

(*a*) 24 days (*b*) 30 days

(*c*) 36 days (*d*) 40 days

32. P can complete a work in 12 days working 8 hours a day. Q can complete the same work in 8 days working 10 hours a day. If both P and Q work together, working 8 hours a day, in how many days can they complete the work ?

(*a*) $5\frac{5}{11}$ (*b*) $5\frac{6}{11}$

(*c*) $6\frac{5}{11}$ (*d*) $6\frac{6}{11}$

(*e*) None of these

33. A and B together can complete a work in 12 days, B and C together can complete the same work in 8 days and A and C together can complete it in 16 days. In total, how many days do A, B and C together take to complete the same work?

(Bank P.O., 2009)

(*a*) $3\frac{5}{12}$ (*b*) $3\frac{9}{13}$

(*c*) $7\frac{5}{12}$ (*d*) $7\frac{5}{13}$

(*e*) None of these

34. A can do a piece of work in 4 hours, B and C together in 3 hours, and A and C together in 2 hours. How long will B alone take to do it? (S.S.C., 2005)

(*a*) 8 hours (*b*) 10 hours

(*c*) 12 hours (*d*) 24 hours

35. A and B can do a work in 8 days, B and C can do the same work in 12 days. A, B and C together can finish it in 6 days. A and C together will do it in

(S.S.C., 2006)

(*a*) 4 days (*b*) 6 days

(*c*) 8 days (*d*) 12 days

36. A and B together can do a job in 2 days; B and C can do it in 4 days; A and C in $2\frac{2}{5}$ days. The number of days required for A to do the job alone is (M.B.A., 2011)

(*a*) 1 (*b*) 3

(*c*) 6 (*d*) 12

37. A and B can do a piece of work in 5 days; B and C can do it in 7 days; A and C can do it in 4 days. Who among these will take the least time if put to do it alone ?

(*a*) A (*b*) B

(*c*) C (*d*) Data inadequate

38. A and B can do a piece of work in 12 days, B and C in 8 days and C and A in 6 days. How long would B take to do the same work alone? (S.S.C., 2007)

(*a*) 24 days (*b*) 32 days

(*c*) 40 days (*d*) 48 days

39. A can build a wall in the same time in which B and C together can do it. If A and B together could do it in 25 days and C alone in 35 days, in what time could B alone do it? (N.M.A.T., 2008)

(*a*) 90 days (*b*) 100 days

(*c*) 175 days (*d*) None of these

40. Madhu takes twice as much time as Uma to complete a work and Rahul does it in the same time as Madhu and Uma together. If all three working together can finish the work in 6 days, then the time taken by Madhu to finish the work is (M.A.T., 2010)

(*a*) 12 days (*b*) 14 days

(*c*) 36 days (*d*) 40 days

41. A takes 5 days more than B to do a certain job and 9 days more than C; A and B together can do the job in the same time as C. How many days A would take to do it?

(*a*) 5 (*b*) 10

(*c*) 15 (*d*) 20

42. A works twice as fast as B. If B can complete a work in 12 days independently, the number of days in which A and B can together finish the work is

(*a*) 4 days (*b*) 6 days

(*c*) 8 days (*d*) 18 days

43. A is twice as good a workman as B. If they work together, they can complete a job in 18 days. If A alone does the job, in how many days he will complete the job? (Hotel Management, 2010)

(*a*) 27 days (*b*) 36 days

(*c*) 40 days (*d*) 54 days

44. David and Michael together can finish a job in 4 days 19 hrs 12 min. If David works at two-thirds Michael's speed, how long does it take Michael alone to finish the same job?

(*a*) 8 days (*b*) 12 days

(*c*) 15 days (*d*) None of these

45. A is thrice as good a workman as B and so takes 60 days less than B for doing a job. The time in which they can do the job together is

(A.A.O. Exam, 2010; M.A.T., 2010)

(*a*) $22\frac{1}{2}$ days (*b*) 30 days

(*c*) 45 days (*d*) 60 days

46. A and B can do a job together in 7 days. A is $1\frac{3}{4}$ times as efficient as B. The same job can be done by A alone in : **(S.S.C., 2003)**

(*a*) $9\frac{1}{3}$ days (*b*) 11 days

(*c*) $12\frac{1}{4}$ days (*d*) $16\frac{1}{3}$ days

47. Kamal can do a work in 15 days. Bimal is 50% more efficient than Kamal. The number of days, Bimal will take to do the same piece of work, is **(C.P.O., 2006)**

(*a*) $7\frac{1}{2}$ (*b*) 10

(*c*) 12 (*d*) 14

48. A does 20% less work than B. If A can complete a piece of work in $7\frac{1}{2}$ hours, then B can do it in **(S.S.C., 2006)**

(*a*) 5 hours (*b*) $5\frac{1}{2}$ hours

(*c*) 6 hours (*d*) $6\frac{1}{2}$ hours

49. A is 30% more efficient than B. How much time will they, working together, take to complete a job which A alone could have done in 23 days ?

(*a*) 11 days (*b*) 13 days

(*c*) $20\frac{3}{17}$ days (*d*) None of these

50. A can do a piece of work in 10 days working 8 hours per day. If B is two-thirds as efficient as A, then in how many days can B alone do the same piece of work, working 5 hours per day?

(*a*) 15 (*b*) 18

(*c*) 20 (*d*) 24

51. *A* does half as much work as *B* in one-sixth of the time. If together they take 10 days to complete a work, how much time shall *B* alone take to do it? **(S.S.C., 2005)**

(*a*) 30 days (*b*) 40 days

(*c*) 50 days (*d*) 70 days

52. A is 50% as efficient as B. C does half of the work done by A and B together. If C alone does the work in 40 days, then A, B and C together can do the work in:

(*a*) $13\frac{1}{3}$ days (*b*) 15 days

(*c*) 20 days (*d*) 30 days

53. Two workers A and B working together completed a job in 5 days. If A worked twice as efficiently as he actually did and B worked $\frac{1}{3}$ as efficiently as he actually did, the work would have been completed in 3 days. A alone could complete the work in :

(*a*) $5\frac{1}{4}$ days (*b*) $6\frac{1}{4}$ days

(*c*) $7\frac{1}{2}$ days (*d*) None of these

54. A can do a work in 15 days and B in 20 days. If they work on it together for 4 days, then the fraction of the work that is left is :

(*a*) $\frac{1}{4}$ (*b*) $\frac{1}{10}$

(*c*) $\frac{7}{15}$ (*d*) $\frac{8}{15}$

55. A can do a piece of work in 15 days, which B can do in 10 days. B worked at it for 8 days. A can finish the remaining work in **(R.R.B., 2004)**

(*a*) 2 days (*b*) 3 days

(*c*) 5 days (*d*) 10 days

56. A and B can complete a work in 18 days and 15 days respectively. They started doing the work together but after 3 days *A* had to leave and *B* alone completed the remaining work. The whole work was completed in

(*a*) $9\frac{3}{4}$ days (*b*) $10\frac{1}{4}$ days

(*c*) $12\frac{1}{2}$ days (*d*) $12\frac{3}{4}$ days

57. A, B and C can separately do a work in 12, 15 and 20 days respectively. They started to work together but C left after 2 days. The remaining work will be finished in **(R.R.B., 2006)**

(*a*) 4 days (*b*) 5 days

(*c*) 6 days (*d*) 15 days

58. A can complete a piece of work in 18 days, B in 20 days and C in 30 days. B and C together start the work and are forced to leave after 2 days. The time taken by A alone to complete the remaining work is **(S.S.C., 2010)**

(*a*) 10 days (*b*) 12 days

(*c*) 15 days (*d*) 16 days

59. A can complete a piece of work in 10 days, B in 15 days and C in 20 days. A and C worked together for 2 days and then A was replaced by B. In how many days, altogether, was the work completed? **(C.P.O., 2007)**

(*a*) 6 (*b*) 8

(*c*) 10 (*d*) 12

60. A machine P can print one lakh books in 8 hours, machine Q can print the same number of books in 10 hours while machine R can print them in 12 hours. All the machines are started at 9 a.m. while machine P is closed at 11 a.m. and the remaining two machines complete the work. Approximately at what time will the work be finished ?

(*a*) 11 : 30 a.m. (*b*) 12 noon

(*c*) 12 : 30 p.m. (*d*) 1 p.m.

61. A and B can do a piece of work in 30 days, while B and C can do the same work in 24 days and C and A in 20 days. They all work together for 10 days when B and C leave. How many days more will A take to finish the work ?

(*a*) 18 days (*b*) 24 days

(*c*) 30 days (*d*) 36 days

62. X and Y can do a piece of work in 20 days and 12 days respectively. X started the work alone and then after 4 days Y joined him till the completion of the work. How long did the work last ?

(*a*) 6 days (*b*) 10 days

(*c*) 15 days (*d*) 20 days

63. A completes $\frac{7}{10}$ of a work in 15 days. Then he completes the remaining work with the help of B in 4 days. The time required for A and B together to complete the entire work is **(S.S.C., 2005)**

(*a*) $8\frac{1}{4}$ days (*b*) $10\frac{1}{2}$ days

(*c*) $12\frac{2}{3}$ days (*d*) $13\frac{1}{3}$ days

64. A man and a boy can do a piece of work in 24 days. If the man works alone for the last 6 days, it is completed in 26 days. How long would the boy take to do it alone? **(S.S.C., 2005)**

(*a*) 20 days (*b*) 24 days

(*c*) 36 days (*d*) 72 days

65. A and B can together finish a work in 30 days. They worked together for 20 days and then B left. After another 20 days, A finished the remaining work. In how many days A alone can finish the job ? **(S.S.C., 2003)**

(*a*) 40 (*b*) 50

(*c*) 54 (*d*) 60

66. X can do a piece of work in 40 days. He works at it for 8 days and then Y finished it in 16 days. How long will they together take to complete the work ?

(*a*) $13\frac{1}{3}$ days (*b*) 15 days

(*c*) 20 days (*d*) 56 days

67. A, B and C together can complete a piece of work in 10 days. All the three started working at it together and after 4 days A left. Then B and C together completed the work in 10 more days. A alone could complete the work in :

(*a*) 15 days (*b*) 16 days

(*c*) 25 days (*d*) 50 days

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

(*a*) 23 days (*b*) 37 days

(*c*) $37\frac{1}{2}$ days (*d*) 40 days

69. *A* and *B* together can do a piece of work in 30 days. A having worked for 16 days, *B* finishes the remaining work alone in 44 days. In how many days shall B finish the whole work alone ?

(*a*) 30 days (*b*) 40 days

(*c*) 60 days (*d*) 70 days

70. A and B together can do a piece of work in 12 days, which B and C together can do in 16 days. After A has been working at it for 5 days and B for 7 days, C finishes it in 13 days. In how many days *C* alone will do the work ?

(*a*) 16 (*b*) 24

(*c*) 36 (*d*) 48

71. A and B can do a piece of work in 28 and 35 days respectively. They began to work together but A leaves after some time and B completed the remaining work in 17 days. After how many days did A leave?

(*a*) $7\frac{5}{9}$ days (*b*) 8 days

(*c*) 9 days (*d*) $14\frac{2}{5}$ days

72. A can build up a wall in 8 days while B can break it in 3 days. A has worked for 4 days and then B joined to work with A for another 2 days only. In how many days will A alone build up the remaining part of the wall? **(M.A.T., 2006)**

(*a*) $6\frac{1}{3}$ days (*b*) 7 days

(*c*) $7\frac{1}{3}$ days (*d*) $13\frac{1}{3}$ days

73. Anuj and Manoj can together paint their house in 30 days. After working for 20 days, Anuj has to go out and Manoj finishes the remaining work in the next 30 days. If Manoj had gone away after 20 days

instead of Anuj, then Anuj would have completed the remaining work in (M.B.A., 2006)

(*a*) 15 days (*b*) 20 days

(*c*) 25 days (*d*) 35 days

74. A started a work and left after working for 2 days. Then B was called and he finished the work in 9 days. Had A left the work after working for 3 days, B would have finished the remaining work in 6 days. In how many days can each of them, working alone, finish the whole work? (N.M.A.T., 2005)

(*a*) 2.5 days, 7.5 days (*b*) 5 days, 8.5 days

(*c*) 5 days, 15 days (*d*) None of these

75. Working together, Asha and Sudha can complete an assigned task in 20 days. However, if Asha worked alone and completed half the work and then Sudha takes over the task and completes the second half of the task, the task will be completed in 45 days. How long will Asha take to complete the task if she worked alone? Assume that Sudha is more efficient than Asha. (M.A.T., 2010)

(*a*) 25 days (*b*) 30 days

(*c*) 60 days (*d*) 65 days

76. A can do a piece of work in 14 days which B can do in 21 days. They begin together but 3 days before the completion of the work, A leaves off. The total number of days to complete the work is (G.B.O., 2007)

(*a*) $6\frac{3}{5}$ (*b*) $8\frac{1}{2}$

(*c*) $10\frac{1}{5}$ (*d*) $13\frac{1}{2}$

77. A, B and C can complete a work separately in 24, 36 and 48 days respectively. They started together but C left after 4 days of start and A left 3 days before the completion of the work. In how many days will the work be completed ?

(*a*) 15 days (*b*) 22 days

(*c*) 25 days (*d*) 35 days

78. A, B and C can complete a work in 10, 12 and 15 days respectively. They started the work together. But A left the work 5 days before its completion. B also left the work 2 days after A left. In how many days was the work completed? (C.P.O., 2007)

(*a*) 4 (*b*) 5

(*c*) 7 (*d*) 8

79. A, B and C together earn ₹ 300 per day, while A and C together earn ₹ 188 and B and C together earn ₹ 152. The daily earning of C is :

(*a*) ₹ 40 (*b*) ₹ 68

(*c*) ₹ 112 (*d*) ₹ 150

80. A, B and C are employed to do a piece of work for ₹ 529. A and B together are supposed to do $\frac{19}{23}$ of the work and B and C together $\frac{8}{23}$ of the work. What amount should A be paid ?

(*a*) ₹ 315 (*b*) ₹ 345

(*c*) ₹ 355 (*d*) ₹ 375

81. Kim can do a work in 3 days while David can do the same work in 2 days. Both of them finish the work together and get ₹ 150. What is the share of Kim ?

(*a*) ₹ 30 (*b*) ₹ 60

(*c*) ₹ 70 (*d*) ₹ 75

82. If A can do $\frac{1}{4}$ of a work in 3 days and B can do $\frac{1}{6}$ of the same work in 4 days, how much will A get if both work together and are paid ₹ 180 in all?

(*a*) ₹ 36 (*b*) ₹ 60

(*c*) ₹ 108 (*d*) ₹ 120

83. A man and a boy received ₹ 800 as wages for 5 days for the work they did together. The man's efficiency in the work was three times that of the boy. What are the daily wages of the boy? (S.S.C., 2005)

(*a*) ₹ 40 (*b*) ₹ 44

(*c*) ₹ 56 (*d*) ₹ 76

84. Two men undertake to do a piece of work for ₹ 1400. The first man alone can do this work in 7 days while the second man alone can do this work in 8 days. If they working together complete this work in 3 days with the help of a boy, how should the money be divided? (M.A.T., 2007)

(*a*) ₹ 600, ₹ 550, ₹ 250 (*b*) ₹ 600, ₹ 525, ₹ 275

(*c*) ₹ 600, ₹ 500, ₹ 300 (*d*) ₹ 500, ₹ 525, ₹ 375

85. A sum of money is sufficient to pay A's wages for 21 days and B's wages for 28 days. The same money is sufficient to pay the wages of both for : (ICET, 2005; G.B.O., 2007)

(*a*) 12 days (*b*) $12\frac{1}{4}$ days

(*c*) 14 days (*d*) $24\frac{1}{2}$ days

86. A can do a piece of work in 10 days; B in 15 days. They work for 5 days. The rest of the work was finished by C in 2 days. If they get ₹ 1500 for the whole work, the daily wages of B and C are (M.A.T., 2005)

(*a*) ₹ 150 (*b*) ₹ 225

(*c*) ₹ 250 (*d*) ₹ 300

87. The daily wages of a worker are ₹ 100. Five workers can do a work in 10 days. If you pay ₹ 20 more daily, they agree to do 25% more work daily. If the proposal is accepted, then the total amount that could be saved is

(*a*) ₹ 200 (*b*) ₹ 250
(*c*) ₹ 300 (*d*) ₹ 500

88. A and B together can complete a work in 12 days. A alone can complete it in 20 days. If B does the work only for half a day daily, then in how many days A and B together will complete the work ?

(*a*) 110 days (*b*) 11 days
(*c*) 15 days (*d*) 20 days

89. *A*, *B* and *C* completed a work costing ₹ 1800. A worked for 6 days, *B* for 4 days and *C* for 9 days. If their daily wages are in the ratio of 5 : 6 : 4, how much amount will be received by *A*? **(S.S.C., 2007)**

(*a*) ₹ 600 (*b*) ₹ 750
(*c*) ₹ 800 (*d*) ₹ 900

90. *A* and *B* can complete a piece of work in 12 and 18 days respectively. A begins to do the work and they work alternatively one at a time for one day each. The whole work will be completed in **(S.S.C., 2007)**

(*a*) $14\frac{1}{3}$ days (*b*) $15\frac{2}{3}$ days
(*c*) $16\frac{1}{3}$ days (*d*) $18\frac{2}{3}$ days

91. A, B and C can do a piece of work in 11 days, 20 days and 55 days respectively, working alone. How soon can the work be done if A is assisted by B and C on alternate days?

(*a*) 7 days (*b*) 8 days
(*c*) 9 days (*d*) 10 days

92. A, B and C can do a piece of work in 20, 30 and 60 days respectively. In how many days can A do the work if he is assisted by B and C on every third day?

(*a*) 12 days (*b*) 15 days
(*c*) 16 days (*d*) 18 days

93. A can do a piece of work in 90 days, B in 40 days and C in 12 days. They work for a day each in turn i.e., first day A does it alone, B does it the second day and C the third day. After that A does it for another day, and so on. After finishing the work they get ₹ 240. If the wages are divided in proportion to the work done by them, find what each will get. **(M.A.T., 2006)**

(*a*) A ₹ 24, B ₹ 54 and C ₹ 162
(*b*) A ₹ 22, B ₹ 50 and C ₹ 132
(*c*) A ₹ 26, B ₹ 52 and C ₹ 142
(*d*) A ₹ 20, B ₹ 44 and C ₹ 182

94. A and B can finish a work, working on alternate days, in 19 days, when A works on the first day. However, they can finish the work, working on alternate days, in $19\frac{5}{6}$ days, when B works on the first day. How many days does A alone take to finish the work?

(*a*) $11\frac{1}{2}$ days (*b*) 15 days
(*c*) 18 days (*d*) 21 days

95. A and B can separately do a piece of work in 20 and 15 days respectively. They worked together for 6 days, after which B was replaced by C. If the work was finished in next 4 days, then the number of days in which C alone could do the work will be

(*a*) 30 (*b*) 35
(*c*) 40 (*d*) 60

96. A, B and C can do a piece of work in 36, 54 and 72 days respectively. They started the work but A left 8 days before the completion of the work while B left 12 days before the completion. The number of days for which C worked is

(*a*) 4 (*b*) 8
(*c*) 12 (*d*) 24

97. Twenty women can do a work in sixteen days. Sixteen men can complete the same work in fifteen days. What is the ratio between the capacity of a man and a woman ?

(*a*) 3 : 4 (*b*) 4 : 3
(*c*) 5 : 3 (*d*) Data inadequate

98. 10 men can complete a piece of work in 15 days and 15 women can complete the same work in 12 days. If all the 10 men and 15 women work together, in how many days will the work get completed ?

(*a*) 6 (*b*) $6\frac{1}{3}$
(*c*) $6\frac{2}{3}$ (*d*) $7\frac{2}{3}$

99. A job can be done by 3 skilled worksmen in 20 days or by 5 boys in 30 days. How many days will they take if they work together? **(M.A.T., 2009)**

(*a*) 8 days (*b*) 10 days
(*c*) 11 days (*d*) 12 days

100. Five men are working to complete a work in 15 days. After five days 10 women are accompanied by them to complete the work in next 5 days. If the work is to be done by women only, then in how many days could the work be over if 10 women have started it ? **(Bank Recruitment, 2007)**

(*a*) 10 days (*b*) 12 days
(*c*) 15 days (*d*) 18 days

101. A contractor undertakes to do a piece of work in 40 days. He engages 100 men at the beginning and 100 more after 35 days and completes the work in stipulated time. If he had not engaged the additional men, how many days behind the schedule the work should have been finished? **(G.B.O., 2007)**

(*a*) 5 (*b*) 6
(*c*) 7 (*d*) 8

102. Seven men can complete a work in 12 days. They started the work and after 5 days, two men left. In how many days will the work be completed by the remaining men ?

(*a*) 5 (*b*) 6
(*c*) 7 (*d*) 8
(*e*) None of these

103. 12 men complete a work in 9 days. After they have worked for 6 days, 6 more men join them. How many days will they take to complete the remaining work ?

(*a*) 2 days (*b*) 3 days
(*c*) 4 days (*d*) 5 days
(*e*) None of these

104. Three men, four women and six children can complete a work in seven days. A woman does double the work a man does and a child does half the work a man does. How many women alone can complete this work in 7 days ?

(*a*) 7 (*b*) 8
(*c*) 12 (*d*) Cannot be determined
(*e*) None of these

105. A man, a woman and a boy can complete a job in 3, 4 and 12 days respectively. How many boys must assist 1 man and 1 woman to complete the job in $\frac{1}{4}$ of a day ?

(*a*) 1 (*b*) 4
(*c*) 19 (*d*) 41

106. 10 men and 15 women together can complete a work in 6 days. It takes 100 days for one man alone to complete the same work. How many days will be required for one woman alone to complete the same work ?

(*a*) 90 (*b*) 125
(*c*) 145 (*d*) 150
(*e*) None of these

107. A child can do a piece of work 15 hours slower than a woman. The child works for 18 hours on the job and then the woman takes charge for 6 hours. In this manner, $\frac{3}{5}$ of the work can be completed. To complete the job now, how much time will the woman take? **(M.A.T., 2005)**

(*a*) 12 hours (*b*) 18 hours
(*c*) 24 hours (*d*) 30 hours

108. A group of workers having equal efficiency can complete a job in 4 days. But it so happened that every alternate day starting from the second day, 3 workers are withdrawn from the job and every alternate day starting from the third day, 2 workers are added to the group. If it now takes 7 days to complete the job, find the number of workers who started the job.

(*a*) 4 (*b*) 5
(*c*) 6 (*d*) 8

109. A man, a woman and a boy can do a piece of work in 6, 9 and 18 days respectively. How many boys must assist one man and one woman to do the work in 1 day? **(N.M.A.T., 2006)**

(*a*) 5 (*b*) 6
(*c*) 9 (*d*) 13

110. If 3 men or 9 boys can finish a piece of work in 21 days, in how many days can 5 men and 6 boys together do the same piece of work?

(Bank Recruitment, 2010)

(*a*) 8 days (*b*) 12 days
(*c*) 14 days (*d*) Cannot be determined
(*e*) None of these

111. If 2 men or 6 women or 4 boys can finish a work in 99 days, how many days will one man, one woman and one boy together take to finish the same work?

(Bank Recruitment, 2010)

(*a*) 44 days (*b*) 54 days
(*c*) 64 days (*d*) 104 days
(*e*) None of these

112. 8 men can complete a piece of work in 20 days. 8 women can complete the same work in 32 days. In how many days will 5 men and 8 women together complete the same work? **(Bank P.O., 2010)**

(*a*) 10 days (*b*) 12 days
(*c*) 14 days (*d*) 16 days
(*e*) None of these

113. 18 men can complete a piece of work in 63 days. 9 women take 189 days to complete the same piece of work. How many days will 4 men, 9 women and 12 children together take to complete the piece of work if 7 children alone can complete the piece of work in 486 days? **(I.R.M.A., 2007)**

(*a*) 54 (*b*) 63
(*c*) 76 (*d*) 81
(*e*) None of these

114. 16 men can finish a work in 24 days and 48 boys can finish the same work in 16 days. 12 men started the work and after 4 days 12 boys joined them. In how many days can they finish the remaining work? **(R.R.B., 2008)**

(*a*) 6 (*b*) 12
(*c*) 16 (*d*) None of these

115. 12 men can complete a piece of work in 4 days, while 15 women can complete the same work in 4 days. 6 men start working on the job and after working for 2 days, all of them stopped working. How many women should be put on the job to complete the remaining work, if it is to be completed in 3 days?

(*a*) 15 (*b*) 18
(*c*) 22 (*d*) Data inadequate
(*e*) None of these

116. Twelve children take sixteen days to complete a work which can be completed by eight adults in twelve days. Sixteen adults started working and after three days ten adults left and four children joined them. How many days will they take to complete the remaining work ?

(*a*) 3 (*b*) 4
(*c*) 6 (*d*) 8
(*e*) None of these

117. Sixteen men can complete a work in twelve days. Twenty-four children can complete the same work in eighteen days. Twelve men and eight children started working and after eight days three more children joined them. How many days will they now take to complete the remaining work ?

(*a*) 2 days (*b*) 4 days
(*c*) 6 days (*d*) 8 days
(*e*) None of these

118. Twenty-four men can complete a work in sixteen days. Thirty-two women can complete the same work in twenty-four days. Sixteen men and sixteen women started working and worked for twelve days. How many more men are to be added to complete the remaining work in 2 days ?

(*a*) 16 (*b*) 24
(*c*) 36 (*d*) 48
(*e*) None of these

119. 5 men and 2 boys working together can do four times as much work as a man and a boy. Working capacities of a man and a boy are in the ratio :

(*a*) 1 : 2 (*b*) 2 : 1
(*c*) 1 : 3 (*d*) 3 : 1

120. If 12 men and 16 boys can do a piece of work in 5 days; 13 men and 24 boys can do it in 4 days, then the ratio of the daily work done by a man to that of a boy is

(*a*) 2 : 1 (*b*) 3 : 1
(*c*) 3 : 2 (*d*) 5 : 4

121. 4 men and 6 women can complete a work in 8 days, while 3 men and 7 women can complete it in 10 days. In how many days will 10 women complete it ?

(*a*) 35 (*b*) 40
(*c*) 45 (*d*) 50

122. 4 men and 10 women were put on a work. They completed $\frac{1}{3}$ of the work in 4 days. After this 2 men and 2 women were increased. They completed $\frac{2}{9}$ more of the work in 2 days. If the remaining work is to be completed in 3 days, then how many more women must be increased? **(M.A.T., 2006)**

(*a*) 8 (*b*) 32
(*c*) 50 (*d*) 55

123. One man, 3 women and 4 boys can do a piece of work in 96 hours, 2 men and 8 boys can do it in 80 hours, 2 men and 3 women can do it in 120 hours. 5 men and 12 boys can do it in :

(*a*) $39\frac{1}{11}$ hours (*b*) $42\frac{7}{11}$ hours
(*c*) $43\frac{7}{11}$ hours (*d*) 44 hours

124. If 6 men and 8 boys can do a piece of work in 10 days while 26 men and 48 boys can do the same in 2 days, the time taken by 15 men and 20 boys in doing the same type of work will be

(*a*) 4 days (*b*) 5 days
(*c*) 6 days (*d*) 7 days

125. If 5 men and 3 women can reap 18 acre of crop in 4 days; 3 men and 2 women can reap 22 acre of crop in 8 days, then how many men are required to join 21 women to reap 54 acre of crop in 6 days? **(M.C.A., 2005)**

(*a*) 5 (*b*) 6
(*c*) 10 (*d*) 12

126. 25 men with 10 boys can do in 6 days as much work as 21 men with 30 boys can do in 5 days. How many boys must help 40 men to do the same work in 4 days? **(R.R.B., 2008)**

(*a*) 5 (*b*) 10
(*c*) 20 (*d*) 40

127. 40 men can complete a piece of work in 15 days. 20 more men join them after 5 days they start doing work. How many days will be required by them to finish the remaining work? **[ESIC—UDC, Exam 2016]**

(*a*) $7\frac{2}{3}$ days (*b*) $6\frac{1}{5}$ days

(*c*) $8\frac{1}{4}$ days (*d*) $6\frac{2}{3}$ days

128. 12 men can do a piece of work in 24 days. How many days are needed to complete the work, if 8 men do this work? **[Indian Railway Gr. 'D' Exam, 2014]**

(*a*) 28 (*b*) 36

(*c*) 48 (*d*) 52

129. A can do in one day three times the work done by B in one day. They together finish $\frac{2}{5}$ of the work in 9 days. The number of days by which B can do the work alone is **[SSC—CHSL (10+2) Exam , 2015]**

(*a*) 90 days (*b*) 120 days

(*c*) 100 days (*d*) 30 days

130. A, B and C can complete a piece of work in 24, 5 and 12 days respectively. Working together, they will complete the same work in **[SSC—CHSL (10+2) Exam, 2015]**

(*a*) $\frac{7}{24}$ days (*b*) $3\frac{3}{7}$ days

(*c*) 4 days (*d*) $3\frac{1}{13}$ days

131. X can do a piece of work in 24 days. When he had worked for 4 days, Y joined him. If complete work was finished in 16 days, Y can alone finish that work in **[SSC—CHSL (10+2) Exam, 2015]**

(*a*) 18 days (*b*) 27 days

(*c*) 36 days (*d*) 42 days

132. 6 men can complete a piece of work in 12 days, 8 women can complete the same piece of work in 18 days and 18 children can do it in 10 days. 4 men, 12 women and 20 children do the work for 2 days. If the remaining work be completed by men only in 1 day, how many men will be required? **[RBI Officer Gr. 'B' (Phase-1) Online Exam, 2015]**

(*a*) 36 (*b*) 24

(*c*) 18 (*d*) Cannot be determined

133. 16 men can finish a piece of work in 49 days. 14 men started working and in 8 days they could finish certain amount of work. If it is required to finish the remaining work in 24 days. How many more men should be added to the existing workforce? **[IBPS—RRB Office Assistant (Online) Exam, 2015]**

(*a*) 21 (*b*) 28

(*c*) 16 (*d*) 14

ANSWERS

1. (*b*)	**2.** (*a*)	**3.** (*a*)	**4.** (*c*)	**5.** (*c*)	**6.** (*d*)	**7.** (*b*)	**8.** (*a*)	**9.** (*e*)	**10.** (*a*)
11. (*c*)	**12.** (*b*)	**13.** (*b*)	**14.** (*c*)	**15.** (*c*)	**16.** (*c*)	**17.** (*c*)	**18.** (*d*)	**19.** (*b*)	**20.** (*a*)
21. (*a*)	**22.** (*b*)	**23.** (*b*)	**24.** (*b*)	**25.** (*a*)	**26.** (*c*)	**27.** (*c*)	**28.** (*d*)	**29.** (*c*)	**30.** (*c*)
31. (*a*)	**32.** (*a*)	**33.** (*d*)	**34.** (*c*)	**35.** (*c*)	**36.** (*b*)	**37.** (*a*)	**38.** (*d*)	**39.** (*c*)	**40.** (*c*)
41. (*c*)	**42.** (*a*)	**43.** (*a*)	**44.** (*a*)	**45.** (*a*)	**46.** (*b*)	**47.** (*b*)	**48.** (*c*)	**49.** (*b*)	**50.** (*d*)
51. (*b*)	**52.** (*a*)	**53.** (*b*)	**54.** (*d*)	**55.** (*b*)	**56.** (*c*)	**57.** (*a*)	**58.** (*c*)	**59.** (*b*)	**60.** (*d*)
61. (*a*)	**62.** (*b*)	**63.** (*d*)	**64.** (*d*)	**65.** (*d*)	**66.** (*a*)	**67.** (*c*)	**68.** (*c*)	**69.** (*c*)	**70.** (*b*)
71. (*b*)	**72.** (*c*)	**73.** (*a*)	**74.** (*c*)	**75.** (*c*)	**76.** (*c*)	**77.** (*a*)	**78.** (*c*)	**79.** (*a*)	**80.** (*b*)
81. (*b*)	**82.** (*d*)	**83.** (*a*)	**84.** (*b*)	**85.** (*a*)	**86.** (*b*)	**87.** (*a*)	**88.** (*c*)	**89.** (*a*)	**90.** (*a*)
91. (*b*)	**92.** (*b*)	**93.** (*a*)	**94.** (*a*)	**95.** (*c*)	**96.** (*d*)	**97.** (*b*)	**98.** (*c*)	**99.** (*d*)	**100.** (*c*)
101. (*a*)	**102.** (*e*)	**103.** (*a*)	**104.** (*a*)	**105.** (*d*)	**106.** (*e*)	**107.** (*a*)	**108.** (*c*)	**109.** (*d*)	**110.** (*e*)
111. (*e*)	**112.** (*d*)	**113.** (*d*)	**114.** (*d*)	**115.** (*a*)	**116.** (*c*)	**117.** (*b*)	**118.** (*b*)	**119.** (*b*)	**120.** (*a*)
121. (*b*)	**122.** (*a*)	**123.** (*c*)	**124.** (*a*)	**125.** (*a*)	**126.** (*b*)	**127.** (*d*)	**128.** (*b*)	**129.** (*a*)	**130.** (*d*)
131. (*c*)	**132.** (*a*)	**133.** (*d*)							

SOLUTIONS

1. Ayesha's 1 day's work = $\frac{1}{16}$. Amita's 1 day's work = $\frac{1}{8}$.

(Ayesha + Amita)'s 1 day's work = $\left(\frac{1}{16}+\frac{1}{8}\right)=\frac{3}{16}$.

$\therefore$ Both together can complete the work in $\frac{16}{3}=5\frac{1}{3}$ days.

2. Required average

$$=\frac{\left(\frac{1}{4}+\frac{1}{5}+\frac{1}{6}+\frac{1}{10}+\frac{1}{12}\right)}{5}=\left(\frac{48}{60}\times\frac{1}{5}\right)=\frac{4}{25}=0.16.$$

3. A's 1 day's work = $\frac{1}{18}$ and B's 1 day's work = $\frac{1}{9}$.

$\therefore$ (A + B)'s 1 day's work = $\left(\frac{1}{18}+\frac{1}{9}\right)=\frac{1}{6}$.

4. 1 minute's work of both the punctures = $\left(\frac{1}{9}+\frac{1}{6}\right)=\frac{5}{18}$.

So, both the punctures will make the tyre flat in $\frac{18}{5}=3\frac{3}{5}$ min.

5. Number of pairs knit by A and B together in 1 day

$=\left(\frac{1}{3}+\frac{1}{9}\right)=\frac{4}{9}$.

$\therefore$ Required number of days $=\left(2\div\frac{4}{9}\right)=\left(2\times\frac{9}{4}\right)=\frac{9}{2}=4\frac{1}{2}$.

6. (A + B)'s 1 day's work = $\left(\frac{1}{6}+\frac{1}{12}\right)=\frac{3}{12}=\frac{1}{4}$.

$\therefore$ Both A and B together can complete the work in 4 days.

Part of the work done by A = $\left(\frac{1}{6}\times 4\right)=\frac{2}{3}$.

7. A's share : B's share = Ratio of their 1 day's work

$=\frac{1}{8}:\frac{1}{12}=3:2$.

$\therefore$ B's share = $₹\left(200\times\frac{2}{5}\right)=₹\,80$.

8. Number of pages typed by George in 1 hour = $\frac{50}{8}=\frac{25}{4}$.

Number of pages typed by Sonia in 1 hour = $\frac{50}{6}=\frac{25}{3}$.

Number of pages typed by George and Sonia together in 1 hour = $\left(\frac{25}{4}+\frac{25}{3}\right)=\left(\frac{75+100}{12}\right)=\frac{175}{12}$.

$\therefore$ Required time = $\left(100\div\frac{175}{12}\right)$ hrs $=\left(\frac{100\times 12}{175}\right)$ hrs

$=\frac{48}{7}$ hrs $=6\frac{6}{7}$ hrs.

9. A's 1 day's work = $\frac{1}{T+3}$;

B's 1 day's work = $\frac{1}{T+12}$.

(A + B)'s 1 day's work = $\frac{1}{T}$.

$\therefore$ $\frac{1}{T+3}+\frac{1}{T+12}=\frac{1}{T} \Rightarrow \frac{2T+15}{(T+3)(T+12)}=\frac{1}{T}$

$\Rightarrow 2T^2 + 15T = T^2 + 15T + 36$

$\Rightarrow T^2 = 36 \Rightarrow T = 6$.

10. Reena's 1 hour's work = $\frac{1}{6}$;

Aastha's 1 hour's work = $\frac{1}{4}$;

Shloka's 1 hour's work = $\frac{1}{12}$.

(Reena + Aastha + Shloka)'s 1 hour's work

$=\frac{1}{4}+\frac{1}{6}+\frac{1}{12}=\frac{6}{12}=\frac{1}{2}$.

Hence, Reena, Aastha and Shloka together take 2 hours to complete the work.

11. 1 day's work of the three persons = $\left(\frac{1}{15}+\frac{1}{20}+\frac{1}{25}\right)=\frac{47}{300}$.

So, all the three together will complete the work in $\frac{300}{47}\simeq 6.4$ days.

12. Amit's 1 day's work = $\left(\frac{1}{4}-\frac{1}{6}\right)=\frac{1}{12}$.

$\therefore$ Amit alone can plough the field in 12 days.

13. Length of cloth produced by A and B in 10 hrs = 3,00,000 m.

Length of cloth produced by B in 10 hrs = $\left(\frac{300000}{15}\times 10\right)$ m

= 200000 m.

$\therefore$ Length of cloth produced by A in 10 hrs = (300000 – 200000) m = 100000 m.

14. (X + Y)'s 1 day's work = $\left(\frac{1}{16}+\frac{1}{16}\right)=\frac{2}{16}=\frac{1}{8}$.

Z's 1 day's work = (X + Y + Z)'s 1 day's work – (X + Y)'s 1 day's work = $\frac{1}{6}-\frac{1}{8}=\frac{1}{24}$.

$\therefore$ Z alone can finish the work in 24 days.

15. (A + B + C)'s 1 day's work = $\frac{1}{4}$,

A's 1 day's work = $\frac{1}{16}$,

B's 1 day's work = $\frac{1}{12}$.

$\therefore$ C's 1 day's work = $\frac{1}{4}-\left(\frac{1}{16}+\frac{1}{12}\right)=\left(\frac{1}{4}-\frac{7}{48}\right)=\frac{5}{48}$.

So, C alone can do the work in $\frac{48}{5}=9\frac{3}{5}$ days.

16. Whole work will be done by A in (5 × 3) = 15 days.

Whole work will be done by B in $\left(10\times\frac{5}{2}\right)$ = 25 days.

A's 1 day's work = $\frac{1}{15}$; B's 1 day's work = $\frac{1}{25}$.

(A + B)'s 1 day's work = $\left(\frac{1}{15}+\frac{1}{25}\right)=\frac{16}{150}=\frac{8}{75}$.

$\therefore$ A and B together can complete the work in $\frac{75}{8}=9\frac{3}{8}$ days.

17. Whole work will be done by X in (10 × 4) = 40 days.

Whole work will be done by Y in $\left(40\times\frac{100}{40}\right)=100$ days.

Whole work will be done by Z in (13 × 3) = 39 days.

$\therefore$ Z will complete the work first.

18. Ratio of digging speeds of man and boy = 8 : 5.
Ratio of times taken by man and boy = 5 : 8.
Suppose the man takes $5x$ days while the boy takes $8x$ days to complete the work alone.
Then, $\frac{1}{5x}+\frac{1}{8x}=\frac{1}{40}\Rightarrow\frac{13}{40x}=\frac{1}{40}\Rightarrow x=13.$
Hence, time taken by the boy to complete the work alone = (8 × 13) days = 104 days.

19. Suppose A, B and C take x, $\frac{x}{2}$ and $\frac{x}{3}$ days respectively to finish the work.
Then, $\left(\frac{1}{x}+\frac{2}{x}+\frac{3}{x}\right)=\frac{1}{2}\ \Rightarrow\ \frac{6}{x}=\frac{1}{2}\ \Rightarrow\ x=12.$
So, B takes 6 days to finish the work.

20. C's 1 day's work = $\frac{1}{7}$; B's 1 day's work = $\left(\frac{1}{2}\times\frac{1}{7}\right)=\frac{1}{14}$;
A's 1 day's work = $\left(\frac{1}{2}\times\frac{1}{14}\right)=\frac{1}{28}.$
$\therefore$ (A + B + C)'s 1 day's work = $\left(\frac{1}{28}+\frac{1}{14}+\frac{1}{7}\right)=\frac{7}{28}=\frac{1}{4}.$
Hence, A, B and C together can complete the work in 4 days.

21. Number of rosogollas eaten by Rosa in 1 minute = $\frac{32}{60}$.
Number of rosogollas eaten by Lila in 1 minute = $\frac{32}{180}$.
Number of rosogollas eaten by Rosa and Lila together in 1 minute = $\left(\frac{32}{60}+\frac{32}{180}\right)=\frac{128}{180}.$
$\therefore$ Required time = $\left(32\div\frac{128}{180}\right)=\left(\frac{32\times180}{128}\right)\text{min}=45\text{ min}.$

22. Baggage delivered by first belt in 1 min = $\left(\frac{3}{5}\right)$ tons.
Baggage delivered by second belt in 1 min = $\left(\frac{1}{2}\right)$ ton.
Baggage delivered by both belts in 1 min
$=\left(\frac{3}{5}+\frac{1}{2}\right)\text{ton}=\frac{11}{10}\text{ tons}.$
$\therefore$ Required time = $\left(33\div\frac{11}{10}\right)\text{min}=\left(\frac{33\times10}{11}\right)\text{min}$
= 30 min.

23. Number of envelopes addressed by first machine in 1 min = $\frac{500}{8}$.
Number of envelopes addressed by second machine in 1 min = $\frac{500}{x}$.
Number of envelopes addressed by both machines in 1 min = $\frac{500}{2}$.
$\therefore\ \frac{500}{8}+\frac{500}{x}=\frac{500}{2}\Rightarrow\frac{1}{8}+\frac{1}{x}=\frac{1}{2}.$

24. Number of units processed by computer A in 1 min = $\frac{1}{3}$.
Number of units processed by computer B in 1 min = $\frac{1}{5}$.
Number of units processed by A, B and C in 1 min
$=\frac{14\times3}{60}=\frac{7}{10}.$
$\therefore$ Number of units processed by computer C in 1 min
$=\frac{7}{10}-\left(\frac{1}{3}+\frac{1}{5}\right)=\frac{7}{10}-\frac{8}{15}=\frac{5}{30}=\frac{1}{6}.$
Hence, computer C takes 6 minutes to process one input alone.

25. Time taken by Bob to type 20 pages = 2 hrs = 120 min.
Time taken by David to type 20 pages = 1 hr 40 min = 100 min.
Time taken by Bob to type 1 page = $\left(\frac{120}{20}\right)\text{min}=6\text{ min}.$
Time taken by David to type 1 page = $\left(\frac{100}{20}\right)\text{min}=5\text{ min}.$
Bob's 1 minute's work = $\frac{1}{6}$;
David's 1 minute's work = $\frac{1}{5}$.
$\therefore$ Ratio of division of work = $\frac{1}{6}:\frac{1}{5}=5:6.$
Hence, number of pages to be typed by Bob
$=\left(77\times\frac{5}{11}\right)=35.$

26. Let the number of pages typed in one hour by P, Q and R be x, y and z respectively.
Then, $x+y+z=\frac{216}{4}$
$\Rightarrow\ x+y+z=54\ z$ ...(*i*)
$z-y=y-x$
$\Rightarrow\ 2y=x+z$ ...(*ii*)
$5z=7x$
$\Rightarrow\ x=\frac{5}{7}z$ ...(*iii*)
Solving (*i*), (*ii*) and (*iii*), we get $x = 15$, $y = 18$, $z = 21$.

27. Number of pages typed by Ronald in 1 hour = $\frac{32}{6}=\frac{16}{3}.$
Number of pages typed by Elan in 1 hour = $\frac{40}{5}=8.$
Number of pages typed by both in 1 hour = $\left(\frac{16}{3}+8\right)=\frac{40}{3}.$
$\therefore$ Time taken by both to type 110 pages
$=\left(110\times\frac{3}{40}\right)\text{hrs}=8\frac{1}{4}\text{hrs}$ = 8 hrs 15 min.

28. Length of cloth produced in 1 hour
$=\left(\frac{pq}{r}\times60\right)\text{m}=\left(\frac{60\,pq}{r}\right)\text{m}.$

$\therefore$ Required time $= \left(20000 \div \frac{60\,pq}{r}\right)\text{hrs} = \left(\frac{20000\,r}{60\,pq}\right)\text{hrs}.$

29. Let A and B together take x hours to complete the work.
Then, A alone takes $(x + 8)$ hrs and B alone takes $\left(x + \frac{9}{2}\right)\text{hrs}$ to complete the work.

Then, $\frac{1}{(x+8)} + \frac{1}{\left(x+\frac{9}{2}\right)} = \frac{1}{x}$

$\Rightarrow \frac{1}{(x+8)} + \frac{2}{(2x+9)} = \frac{1}{x}$

$\Rightarrow x(4x + 25) = (x + 8)(2x + 9)$

$\Rightarrow 2x^2 = 72 \Rightarrow x^2 = 36 \Rightarrow x = 6.$

30. Let the time taken by the three friends together to do the work be x hours.
Then, time taken by Anne alone $= (x + 6)$ hrs;
time taken by Bob alone $= (x + 1)$ hrs;
time taken by Chris alone $= 2x$ hrs.

$\therefore \frac{1}{x+6} + \frac{1}{x+1} + \frac{1}{2x} = \frac{1}{x}$

$\Rightarrow \frac{2x(x+1) + 2x(x+6) + (x+1)(x+6)}{2x(x+6)(x+1)} = \frac{1}{x}$

$\Rightarrow 5x^2 + 21x + 6 = 2(x^2 + 7x + 6)$

$\Rightarrow 3x^2 + 7x - 6 = 0 \Rightarrow (x + 3)(3x - 2) = 0 \Rightarrow x = \frac{2}{3}$

$[\because x \neq -3]$

$\therefore$ Required time $= \frac{2}{3}\text{hrs} = \left(\frac{2}{3} \times 60\right)\text{min} = 40\text{ min}.$

31. 3 (B's 1 day's work) = (A + C)'s 1 day's work
$\Rightarrow$ 4 (B's 1 day's work) = (A + B + C)'s 1 day's work
$\Rightarrow$ B's 1 day's work $= \left(\frac{1}{4} \times \frac{1}{10}\right) = \frac{1}{40}.$

2 (C's 1 day's work) = (A + B)'s 1 day's work
$\Rightarrow$ 3 (C's 1 day's work) = (A + B + C)'s 1 day's work
$\Rightarrow$ C's 1 day's work $= \left(\frac{1}{3} \times \frac{1}{10}\right) = \frac{1}{30}.$

$\therefore$ A's 1 day's work = (A + B + C)'s 1 day's work − (B + C)'s 1 day's work

$= \frac{1}{10} - \left(\frac{1}{40} + \frac{1}{30}\right) = \frac{1}{10} - \frac{7}{120} = \frac{5}{120} = \frac{1}{24}.$

Hence, A alone would take 24 days to complete the work.

32. P can complete the work in (12×8) hrs = 96 hrs.
Q can complete the work in (8×10) hrs = 80 hrs.

$\therefore$ P's 1 hour's work $= \frac{1}{96}$

and Q's 1 hour's work $= \frac{1}{80}.$

(P + Q)'s 1 hour's work $= \left(\frac{1}{96} + \frac{1}{80}\right) = \frac{11}{480}.$

So, both P and Q will finish the work in $\left(\frac{480}{11}\right)\text{hrs}.$

$\therefore$ Number of days of 8 hours each

$= \left(\frac{480}{11} \times \frac{1}{8}\right) = \frac{60}{11}\text{ days} = 5\frac{5}{11}\text{ days}.$

33. (A + B)'s 1 day's work $= \frac{1}{12};$

(B + C)'s 1 day's work $= \frac{1}{8};$

(A + C)'s 1 day's work $= \frac{1}{16}.$

Adding, we get: 2 (A + B + C)'s 1 day's work

$= \left(\frac{1}{12} + \frac{1}{8} + \frac{1}{16}\right) = \frac{13}{48}.$

$\therefore$ (A + B + C)'s 1 day's work $= \frac{13}{96}.$

So, A, B and C together can complete the work in $\frac{96}{13} = 7\frac{5}{13}\text{ days}.$

34. A's 1 hour's work $= \frac{1}{4};$

(B + C)'s 1 hour's work $= \frac{1}{3};$

(A + C)'s 1 hour's work $= \frac{1}{2}.$

(A + B + C)'s 1 hour's work $= \frac{1}{4} + \frac{1}{3} = \frac{7}{12}.$

$\therefore$ B's 1 hour's work = (A + B + C)'s 1 hour's work − (A + C)'s 1 hour's work $= \frac{7}{12} - \frac{1}{2} = \frac{1}{12}.$

So, B alone can complete the work in 12 hours.

35. (A + B + C)'s 1 day's work $= \frac{1}{6};$

(A + B)'s 1 day's work $= \frac{1}{8};$

(B + C)'s 1 day's work $= \frac{1}{12}.$

$\therefore$ (A + C)'s 1 day's work

$= \left(2 \times \frac{1}{6}\right) - \left(\frac{1}{8} + \frac{1}{12}\right) = \left(\frac{1}{3} - \frac{5}{24}\right) = \frac{3}{24} = \frac{1}{8}.$

So, A and C together will do the work in 8 days.

36. (A + B)'s 1 day's work $= \frac{1}{2};$

(B + C)'s 1 day's work $= \frac{1}{4};$

(A + C)'s 1 day's work $= \frac{5}{12}.$

Adding, we get: 2 (A + B + C)'s 1 day's work

$= \left(\frac{1}{2} + \frac{1}{4} + \frac{5}{12}\right) = \frac{14}{12} = \frac{7}{6}$

$\Rightarrow$ (A + B + C)'s 1 day's work $= \frac{7}{12}.$

So, A's 1 day's work $= \left(\frac{7}{12} - \frac{1}{4}\right) = \frac{4}{12} = \frac{1}{3}.$

$\therefore$ A alone can do the work in 3 days.

37. (A + B)'s 1 day's work = $\frac{1}{5}$;

(B + C)'s 1 day's work = $\frac{1}{7}$;

(A + C)'s 1 day's work = $\frac{1}{4}$.

Adding, we get : 2 (A + B + C)'s 1 day's work

$= \left(\frac{1}{5}+\frac{1}{7}+\frac{1}{4}\right)=\frac{83}{140}$.

(A + B + C)'s 1 day's work = $\frac{83}{280}$.

A's 1 day's work = $\left(\frac{83}{280}-\frac{1}{7}\right)=\frac{43}{280}$;

B's 1 day's work = $\left(\frac{83}{280}-\frac{1}{4}\right)=\frac{13}{280}$;

C's 1 day's work = $\left(\frac{83}{280}-\frac{1}{5}\right)=\frac{27}{280}$.

Thus time taken by A, B, C is $\frac{280}{43}$ days, $\frac{280}{13}$ days, $\frac{280}{27}$ days respectively.

Clearly, the time taken by A is least.

38. (A + B)'s 1 day's work = $\frac{1}{12}$;

(B + C)'s 1 day's work = $\frac{1}{8}$;

(A + C)'s 1 day's work = $\frac{1}{6}$.

[(A + B)'s 1 day's work + (B + C)'s 1 day's work] − (A + C)'s 1 day's work = $\frac{1}{12}+\frac{1}{8}-\frac{1}{6}=\frac{1}{24}$.

$\Rightarrow$ 2 (B's 1 day's work) = $\frac{1}{24}$

$\Rightarrow$ B's 1 day's work = $\frac{1}{48}$.

Hence, *B* alone can do the work in 48 days.

39. (A + B)'s 1 day's work = $\frac{1}{25}$; C's 1 day's work = $\frac{1}{35}$.

(A + B + C)'s 1 day's work = $\left(\frac{1}{25}+\frac{1}{35}\right)=\frac{12}{175}$. ...(*i*)

Also, A's 1 day's work = (B + C)'s 1 day's work. ...(*ii*)

From (*i*) and (*ii*), we get: 2 × (A's 1 day's work) = $\frac{12}{175}$

$\Rightarrow$ A's 1 day's work = $\frac{6}{175}$.

$\therefore$ B's 1 day's work = $\left(\frac{1}{25}-\frac{6}{175}\right)=\frac{1}{175}$.

40. Suppose Uma takes x days to complete a work.

Then, Madhu takes $2x$ days to complete the work.

Uma's 1 day's work = $\frac{1}{x}$;

Madhu's 1 day's work = $\frac{1}{2x}$.

Rahul's 1 day's work = (Madhu + Uma)'s 1 day's work

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

(Rahul + Madhu + Uma)'s 1 day's work

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

$\therefore$ $\frac{3}{x}=\frac{1}{6}\Rightarrow x=18$.

Hence, Madhu takes (2 × 18) = 36 days to complete the work.

41. Suppose A takes x days to do the job alone.

Then, B takes $(x - 5)$ days and C takes $(x - 9)$ days.

(A + B)'s 1 day's work = C's 1 day's work

$\Rightarrow \frac{1}{x}+\left(\frac{1}{x-5}\right)=\frac{1}{x-9}\Rightarrow\frac{(x-5)+x}{x(x-5)}=\frac{1}{(x-9)}$

$\Rightarrow$ $(2x - 5)(x - 9) = x(x - 5)$

$\Rightarrow$ $2x^2 - 23x + 45 = x^2 - 5x$

$\Rightarrow$ $x^2 - 18x + 45 = 0 \Rightarrow (x - 3)(x - 15) = 0 \Rightarrow x = 15$. [$\because x \neq 3$]

Hence, A alone would take 15 days to do the job.

42. Ratio of rates of working of A and B = 2 : 1.

So, ratio of times taken = 1 : 2.

$\therefore$ A's 1 day's work = $\frac{1}{6}$; B's 1 day's work = $\frac{1}{12}$.

(A + B)'s 1 day's work = $\left(\frac{1}{6}+\frac{1}{12}\right)=\frac{3}{12}=\frac{1}{4}$.

So, A and B together can finish the work in 4 days.

43. (A's 1 day's work) : (B's 1 day's work) = 2 : 1.

(A + B)'s 1 day's work = $\frac{1}{18}$.

$\therefore$ A's 1 day's work = $\left(\frac{1}{18}\times\frac{2}{3}\right)=\frac{1}{27}$.

Hence, *A* alone can finish the work in 27 days.

44. Total time taken by David and Michael together

= 4 days 19 hrs 12 min = 4 days $19\frac{1}{5}$ hrs

= $4\text{ days}+\left(\frac{96}{5}\times\frac{1}{24}\right)\text{days} = 4\frac{4}{5}\text{days}=\frac{24}{5}\text{days}$.

(David + Michael)'s 1 day's work = $\frac{5}{24}$.

(David's 1 day's work) : (Michael's 1 day's work)

$= \frac{2}{3}:1 = 2:3$.

$\therefore$ Michael's 1 day's work = $\left(\frac{5}{24}\times\frac{3}{5}\right)=\frac{1}{8}$.

Hence, Michael alone can finish the job in 8 days.

45. Ratio of times taken by A and B = 1 : 3.

If difference of time is 2 days, B takes 3 days.

If difference of time is 60 days, B takes $\left(\frac{3}{2}\times 60\right)=90$ days.

So, A takes 30 days to do the work.

A's 1 day's work = $\frac{1}{30}$; B's 1 day's work = $\frac{1}{90}$.

(A + B)'s 1 day's work = $\left(\frac{1}{30}+\frac{1}{90}\right)=\frac{4}{90}=\frac{2}{45}$.

$\therefore$ A and B together can do the work in $\frac{45}{2}=22\frac{1}{2}$ days.

46. (A's 1 day's work) : (B's 1 day's work) = $\frac{7}{4}:1=7:4$.

Let A's and B's 1 day's work be $7x$ and $4x$ respectively.

Then, $7x+4x=\frac{1}{7} \Rightarrow 11x=\frac{1}{7} \Rightarrow x=\frac{1}{77}$.

$\therefore$ A's 1 day's work = $\left(\frac{1}{77}\times 7\right)=\frac{1}{11}$.

Hence, A alone can do the job in 11 days.

47. Ratio of times taken by Kamal and Bimal = 150 : 100 = 3 : 2

Suppose Bimal takes x days to do the work.

$3:2::15:x \Rightarrow x=\left(\frac{2\times 15}{3}\right) \Rightarrow x=10$ days.

48. Ratio of times taken by A and B = 100 : 80 = 5 : 4.

Suppose B takes x hours to do the work.

$5:4::\frac{15}{2}:x \Rightarrow x=\left(\frac{4\times 15}{2\times 5}\right)\Rightarrow x=6$ hours.

49. Ratio of times taken by A and B = 100 : 130 = 10 : 13.

Suppose B takes x days to do the work.

Then, $10:13::23:x \Rightarrow x=\left(\frac{23\times 13}{10}\right) \Rightarrow x=\frac{299}{10}$.

A's 1 day's work = $\frac{1}{23}$; B's 1 day's work = $\frac{10}{299}$.

(A + B)'s 1 day's work = $\left(\frac{1}{23}+\frac{10}{299}\right)=\frac{23}{299}=\frac{1}{13}$.

$\therefore$ A and B together can complete the job in 13 days.

50. Time taken by A alone to do the work = (10 × 8) hrs = 80 hrs.

Since B is two-thirds as efficient as A, so time taken by B to do the work

= $\left(80\times\frac{3}{2}\right)$ hrs = 120 hrs.

$\therefore$ Required time = $\left(\frac{120}{5}\right)$ days = 24 days.

51. Suppose B takes x days to do the work.

$\therefore$ A takes $\left(2\times\frac{1}{6}x\right)=\frac{1}{3}x$ days to do it.

(A + B)'s 1 day's work = $\frac{1}{10}$.

$\therefore \frac{1}{x}+\frac{3}{x}=\frac{1}{10}\Rightarrow\frac{4}{x}=\frac{1}{10}\Rightarrow x=40$.

52. (A's 1 day's work) : (B's 1 day's work)

= 150 : 100 = 3 : 2.

Let A's and B's 1 day's work be $3x$ and $2x$ respectively.

Then, C's 1 day's work = $\left(\frac{3x+2x}{2}\right)=\frac{5x}{2}$.

$\therefore \frac{5x}{2}=\frac{1}{40}$ or $x=\left(\frac{1}{40}\times\frac{2}{5}\right)=\frac{1}{100}$.

A's 1 day's work = $\frac{3}{100}$; B's 1 day's work = $\frac{1}{50}$;

C's 1 day's work = $\frac{1}{40}$.

(A + B + C)'s 1 day's work = $\left(\frac{3}{100}+\frac{1}{50}+\frac{1}{40}\right)=\frac{15}{200}=\frac{3}{40}$.

So, A, B and C together can do the work in $\frac{40}{3}=13\frac{1}{3}$ days.

53. Let A's 1 day's work = x and B's 1 day's work = y.

Then, $x+y=\frac{1}{5}$ and $2x+\frac{1}{3}y=\frac{1}{3}$.

Solving, we get : $x=\frac{4}{25}$ and $y=\frac{1}{25}$.

$\therefore$ A's 1 day's work = $\frac{4}{25}$.

So, A alone could complete the work in $\frac{25}{4}=6\frac{1}{4}$ days.

54. A's 1 day's work = $\frac{1}{15}$; B's 1 day's work = $\frac{1}{20}$.

(A + B)'s 1 day's work = $\left(\frac{1}{15}+\frac{1}{20}\right)=\frac{7}{60}$.

(A + B)'s 4 days' work = $\left(\frac{7}{60}\times 4\right)=\frac{7}{15}$.

$\therefore$ Remaining work = $\left(1-\frac{7}{15}\right)=\frac{8}{15}$.

55. B's 8 days' work = $\left(\frac{1}{10}\times 8\right)=\frac{4}{5}$;

Remaining work = $\left(1-\frac{4}{5}\right)=\frac{1}{5}$.

Now, $\frac{1}{15}$ work is done by A in 1 day.

$\therefore$ $\frac{1}{5}$ work is done by A in $\left(15\times\frac{1}{5}\right)=3$ days.

56. (A + B)'s 1 day's work = $\left(\frac{1}{18}+\frac{1}{15}\right)=\frac{11}{90}$.

(A + B)'s 3 days' work = $\left(\frac{11}{90}\times 3\right)=\frac{11}{30}$.

Remaining work = $\left(1-\frac{11}{30}\right)=\frac{19}{30}$.

Now, $\frac{1}{15}$ work is done by B in 1 day.

$\therefore$ $\frac{19}{30}$ work will be done by B in $\left(15\times\frac{19}{30}\right)=\frac{19}{2}$ days

$=9\frac{1}{2}$ days.

Hence, total time taken = $\left(3+9\frac{1}{2}\right)$ days $=12\frac{1}{2}$ days.

57. (A + B + C)'s 1 day's work = $\left(\frac{1}{12}+\frac{1}{15}+\frac{1}{20}\right)=\frac{12}{60}=\frac{1}{5}$.

(A + B + C)'s 2 days' work = $\left(\frac{1}{5}\times 2\right)=\frac{2}{5}$.

Remaining work = $\left(1-\frac{2}{5}\right)=\frac{3}{5}$.

(A + B)'s 1 day's work = $\left(\frac{1}{12}+\frac{1}{15}\right)=\frac{9}{60}=\frac{3}{20}$.

Now, $\frac{3}{20}$ work is done by A and B in 1 day.

$\therefore$ $\frac{3}{5}$ work will be done by A and B in $\left(\frac{20}{3}\times\frac{3}{5}\right)=4$ days.

58. (B + C)'s 1 day's work = $\left(\frac{1}{20}+\frac{1}{30}\right)=\frac{5}{60}=\frac{1}{12}$.

(B + C)'s 2 day's work = $\left(\frac{1}{12}\times 2\right)=\frac{1}{6}$.

Remaining work = $\left(1-\frac{1}{6}\right)=\frac{5}{6}$.

$\frac{1}{18}$ work is done by A in 1 day.

$\frac{5}{6}$ work will be done by A in $\left(18\times\frac{5}{6}\right)$ = 15 days.

59. (A + C)'s 1 day's work = $\left(\frac{1}{10}+\frac{1}{20}\right)=\frac{3}{20}$.

(A + C)'s 2 days' work = $\left(\frac{3}{20}\times 2\right)=\frac{3}{10}$.

Remaining work = $\left(1-\frac{3}{10}\right)=\frac{7}{10}$.

(B + C)'s 1 day's work = $\left(\frac{1}{15}+\frac{1}{20}\right)=\frac{7}{60}$.

$\frac{7}{60}$ work is done by B and C in 1 day.

$\frac{7}{10}$ work will be done by B and C in $\left(\frac{60}{7}\times\frac{7}{10}\right)=6$ days.

Hence, total time taken = (2 + 6) days = 8 days.

60. (P + Q + R)'s 1 hour's work = $\left(\frac{1}{8}+\frac{1}{10}+\frac{1}{12}\right)=\frac{37}{120}$.

Work done by P, Q and R in 2 hours = $\left(\frac{37}{120}\times 2\right)=\frac{37}{60}$.

Remaining work = $\left(1-\frac{37}{60}\right)=\frac{23}{60}$.

(Q + R)'s 1 hour's work = $\left(\frac{1}{10}+\frac{1}{12}\right)=\frac{11}{60}$.

Now, $\frac{11}{60}$ work is done by Q and R in 1 hour.

So, $\frac{23}{60}$ work will be done by Q and R in $\left(\frac{60}{11}\times\frac{23}{60}\right)=\frac{23}{11}$ hours

$\approx$ 2 hours.

So, the work will be finished approximately 2 hours after 11 a.m., *i.e.*, around 1 p.m.

61. 2 (A + B + C)'s 1 day's work = $\left(\frac{1}{30}+\frac{1}{24}+\frac{1}{20}\right)=\frac{15}{120}=\frac{1}{8}$.

$\Rightarrow$ (A + B + C)'s 1 day's work = $\frac{1}{16}$.

Work done by A, B and C in 10 days = $\frac{10}{16}=\frac{5}{8}$.

Remaining work = $\left(1-\frac{5}{8}\right)=\frac{3}{8}$.

A's 1 day's work = $\left(\frac{1}{16}-\frac{1}{24}\right)=\frac{1}{48}$.

Now, $\frac{1}{48}$ work is done by A in 1 day.

So, $\frac{3}{8}$ work will be done by A in $\left(48\times\frac{3}{8}\right)=18$ days.

62. Work done by X in 4 days = $\left(\frac{1}{20}\times 4\right)=\frac{1}{5}$.

Remaining work = $\left(1-\frac{1}{5}\right)=\frac{4}{5}$.

(X + Y)'s 1 day's work = $\left(\frac{1}{20}+\frac{1}{12}\right)=\frac{8}{60}=\frac{2}{15}$.

Now, $\frac{2}{15}$ work is done by X and Y in 1 day.

So, $\frac{4}{5}$ work will be done by X and Y in $\left(\frac{15}{2}\times\frac{4}{5}\right)=6$ days.

Hence, total time taken = (6 + 4) days = 10 days.

63. (A + B)'s 4 days' work = $\left(1-\frac{7}{10}\right)=\frac{3}{10}$.

(A + B)'s 1 day's work = $\left(\frac{3}{10}\times\frac{1}{4}\right)=\frac{3}{40}$.

Hence, A and B together take $\frac{40}{3}=13\frac{1}{3}$ days to complete the entire work.

64. (M + B)'s 1 days' work = $\frac{1}{24}$.

(M + B)'s 20 days' work + M's 6 days' work = 1

$\Rightarrow$ M's 6 days' work = $\left(1-\frac{1}{24}\times 20\right)=\frac{4}{24}=\frac{1}{6}$

$\Rightarrow$ M's 1 day's work = $\frac{1}{6}\times\frac{1}{6}=\frac{1}{36}$.

$\therefore$ B's 1 day's work = $\frac{1}{24}-\frac{1}{36}=\frac{1}{72}$.

Hence, the boy alone can do the work in 72 days.

65. (A + B)'s 20 days' work = $\left(\frac{1}{30}\times 20\right)=\frac{2}{3}$.

Remaining work = $\left(1-\frac{2}{3}\right)=\frac{1}{3}$.

Now, $\frac{1}{3}$ work is done by A in 20 days.

Whole work will be done by A in (20 × 3) = 60 days.

66. Work done by X in 8 days = $\left(\frac{1}{40}\times 8\right)=\frac{1}{5}$.

Remaining work = $\left(1-\frac{1}{5}\right)=\frac{4}{5}$.

Now, $\frac{4}{5}$ work is done by Y in 16 days.

Whole work will be done by Y in $\left(16\times\frac{5}{4}\right)=20$ days.

$\therefore$ X's 1 day's work = $\frac{1}{40}$, Y's 1 day's work = $\frac{1}{20}$.

(X + Y)'s 1 day's work = $\left(\frac{1}{40}+\frac{1}{20}\right)=\frac{3}{40}$.

Hence, X and Y will together complete the work in $\frac{40}{3}=13\frac{1}{3}$ days.

67. Work done by A, B and C in 4 days = $\left(\frac{1}{10}\times 4\right)=\frac{2}{5}$.

Remaining work = $\left(1-\frac{2}{5}\right)=\frac{3}{5}$.

Now, $\frac{3}{5}$ work is done by B and C in 10 days.

Whole work will be done by B and C in $\left(10\times\frac{5}{3}\right)=\frac{50}{3}$ days.

(A + B + C)'s 1 day's work = $\frac{1}{10}$,

(B + C)'s 1 day's work = $\frac{3}{50}$.

A's 1 day's work = $\left(\frac{1}{10}-\frac{3}{50}\right)=\frac{2}{50}=\frac{1}{25}$.

$\therefore$ A alone could complete the work in 25 days.

68. Whole work is done by A in $\left(20\times\frac{5}{4}\right)=25$ days.

Now, $\left(1-\frac{4}{5}\right)$ *i.e.*, $\frac{1}{5}$ work is done by A and B in 3 days.

Whole work will be done by A and B in (3 × 5) = 15 days.

A's 1 day's work = $\frac{1}{25}$, (A + B)'s 1 day's work = $\frac{1}{15}$.

$\therefore$ B's 1 day's work = $\left(\frac{1}{15}-\frac{1}{25}\right)=\frac{4}{150}=\frac{2}{75}$.

So, B alone would do the work in $\frac{75}{2}=37\frac{1}{2}$ days.

69. Let A's 1 day's work = x and B's 1 day's work = y.

Then, $x+y=\frac{1}{30}$ and $16x+44y=1$.

Solving these two equations, we get : $x=\frac{1}{60}$ and $y=\frac{1}{60}$.

$\therefore$ B's 1 day's work = $\frac{1}{60}$.

Hence, B alone shall finish the whole work in 60 days.

70. A's 5 days' work + B's 7 days' work + C's 13 days' work = 1

$\Rightarrow$ (A + B)'s 5 days' work + (B + C)'s 2 days' work + C's 11 days' work = 1

$\Rightarrow$ $\frac{5}{12}+\frac{2}{16}+$ C's 11 days' work = 1

$\Rightarrow$ C's 11 days' work = $1-\left(\frac{5}{12}+\frac{2}{16}\right)=\frac{11}{24}$

$\Rightarrow$ C's 1 day's work = $\left(\frac{11}{24}\times\frac{1}{11}\right)=\frac{1}{24}$.

$\therefore$ C alone can finish the work in 24 days.

71. (A + B)'s 1 day's work = $\left(\frac{1}{28}+\frac{1}{35}\right)=\frac{9}{140}$.

Work done by B in 17 days = $\left(\frac{1}{35}\times 17\right)=\frac{17}{35}$.

Remaining work = $\left(1-\frac{17}{35}\right)=\frac{18}{35}$.

Now, $\frac{9}{140}$ work was done by (A + B) in 1 day.

So, $\frac{18}{35}$ work was done by (A + B) in $\left(\frac{140}{9}\times\frac{18}{35}\right)=8$ days.

$\therefore$ A left after 8 days.

72. Part of wall built by A in 1 day = $\frac{1}{8}$.

Part of wall broken by B in 1 day = $\frac{1}{3}$.

Part of wall built by A in 4 days = $\left(\frac{1}{8}\times 4\right)=\frac{1}{2}$.

Part of wall broken by (A + B) in 2 days = $2\left(\frac{1}{3}-\frac{1}{8}\right)=\frac{5}{12}$.

Part of wall built in 6 days = $\left(\frac{1}{2}-\frac{5}{12}\right)=\frac{1}{12}$.

Remaining part to be built = $\left(1-\frac{1}{12}\right)=\frac{11}{12}$.

Now, $\frac{1}{8}$ wall is built by A in 1 day.

$\therefore$ $\frac{11}{12}$ wall will be built by A in $\left(8\times\frac{11}{12}\right)$

= $\frac{22}{3}$ days $=7\frac{1}{3}$ days.

73. (Anuj + Manoj)'s 20 days' work = $\left(\frac{1}{30}\times 20\right)=\frac{2}{3}$.

Remaining work = $\left(1-\frac{2}{3}\right)=\frac{1}{3}$.

Manoj's 30 days' work = $\frac{1}{3}$.

$\therefore$ Manoj's 1 days' work = $\frac{1}{90}$.

Anuj's 1 days' work = $\left(\frac{1}{30}-\frac{1}{90}\right)=\frac{2}{90}=\frac{1}{45}$.

If Manoj had gone away after 20 days, then the remaining $\frac{1}{3}$ work would have been done by Anuj.

$\frac{1}{45}$ work is done by Anuj in 1 day.

$\frac{1}{3}$ work would be done by Anuj in $\left(45\times\frac{1}{3}\right)$ = 15 days.

74. Suppose A takes x days to finish the work alone and B takes y days to finish the work alone.

Then, $\frac{2}{x}+\frac{9}{y}=1$ ...(*i*)

And, $\frac{3}{x}+\frac{6}{y}=1\Leftrightarrow\frac{1}{x}+\frac{2}{y}=\frac{1}{3}\Leftrightarrow\frac{2}{x}+\frac{4}{y}=\frac{2}{3}$ ...(*ii*)

Subtracting (*ii*) from (*i*), we get: $\frac{5}{y}=\frac{1}{3}$ or $y=15$.

Putting $y = 15$ in (*i*), we get: $\frac{2}{x}=\frac{2}{5}$ or $x = 5$.

Hence, A alone takes 5 days while B alone takes 15 days to finish the work.

75. Suppose Asha takes x days to complete the task alone while Sudha takes y days to complete it alone.

Since Sudha is more efficient than Asha, we have $x > y$.

Asha's 1 day's work = $\frac{1}{x}$; Sudha's 1 day's work = $\frac{1}{y}$.

(Asha + Sudha)'s 1 day's work = $\frac{1}{x}+\frac{1}{y}=\frac{x+y}{xy}$.

If Asha and Sudha each does half of the work alone, time taken = $\left(\frac{x}{2}+\frac{y}{2}\right)\text{days}=\left(\frac{x+y}{2}\right)\text{days}$.

$\therefore$ $\frac{x+y}{2}=45\Rightarrow x+y=90$

From (*i*) and (*ii*), we have: $\frac{xy}{20}=90$ or $xy = 1800$.

Now, $xy = 1800$ and $x + y = 90 \Rightarrow x = 60, y = 30$.

[$\because x > y$]

Hence, Asha alone will take 60 days to complete the task.

76. B's 3 days' work = $\left(\frac{1}{21}\times 3\right)=\frac{1}{7}$.

Remaining work = $\left(1-\frac{1}{7}\right)=\frac{6}{7}$.

(A + B)'s 1 day's work = $\left(\frac{1}{14}+\frac{1}{21}\right)=\frac{5}{42}$.

Now, $\frac{5}{42}$ work is done by A and B in 1 day.

$\therefore$ $\frac{6}{7}$ work is done by A and B in $\left(\frac{42}{5}\times\frac{6}{7}\right)=\frac{36}{5}$ days.

Hence, total time taken = $\left(3+\frac{36}{5}\right)\text{days}=10\frac{1}{5}\text{days}$.

77. (A + B + C)'s 1 day's work = $\left(\frac{1}{24}+\frac{1}{36}+\frac{1}{48}\right)=\frac{13}{144}$.

Work done by (A + B + C) in 4 days = $\left(\frac{13}{144}\times 4\right)=\frac{13}{36}$.

Work done by B in 3 days = $\left(\frac{1}{36}\times 3\right)=\frac{1}{12}$.

Remaining work = $\left[1-\left(\frac{13}{36}+\frac{1}{12}\right)\right]=\frac{5}{9}$.

(A + B)'s 1 day's work = $\left(\frac{1}{24}+\frac{1}{36}\right)=\frac{5}{72}$.

Now, $\frac{5}{72}$ work is done by A and B in 1 day.

So, $\frac{5}{9}$ work is done by A and B in $\left(\frac{72}{5}\times\frac{5}{9}\right)=8$ days.

Hence, total time taken = (4 + 3 + 8) days = 15 days.

78. C's 3 days' work = $\left(\frac{1}{15}\times 3\right)=\frac{1}{5}$.

(B + C)'s 2 days' work = $\left[\left(\frac{1}{12}+\frac{1}{15}\right)\times 2\right]=\left(\frac{3}{20}\times 2\right)=\frac{3}{10}$.

Remaining work = $\left[1-\left(\frac{1}{5}+\frac{3}{10}\right)\right]=\left(1-\frac{1}{2}\right)=\frac{1}{2}$.

(A + B + C)'s 1 day's work = $\left(\frac{1}{10}+\frac{1}{12}+\frac{1}{15}\right)=\frac{15}{60}=\frac{1}{4}$.

$\frac{1}{4}$ work is done by A, B and C in 1 day.

$\therefore$ $\frac{1}{2}$ work is done by A, B and C in $\left(4\times\frac{1}{2}\right)$ = 2 days.

Total number of days = (3 + 2 + 2) = 7.

79. B's daily earning = ₹ (300 – 188) = ₹ 112.

A's daily earning = ₹ (300 – 152) = ₹ 148.

C's daily earning = ₹ [300 – (112 + 148)] = ₹ 40.

80. Work done by A = $\left(1-\frac{8}{23}\right)=\frac{15}{23}$.

$\therefore$ A : (B + C) = $\frac{15}{23}:\frac{8}{23}=15:8$.

So, A's share = ₹$\left(\frac{15}{23}\times 529\right)=$ ₹ 345.

81. Kim's wages : David's wages

= Kim's 1 day's work : David's 1 day's work

= $\frac{1}{3}:\frac{1}{2}=2:3$.

$\therefore$ Kim's share = ₹ $\left(\frac{2}{5}\times 150\right)$ = ₹ 60.

82. Whole work is done by A in (3 × 4) = 12 days.
Whole work is done by B in (4 × 6) = 24 days.
A's wages : B's wages
= A's 1 day's work : B's 1 day's work = $\frac{1}{12}:\frac{1}{24}=2:1$.

$\therefore$ A's share = ₹ $\left(\frac{2}{3}\times 180\right)$ = ₹ 120.

83. Ratio of 1 day's work of man and boy = 3 : 1.

Total wages of the boy = ₹ $\left(800\times\frac{1}{4}\right)$ = ₹ 200.

$\therefore$ Daily wages of the boy = ₹ $\left(\frac{200}{5}\right)$ = ₹ 40.

84. Boy's 1 day's work = $\frac{1}{3}-\left(\frac{1}{7}+\frac{1}{8}\right)=\left(\frac{1}{3}-\frac{15}{56}\right)=\frac{11}{168}$.

$\therefore$ Ratio of wages of the first man, second man and boy
= $\frac{1}{7}:\frac{1}{8}:\frac{11}{168}=24:21:11$.

First man's share = ₹ $\left(\frac{24}{56}\times 1400\right)$ = ₹ 600;

Second man's share = ₹ $\left(\frac{21}{56}\times 1400\right)$ = ₹ 525;

Boy's share = ₹ [1400 − (600 + 525)] = ₹ 275.

85. Let total money be ₹ x. A's 1 day's wages = ₹ $\frac{x}{21}$,

B's 1 day's wages = ₹ $\frac{x}{28}$.

$\therefore$ (A + B)'s 1 day's wages = ₹ $\left(\frac{x}{21}+\frac{x}{28}\right)$ = ₹ $\frac{x}{12}$.

$\therefore$ Money is sufficient to pay the wages of both for 12 days.

86. Part of the work done by A = $\left(\frac{1}{10}\times 5\right)=\frac{1}{2}$.

Part of the work done by B = $\left(\frac{1}{15}\times 5\right)=\frac{1}{3}$.

Part of the work done by C = $1-\left(\frac{1}{2}+\frac{1}{3}\right)=\frac{1}{6}$.

So, (A's share) : (B's share) : (C's share) = $\frac{1}{2}:\frac{1}{3}:\frac{1}{6}=3:2:1$.

$\therefore$ A's share = ₹ $\left(\frac{3}{6}\times 1500\right)$ = ₹ 750,

B's share = ₹ $\left(\frac{2}{6}\times 1500\right)$ = ₹ 500,

C's share = ₹ $\left(\frac{1}{6}\times 1500\right)$ = ₹ 250.

A's daily wages = ₹ $\left(\frac{750}{5}\right)$ = ₹ 150;

B's daily wages = ₹ $\left(\frac{500}{5}\right)$ = ₹ 100;

C's daily wages = ₹ $\left(\frac{250}{2}\right)$ = ₹ 125.

$\therefore$ Daily wages of B and C = ₹ (100 + 125) = ₹ 225.

87. 5 workers' 1 day's work = $\frac{1}{10}$.

5 workers' 1 day's work on increasing wages
= 125% of $\frac{1}{10}=\left(\frac{125}{100}\times\frac{1}{10}\right)=\frac{1}{8}$.

So, now the work is done in 8 days.
Original wage bill = ₹ (100 × 5 × 10) = ₹ 5000.
New wage bill = ₹ (120 × 5 × 8) = ₹ 4800.
$\therefore$ Amount saved = ₹ (5000 − 4800) = ₹ 200.

88. B's 1 day's work = $\left(\frac{1}{12}-\frac{1}{20}\right)=\frac{2}{60}=\frac{1}{30}$.

Now, (A + B)'s 1 day's work = $\left(\frac{1}{20}+\frac{1}{60}\right)=\frac{4}{60}=\frac{1}{15}$.

[$\because$ B works for half day only]

So, A and B together will complete the work in 15 days.

89. Let the daily wages of A, B and C be ₹ 5x, ₹ 6x and ₹ 4x respectively.
Then, ratio of their amounts = (5x × 6) : (6x × 4) : (4x × 9) = 30 : 24 : 36 = 5 : 4 : 6.

$\therefore$ A's amount = ₹ $\left(1800\times\frac{5}{15}\right)$ = ₹ 600.

90. (A + B)'s 2 days' work = $\left(\frac{1}{12}+\frac{1}{18}\right)=\frac{5}{36}$.

Work done in 7 pairs of days = $\left(\frac{5}{36}\times 7\right)=\frac{35}{36}$.

Remaining work = $\left(1-\frac{35}{36}\right)=\frac{1}{36}$.

On 15th day, it is A's turn.

$\frac{1}{12}$ work is done by A in 1 day.

$\frac{1}{36}$ work is done by A in $\left(12\times\frac{1}{36}\right)=\frac{1}{3}$ day.

$\therefore$ Total time taken = $14\frac{1}{3}$ days.

91. (A + B)'s 1 day's work = $\left(\frac{1}{11}+\frac{1}{20}\right)=\frac{31}{220}$.

(A + C)'s 1 day's work = $\left(\frac{1}{11}+\frac{1}{55}\right)=\frac{6}{55}$.

Work done in 2 days = $\left(\frac{31}{220}+\frac{6}{55}\right)=\frac{55}{220}=\frac{1}{4}$.

Now, $\frac{1}{4}$ work is done in 2 days.

$\therefore$ Whole work will be done in (2 × 4) = 8 days.

92. A's 2 days' work = $\left(\frac{1}{20}\times 2\right)=\frac{1}{10}$.

(A + B + C)'s 1 day's work = $\left(\frac{1}{20}+\frac{1}{30}+\frac{1}{60}\right)=\frac{6}{60}=\frac{1}{10}$.

Work done in 3 days = $\left(\frac{1}{10}+\frac{1}{10}\right)=\frac{1}{5}$.

Now, $\frac{1}{5}$ work is done in 3 days.

$\therefore$ Whole work will be done in $(3 \times 5) = 15$ days.

93. (A + B + C)'s 3 days' work = $\frac{1}{90}+\frac{1}{40}+\frac{1}{12}=\frac{43}{360}$.

(A + B + C)'s 24 days' work = $\frac{43}{360}\times 8=\frac{344}{360}$.

Remaining work = $\left(1-\frac{344}{360}\right)=\frac{16}{360}=\frac{4}{90}$.

On 25th day, it is A's turn.

A's 1 day's work = $\frac{1}{90}$.

Remaining work = $\left(\frac{4}{90}-\frac{1}{90}\right)=\frac{3}{90}=\frac{1}{30}$.

On 26th day, it is B's turn.

B's 1 day's work = $\frac{1}{40}$.

Remaining work = $\left(\frac{1}{30}-\frac{1}{40}\right)=\frac{1}{120}$.

On 27th day, it is C's turn.

$\frac{1}{12}$ work is done by C in 1 day.

$\frac{1}{120}$ work is done by C in $\left(12\times\frac{1}{120}\right)=\frac{1}{10}$ day.

Hence, the whole work is completed in $26\frac{1}{10}$ days out of which A worked for 9 days, B worked for 9 days and C worked for $8\frac{1}{10}$ days.

Ratio of wages of A, B and C = Ratio of work done by A, B and C

$$= \left(\frac{1}{90}\times 9\right):\left(\frac{1}{40}\times 9\right):\left(\frac{1}{12}\times 8\frac{1}{10}\right)=\frac{1}{10}:\frac{9}{40}:\frac{27}{40}$$

$= 4 : 9 : 27.$

A's share = $₹\left(\frac{4}{40}\times 240\right)=₹\,24$;

B's share = $₹\left(\frac{9}{40}\times 240\right)=₹\,54$;

C's share = $₹\left(\frac{27}{40}\times 240\right)=₹\,162$.

94. Let the time taken by A alone and B alone to complete the work be x days and y days respectively.

When A works on the first day:

In this case, A works for 10 days while B works for 9 days.

$\therefore \quad \frac{10}{x}+\frac{9}{y}=1$ ...(*i*)

When B works on the first day:

In this case, A works for $9\frac{5}{6}\text{ days}\left(=\frac{59}{6}\text{ days}\right)$ while B works for 10 days.

$\therefore \quad \frac{59}{6x}+\frac{10}{y}=1$ ...(*ii*)

Multiplying (*i*) by 10 and (*ii*) by 9 and then subtracting, we get: $x = \frac{23}{2}=11\frac{1}{2}$.

Hence, A alone takes $11\frac{1}{2}$ days to complete the work.

95. (A + B)'s 6 days' work = $6\left(\frac{1}{20}+\frac{1}{15}\right)=\frac{7}{10}$;

(A + C)'s 4 days' work = $\left(1-\frac{7}{10}\right)=\frac{3}{10}$;

(A + C)'s 1 day's work = $\frac{3}{40}$. A's 1 day's work = $\frac{1}{20}$.

$\therefore$ C's 1 day's work = $\left(\frac{3}{40}-\frac{1}{20}\right)=\frac{1}{40}$.

Hence, C alone can finish the work in 40 days.

96. Suppose the work was finished in x days.

Then, A's $(x - 8)$ days' work + B's $(x - 12)$ days' work + C's x days' work = 1

$\Rightarrow \quad \frac{(x-8)}{36}+\frac{(x-12)}{54}+\frac{x}{72}=1$

$\Leftrightarrow \quad 6(x - 8) + 4(x - 12) + 3x = 216.$

$\therefore \quad 13x = 312$ or $x = 24$.

97. (20×16) women can complete the work in 1 day.

$\therefore$ 1 woman's 1 day's work = $\frac{1}{320}$.

(16×15) men can complete the work in 1 day.

$\therefore$ 1 man's 1 day's work = $\frac{1}{240}$.

So, required ratio = $\frac{1}{240}:\frac{1}{320}=4:3$.

98. 10 men's 1 day's work = $\frac{1}{15}$;

15 women's 1 day's work = $\frac{1}{12}$.

(10 men + 15 women)'s 1 day's work = $\left(\frac{1}{15}+\frac{1}{12}\right)=\frac{9}{60}=\frac{3}{20}$.

$\therefore$ 10 men and 15 women will complete the work in $\frac{20}{3}=6\frac{2}{3}$ days.

99. 3 men's 1 day's work = $\frac{1}{20}$;

5 boys' 1 day's work = $\frac{1}{30}$.

(3 men + 5 boys)'s 1 day's work = $\left(\frac{1}{20}+\frac{1}{30}\right)=\frac{5}{60}=\frac{1}{12}$.

$\therefore$ 3 men and 5 boys will complete the work in 12 days.

100. 5 men's 15 days' work = 5 men's 10 days' work + 10 women's 5 days' work

$\Rightarrow$ 5 men's 5 days' work = 10 women's 5 days' work

$\Rightarrow$ 10 women's 5 days' work = $\left(\frac{1}{15}\times 5\right)=\frac{1}{3}$

$\Rightarrow$ 10 women's 1 day's work = $\frac{1}{15}$.

$\therefore$ 10 women can complete the work in 15 days.

101. 100 men's 40 days' work + 100 men's 5 days' work = 1

$\Rightarrow$ 100 men's 45 days' work = 1

So, if the contractor had not engaged additional men, 100 men would have finished the work in 45 days.

Difference in time = (45 – 40) days = 5 days.

102. (7 × 12) men can complete the work in 1 day.

$\therefore$ 1 man's 1 day's work = $\frac{1}{84}$.

7 men's 5 days' work = $\left(\frac{1}{12}\times 5\right)=\frac{5}{12}$.

Remaining work = $\left(1-\frac{5}{12}\right)=\frac{7}{12}$.

5 men's 1 day's work = $\left(\frac{1}{84}\times 5\right)=\frac{5}{84}$.

$\frac{5}{84}$ work is done by them in 1 day.

$\frac{7}{12}$ work is done by them in $\left(\frac{84}{5}\times\frac{7}{12}\right)=\frac{49}{5}$ days $=9\frac{4}{5}$ days.

103. 1 man's 1 day's work = $\frac{1}{108}$.

12 men's 6 days' work = $\left(\frac{1}{9}\times 6\right)=\frac{2}{3}$.

Remaining work = $\left(1-\frac{2}{3}\right)=\frac{1}{3}$.

18 men's 1 day's work = $\left(\frac{1}{108}\times 18\right)=\frac{1}{6}$.

$\frac{1}{6}$ work is done by them in 1 day.

$\therefore$ $\frac{1}{3}$ work is done by them in $\left(6\times\frac{1}{3}\right)=2$ days.

104. Let 1 woman's 1 day's work = x.

Then, 1 man's 1 day's work = $\frac{x}{2}$ and 1 child's 1 day's work = $\frac{x}{4}$.

So, $\left(\frac{3x}{2}+4x+\frac{6x}{4}\right)=\frac{1}{7}$ $\Rightarrow$ $\frac{28x}{4}=\frac{1}{7}$

$\Rightarrow$ $x=\left(\frac{1}{7}\times\frac{4}{28}\right)=\frac{1}{49}$.

$\therefore$ 1 woman alone can complete the work in 49 days.

So, to complete the work in 7 days, number of women required = $\left(\frac{49}{7}\right)=7$.

105. (1 man + 1 woman)'s 1 day's work = $\left(\frac{1}{3}+\frac{1}{4}\right)=\frac{7}{12}$.

Work done by 1 man and 1 woman in $\frac{1}{4}$ day $=\left(\frac{7}{12}\times\frac{1}{4}\right)=\frac{7}{48}$.

Remaining work = $\left(1-\frac{7}{48}\right)=\frac{41}{48}$.

Work done by 1 boy in $\frac{1}{4}$ day = $\left(\frac{1}{12}\times\frac{1}{4}\right)=\frac{1}{48}$.

$\therefore$ Number of boys required = $\left(\frac{41}{48}\times 48\right)=41$.

106. 1 man's 1 day's work = $\frac{1}{100}$.

(10 men + 15 women)'s 1 day's work = $\frac{1}{6}$.

15 women's 1 day's work = $\left(\frac{1}{6}-\frac{10}{100}\right)=\left(\frac{1}{6}-\frac{1}{10}\right)=\frac{1}{15}$.

1 woman's 1 day's work = $\frac{1}{225}$.

$\therefore$ 1 woman alone can complete the work in 225 days.

107. Suppose the woman takes x hours to do the job.

Then, the child takes $(x + 15)$ hours to do the job.

Woman's 1 hours' work = $\frac{1}{x}$.

Child's 1 hours' work = $\frac{1}{(x+15)}$.

Child's 18 hours' work + Woman's 6 hours' work = $\frac{3}{5}$

$\Rightarrow$ $\frac{18}{(x+15)}+\frac{6}{x}=\frac{3}{5}\Rightarrow\frac{18x+6(x+15)}{x(x+15)}=\frac{3}{5}$

$\Rightarrow$ $5(24x + 90) = 3(x^2 + 15x)$

$\Rightarrow$ $120x + 450 = 3x^2 + 45x$

$\Rightarrow$ $3x^2 - 75x - 450 = 0 \Rightarrow x^2 - 25x - 150 = 0$

$\Rightarrow$ $x^2 - 30x + 5x - 150 = 0$

$\Rightarrow$ $x(x - 30) + 5(x - 30) = 0$

$\Rightarrow$ $(x - 30)(x + 5) = 0 \Rightarrow x = 30$.

Remaining work = $\left(1-\frac{3}{5}\right)=\frac{2}{5}$.

$\frac{1}{30}$ work is done by the woman in 1 hour.

$\therefore$ $\frac{2}{5}$ work will be done by the woman in $\left(30\times\frac{2}{5}\right)$

= 12 hours.

108. Let the number of workers who started the job be n.

Then, n workers' 1 day's work = $\frac{1}{4}$

$\Rightarrow$ 1 worker's 1 day's work = $\frac{1}{4n}$.

Now, n workers worked on first day, $(n-3)$ on 2nd day, $(n-3+2)$ *i.e.*, $(n-1)$ on 3rd day, ... and so on.

Thus, we have:

$[n + (n-3) + (n-1) + (n-4) + (n-2) + (n-5) + (n-3)] \times \frac{1}{4n} = 1$

$\Rightarrow \quad 7n - 18 = 4n \Rightarrow 3n = 18 \Rightarrow n = 6.$

Hence, 6 workers started the job.

109. (1 man + 1 woman)'s 1 day's work = $\frac{1}{6}+\frac{1}{9}=\frac{5}{18}$.

Remaining work = $\left(1-\frac{5}{18}\right)=\frac{13}{18}$.

Work done by 1 boy in 1 day = $\frac{1}{18}$.

$\therefore$ Number of boys required = $\left(\frac{13}{18}\times 18\right)=13.$

110. 1 man's 1 day's work = $\frac{1}{21\times 3}=\frac{1}{63}$;

1 boy's 1 day's work = $\frac{1}{21\times 9}=\frac{1}{189}$.

(5 men + 6 boys)'s 1 day's work

$= \frac{5}{63}+\frac{6}{189}=\frac{5}{63}+\frac{2}{63}=\frac{7}{63}=\frac{1}{9}.$

Hence, 5 men and 6 boys together can do the work in 9 days.

111. 1 man's 1 day's work = $\frac{1}{99\times 2}=\frac{1}{198}$;

1 woman's 1 day's work = $\frac{1}{99\times 6}=\frac{1}{594}$;

1 boy's 1 day's work = $\frac{1}{99\times 4}=\frac{1}{396}$.

(1 man + 1 woman + 1 boy)'s 1 day's work

$= \left(\frac{1}{198}+\frac{1}{594}+\frac{1}{396}\right)=\frac{11}{1188}=\frac{1}{108}.$

Hence, 1 man, 1 woman and 1 boy together take 108 days to finish the same work.

112. 1 man's 1 day's work = $\frac{1}{20\times 8}=\frac{1}{160}$;

1 woman's 1 day's work = $\frac{1}{32\times 8}=\frac{1}{256}$.

(5 men + 8 women)'s 1 day's work

$= \left(\frac{5}{160}+\frac{8}{256}\right)=\frac{1}{32}+\frac{1}{32}=\frac{1}{16}.$

Hence, 5 men and 8 women together can complete the work in 16 days.

113. 1 man's 1 day's work = $\frac{1}{63\times 18}=\frac{1}{1134}$;

1 woman's 1 day's work = $\frac{1}{189\times 9}=\frac{1}{1701}$;

1 child's 1 day's work = $\frac{1}{486\times 7}=\frac{1}{3402}$.

(4 men + 9 women + 12 children)'s 1 days' work

$= \left(\frac{4}{1134}+\frac{9}{1701}+\frac{12}{3402}\right)=\frac{42}{3402}=\frac{1}{81}.$

Hence, 4 men, 9 women and 12 children together will complete the work in 81 days.

114. 1 man's 1 day's work = $\frac{1}{24\times 16}=\frac{1}{384}$;

1 boy's 1 day's work = $\frac{1}{16\times 48}=\frac{1}{768}$.

12 men's 4 days' work = $\left(\frac{12}{384}\times 4\right)=\frac{1}{8}$.

Remaining work = $\left(1-\frac{1}{8}\right)=\frac{7}{8}$.

(12 men + 12 boys)'s 1 day's work

$= \left(\frac{12}{384}+\frac{12}{768}\right)=\left(\frac{1}{32}+\frac{1}{64}\right)=\frac{3}{64}.$

$\frac{3}{64}$ work is done by (12 men + 12 boys) in 1 day.

$\therefore \quad \frac{7}{8}$ work is done by them in $\left(\frac{64}{3}\times\frac{7}{8}\right)=\frac{56}{3}$ days

$= 18\frac{2}{3}$ days.

115. 1 man's 1 day's work = $\frac{1}{48}$;

1 woman's 1 day's work = $\frac{1}{60}$.

6 men's 2 days' work = $\left(\frac{6}{48}\times 2\right)=\frac{1}{4}$.

Remaining work = $\left(1-\frac{1}{4}\right)=\frac{3}{4}$.

Now, $\frac{1}{60}$ work is done in 1 day by 1 woman.

So, $\frac{3}{4}$ work will be done in 3 days by $\left(60\times\frac{3}{4}\times\frac{1}{3}\right)$

= 15 women

116. 1 child's 1 day's work = $\frac{1}{192}$;

1 adult's 1 day's work = $\frac{1}{96}$.

Work done in 3 days = $\left(\frac{1}{96}\times 16\times 3\right)=\frac{1}{2}$.

Remaining work = $\left(1-\frac{1}{2}\right)=\frac{1}{2}$.

(6 adults + 4 children)'s 1 day's work = $\left(\frac{6}{96}+\frac{4}{192}\right)=\frac{1}{12}$.

$\frac{1}{12}$ work is done by them in 1 day.

$\frac{1}{2}$ work is done by them in $\left(12\times\frac{1}{2}\right)$ = 6 days.

117. 1 man's 1 day's work = $\frac{1}{192}$;

1 child's 1 day's work = $\frac{1}{432}$.

Work done in 8 days = $8\left(\frac{12}{192}+\frac{8}{432}\right)=8\left(\frac{1}{16}+\frac{1}{54}\right)=\frac{35}{54}$.

Remaining work = $\left(1-\frac{35}{54}\right)=\frac{19}{54}$.

(12 men + 11 children)'s 1 day's work = $\left(\frac{12}{192}+\frac{11}{432}\right)=\frac{19}{216}$.

Now, $\frac{19}{216}$ work is done by them in 1 day.

$\therefore$ $\frac{19}{54}$ work will be done by them in $\left(\frac{216}{19}\times\frac{19}{54}\right)$ = 4 days.

118. 1 man's 1 day's work = $\frac{1}{384}$;

1 woman's 1 day's work = $\frac{1}{768}$.

Work done in 12 days = $12\left(\frac{16}{384}+\frac{16}{768}\right)=\left(12\times\frac{3}{48}\right)=\frac{3}{4}$.

Remaining work = $\left(1-\frac{3}{4}\right)=\frac{1}{4}$.

(16 men + 16 women)'s 2 days' work

$= 2\left(\frac{16}{384}+\frac{16}{768}\right)=\left(2\times\frac{1}{16}\right)=\frac{1}{8}$.

Remaining work = $\left(\frac{1}{4}-\frac{1}{8}\right)=\frac{1}{8}$.

$\frac{1}{384}$ work is done in 1 day by 1 man.

$\therefore$ $\frac{1}{8}$ work will be done in 2 days by $\left(384\times\frac{1}{8}\times\frac{1}{2}\right)$

= 24 men.

119. Let 1 man's 1 day's work = x
and 1 boy's 1 day's work = y.

Then, $5x+2y=4(x+y)\Rightarrow x=2y\Rightarrow\frac{x}{y}=\frac{2}{1}$.

120. Let 1 man's 1 day's work = x
and 1 boy's 1 day's work = y.

Then, $12x+16y=\frac{1}{5}$ and $13x+24y=\frac{1}{4}$.

Solving these two equations, we get : $x=\frac{1}{100}$ and $y=\frac{1}{200}$.

$\therefore$ Required ratio = $x:y=\frac{1}{100}:\frac{1}{200}=2:1$.

121. Let 1 man's 1 day's work = x
and 1 woman's 1 day's work = y.

Then, $4x+6y=\frac{1}{8}$ and $3x+7y=\frac{1}{10}$.

Solving these two equations, we get : $x=\frac{11}{400}$, $y=\frac{1}{400}$.

$\therefore$ 1 woman's 1 day's work = $\frac{1}{400}$.

$\Rightarrow$ 10 women's 1 day's work = $\left(\frac{1}{400}\times10\right)=\frac{1}{40}$.

Hence, 10 women will complete the work in 40 days.

122. Let 1 man's 1 day's work = x
and 1 woman's 1 day's work = y.

Then, $4x+10y=\frac{1}{3}\times\frac{1}{4}=\frac{1}{12}\Rightarrow 2x+5y=\frac{1}{24}$ ...(*i*)

And, $6x+12y=\frac{1}{9}\Rightarrow 2x+4y=\frac{1}{27}$ ...(*ii*)

Subtracting (*ii*) from (*i*), we get: $y=\frac{1}{24}-\frac{1}{27}=\frac{1}{216}$.

Now, (6 men + 12 women)'s 3 days' work = $\left(\frac{1}{9}\times3\right)=\frac{1}{3}$.

Work completed = $\left(\frac{1}{3}+\frac{2}{9}+\frac{1}{3}\right)=\frac{8}{9}$.

Remaining work = $\left(1-\frac{8}{9}\right)=\frac{1}{9}$.

1 woman's 3 days' work = $\left(\frac{1}{216}\times3\right)=\frac{1}{72}$.

In 3 days, $\frac{1}{72}$ work is done by 1 woman.

$\therefore$ In 3 days, $\frac{1}{9}$ work is done by $\left(72\times\frac{1}{9}\right)$ = 8 women.

123. Let 1 man's 1 hour's work = x;
1 woman's 1 hour's work = y
and 1 boy's 1 hour's work = z.

Then, $x+3y+4z=\frac{1}{96}$ ... (*i*)

$2x+8z=\frac{1}{80}$ ... (*ii*)

$2x+3y=\frac{1}{120}$ ... (*iii*)

Adding (*ii*) and (*iii*) and subtracting (*i*) from it,

we get : $3x+4z=\frac{1}{96}$ ...(*iv*)

From (*ii*) and (*iv*), we get $x=\frac{1}{480}$.

Substituting, we get : $y=\frac{1}{720}$, $z=\frac{1}{960}$.

(5 men + 12 boys)'s 1 hour's work

$= \left(\frac{5}{480}+\frac{12}{960}\right)=\left(\frac{1}{96}+\frac{1}{80}\right)=\frac{11}{480}.$

$\therefore$ 5 men and 12 boys can do the work in $\frac{480}{11}$

i.e., $43\frac{7}{11}$ hours.

124. Let 1 man's 1 day's work = x

and 1 boy's 1 day's work = y.

Then, $6x + 8y = \frac{1}{10}$ and $26x + 48y = \frac{1}{2}$.

Solving these two equations, we get: $x = \frac{1}{100}$ and $y = \frac{1}{200}$.

(15 men + 20 boys)'s 1 day's work $= \left(\frac{15}{100}+\frac{20}{200}\right)=\frac{1}{4}$.

$\therefore$ 15 men and 20 boys can do the work in 4 days.

125. Acreage reaped by 5 men and 3 women in 1 day $= \frac{18}{4}=\frac{9}{2}$.

Acreage reaped by 3 men and 2 women in 1 day

$= \frac{22}{8}=\frac{11}{4}$.

Suppose 1 man can reap x acres in 1 day and 1 woman can reap y acres in 1 day.

$\therefore \quad 5x + 3y = \frac{9}{2} \Rightarrow 10x + 6y = 9$ ...(*i*)

$3x + 2y = \frac{11}{4} \Rightarrow 9x + 6y = \frac{33}{4}$ ...(*ii*)

Subtracting (*ii*) from (*i*), we get : $x = 9-\frac{33}{4}=\frac{3}{4}$.

Putting $x = \frac{3}{4}$ in (*i*), we get: $6y = 9-\frac{15}{2}=\frac{3}{2}\Rightarrow y=\frac{1}{4}$.

Acreage reaped by 21 women in 6 days $= \left(\frac{1}{4}\times 21\times 6\right)=\frac{63}{2}$.

Remaining acreage to be reaped $= \left(54-\frac{63}{2}\right)=\frac{45}{2}$.

Acreage reaped by 1 man in 6 days $= \left(\frac{3}{4}\times 6\right)=\frac{9}{2}$.

In 6 days, $\frac{9}{2}$ acre is reaped by 1 man.

$\therefore$ In 6 days, $\frac{45}{2}$ acre is reaped by $\left(\frac{2}{9}\times\frac{45}{2}\right)$ men = 5 men.

126. Let 1 man's 1 day's work = x

and 1 boy's 1 day's work = y.

Then, $6\ (25x + 10y) = 5\ (21x + 30y)$

$\Rightarrow \quad 150x + 60y = 105x + 150y \Rightarrow 45x = 90y \Rightarrow x = 2y.$

Let the required number of boys be z.

Then, $4\ (40x + zy) = 6\ (25x + 10y) \Rightarrow 4\ (80y + zy)$

$= 6\ (50y + 10y)$ [$\because x = 2y$]

$\Rightarrow \quad 80 + z = \frac{6\times 60}{4} = 90 \Rightarrow z = 10.$

127. Work done by 40 men in 5 days $= \frac{1}{3}$ (as if whole work is completed in 15 days then in 5 days 1/3rd of the work will be finished)

Remaining work $= 1-\frac{1}{3}=\frac{2}{3}$

$\because$ 40 men do 1 work in 15 days.

60 men can do $\frac{2}{3}$ work in x day

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

$M_1 = 40 \quad M_2 = 60$

$D_1 = 15 \quad D_2 = x$

$W_1 = 1 \quad W_2 = \frac{2}{3}$

$\Rightarrow \frac{40\times 15}{1}=\frac{60\times x}{\frac{2}{3}}$

$\Rightarrow \frac{2}{3}(40\times 15)=60x$

$\Rightarrow 2 \times 40 \times 5 = 60x$

$\Rightarrow x = \frac{20}{3}=6\frac{2}{3}$ days

128. 12 men can do a piece of work in 24 days

$\Rightarrow M_1 = 12$ and $D_1 = 24$

8 men can do this work in D_2 days

$\Rightarrow M_2 = 8$

$M_1 D_1 = M_2 D_2$

$\Rightarrow 12 \times 24 = 8 \times D_2$

$\Rightarrow D_2 = \frac{12\times 24}{8} = 36$ days

129. Let time taken by A alone in doing work be x days.

$\therefore$ Time taken by B alone = $3x$ days

A's 1 day's work = $\frac{1}{x}$

B's 1 day's work = $\frac{1}{3x}$

$\because$ A and B together finish = $\frac{2}{5}$ work in 9 days.

$\therefore$ Time taken by A and B in doing whole work

$= \frac{9\times 5}{2}=\frac{45}{2}$ days

According to given information we get

$\therefore \frac{1}{x}+\frac{1}{3x}=\frac{2}{45}$

$\Rightarrow \frac{3+1}{3x}=\frac{2}{45}$

$\Rightarrow \frac{4}{3x}=\frac{2}{45}$

By cross-multiply we get

$\Rightarrow 2 \times 3x = 4 \times 45$

$\Rightarrow x = \frac{4\times 45}{2\times 3} = 30$ days

Time taken by A = x days = 30 days

$\therefore$ Time taken by B = $3x$ days
= 3 × 30 = 90 days

130. A's 1 days work = $\frac{1}{24}$

B's 1 days work = $\frac{1}{5}$

C's 1 days work = $\frac{1}{12}$

$\therefore$ (A + B + C)'s 1 days work

$= \frac{1}{24}+\frac{1}{5}+\frac{1}{12}$

LCM of 24, 5 and 12

2	24 – 5 – 12
2	12 – 5 – 6
3	6 – 5 – 3
	2 – 5 – 1

$2 \times 2 \times 3 \times 2 \times 5 = 120$

$= \frac{5+24+10}{120}$

$= \frac{39}{120} = \frac{13}{40}$

Time taken by A, B and C to complete the work, working together

$= \frac{40}{13} = 3\frac{1}{13}$ days

131. X's 1 day's work = $\frac{1}{24}$

X's 16 day's work = $\frac{16}{24}$

Let Y alone complete the work in x days.

Y's 12 days work = $\frac{12}{x}$

According to the question,

Complete work done by X and Y = 1

X's 16 days work + Y's 12 days work = 1

$\Rightarrow \frac{16}{24}+\frac{12}{x}=1$

$\Rightarrow \frac{2}{3}+\frac{12}{x}=1$

$\Rightarrow \frac{12}{x}=1-\frac{2}{3}=\frac{1}{3}$

$\Rightarrow$ x = 12 × 3 = 36 days

132. 6 men will complete the work in 12 days

1 man will complete the work in = 6 × 12 = 72 days

8 women can complete two work in 18 day

1 woman will complete the work in = 8 × 18 = 144 days

18 children can complete the work in 10 days.

1 child will complete the work in = 18 × 10 = 180 days

1 men's 1 day's work = $\frac{1}{72}$

1 women's 1 day's work = $\frac{1}{144}$

1 children's 1 day's work = $\frac{1}{180}$

4 men + 12 women + 20 children's 2 days' work

$= 2\left(\frac{4}{72}+\frac{12}{144}+\frac{20}{180}\right)$

$= 2\left(\frac{1}{18}+\frac{1}{12}+\frac{1}{9}\right)$

LCM of 18, 12 and 9 = 36

$= \frac{2(2+3+4)}{36}=\frac{1}{2}$

$\therefore$ Remaining work = $\frac{1}{2}$

$\therefore$ Required number of men = $72\times\frac{1}{2}=36$

133. Given M_1 = 16; D_1 = 49; W_1 = 1

M_2 = ?; D_2 = 24; W_2 = ?

According to the question

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

$\Rightarrow \frac{16\times49}{1}=\frac{14\times8}{W_2}$

$\Rightarrow W_2=\frac{14\times8}{16\times49}=\frac{1}{7}$

Remaining work = $1-\frac{1}{7}=\frac{6}{7}$

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

$\Rightarrow \frac{16\times49}{1}=\frac{M_2\times24}{\frac{6}{7}}$

$\Rightarrow 16\times49=\frac{M_2\times24\times7}{6}$

$\Rightarrow 16\times49=M_2\times4\times7$

$\Rightarrow M_2=\frac{16\times49}{4\times7}=28$

Number of additional men = 28 – 14 = 14

EXERCISE

(DATA SUFFICIENCY TYPE QUESTIONS)

Directions (*Questions 1–11*): *Each of the questions given below consists of a statement and/or a question followed by two statements labelled I and II. Read both the statements and*

Give answer (a) if the data in Statement I alone are sufficient to answer the question, while the data in Statement II alone are not sufficient to answer the question;

Give answer **(b)** *if the data in Statement II alone are sufficient to answer the question, while the data in Statement I alone are not sufficient to answer the question;*

Give answer **(c)** *if the data either in Statement I or in Statement II alone are sufficient to answer the question;*

Give answer **(d)** *if the data even in both Statements I and II together are not sufficient to answer the question;*

Give answer **(e)** *if the data in both Statements I and II together are necessary to answer the question.*

1. Will Q take more than 8 hours to complete the job alone?

I. P works faster than Q.

II. P and Q can together finish the job in 5 hours. **(J.M.E.T., 2005)**

2. In how many days can Mohan alone complete the work?

I. Mohan and Prakash together can complete the work in 17 days.

II. Rakesh works double as fast as Mohan and can alone complete the work in 10 days. **(Bank P.O., 2006)**

3. In how many days can B alone complete the work? **(Bank P.O., 2009)**

I. B and C together can complete the work in 8 days.

II. A and B together can complete the work in 12 days.

4. How long will Machine Y, working alone, take to produce x candles ? **(M.B.A., 2002)**

I. Machine X produces x candles in 5 minutes.

II. Machine X and Machine Y working at the same time produce x candles in 2 minutes.

5. B alone can complete a work in 12 days. How many days will A, B and C together take to complete the work ? **(SNAP, 2005)**

I. A and B together can complete the work in 3 days.

II. B and C together can complete the work in 6 days.

6. Is it cheaper to employ X to do a certain job than to employ Y ?

I. X is paid 20% more per hour than Y, but Y takes 2 hours longer to complete the job.

II. X is paid ₹ 80 per hour.

7. A and B together can complete a task in 7 days. B alone can do it in 20 days. What part of the work was carried out by A ?

I. A completed the job alone after A and B worked together for 5 days.

II. Part of the work done by A could have been done by B and C together in 6 days.

8. Who is the slowest among the three workers P, Q and R? **(M.A.T., 2009)**

I. P and Q together fence a garden of perimeter 800 m in 11 hours.

II. P, Q and R together can fence a garden of perimeter 800 m in 5 hours.

9. How many women can complete a piece of work in 15 days? **(Bank P.O., 2009)**

I. 12 women can complete the same piece of work in 20 days.

II. 10 men can complete the same piece of work in 12 days.

10. In how many days 10 men will finish the work while working together? **(Bank P.O., 2008)**

I. Only 12 women can finish the work in 16 days.

II. 4 men and 6 women can finish the work in 16 days.

11. How many women can complete the work in 10 days? **(Bank P.O., 2009)**

I. Work done by one woman in one day is 75% of the work done by one man in one day.

II. Work done by one woman in one day is 150% of the work done by one child in one day.

Directions (*Questions 12–19*)**:** ***Each of the following questions consists of a question followed by three statements I, II and III. You have to study the question and the statements and decide which of the statement*(s) *is/are necessary to answer the question.***

12. In how many days can A and B working together complete a job ?

I. A alone can complete the job in 30 days.

II. B alone can complete the job in 40 days.

III. B takes 10 days more than A to complete the job.

(*a*) I and II only (*b*) II and III only
(*c*) I and III only (*d*) Any two of the three
(*e*) All I, II and III

13. In how many days A alone can complete a work?

I. A and B can complete the work in 8 days.

II. B takes twice the time taken by A in completing the work.

III. A and B together take $\frac{1}{3}$ of the time taken by B alone in completing the work. **(Bank P.O., 2004)**

(*a*) Only I and III (*b*) Only II and III
(*c*) All I, II and III (*d*) Any two of the three
(*e*) None of these

14. In how many days can the work be completed by A and B together ? **(M.A.T., 2005)**

I. A alone can complete the work in 8 days.

II. If A alone works for 5 days and B alone works for 6 days, the work gets completed.

III. B alone can complete the work in 16 days.

(*a*) I and II only
(*b*) II and III only
(*c*) Any two of the three
(*d*) II and either I or III
(*e*) None of these

15. In how many days will B alone complete the work?

I. A and B together can complete the work in 8 days.

II. B and C together can complete the work in 10 days.

III. A and C together can complete the work in 12 days.

(*a*) Only I and II
(*b*) Only II and III
(*c*) All I, II and III
(*d*) Question cannot be answered with the information in all the three statements
(*e*) None of these

16. How many workers are required for completing the construction work in 10 days ?

I. 20% of the work can be completed by 8 workers in 8 days.

II. 20 workers can complete the work in 16 days.

III. One-eighth of the work can be completed by 8 workers in 5 days.

(*a*) I only
(*b*) II and III only
(*c*) III only
(*d*) I and III only
(*e*) Any one of the three

17. In how many days can 16 men and 8 women together complete the piece of work ? **(Bank P.O., 2006)**

I. 8 men complete the piece of work in 10 days.

II. 16 women complete the piece of work in 10 days.

III. 5 women take 32 days to complete the piece of work.

(*a*) Only I and II
(*b*) Only II and III
(*c*) Only I and III
(*d*) Only I and either II or III
(*e*) Any two of the three

18. In how many days can the work be done by 9 men and 15 women ?

I. 6 men and 5 women can complete the work in 6 days.

II. 3 men and 4 women can complete the work in 10 days.

III. 18 men and 15 women can complete the work in 2 days.

(*a*) III only
(*b*) All I, II and III
(*c*) Any two of the three
(*d*) Any one of the three
(*e*) None of these

19. In how many days can 10 women finish a work? **(N.M.A.T. 2005; R.B.I., 2002)**

I. 10 men can complete the work in 6 days.

II. 10 men and 10 women together can complete the work in $3\frac{3}{7}$ days.

III. If 10 men work for 3 days and thereafter 10 women replace them, the remaining work is completed in 4 days.

(*a*) Any two of the three
(*b*) I and II only
(*c*) II and III only
(*d*) I and III only
(*e*) None of these

Directions (*Questions 20-21*): ***Each of these questions is followed by three statements. You have to study the question and all the three statements given to decide whether any information provided in the statement*(s) *is/are redundant and can be dispensed with while answering the given question.***

20. In how many days can the work be completed by A, B and C together?

I. A and B together can complete the work in 6 days.

II. B and C together can complete the work in $3\frac{3}{4}$ days.

III. A and C together can complete the work in $3\frac{1}{3}$ days.

(*a*) Any one of the three
(*b*) I only
(*c*) II only
(*d*) III only
(*e*) Information in all the three statements is necessary to answer the question.

21. 8 men and 14 women are working together in a field. After working for 3 days, 5 men and 8 women leave the work. How many more days will be required

to complete the work ?

I. 19 men and 12 women together can complete the work in 18 days.

II. 16 men can complete two-thirds of the work in 16 days.

III. In a day, the work done by three men is equal to the work done by four women. **(M.A.T., 2006)**

(*a*) I only
(*b*) II only
(*c*) III only
(*d*) I or II or III
(*e*) II or III only

ANSWERS

1. (*e*)	**2.** (*b*)	**3.** (*d*)	**4.** (*e*)	**5.** (*e*)	**6.** (*d*)	**7.** (*a*)	**8.** (*d*)	**9.** (*a*)	**10.** (*e*)
11. (*d*)	**12.** (*d*)	**13.** (*e*)	**14.** (*c*)	**15.** (*c*)	**16.** (*e*)	**17.** (*d*)	**18.** (*c*)	**19.** (*a*)	**20.** (*e*)
21. (*d*)									

SOLUTIONS

1. From II, we can conclude that if P and Q worked with equal efficiency, each of them alone would do the job in 10 hours. But according to I, Q is slower than P. So Q alone would take more than 10 hours to complete the job. Thus, both I and II together are necessary to get the answer.
∴ Correct answer is (*e*).

2. From II, it is clear that Mohan alone takes double the time as taken by Rakesh alone to do the work i.e., 20 days.
I is insufficient.
Thus, II alone gives the answer.
∴ Correct answer is (*b*).

3. **I.** gives, (B + C)'s 1 day's work = $\frac{1}{8}$ ...(*i*)

II. gives, (A + B)'s 1 day's work = $\frac{1}{12}$ ...(*ii*)

We cannot find B's 1 day's work using (*i*) and (*ii*).
Thus, both I and II together are not sufficient.
∴ Correct answer is (*d*).

4. **I.** gives, Machine X produces $\frac{x}{5}$ candles in 1 min.

II. gives, Machines X and Y produce $\frac{x}{2}$ candles in 1 min.

From I and II, Y produces $\left(\frac{x}{2}-\frac{x}{5}\right)=\frac{3x}{10}$ candles in 1 min.

$\frac{3x}{10}$ candles are produced by Y in 1 min.
x candles will be produced by Y in
$\left(\frac{10}{3x}\times x\right)\text{min}=\frac{10}{3}\text{min}$.

Thus, I and II both are necessary to get the answer.
∴ Correct answer is (*e*).

5. Given : B's 1 day's work = $\frac{1}{12}$.

I. gives, (A + B)'s 1 day's work = $\frac{1}{3}$

⇒ A's 1 day's work = $\left(\frac{1}{3}-\frac{1}{12}\right)=\frac{3}{12}=\frac{1}{4}$.

II. gives, (B + C)'s 1 day's work = $\frac{1}{6}$

⇒ C's 1 day's work = $\left(\frac{1}{6}-\frac{1}{12}\right)=\frac{1}{12}$.

∴ (A + B + C)'s 1 day's work = $\left(\frac{1}{4}+\frac{1}{12}+\frac{1}{12}\right)=\frac{5}{12}$.

Hence, they all finish the work in $\frac{12}{5}=2\frac{2}{5}$ days.

Thus, I and II both are necessary to get the answer.
∴ Correct answer is (*e*).

6. Suppose X takes x hours and Y takes $(x + 2)$ hours to complete the job.

II. X is paid ₹ 80 per hour.
Total payment to X = ₹ $(80x)$.

I. X = 120% of Y = $\frac{120}{100}\text{Y}=\frac{6}{5}\text{Y}$ ⇒ $\text{Y}=\frac{5}{6}\text{X}$.

∴ Y is paid ₹$\left(\frac{5}{6}\times 80\right)$ per hour

⇒ Y is paid ₹$\left[\frac{200}{3}(x+2)\right]$.

We cannot compare $(80x)$ and $\frac{200}{3}(x+2)$.

∴ Correct answer is (*d*).

7. B's 1 day's work = $\frac{1}{20}$. (A + B)'s 1 day's work = $\frac{1}{7}$.

I. (A + B)'s 5 days' work = $\frac{5}{7}$.

Remaining work = $\left(1-\frac{5}{7}\right)=\frac{2}{7}$.

∴ $\frac{2}{7}$ work was carried by A.

II. is irrelevant.
∴ Correct answer is (*a*).

8. Clearly, using I and II, we can find only R's 1 hour's work while the same cannot be found for *P* and *Q*.

Hence, the speeds of P, Q and R cannot be compared. Thus, correct answer is (d).

9. **I.** gives, 1 woman's 1 day's work = $\frac{1}{20\times12}=\frac{1}{240}$.

$\therefore$ 1 woman's 15 days' work = $\left(\frac{1}{240}\times15\right)=\frac{1}{16}$.

So, 16 women can complete the work in 15 days.

Thus, I alone gives the answer. While II is irrelevant.

$\therefore$ Correct answer is (a).

10. **I.** gives, 1 woman's 1 day's work = $\frac{1}{16\times12}=\frac{1}{192}$.

II. gives, $(4M + 6W) = 12W \Rightarrow 4M = 6W \Rightarrow M = \frac{3}{2}W$.

So, 1 man's 1 day's work = $\left(\frac{3}{2}\times\frac{1}{192}\right)=\frac{1}{128}$.

10 men's 1 day's work = $\left(\frac{1}{128}\times10\right)=\frac{5}{64}$.

Hence, 10 men together take $\frac{64}{5}$ *i.e.*, $12\frac{4}{5}$ days to finish the work.

Thus, both I and II are necessary to answer the question.

$\therefore$ Correct answer is (e).

11. Both I and II tell us about the comparative efficiencies of a man, a woman and a child. From the given information, the answer cannot be obtained.

$\therefore$ Correct answer is (d).

12. **I.** A can complete the job in 30 days.

$\therefore$ A's 1 day's work = $\frac{1}{30}$.

II. B can complete the job in 40 days.

$\therefore$ B's 1 day's work = $\frac{1}{40}$.

III. B takes 10 days more than A to complete the job.

I and II gives, (A + B)'s 1 day's work = $\left(\frac{1}{30}+\frac{1}{40}\right)=\frac{7}{120}$.

$\therefore$ I and III also give the same answer.

II and III also give the same answer.

$\therefore$ Correct answer is (d).

13. **I.** (A + B)'s 1 day's work = $\frac{1}{8}$.

II. Suppose A takes x days to complete the work.

Then, B takes $2x$ days to complete it.

$\therefore \frac{1}{x}+\frac{1}{2x}=\frac{1}{8} \Rightarrow \frac{3}{2x}=\frac{1}{8} \Leftrightarrow x=\frac{3\times8}{2}=12.$

So, A alone takes 12 days to complete the work.

III. B alone takes (3 × 8) = 24 days to complete the work.

$\therefore$ A's 1 day's work = $\frac{1}{8}-\frac{1}{24}=\frac{2}{24}=\frac{1}{12}$.

So, A alone takes 12 days to complete the work.

Thus, (I and II) or (I and III) give the answer.

$\therefore$ Correct answer is (e).

14. **I.** A can complete the job in 8 days.

So, A's 1 day's work = $\frac{1}{8}$.

II. A works for 5 days, B works for 6 days and the work is completed.

III. B can complete the job in 16 days.

So, B's 1 day's work = $\frac{1}{16}$.

I and III : (A + B)'s 1 day's work = $\left(\frac{1}{8}+\frac{1}{16}\right)=\frac{3}{16}$.

$\therefore$ Both can finish the work in $\frac{16}{3}$ days.

II and III : Suppose A takes x days to finish the work.

Then, $\frac{5}{x}+\frac{6}{16}=1 \Rightarrow \frac{5}{x}=\left(1-\frac{3}{8}\right)=\frac{5}{8} \Rightarrow x=8.$

$\therefore$ (A + B)'s 1 day's work = $\left(\frac{1}{8}+\frac{1}{16}\right)=\frac{3}{16}$.

$\therefore$ Both can finish it in $\frac{16}{3}$ days.

I and II : A's 1 day's work $=\frac{1}{8}$. Suppose B takes x days to finish the work.

Then from II, $\left(5\times\frac{1}{8}+6\times\frac{1}{x}=1\right) \Leftrightarrow \frac{6}{x}=\left(1-\frac{5}{8}\right)$

$=\frac{3}{8} \Rightarrow x=\left(\frac{8\times6}{3}\right)=16.$

$\therefore$ (A + B)'s 1 day's work = $\left(\frac{1}{8}+\frac{1}{16}\right)=\frac{3}{16}$.

$\therefore$ Both can finish it in $\frac{16}{3}$ days.

Hence, the correct answer is (c).

15. **I.** (A + B)'s 1 day's work = $\frac{1}{8}$. ...(i)

II. (B + C)'s 1 day's work = $\frac{1}{10}$. ...(ii)

III. (A + C)'s 1 day's work = $\frac{1}{12}$. ...(iii)

Adding (i), (ii) and (iii), we get:

2 (A + B + C)'s 1 day's work = $\frac{1}{8}+\frac{1}{10}+\frac{1}{12}=\frac{37}{120}$

$\Rightarrow$ (A + B + C)'s 1 day's work = $\frac{37}{240}$.

$\therefore$ B's 1 day's work = $\left(\frac{37}{240}-\frac{1}{12}\right)=\frac{17}{240}$.

Hence, B alone can complete the work in $\frac{240}{17}$

i.e., $14\frac{2}{17}$ days.

Thus, I, II and III together give the answer.

$\therefore$ Correct answer is (c).

16. **I.** $\frac{20}{100}$ work can be completed by (8×8) workers in 1 day.

$\Rightarrow$ Whole work can be completed by $(8 \times 8 \times 5)$ workers in 1 day

$= \frac{8 \times 8 \times 5}{10}$ worke rs in 10 days = 32 workers in 10 days.

II. (20×16) workers can finish it in 1 day

$\Rightarrow \frac{(20 \times 16)}{10}$ workers can finish it in 10 days

$\Rightarrow$ 32 workers can finish it in 10 days.

III. $\frac{1}{8}$ work can be completed by (8×5) workers in 1 day

$\Rightarrow$ Whole work can be completed by $(8 \times 5 \times 8)$ workers in 1 day

$= \frac{8 \times 5 \times 8}{10}$ workers in 10 days = 32 workers in 10 days.

$\therefore$ Any one of the three gives the answer.

$\therefore$ Correct answer is (*e*).

17. **I.** 1 man's 1 day's work $= \frac{1}{10 \times 8} = \frac{1}{80}$.

II. 1 woman's 1 day's work $= \frac{1}{10 \times 16} = \frac{1}{160}$.

III. 1 woman's 1 day's work $= \frac{1}{32 \times 5} = \frac{1}{160}$.

Since II and III give the same information, either of them may be used.

(16 men + 8 women)'s 1 day's work

$= \left(\frac{1}{80} \times 16 + \frac{1}{160} \times 8\right) = \frac{1}{5} + \frac{1}{20} = \frac{5}{20} = \frac{1}{4}$.

$\therefore$ 16 men and 8 women together can complete the work in 4 days.

Thus, I and either II or III give the answer.

$\therefore$ Correct answer is (*d*).

18. Clearly, any two of the three will give two equations in x and y, which can be solved simultaneously.

$\therefore$ Correct answer is (*c*).

$\left[\text{For example I and II together give } \left(6x + 5y = \frac{1}{6}, 3x + 4y = \frac{1}{10}\right)\right]$.

19. **I.** (10×6) men can complete the work in 1 day

$\Rightarrow$ 1 man's 1 day's work $= \frac{1}{60}$.

II. $\left(10 \times \frac{24}{7}\right)$ men $+ \left(10 \times \frac{24}{7}\right)$ women can complete the work in 1 day.

$\Rightarrow \left(\frac{240}{7}\right)$ men's 1 day's work $+ \left(\frac{240}{7}\right)$ women's 1 day's work = 1

$\Rightarrow \left(\frac{240}{7} \times \frac{1}{60}\right) + \left(\frac{240}{7}\right)$ women's 1 day's work = 1.

$\Rightarrow \left(\frac{240}{7}\right)$ women's 1 day's work $= \left(1 - \frac{4}{7}\right) = \frac{3}{7}$

$\Rightarrow$ 10 women's 1 day's work $= \left(\frac{3}{7} \times \frac{7}{240} \times 10\right) = \frac{1}{8}$.

So, 10 women can finish the work in 8 days.

III. (10 men's work for 3 days) + (10 women's work for 4 days) = 1

$\Rightarrow$ (10 × 3) men's 1 day's work + (10 × 4) women's 1 day's work = 1

$\Rightarrow$ 30 men's 1 day's work + 40 women's 1 day's work = 1.

Thus, I and III will give us the answer. And, II and III will give us the answer.

$\therefore$ Correct answer is (*a*).

20. **I.** (A + B)'s 1 day's work $= \frac{1}{6}$.

II. (B + C)'s 1 day's work $= \frac{4}{15}$.

III. (A + C)'s 1 day's work $= \frac{3}{10}$.

Adding, we get 2 (A + B + C)'s 1 day's work

$= \left(\frac{1}{6} + \frac{4}{15} + \frac{3}{10}\right) = \frac{22}{30}$

$\Rightarrow$ (A + B + C)'s 1 day's work $= \left(\frac{1}{2} \times \frac{22}{30}\right) = \frac{11}{30}$.

Thus, A, B and C together can finish the work in $\frac{30}{11}$ days.

Hence I, II and III are necessary to answer the question.

$\therefore$ Correct answer is (*e*).

21. Clearly, I only gives the answer.

Similarly, II only gives the answer.

And, III only gives the answer.

$\therefore$ Correct answer is (*d*).