# 09

# TIME AND WORK

The work is directly proportional to time. As one can say if a particular person works for more time then, more work will be done and if he devotes less time, then Less work will be done. Person is directly proportional to time, provided that he/she maintains his/her efficiency during the work.

## CONCEPT OF EFFICIENCY:-

Suppose a person can complete a particular work in 2 days, then we can say that each day he does half of the work or 50% work each day. Thus it is clear that his efficiency is 50% per day.

## EXAMPLES

1. A can do a job in 15 days and B can do the same job in 20 days, in how many days working together they can complete the job?

Sol.
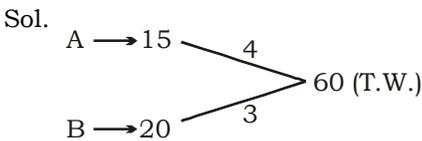


**Note:** To find the total work we take L.C.M of A and B's time. From total work and time we calculate the per day efficiency/ work of A and B.

A's 1 day work = 4

B's 1 day work = 3

\ (A + B)'s 1 day work = (4 + 3) = 7

\ Time taken by both to finish the total work = $\dfrac{60}{7}$ = $8\dfrac{4}{7}$ days
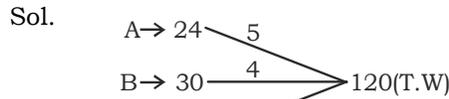
2. A can do a piece of work in 10 days, B can do it in 12 days and C can do the same work in 15 days. In how many days A, B and C can complete the whole work working together?

Sol.
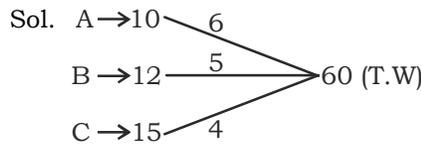


A's 1 day work = 6

B's 1 day work = 5

C's 1 day work = 4

(A+B+C)'s 1 day work = (6+5+4) = 15

\ Time taken by (A+B+C) to finish the total work = $\dfrac{60}{15}$ = 4 days

3. A can do a piece of work in 24 days, while B can do it in 30 days. With the help of C they can finish the whole work in 12 days. How much time is required by C to complete the work, alone?

Sol.



A's 1 day work = 5

B's 1 day work = 4

(A + B + C)'s 1 day work = 10

\ C's 1 day work = 10 – 4 – 5 = 1

\ Time taken by C to finish the total work = $\dfrac{120}{1}$ = 120 days

4. A and B can do a piece of work in 8 days, B and C can do the same work in 12 days and A and C complete it in 8 days. In how many days A, B and C complete the whole work working together?
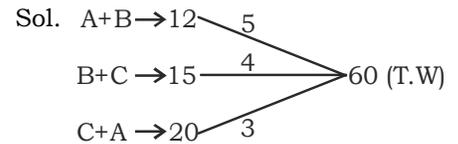
Sol.
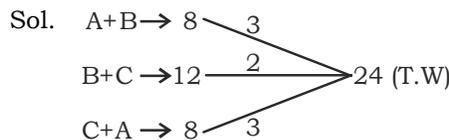


\ 1 day work of [(A+B)+(B+C) + (C+A)] = 3 + 2 + 3 = 8

\ 1 day work of [2(A+B+C)] = 8 and,1 day work of (A+B+C) = $\dfrac{8}{2}$ = 4

Then time taken by (A+B+C) to finish the total work = $\dfrac{24}{4}$ = 6 days

5. A and B can do a piece of work in 12 days. B and C in 15 days, C and A in 20 days. In how many days can C alone do it?
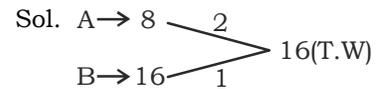
Sol.



\ 1 day work of [(A+B)+(B+C) + (C+A)] = 5 + 4 + 3 = 12

\ 1 day work of [2(A+B+C)] = 12

\ 1 day work of (A+B+C)'s = $\dfrac{12}{2}$ = 6

1 day work of (A+B) = 5

1 day work of C = 6 – 5 = 1

\ Time taken by C to finish the total work = $\dfrac{60}{1}$ = 60 days

6. A takes 8 days to finish a job alone, while B takes 16 days to finish the same job. What is the ratio of their efficiency and who is less efficient?

Sol.



A's 1 day work/efficiency = 2

B's 1 day work/efficiency = 1

Ratio of efficiency of A:B = 2: 1

Hence, A is twice efficient as B.

7. A is thrice efficient as B and A takes 20 days to do a job, then in how many days B can finish the same job?

ency of A : B = 3 : 1

of A and B

$$\boxed{\text{iency}\,\alpha\,\dfrac{1}{\text{time}}}$$

|  | A | B |
|---|---|---|
| Efficiency → | 3 : | 1 |
| Time → | 1 : | 3 |
|  | ↓×20 | ↓×20 |
|  | 20 days | 60 days |
|  | (Given) |  |

So B will take 60 days to finish the same job.

8. A is thrice as efficient as B and therefore able to finish a piece of work in 60 days less than B. Find the time in which A and B can complete the work individually.

Sol. Efficiency of A : B = 3 : 1

Time of A : B = 1 : 3

$$\boxed{\text{Efficiency}\,\alpha\,\dfrac{1}{\text{time}}}$$

|  | A | B |
|---|---|---|
| Efficiency → | 3 : | 1 |
| Time → | 1 : | 3 |

2 units difference

2 units → 60 days

1 unit → $\dfrac{60}{2}$ = 30 days

3 units → 30 × 3 = 90 days

\  Time taken by A to complete the work 1 unit = 30 days

and, Time taken by B to complete the work = 3 units = 90 days

9. A is twice as good as B and therefore able to finish a piece of work in 30 days less than B. In how many days they can complete the whole work, working together?

Sol. Ratio of Efficiency of A:B = 2:1

Ratio of Time of A:B = 1:2

$$\boxed{\text{Efficiency}\,\alpha\,\dfrac{1}{\text{time}}}$$

|  | A | B |
|---|---|---|
| Efficiency → | 2 : | 1 |
| Time → | 1 : | 2 |

1 unit difference

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1 unit → 30 days

2 units → 30 × 2 = 60 days

\ A can complete the whole work = 30 days

B can complete the whole work in = 60 days.

A → 30 ⟍ 2
                    ⟩ 60(T.W)
B → 60 ⟋ 1

(A+B)'s 1 day work = (2+1) = 3

(A+B) can complete the whole

work = $\dfrac{60}{3}$ = 20 days.

10. A can do a work in x days while B can do the same work in y days then in how many days will they complete the whole work, working together?

Sol. A → x ⟍ y
                    ⟩ xy(T.W)
B → y ⟋ x

A's 1 day work = y

B's 1 day work = x

(A+B)'s 1 day work = x + y

(A+B) complete the whole work

= $\left\{\dfrac{xy}{x+y}\right\}$ days.

11. Unnati can do a piece of work in 20 days. Pragati is 25% more efficient than unnati. The number of days taken by Pragati to do the same piece of work is:

Sol. $\boxed{\text{Efficiency}\,a\,\dfrac{1}{\text{time}}}$  $\left[Q\ 25\% = \dfrac{1}{4}\right]$

|  | Unnati | Pragati |
|---|---|---|
| Efficiency → | 4 | 5 |

25% more efficient

|  | Unnati | Pragati |
|---|---|---|
| Time → | 5 | 4 |
|  | ↓×4 | ↓×4 |
|  | 20 days | 16 days |
|  | (Given) |  |

Therefore, number of days taken by Pragati to do the same work = 16 days

12. A can complete a work in 10 days, B in 12 days and C in 15 days. All they began the work together but A had to leave the work after 2 days of the starting and B leave 3 days before the completion of the work. How long did the work last?

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Sol. A → 10 ⟍ 6
       B → 12 — 5 ⟩ 60(T.W)
       C → 15 ⟋ 4

A's 1 day work = 6

B's 1 day work = 5

C's 1 day work = 4

(A+B+C)'s 1day's work = 15

| Initial 2 days | | Last 3 days |
|---|---|---|
| A+B+C | B+C | C |
| 2×15 = 30 work | 18 work | 4×3 = 12 work |

Thus, the remaining work '18'

completed by B + C in = $\dfrac{18}{9}$ = 2 days

So, the total number of required days = 2+2+3 = 7 days

13. A can finish a work in 12 days and B can do it in 15 days. After A had worked for 3 days, B also joined A to finish the remaining work. Remaining work will be finished in how many days?

Sol. A → 12 ⟍ 5
                     ⟩ 60(T.W)
       B → 15 ⟋ 4

A's 1 day work = 5

B's 1 day work = 4

(A+B)'s 1 day work = (5+4) = 9

| Initial 3 days | |
|---|---|
| A | A+B |
| 5×3 = 15 work | 45 work |

Thus, the remaining work

complete by (A+B) = $\dfrac{45}{9}$ = 5 day

Remaining work completed in = 5 days

14. Sonu can do a piece of work in 20 days. He started the work and left after some days, when 25% work was done. After it Abhijeet joined and completed work in 10 days. In how many days Sonu and Abhijeet can complete the whole work.

Sol. Let the total work = 20 units

\  Sonu 1 day work = 1 unit
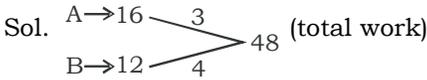
| 5 units | 15 units |
|---|---|
| Sonu | Abhijeet |

25% of total work = 5 units

Abhijeet's 1 day work = $\dfrac{15}{10}$

= 1.5 Units

_eet_)'s 1 day work

5 units

equired (Sonu +
omplete the whole

...... 2.5   8 days

**15.** A alone can complete a work in 16 days and B alone in 12 days. Starting with A, they work on alternate days. The total work will be completed in how many days?

Sol.   A→16 ⟍ 3
                    ⟩ 48 (total work)
        B→12 ⟋ 4

A's 1 day work = 3

B's 1 day work = 4

(Now A come and work for 1 day = 3

B Come and work for 1 day = 4

In 2 days (A+B) work = 4+3 = 7

| Time | Work |
|------|------|
| 2 | 7 |
| ×6 | ×6 |
| 12 days | 42 work |

Now A comes   $\dfrac{+1}{13 \text{ days}}$   $\dfrac{+3}{45}$

Now B comes   $+\dfrac{3}{4}$ days

$13\dfrac{3}{4}$ days   $\dfrac{+3}{48}$ (total work)

Total time required to complete

the work = $13\dfrac{3}{4}$ days

**16.** A does $\dfrac{4}{5}$ 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?
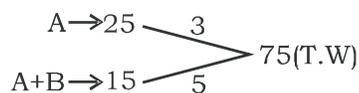
Sol. A does $\dfrac{4}{5}$ of a work in = 20 days

A completes whole work in

= $20 ´ \dfrac{5}{4}$ = 25 days

(A+B) does $\dfrac{1}{5}$ of a work in = 3 days

(A + B) complete whole work in

= 3×5 = 15 days

        A→25 ⟍ 3
                      ⟩ 75(T.W)
      A+B→15 ⟋ 5
A's 1 day work = 3

(A+B)'s 1 day work = 5

B's 1 day work = 5–3 = 2

Time required to complete the whole work by 'B'

= $\dfrac{75}{2}$ = $37\dfrac{1}{2}$ days

**17.** Two workers A and B are engaged to do a piece of work. A working alone would take 8 hours more to complete the work than they working together. If B worked alone, he would take $4\dfrac{1}{2}$ hours more than when work together. The time required to finish the work together is?

Sol.
              A (8 hours more)
              ↗
    ( A + B )
              ↘
              B $\left(4\dfrac{1}{2}\text{ hours more}\right)$
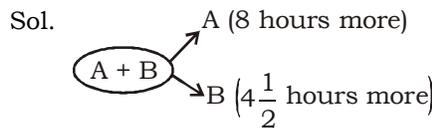
In this type of question we use this formula to calculate time required to finish the work together

(A+B) time =

$$\sqrt{A\left(\text{time more}\right) \times B\left(\text{time more}\right)}$$

(A+B) = $\sqrt{8 ´ \dfrac{9}{2}}$

(A+B) = $\sqrt{36}$

(A+B) = 6 hours

**18.** 8 men can do a piece of work in 5 days. How many men are needed to complete the work in 10 days?

(a) 8 men          (b) 4 men
(c) 2 men          (d) 3 men

Sol. (b) According to the question,

$m_1 \times d_1 = m_2 \times d_2 = 8 \times 5 = 10 \times m_2$

= $m_2$ = 4 men

**19.** 20 men can prepare 40 toys in 24 days working 18 hours a day. Then in how many days can 36 men prepare 48 toys working 16 hours a day?

(a) 16 days        (b) 12 days
(c) 21 days        (d) 18 days

Sol. (d) According to the question,

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

$$\dfrac{20 ´ 24 ´ 18}{40} = \dfrac{36 ´ 16 ´ d_2}{48}$$

$$\dfrac{20 ´ 24 ´ 18 ´ 48}{40 ´ 36 ´ 16} = 18 \text{ days}$$

**20.** A and B can finish a piece of work in 30 days, B and C in 40 days while C and A in 60 days. How long will they take to finish it together?
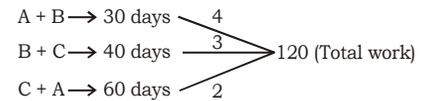
(a) $26\dfrac{2}{3}$ days

(b) $16\dfrac{2}{3}$ days

(c) 25 days

(d) 24 days

Sol. (a) According to the question,

    A + B → 30 days ⟍ 4
    B + C → 40 days — 3 ⟩ 120 (Total work)
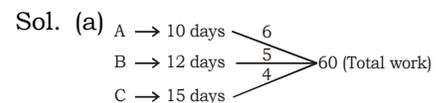    C + A → 60 days ⟋ 2

Total efficiency (A + B + C) = $\dfrac{9}{2}$

A + B + C together will Complete the whole work

= $\dfrac{120 ´ 2}{9}$ = $26\dfrac{2}{3}$ days

**21.** A, B and C can do a piece of work in 10, 12 and 15 days respectively, they start working together but C leaves after working for 3 days and B, 4 days before the completion of the work. In how many days the work was finished?

(a) $6\dfrac{2}{11}$ days     (b) 7 days

(c) $7\dfrac{2}{15}$ days     (d) $6\dfrac{2}{5}$ days

Sol. (a)  A → 10 days ⟍ 6
          B → 12 days — 5 ⟩ 60 (Total work)
          C → 15 days ⟋ 4

Work done by C in 3 days

= 3 × 4 = 12

remaining work = 60 – 12 = 48

work done by B in 4 days = 4 × 5
                          = 20

If we add the work B = 48 + 20
                      = 68 days

This 68 unit of work is done by A and B.

Total days to complete the work

...ays

...ing 4 hours a day ... of work in 10 days. ...er of days in which ...ng 8 hrs a day can ...vork. Assume that 2 men of the first group do as much work in 2 hour as 4 men of the second group do in 1 hour.

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

(c) $5\frac{3}{6}$ days    (d) $3\frac{1}{6}$ days

Sol. (b) Ist Group      IInd Group

     $2 \times 2$    :    $4 \times 1$

       1     :     1

So, the Efficiency of men of both the group is same.

According to the question

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

$$\frac{30 \times 4 \times 10}{1} = \frac{45 \times 8 \times d_2}{2}$$

$$d_2 = \frac{30 \times 2 \times 4 \times 10}{45 \times 8}$$

$$d_2 = 6\frac{2}{3} \text{ days}$$

23. A, B and C together can do a work in 4 days. A alone can do the work in 12 days and B alone can do the same work in 18 days. Find in what time C alone can do that work?

(a) 8 days      (b) 27 days

(c) 9 days      (d) 18 days

Sol. (c)   A + B + C → 4 days    9

     A → 12 days   3   36 (Total work)

              2

     B → 18 days

C's efficiency = 4

C completes the whole work = $\frac{36}{4}$

= 9 days

24. A, B and C together can do a work in 12 days. A alone can do the work in 36 days and B alone can do the same work in 54 days. Find in what time C alone can do

that work?

(a) 9 days      (b) 18 days

(c) 24 days      (d) 27 days

Sol. (d) A + B + C → 12 days   9

     A → 36 days   3   108

             2   (Total work)

     B → 54 days

C's efficiency = 4

C Completes the whole work in

= $\frac{108}{4}$ = 27 days

25. A can complete a work in 35 days and B can do the same work in 28 days. If A after doing 10 days, leaves the work, find in how many days B will do the remaining work?

(a) 25 days      (b) 20 days

(c) 27 days      (d) 24 days

Sol. (b)   A → 35 days   4

                  140

                  (Total work)

     B → 28 days   5

work done by A = $4 \times 10 = 40$

Remaining work = $(140 - 40) = 100$

therefore, work will be done by B

in = $\frac{100}{5}$ = 20 days

# Exercise

1. A can do a piece of work in 7 days and B can do the same work in 7 days. In how many days working together will they do the same work?
   (a) 7
   (b) 14
   (c) $\frac{7}{4}$
   (d) $\frac{7}{2}$

2. X can do a piece of work in 30 days and Y can do in 20 days. In how many days they work together to finish the same work?
   (a) 15
   (b) 10
   (c) 12
   (d) 8

3. P can do the work in 15 days and Q can do the same work in 30 days. In how many days they work together to finish the same work?
   (a) 5
   (b) 10
   (c) $\frac{7}{2}$
   (d) 20

4. A can do a piece of work in 23 days and B in 29 days. In how many days they work together to finish the work?
   (a) $12\frac{1}{13}$
   (b) $10\frac{17}{29}$
   (c) $10\frac{2}{23}$
   (d) $12\frac{43}{52}$

5. Ram can finish a work in 30 days and Vijay in 60 days, In how many days they work together will do the same work?
   (a) 20
   (b) 10
   (c) 15
   (d) 25

6. Aman can do a work in 8 days and Shyam in 10 days. In how many days they, work together will do the double work?
   (a) 5
   (b) $\frac{40}{9}$
   (c) 4
   (d) $\frac{80}{9}$

7. A can do the work in 50 days, B in 30 days. How many days they work together to finish the whole work?
   (a) 6
   (b) $18\frac{3}{4}$
   (c) 12
   (d) 25

8. X can do a work in 18 days and Y in 36 days. How many days they work together to complete the Two-Third work?
   (a) 4
   (b) 12
   (c) 8
   (d) 9

9. Ashish can do a work in 25 days and Rohit in 75 days. How many days they work together to complete the Two-fifth work?
   (a) 20
   (b) $\frac{15}{2}$
   (c) $\frac{75}{4}$
   (d) $\frac{15}{4}$

10. A can do the work in 60 days and B in 90 days. How many days they work together to complete the four times the total work?
    (a) 36
    (b) 72
    (c) 144
    (d) 18

11. A, B and C can complete a piece of work in 12, 15 and 20 days respectively. How many days they work together to complete the same work?
    (a) 10 days
    (b) 6 days
    (c) 5 days
    (d) 9 days

12. P, Q, R and S can complete a piece of work in 20, 30, 15, 45 hours respectively. How many hours they work together to complete the work?
    (a) $10\frac{2}{7}$ hours
    (b) 25 hours
    (c) $\frac{180}{29}$ hours
    (d) $\frac{180}{31}$ hours

13. Ram, Shyam and Ankit can complete a piece of work in 7 days, 9 days and 19 days respectively. In how many days they work together to complete the work?
    (a) $4\frac{91}{367}$
    (b) $8\frac{96}{367}$
    (c) $3\frac{96}{367}$
    (d) $3\frac{95}{367}$

14. Shakshi, Priyanka and Pragati working separately can do a piece of work in 9, 12 and 36 hours respectively. If they work together they will complete the 60% of the work in how many days?
    (a) $\frac{21}{10}$
    (b) $\frac{27}{10}$
    (c) $\frac{11}{10}$
    (d) $\frac{37}{10}$

15. Naveen, Ashish and Mohit can do a certain Job in 17, 19 and 21 days respectively. If they work together they will complete the work in?
    (a) $10\frac{777}{1079}$ days
    (b) $6\frac{304}{1079}$ days
    (c) $6\frac{16}{1079}$ days
    (d) $5\frac{362}{1079}$ days

16. Rakesh, Ashok and Raju can do a piece of work in 30, 45 and 60 days respectively. Working together, In how many days they will complete the Two-fifth work?
    (a) 15
    (b) $\frac{180}{31}$
    (c) $\frac{72}{13}$
    (d) $\frac{90}{31}$

17. A tyre has two Punctures. The first Puncture alone would have made the tyre flat in 9 minutes and second alone would have done it in 12 minutes. If air leaks out at a constant rate, how long it takes both the Punctures together to make it flat?
    (a) $5\frac{6}{7}$ minutes
    (b) $5\frac{2}{7}$ minutes

(c) $5\dfrac{1}{7}$ minutes (d) 6 minutes

18. Ankit can do $\dfrac{1}{3}$ of a piece of work in 5 days, Vinod do $\dfrac{3}{5}$ of the same work in 15 days and Chetan can do $\dfrac{6}{7}$ of that work in 18 days. In how many days three of them working together will complete the work?

(a) $\dfrac{131}{21}$      (b) $\dfrac{129}{28}$

(c) $\dfrac{175}{27}$      (d) $\dfrac{128}{27}$

19. A man can do a piece of work in 5 days, but with the help of his son, he can do it in 3 days. In what time can the son do it alone?

(a) $6\dfrac{1}{2}$ days      (b) 7

(c) $7\dfrac{1}{2}$ days      (d) 8 days

20. A can lay railway track between two given stations in 16 days, B can do 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?

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

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

21. A takes twice as much time as B or thrice as much time C to finish a piece of work Working together, they can finish the work in 2 days. B can do the work alone in:
(a) 4 days      (b) 6 days
(c) 8 days      (d) 12 days

22. X can do $\dfrac{1}{4}$ of the work in 10 days, Y can do 40% of the work in 40 days and Z can do $\dfrac{1}{3}$ of the work in 13 days. Who will complete the work first?
(a) X      (b) Y
(c) Z      (d) X and Z both

23. 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?
(a) 14, 17, 20    (b) 15, 17, 22
(c) 15, 18, 21    (d) 16, 18, 22

24. Elan and Ronald 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?
(a) 7 hours 30 minutes
(b) 8 hours
(c) 8 hours 15 minutes
(d) 8 hours 25 minutes

25. 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 $4\dfrac{1}{2}$ hours more to complete the job than they both working together. What time would they take to do the work together?
(a) 4 hours      (b) 5 hours
(c) 6 hours      (d) 7 hours

26. 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) $5\dfrac{5}{11}$      (b) $5\dfrac{6}{11}$

(c) $6\dfrac{5}{11}$      (d) $6\dfrac{6}{11}$

27. A and B can do work in 12 day, B and C in 15 days, C and A in 20 days. If A and B work for 5 days and remaining work is done by B and C. In how many days the work will complete.

(a) 15 days      (b) $13\dfrac{3}{4}$

(c) 10 days      (d) $15\dfrac{2}{3}$ days

28. 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:
(a) 4 days      (b) 6 days
(c) 8 days      (d) 12 days

29. A and B can do a piece of work in 72 days, B and C can do it in 120 days; A and C can do it in 90 days. In what time can A alone do it?
(a) 80 days      (b) 100 days
(c) 120 days      (d) 150 days

30. 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

31. A can do a certain work in the same time in which B and C together can do it. If A and B together could do it in 10 days and C alone in 50 days, then B alone could do it in;
(a) 15 days      (b) 20 days
(c) 25 days      (d) 30 days

32. 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

33. A is thrice as good a workman as B and therefore is able to finish a job in 60 days less than B. Working together, they can do it in?

(a) 20 days      (b) $22\dfrac{1}{2}$ days

(c) 25 days      (d) 30 days

**Time and Work**

34. A and B can do a job together in 7 days. A is $2\frac{1}{3}$ times as efficient as B. The same job can be done by A alone in;

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

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

35. A does half as much work as B in three-fourth of the time. If together they take 18 days to complete the work, how much time shall B take to do it?
(a) 30 days
(b) 35 days
(c) 40 days
(d) None of these

36. Ashish is more 50% efficient than Manoj. Chetan does half of the work done by Ashish and Manoj together. If Chetan alone does the work in 40 days, then Ashish, Manoj and Chetan together can do the work?

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

(c) 20              (d) 30

37. 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 acutally did, the work would have been completed in 3 days. A alone could complete the work in?
(a) 15/4          (b) 4
(c) 18/4          (d) 25/4

38. 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) $\frac{8}{15}$

39. A can finish a work in 18 days and B can do the same work in 15 days. B worked for 10 days and left the job. In how many days A alone can finish the remaining work?

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

(c) 6              (d) 8

40. A and B can complete a work in 15 days and 10 days respectively. They started doing the work together but after 2 days B had to leave and A alone completed the remaining work. The whole work was completed in;
(a) 8 days        (b) 10 days
(c) 12 days       (d) 15 days

41. A can finish a work in 24 days, B in 9 days and C in 12 days. B and C start the work but they forced to leave after 3 days. The remaining work was done by A in?
(a) 5 days        (b) 6 days

(c) 10 days       (d) $10\frac{1}{2}$ days

42. 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 p.m. while machine P is closed at 11 am and the remaining two machine complete the work. Approximately at what time will the work be finished?
(a) 11:30 a.m    (b) 12 noon
(c) 12:30 am     (d) 1 p.m.

43. 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 after 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

44. X and Y can do 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 he work least?
(a) 6 days        (b) 10 days
(c) 15 days       (d) 20 days

45. 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 day A alone can finish the job?
(a) 40            (b) 50
(c) 54            (d) 60

46. 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

47. 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

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

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

(c) $37\frac{1}{2}$ days   (d) 56 days

49. A and B together can do a piece of work in 30 days. A having worked for 16 days, B finished 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

50. 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 finished it in 13 days. In how many days C alone will do the work?
(a) 16            (b) 24
(c) 36            (d) 48

1. (d) A → 7 ⟍ 1
   B → 7 ⟋ 1 ⟶ 7 (Total work)

   **Note:-** To find total work we take L.C.M of A and B time. From total work and time we calculate the per day efficiency/work of A and B.

   A's 1 day work = 1

   B's 1 day work = 1

   (A + B)'s day work = (1 + 1) = 2

   Time taken by both to finish the total work

   $= \dfrac{\text{Total work}}{\text{Total efficiency}} = \dfrac{7}{2}$ days

2. (c)

   X → 30 ⟍ 2
   Y → 20 ⟋ 3 ⟶ 60 (Total work)

   To find the total work we take L.C.M of X and Y time. From total work and time we calculate the per day efficiency/ work of X and Y.

   X's 1 day work = 2

   Y's 1 day work = 3

   (x and Y)'s 1 day work = (2 + 3) = 5

   Together to finish the total work

   $= \dfrac{60}{5} = 12$ days

3. (b)

   P → 15 ⟍ 2
   Q → 30 ⟋ 1 ⟶ 30 (Total work)

   By calculating L.C.M of P's and Q's Time, we obtain total work. Then we calcuate per day efficiency/work of P and Q.

   P's one day work = 2

   Q's one day work = 1

   (P and Q)'s one day work = 3

   P and Q together complete the work $= \dfrac{30}{3} = 10$ days

4. (d)

   A → 23 ⟍ 29
   B → 29 ⟋ 23 ⟶ 667 (Total work)

   Total work (L.C.M) of 23, 29) = 667

   A's one day work = 29

   B's one day work = 23

   A and B together complete the work $= \dfrac{\text{Total work}}{\text{Total efficiency}}$

   $= \dfrac{667}{29 + 23} = \dfrac{667}{52} = 12\dfrac{43}{52}$ days

5. (a)

   Ram → 30 ⟍ 2
   Vijay → 60 ⟋ 1 ⟶ 60 (Total work)

   Total work = 60

   Total Efficiency of Ram and Vijay in one day = 2 + 1 = 3

   Ram and Shyam together complete the work

   $= \dfrac{\text{Total work}}{\text{Total efficiency}} = \dfrac{60}{3} = 20$ days

6. (d)

   Aman → 8 ⟍ 5
   Shyam → 10 ⟋ 4 ⟶ 40 (Total work)

   Total Efficiency of Aman and Shyam in one day = 5 + 4 = 9

   Aman and Shyam together complete the work (40 units)

   $= \dfrac{\text{Total work}}{\text{Total efficiency}} = \dfrac{40}{9}$ days

   Aman and Shyam together to complete the double (40×2)

   work $= 2 \times \dfrac{40}{9} = \dfrac{80}{9}$ days

7. (b)

   A → 50 ⟍ 3
   B → 30 ⟋ 5 ⟶ 150 (Total work)

   Total efficiency of A and B = 5 + 3 = 8

   A and B together complete the work $= \dfrac{150}{8} = 18\dfrac{3}{4}$ days

8. (c)

   X → 18 ⟍ 2
   Y → 36 ⟋ 1 ⟶ 36 (Total work)

   Total efficiency of X and Y = 2 + 1 = 3

   X and Y together to complete the Two-Third work

   $= \dfrac{2}{3} \cdot \left(\dfrac{36}{3}\right) = 8$ days

9. (b)

   Ashish → 25 ⟍ 3
   Rohit → 75 ⟋ 1 ⟶ 75 (Total work)

   Total efficiency of Ashish and Rohit = 3 + 1 = 4

   Ashish and Rohit together complete the Two-Fifth work

   $= \dfrac{2}{5} \cdot \left(\dfrac{75}{4}\right) = \dfrac{15}{2}$ days

10. (c)

    A → 60 ⟍ 3
    B → 90 ⟋ 2 ⟶ 180 (Total work)

    Total efficiency of A and B = 3 + 2 = 5

    A and B together to complete the Four-time work $= \dfrac{180}{5} \times 4 = 144$ days.

11. (c)

    A → 12 ⟍ 5
    B → 15 — 4 ⟶ 60
    C → 20 ⟋ 3

    Total efficiency = 5 + 4 + 3 = 12

    A, B and C together to complete the work $= \dfrac{60}{12} = 5$ days

12. (d)

    P → 20 ⟍ 9
    Q → 30 — 6
    R → 15 — 12 ⟶ 180
    S → 45 ⟋ 4

    Total efficiency of P, Q, R and S = 9 + 6 + 12 + 4 = 31

    P, Q, R and S together complete the work $= \dfrac{180}{31}$ hours

13. (c)

    Ram → 7 ⟍ 171
    Shyam → 9 — 133 ⟶ 1197
    Ankit → 19 ⟋ 63

    Total efficiency of Ram, Shyam and Ankit = 171 + 133 + 63 = 367

    Ram, Shyam and Ankit together complete the work

    $= \dfrac{1197}{367} = 3\dfrac{96}{367}$ days

14. (b)

    Shakshi → 9 ⟍ 4
    Priyanka → 12 — 3 ⟶ 36
    Pragati → 36 ⟋ 1

Total efficiency of Shakshi, Priyanka and Pragati
= 4 + 3 + 1 = 8

Shakshi, Priyanka and Pragati together complete the 60% of the

work = 60% of $\left(\dfrac{36}{8}\right)$

$= \dfrac{60}{100} \times \dfrac{36}{8} = \dfrac{27}{10}$ days

15. (b) Naveen → 17, Ashish → 19, Mohit → 21; 399, 357, 323 → 6783

Total efficiency of Naveen, Ashish and Mohit = 399 + 357 + 323
= 1079

Naveen, Ashish and Mohit together complete the work

$= \dfrac{6783}{1079} = 6\dfrac{304}{1079}$ days

16. (c) Rakesh → 30, Ashok → 45, Raju → 60; 6, 4, 3 → 180

Total efficiency of Rakesh, Ashok and Raju = 6 + 4 + 3 = 13

Rakesh, Ashok and Raju together to complete the Two-fifth work

$= \dfrac{2}{5} \times \dfrac{180}{13} = \dfrac{72}{13}$ days

17. (c) Ist → 9, IInd → 12; 4, 3 → 36

Total efficiency of Ist and IInd
= 4 + 3 = 7

Ist and IInd together to make it

flat $= \dfrac{36}{7} = 5\dfrac{1}{7}$ minutes

18. (c) Ankit $\dfrac{1}{3}$ unit work = 5 days

Ankit 1unit work
= 5 × 3 = 15 days

Vinod $\dfrac{3}{5}$ unit work = 15 days

Vinod 1unit work

$= 15 \times \dfrac{5}{3} = 25$ days

Chetan $\dfrac{6}{7}$ unit work = 18 days

Chetan 1unit work

$= 18 \times \dfrac{7}{6} = 21$ days

Ankit → 15, Vinod → 25, Chetan → 21; 35, 21, 25 → 525

Total Efficiency of one day
= 35 + 21 + 25 = 81

All three together complete the

work $= \dfrac{525}{81} = \dfrac{175}{27}$ days

19. (c) man → 5, man+son → 3; 3, 5 → 15

Efficiency of son in one day
= 5 – 3 = 2

son complete the work in

$= \dfrac{15}{2}$ days $= 7\dfrac{1}{2}$ days

20. (c) A → 16, B → 12, A + B + C → 4; 3, 4, 12 → 48

Efficiency of C in one day
= 12 – 4 – 3 = 5

C completes the work in

$= \dfrac{48}{5}$ days $= 9\dfrac{3}{5}$ days

21. (b)

| | A | B | C |
|---|---|---|---|
| Time Ratio → | 6 | 3 | 2 |
| Efficiency Ratio → | 1 | 2 | 3 |

Total Efficiency of A, B and C in one day = 1 + 2 + 3 = 6

Total work = 6 × 2 = 12 units

B alone can finish the work

$= \dfrac{12}{2} = 6$ days

22. (c) X $\dfrac{1}{4}$ unit work = 10 days

X 1unit work = 10 × 4 = 40 days

Y 40% work = 40 days

Y 100% work $= 40 \times \dfrac{100}{40} = 100$ days

Z $\dfrac{1}{3}$ unit work = 13 days

Z 1 unit work = 13 × 3 = 39 days

Z will be the first to complete the work.

23. (c) P, Q, and R typist type 216 pages in 4 hours

P, Q ana R typist type in 1 hour

$= \dfrac{216}{4} = 54$ pages

Let the number of pages typed in one hour by P, Q and R = X, Y and Z respectively.

X + Y + Z = 54          .......(i)

Z – Y = Y – X

2Y = X + Z          ......(ii)

5Z = 7X

Now, from equation (i)

$\dfrac{5}{7}$ Z + $\dfrac{6}{7}$ Z + Z = 54

$\dfrac{18}{7}$ Z = 54

Z = 21 pages

Y $= \dfrac{6}{7} \times 21 = 18$ pages

X $= \dfrac{5}{7} \times 21 = 15$ pages

24. (c) Ronald working for 1 hour

$= \dfrac{32}{6} = \dfrac{16}{3}$ pages

Elan working for 1 hour

$= \dfrac{40}{5} = 8$ pages

both together type for 1 hour

$= \dfrac{16}{3} + 8 = \dfrac{40}{3}$ pages

Both together type 110 pages

$= \dfrac{110 \times 3}{40} = \dfrac{33}{4}$ hours

$= 8\dfrac{1}{4}$ hours,

8 hours 15 minutes

25. (c) A and B together can complete

the work $= \sqrt{8 \times \dfrac{9}{2}} = \sqrt{36} = 6$ hours

26. (a) P → 12 × 8 = 96 hours, Q → 8 × 10 = 80 hours; 5, 6 → 480

Total efficiency of one hour
= 5 + 6 = 11

Both together complete the work

$= \dfrac{480}{11}$ hours

Both together complete the work in 8 hours a day

$= \dfrac{480}{11}, \dfrac{1}{8} = \dfrac{60}{11} = 5\dfrac{5}{11}$ days

**27. (b)**

A + B → 12 ⟍ 5
B + C → 15 — 4 ⟩ 60
C + A → 20 ⟋ 3

Efficiency of A, B and C in one day $= \dfrac{5+4+3}{2} = 6$

(A + B) work for 5 days = 5 × 5 = 25

Remaining work will be completed $= \dfrac{35}{4}$

Total days = 5 + $\dfrac{35}{4}$ = $\dfrac{55}{4}$

$= 13\dfrac{3}{4}$ days

**28. (c)**

A + B → 8 ⟍ 3
B + C → 12 — 2 ⟩ 24
A + B + C → 6 ⟋ 4

(A + C)'s efficiency of one's day
= (4 × 2) – 3 – 2 = 3

(A + C)'s complete the work

$= \dfrac{24}{3} = 8$ days

**29. (c)**

A + B → 72 ⟍ 5
B + C → 120 — 3 ⟩ 360
A + C → 90 ⟋ 4

Total efficiency of one days

$= \dfrac{5+3+4}{2} = 6$

A's one day efficiency = 6 – 3 = 3
A complete the work in

$= \dfrac{360}{3} = 120$ days

**30. (a)**

A + B → 5 ⟍ 28
B + C → 7 — 20 ⟩ 140
A + C → 4 ⟋ 35

---

A, B and C one day efficiency

$= \dfrac{28+20+35}{2} = \dfrac{83}{2}$

A's one day efficiency

$= \dfrac{83}{2} - 20 = \dfrac{43}{2} = 21.5$

B's one day efficiency

$= \dfrac{83}{2} - 35 = \dfrac{13}{2} = 6.5$

C's one day efficiency

$= \dfrac{83}{2} - 28 = \dfrac{27}{2} = 13.5$

A's one's days efficiency is maximum, So A will complete the work in Least time among them.

$A = 140 \times \dfrac{2}{43} = \dfrac{280}{43} = 6\dfrac{22}{43}$ days

**31. (c)**

A + B → 10 ⟍ 5
C → 50 ⟋ 1 ⟩ 50

Then efficiency of A = B + C also equal
B's = X
5 – X = X + 1
X = 2
B completed the work

$= \dfrac{50}{2} = 25$ days

**32. (a)**

| | A | B |
|---|---|---|
| Efficiency Ratio → | 2 | 1 |
| → | 1 | 2 |

↓ ↓ ×6
12 (given)

Total work = 12 ×1 units

work done by (A + B) $= \dfrac{12}{3} = 4$ days

**Note:** Efficiency Ratio is inversely proportionate to the time Ratio.

$\left[ Ea \dfrac{1}{T} \right]$

**33. (b)**

| | A | B |
|---|---|---|
| Efficiency Ratio → | 3 | 1 |
| Time Ratio → | 1 | 3 |

[Time is Inversely proportion to efficiency}

Difference of Time (3 – 1) ® 60

---

2 ® 60
1 ® 30 (A's days)
3 ® 90 (B's days)

Together to complete the work

$= \dfrac{90}{3+1} = \dfrac{90}{4} = 22\dfrac{1}{2}$ days

**34. (b)**

| | A | B |
|---|---|---|
| Efficiency Ratio → | 7 | 4 |

Total work = (7 + 4) × 7 = 77
A's alone to finish the work

$= \dfrac{77}{7} = 11$ days

**35. (a)**

| | A | B |
|---|---|---|
| Time Ratio → | 6 | 4 |
| | 3 | 2 |
| Efficiency Ratio → | 2 | 3 |

Total work = (2 + 3) × 18 = 90
B alone finish the work

$= \dfrac{90}{3} = 30$ days

**36. (a)**

| | Ashish | Manoj |
|---|---|---|
| efficiency Ratio → | 3 | 2 |

Chetan work for one day

$= \dfrac{3+2}{2} = \dfrac{5}{2}$

| Ashish | Manoj | Chetan |
|---|---|---|
| 3 | 2 | $\dfrac{5}{2}$ |

Efficiency Ratio ® 6 : 4 : 5

efficiency $\propto \dfrac{1}{time}$

Time Ratio ® 10 : 15 : 12

–
40

Q   12 Units = 40

\   15 Units = $\dfrac{40}{12} \times 15 = 50$

10 Units = $\dfrac{40}{12} \times 10 = \dfrac{100}{3}$

**Time and Work**

Ashish → $\frac{100}{3}$ ⟍6

Manoj → 50 —4⟍ ⟩200

Chetan → 40 ⟋5
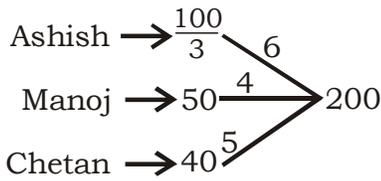
All together complete the work

$= \frac{200}{15} = \frac{40}{3} = 13\frac{1}{3}$ days

37. (d)

A + B → 5 days ⟍3

⟩15 (Total Work)

2A + $\frac{B}{3}$ → 3 days ⟋5
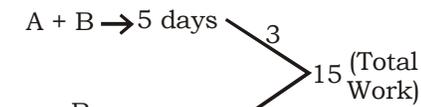
A + B = 3 Units ···· (i)

$2A + \frac{B}{3} = 5$

6A + B = 15 Units ···(ii)

Subtracting (i) from (ii)

5A = 12 units

A = $\frac{12}{5}$ units

efficiency of A = $\frac{12}{5}$ units

Time taken by A to complete the work = $\frac{15}{12/5}$ Þ $\frac{75}{12} = \frac{25}{4}$ days

38. (d) A → 15 ⟍4

⟩60 (Total Work)

B → 20 ⟋3
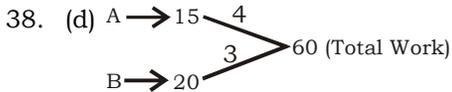
Total efficiency of A and B in one day = 4 + 3 = 7

Both together work for 4 days = 7 × 4 = 28

Remaining work = 60 – 28 = 32

Fraction of the remaining work

$= \frac{32}{60} = \frac{8}{15}$

39. (c) A → 18 ⟍5

⟩90

B → 15 ⟋6
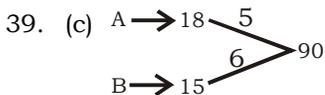
B's 10 day work = 10 × 6 = 60

Remaining work = 90 – 60 = 30

A completed the remaining work

$= \frac{30}{5} = 6$ days

40. (c) A → 15 ⟍2

⟋3 ⟩30

B → 10
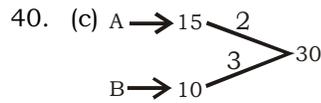
Both together 2 days work

= 2 × (2 + 3) = 10
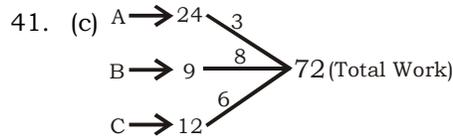
Remaining work = 30 – 10 = 20

A alone completed the remaining

work = $\frac{20}{2} = 10$ days

Whole work is completed

= 10 + 2 = 12 days

41. (c) A → 24 ⟍3

B → 9 —8⟍ ⟩72 (Total Work)

C → 12 ⟋6
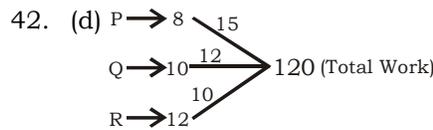
B and C three days work

= 3 × (8 + 6) = 42

Remaining work = 72 – 42 = 30

Remaining work done by A

$= \frac{30}{3} = 10$ days

42. (d) P → 8 ⟍15

Q → 10 —12⟍ ⟩120 (Total Work)

R → 12 ⟋10

All together work for 2 hours

= (15 + 12 + 10) × 2 = 74

Remaining work = 120 – 74 = 46

Remaining work will be finished

by Q and R = $\frac{46}{12+10} = \frac{46}{22}$
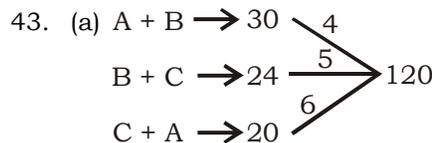
= 2 hours 5 minutes (approximate)

11 : 00 a.m + 2 hours = 1 p.m

One lakh Books will be print at 1 p.m

43. (a) A + B → 30 ⟍4

B + C → 24 —5⟍ ⟩120

C + A → 20 ⟋6

Efficiency of one day A, B and C

$= \frac{4+5+6}{2} = \frac{15}{2}$

All together work for 10 days

$= \frac{15}{2} \times 10 = 75$
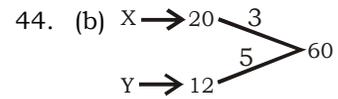
Remaining work = 120 – 75 = 45

A's one day efficiency

$= \frac{15}{2} - 5 = \frac{5}{2}$

A take to finish the work

$= 45 \times \frac{2}{5} = 18$ days

44. (b) X → 20 ⟍3

⟩60

Y → 12 ⟋5

X's 4 days work = 4 × 3 = 12

Remaining work = 60 – 12 = 48

Both together to finish the work

$= \frac{48}{3+5} = \frac{48}{8} = 6$ days

Total days = 4 + 6 = 10 days

45. (d) Remaining work = 30 – 20
= 10 days

A finished the remaining work
= 20 days

A finished the whole work
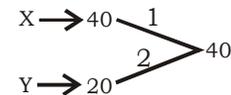
$= 20 \times \frac{30}{10} = 60$ days

46. (a) Remaining work
= 40 – 8 = 32 days

Y finished the remaining work
= 16 days

Y finished the whole work

$= 16 \times \frac{40}{32} = 20$ days

X → 40 ⟍1

⟩40

Y → 20 ⟋2

Both together to finish the remaining work

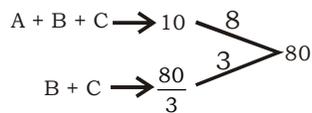$= \frac{40}{2+1} = \frac{40}{3} = 13\frac{1}{3}$ days

47. (c) Remaining work = 10 – 4
= 6 days

B and C together to finish the remaining work = 10 – 4 + 10
= 16 days

B and C together to finish the

whole work

$$= 16' \frac{10}{6} = \frac{80}{3} \text{ days}$$

A + B + C → 10 ⟍ 8
B + C → $\frac{80}{3}$ ⟋ 3 ⟍ 80

A's one day efficiency = 8 – 3 = 5

A alone can do the work in = $\frac{80}{5}$

= 16 days
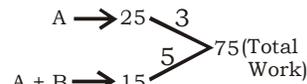
48. (c) A's $\frac{4}{5}$ work = 20 days

A's one work = $20 \times \frac{5}{4}$ = 25 days

Together working for $\left(1 - \frac{4}{5} = \frac{1}{5}\right)$

work = 3 days
Together working for whole work
= 3 × 5 = 15 days

A → 25 ⟍ 3
A + B → 15 ⟋ 5 ⟍ 75 (Total Work)

B's one day efficiency = 5 – 3 = 2
B's whole work to be completed

$$= \frac{75}{2} = 37\frac{1}{2} \text{ days}$$

49. (c) (A+B) completed the work in 30 days
A worked = 16 days
Remaining work will be completed by B in 44 days
A.T.Q
(A + B) × 30 = A × 16 + B × 44
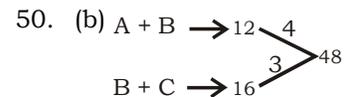30A + 30 B = 16A + 44B
14 A = 14B

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

Now,
A+B worked 30 days his efficiency ratio is 1 : 1
So

total work = 30 × (1+1) = 60
\ B finished the whole work

$$= \frac{60}{1} = 60 \text{ days}$$

50. (b) A + B → 12 ⟍ 4
B + C → 16 ⟋ 3 ⟍ 48

According to the question,
5 (A+B)+2(B+C)+11C = 48
A and B together 5 day's work
= 5 × 4 = 20
B and C together 2 days work
= 2 × 3 = 6
C's one day work

$$= \frac{48 - 20 - 6}{13 - 2} = \frac{22}{11} = 2$$

C's whole work completed

$$= \frac{48}{2} = 24 \text{ days}$$

**Time and Work**