CH 1 TIME AND WORK

ANSWERS AND EXPLANATIONS

EXERCISE 1

1. (e) ∵ 15 men can do 1 work in 3 days.

∴ 1 man can do 1 work in 3 × 15 days.

∴ 10 men can do the same work in

$$\frac{3\times15}{10}=\frac{9}{2}=4\frac{1}{2}\text{ days}$$

2. (c) ∵ 16 men can complete 1 work in 8 days.

∴ 1 man can complete 1 work in 8 × 16

∴ 12 men can complete the same work in

$$\frac{16\times8}{12}=\frac{32}{3}=10\frac{2}{3}\text{ days.}$$

3. (b) ∵ 17 men can complete 1 work in 12 days

∴ 1 man can complete the work in 12 × 17 days

∴ 6 men can complete the work in

$$\frac{12\times17}{6}=34\text{ days}$$

4. (c) Number of days $= \frac{12\times8}{12-8}$

= 24 days

5 (e) Required number of days

$$=\frac{6\times12}{6+12}$$

= 4 days

6. (a) 112 men can complete the whole work in

8 × 3 = 24 days

∴ Required no. of days

$$=\frac{12\times24}{16}=18$$

7. (c) Part processed by computer A in 1 minute $=\frac{1}{3}$

Part processed by computer B in 1 minute $=\frac{1}{5}$

Part processed by computer C in 1 minute

$$=\frac{42}{60}-\frac{1}{3}-\frac{1}{5}$$

$$=\frac{42-20-12}{60}=\frac{10}{60}=\frac{1}{6}$$

Hence, computer C will process 1 input 6 minutes.

8 (b) Required no. of binders

$$=\frac{800\times21\times15}{1400\times20}=9$$

9. (d) Required no. of days

$$=\frac{9800}{350}=28\text{ days}$$

10. (a) In an hour, George and Sonia together can copy $\frac{1}{6}+\frac{1}{8}=\frac{7}{24}$ of a 50-page manuscript.

i.e. In an hour they together can copy $\frac{7}{48}$ of the 100-page manuscript.

i.e. They together can copy a 100-page manuscript in $\frac{48}{7}$ hours, i.e. $6\frac{6}{7}$ hours.

11. (b) A's 1 day's work

$= \frac{1}{10}$ and B's 1 day's work $= \frac{1}{15}$

∴ (A + B)'s 1 day's work

$$=\left(\frac{1}{10}+\frac{1}{15}\right)=\frac{1}{6}.$$

So, both together will finish the work in 6 days.

12. (a) (A + B)'s 1 day's work = $\frac{1}{12}$th part of whole work.

B's 1 day's work = $\frac{1}{28}$th part of whole work.

$\therefore$ A's 1 day's work

= $\frac{1}{12}-\frac{1}{28}=\frac{1}{21}$th part of whole work.

$\therefore$ A alone can finish the work in 21 days

13. (d) (Man + Son)'s one day's work = $\frac{1}{8}$

Man's one day's work = $\frac{1}{10}$

$\Rightarrow$ Son's one day's work = $\frac{1}{8}-\frac{1}{10}=\frac{1}{40}$

$\therefore$ Son can do it in 40 days.

14. (c) 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.

15. (a) A's one day's work $=\frac{1}{3}$rd work.

B's one day's work $=\frac{1}{6}$th work.

(A + B)'s one day's work $=\frac{1}{3}+\frac{1}{6}=\frac{1}{2}$nd work

$\therefore$ A and B together can complete the work (knit a pair of socks) in 2 days.

$\therefore$ They together knit two pair of socks in 4 days.

16. (a) Use direct formula as given

$$\frac{1}{\frac{1}{A}+\frac{1}{B}+\frac{1}{C}}$$

So time required when they work together.

$$= \frac{1}{\frac{1}{56}+\frac{1}{84}+\frac{1}{280}} = 30 \text{ hours}$$

17. (a) We have W = work to be done = Destruction of the city = X × 7 plane days, where X = original number of planes. Also, W = (X – 12) × 10 plane days.

Now the work done is same in the two cases (destruction of same city)

$\Rightarrow$ X × 7 ≡ (X – 12) × 10

$\Rightarrow$ X = 40 planes.

18. (b) $12M \times 18 = 12W \times 18 \times \frac{4}{3}$

$\therefore$ W $\frac{3}{4}M$

$10M + 8W = 10M + 8 \times \frac{3}{4}M = 16M$

$\therefore$ 16 men can complete the same work

in $\frac{12\times18}{16}=\frac{27}{2}=13\frac{1}{2}$days

19. (e) $M = 2B$

$\therefore$ $7M + 4B = 14B + 4B = 18B$

$5M + 4B = 10B + 4B = 14B$

$\because$ 18 boys complete the work in 6 days.

$\therefore$ 14 boys complete the work in

$\frac{6\times18}{14}=7\frac{5}{7}$ days.

Note: 7 men and 4 boys complete the work in 6 days. We have to find out the no. of days in which 5 men and 4 boys complete the work. Here, we see that 4 boys are common in both the cases, therefore, 5 men will take more time to complete the work, i.e., more than 6 days, which is not given in any options. Therefore, without calculating we can say that our answer is (e).

20. (d) $8W = 6M = 12B$

$12M + 12W + 12B \Rightarrow 12M + 9M + 6M = 27M$

$\therefore$ 9 men can complete the work by working 1 hour

per day in 6 × 6 days

∴ 27 men working 8 hours per day

$= \frac{6\times6\times9}{27\times8} = 1\frac{1}{2}$ days.

21. (a) The part of job that Suresh completes in 9 hours

$= \frac{9}{15} = \frac{3}{5}$

Remaining job = $1-\frac{3}{5}=\frac{2}{5}$

Remaining job can be done by Ashutosh in

$\frac{2}{5} \times 10 = 4$ hours

22. (d) 15 women's work of a day $= \frac{1}{6}-\frac{1}{10} \Rightarrow \frac{1}{15}$ part

∴ for 1 whole part a woman will take

= 15 × 15 = 225 days.

23. (b) $m_1 \times d_1 \times t_1 \times w_2 = m_2 \times d_2 \times t_2 \times w_1$

$24 \times 10 \times 8 \times 1 = m_2 \times 6 \times 10 \times 1$

$\Rightarrow m_2 = \frac{24\times10\times8}{6\times10} = 32$ men

EXERCISE 2

1. (d) ∵ A can do $\frac{3}{4}$ of the work in 12 days

∴ A can do $\frac{1}{8}$ of the work in

$12\times\frac{4}{13}\times\frac{1}{8}$ days = 2 days

2. (a) A's 1 day's work

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

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

3. (d) Let the time taken by Bhavika and Ritika together be x days

∴ time taken by Bhavika alone = x + 8 days

and time taken by Ritika alone = $x+\frac{9}{2}$ days

∴ 1 day's work is $\frac{1}{x+8}+\frac{1}{x+\frac{9}{2}}=\frac{1}{x}$

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

$\Rightarrow \quad \frac{2}{2x+9}=\frac{1}{x}-\frac{1}{x+8}$

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

$\Rightarrow \quad 2(x^2+8x)=8(2x+9)$

$\Rightarrow \quad 2x^2 + 16x = 16x + 72$

$\Rightarrow \quad 2x^2 = 72$

$\Rightarrow \quad x = 6$ days

4. (b) (A + B)'s 5 days' work

$= 5\left(\frac{1}{25}+\frac{1}{20}\right)=\frac{45}{100}=\frac{9}{20}$

Remaining work = $\left(1-\frac{9}{20}\right)=\frac{11}{20}$

$\frac{11}{20}$ of the work would be finished by B in

$\frac{\frac{11}{20}}{\frac{1}{20}} = 11$ days.

5. (a) 50 men complete 0.4 work in 25 days.

Applying the work rule,

$m_1 \times d_1 \times w_2 = m_2 \times d_2 \times w_1$

we have,

$50\times25\times0.6 = m_2 \times 25\times0.4$

or $m_2 = \frac{50\times25\times0.6}{25\times0.4} = 75$ men

Number of additional men required

= (75 – 50) = 25

6. (b) Let in x days 10 men will dig a trench

100 m long , 4 m wide and 3m deep, working 8 hours a day

Since, 36 men can dig a trench in 6 days in 10 hours a day

$\therefore \quad 36 \times 6 \times 10 = 8 \times 10 \times x$

$\Rightarrow x = \frac{36\times6\times10}{8\times10}\text{days} = 27\text{days}$

7. (d) In 1 day, work done by 12 men = $\frac{1}{18}$

In 6 days, work done by 12 men = $\frac{6}{18} = \frac{1}{3}$

Remaining work = $\frac{2}{3}$

Now, $m_1 \times d_1 \times w_2 = m_2 \times d_2 \times w_1$

or $12\times18\times\frac{2}{3} = 16\times d_2 \times 1$

or $d_2 = \frac{4\times18\times2}{16} = 9\text{days}$

8. (d) (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

$= \left(\frac{37}{120}\times2\right) = \frac{37}{60}.$

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

$\left(\frac{60}{11}\times\frac{23}{60}\right) = \frac{23}{11}\text{ hours} \approx 2\text{ hours}.$

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

9. (c) 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

$\frac{20}{3} = 6\frac{2}{3}\text{ days}.$

10. (a) Work done by A and B in 5 days = $\left(\frac{1}{10}+\frac{1}{15}\right)\times5 = \frac{5}{6}$

Work remaining = $1-\frac{5}{6} = \frac{1}{6}$

$\therefore$ C alone can do the work in $6 \times 2 = 12$ days

Ratio of their share work

$= \frac{5}{10}:\frac{5}{15}:\frac{2}{12} = 3:2:1$

Share of wages = Rs 225, Rs 150, Rs 75.

11. (a) If A and B work separately then A completes his work in 30 days and B completes his work in 40 days.

$\therefore$ Ratio of the days = 30: 40 $\equiv$ 3: 4

$\Rightarrow$ Ratio of the work of Aand B = 4 : 3

$\therefore$ A's share = $\frac{4}{7}$ and B's share = $\frac{3}{7}$

Now, They received Rs. 2100(together).

$\therefore$ B will receive a payment of Rs.

$\frac{3}{7}\times2100 = \text{Rs.}900$

12. (a) Let the number of men originally employed be x.

$9x = 15(x - 6)$

or $x = 15$

13. (b) X's one day's work $= \frac{1}{15}$th work.

Y's one day's work

$= \frac{1}{15} + 50\%$ of $\frac{1}{15} = \frac{1}{10}$th work

$\therefore$ (X + Y)'s one day's work

$= \frac{1}{15} + \frac{1}{10} = \frac{1}{6}$th work

Hence, they together finish the work in 6 days.

14. (b) A's one day's work $= \frac{1}{8}$th work

B's one day's work $= \frac{1}{3}$rd work

$\therefore$ A's 4 day's work $= 4 \times \frac{1}{8} = \frac{1}{2}$nd work

$\therefore$ In next two days, total wall

$= \frac{1}{2} + 2\left(\frac{1}{8}\right) - 2\left(\frac{1}{3}\right) = \frac{1}{12}$th wall

Remaining wall $= 1 - \frac{1}{12} = \frac{11}{12}$th

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

$\therefore$ $\frac{11}{12}$th wall is built up by A in

$8 \times \frac{11}{12} = 7\frac{1}{3}$ days.

15. (b) Sakshi's one day's work $= \frac{1}{20}$th work

Tanya's one day's work

$= \frac{1}{20} + 25\%$ of $\frac{1}{20} = \frac{1}{16}$th work

Hence, Tanya takes 16 days to complete the work.

16. (a) 1 man's 1 day's work $= \frac{1}{108}$.

12 men's 6 day's 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 $6 \times \frac{1}{3} = 2$days

17. (b) Let work will be completed in x days. Then,

work done by A in (x – 3) days + work done by B in x days = 1

$\frac{x-3}{9} + \frac{x}{18} = 1$

$\Rightarrow 3x = 24 \Rightarrow x = 8$ days.

18. (a) 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, $\left(\frac{3x}{2} + 4x + \frac{6x}{4}\right) = \frac{1}{7} \Rightarrow x = \left(\frac{1}{7} \times \frac{4}{28}\right) = \frac{1}{49}$.

$\therefore$ 1 woman alone can complete the work in 49 days.

So, to complete the work in 7 days, women required

$= \left(\frac{49}{7}\right) = 7$.

19. (a) 1 man's 1 day's work = $\frac{1}{48}$;

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

6 men's 2 day's 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.

20. (b) Let Sunil finishes the job in x hours.

Then, Ramesh will finish the job in $\frac{x}{2}$ hours.

We have, $x-\frac{x}{2}=3\Rightarrow x=6$

Therefore, Sunil finishes the job in 6 hours and Ramesh in 3 hours.

Work done by both of them in 1 hour = $\frac{1}{6}+\frac{1}{3}=\frac{1}{2}$

They together finish the piece of work in 2 hours.

21. (a) Sunil takes 5 days and Pradeep takes 15 days to do the work.

In a day they would complete

$\frac{1}{5}+\frac{1}{15}$ i.e., $\frac{4}{15}^{th}$ work.

The remaining $11/15^{th}$ work would be completed by Pradeep in

$\frac{11}{15}\times 15$ i.e. 11 days.

22. (c) Suresh, working alone 42 days = 1 unit of work.

Mahesh is 1/5 times more efficient that Suresh. So Mahesh is 6/5 times as efficient as Suresh. Hence Mahesh should require 5/6th of the time, the time taken by Suresh.

Therefore time taken by Mahesh = 5/6 × 42 = 35 days.

23. (a) Ganpat's day work = 1/15 of the total.

Yogesh's 1 day work = 1/20 of the total.

Bhagwat's 1 day work = 1/30 of the total.

They can do $\left(\frac{1}{15}+\frac{1}{20}+\frac{1}{30}\right)$ of the total work in 1 day.

$\Rightarrow$ Total work can be finished in

$$\frac{1}{\frac{1}{15}+\frac{1}{20}+\frac{1}{30}}$$

$$=\frac{15\times 20\times 30}{15\times 20+20\times 30+30\times 15}$$

$$=\frac{9000}{1350}=\frac{20}{3}\text{ days.}$$

24. (b) Given 12 men ≡ 15 women ≡ 18 boys

$\therefore$ 1 Man ≡ 1.5 boys, 1 woman = 6/5 boys.

Now, 5W + 6B = 12B.

Required answer is calculated as follows :

Total no. of boys reqd.

= 18 × [(15/16) × (8/9)] = 15 boys

The number of boys already present = 12.

Hence, 3 boys more required.

But 3 boys = 2 men.

So, 2 men are required.

25. (a) Given 6 BSF ≡ 10 CRPF $\Rightarrow$ 4 BSF + 9 CRPF

= 4 + (9 × 6/10) BSF = $\frac{94}{10}$ BSF

Now work = 6 × 2 BSF days = $\frac{94}{10}\times X$ BSF days

We have $6\times 2\equiv\frac{94}{10}\times X\Rightarrow X = 1.27$ days

26. (a) The factors by which the expenses change are

= 8/9 × 7/12 × 3/5 × 16380 = 5096 for 7 months.

27. (a) 1 horse = 2 cows, 10 horses = 20 cows.

$\Rightarrow$ 10 horses + 15 cows = 20 + 15 = 35 cows.

15 horses + 10 cows = 40 cows. Now 35 cows

eat 5 acres.

$\Rightarrow$ 40 cows eat $5 \times \frac{40}{35} = 5\frac{5}{7}$ acres.

Here we have converted everything in terms of cows, you can work in terms of horses also.

28. (c)

	Men	Women	Children
Work	3	2	1
Numbers	20	30	36

Ratio of wages

$= (3 \times 20) : (2 \times 20) : (1 \times 36) = 5 : 5 : 3$

Total wages of men $= \frac{5}{13} \times 780 = \text{Rs. } 300$

$\therefore$ Wages of a man = Rs. 15

Similarly, wages of woman = Rs. 10

and wages of child = Rs. 5

Total waves of 15 men, 21 women and 30 children

$= 15 \times 15 + 21 \times 10 + 30 \times 5 = 585$

Total wages for 2 weeks = Rs. 1170

29. (a) Let 1 man's 1 days' work= x & 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 $12\frac{1}{2}$ days.

30. (b) A, B and C's 1 day's work = $\frac{1}{10}$

i.e. $\frac{1}{A} + \frac{1}{B} + \frac{1}{C} = \frac{1}{10}$ ....(1)

Also, only C's 1 day's work = $\frac{3}{100}$

i.e. $\frac{1}{C} = \frac{1}{100}$ .... (2)

From the given condition,

$\frac{5}{A} = \frac{4}{B} \Rightarrow B = \frac{4}{5}A$ .... (3)

By comparing the ratio given in equ (1) and (2),

We can say C is the lowest worker.

Also, from equation (1) and (3), B is the fastest worker.

$\therefore$ We have, $\frac{4}{5B} + \frac{1}{B} + \frac{1}{100} = \frac{1}{10}$ {from (1), (2), (3)}

$\Rightarrow \frac{9}{5B} = \frac{9}{100} \Rightarrow 5B = 100 \Rightarrow B = 20.$

Hence, B completes the entire work in 20 days.

31. (b)

Men	Working hours	Days	Work
15	8	12	1
$x + \frac{15}{2} + \frac{5}{2}$	6	30	$\frac{9}{4}$

Using $M_1T_1W_2 = M_2T_2W_1$, we get

$15 \times (8 \times 12) \times \frac{9}{4} = (x + 10)(6 \times 30) \times 1$

$\Rightarrow x + 10 = \frac{8 \times 12 \times 9}{2 \times 6 \times 4} = 18$

$\Rightarrow x = 18 - 10 = 8$

Hence, 8 men must be associated.

32 (c) 10 men finishes a work in 10 days

and 12 women finishes in 10 days.

$\therefore$ 10 men and 12 women finishes a work in 10 days

$\therefore$ 15 men and 6 women will complete the work in

$\frac{10 \times 10 \times 12}{10 \times 6 + 15 \times 12}$ days i.e, in 5 days.

33. (a) 1st man can do in 3 days $=\frac{3}{6}$ part of the work

2nd man can do in 3 days $=\frac{3}{8}$ part of the work

Boy can do in 3 days

$=1-\left(\frac{3}{6}+\frac{3}{8}\right)=\frac{6}{48}$ part of the work

$\therefore$ Ratio of their wages

$=\frac{3}{6}:\frac{3}{8}:\frac{6}{48}=\frac{1}{2}:\frac{3}{8}:\frac{1}{8}$

$= 4 : 3 : 1$

Boy's share $=\frac{1}{4+3+1}\times 600 \quad =\frac{1}{8}\times 600 = \text{Rs.}75.$

34. (b) 1st man can do in 3 days = $\frac{3}{7}$ part of the work

2nd man can do in 3 days = $\frac{3}{8}$ part of the work

Boy can do in 3 days = $1-\left(\frac{3}{7}+\frac{3}{8}\right)$

$=\frac{11}{56}$ part of the work

$\therefore$ Ratio of their wages $=\frac{3}{7}:\frac{3}{8}:\frac{11}{56} = 24 : 21 : 11$

$\therefore$ 1st man's share $=\frac{24}{24+21+11}\times 1400$

$=\frac{24}{56}\times 1400 = \text{Rs.}600.$

2nd man's share $=\frac{21}{24+21+11}\times 1400$

$=\frac{21}{56}\times 1400 = \text{Rs.}525$

Boy's share $=\frac{11}{24+21+11}\times 1400$

$=\frac{11}{56}\times 1400 = \text{Rs.}275.$

35. (b) Remaining work $=1-\left(\frac{1}{3}+\frac{2}{9}\right)=\frac{9-(3+2)}{9}=\frac{4}{9}$

4 men + 10 women do 1 work in 12 days.

6 men + 12 women do 1 work in 9 days.

48 men + 120 women = 54 men + 108 women

$\Rightarrow$ 6 men = 12 women

$\Rightarrow$ 1 men = 2 women

$\therefore$ In 12 days 1 work requires 9 men

$\therefore$ In 1 day 1 work requires 9 × 12 men

$\therefore$ In 3 days 1 work requires $\frac{9\times 12}{3}$ men

$\therefore$ In 3 days $\frac{4}{9}$ work requires

$\frac{9\times 12\times 4}{3\times 9}=16$ men

There are 6 men and 12 women or (12 men equivalent)

So, 4 men equivalent is required additionally

$\therefore$ 8 women are needed to finish the work.

36. (b) In one hr. B finishes $\frac{1}{20}$ of the work.

In one hr. A finishes $\frac{1}{20}\times\frac{3}{2}=\frac{3}{40}$ of the work.

A+B finish $\frac{2+3}{40}=\frac{1}{8}$ of the work in 1 hr.

Both of them will take 8 hrs. to finish the work.

EXERCISE 3

1. (b) Let the man alone do the work in x days.

Then, the woman alone do the work in 2x days.

Their one day's work = $\frac{1}{8}$th part of whole work

i.e. $\frac{1}{x}+\frac{1}{2x}=\frac{1}{8}$

$\Rightarrow x = 12$ days

$\therefore$ man takes 12 days and woman 2x = 24 days.

2. (b) X's one day's work = $\frac{1}{25}$th part of whole work.

Y's one day's work = $\frac{1}{30}$th part of whole work.

Their one day's work

$= \frac{1}{25}+\frac{1}{30}=\frac{1}{150}$th part of whole work.

Now, work is done in 5 days

$=\frac{11}{150}\times 5=\frac{11}{30}$th of whole work

$\therefore$ Remaining work

$= 1-\frac{11}{30}=\frac{19}{30}$th of whole work

Now, $\frac{1}{30}$th work is done by Y in one day.

$\therefore$ $\frac{19}{30}$th work is done by Y in

$$\frac{1}{1/30}\times\frac{19}{30}=19\,\text{days}$$

3. (c) A's one day's work = $\frac{1}{16}$th work

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

Let B has worked alone = x days. Then,

A's amount of work + B's amount of work = 1

$$\Rightarrow 4\left(\frac{1}{16}\right)+(x+4)\left(\frac{1}{12}\right)=1$$

$$\Rightarrow \frac{1}{4}+\frac{x+4}{12}=1\Rightarrow x=\frac{3}{4}\times 12-4$$

$\Rightarrow x = 5$ days

4. (b) 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 days 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.

5. (c) Let C completes the work in x days.

Work done by (A + B) in 1 day = $\frac{1}{10}$

Work done by (B +C) in 1 day = $\frac{1}{18}$

A's 5 days' work + B's 10 days' work + C's 15 days' work = 1

or (A + B)'s 5 days' work

+ (B + C)'s 5 days' work

+ C's 10 days' work = 1

or $\frac{5}{10}+\frac{5}{18}+\frac{10}{x}=1$ or x = 45 days

6. (b) Man's two day's work

$= 2\times\frac{1}{20}$th work $=\frac{1}{10}$th work

Woman's two days's work

$$=2\times\frac{1}{30}\text{th work}=\frac{1}{15}\text{th work}$$

Boy's two day's work

$=2\times\frac{1}{60}$th work = $\frac{1}{30}$th work

Now, let 2 men, 8 women and x boys can complete work in 2 days. Then ,

2 men's work +8 women's work

+ x boy's work =1

$$2\left(\frac{1}{10}\right)+8\left(\frac{1}{15}\right)+x\left(\frac{1}{30}\right)=1$$

$$\Rightarrow x=\left(1-\frac{1}{5}-\frac{8}{15}\right)\times 30 \Rightarrow x = 8 \text{ boys}$$

7. (c) Suppose that X men must be discharged at the end of the 18th day.

$100 \times 10 + 150 \times 1 + 200 \times 7 + (200 - X) \times 5$

$= 100 \times 30$

$5X = 550 \Rightarrow X = 110$ men

8. (a) $15 W = 10 M$

Now, $5W + 4M$

$$= 5W+\frac{4\times 15}{10} W$$

$$= 5W+6W = 11 W$$

If 15 women can complete the project in 55 days,

11 women can complete the same project in

$$\frac{55\times 15}{11}=75\,\text{days}$$

9. (d) Let if both A and B work together, they take x days.

$$\therefore (A + B)\text{'s 1 days's work} = \frac{1}{x}\text{th work.}$$

$$A\text{'s 1 day's work} = \frac{1}{x+8}\text{th work.}$$

$$B\text{'s 1 day's work} = \frac{1}{x+9/2}\text{th work.}$$

Now, $\frac{1}{x+8}+\frac{2}{2x+9}=\frac{1}{x}$

$\Rightarrow x(2x+9+2x+16) = (x+8)(2x+9)$

$\Rightarrow 4x^2 + 25x = 2x^2 + 25x + 72$

$\Rightarrow x^2 = 36 \Rightarrow x = 6$ days

10. (c) In 8 days, Anil does $= \frac{1}{3}$rd work.

$$\therefore \text{in 1 day, he does} = \frac{1}{24}\text{th work.}$$

$\therefore$ Rakesh's one day's work

$$= 60\% \text{ of } \frac{1}{24} = \frac{1}{40}\text{th work.}$$

$$\text{Remaining work} = 1-\frac{1}{3}=\frac{2}{3}$$

(Anil and Rakesh)'s one day's work

$$= \frac{1}{24}+\frac{1}{40}=\frac{1}{15}\text{th work}$$

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

$$\therefore \frac{2}{3}\text{rd work is done by them in } 15\times\frac{2}{3}=10\,\text{days}$$

11. (b) A's one day's work $= \frac{1}{32}$

B's one day's work $= \frac{1}{20}$

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

$$\therefore \text{C's one day's work} = \frac{1}{12}-\frac{1}{20}=\frac{1}{30}$$

D's one day's work $= \frac{1}{24}$

$\therefore$ (A + B + C + D)'s one day's work

$$= \frac{1}{32}+\frac{1}{20}+\frac{1}{30}+\frac{1}{24}$$

$$=\frac{75+120+80+100}{2400}$$

$$= \frac{375}{2400}=\frac{15}{96}=\frac{5}{32}$$

$\therefore$ Out of $\frac{5}{32}$ of work done, $\frac{1}{30}$ of the work is done by C.

$\Rightarrow$ Out of Rs. 25 paid for the work, C will receive

Rs. $\frac{1/30}{5/32}\times 25$, i.e. $\frac{1}{30}\times\frac{32}{5}\times 25$,

i.e. Rs. $\frac{16}{3}$

12. (b) A's one day's work = $\frac{1}{15}$th work.

B's one day's work = $\frac{1}{10}$th work.

(A + B)'s one day's work

$= \frac{1}{15}+\frac{1}{10}=\frac{1}{6}$th work.

Let A left after x days.

$\therefore$ (A +B)'s x days' work = $\frac{x}{6}$th work.

Remaining work

$=1-\frac{x}{6}=\frac{6-x}{6}$th work.

Now, in 5 days, work done by B = $\frac{6-x}{6}$th work.

$\therefore$ In 1 day work done by B

$=\frac{6-x}{30}$th work and $\frac{6-x}{30}=\frac{1}{10}$

$\therefore x = 3$ days

13. (a) Let Suresh undertakes a tour of x days.

Then, expenses for each day = $\frac{360}{x}$

Now, $\frac{360}{x+4}=\frac{360}{x}-3$

or $360\left(\frac{1}{x}-\frac{1}{x+4}\right)=3$

or $x^2+4x-480=0$

or $x = -24$ or $x = 20$

Since, $x \neq -24$ we have $x = 20$

14. (b) Let B can finish the work in x days.

Then A can finish the work in (x – 3) days.

B's one day's work = $\frac{1}{x}$th work

A's one day's work = $\frac{1}{x-3}$th work

A's 4 days' work = $\frac{4}{x-3}$th work

Remaining work $=1-\frac{4}{x-3}=\frac{x-7}{x-3}$th work

The remaining work done by B in 14 – 4

= 10 days.

Now, in 10 days, work done by B = $\frac{x-7}{x-3}$ th work

$\therefore$ In 1 day, work done by B

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

and $\frac{1}{10}\left(\frac{x-7}{x-3}\right)=\frac{1}{x}$

$\Rightarrow x = 15$days

$\therefore$ B will finish in 15 days and A will finish in 12 days

15. (a) (A + B)'s one day's work = $\frac{1}{5}$th work

Let A can do job in x days. Then,

A's one day's work = $\frac{1}{x}$th work

and B's one day's work

$=\frac{1}{5}-\frac{1}{x}=\frac{x-5}{5x}$th work

Now , (2A)'s work + $\left(\frac{1}{3}\right)$B's work = $\frac{1}{3}$rd work

$\Rightarrow \frac{2}{x}+\frac{1}{3}\left(\frac{x-5}{5x}\right)=\frac{1}{3}$

$\Rightarrow x=\frac{25}{4}=6\frac{1}{4}$ days

16. (a) 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

$= \left(\frac{15}{100} + \frac{20}{200}\right) = \frac{1}{4}$.

∴ 15 men and 20 boys can do the work in 4 days.

17. (b) Let x additional men employed.

117 men were supposed to finish the whole work in $46 \times 8 = 368$ hours.

But 117 men completed $\frac{4}{7}$ of the work in 33×8 = 264 hours

∴ 117 men could complete the work in 462 hours.

Now (117 + x) men are supposed to do $\frac{3}{7}$ of the work, working 9 hours a day, in $13 \times 9 = 117$ hours, so as to finish the work in time.

i.e. (117 + x) men are supposed to complete the whole work in $117 \times \frac{7}{3} = 273$ hours.

∴ $(117 + x) \times 273 = 117 \times 462$

$\Rightarrow$ $(117 + x) \times 7 = 3 \times 462$

$\Rightarrow$ $x + 117 = 3 \times 66 = 198 \Rightarrow x = 81$

∴ Required number of additional men to finish the work in time = 81.