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