STAFF SELECTION COMMISSION – Solved Papers

TIME AND WORK (Some Important Exercises)

1. If A alone can do a work in 12 days and B alone can do it in 8 days, working together, in how many days will they complete it?

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

(3) $3\frac{4}{5}$ days (4) 6 days

Ans : 1

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

B's one day's work $= \frac{1}{8}$

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

$= \frac{1}{12} + \frac{1}{8} = \frac{2+3}{24} = \frac{5}{24}$

Now, $\frac{5}{24}$ work is done in = 1 day

$\therefore$ 1 work is done in $= \frac{24}{5}$

$= 4\frac{4}{5}$

2. A can do $\frac{1}{2}$ of a work in 9 days while B can do $\frac{1}{3}$ of the same work in 6 days. How long would it take for A and B together to complete the work?

(1) 8 days (2) 9 days

(3) 10 days (4) 7 days

Ans : 2

A's 9 day's work $= \frac{1}{2}$

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

$= \frac{1}{2\times 9} = \frac{1}{18}$

B's 6 day's work $= \frac{1}{3}$

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

$= \frac{1}{3\times 6} = \frac{1}{18}$

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

$= \frac{1}{18} + \frac{1}{18} = \frac{2}{18} = \frac{1}{9}$

$\therefore$ A and B both together will complete the work in 9 days.

3. A and B can do a work in 8 days. B alone can do it in 24 days. In how many days. A alone can do the same work?

(1) 10 days (2) 9 days

(3) 12 days (4) 14 days

Ans : 3

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

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

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

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

$= \frac{1}{8} - \frac{1}{24} = \frac{3-1}{24} = \frac{1}{24} = \frac{1}{12}$

$\therefore$ A will complete the work in 12 days.

4. 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 will they finish it working together? In what time can A do it separately?

(1) 45 days (2) 20 days

(3) 60 days (4) 30 days

Ans : 4

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

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

(C + A)'s 1 day's work $= \frac{1}{20}$

Adding all,

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

$= \frac{1}{12} + \frac{1}{15} + \frac{1}{20}$

$= \frac{5+4+3}{60} = \frac{12}{60} = \frac{1}{5}$

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

$= \frac{1}{5\times 2} = \frac{1}{10}$

$\therefore$ (A + B + C) together can complete the work in 10 days. Now, A's 1 day's work

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

$$= \frac{1}{10} - \frac{1}{15} = \frac{3-2}{30} = \frac{1}{30}$$

$\therefore$ A alone can finish the work in 30 days.

5. A, B and C can complete a work in 8 days. B alone can do it in 18 days and C alone can do it in 24 days. In how many days can A alone do the same work?

(1) 36 days (2) 24 days

(3) 38 days (4) 30 days

Ans : 1

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

$$B\text{'s 1 day's work} = \frac{1}{18}$$

$$C\text{'s 1 day's work} = \frac{1}{24}$$

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

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

$$= \frac{1}{8} - \frac{1}{18} - \frac{1}{24}$$

$$= \frac{9-4-3}{72} = \frac{2}{72} = \frac{1}{36}$$

$$\therefore A\text{'s 1 day's work} = \frac{1}{36}$$

$\therefore$ A alone can do the same work in 36 days.

6. A can do a piece of work in 40 days. He works on it for 5 days and then B completes it in 21 days. How long will A and B together take to complete the work?

(1) 10 days (2) 15 days

(3) 20 days (4) 25 days

Ans : 2

$$A\text{'s 1 day's work} = \frac{1}{40}$$

$$\therefore A\text{'s 5 days' work} = \frac{5}{40} = \frac{1}{8}$$

$$\text{Remaining work} = 1 - \frac{1}{8} = \frac{7}{8}$$

This part of work is done by B in 21 days.

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

$$= \frac{7}{8 \times 21} = \frac{1}{24}$$

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

$$= \frac{1}{40} + \frac{1}{24} = \frac{3+5}{120}$$

$$= \frac{8}{120} = \frac{1}{15}$$

Hence, A and B together will complete the work in 15 days.

7. Ram can do a piece of work in 20 days and Shyam in 30 days. They work together for 10 days. After that Shyam leaves and rest of the work is completed by Ram alone. How long does it take Ram to finish the remaining work?

(1) 3 days (2) $2\frac{1}{3}$ days

(3) $3\frac{1}{3}$ days (4) $4\frac{1}{3}$ days

Ans : 3

$$\text{Ram's 1 day's work} = \frac{1}{20}$$

$$\text{Shyam's 1 day's work} = \frac{1}{30}$$

$\therefore$ (Ram + Shyam)'s 1 day's work

$$= \frac{1}{20} + \frac{1}{30} = \frac{3+2}{60}$$

$$= \frac{5}{60} = \frac{1}{12}$$

$\therefore$ (Ram + Shyam)'s 10 day's work $= 10 \times \frac{1}{12} = \frac{5}{6}$

Now, $\frac{1}{6}$ work is completed by Ram alone.

To finish this part Ram will take $= \frac{\text{Remaining work}}{\text{Ram's 1 day's work}} = \frac{\frac{1}{6}}{\frac{1}{20}}$

$$= \frac{1}{6} \times 20 = \frac{10}{3} = 3\frac{1}{3} \text{ days.}$$

8. A and B can complete a piece of work in 45 and 40 days respectively. Both started to work together, but after some days A left and B alone completed the rest work in 23 days. For how many days did A work?

(1) 12 days (2) 10 days

(3) 8 days (4) 9 days

Ans : 4

Let A worked for x days.

A's 1 day's work $= \frac{1}{45}$

$\therefore$ A's x day's work $= \frac{x}{45}$

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

$\therefore$ B's x day's work

$= \frac{1}{40} \times x = \frac{x}{40}$

(A + B) together worked for x days.

$\therefore$ (A + B)'s x day's work

$= \frac{x}{45} + \frac{x}{40}$

$= \frac{8x + 9x}{360} = \frac{17x}{360}$

$\therefore$ Remaining work

$= 1 - \frac{17x}{360} = \frac{360 - 17x}{360}$

This part of work i.e., $\frac{360 - 17x}{360}$ is completed by B alone in 23 days.

$\therefore \frac{360 - 17x}{360}$ = 23 × B's 1 day's work

$\frac{360 - 17x}{360} = 23$

$= 23 \times \frac{1}{40} = \frac{23}{40}$

$\Rightarrow 360 - 17x = \frac{23}{40} \times 360 = 270$

$\Rightarrow 17x = 360 - 207 = 153$

$\Rightarrow x = \frac{153}{17} = 9$ days

Hence, A worked for 9 days.

9. A and B together can finish a work in 15 days. A and C take 2 days more to complete the same work than that of B and C, A, B and C together complete the work in 8 days. In how many days will A finish it separately?

(1) 40 days (2) 24 days

(3) $17\frac{1}{7}$ days (4) 20 days

Ans : 1

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

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

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

$= \frac{1}{8} - \frac{1}{15} = \frac{15 - 18}{120} = \frac{7}{120}$

Let (B + C) can complete the work in $(x + 2)$ days.

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

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

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

$= \frac{1}{x} - \frac{7}{120} = \frac{120 - 7x}{120x}$

and, A's 1 day's work

$= \frac{1}{x+2} - \frac{7}{120}$

$= \frac{120 - 7(x+2)}{120(x+2)}$

$= \frac{106 - 7x}{120(x+2)}$

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

$\Rightarrow \frac{106 - 7x}{120(x+2)} + \frac{120 - 7x}{120x}$

$= \frac{1}{15}$

$\Rightarrow \frac{106x - 7x^2 + 120x + 240 - 7x^2 - 14x}{120x(x+2)}$

$= \frac{1}{15}$

$\Rightarrow -14x^2 + 212x + 240$

$= 8x^2 + 16x$

$\Rightarrow 22x^2 - 196x - 240 = 0$

$\Rightarrow 11x^2 - 98x - 120 = 0$

$\Rightarrow 11x^2 - 110x + 12x - 120 = 0$

$\Rightarrow 11x(x - 10) + 12(x - 10) = 0$

$\Rightarrow (x - 10)(11x + 12) = 0$

$\Rightarrow x = 10$, and $-\frac{12}{11}$

But no. of days cannot be negative hence the value of

$x = -\frac{12}{11}$ is inadmissible.

$\therefore x = 10$

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

$= \frac{1}{10+2} - \frac{7}{120}$

$= \frac{1}{12} - \frac{7}{120}$

$= \frac{10-7}{120} = \frac{3}{120} = \frac{1}{40}$

$\therefore$ A alone can complete the work in 40 days.

10. A and B together can do a piece of work in 30 days, B and C together can do it in 20 days. A starts the work and works on it for 5 days, then B takes it up and works for 15 days. Finally C finishes the work in 18 days. In how many days can C do the work when doing it separately?

(1) 40 days (2) 24 days

(3) 120 days (4) 60 days

Ans : 2

(A + B)'s 1 day's work $= \frac{1}{30}$

(B + C)'s 1 day's work $= \frac{1}{20}$

Let us denote A's 1 day's work by A, B's 1 day's work by B and C's by C.

So, A + B = $\frac{1}{30}$

and, B + C $= \frac{1}{20}$

Also, 5A + 15B + 18C = 1 work

This can be arranged and rewritten as,

5(A + B) + 10 (B + C) + 8C = 1

Substituting the values of (A + B) and (B + C) we get,

$\left(5\times\frac{1}{30}\right)+\left(10\times\frac{1}{20}\right)+8C=1$

or, $\frac{1}{6}+\frac{1}{2}+8C=1$

or, 8C = $1-\frac{1}{6}-\frac{1}{2}$

or, $8C = \frac{2}{6}$

or, $C = \frac{2}{6\times 8} = \frac{1}{24}$

Hence, C will complete the work in 24 days.

11. 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 for 10 days when B and C leave. How many days more will A take to complete the work?

(1) 16 days (2) 15 days

(3) 18 days (4) 20 days

Ans : 3

(A + B)'s 1 day's work $= \frac{1}{30}$

(B + C)'s 1 day's work $= \frac{1}{24}$

(C + A)'s 1 day's work $= \frac{1}{20}$

Adding all the above, we have 2(A + B + C)'s 1 day's work

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

$= \frac{4+5+6}{120} = \frac{15}{120} = \frac{1}{8}$

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

$= \frac{1}{8\times 2} = \frac{1}{16}$

Now, all three worked together for 10 days.

$\therefore$ (A + B + C)'s 10 days' work

$= \frac{1}{16}\times 10 = \frac{5}{8}$

$\therefore$ Remaining part of work

$= 1-\frac{5}{8} = \frac{8-5}{8} = \frac{3}{8}$

Now, A's 1 day's work

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

$= \frac{1}{16}-\frac{1}{24} = \frac{3-2}{48} = \frac{1}{48}$

Since, A finishes $\frac{1}{48}$ part of work in 1 day

$\therefore$ A will finish $\frac{3}{8}$ part of work in $1\times 48\times\frac{3}{8} = 18$ days.

12. 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 work.

In how many days will the work be completed?

(1) 20 days (2) 18 days

(3) 16 days (4) 15 days

Ans : 4

Let the work be completed in x days. Therefore, A worked for $x - 3$ days. B for x days and C for 4 days.

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

B's 1 day's work $= \frac{1}{36}$

and C's 1 day's work $= \frac{1}{48}$

$$\therefore (x-3)\times\frac{1}{24}+x\times\frac{1}{36}+4\times\frac{1}{48}=1$$

$$\Rightarrow \frac{x-3}{24}+\frac{x}{36}+\frac{1}{12}=1$$

$$\Rightarrow \frac{3x-9+2x+6}{72}=1$$

$$\Rightarrow 5x - 3 = 72$$

$$\Rightarrow 5x = 75$$

$$\Rightarrow x = \frac{75}{5} = 15$$

Hence, the work was completed in 15 days.

13. A can complete a work in 24 days, B in 32 days and C in 64 days. They start together. A works for 6 days and leaves and B leaves 6 days before the work is finished. In how many days was the work finished?

(1) 20 days (2) 21 days

(3) 22 days (4) 25 days

Ans : 1

Let the work was completed in x days. Hence A worked for 6 days, B worked for $(x - 6)$ days and C worked for x days.

Now, A's 1 day's work = $\frac{1}{24}$

$\therefore$ A's 6 days' work

$$= \frac{1}{24}\times 6 = \frac{1}{4}$$

B's 1 day's work $= \frac{1}{32}$

$\therefore$ B's $(x - 6)$ days work

$$= \frac{1}{32}\times(x-6) = \frac{(x-6)}{32}$$

C's 1 day's work $= \frac{1}{64}$

$\therefore$ C's x days' work

$$= \frac{1}{64}\times x = \frac{x}{64}$$

$$\therefore \frac{1}{4}+\frac{x-6}{32}+\frac{x}{64}=1$$

$$\Rightarrow \frac{x-6}{32}+\frac{x}{64}=1-\frac{1}{4}=\frac{3}{4}$$

$$\Rightarrow \frac{2x-12+x}{64}=\frac{3}{4}$$

$$\Rightarrow 3x - 12 = 48$$

$$\Rightarrow 3x = 48 + 12 = 60$$

$$\Rightarrow x = \frac{60}{3} = 20$$

Hence, the work was completed in 20 days.

14. A can complete a work in 10 days, B can complete the same work in 20 days and C in 40 days. A starts working on the first day, B works for second day and C works for third day. Again A works for fourth day and B for fifth day and so on. If they continued working in the same way, in how many days will the work be completed?

(1) 15 days (2) 16.5 days

(3) 15.5 days (4) 17 days

Ans : 2

A's work for the first day $= \frac{1}{10}$

B's work for the second day

$$= \frac{1}{20}$$

C's work for the third day

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

Work done in 3 days by them

$$= \frac{1}{10}+\frac{1}{20}+\frac{1}{40}$$

$$= \frac{4+2+1}{40} = \frac{7}{40}$$

Hence, $\frac{7}{40}$ part of work will be completed in 3 days.

$\frac{7\times 2}{40}$ part of work will be completed in 2×3 i.e. 6 days.

$\frac{7\times 5}{40}$ i.e $\frac{35}{40}$ part of work will be completed in 3×5 or 15 days.

Remaining work

$$= 1 - \frac{35}{40} = \frac{5}{40} = \frac{1}{8}$$

Now, A will work on 16th day. The remaining work after 16 days $= \frac{1}{8} - \frac{1}{10} = \frac{5-4}{40} = \frac{1}{40}$

Again, B will work on 17th day.

$\because$ B completes the work in 20 days.

$\therefore$ B will complete $\frac{1}{40}$ part of work in $20 \times \frac{1}{40} = \frac{1}{2}$ day

$\therefore$ Total time taken in completion of work

$$= 15 + 1 + \frac{1}{2} = 16\frac{1}{2} \text{ days}$$

15. 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 and C do it if he works alone?

(1) 230 days (2) 225 days

(3) 240 days (4) 220 days

Ans : 3

A's 1 day's work = $\frac{1}{120}$

B's 1 day's work = $\frac{1}{150}$

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

$$= \frac{1}{120} + \frac{1}{150}$$

$$= \frac{5+4}{600} = \frac{9}{600} = \frac{3}{200}$$

(A + B) work together for 20 days.

Hence, (A + B)'s 20 days work

$$= 20 \times \frac{3}{200} = \frac{3}{10}$$

After 20 days B leaves, and A alone works for 12 days.

$\therefore$ A's 12 day's work

$$= \frac{1}{120} \times 12 = \frac{1}{10}$$

Now, after 12 days, C joins A and the work is finished in 48 days. It means A works for 48 days more.

$\therefore$ A's 48 days' work

$$= \frac{1}{120} \times 48 = \frac{2}{5}$$

$\therefore$ Total work done by A and B together

$$= \frac{3}{10} + \frac{1}{10} + \frac{2}{5}$$

$$= \frac{3+1+4}{10} = \frac{8}{10} = \frac{4}{5}$$

$\therefore$ Remaining work

$$= 1 - \frac{4}{5} = \frac{1}{5}$$

This part of work, i.e., $\frac{1}{5}$ is done by C in 48 days

$\therefore$ C's days work $= \frac{1}{5}$

$\therefore$ C's 1 days work $= \frac{1}{5 \times 48} = \frac{1}{240}$

Hence C alone can finish the work in 240 days.