Time and work.

1. worker A takes 8 hours to do a job worker B taken 10 hours to do the same work. How long should it take both A and B working together but independently, to do the same job.

Sol

A's 1 hour's work $= \frac{1}{8}$ B's 1 hours work $= \frac{1}{10}$

(A+B)'s 1 hours work $= \left(\frac{1}{8} + \frac{1}{10}\right) = \frac{9}{40}$

Both A and B will finish the work in $\frac{40}{9} = 4\frac{4}{9}$ days.

2. A and B together can complete a piece of work in 4 days. If A alone can complete the same work in 12 days. in how many days can B alone complete that work.

Sol:

(A+B)'s 1 day's work $= \frac{1}{4}$ A's 1 day's work $= \frac{1}{12}$

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

Hence, B alone can complete the work is 6 days.

3 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 $(7\times9) = 63$ hours

B can complete the work in $(6\times7) = 1/42$ hours

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

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

∴ Both will finish the work in $\frac{126}{5}$ hrs

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

4 A and B can do a piece of work in 18 days. B and C can do a piece of work in 24 days. A and C can do it in 36 days. How many days will be A, B and C finish it working together and separately?

Sol: (A+B)'s 1 day's work $= \frac{1}{18}$. (B+C)'s 1 day's work $= \frac{1}{24}$

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

Adding, we get 2(A+B+C)'s 1 day's work $= \left(\frac{1}{18}+\frac{1}{24}+\frac{1}{36}\right)$

$= \frac{9}{72} = \frac{1}{8}$

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

Thus, A, B and C together can finish the work in 16 days.

Now A's 1 day's work = 1{(A+B+C)'s 1 day's work} - 1{(B+C)'s 1 day's work}

$= \left(\frac{1}{16} - \frac{1}{24}\right) = \frac{1}{48}$

A alone can finish the work in 48 days.

Similarly B's 1 day's work $= \left(\frac{1}{16} - \frac{1}{36}\right)$

$= \frac{5}{144}$.

B alone can finish the work in $\frac{144}{5} = 28\frac{4}{5}$ days

and C's 1 day's work $= \left(\frac{1}{16} - \frac{1}{18}\right) = \frac{1}{144}$

∴ C alone can finish the work in 144 days.

5 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 days work) = 2:1

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

Divide $\frac{1}{18}$ in ratio = 2:1

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.

6. A can do a certain job in 12 days. B is 60% more efficient than A. How many days does B alone takes 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

7. 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

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

(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

8. A and B undertake to do a piece of work for Rs. 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 days 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 $= \frac{1}{6} : \frac{1}{8} : \frac{1}{24} = 4 : 3 : 1$

A's share Rs $= \left(600 \times \frac{4}{8}\right)$ = Rs = 300

B's share Rs $= \left(600 \times \frac{3}{8}\right)$ = Rs = 225

C's share Rs $= \left(600 \times \frac{1}{8}\right)$ = Rs 75

9. A and B working separately can do a Piece of work in 9 and 12 days respectively. If They work for a day alternatively, A beginning in how many days The work will be completed?

Sol:

(A + B)'s 2 day's 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 $\left(9 \times \frac{1}{36}\right) = \frac{1}{4}$ days

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

10. 45 men can complete a work in 16 days. Six days after They started working 30 more men Joining Them. How many days will They now take to complete The remaining work?

Sol: (45 x 16) men can complete The work in 1 day

1 man's 1 day's work $= \frac{1}{720}$

45 men's 6 day's 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.

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

11. 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 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 $y = \frac{1}{100}$

(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.

12 A does a work in 10 days and B does The same work in 15 days. how many days together will do The same work?

Sol:

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

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

~~(A+B)~~'s 1 day's $= \left(\frac{1}{10} + \frac{1}{15}\right) = \frac{1}{6}$

So both together will finish The work in 6 days.

13. A can finish a work in 18 days and B can do same work in half the time taken by A. Then working together what part of the same work they can finish in a day?

Sol:

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

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

14. A type has two Punctures. The first Puncture alone would have made the type of flat in 9 minites and the second alone would have done it 6 minutes. If air leaks out at a constant rate. How long does it take both the Punctures together to make it flat?

Sol:

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 $\frac{18}{5}$

both of the Punctures together to mate it flat in $3\frac{3}{5}$ minutes

15 A, B and C can complete a piece of work in 24:6 and 12 days. respectively. working together they will complete the same work in.

Sol:

(A+B+C)'s 1 day's work = $\left(\frac{1}{24}+\frac{1}{6}+\frac{1}{12}\right) = \frac{7}{24}$.

So, A, B and C together will complete the job in $\frac{24}{7}$

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