Time And Work.

Exercise Questions:-

1. A does a work in 10 days and B does the same work in 15 days. In how many days they together will do the same work?

Solution:
A's 1 days work $= \frac{1}{10}$ and

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

$\therefore$ (A+B)'s 1 days work $= \left(\frac{1}{10}+\frac{1}{15}\right) = \frac{1}{6}$.

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

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

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

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

Ans: $\frac{1}{6}$

3. A tyre has two punctures. The first puncture alone would have made the tyre flat in 9 minutes and the second alone would have done it in 6 minutes. If air leaks out at a constant rate, how long does it take both the punctures together to make it flat?

Solution!

1 minute's work of both the Punctures $= \left(\frac{1}{9} + \frac{1}{6}\right) = \frac{5}{18}$

So, both the puncture, will make the tyre flat in $\frac{18}{5} = 3\frac{3}{5}$ minutes.

Ans: $3\frac{3}{5}$ minutes.

4. 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 $= \left(\frac{1}{24} + \frac{1}{6} + \frac{1}{12}\right) = \frac{1}{24}$

So, A, B and C together will complete the job in

$\frac{24}{7} = 3\frac{3}{7}$ days.   Ans: $3\frac{3}{7}$ days.

5. A man can do a job in 15 days. His father takes 20 days and his son finishes it in 25 days. How long will they take to complete the job. if they all work together?

Sol:- 1 day's work of the three persons

$= \left(\frac{1}{15} + \frac{1}{20} + \frac{1}{25}\right) = \frac{47}{300}$

So, all the three together will complete the work in $\frac{300}{47} = 6.4$ days.

Ans: 6.4 days.

6. 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?

Sol: Son's 1 day's work $= \left(\frac{1}{3} - \frac{1}{5}\right) = \frac{2}{15}$

∴ The son alone can do the work in $\frac{15}{2} = 7\frac{1}{2}$ days

Ans $= 7\frac{1}{2}$ days.

7. A can lay railway track between two given stations in 16 days and B can do the 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!

Sol:- $(A+B+C)$'s 1 day's work $= \frac{1}{4}$, A's 1days work $= \frac{1}{16}$,

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

∴ C's 1 days work $= \frac{1}{4} - \left(\frac{1}{16} + \frac{1}{12}\right) = \left(\frac{1}{4} - \frac{7}{48}\right) = \frac{5}{48}$

So, C alone can do the work in $\frac{48}{5} = 9\frac{3}{5}$ days.

Ans: $9\frac{3}{5}$ days.

8. A takes twice as much time as B or thrice as much time to finish a piece of work. working together, they can finish the work in 2 days. B can do the work done in!

Sol: Suppose A, B and C take x, $\frac{x}{2}$, and $\frac{x}{3}$ hours respectively to finish the work.

Then, $\left[\frac{1}{x} + \frac{2}{x} + \frac{3}{x}\right] = \frac{1}{2} \implies \frac{6}{x} = \frac{1}{2}$

So, B takes 6 hours to finish the work.

Ans! 6 days.

9. X can do $\frac{1}{4}$ of a work in 10 days. Y can do 40 of the work in 40 days and Z can do $\frac{1}{3}$ of the work in 13 days. who will complete the work first?

Sol:- whole work will be done by X in $(10 \times 4) = 40$ days

whole work will be done by y in $\left(40 \times \frac{100}{40}\right) = 100$ days

whole work will be done by Z in $(13 \times 3) = 39$ days

∴ Z will complete the work first.

10. P, Q and R are three typists who working simultaneously can type 216 pages in 4 hours. In one hours, R can type as many pages more then 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 may pages does each of them type per hour?

SOL! Let the number of pages typed in one hour by P, Q and R be x, y and z respectively. Then,

$x + y + z = \frac{216}{4}$ => $x + y + z = 54$

$z - y = y - x$ => $2y = x + z$

$5z = 7x$ => $x = \frac{5}{7} z$.

Solving (i), (ii) and (iii), we get $x = 15, y = 18, z = 21$.

11. Ronald and Elan are working on an assignment. Ronald taken 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?

Sol:- Number of pages typed by Ronald in
$\qquad$ 1 hour $= \dfrac{32}{6} = \dfrac{16}{3}$

Number of pages typed by Elan in
$\qquad$ 1 hour $= \dfrac{40}{5} = 8$

Number of pages typed by both in
$\qquad$ 1 hour $= \left(\dfrac{16}{3} + 8\right) = \dfrac{40}{3}$

∴ Time taken by both to type 110 pages.

$= \left(110 \times \dfrac{3}{40}\right)$ hrs $= 8\dfrac{1}{4}$ hrs $= 8$ hrs 16 minute.

$\qquad$ Ans $= 8$ hrs 16 minutes.

12. Two workers A and B are engaged to do a work. A working alone takes 8 hours more to complete the job then 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?

Sol:- Let A and B together take x hours to Complete the work, then.

A alone takes $(x+8)$ hrs and B alone takes $\left(x + \dfrac{9}{2}\right)$hrs to Complete the work then,

$\dfrac{1}{(x+8)} + \dfrac{1}{\left(x + \dfrac{9}{2}\right)} = \dfrac{1}{x}$ ⟹ $\dfrac{1}{(x+8)} + \dfrac{2}{(2x+9)} = \dfrac{1}{x}$

⟹ $x(4x+25) = (x+8)(2x+9)$

⟹ $2x^2 = 72$ ⟹ $x^2 = 36$ ⟹ $x = 6$.

13. 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?

SoL!- P can Complete the work in (12×8) hrs = 96 hrs.

Q can Complete the work in (8×10) hrs = 80 hrs.

∴ P's 1 hours work = $\frac{1}{96}$ and Q's 1 hours work = $\frac{1}{80}$

$(P+Q)$'s 1 hours work = $\left(\frac{1}{96} + \frac{1}{80}\right) = \frac{11}{480}$

So, both P and Q will finish the work in $\left(\frac{480}{11}\right)$ hrs

∴ Number of days of 8 hours each = $\left(\frac{480}{11} \times \frac{1}{8}\right) = \frac{60}{11}$ days

$= 5\frac{5}{11}$ days.

14. A and B can do a work in 12 days, B and C in 15 days, C and A in 20 days. If A, B and C work together, they will Complete the work in:

SoL!- $(A+B)$'s 1 day's work = $\frac{1}{12}$; $(B+C)$'s 1day's work = $\frac{1}{15}$;

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

Adding, we get : $2(A+B+C)$'s 1 day work

$= \left(\frac{1}{12} + \frac{1}{15} + \frac{1}{20}\right) = \frac{12}{60} = \frac{1}{5}$

∴ $(A+B+C)$'s 1 day's work = $\frac{1}{10}$

So, A, B and C together can Complete the work in 10 days.

15. A and B can do a piece of 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:

Sol:- $(A+B+C)'s$ 1 day's work $= \frac{1}{6}$;

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

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

∴ $(A+C)'s$ 1 day's work $= \left(2 \times \frac{1}{6}\right) - \left(\frac{1}{8} + \frac{1}{12}\right) = \left(\frac{1}{3} - \frac{5}{24}\right)$

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

So, A and C together will do the work in 8 days.