TIME AND WORK

IMPORTANT FACTS AND FORMULAE

1. If A can do a piece of work in n days, then A's day's work $=\frac{1}{n}$.

2. If A's 1 day's work $=\frac{1}{n}$. then A can finish the work in n days.

3. If A is thrice as good a workman as B, then:
Ratio of work done by A and B = 3 : 1.
Ratio of times taken by A and B to finish a work = 1 : 3.

SOLVED EXAMPLES

Ex. 1. ***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 $=\frac{1}{12}$.

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

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

Ex. 2. ***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 day's work) = 2 : 1.

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

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

$\therefore$ 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.

Ex. 3. ***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 day's 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 $=\frac{1}{6}:\frac{1}{8}:\frac{1}{24}=4:3:1$.

$\therefore$ 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. [600 – (300 + 225)] = Rs. 75.

Ex. 3. ***A and B working separately can do a piece of work in 9 and 12 days respectively. If they work for a day alternately, 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 $\left(6\times\frac{1}{36}\right)=\frac{1}{4}$ day.

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

Ex. 4. ***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 and 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 $\frac{25}{2}=12\frac{1}{2}$ days.

Exercise – 1

(OBJECTIVE TYPE QUESTIONS)

Directions: ***Mark (√) against the correct answer:***

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?

   (a) 5 days (b) 6 days (c) 8 days (d) 9 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?

(a) $\frac{1}{6}$ (b) $\frac{1}{9}$ (c) $\frac{2}{5}$ (d) $\frac{2}{7}$

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?

(a) $1\frac{1}{2}$ min *utes* (b) $3\frac{1}{2}$ min *utes* (c) $3\frac{3}{5}$ min *utes* (d) $4\frac{1}{4}$ min *utes*

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:

(a) $\frac{1}{24}$ *day* (b) $\frac{7}{24}$ *day* (c) $3\frac{3}{7}$ *day* (d) 4 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?

(a) Less than 6 days (b) Exactly 6 days

(c) Approximately 6.4 days (d) More than 10 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?

(a) $6\frac{1}{2}$*days* (b) 7 days (c) $7\frac{1}{2}$*days* (d) 8 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:

(a) $9\frac{1}{5}$*days* (b) $9\frac{2}{5}$*days* (c) $9\frac{3}{5}$*days* (d) 10 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 alone in:

(a) 4 days (b) 6 days (c) 8 days (d) 12 days

9. Ronald and Elan are working on an assignment. Ronald takes 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?

(a) 7 hours 30 minutes (b) 8 hours

(c) 8 hours 15 minutes (d) 8 hours 25 minutes

10. 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?

(a) $5\frac{5}{11}$ (b) $5\frac{6}{11}$ (c) $6\frac{5}{11}$ (d) $6\frac{6}{11}$

11. 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:

(a) 5 days (b) $7\frac{5}{6}$*days* (c) 10 days (d) $15\frac{2}{3}$*days*

12. A and B can do a 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:

(a) 4 days (b) 6 days (c) 8 days (d) 12 days

13. A can do a piece of work in 4 hours; B and C together can do it in 3 hours, while A and C together can do it in 2 hours. How long will B alone take to do it?

(a) 8 hours (b) 10 hours (c) 12 hours (d) 24 hours

14. A can do a certain work in the same time in which B and C together can do it. If A and B together could do it in 10 days and C alone in 50 days, then B alone could do it in:

(a) 15 days (b) 20 days (c) 25 days (d) 30 days

15. A works twice as fast as B. If B can complete a work in 12 days independently, the number of days in which A and B can together finish the work is:

(a) 4 days (b) 6 days (c) 8 days (d) 18 days

16. A is thrice as good a workman as B and therefore is able to finish a job in 60 days less than B. Working together, they can do it in:

(a) 20 days (b) $22\frac{1}{2} days$ (c) 25 days (d) 30 days

17. A and B can do a job together in 7 days. A is $1\frac{3}{4}$ times as efficient as B. The same job can be done by A alone in:

(a) $9\frac{1}{3} days$ (b) 11 days (c) $12\frac{1}{4} days$ (d) $16\frac{1}{3} days$

18. Sakshi can do a piece of work in 20 days. Tanya is 25% more efficient than Sakshi. The number of days taken by Tanya to do the same piece of work is:

(a) 15 (b) 16 (c) 18 (d) 25

19. A is 30% more efficient than B. How much time will they, working together, take to complete a job which A alone could have done in 23 days?

(a) 11 days (b) 13 days (c) $20\frac{3}{17} days$ (d) None of these

20. A can do a work in 15 days and B in 20 days. If they work on it together for 4 days, then the fraction of the work that is left is:

(a) $\frac{1}{4}$ (b) $\frac{1}{10}$ (c) $\frac{7}{15}$ (d) $\frac{8}{15}$

21. A can finish a work in 18 days and B can do the same work in 15 days. B worked for 10 days and left the job. In how many days, A alone can finish the remaining work?

(a) 5 (b) $5\frac{1}{2}$ (c) 6 (d) 8

22. A and B can complete a work in 15 days and 10 days respectively. They started doing the work together but after 2 days B had to leave and A alone completed the remaining work. The whole work was completed in:

(a) 8 days (b) 10 days (c) 12 days (d) 15 days

23. A can finish a work in 24 days, B in 9 days and c in 12 days. B and C start the work but are forced to leave after 3 days. The remaining work was done by A in:

(a) 5 days (b) 6 days (c) 10 days (d) $10\frac{1}{2}days$

24. A machine P can print one lakh books in 8 hours, machine Q can print the same number of books in 10 hours while machine R can print them in 12 hours. All the machines are started at 9 a.m. while machine P is closed at 11 a.m. and the remaining two machines complete the work. Approximately at what time will the work be finished?

(a) 11:30 a.m. (b) 12 noon (c) 12:30 p.m. (d) 1 p.m.

25. X and Y can do a piece of work in 20 days and 12 days respectively. X started the work alone and then after 4 days Y joined him till the completion of the work. How long did the work last?

(a) 6 days (b) 10 days (c) 15 days (d) 20 days

26. A and B can together finish a work in 30 days. They worked together for 20 days and then B left. After another 20 days, A finished the remaining work. In how many days A alone can finish the job?

(a) 40 (b) 50 (c) 54 (d) 60

27. X can do a piece of work in 40 days. He works at it for 8 days and then Y finished it in 16 days. How long will they together take to complete the work?

(a) $13\frac{1}{3}days$ (b) 15 days (c) 20 days (d) 56 days

28. A does $\frac{4}{5}$ of a work in 20 days. He then calls in B and they together finish the remaining work in 3 days. How long B alone would take to do the whole work?

(a) 23 days (b) 37 days (c) $37\frac{1}{2}days$ (d) 40 days

29. A and B together can do a piece of work in 30 days. A having worked for 16 days, B finishes the remaining work alone in 44 days. In how many days shall B finish the whole work alone?

(a) 30 days (b) 40 days (c) 60 days (d) 70 days

30. A and B can do a piece of work in 45 days and 40 days respectively. They began to do the work together but A leaves after some days and then B completed the remaining work in 23 days. The number of days after which A left the work was:

(a) 6 (b) 8 (c) 9 (d) 12