TIME AND WORK

day-1

Concepts

- If a man can do a piece of work in x days, then the work done by him in one day will be $\frac{1}{x}$ of the total work.
  The relation between Number of people working (N), Number of Days (D) worked, Number of hours (H) worked per day and the Quantity of Work (W) is
  $$\frac{N_1 \times D_1 \times H_1}{W_1} = \frac{N_2 \times D_2 \times H_2}{W_2}$$
- If A can complete a work in 'x' days, he will do $\frac{1}{x}$ of the work in one day.
- If B can complete a work in 'y' day, he will do $\frac{1}{y}$ of the work in one day.
- Total work done by both in one day = $\frac{1}{x} + \frac{1}{y} = \frac{x+y}{xy}$
- Time taken for them to complete the work = $\frac{xy}{x+y}$
- If you are solving questions by assuming the total amount of work to be done, assume the total amount of work to be completed as the LCM of time taken by different people to complete the same piece of work (to make calculations easier).
- The wages paid for any task has to be divided between workers in the proportion of their contribution towards the completion of the task.
- For questions based on Pipes and cisterns, the same concept of people working with different efficiencies is used. The work done in filling a cistern is taken as positive and the work done in emptying a cistern is taken as negative.

Drill

1. A can do a piece of work in 40 days and B can do the same work in 60days. Working together, in how many days will they complete the work?
2. Working together, Rajeev and Vikram can complete a piece of workin 48 days. Rajeev can complete the work alone in 64 days. Both of them worked together for 30 days and then Rajeev left. How long will Vikram take to complete the remaining work?
3. A can do a piece of work in 10 days, B in 12 days and C in 15 days. They all start the work together, but A leaves the work after 2 days and B leaves 3 days before the work is completed. How many days did thework last?
4. Two taps A and B can fill a cistern in 42 and 56 minutes respectively. If both the taps are opened together, then find the time taken to fill thecistern.
5. Two taps A and B can fill a cistern in 10 and 15 minutes respectively.Both the taps are opened together but at the end of 3 minutes, tap B is turned off. In how much time will the cistern be filled?
6. A cistern is fitted with three taps, namely P, Q and R. P and Q can fill a cistern in 10 and 15 minutes respectively whereas R (emptying tap fitted at the bottom of the cistern) can empty it in 12 minutes. If all the three pipes are kept open, in how much time will the cistern be filled?
7. A cistern generally takes 20 minutes to be filled by a pipe, but due to a leak, it takes 10 extra minutes to get filled. Find the time in which the leak alone can empty the cistern filled with water.
8. 12 men can dig a well in 15 days, working 8 hours a day. How many days will 18 men require to dig a similar well working for 5 hours aday?
9. 30 workers can make 24 tables in 21 days, working 8 hours a day. If35 workers want to make 18 such tables in 12 days, how many hours should they work every day?
10. If 9 friends can eat 9 ice creams in 9 minutes, how long will 15 friends take to eat 15 such ice creams?
11. A mess has provisions for 360 men for 70 days. If the number of men increases by 90, for how many days will the provisions last?
12. 12 boys and 16 girls can do a piece of work in 10 days while 13 boys and 24 girls can do the same work in 8 days. Find the time taken by 15 boys and 20 girls to do the same work.
13. A can complete a piece of work in 30 days. B can complete the same work in 40 days. If they complete the work together and earn Rs. 350 for the job, find A's share.
14. A can do a piece of work in 25 days and B can do it in 20 days. They work together for 5 days and then A quits. B completes the remaining work. If they are paid Rs. 750 for the job, find B's share.
15. A and B can do a work in 20 and 30 days respectively. If both of them working along with C can finish the work in 8 days, then find C's share in the total wage of Rs. 1200.
16. In the question discussed earlier, "12 boys and 16 girls can do a piece ofwork in 10 days while 13 boys and 24 girls can do the same work in 8 days. Find the time taken by 15 boys and 20 girls to do the same work.", if the group is paid Rs. 40,000 for the task, what will be the wage paid to each boy and girl per day?

Concept review questions

1. A certain number of men can finish a job in 90 days. If there were 16 more men, the work could have been completed 18 days earlier. How many men were there initially?

   a. 108 b. 64 c. 80 d. 48

2. 12 men can build a wall 100 metres long, 3 metres high and 0.5 meter thick in 25 days. In how many days will 20 men build a wall 60 metres long, 4 metres high and 0.25 metres thick?

   a. 3 days b. 12 days c. 6 days d. 8 days

3. A man works twice as fast as a woman. A woman works twice as fast as a child. If 16 men can complete a job in 12 days, then how many days would be required for 32 women and 64 children together to complete the same job?

   a. 2 days b. 12 days c. 3 days d. 6 days

4. To complete a task in 45 days, a contractor employs 45 people. Upon reviewing the work after 30 days, he notices that only half of the task is complete. In order to complete the work in 45 days, how many extra people must he employ now?

   a. 90 b. 15 c. 60 d. 45

5. To complete a task, two men work on the first day, three men on the second day and so on, till it gets completed. If the same

work can becompleted by 9 men working for 15 days, in how many days will the work be completed in the earlier case?

a. 15 days b. 16 days c. 14 days d. 17 days

6. 4 men and 4 women can build a room in 5 days. 7 men and 2 women will take 4 days to complete the same piece of work. How many days will 6 men and 1 woman take to complete twice the job?

a. 10 days b. 20 days c. 5 days d. None

7. If 3 men or 4 women can reap a field in 43 days, how long will 7 men and 5 women take to reap it?

a. 12 days b. 1 day c. 6 days d. 8 days

8. A is thrice as good a work man as B. If together they can complete a task in 12 days, in how many days can A alone complete it?

a. 48 days b. 16 days c. 24 days d. None

9. Rajeev takes one hour to arrange 96 books. Sanjeev takes one and a half hour to arrange the same number of books. Working together, how many hours will they take to arrange 4000 books?

a. $20\frac{2}{3}$ hrs b. $31\frac{1}{4}$ hrs c. $41\frac{1}{3}$ hrs d. 25 hrs

10. Anil, Benny and Cyril work for a ship building company. Anil can build a ship in 10 days while Benny can build the same ship in 8 days. Working together, all three of them can build a similar ship in 4 days. In how many days can Cyril alone build it?

a. 20 days b. 80 days c. 40 days d. None

11. A and B can do a piece of work in 30 days. B and C can do it in 37.5 days. C and A can do it in 50 days. In how many days will they finish, if A, B and C work together?

a. 25 days b. 15 days c. 10 days d. None

12. A, working alone can make a cabinet in 12 days. B will take 6 days more than A to do the same work. A and B along with the help of C completes it in 5 days. If they are paid Rs. 9000 for the job, find C's share.

a. Rs. 2750 b. Rs. 2500 c. Rs. 2250 d. None

13. Two taps X and Y can fill a cistern in 32 and 40 minutes respectively. Both the taps are opened into the empty cisterns and after some time tap X is closed. Tap Y alone fills the remaining portion of the cistern. If it took 25 minutes to fill the tank, for how much time was tap X keptopen?

a. 13 min b. 25 min c. 12 min d. None

14. Taps X and Y can fill a tank in 30 and 40 minutes respectively. Tap Z can empty the filled tank in 60 minutes. If all the three taps are kept open for one minute each, how much time will the taps take to fill the tank?

a. 48 min b. 72 min c. 24 min d. None

15. A booster pump can be used for filling as well as emptying a tank of capacity 2400 m^3. The emptying capacity of the pump is 10 m^3 per minute higher than its filling capacity and the pump needs 8 minutes lesser to empty the tank than it needs to fill it. What is the filling capacity of the pump?

a. 20 m^3/min b. 60 m^3/min c. 40 m^3/min d. 50 m^3/min

16. A tap requires 18 hours to fill a tank. On a particular day, it was noticed that 18 hours after the tap was turned open, the tank was not filled due to leak at the bottom of the tank. The leak was plugged and it took the tap 3 more hours to fill the tank. Working alone, how long will the leak take to empty the tank?

a. 3 hrs b. 108 hrs c. 72 hrs d. None