Important Things to know for solving Problems on Time and Work

1. If A can do a piece of work in n days, then A’s 1 day work = 1/n

2. If A’s 1 day’s work = 1/n, then A can finish the work in n days.

Example: If A can do a piece of work in 4 days, then A’s 1 day’s work = 1/4. If A’s 1 day’s work = 1/5, then A can finish the work in 5 days

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

4. Definition of Variation: The change in two different variables follow some definite rule. It said that the two variables vary directly or inversely. Its notation is X/Y = k, where k is called constant. This variation is called direct variation. XY = k. This variation is called inverse variation.

5. Some Pairs of Variables:

   i. Number of workers and their wages. If the number of workers increases, their total wages increase. If the number of days reduced, there will be less work. If the number of days is increased, there will be more work. Therefore, here we have direct proportion or direct variation.

   ii. Number workers and days required to do a certain work is an example of inverse variation. If more men are employed, they will require fewer days and if there are less number of workers, more days are required.

   iii. There is an inverse proportion between the daily hours of a work and the days required. If the number of hours is increased, less number of days are required and if the number of hours is
reduced, more days are required.

6. Some Important Tips:

Number of days required to complete the given work = Total work/One day’s work.

Since the total work is assumed to be one(unit), the number of days required to complete the given work
would be the reciprocal of one day’s work. Sometimes, the problems on time and work can be solved
using the proportional rule ((man*days*hours)/work) in another situation.

7. If men is fixed, work is proportional to time. If work is fixed, then time is inversely
proportional to men therefore,
(M1*T1/W1) = (M2*T2/W2)

Problems on Time and Work

1) If 9 men working 6 hours a day can do a work in 88 days. Then 6 men working 8 hours a day
can do it in how many days?

Solution: From the above formula i.e (m1*t1/w1) = (m2*t2/w2)
so (9*6*88/1) = (6*8*d/1)
on solving, d = 99 days.

2) If 34 men completed 2/5th of a work in 8 days working 9 hours a day. How many more man
should be engaged to finish the rest of the work in
6 days working 9 hours a day?

Solution: From the above formula i.e (m1*t1/w1) = (m2*t2/w2)
so, (34*8*9/(2/5)) = (x*6*9/(3/5))
so x = 136 men
number of men to be added to finish the work = 136-34 = 102 men
3) If 5 women or 8 girls can do a work in 84 days. In how many days can 10 women and 5 girls can do the same work?

Solution: Given that 5 women is equal to 8 girls to complete a work so, 10 women = 16 girls.
Therefore 10women + 5 girls = 16 girls + 5 girls = 21 girls.
8 girls can do a work in 84 days
then 21 girls ———— ?
Answer = (8*84/21) = 32 days. Therefore 10 women and 5 girls can a work in 32 days

4) Worker A takes 8 hours to do a job. Worker B takes 10 hours to do the same job. How long it take both A & B, working together but independently, to do the same job?

Solution: A’s one hour work = 1/8.
B’s one hour work = 1/10
(A+B)’s one hour work = 1/8 + 1/10 = 9/40
Both A & B can finish the work in 40/9 days

5) 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: Given that B alone can complete the same work in days = half the time taken by A = 9 days
A’s one day work = 1/18
B’s one day work = 1/9
(A+B)’s one day work = 1/18 + 1/9 = 1/6

6) 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.

Solution: if A takes x days to do a work then
B takes 2x days to do the same work
= > 1/x + 1/2x = 1/18
= > 3/2x = 1/18
= > x = 27 days.
Hence, A alone can finish the work in 27 days.

7) A can do a certain work in 12 days. B is 60% more efficient than A. How many days does B
alone take to do the same job?

Solution: Ratio of time taken by A & B = 160:100 = 8:5
Suppose B alone takes x days to do the job.
Then, 8:5::12:x
=> 8x = 5*12
=> x = 15/2 days.

8) A can do a piece of work in 7 days of 9 hours each and B alone can do it in 6 days of 7 hours each. How long will they take to do it working together 8 2/5 hours a day?

Solution: A can complete the work in (7*9) = 63 days
B can complete the work in (6*7) = 42 days
=> A’s one hour’s work = 1/63 and
B’s one hour work = 1/42
(A+B)’s one hour work = 1/63+1/42 = 5/126
Therefore, Both can finish the work in 126/5 hours.
Number of days of 8 2/5 hours each = (126*5/(5*42)) = 3 days

9) 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 ?

Solution: Suppose A,B and C take x,x/2 and x/3 hours respectively finish the work then 1/x+2/x+3/x = 1/2
=> 6/x = 1/2
=> x = 12
So, B takes 6 hours to finish the work.

10) X can do ¼ of a work in 10 days, Y can do 40% of work in 40 days and Z can do 1/3 of work in 13 days. Who will complete the work first?

Solution: Whole work will be done by X in 10*4 = 40 days.
Whole work will be done by Y in (40*100/40) = 100 days.
Whole work will be done by Z in (13*3) = 39 days
Therefore,Z will complete the work first.
1) 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 can finish it in 3 days. Find the share of each?

Solution: C’s one day’s work = \( \frac{1}{3} - \left( \frac{1}{6} + \frac{1}{8} \right) = \frac{1}{24} \)
Therefore, A:B:C = Ratio of their one day’s work = \( \frac{1}{6} : \frac{1}{8} : \frac{1}{24} = 4:3:1 \)
A’s share = Rs \( \frac{600 \times 4}{8} = 300 \)
B’s share = Rs \( \frac{600 \times 3}{8} = 225 \)
C’s share = Rs \( 600 - (300 + 225) \) = Rs 75

2) A can do a piece of work in 80 days. He works at it for 10 days & then B alone finishes the remaining work in 42 days. In how much time will A and B, working together, finish the work?

Solution: Work done by A in 10 days = \( \frac{10}{80} = \frac{1}{8} \)
Remaining work = \( 1 - \left( \frac{1}{8} \right) = \frac{7}{8} \)
Now, work will be done by B in 42 days.
Whole work will be done by B in \( \frac{42 \times 8}{7} = 48 \) days
Therefore, A’s one day’s work = \( \frac{1}{80} \)
B’s one day’s work = \( \frac{1}{48} \)
\((A+B)’s \) one day’s work = \( \frac{1}{80} + \frac{1}{48} = \frac{8}{240} = \frac{1}{30} \)
Hence, both will finish the work in 30 days.

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

Solution: Let the number of pages typed in one hour by P, Q and R be \( x,y \) and \( z \) respectively. Then
\( x+y+z = \frac{216}{4} = 54 \) ———— 1
\( z-y = y-x \Rightarrow 2y = x+z \) ———— 2
\( 5z = 7x \Rightarrow x = \frac{5x}{7} \) ———— 3
Solving 1,2 and 3 we get \( x = 15, y = 18, \) and \( z = 21 \)

4) 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?
Solution: Number of pages typed by Ronald in one hour = \( \frac{32}{6} = \frac{16}{3} \)
Number of pages typed by Elan in one hour = \( \frac{40}{5} = 8 \)
Number of pages typed by both in one hour = \( \left( \frac{16}{3} + 8 \right) = \frac{40}{3} \)
Time taken by both to type 110 pages = \( 110 \times \frac{3}{40} = 8 \) hours.

5) Two workers A and B are engaged to do a work. A working alone takes 8 hours more to complete the job than if both working together. If B worked alone, he would need 4 1/2 hours more to complete the job than they both working together. What time would they take to do the work together.

Solution: \( \frac{1}{x+8} + \frac{1}{x+\frac{9}{2}} = \frac{1}{x} \)
\( \Rightarrow \frac{1}{x+8} + \frac{2}{2x+9} = \frac{1}{x} \)
\( \Rightarrow x(4x+25) = (x+8)(2x+9) \)
\( \Rightarrow 2 \times 2 = 72 \)
\( \Rightarrow x^2 = 36 \)
\( \Rightarrow x = 6 \)
Therefore, A and B together can do the work in 6 days.

6) 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 how many days?

Solution: \( A+B \)'s one day's work = \( \frac{1}{12} \);
\( B+C \)'s one day's work = \( \frac{1}{15} \);
\( A+C \)'s one day's work = \( \frac{1}{20} \);
Adding we get \( 2(A+B+C) \)'s one day's work = \( \frac{1}{12} + \frac{1}{15} + \frac{1}{20} = \frac{12}{60} = \frac{1}{5} \)
\( A+B+C \)'s one day work = \( \frac{1}{10} \)
So, A, B, and C together can complete the work in 10 days.

7) 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 how many days?

Solution: \( A+B+C \)'s one day's work = \( \frac{1}{6} \);
\( A+B \)'s one day's work = \( \frac{1}{8} \);
\( B+C \)'s one day's work = \( \frac{1}{12} \);
\( A+C \)'s one day's work = \( 2(A+B+C) \)'s one day's work - \( (A+B) \)'s one day work + \( (B+C) \)'s one day work
\( = \frac{2}{6} - \left( \frac{1}{8} + \frac{1}{12} \right) \)
\( = \frac{1}{3} - \frac{5}{24} \)
So, A and C together will do the work in 8 days.

8) 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 how many days?

Solution:

(A+B)'s one day's work = 1/10;

C's one day's work = 1/50

(A+B+C)'s one day's work = (1/10+1/50) = 6/50 = 3/25

Also, A's one day's work = (B+C)'s one day's work

From i and ii, we get :2*(A's one day's work) = 3/25

=> A's one day's work = 3/50

B's one day's work = (1/10-3/50)

= 2/50

= 1/25

B alone could complete the work in 25 days.

9) 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:

Solution:

Ratio of times taken by A and B = 1:3.

If difference of time is 2 days, B takes 3 days

If difference of time is 60 days, B takes (3*60/2) = 90 days

So, A takes 30 days to do the work = 1/90

A’s one day’s work = 1/30;

B’s one day’s work = 1/90;

(A+B)'s one day’s work = 1/30+1/90 = 4/90 = 2/45

Therefore, A & B together can do the work in 45/2 days

10) 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 & B, working together, finish the work?

Solution:

Work Done by A n 10 days = 10/80 = 1/8

Remaining work = 1-1/8 = 7/8

Now 7/8 work is done by B in 42 days

Whole work will be done by B in 42*8/7 = 48 days

=> A’s one day’s work = 1/80 and
B’s one day’s work = 1/48
(A+B)’s one day’s work = 1/80+1/48 = 8/240 = 1/30
Hence both will finish the work in 30 days.

11) 45 men can complete a work in 16 days. Six days after they started working, so more men joined them. How many days will they now take to complete the remaining work?

Solution: \( M_1 \times D_1 / W_1 = M_2 \times D_2 / W_2 \)
\[ = 45 \times 6 / (6 / 16) = 75 \times x / (1 - (6 / 16)) \]
\[ = x = 6 \text{ days} \]

12) A is 50% as efficient as B. C does half the work done by A & B together. If C alone does the work in 40 days, then A, B and C together can do the work in:

Solution: A’s one day’s work:B’s one day’s work = 150:100 = 3:2
Let A’s & B’s one day’s work be 3x and 2x days respectively.
Then C’s one day’s work = 5x/2
\[ = > 5x/2 = 1/40 \]
\[ = > x = ((1/40) \times (2/5)) = 1/100 \]
A’s one day’s work = 3/100
B’s one day’s work = 1/50
C’s one day’s work = 1/40
So, A, B and C can do the work in 13 1/3 days.

13) 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?

Solution: B’s 10 day’s work = 10/15 = 2/3
Remaining work = (1-(2/3)) = 1/3
Now, 1/18 work is done by A in 1 day.
Therefore 1/3 work is done by A in 18*(1/3) = 6 days.

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

Solution: (B+C)’s one day’s work = 1/9+1/12 = 7/36
Work done by B & C in 3 days = 3*7/36 = 7/12
Remaining work = 1-(7/12) = 5/12
Now, 1/24 work is done by A in 1 day.
So, 5/12 work is done by A in 24*5/12 = 10 days

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

Solution: work done by X in 4 days = 4/20 = 1/5
Remaining work = 1-1/5 = 4/5
(X+Y)’s one day’s work = 1/20+1/12 = 8/60 = 2/15
Now, 2/15 work is done by X and Y in one day.
So, 4/5 work will be done by X and Y in 15/2*4/5 = 6 days
Hence Total time taken = (6+4) days = 10 days

16) A does 4/5 of 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?

Solution: Whole work is done by A in 20*5/4 = 25 days
Now, (1-(4/5)) i.e 1/5 work is done by A & B in days.
Whole work will be done by A & B in 3*5 = 15 days
= >B’s one day’s work = 1/15-1/25 = 4/150 = 2/75
So, B alone would do the work in 75/2 = 37 ½ days.

17) 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 n 23 days. The number of days after which A left the work was

Solution: (A+B)’s one day’s work = 1/45+1/40 = 17/360
Work done by B in 23 days = 23/40
Remaining work = 1-(23/40) = 17/40
Now, 17/360 work was done by (A+B) in 1 day.
17/40 work was done by (A+B) in (1*(360/17)*(17/40)) = 9 days
So, A left after 9 days.

18) A can do a piece of work in 10 days, B in 15 days. They work for 5 days. The rest of work finished by C in 2 days. If they get Rs 1500 for the whole work, the daily wages of B and C are:

Solution: Part of work done by A = 5/10 = 1/2
Part of work done by B = 1/3
Part of work done by C = \(1-(\frac{1}{2}+\frac{1}{3})\) = \(\frac{1}{6}\)

A’s share: B’s share: C’s share = \(\frac{1}{2}:\frac{1}{3}:\frac{1}{6}\) = 3:2:1

A’s share = \((\frac{3}{6}) \times 1500\) = 750

B’s share = \((\frac{2}{6}) \times 1500\) = 500

C’s share = \((\frac{1}{6}) \times 1500\) = 250

A’s daily wages = \(\frac{750}{5}\) = 150/-

B’s daily wages = \(\frac{500}{5}\) = 100/-

C’s daily wages = \(\frac{250}{2}\) = 125/-

Daily wages of B & C = 100+125 = 225/-

19) A alone can complete a work in 16 days and B alone can complete the same in 12 days. Starting with A, they work on alternate days. The total work will be completed in how many days?

(a) 12 days  (b) 13 days  (c) 13 5/7 days  (d) 13 ¾ days

Solution: \((A+B)’s\) 2 days work = \(\frac{1}{16} + \frac{1}{12}\) = \(\frac{7}{48}\)

work done in 6 pairs of days = \((\frac{7}{48}) \times 6\) = \(\frac{7}{8}\)

remaining work = 1- \(\frac{7}{8}\) = \(\frac{1}{8}\)

work done by A on 13th day = \(\frac{1}{16}\)

remaining work = \(\frac{1}{8} - \frac{1}{16}\) = \(\frac{1}{16}\)

on 14th day, it is B’s turn

1/12 work is done by B in 1 day.

1/16 work is done by B in \(\frac{3}{4}\) day.

Total time taken = 13 \(\frac{3}{4}\) days.

So, Answer is: D

20) A, B and C can do a piece of work in 20, 30 and 60 days respectively. In how many days can A do the work if he is assisted by B and C on every third day?

Solution: A’s two day’s work = \(\frac{2}{20}\) = \(\frac{1}{10}\)

\((A+B+C)’s\) one day’s work = \(\frac{1}{20}+\frac{1}{30}+\frac{1}{60}\) = \(\frac{6}{60}\) = \(\frac{1}{10}\)

Work done in 3 days = \((\frac{1}{10}+\frac{1}{10})\) = \(\frac{1}{5}\)

Now, 1/5 work is done in 3 days

Therefore, Whole work will be done in \((3 \times 5)\) = 15 days.

21) Seven men can complete a work in 12 days. They started the work and after 5 days, two men left. In how many days will the work be completed by the remaining men?
22) 12 men complete a work in 9 days. After they have worked for 6 days, 6 more men joined them. How many days will they take to complete the remaining work?

(a) 2 days (b) 3 days (c) 4 days (d) 5 days

Solution: 1 man's 1 day work = 1/108
12 men's 6 days work = 6/9 = 2/3
remaining work = 1 - 2/3 = 1/3
18 men's 1 day's work = 18/108 = 1/6
1/6 work is done by them in 1 day
therefore, 1/3 work is done by them in 6/3 = 2 days.
Ans : A

23) A man, a woman and a boy can complete a job in 3, 4 and 12 days respectively. How many boys must assist 1 man and 1 woman to complete the job in ¼ of a day?

(a). 1 (b). 4 (c). 19 (d). 41

Solution: (1 man + 1 woman)'s 1 days work = 1/3 + 1/4 = 7/12
Work done by 1 man and 1 woman in 1/4 day = ((7/12)*(1/4)) = 7/48
Remaining work = 1 - 7/48 = 41/48
Work done by 1 boy in ¼ day = ((1/12)*(1/4)) = 1/48
Therefore, Number of boys required = ((41/48)*48) = 41 days
So, Answer: D

24) 12 men can complete a piece of work in 4 days, while 15 women can complete the same work in 4 days. 6 men start working on the job and after working for 2 days, all of them stopped
working. How many women should be put on the job to complete the remaining work, if it is to be completed in 3 days.

(A) 15 (B) 18 (C) 22 (D) data inadequate

Solution: one man’s one day’s work = 1/48
one woman’s one day’s work = 1/60
6 men’s 2 day’s work = ((6/48)*2) = ¼
Remaining work = 3/4
Now, 1/60 work s done in 1 day by 1 woman.
So, ¾ work will be done in 3 days by (60*(3/4)*(1/3)) = 15 woman.
So, Answer: A

25) Twelve children take sixteen days to complete a work which can be completed by 8 adults in 12 days. Sixteen adults left and four children joined them. How many days will they take to complete the remaining work?

(A) 3 (B) 4 ( C) 6 (D) 8

Solution: one child’s one day work = 1/192;
one adult’s one day’s work = 1/96;
work done in 3 days = ((1/96)*16*3) = 1/2
Remaining work = 1 − ½ = 1/2
(6 adults+ 4 children)’s 1 day’s work = 6/96+4/192 = 1/12
1/12 work is done by them in 1 day.
½ work is done by them 12*(1/2) = 6 days
So, Answer = C

26) Sixteen men can complete a work in twelve days. Twenty four children can complete the same work in 18 days. 12 men and 8 children started working and after eight days three more children joined them. How many days will they now take to complete the remaining work?

(A) 2 days (B) 4 days ( C) 6 days (D) 8 days

Solution: one man’s one day’s work = 1/192
one child’s one day’s work = 1/432
Work done in 8 days = 8*(12/192+ 8/432) = 8*(1/16+1/54) = 35/54
Remaining work = 1 - 35/54 = 19/54
(12 men + 11 children)'s 1 day's work = 12/192 + 11/432 = 19/216
Now, 19/216 work is done by them in 1 day.
Therefore, 19/54 work will be done by them in ((216/19)*(19/54)) = 4 days
So, Answer: B

27) Twenty-four men can complete a work in 16 days. Thirty-two women can complete the same work in twenty-four days. Sixteen men and sixteen women started working and worked for 12 days. How many more men are to be added to complete the remaining work in 2 days?

(A) 16 men (B) 24 men (C) 36 men (D) 48 men

Solution: one man's one day's work = 1/384
one woman's one day's work = 1/768
Work done in 12 days = 12*(16/384 + 16/768) = 12*(3/48) = 3/4
Remaining work = 1 - ¾ = 1/4
(16 men + 16 women)'s two day's work = 12*(16/384 + 16/768) = 2/16 = 1/8
Remaining work = 1/4 - 1/8 = 1/8
1/384 work is done in 1 day by 1 man.
Therefore, 1/8 work will be done in 2 days in 384*(1/8)*(1/2) = 24 men

28) 4 men and 6 women can complete a work in 8 days, while 3 men and 7 women can complete it in 10 days. In how many days will 10 women complete it?

(A) 35 days (B) 40 days (C) 45 days (D) 50 days

Solution: Let 1 man's 1 day's work = x days and
1 woman's 1 day's work = y
Then, 4x + 6y = 1/8 and 3x + 7y = 1/10.
Solving these two equations, we get: x = 11/400 and y = 1/400
Therefore, 1 woman's 1 day's work = 1/400
=> 10 women will complete the work in 40 days.
Answer: B

29) One man, 3 women and 4 boys can do a piece of work in 96 hours, 2 men and 8 boys can do it in 80 hours, 2 men & 3 women can do it in 120 hours. 5 Men & 12 boys can do it in how many hours?
Solution: Let 1 man’s 1 hour’s work = x
1 woman’s 1 hour’s work = y
1 boy’s 1 hour’s work = z

Then, \(x + 3y + 4z = \frac{1}{96}\) ——— (1)
\(2x + 8z = \frac{1}{80}\) ——— (2)

Adding (2) & (3) and subtracting (1)
\(3x + 4z = \frac{1}{96}\) ——— (4)

From (2) and (4), we get \(x = \frac{1}{480}\)

Substituting, we get: \(y = \frac{1}{720}\) and \(z = \frac{1}{960}\)

\((5\text{ men} + 12\text{ boys})\)’s 1 hour’s work = \(\frac{5}{480} + \frac{12}{960} = \frac{1}{96} + \frac{1}{80} = \frac{11}{480}\)

Therefore, 5 men and 12 boys can do the work in \(\frac{480}{11}\) or \(43\frac{7}{11}\) hours.

So, Answer: C