QUANTITATIVE ABILITY - TIME AND WORK

CONCEPTS

Man - Work - Hour Formula:

More men can do more work. More work means more time required to do work.
More men can do more work in less time.
M men can do a piece of work in T hours, then Total effort or work = MT man hours.
Rate of work * Time = Work Done.
If A can do a piece of work in D days, then A's 1 day's work = 1/D.
Part of work done by A for t days = t/D.
If A's 1 day's work = 1/D, then A can finish the work in D days.
MDH/W = Constant
Where,
M = Number of men
D = Number of days
H = Number of hours per day
W = Amount of work
If M1 men can do W1 work in D1 days working H1 hours per day and M2 men can do W2 work in D2 days working H2 hours per day, then
(M1 × D1 × H1)/W1 = (M2 × D2 × H2)/W2

- If A is x times as good a workman as B, then:
  Ratio of work done by A and B = x:1
  Ratio of time taken by A and B to finish a work = 1: x i.e; A will take $\frac{1}{x}^{th}$ of the time taken by B to do the same work.

Shortcuts for frequently asked time and work problems

- A and B can do a piece of work in 'a' days and 'b' days respectively, then working together:
  They will complete the work in (ab)/(a + b) days
  In one day, they will finish (a + b)/ab part of work.

- If A can do a piece of work in 'a' days, B can do in 'b' days and C can do in 'c' days then,
  A, B and C together can finish the same work in (abc)/(ab + bc + ca) days.

- If A can do a work in x days and A and B together can do the same work in y days then,
  Number of days required to complete the work if B works alone = (xy)/(x − y) days.

- If A and B together can do a piece of work in x days, B and C together can do it in y days and C and A together can do it in z days, then number of days required to do the same work:
  If A, B, and C working together = (2xyz)/(xy + yz + zx)
  If A working alone = (2xyz)/(xy + yz – zx)
  If B working alone = (2xyz)/(−xy + yz + zx)
  If C working alone = (2xyz)/(xy – yz + zx)

- If A and B can together complete a job in x days.
  If A alone does the work and takes 'a' days more than A and B working together.
  If B alone does the work and takes b days more than A and B working together.
  Then, x = $\sqrt{ab}$ days

- If m1 men or b1 boys can complete a work in D days, then m2 men and b2 boys can complete the same work in (D × m1 × b1)/(m2 × b1 + m1 × b2) days.

- If m men or w women or b boys can do work in D days, then 1 man, 1 woman and 1 boy together can together do the same work in (D × m × w × b)/(mw + wb + bm) days.

- If the number of men to do a job is changed in the ratio a : b, then the time required to do the work will be changed in the inverse ratio. ie; b : a

- If people work for same number of days, ratio in which the total money earned has to be shared is the ratio of work done per day by each one of them.

- A, B and C can do a piece of work in x, y and z days respectively. The ratio in which the amount earned should be shared is (1/x) : (1/y) : (1/z) = yz : zx : xy

- If people work for different number of days, ratio in which the total money earned has to be shared is the ratio of work done by each one of them.

Special cases of time and work problems

❖ Given a number of people work together/alone for different time periods to complete a work, for eg: A and B work together for few days, then C joins them, after few days B leaves the job. To solve such problems, following procedure can be adopted.
  - ➢ Let the entire job be completed in D days.
  - ➢ Let sum of parts of the work completed by each person = 1
  - ➢ Find out part of work done by each person with respect to D. This can be easily found out if you calculate how many days each person worked with respect to D.
  - ➢ Substitute values found out in Step 3 in Step 2 and solve the equation to get unknowns.

❖ A certain no of men can do the work in D days. If there were m more men, the work can be done in d days less. How many men were there initially?

  Let the initial number of men be M
  Number of man days to complete work = M × D
  If there are (M + m) men, days taken = D − d
  So, man days = (M + m)(D − d)
  i.e; M × D = (M + m)(D − d)
  M[D − (D − d)] = m(D − d)
  M = m(D − d)/d

- A certain no of men can do the work in D days. If there were m less men, the work can be done in d days more. How many men were initially?

  Let the initial number of men be M
  Number of man days to complete work = M × D
  If there are (M – m) men, days taken = (D + d)
  So, man days = (M − m)(D + d)
  i.e; MD = (M – m)(D + d)
  M(D + d – D) = m(D + d)
  M = m(D + d)/d

- Given A takes a days to do work. B takes b days to do the same work. Now A and B started the work together and n days before the completion of work A leaves the job. Find the total number of days taken to complete work?

  Let D be the total number of days to complete work.
  A and B work together for (D−n) days.
  So, $(D-n)(\frac{1}{a}+\frac{1}{b})$ + n $(\frac{1}{b})$ = 1
  $D(\frac{1}{a}+\frac{1}{b}) - \frac{n}{a}-\frac{n}{b}-\frac{n}{b} = 1$
  $D(\frac{1}{a}+\frac{1}{b}) = \frac{n+a}{a}$
  $D = \frac{b(n+a)}{a+b}$ days.

Frequently asked questions in quantitative aptitude test on time and work

After going through the questions given below, it will be good for you if you can take our practice placement test. At the end of the test, you can have a look at solutions provided for each question with answers.

1. Given A takes x days to do work. B takes y days to do the same work. If A and B work together, how many days will it take to complete the work?
2. If A and B together can do a piece of work in x days, B and C together can do it in y days and C and A together can do it in z days, find how many days it takes for each of them to complete the work if they worked individually. How many days will it take to complete the work if they worked together?
3. Give A is n times efficient than B. Also A takes n days less than B to complete the work. How many days will it take to complete the work if they worked together?
4. Given A takes x days to do work. B takes y days to do the same work. Now A & B together begins a work. After few days one of them leaves. Also, given the other takes n more days to complete the work
   (a) Find total number of days to complete the work.
   (b) How many days did they work together?
5. Given A takes x days to do work. B takes y days to do the same work. A started the work and B joined him after n days.
   (a) How long did it take to complete the work?
   (b) How many days did they work together? Or How long did B work?

6. Case 5 with 3 people joining work one after the other.
7. Given A takes x days to do work. B takes y days to do the same work. If A and B works on alternate days i.e. A alone works on first day, B alone works on next day and this cycle continues, in how many days will the work be finished
8. Given A alone can complete a job in x days and also B is b% efficient than A. How many days will it take to complete work if B works alone?
9. Problems where combinations of workers [men, women, girls and boys] take some days to do a work. These problems are solved using man days concept.
   (a) You have to calculate for another combination of them to complete the work.
   (b) How long will one set of people take to complete the entire work?
10. A certain combination starts the job and after few days leaves the work. Find the number of people from the category who are required to finish the remaining work.
11. Problems related to wages from work. How much each person earns from the work done.

TIME AND WORK – WORKSHEET (BASIC)

Directions for questions 1 to 5:

3 toys maker Mahesh, Suresh and Ramesh take a contract of making toys. Mahesh alone can make the entire toys in 12 days while Suresh alone can make the entire toys in 15 days and Ramesh can destroy the entire toys in 20 days.

Q 1: How much time will Mahesh and Suresh take to make all toys if Mahesh and Suresh work together?

(a) 20/3 days (b) 13.5 days (c) $13\frac{1}{4}$ days (d) 8.25 days

Q 2: How much time will they take to make the entire toys if all 3 work together?

(a) 3 days (b) 13.5 days (c) $13\frac{1}{4}$ days (d) 10 days

Q 3: How much time will Mahesh and Suresh take to make the entire toys and if they work on alternate days with Mahesh starting on the first day?

(a) 13 days (b) 13.5 days (c) $13\frac{1}{4}$ days (d) 8.25 days

Q 4: In the previous question, when will the work be complete if all 3 work on alternate days, with Mahesh working on first day, Suresh on second day, Ramesh on third day, and this process repeats till work is complete?

(a) 30 days (b) $30\frac{3}{5}$ days (c) $28\frac{1}{4}$ days (d) Never

Q 5: How much time Mahesh and Suresh will they take to make the entire toys if they start working together, but Suresh leaves 2 days before the scheduled completion of the work?

(a) 6.9 days (b) $8\frac{1}{5}$ days (c) 8.5 days (d) $8\frac{4}{15}$ days

Q 6: Two taps can fill a tank in 24 min and 36 min respectively. A 3rd outlet pipe can empty the tank in 30min. If all of them are opened simultaneously, what will be the time required to fill the tank?

(a) 75 min (b) 20 min (c) 12 min (d) $\frac{360}{13}$ min

Q 7: Bhim and Arjun working by themselves can build a wall respectively in 8 days and 18 days more than what they would take when working together. In how many days can Bhim alone build the wall?

(a) 20 (b) 24 (c) 30 (d) 12

Q 8: Three taps are connected to a water tank. First and second taps fill it up in A seconds and B seconds respectively, when they are opened separately. The third tap empties the full tank in C seconds. If all are opened simultaneously, what is the condition required on A, B and C to ensure that the tank will actually fill up?

(a) A + B > C (b) A – B < C (c) AB<BC + CA (d) $A + B > \frac{C}{2}$

Q 9: A tank can be filled by one tap in 10 minutes and by another in 30 minutes. Both the taps are kept open for 5 minutes and then the first one is shut off. In how many minutes more is the tank completely filled?

(a) 5 (b) 7.5 (c) 10 (d) 12

Q 10: A factory has 3 stamping machines for stamping, which can finish a lot in 4, 5 and 6 hours respectively. Due to some power problems in the city on Thursdays, only 2 of these machines can work simultaneously at any given point in time. What is the largest part of the job that can be finished in one hour on a Thursday?

(a) 20/9 (b) 11/15 (c) 9/20 (d) 5/6

Q 11: A can do (1/3) of a work in 5 days and B can do (2/5) of the work in 10 days. In how many days both A and B together can do the work?

(a) $7\frac{3}{4}$ (b) $8\frac{4}{5}$ (c) $9\frac{3}{8}$ (d) 10

Q 12: in 5 days, 64 pumps can fill a 100 liters tank working 12 hours a day. In how many days will 80 pumps, working 8 hours a day, fill another tank of capacity 300 liters?

(a) 36 days (b) 27 days (c) 18 days (d) 13.5 days

Q 13: 7 wrestlers fight for 8 hours and lose a total of 20 pounds, how many more wrestlers fighting would it take to lose a total of 20 pounds in only 4 hours, if the new wrestlers lost weight only half as fast as the original 7?

(a) 7 (b) 21 (c) 27 (d) 14

Q 14: 15 men take 21 days of 8 hours each to do a piece of work. How many days of 6 hours each would 21 women take if 3 women do as much work as 2 men?

(a) 20 (b) 21 (c) 25 (d) 30

Q 15: 12 mugs of water fill a bucket when the capacity of each mug is 13.5 liters. How many mugs will be needed to fill the same bucket, if the capacity of each mug is 9 liters?

(a) 12 (b) 14 (c) 16 (d) 18

Q 16: 8 women can dig a pit in 20 hours. If a woman works half as much again as a boy, then 4 women and 9 boys can dig a similar pit in:

(a) 10 hours (b) 12 hours (c) 15 hours (d) 16 hours

Q 17: 8 boys and 12 girls complete a certain piece of work in 9 days. If each boy takes twice the time taken by a girl to finish the work, in how many days will 12 girls finish the same work ?

(a) 8 (b)15 (c) 9 (d) 12

Q 18: 10 men can finish a piece of work in 10 days, where as it take 12 women to finish it in 10 days. If 15 men and 6 women undertake to complete the work, how many days will they take to complete it?

(a) 2 (b) 4 (c) 5 (d) 11

Q 19: If 3 farmers or 4 tractors can plough a field in 43 days, then the number of days that 7 farmers and 5 tractors take to plough it is:

(a) 12 (b) 18 (c) 24 (d) 30

Q 20: 12 men or 18 women can reap a field in 14 days. The number of days that 8 men and 16 women will take to reap it is:

(a) 5 (b) 7 (c) 8 (d) 9

Q 21: A alone can finish a work in 10 days and B alone can do it in 15 days. If they work together and finish, then out of a total wages of Rs.75. A will get:

(a) Rs.30 (b) Rs.37.50 (c) Rs.45 (d) Rs.50

Q 22: A can do a certain job in 12 days. B is 60% more efficient than A. The number of days it takes for B to do the same piece of work is:

(a) 6 (b) $6\frac{1}{4}$ (c) $7\frac{1}{2}$ (d) 8

Q 23: A is thrice as good a work man as B and takes 10 days less to do a piece of work than B takes. B can do the work in:

(a) 12 days (b) 15 days (c) 20 days (d) 30 days

Q 24: A, B and C together earn Rs.150 per day while A and C together earn Rs.94 and B and C together earn Rs.76. The daily earning of C is:

(a) Rs.75 (b) Rs.56 (c) Rs.34 (d) Rs.20

Q 25: A can complete a job in 9 days B in 10 days and C in 15 days. B and C start the work and are forced to leave after 2 days. The time taken to complete the remaining work is:

(a) 6 days (b) 9 days (c) 10 days (d) 13 days

Q 26: A completes a work in 4 days whereas B completes the work in 6 days. C works $1\frac{1}{2}$ times as fast as A. How many days it will take for the three together to complete the work?

(a) $\frac{7}{12}$ (b) $1\frac{5}{12}$ (c) $1\frac{5}{7}$ (d) None of these

Q 27: Twelve men can complete a work in 8 days. Three days after they started the work, 3 more men joined them. In how many days will all of them together complete the remaining work?

(a) 2 (b) 4 (c) 5 (d) 6

Q 28: A, B and C contract a work for Rs.550. Together A and B are to do 7/11 of the work. The share of C should be:

(a) Rs.$183\frac{1}{3}$ (b) Rs.200 (c) Rs.300 (d) Rs.400

Q 29: If 5 men or 9 women can finish a piece of work in 19 days, 3 men and 6 women will do the same work in:

(a) 10 days (b) 12 days (c) 13 days (d) 15 days

Q 30: Two men undertake to do a piece of work for Rs.400. One alone can do it in 6 days, the other in 8 days. With the help of a boy, they finish it in 3 days. The boy's share is

(a) Rs.40 (b) Rs.50 (c) Rs.60 (d) Rs.80

TIME AND WORK – WORKSHEET (MODERATE)

Q 1: A and B can together do a piece of work in 15 days. B alone can do it in 20 days. In how many days can A alone do it?

(a) 30 days (b) 40 days (c) 45 days (d) 60 days

Q 2: Rahul can do a work alone in 10 days while Gandhi can do it alone in 15 days and Pappu alone can destroy the entire work in 12 days. How many days will they take to complete the work if they work alternately with Rahul work on first day, Gandhi on 2nd day and Pappu on 3rd day and so on?

(a) 39 days (b) $33\frac{1}{6}$ days (c) $33\frac{5}{6}$ days (d) None of these

Q 3: Two pipes A and B can fill a cistern in $7\frac{1}{2}$ and 5 minutes respectively, and a tap C can empty 60% of the cistern in 9 minutes. All three were opened simultaneously when the cistern was empty. The tap C was closed after one minute. How many more minutes would it take for the cistern to be filled?

(a) $2\frac{1}{5}$ minute (b) $3\frac{1}{5}$ minute (c) 2.5 minute (d) none of these

Q 4: 4 men and 3 women can do a task in 6 hours. 5 men and 7 women can do the same task in 4 hours. Nearly how long will it take for 1 man and 1 woman to do the same task?

(a) 5 hours (b) 12 hours (c) 25 hours (d) 22 hours

Q 5: Saania and Mirza, working together, solve a work-related problem in 5 minutes. If Saania worked twice as efficiently as she does now and Mirza worked half as efficiently as she does now, they could solve the problem in 4 minutes. Assuming the work done is proportional to the time spent and efficiency, how much time would it take Saania alone to solve the problem?

(a) 10 minutes (b) 8 minutes (c) 12 minutes (d) none of these

Q 6: A leak in the lower portion of a tank can empty the full tank in 9 hrs. An inlet pipe fills water at the rate of 10 liter a minute. When the tank is full, the inlet is opened and due to leak, the tank is empty in 16 hrs. How many litres does the cistern hold?

(a) 17,580 (b) 17,960 (c) 18,290 (d) 12,342

Q 7: If 2 women work together, they complete the work in 6 hours. One woman completes the work 5 hours faster than the second one. How many hours it take the second woman to complete the work?

(a) 20 hours (b) 38 hours (c) 15 hours (d) 30 hours

Q 8: A does half as much work as B in three-fourth of the time. If together they take 18 days to complete a work, how much time shall B take to do it?

(a) 30 days (b) 35 days (c) 40 days (d) None of these

Q 9: A tank can be filled by a pipe in 20 minute and by another pipe in 60 min. Both the pipes are kept open for 10 min. and then the first pipe is shut off. After this, the tank will be completely filled in

(a) 10 min. (b) 12 min. (c) 15 min. (d) 20 min.

Q 10: A group of workers was put on a job. From the second day onwards, one worker was withdrawn each day. The job was finished when the last worker was withdrawn. Had no worker been withdrawn at any stage, the group would have finished the job in 33% lesser time. The initial number of workers in the group was

(a) 6 (b) 3 (c) 5 (d) 10

Q 11: A water tank has 3 taps A, B and C. A fills 4 buckets in 24 minutes. B fills 8 buckets in 1 hour and C fills 2 buckets in 20 min's. If all the taps are opened together, a full tank is emptied in 2 hours. If a bucket contains 5L water, what is the capacity of the tank?

(a) 120L (b) 240L (c) 180L (d) 60L

Q 12: Two farmers undertake the task to plough a field. The second farmer begins working one day after the first one. 3 days after the first farmer had begun working; there was still 9/20 of the field to be ploughed. When the work was completed, it turned out that each farmer had ploughed exactly half of the field. How many days would it take for the second farmer to plough the complete field by himself?

(a) 12 days (b) 8 days (c) 10 days (d) 9 days

Q 13: If a man or 2 women or 3 boys can do a piece of work in 44 days, then the same piece of work will be done by 1 man, 1 woman and 1 boy in:

(a) 21 days (b) 24 days (c) 26 days (d) 33 days

Q 14: Three farmers paid Rs.1000 for some quantity of pasture. The first farmer grazed his 9 mules for some time on the pasture; the second farmer grazed his 12 cows for twice the time taken by the mules of the first farmer. The third farmer grazed some goats for two and a half times the time for which the second farmer grazed his cows. The third farmer paid half the total cost of the pasture. If 16 cows eat as much as 4 mules while 10 goats eat as much as 3 cows, how much did the first and second man, respectively, pay?

(a) 100, 400 (b) 180, 320 (c) 130, 320 (d) 150, 350

Q 15: Two pipes P and Q can fill a cistern in 12 min. and 15 min. respectively but a third pipe 'R' can empty the full tank in 6 min. P and Q are kept open for 5 min. in the beginning and then 'R' is also opened. In what time is the cistern emptied?

(a) 30 min. (b) 33 min. (c) 37.5 min. (d) 45 min.

Q 16: A cistern can be filled in 9 hours. But it takes 10 hours, due to a leak in its lower part. If the cistern is full, then the time that the leak will take to empty it, is:

(a) 60min. (b) 70min. (c) 80min. (d) 90min.

Q 17: X is 25% more efficient than Y and his hourly wages are 25% more. If X is paid Rs. 75, how much will Y receive for the same work?

(a) 65 (b) 90 (c) 75 (d) 110

Q 18: To fill a cistern, pipes P, Q & R take 20, 15 & 12 minutes respectively. The time in minutes that the three pipes together will take to fill the cistern is:

(a) 5 min. (b) 10 min. (c) 12 min. (d) 15.66 min.

Q 19: Jay and Veer working by themselves can build a wall respectively in 16 days and 25 days more than what they would take when working together. In how many days can Jay alone build the wall?

(a) 20 (b) 36 (c) 45 (d) None of these

Q 20: A can complete a piece of work in 4 days. B takes double the time taken by A, C takes double that of B and D takes double that of C to complete the same task. They are paired in groups of two each. One pair takes two-thirds the time needed by the second pair to complete the work. Which is the first pair?

(a) A, B (b) A, C (c) B, C (d) A, D

Solutions – Worksheet (Basic)

Solution 1: (a)
Let the amount of work to be done is 60 units, then we can say that Mahesh will do 5 unit of work per day, Suresh will do 4 units of work per day and Ramesh will destroy 3 units of work per day.
Together Mahesh and Suresh will complete 9 units of work per day.
Time taken to complete the work = 60/9 = 20/3 days.

Solution 2: (d)
Together Mahesh, Suresh and Ramesh will complete 6 units of work per day.
Time taken to complete the work = 60/6 = 10 days.

Solution 3: (c)
Alternately Mahesh and Suresh will do 9 units of work in 2 days.
So, they will complete 54 units of work in 12 days.
On 13th day A will do 5 units. Remaining 1 unit will be completed by B in 1/4 days.
Total time taken would be 13(1/4) days.

Solution 4: (c)
Now, all 3 working alternately starting from Mahesh
In 3 days they will complete 6 units of work.
So, they complete 54 units of work in 27 days.
On 28th day Mahesh will complete 5 units of work and remaining 1 unit will be completed by Suresh in 1/4 day.
Total time taken would be 28(1/4).

Solution 5: (d)
In 2 days they both can complete 18 units of work. We can say that in the last 2 days 18 unit of work was to be done and 42 units of work was already completed.
Time taken to complete the work = (42/9) + (18/5) = $8\frac{4}{15}$ days

Solution 6: (d)
Let the total capacity of tank is 360 units.
1st inlet pipe can fill 15 units per minute.
2nd inlet pipe can fill 10 units per minute.
3rd outlet pipe can empty 12 units per minute.
Total of 13 units filled in 1 minute.
Time taken to fill the tank is 360/13.

Solution 7: (a)
Let they both complete the work in A days.
Therefore, Bhim will complete the work in A + 8 days.
And Arjun will complete the work in A + 18 days.
Hence $\frac{1}{A+8} + \frac{1}{A+18} = \frac{1}{A}$
A = 12 days.
Hence Bhim will complete the work in 20 days alone.

Solution 8: (c)
Let the total capacity of tank is ABC units.
1st inlet pipe can fill BC units per minute.
2nd inlet pipe can fill CA units per minute.
3rd outlet pipe can empty AB units per minute.
Hence to fill the tank BC + CA > AB

Solution 9: (c)
Let the work be 30 units.
1st tap can fill 3 units per unit time and 2nd tap can fill 1 unit per unit time.
In 5 minutes both can fill 20 units.
Remaining 10 units is filled by 2nd tap in 10 minutes.

Solution 10: (c)
Maximum work which can be done on Thursday = (1/4) + (1/5) = 9/20

Solution 11: (c)
1/3 work is done by A in 5 days.
Whole work will be done by A in 15 days.
2/5 of work is done by B in 10 days.
Whole work will be done by B in 25 days
(A+B)'s 1 day's work = [(1/15) + (1/25)] = 8/75
So, both together can finish it in 75/8 days i.e. $9\frac{3}{8}$ days.

Solution 12: (c)
$$\frac{M_1D_1T_1}{W_1} = \frac{M_2D_2T_2}{W_2}$$
$$\frac{64\times12\times5}{100} = \frac{80\times D\times8}{300}$$
D = 18 days

Solution 13: (d)
$$\frac{M_1D_1}{W_1} = \frac{M_2D_2}{W_2}$$
$$\frac{7\times8}{20} = \frac{(7+\frac{x}{2})\times4}{20}$$
x = 14.

Solution 14: (d)
3 women = 2 men
21 women = 14 men
$$\frac{M_1D_1T_1}{W_1} = \frac{M_2D_2T_2}{W_2}$$
$$\frac{15\times21\times8}{1} = \frac{14\times D\times6}{1}$$
D = 30.

Solution 15: (d)
Capacity of the bucket = 12 × 13.5 = 162 liters.
Capacity of each bucket = 9 liters.
Number of buckets needed = 162/9 = 18

Solution 16: (d)
1 woman = 3/2 boys, so (4 women + 9 boys) = 15 boys
Also, 8 women = (3/2) × 8 i.e. 12 boys
Now, 12 boys can dig the pit in 20 hours.
15 boys can dig it in (20 × 12/15) = 16 days.

Solution 17: (d)
2 boy = 1 girl
(8 boy + 12 girls) = 16 girls
Now, less girls, more days
12 : 16 : : 9 : x
x = (16×9)12 = 12 days

Solution 18: (c)
10 men = 12 women or 1 man = 6/5 women.
15 men + 6 women = [15 × (6/5) + 6] women i.e., 24 women.
Now, 12 women can do the work in 10 days.
24 women can do it in [10 × (12/24)] =5 days

Solution 19: (a)
3 farmer = 4 tractor or 1 farmer = 4/3 tractor.
7 farmer + 5 tractor = [7 × (4/3) + 5] tractor i.e., 43/3 tractor.
Now, 4 tractors can plough the field in 43 days.
43/3 tractor can plough it in [43 × 4 × (3/43)] = 12 days

Solution 20: (d)
12 men = 18 women or 1 man = 3/2 women.
8 men + 16 women = [8 × (3/2) + 16] women i.e. 28 women. Now, 18 women can reap the field in 14 days.
28 women can reap it in [14 × (18/28)] = 9 days.

Solution 21: (c)
Ratio of time taken by A and B = 10: 15 = 2: 3
Ratio of work done in the same time = 3:2.
So, the money is to be divided among A and B in the ratio 3: 2
A's share = Rs. [75 × (3/5)] = Rs.45.

Solution 22: (c)
Ratio of time, taken by A and B = 160: 100 = 8: 5
If A takes 8 days, B takes 5 days.
If A takes 12 days, B takes = [(5/8) × 12] = $7\frac{1}{2}$ days

Solution 23: (b)
Ratio of time taken by A and B = 1 : 3
If the difference of time is 2 days, B takes 3 days.
If the difference of time is 10 days. B takes [(3/2) × 10] = 15 days

Solution 24: (d)
B's daily earning = Rs. (150 - 94) = Rs.56
A's daily earning = Rs. (150 - 76) = Rs.74
C's daily earning = Rs. [(150 - (56 + 74)] = Rs.20

Solution 25: (a)
[B + C]'s 2 day work = 2[(1/10) + (1/15)] = 1/3
Remaining work = [1 − 1/3] = 2/3
1/9 work is done by A in 1 day
2/3 work is done by A in [9 × (2/3)] = 6 days

Solution 26: (d)
Time taken by C alone = $[\frac{2}{3} \times 4] = \frac{8}{3}$ days
Their 1 day's work = $[\frac{1}{4} + \frac{1}{6} + \frac{3}{8}]$ = 19/24
So, together they can finish the work in 24/19

Solution 27: (b)
1 man's one day's work = 1/96
12 men's 3 day's work = [3 × (1/8)] = 3/8
Remaining work = [1 – 3/8] = 5/8
15 men's 1 day's work = 15/96
Now, 15/96 work is done by them in 1 day,
5858 work will be done by them in [(96/15) × (5/8)] i.e.4 days

Solution 28: (b)
Work to be done by C = [1 − 7/11] = 4/11
(A + B): C = (7/11) : (4/11) = 7:4
C's share = Rs. [550 × (4/11)] = Rs.200

Solution 29: (d)
5 men = 9 women or 1 men = 7/5 women.
3 men + 6 women = [3 × (9/5) + 6] i.e., 57/5 women.
Now 9 women can do the work in 19 days.
57/5 women can do it in (19 × 9 × 5)/57 = 15 days

Solution 30: (b)
One man's 1 day's work = 1/6
Another man's 1 day's work = 1/8
Boy's 1 day's work = (1/3) − [1/6 + 1/8] = 1/24
Ratio of their shares = (1/6): (1/8): (1/24) = 4: 3: 1
Boy's share = Rs. [400 × (1/8)] = Rs.50

Solutions- Worksheet (Moderate)

Solution 1: (d)

Let A can alone finish the work in x days. Therefore $\frac{1}{x}+\frac{1}{20}=\frac{1}{15}$.

Hence x = 60 days.

Solution 2: (d)

Let us solve this question by LCM rule.

Let the total number of units to be done is 60 units.

Hence Rahul will complete 6 units a day, Gandhi will do 4 units a day and Pappu can destroy 5 units a day. So, we can say in 3 days they will complete 5 units. Hence in 30 days, 50 units of the work will be completed. Now on 31st day Rahul will complete 6 units and on 32nd day Gandhi will complete 4 units. Hence the work will be completed in 32 days.

Solution 3: (a)

Tap C can empty 60% of the cistern in 9 minutes or 100% in 15 minutes.

Let tank will be filled in t minutes. Hence, $\frac{t}{7.5}+\frac{t}{5}-\frac{1}{15}=1$

Therefore, t = $3\frac{1}{5}$. Hence extra time would be $3\frac{1}{5}-1=2\frac{1}{5}$ minutes.

Solution 4: (d)

Short trick:

If 4 men and 3 women can do a task in 6 hours. We can say that 3 men and 3 women will take more than 6 hours to complete the same task. So, 1 man and 1 woman will take more than 18 hours.

If 4 men and 3 women can do a task in 6 hours. We can say that 4 men and 4 women will take less than 6 hours to complete the same task. So, 1 man and 1 woman will take less than 24 hours.

Only option d is satisfying.

Solution 5: (a)

Let Saania completes the work in A minutes and Mirza in B minutes.

Therefore, $\frac{1}{A}+\frac{1}{B}=\frac{1}{5}$

If Saania worked twice as efficiently as she does now and Mirza worked half as efficiently as she does now, they could solve the problem in 4 minutes. Therefore, $\frac{1}{(\frac{A}{2})}+\frac{1}{2B}=\frac{1}{4}$

Solving the equations will give A = 10 minutes.

Solution 6: (d)

Work done by the inlet in 1 hr = 1/9 – 1/16 =7/144

Work done by the inlet in 1 minute = (7/144) × (1/60) = 7/8,640

Volume of 7/8,640 part = 10 litres.

Whole volume = 10 × 8,640/7 = 12,342 litres.

Solution 7: (c)

Let the work done by the 1st woman in x hours. Then 2nd woman takes x + 5 hours to complete it.

$\frac{1}{x}+\frac{1}{x+5}=\frac{1}{6}$

Therefore, x = 10. Hence 2nd woman will complete the work in 15 hours.

Solution 8: (a)
Suppose B takes x days to do the work.
A takes [2 × (3x/4)] i.e., 3x/2 days to do it.
Now (A + B)'s 1 day's work = 1/18
(1/x) + (2/3x) = 1/18 or x=30

Solution 9: (d)
Part filled in 10 min.
= 10[(1/20) + (1/60)] = [10 × (4/60] = 2/3
Remaining part = (1 − 2/3) = 1/3
Part filled by second tap in 1 min. =1/60
1/60 : 1/3 :: 1 : x
⇒ x = (1/3) × 1 × 60 = 20 min.

Solution 10: (b)
Let there been A workers to start with. Since 1 worker is withdrawn each day, the job is completed in A days. Without withdrawing workers, then work is completed in 33% less than n days i.e. 2n/3 days.
Work done when withdrawing the worker each day = $(\frac{3}{2n^2})$ × {n + (n - 1) +.....+ 2 + 1}
= $(\frac{3}{2n^2}) \times \frac{n(n+1)}{2} = 1$
Or n = 3

Solution 11: (b)
1 bucket = 5L water,
Tap A: 20L in 24 minutes = (5/6)L in 1 minute.
Tap B: 40L in 60 minutes = (2/3)L in 1 minute.
Tap C: 10L in 20 minutes = (1/2)L in 1 minute.
A + B + C = (5/6) + (2/3) + (1/2) = 2 L/minute.
So in 2 hours, the discharge would be 240 L, which is the capacity of the tank.

Solution 12: (b)
Let the first farmer completes the work in X days and second in Y days.
$\frac{3}{X} + \frac{2}{Y} = \frac{11}{20}$
Now each farmer had ploughed the half field, then
$\frac{X}{2} - \frac{Y}{2} = 1$
Solving equations gives X = 10 days and Y = 8 days

Solution 13: (b)
1 man = 2 women = 3 boys
1 woman = 1/2 man and 1 boy = 1/3 man
So, [1 + 1/2 + 1/3] men = [11/6] men
Now, 1 man can do the piece of work in 44 days
11/6 men can do it in [44 × (6/11)] = 24 days

Solution 14: (b)
9 mules grazed for t time and 12 cows grazed for 2t time.
We can say, 12 cows grazed for 2t time = 24 cows grazed for t time.
Now, 6 cows = 4 mules or 24 cows = 16 mules.
So, we can say first farmer grazed 9 mules for t time and 2nd farmer grazed 16 mules for t time.
Hence the amount paid would be in the ration of 9:16.

Solution 15: (d)
Part filled in 5 min.
=5[(1/12) + (1/15)] = (5 × 9/60) = 3/4 =45 min.
Part emptied in 1 min. when all the pipes are opened.
= (1/6) – (1/12 + 1/15)
= (1/6) – (3/20) = 1/60
1/60 part is emptied in 1 min.
3/4 part will be emptied in [(60 × (3/4)] = 45 min.

Solution 16: (d)
Work done by the leak in 1 hr
= [(1/9) – (1/10)] = 1/90
Leak will be empty the full cistern in 90 min.

Solution 17: (c)
Let work done by Y in 1 hour be 1 unit. Then work done by X in 1 hour would be 1.25 units. Therefore, 1 units of work is done by Y in 1 hour and by X in 0.8 hour. Since hourly wages of X are 25% more than Y or Y will get 20% less than X. So, if X gets 75 rupees working 0.8 hours, Y will get 20% less i.e. 60 rupees. For same work, time taken by Y is 1 hour and hence he will get (1/0.8) × 60 = 75 rupees

Solution 18: (a)
Part filled by (P + Q + R) in 1 min.
= (1/20) + (1/15) + (1/12) = 12/60 = 1/5
All the three pipes together will full the tank in 5 min.

Solution 19: (b)
Let they both complete the work in A days.
Therefore, Jay will complete the work in A + 16 days.
And Veer will complete the work in A + 25 days.
Hence $\frac{1}{A+16} + \frac{1}{A+25} = \frac{1}{A}$
A = 20 days.
Hence Bhim will complete the work in 36 days alone.

Solution 20: (d)
Let A do x part of the work in one day. B does 2x part of the work in 1 day. C does 4x part of the work in 1 day and D does 8x part of the work in 1 day. Now we need to form 2 pairs from x, 2x , 4x and 8x such that sum of 1 pair = $\frac{1}{(2/3)}$ of the sum of the other pair.
Now, x + 8x = $\frac{3}{2}$ (2x + 4x)
Therefore, A and D take two-third of the time taken by B and C together.