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Shortcut Methods Tips & Tricks

Reasoning & Quantitative Mathematics

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By Annu Stark

Time and Work

Three main factors of Time and Work

There is a definite relationship between Time and Work. In this concept, there are only three factors:

- Time taken to complete a certain job
- Unit of work done
- Number of persons doing the job

There is a mental relationship between these three, discussed as follows:
Work done (W) = Number of days (Time taken) (T or D) × Number of men (M)
W = D × M

Some basic points
More number of men can do more work i.e. both are directly proportional
More number of men take less time to complete certain job i.e. both are inversely proportional
By summarizing, we get
$\frac{W_1}{W_2} = \frac{M_1}{M_2} \times \frac{D_1}{D_2}$
Let us start solving some examples:

Example 1: 10 men can cut 8 trees in 16 days. In how many days can 6 men cut 10 trees?
Solution: This is a very simple example. You are given:
$W_1 = 8$
$W_2 = 10$
$M_1 = 10$
$M_2 = 6$
$D_1 = 16$
$D_2 = ?$

Using formula,
$\frac{W_1}{W_2} = \frac{M_1}{M_2} \times \frac{D_1}{D_2}$
$\frac{8}{10} = \frac{10}{6} \times \frac{16}{D_2}$
$\Rightarrow D_2 = 33.3$

Concept of efficiency
This means, "How much work one person can do in one day (expressed in percentage)"
For example: A person can do a job in 2 days
⇒ He can do 50% work in one day
Therefore, his efficiency will be 50%
Just a 2-step concept
This concept involves two steps to calculate efficiency:

- Convert into fraction i.e. per day work
- Multiply with 100 i.e. convert into percentage

Try the following example first, then re-read above points

Example 2: If a person can complete his work in 5days. What will be his efficiency?
Solution: Number of days a person take to complete his work = 5
⇒ He is doing 1/5 th work per day (converted into fraction)
Convert it into percentage:
100/5 = 20%
Therefore, his efficiency is 20%.
Summarizing, If a person can do his job in n days, efficiency will be

Efficiency = $\frac{100}{n}$%
Note: Negative efficiency cancels the positive efficiency
For Example: Positive efficiency = 5%
Negative efficiency = 1.5%
Net efficiency = 5- 1.5 = 3.5%
As we all know, in competitive exams time management is very important. I suggest you to learn the fractions till 15.

Number of days required to complete work	Work/Day	Efficiency (%)
N	1/n	100/n
1	1	100
2	1/2	50
3	1/3	33.33
4	1/4	25
5	1/5	20
6	1/6	16.66
7	1/7	14.28
8	1/8	12.5
9	1/9	11.11
10	1/10	10
11	1/11	9.09
12	1/12	8.25
13	1/13	7.69
14	1/14	7.14
15	1/15	6.66

Example 3: A can do a job in 10 days. B can do a job in 5 days. In how many days they can complete the job if they work together?

Solution: Consider the above table
A's efficiency = 10%
B's efficiency = 20%
A+ B efficiency = 10 + 20 = 30%
This means, In one day A and B together can do 30% of work.
Therefore, Number of days A and B together take to do 100% of work = $\frac{100}{3}$
⇒3.33 days

Example 4: A and B together can do a job in 4 days. If A can do job in 12 days if he works alone, then how many days B alone take to complete the job?

Solution: A+B take = 4 days
⇒ A+B's efficiency = 25% i.e. they together do 25% of work in one day
A takes = 12 days
⇒ A's efficiency = 8.33%
B's efficiency = (A+B) - (A)

⇒ 25% - 8.33% = 16.66%
This means, B can do 16.66% work in one day
Therefore, to complete the job he will take = $\frac{100}{16.66}$ days
⇒ 6days

Example 5: A and B can do job in 8 days. B and C can do same job in 12 days. A, B and C together can do same job in 6 days. In how many days A and C together can complete the job?

Solution: You are given that:
A+B's efficiency = 12.5%
B+C's efficiency = 8.33%
A+B+C's efficiency = 16.66%
we need to find A+C
Consider, 2(A+B+C) = (A+B) + (B+C) + (C+A)
⇒2(16.66) = 12.5+ 8.33 + (C+A)
⇒ C+A = 12.49 = 12.5%
Therefore, A and C takes= $\frac{100}{12.5}$= 8 days
Hope you all understand this topic. I will soon update questions for your practice.

Trick

One simple technique is using days in denominator while solving questions. For example, A can do a job in 3 days and B can do the same job in 6 days. In how much time they can do the job together.

Solution - 1/3 + 1/6 = 1/2, hence 2 days is the answer.
Examiner can set the question in opposite way and can ask you how much time A or B alone will take to complete the job. It is quite easy to calculate said question by putting values in equation we arrived in above question.

You need to understand one simple concept - If A can do a job in 10 day then in one day A can do 1/10th of job.

Now let's solve questions with this trick
Question 1 - A take 5 days to complete a job and B takes 10 days to complete the same job. In how much time they will complete the job together?

Solution - A's efficiency = 20%, B's efficiency = 10%. If they work together they can do 30% of the job in a day. To complete the job they need 3.33 days.

Question 2 - A is twice as efficient as B and can complete a job 30 days before B. In how much they can complete the job together?

Solution - Let efficiency percentage as x
A's efficiency = 2x and B's efficiency = x
A is twice efficient and can complete the job 30 days before B. So,
A can complete the job in 30 days and B can complete the job in 60 days

A's efficiency = 1/30 = 3.33%
B's efficiency = 1/60 = 1.66%
Both can do 5% (3.33% + 1.66%) of the job in 1 day.
So the can complete the whole job in 20 days (100/5)

Question 3 - A tank can be filled in 20 minutes. There is a leakage which can empty it in 60 minutes. In how many minutes tank can be filled?

Solution -
Method 1
⇒ Efficiency of filling pipe = 20 minutes = 1/3 hour = 300%
⇒ Efficiency of leakage = 60 minutes = 100%

We need to deduct efficiency of leakage so final efficiency is 200%. We are taking 100% = 1 Hour as base so answer is 30 minutes.

Method 2
⇒ Efficiency of filling pipe = 100/20 = 5%
⇒ Efficiency of leakage pipe = 100/60 = 1.66%
⇒ Net filling efficiency = 3.33%
So, tank can be filled in = 100/3.33% = 30 minutes

You can change the base to minutes or even seconds.

Question 4 - 4 men and 6 women working together can complete the work within 10 days. 3 men and 7 women working together will complete the same work within 8 days. In how many days 10 women will complete this work?

Solution - Let number of men =x, number of women = y
⇒ Efficiency of 4 men and 6 women = 100/10 = 10%
⇒ So, 4x+6y = 10
Above equation means 4 men and 6 women can do 10% of a the job in one day.

⇒ Efficiency of 3 men and 7 women = 100/8 = 12.5%
So, 3x+7y = 12.5

By solving both equations we get, x = -0.5 and y = 2

⇒ Efficiency of 1 woman(y) = 2% per day
⇒ Efficiency of 10 women per day = 20%
So 10 women can complete the job in 100/20 = 5 days

Question 5 - A and B together can complete a task in 20 days. B and C together can complete the same task in 30 days. A and C together can complete the same task in 30 days. What is the respective ratio of the number of days taken by A when completing the same task alone to the number of days taken by C when completing the same task alone?

Solution - ⇒ Efficiency of A and B = 1/20 per day = 5% per day ___________1
⇒ Efficiency of B and C = 1/30 per day = 3.33% per day_________2
⇒ Efficiency of C and A = 1/30 per day = 3.33% per day_________3

Taking equation 2 and 3 together
⇒ B + C = 3.33% and C + A = 3.33%
⇒ C and 3.33% will be removed. Hence A = B
⇒ Efficiency of A = B = 5%/2 = 2.5% = 1/40
⇒ Efficiency of C = 3.33% - 2.5% = 0.833% = 1/120
⇒ A can do the job in 40 days and C can do the job in 120 days he they work alone.
⇒ Ratio of number of days in which A and C can complete the job 1:3.

Exercise - 12

1) 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) 1/4 b) 1/10 c) 7/15
   d) 8/15 e) None of these

2) A can lay railway track between two given stations in 16 days and B can do the same job in 12 days, with help of C, they did the job in 4 days only. Then, C alone can do the job in:
   a) $9\frac{1}{5}$ b) $9\frac{2}{5}$ c) $9\frac{3}{5}$
   d) 10 e) None of these

3) 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?
   a) 12 days b) 15 days c) 16 days
   d) 18 days e) None of these

4) A is thrice as good as 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) $22\frac{1}{2}$ c) 25 days
   d) 30 days e) None of these

5) A alone can do a piece of work in 6 days and B alone 8 days. A and B undertook to do it for Rs.3200. With the help of C, they completed the work in 3 days. How much is to be paid to C?
   a) Rs.375 b) Rs.400 c) Rs.600
   d) Rs.800 e) None of these

6) If 6 men and 8 boys can do a piece of work in 10 days while 26 men and 48 boys can do the same in 2 days, the time taken by 15 men and 20 boys in doing the same type of work will be:
   a) 4 days b) 5 days c) 6 days
   d) 7 days e) None of these

7) 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 e) None of these

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:
a) 15 days b) 20 days c) 25 days
d) 30 days e) None of these

9) A does 80% 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) $37\frac{1}{2}$
d) 40 days e) None of these

10) 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 work. Approximately at what time will the work (to print one lakh books) be finished?
a) 11:30 A.M. b) 12 noon c) 12:30 P.M.
d) 1:00 P.M. e) None of these

11) 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 e) None of these

12) 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 b) 40 c) 45
d) 50 e) None of these

13) A and B can together finish a work 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 work?
a) 45 b) 50 c) 54
d) 60 e) None of these

14) 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) $6\frac{6}{11}$ e) None of these

15) 10 women can complete a work in 7 days and 10 children take 14 days to complete the work. How many days will 5 women and 10 children take to complete the work?
a) 3 b) 5 c) 7
d) Data inadequate e) None of these

16) 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 e) None of these

17) 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) $20\frac{3}{17}$
d) Data inadequate e) None of these

18) Ravi and Kumar are working on an assignment. Ravi takes 6 hours to type 32 pages on a computer, while Kumar 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 e) None of these

19) 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) $3\frac{3}{7}$]
d) 4 days e) None of these

20) 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 e) None of these

21) A takes twice as much time as B or thrice as much time as C 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 e) None of these

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 lea0ve 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 e) None of these

23) A and B can do a piece of work in 30 days, while B and C can do the same work in 24 days and C and A in 20 days. They all work together for 10 days when B and C leave. How many days more will A take to finish the work?
a) 18 days b) 24 days c) 30 days
d) 36 days e) None of these

24) 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 in:
a) 4 days b) 6 days c) 8 days
d) 18 days e) None of these

25) Twenty women can do a work in sixteen days. Sixteen men can complete the same work in fifteen days. What is the ration between the capacity of a man and a woman?
a) 3 : 4 b) 4 : 3 c) 5 : 3
d) Date inadequate e) None of these

26) 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 e) None of these

27) 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) $10\frac{1}{2}$ e) None of these

28) 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) $13\frac{1}{3}$ b) 15 days c) 20 days
d) 26 days e) None of these

29) 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) $9\frac{1}{3}$ b) 11 days c) $12\frac{1}{4}$
d) $16\frac{1}{3}$ e) None of these

30) P is thrice as efficient as Q and is therefore able to finish a piece of work in 60 days less than Q. Find the time in which P and Q can complete the work individually.
a) 90 days, 30 days b) 60 days, 20 days c) 65 days, 30 days
d) 85 days, 90 days e) None of these

31) A tub can be filled in 20 minutes but there is a leakage in it which can empty the full tub in 60 minutes. In how many minutes it can be filled?
a) 10 minutes b) 30 minutes c) 40 minutes
d) 25 minutes e) None of these

32) A can do a piece of work in 14 days while B can do it in 21 days. In how many days, working together they will complete the whole work?
a) 10.5 b) 8 c) 8.4
d) 9 e) None of these

33) A is thrice as efficient as B. Working together they complete the work in 3 days. If B takes 8 days more than A, what is the number of days taken by A to finish the whole work, alone?
a) 4 b) 2 c) 12
d) 16 e) None of these

34) Aman can do a piece of work in 14 days, while Suneeta can do the same work in 21 days. They started the work together but 3 days before the completion of the work, Aman left the work. The total number of days to complete the work is :
a) $7\frac{1}{5}$ b) 8.5 c) 5
d) $10\frac{1}{5}$ e) None of these

35) Karan can do a work in 10 days while Sohan can do the same work in 20 days. They started work together. After 3 days Karan left the work and Sohan completed it. For how many days Sohan worked alone more than the number of days required when both worked together?
a)$4\frac{1}{3}$ b) $3\frac{1}{4}$ c) $2\frac{3}{5}$
d) $3\frac{2}{3}$ e) None of these

36) A and B undertook a work for Rs.350. A got Rs.150 more than that of B, when they worked together. B takes 9 days more than A, when they work individually. In how many days A and B working together can do the whole work:

a) 5 b) $4\frac{2}{7}$ c) $4\frac{5}{7}$
d) $5\frac{4}{7}$ e) None of these

37) When A, B and C are deployed for a task, A and B together do 70% of the work and B and C together do 50% of the work. Who is most efficient?

a) a b) b c) c
d) Data inadequate e) None of these

38) A contractor undertook a work to complete in 60 days. But just after 20 days he observed that only $\frac{1}{5}$th of the project work had been completed. To complete the work in time (i.e., in rest days) minimum how many workers he had to increase, if there were initially 75 workers were deployed for the task?

a) 25 b) 50 c) 75
d) Data inadequate e) None of these

39) If 2 men or 3 women or 4 boys can do a piece of work in 52 days, then the same piece of work will be done by 1 man, 1 woman and 1 boy in :

a) 48 days b) 36 days c) 45 days
d) Data inadequate e) None of these

40) A contractor undertook to complete the work in 40 days and he deployed 20 men for his work. 8 days before the scheduled time he realized that $1/3^{rd}$ of the work was still to be done. How many more men were required to complete the work in stipulated time?

a) 16 b) 15 c) 20
d) 25 e) None of these

41) B and C are equally efficient, but the efficiency of A is half of each B and C. A and B started a work and 3 days later C joined them. If A alone can do the work in 14 days, then in how many more days the work will be completed?

a) 1 b) 2 c) 3
d) 4.5 e) None of these

42) 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?

a) 6 days b) 12 c) 8 days
d) 9 days e) None of these

43) 4 men and 2 boys can finish a piece of work in 5 days. 3 women and 4 boys can finish the same work in 5 days. Also 2 men and 3 women can finish the same work in 5 days. In how many days 1 man, 1 woman and one boy can finish the work, at their double efficiency?

a) $4\frac{8}{13}$ b) $4\frac{7}{13}$ c) $3\frac{7}{13}$
d) Data inadequate e) None of these

44) 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.

a) Rs.80 b) Rs.75 c) Rs.90
d) Rs.82 e) None of these

45) Tap A can fill the empty tank in 12 hours, but due to a leak in the bottom it is filled in 15 hours, if the tank is full and then tap A is closed then in how many hours the leak can empty it?
a) 45 hours b) 48 hours c) 52 hours
d) 60 hours e) None of these

46) 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?
a) 72 days b) 30 days c) 27 days
d) 32 days e) None of these

47) Pipe A basically used as inlet pipe and pipe B is used as outlet pipe. Pipes A and B both are opened simultaneously, all the time. When pipe A fills the tank and B empty the tank, it will take double the time than when both the pipes fill the tank. When pipe B is used for filling the tank, its efficiency remains constant. What is the ratio of efficiency of pipe A and pipe B respectively?
a) 3 : 1 b) 5 : 2 c) 1 : 3
d) 3 : 2 e) None of these

48) 45 men can complete a work in 16 days. Six days after they started working. 30 more men joined them. How many days will they now take to complete the remaining work?
a) 18 days b) 12 days c) 9 days
d) 6 days e) None of these

49) Two pipes A and B can fill a cistern in 15 hours and 10 hours respectively. A tap C can empty the full cistern in 30 hours. All the three taps were open for 2 hours, when it was remembered that the emptying tap had been left open. It was then closed. How many hours more would it take for the cistern to be filled?
a) 30 min. b) 1.2 hours c) 24 min.
d) 35 min. e) None of these

50) 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) $1\frac{1}{2}$ b) $3\frac{1}{2}$ c) $3\frac{3}{5}$
d) $4\frac{1}{4}$ e) None of these

51) A single reservoir supplies the petrol to the whole city, while the reservoir is fed by a single pipeline filling the reservoir with the stream of uniform volume. When the reservoir is full and if 40,000 litres of petrol is used daily, the supply fails in 90 days. If 32,000 litres of petrol is used daily, it fails in 60 days. How much petrol can be used daily without the supply every failing?
a) 64000 litres b) 56000 litres c) 78000 litres
d) 60000 litres e) None of these

52) A is 50% more efficient than B. C does half of the work done by A and B together. If C alone does the work in 40 days, then A, B and C together can do the work in :
a) $13\frac{1}{3}$ days b) 15 days c) 20 days
d) 30 days e) None of these

53) The total number of men, women and children working in a factory is 18. They earn Rs.4000 in a day. If the sum of the wages of all men, all women and all children is in the ratio of 18 :

10 : 12 and if the wages of an individual man, woman and child is in the ratio 6 : 5 : 3, then how much a woman earn in a day?

a) Rs.400 b) Rs.250 c) Rs.150
d) Rs.120 e) None of these

54) 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) $6\frac{6}{11}$ e) None of these

55) Eklavya can do the 6 times the actual work in 36 days while Faizal can do the one-fourth of the original work in 3 days. In how many days will both working together complete the 3 times of the originalwork?

a) 6 b) 10 c) 12
d) 15 e) None of these

56) 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 e) None of these

57) Aman and Raman are two workers. Working together they can complete the whole work in 10 hours. If the Aman worked for 2.5 hours and Raman worked for 8.5 hours, still there was half of the work to be done. In how many hours Aman working alone, can complete the whole work?

a) 24 hours b) $17\frac{1}{7}$hours c) 40 hours
d) Data inadequate e) None of these

58) 5 men and 2 boys working together can do four times as much work as a man and a boy. Working capacities of a man and a boy are in the ratio :

a) 1 : 2 b) 2 : 1 c) 1 : 3
d) 3 : 1 e) None of these

59) A alone can do a piece of work in 6 days and B alone in 8 days. A and B undertook to do it for Rs.3200. With the help of C, they completed the work in 3 days. How much is to be paid to C?

a) Rs.375 b) Rs.400 c) Rs.600
d) Rs.800 e) None of these

60) If there is leakage also which is capable of draining out the liquid drom the tank at half of the rate of outlet pipe, then what is the time taken to fill the empty tank when both the pipes are opened?

a) 3 hours b) $3\frac{2}{3}$ hours c) 4 hours
d) Data inadequate e) None of these

61) A, B and C are employed to do a piece of work for Rs.529. A and B together are supposed to do $\frac{19}{23}$ of the work and B and C together $\frac{8}{23}$ of the work. What amount should A be paid?

a) Rs.315 b) Rs.345 c) Rs.355
d) Rs.375 e) None of these

62) 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　e) None of these

63) A, B and C can do a piece of work in 36, 54 and 72 days respectively. They started the work but A left 8 days before the completion of the work while B left 12 days before the completion. The number of days for which C worked is :

a) 4　b) 8　c) 12
d) 24　e) None of these

64) A and B together can complete a work in 12 days. A alone can complete it in 20 days. If B does the work only for half a day daily, then in how many days A and B together will complete the work?

a) 10 days　b) 11 days　c) 15 days
d) 20 days　e) None of these

65) 10 women can complete a work in 7 days and 10 children take 14 days to complete the work. How many days will 5 women and 10 children take to complete the work?

a) 3　b) 5　c) 7
d) Data inadequate　e) None of these

66) 12 men complete a work in 9 days. After they have worked for 6 days, 6 more men join them. How many days will they take to complete the remaining work?

a) 2 days　b) 3 days　c) 4 days
d) 5 days　e) None of these

67) A, B and C together earn Rs.300 per day, while A and C together earn Rs.188 and B and C together earn Rs.152. The daily earning of C is :

a) Rs.40　b) Rs.68　c) Rs.112
d) Rs.150　e) None of these

Solutions:

1. Option D

A's 1 day's work $= \frac{1}{15}$

B's 1 day's work $= \frac{1}{20}$

(A + B)'s 1 day's work $= \left[\frac{1}{15} + \frac{1}{20}\right] = \frac{7}{60}$

(A + B)'s 4 day's work $= \left[\frac{7}{60} \times 4\right] = \frac{7}{15}$

Therefore, Remaining work $= \left[1 \quad \frac{7}{15}\right] = \frac{8}{15}$

2. Option C

(A + B + C)'s 1 day's work $= \frac{1}{4}$

A's 1 day's work $= \frac{1}{16}$

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

C's 1 day's work $= \frac{1}{4} \quad \left[\frac{1}{16} + \frac{1}{12}\right] = \left[\frac{1}{4} \quad \frac{7}{48}\right] = \frac{5}{48}$

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

3. Option B

A's 2 day's work $= \left[\frac{1}{20} \times 2\right] = \frac{1}{10}$

(A + B + C)'s 1 day's work $= \left[\frac{1}{20} + \frac{1}{30} + \frac{1}{60}\right] = \frac{6}{60} = \frac{1}{10}$

Work done in 3 days $= \left[\frac{1}{10} + \frac{1}{10}\right] = \frac{1}{5}$

Now, $\frac{1}{5}$ work is done in 3 days.

Whole work will be done in (3 × 5) = 15 days

4. Option B

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

The time difference is (3 1) 2 days while B take 3 days and A takes 1 day.

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

If difference of time is 60 days, B takes $\left[\frac{3}{2} \times 60\right] = 90$ days

So, A takes 30 days to do the work.

A's 1 day's work $= \frac{1}{30}$

B's 1 day's work $= \frac{1}{90}$

(A + B)'s 1 day's work $= \left[\frac{1}{30} + \frac{1}{90}\right] = \frac{4}{90} = \frac{2}{45}$

A and B together can do the work in $\frac{45}{2} = 22\frac{1}{2}$ days

5. Option B

C's 1 day's work $= \frac{1}{3} \quad \left[\frac{1}{6} + \frac{1}{8}\right] = \frac{1}{3} \quad \frac{7}{24} = \frac{1}{24}$

A's wages : B's wages : C's wages $= \frac{1}{6} : \frac{1}{8} : \frac{1}{24} = 4 : 3 : 1$

C's share (for 3 days) = Rs.$\left[3 \times \frac{1}{24} \times 3200\right]$ = Rs.400

6. Option A

Let 1 man's 1 day's work = x and 1 boy's 1 day's work = y

Then, $6x + 8y = \frac{1}{10}$ and $26x + 48y = \frac{1}{2}$

Solving these two equations, we get : $x = \frac{1}{100}$ and $y = \frac{1}{200}$

(15 men + 20 boy)'s 1 day's work $= \left[\frac{15}{100} + \frac{20}{200}\right] = \frac{1}{4}$

15 men and 20 boys can do the work in 4 days.

7. Option C

A's 1 hour's work = $\frac{1}{4}$

(B + C)'s 1 hour's work = $\frac{1}{3}$

(A + C)'s 1 hour's work = $\frac{1}{2}$

(A + B + C)'s 1 hour's work = $\left[\frac{1}{4} + \frac{1}{3}\right] = \frac{7}{12}$

B's 1 hour's work = $\left[\frac{7}{12} \quad \frac{1}{2}\right] = \frac{1}{12}$

B alone will take 12 hours to do the work.

8. Option C

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

C's 1 day's work = $\frac{1}{50}$

(A + B + C)'s 1 day's work = $\left[\frac{1}{10} + \frac{1}{50}\right] = \frac{6}{50} = \frac{3}{25}$ .... (i)

A's 1 day's work = (B + C)'s 1 day's work .... (ii)

From (i) and (ii), we get 2 × (A's 1 day's work) = $\frac{3}{25}$

A's day's work = $\frac{3}{50}$

B's 1 day's work= $\left[\frac{1}{10} \quad \frac{3}{50}\right] = \frac{2}{50} = \frac{1}{25}$

So, B alone could do the work in 25 days.

9. Option C

Whole work is done by A in $\left[20 \times \frac{5}{4}\right]$ = 25 days

Now, $\left[1 \quad \frac{4}{5}\right]$ i.e., $\frac{1}{5}$ work is done by A and B in 3 days.

Whole work will be done by A and B in (3 × 5) = 15 days.

A's 1 day's work = $\frac{1}{25}$, (A + B)'s 1 day's work = $\frac{1}{15}$

B's 1 day's work = $\left[\frac{1}{15} \quad \frac{1}{25}\right] = \frac{4}{150} = \frac{2}{75}$

So, B alone would do the work in $\frac{75}{2}$ =37 $\frac{1}{2}$ days

10. Option D

(P + Q + R)'s 1 hour's work = $\left[\frac{1}{8} + \frac{1}{10} + \frac{1}{12}\right] = \frac{37}{120}$

Work done by P, Q and R in 2 hours = $\left[\frac{37}{120} \times 2\right] = \frac{37}{60}$

Remaining work = $\left[1 \quad \frac{37}{60}\right] = \frac{23}{60}$

(Q + R)'s 1 hour's work = $\left[\frac{1}{10} + \frac{1}{12}\right] = \frac{11}{60}$

Now, $\frac{11}{60}$ work is done by Q and R in 1 hour.

So, $\frac{23}{60}$ work will be done by Q and R in $\left[\frac{60}{11} \times \frac{23}{60}\right] = \frac{23}{11}$ hours $\approx$ 2 hours

So, the work will be finished approximately 2 hours after 11 A.M., i.e., around 1 P.M.

11. Option C

B's 10 day's work $= \left[\frac{1}{15} \times 10\right] = \frac{2}{3}$

Remaining work $= \left[1 \quad \frac{2}{3}\right] = \frac{1}{3}$

Now, $\frac{1}{18}$ work is done by A in 1 day.

$\frac{1}{3}$ work is done by A in $\left[18 \times \frac{1}{3}\right]$ = 6 days.

12. Option B

Let 1 man's 1 day's work = x and 1 woman's 1 day's work = y.

Then, $4x + 6y = \frac{1}{8}$ and $3x + 7y = \frac{1}{10}$

Solving the two equations, we get $x = \frac{11}{400}$, $y = \frac{1}{400}$

1 woman's 1 day's work $= \frac{1}{400}$

10 women's 1 day's work $= \left[\frac{1}{400} \times 10\right] = \frac{1}{40}$

Hence, 10 women will complete the work in 40 days.

13. Option D

(A + B)'s 20 day's work $= \left[\frac{1}{30} \times 20\right] = \frac{2}{3}$

Remaining work $= \left[1 \quad \frac{2}{3}\right] = \frac{1}{3}$

Now, $\frac{1}{3}$ work is done by A in 20 days.

Therefore, the whole work will be done by A in (20 × 3) = 60 days.

14. Option A

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 hour's work $= \frac{1}{96}$ and Q's 1 hour's work $= \frac{1}{80}$

[P + Q)'s 1 hour's 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

15. Option C

1 woman's 1 day's work $= \frac{1}{70}$

1 child's 1 day's work $= \frac{1}{140}$

(5 women + 10 children)'s day's work $= \left[\frac{5}{70} + \frac{10}{140}\right] = \left[\frac{1}{14} + \frac{1}{14}\right] = \frac{1}{7}$

5 women and 10 children will complete the work in 7 days.

16. Option B

Work done by X in 4 days $= \left[\frac{1}{20} \times 4\right] = \frac{1}{5}$

Remaining work $= \left[1 \quad \frac{1}{5}\right] = \frac{4}{5}$

(X + Y)'s 1 day's work $= \left[\frac{1}{20} + \frac{1}{12}\right] = \frac{8}{60} = \frac{2}{15}$

Now, $\frac{2}{15}$ work is done by X and Y in 1 day.

So, $\frac{4}{5}$ work will be done by X and Y in $\left[\frac{15}{2} \times \frac{4}{5}\right]$ = 6 days

Hence, total time taken = (6 + 4) days = 10 days

17. Option B

Ration of times taken by A and B = 100 : 130 = 10 : 13

Suppose B takes x days to do the work.

Then, 10 : 13:: 23 : x $\quad x = \left[\frac{23 \times 13}{10}\right] \quad x = \frac{299}{10}$

A's 1 day's work $= \frac{1}{23}$

B's 1 day's work $= \frac{10}{299}$

(A + B)'s 1 day's work $= \left[\frac{1}{23} + \frac{10}{299}\right] = \frac{23}{299} = \frac{1}{13}$

Therefore, A and B together can complete the work in 13 days.

18. Option C

Number of pages typed by Ravi in 1 hour $= \frac{32}{6} = \frac{16}{3}$

Number of pages typed by Kumar in 1 hour $= \frac{40}{5} = 8$

Number of pages typed by both in 1 hour $= \left[\frac{16}{3} + 8\right] = \frac{40}{3}$

Time taken by both to type 110 pages $= \left[110 \times \frac{3}{40}\right]$ hours

$= 8\frac{1}{4}$ hours or 8 hours 15 minutes

19. Option C

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

(A + B + C)'s 1 day's work $= \left[\frac{1}{24} + \frac{1}{6} + \frac{1}{12}\right] = \frac{7}{24}$

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

So, all the three together will complete the job in $\left[\frac{24}{7}\right]$ days $= 3\frac{3}{7}$

20. Option B

Ration of times taken by Sakshi and Tanya = 125 : 100 = 5 : 4

Suppose Tanya takes x days to do the work.

5 : 4::20 : x $\quad x = \left[\frac{4 \times 20}{5}\right]$

x = 16 days

Hence, Tanya takes 16 days to complete the work.

21. Option B

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

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

$\frac{6}{x} = \frac{1}{2}$

x = 12

So, B takes (12/2) = 6 days to finish the work.

22. Option C

(A + B)'s 1 day's work = $\left[\frac{1}{15} + \frac{1}{10}\right] = \frac{1}{6}$

Work done by A and B in 2 days = $\left[\frac{1}{6} \times 2\right] = \frac{1}{3}$

Remaining work = $\left[1 \quad \frac{1}{3}\right] = \frac{2}{3}$

Now, $\frac{1}{15}$ work is done by A in 1 day.

$\frac{2}{3}$ work will be done by A in $\left[15 \times \frac{2}{3}\right]$ = 10 days

Hence, the total time taken = (10 + 2) = 12 days.

23. Option A

2 (A + B + C)'s 1 day's work = $\left[\frac{1}{30} + \frac{1}{24} + \frac{1}{20}\right] = \frac{15}{120} = \frac{1}{8}$

Therefore, (A + B + C)'s 1 day's work = $\frac{1}{2 \times 8} = \frac{1}{16}$

Work done by A, B, C in 10 days = $\frac{10}{16} = \frac{5}{8}$

Remaining work = $\left[1 \quad \frac{5}{8}\right] = \frac{3}{8}$

A's 1 day's work = $\left[\frac{1}{16} \quad \frac{1}{24}\right] = \frac{1}{48}$

Now, $\frac{1}{48}$ work is done by A in 1 day.

So, $\frac{3}{8}$ work will be done by A in $\left[48 \times \frac{3}{8}\right]$ = 18 days.

24. Option A

Ratio of rates of working of A and B = 2 : 1

So, ratio of times taken = 1 : 2

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

A's 1 day's work = $\frac{1}{6}$; (2 times of B's work)

(A + B)'s 1 day's work = $\left[\frac{1}{6} + \frac{1}{12}\right] = \frac{3}{12} = \frac{1}{4}$

So, A and B together can finish the work in 4 days.

25. Option B

(20 × 16) women can complete the work in 1 day.

1 woman's 1 day's work = $\frac{1}{320}$

(16 × 15) men can complete the work in 1 day.

1 man's 1 day's work $= \frac{1}{240}$

So, required ratio $= \frac{1}{240} : \frac{1}{320}$

$= \frac{1}{3} : \frac{1}{4}$

= 4 : 3 (cross multiplied)

26. Option C

(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 $= \left[2 \times \frac{1}{6}\right] \quad \left[\frac{1}{8} + \frac{1}{12}\right]$

$= \left[\frac{1}{3} \quad \frac{5}{24}\right]$

$= \frac{3}{24}$

$= \frac{1}{8}$

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

27. Option C

(B + C)'s 1 day's work $= \left[\frac{1}{9} + \frac{1}{12}\right] = \frac{7}{36}$

Work done by B and C in 3 days $= \left[\frac{7}{36} \times 3\right] = \frac{7}{12}$

Remaining work $= \left[1 \quad \frac{7}{12}\right] = \frac{5}{12}$

Now, $\frac{1}{24}$ work is done by A in 1 day.

So, $\frac{5}{12}$ work is done by A in $\left[24 \times \frac{5}{12}\right]$ = 10 days.

28. Option A

Work done by X in 8 days $= \left[\frac{1}{40} \times 8\right] = \frac{1}{5}$

Remaining work $= \left[1 \quad \frac{1}{5}\right] = \frac{4}{5}$

Now, $\frac{4}{5}$ work is done by Y in 16 days.

Whole work will be done by Y in $\left[16 \times \frac{5}{4}\right]$ = 20 days.

X's 1 day's work $= \frac{1}{40}$, Y's 1 day's work $= \frac{1}{20}$

(X + Y)'s 1 day's work $= \left[\frac{1}{40} + \frac{1}{20}\right] = \frac{3}{40}$

Hence, X and Y will together complete the work in $\left[\frac{40}{3}\right] = 13\frac{1}{3}$ days.

29. Option B

(A's 1 day's work) : (B's 1 day's work) $= \frac{7}{4} : 1 = 7 : 4$

Let A's and B's 1 day's work be 7x and 4x respectively.

Then, $7x + 4x = \frac{1}{7}$ $\qquad 11x = \frac{1}{7}$ $\qquad x = \frac{1}{77}$

A's 1 day's work = $\left[\frac{1}{77} \times 7\right] = \frac{1}{11}$

30. Option A

Efficiency of P : Q = 3 : 1
Required number of days of P : Q = 1 : 3
i.e., if P requires x days then Q requires 3x days
but 3x x = 60
2x = 60
x = 30 and 3x = 90
Thus P can finish the work in 30 days and Q can finish the work in 90 days.

31. Option B

Filling efficiency = 5% $5 = \frac{100}{20}$
Emptying efficiency = 1.66% $1.66 = \frac{100}{60}$
Net efficiency = 5 1.66 = 3.33%
Required time to full the tub = $\frac{100}{3.33}$ = 30 minutes

32. Option C

Efficiency of A = 7.14%
Efficiency of B = 4.76%
Efficiency of A + B = 11.9%
Number of days required by A and B, working together = $\frac{100}{11.9}$ = 8.4 days

33. Option A

Efficiency of A + B = 33.33% $\left[= \frac{100}{3}\right]$
Ratio of efficiency of A and B = 3 : 1
Efficiency of A = $\frac{3}{4} \times 33.33$ = 25%
Number of days taken by A = 4 = $\frac{100}{25}$ = 4

34. Option A

3 days before the completion of the work Aman left the work means in last 3 days only Suneeta has worked alone.
So, in last 3 days worked done by Suneeta = $3 \times \frac{1}{21} = \frac{1}{7}$
So, the rest $\left[1 \quad \frac{1}{7}\right] = \frac{6}{7}$ work was done by Aman and Suneeta both.
Number of days in which Aman and Suneeta worked together = $\frac{6/7}{5/42} = \frac{36}{5} = 7\frac{1}{5}$ days

35. Option A

Karan's efficiency = 10%
Sohan's efficiency = 5%
Work done by Karan and Sohan together in 3 days = 15 × 3 = 45%
Now, number of days in which B completed rest (55%) work alone = $\frac{55}{5}$ = 11

Total number of days in which B worked = 3 + 11 = 14

Now number of days required by B, when A and B both worked together = $\frac{100}{15}$ =6 $\frac{2}{3}$

Required difference in number of days = (11) $\left[6\frac{2}{3}\right]$

= $\frac{13}{3}$ = 4 $\frac{1}{3}$ days

36. Option B

A's share = Rs.250
B's share = Rs.100
It means the ratio of efficiency of A : B = 250 : 100 = 5 : 2
Ratio of days taken by A and B = 2x : 5x
Now, 5x 2x = 9 x = 3
Number of days taken by A = 6 (efficiency = 16.66%)
Number of days taken by B = 15 (efficiency = 6.66%)
Therefore number of days taken by A and B, working together = $\frac{100}{23.33}$ = $\frac{300}{70}$ = 4 $\frac{2}{7}$ days

37. Option A

A + B = 70%
B + C = 50% [A + B + B + C (A + B + C) = B]
70 + 50 100 = 20%
B = 20%
A = 50%
C = 30%
Hence, A is most efficient.

38. Option C

Work done = $\frac{1}{5}$

Remaining work = $\frac{4}{5}$
4 (20 × 75) = 40 × x
x = 150
Therefore 75 men should be increased.

39. Option E

Work done by 2 men = 3 women = 4 boys
1 man = 2 boys
1 women = $\frac{4}{3}$ boys
Boys × days = 4 × 52 (boys days)
Again 1 man + 1 woman + 1 boy = 2 + $\frac{4}{3}$ + 1 = $\frac{13}{3}$ boys

40. Option C

Work done = $\frac{2}{3}$

Remaining work = $\frac{1}{3}$, which is half of $\frac{2}{3}$

$\frac{1}{2} \times (20 \times 32) = 8 \times x$

x = 40 men

Therefore, 20 more men were required.

41. Option A

Number of days taken by A to complete work alone = 14 days
Number of days taken by B to complete work alone = 7 days
Number of days taken by C to complete work alone = 7 days

One day's work of A and B = $\frac{1}{14} + \frac{1}{7} = \frac{3}{14}$

And one day's work of A, B and C = $\frac{1}{14} + \frac{1}{7} + \frac{1}{7} = \frac{5}{14}$

3 day's work of A and B = $3 \times \frac{3}{14} = \frac{9}{14}$

Remaining work = $\frac{5}{14}$ $\left[1 \quad \frac{9}{14}\right]$

This remaining work will be done by A, B and C = $\frac{5/14}{5/14}$ = 1 day

42. Option A

(A + B)'s 1 day's work = $\frac{1}{4}$, As 1 day's work = $\frac{1}{12}$

B's 1 day's work= $\left[\frac{1}{4} \quad \frac{1}{12}\right] = \frac{1}{6}$

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

43. Option E

Efficiency of 4 men and 2 boys = 20%
Efficiency of 3women and 4 boys = 20%
Efficiency of 2 men and 3 women = 20%

So, Efficiency of 6 men, 6 women and 6 boys = 60%
So, efficiency of 1 man, 1 woman and 1 boy = 10%
Now, since they will work at double their efficiency
Efficiency of 1 man, 1 woman and 1 boy = 20%
Required number of days = 5

44. Option B

C's 1 day's work = $\frac{1}{3}$ $\left[\frac{1}{6} + \frac{1}{8}\right] = \frac{1}{24}$

A : B : C = Ratio of their 1 day's work = $\frac{1}{6} : \frac{1}{8} : \frac{1}{24}$ = 4 : 3 : 1

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.$\left[600 \quad (300 + 225)\right]$ = Rs.75

45. Option D

Efficiency of A = 8.33%
Effective efficiency = 6.66%, when there is leakage
So, efficiency of leakage = 1.66% = (8.33   6.66)
It means due to leakage a full tank will be empty in 60 hours.

46. Option C

(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
So, 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.

47. Option A

Efficiency when both pipes used to fill = A + B
And efficiency when pipe A is used to fill and pipe B is used to empty the tank = A   B
So, $\frac{A + B}{A \quad B} = \frac{2}{1}$
$\frac{A}{B} = \frac{3}{1}$
Thus, the ratio of efficiency of pipe A and B = 3 : 1

48. Option E

(45 × 16) men can complete the work in 1 day.
So, 1 man's 1day's work = $\frac{1}{720}$
45 men's 6 day's work = $\left[\frac{1}{16} \times 6\right] = \frac{3}{8}$ Remaining work = $\left[1 \quad \frac{3}{8}\right] = \frac{5}{8}$

49. Option C

Time taken by pipes A and B to fill the whole tank = $\frac{100}{16.66}$ = 6 hours
Capacity filled in 2 hours by pipes A, B and C = 2 × 13.33 = 26.66%
Remaining capacity = 73.33%
This remaining capacity can be filled by A and B = $\frac{73.33}{16.66} = 4\frac{2}{5}$
So, the total time required = $2 + 4\frac{2}{5}$ = 6 hours 24 minutes
Thus, in this case 24 minutes extra are required.

50. Option C

1 minute's work of both the punctures = $\left[\frac{1}{9} + \frac{1}{6}\right] = \frac{5}{18}$
So, both the punctures will make the tyre flat in $\frac{18}{5} = 3\frac{3}{5}$ min.

51. Option B

Let x litre be the per day filling and v litre be the capacity of the reservoir, then

$90x + v = 40000 \times 90$ .... (1)
$60x + v = 32000 \times 60$ .... (2)
Solving eq. (1) and (2), we get
$x = 56000$
Hence, 56000 litres per day can be used without the failure of supply.

52. Option A

(A's 1 day's work) : (B's 1 day's work) = 150 : 100 = 3 : 2
Let A's and B's 1 day's work be 3x and 2x respectively.
Then, C's 1 day's work $= \left[\frac{3x + 2x}{2}\right] = \frac{5x}{2}$
So, $\frac{5x}{2} = \frac{1}{40}$ or $x = \left[\frac{1}{40} \times \frac{2}{5}\right] = \frac{1}{100}$
A's 1 day's work $= \frac{3}{100}$; B's 1 day's work $= \frac{1}{50}$; C's 1 day's work $= \frac{1}{40}$
(A + B + C)'s 1 day's work $= [\frac{3}{100} + \frac{1}{50} + \frac{1}{40}] = \frac{15}{200} = \frac{3}{40}$
So, A, B and C together can do the work in $\frac{40}{3} = 13\frac{1}{3}$ days

53. Option B

Ratio of number of men, women and children $= \frac{18}{6} : \frac{10}{5} : \frac{12}{3} = 3x : 2x : 4x$
So, $(3x + 2x + 4x) = 18$
So, $x = 2$
Therefore, number of women = 4
Share of all women $= \frac{10}{40} \times 4000 =$ Rs.1000

(18 + 10 + 12 = 40)

So, Share of each woman $= \frac{1000}{4} =$ Rs.250

54. Option A

P can complete the work in (12 × 8) hrs. = 96 hrs.
Q can complete the work in (8 × 10) hrs. = 80 hrs.
So, P's 1 hour's work $= \frac{1}{96}$ and Q's 1 hour's work $= \frac{1}{80}$
(P + Q)'s 1 hour's 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.
So, 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

55. Option C

Efficiency of Eklavya	= 16.66%
Efficiency of Faizal	= 8.33%
Total efficiency of Eklavya and Faizal	= 25%

So, they can do actual work in 4 days
So, 3 times work requires 12 days.

56. Option D

(A + B)'s 20 day's work = $\left[\frac{1}{30} \times 20\right] = \frac{2}{3}$ Remaining work = $[1 \quad \frac{2}{3}] = \frac{1}{3}$
Now, $\frac{1}{3}$ work is done by A in 20 days.
Whole work will be done by A in (20 × 3) = 60 days

57. Option B

Efficiency of Aman and Raman = 10%
Aman worked for 2.5 hours and Raman worked separately 8.5 hours. Which means it can be considered that Aman and Raman worked together for 2.5 hours and Raman worked alone for 6 hours.
Thus, Aman and Raman in 2.5 hours can complete 25% work. It means the remaining (50 25) = 25% of the work was done by Raman in 6 hours.
Therefore, Raman can do 100% work in 24 hours. It means the efficiency of Raman = 4.16%
Therefore, efficiency of Aman = (10 4.16) = 5.83%
Thus, Aman require $\frac{100}{5.83} = 17\frac{1}{7}$ hours to complete the work alone.

58. Option B

Let 1 man's 1 day's work = x and 1 boy's 1 day's work = y
Then, 5x + 2y = 4 (x + y) x = 2y $\frac{x}{y} = \frac{2}{1}$

59. Option B

C's 1 day's work $= \frac{1}{3} \quad \left[\frac{1}{6} + \frac{1}{8}\right] = \frac{1}{3} \quad \frac{7}{24} = \frac{1}{24}$
A's wages : B's wages : C's wages = $\frac{1}{6} : \frac{1}{8} : \frac{1}{24}$ = 4 : 3 : 1
So, C's share = Rs.$\left[\frac{1}{8} \times 3200\right]$ = Rs.400

60. Option C

Rate of leakage = 8.33% per hour
Net efficiency = 50 (16.66 + 8.33) = 25%
Time required = $\frac{100}{25}$ = 4 hours

61. Option B

Work done by A $= \left[1 \quad \frac{8}{23}\right] = \frac{15}{23}$
So, A : (B + C) = $\frac{15}{23} : \frac{8}{23}$ = 15 : 8
So, A's share = Rs. $\left[\frac{15}{23} \times 529\right]$ = Rs.345

62. Option B

(A's 1 day's work) : (B's 1 day's work) = $\frac{7}{4}$: 1 = 7 : 4
Let A's and B's 1 day's work be 7x and 4x respectively.
Then, 7x + 4x = $\frac{1}{7}$ 11x = $\frac{1}{7}$ x = $\frac{1}{77}$

So, A's 1 day's work = $\left[\frac{1}{77} \times 7\right] = \frac{1}{11}$

63. Option D

Suppose the work was finished in x days.
Then, A's (x   8) day's work + B's (x   12) day's work + C's x day's work = 1
$\frac{x \quad 8}{36} + \frac{x \quad 12}{54} + \frac{x}{72} = 1$ 6(x   8) + 4 (x   12) + 3x = 216
So, 13x = 312 or x = 24

64. Option C

B's 1 day's work = $\left[\frac{1}{12} \quad \frac{1}{20}\right] = \frac{2}{60} = \frac{1}{30}$

Now, (A + B)'s 1 day's work = $\left[\frac{1}{20} + \frac{1}{60}\right] = \frac{4}{60} = \frac{1}{15}$ [B works for half day only]
So, A and B together will complete the work in 15 days.

65. Option C

1 woman's 1 day's work = $\frac{1}{70}$; 1 child's 1 day's work = $\frac{1}{140}$

(5 women + 10 children)'s 1 day's work = $\left[\frac{5}{70} + \frac{10}{140}\right] = \left[\frac{1}{14} + \frac{1}{14}\right] = \frac{1}{7}$
So, 5 women and 10 children will complete the work in 7 days.

66. Option A

1 man's 1 day's work = $\frac{1}{108}$

12 men's 6 day's work = $\left[\frac{1}{9} \times 6\right] = \frac{2}{3}$ Remaining work = $\left[1 \quad \frac{2}{3}\right] = \frac{1}{3}$

18 men's 1 day's work = $\left[\frac{1}{108} \times 18\right] = \frac{1}{6}$

$\frac{1}{6}$ work is done by them in 1 day.

So, $\frac{1}{3}$ work is done by them in $\left[6 \times \frac{1}{3}\right]$ = 2 days

67. Option A

B's daily earning = Rs. (300   188) = Rs.112
A's daily earning = Rs. (300   152) = Rs.148

C's daily earning = Rs. [300   (112 + 148)] = Rs.40

MODULE OBJECTIVE:

The module **calendar** is used to find many problems related to odd days, leap year, and counting of odd days and many.

The module **clock** is used to find many problems related to find angle between hour and minute hand of a clock, at what time the hands of clock will be together and many.

Prerequisites:

CALENDAR

- *Odd Days:*

We are supposed to find the day of the week on a given date.

For this, we use the concept of 'odd days'.

In a given period, the number of days more than the complete weeks are called *odd days*.

- *Leap Year:*

(i). Every year divisible by 4 is a leap year, if it is not a century.

(ii). Every 4th century is a leap year and no other century is a leap year.

Note: *A leap year has 366 days.*

Examples:

i. Each of the years 1948, 2004, 1676 etc. is a leap year.
ii. Each of the years 400, 800, 1200, 1600, 2000 etc. is a leap year.
iii. None of the years 2001, 2002, 2003, 2005, 1800, 2100 is a leap year.

- *Ordinary Year:*

The year which is not a leap year is called an *ordinary years*. An ordinary year has 365 days.

- *Counting of Odd Days:*

1. 1 ordinary year = 365 days = (52 weeks + 1 day.)

   ∴ 1 ordinary year has 1 odd day.

2. 1 leap year = 366 days = (52 weeks + 2 days)

   ∴ 1 leap year has 2 odd days.

3. 100 years = 76 ordinary years + 24 leap years

   = (76 x 1 + 24 x 2) odd days = 124 odd days.

   = (17 weeks + days) ≡ 5 odd days.

   ∴ Number of odd days in 100 years = 5.

   Number of odd days in 200 years = (5 x 2) ≡ 3 odd days.

   Number of odd days in 300 years = (5 x 3) ≡ 1 odd day.

   Number of odd days in 400 years = (5 x 4 + 1) ≡ 0 odd day.

   Similarly, each one of 800 years, 1200 years, 1600 years, 2000 years etc. has 0 odd days.

- *Day of the Week Related to Odd Days:*

No. of days:	0	1	2	3	4	5	6
Day:	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.

Some codes o remember the months and weeks:
a) Week
Sunday – 1
Monday – 2
Tuesday – 3
Wednesday – 4
Thursday – 5
Friday – 6
Saturday – 0

b) Month

jan – 1	july – 0
feb – 4	Aug – 3
Mar – 4	Sep – 6
Apr – 0	Oct – 1
May – 2	Nov – 4
june – 5	Dec – 6

CLOCK:

The Face or dial of a watch is a circle whose circumference is divided into 60 equal parts, called *minute spaces*.
A clock has two hands, the smaller one is called *the hour hand* or *short hand* while the larger one is called the *minute hand* or *long hand.*.
i) In 60 minutes, the minute hand gains 55 minutes on the hour hand.
ii) In every hour, both the hands coincide once.
iii) The hands are in the same straight line when they are coincident or opposite to each other.
iv) When the two hands are at right angles, they are 15 minute spaces apart.
v)When the hand's are in opposite directions, they are 30 minute spaces apart.
vi)Angle traced by hour hand in 12 hrs = 360°.
vii)Angle traced by minute hand in 60 min. = 360°.
viii)Too Fast and Too Slow: If a watch or a clock indicates 8.15, when the correct time , 8 is said to be 15 minutes too fast.
On the other hand, if it indicates 7.45, when the correct time is 8, it is said to be 15 minutes too slow.

Solved Examples:

CALENDAR:

1. It was Sunday on Jan 1, 2006. What was the day of the week Jan 1, 2010?

A.Sunday B.Saturday
C.Friday D.Wednesday

Answer: Option **C** **[RRB 2001]**

Solution:

On 31st December, 2005 it was Saturday.

Number of odd days from the year 2006 to the year 2009 = (1 + 1 + 2 + 1) = 5 days.

∴ On 31st December 2009, it was Thursday.

Thus, on 1st Jan, 2010 it is Friday.

2. What was the day of the week on 28th May, 2006?

A.Thursday B.Friday
C.Saturday D.Sunday

Answer: Option **D**

Solution:

28 May, 2006 = (2005 years + Period from 1.1.2006 to 28.5.2006)

Odd days in 1600 years = 0

Odd days in 400 years = 0

5 years = (4 ordinary years + 1 leap year) = (4 x 1 + 1 x 2) ≡ 6 odd days

```
Jan.  Feb.   March    April    May
(31 +  28  +  31   +   30   +   28 ) = 148 days
```

∴ 148 days = (21 weeks + 1 day) ≡ 1 odd day.

Total number of odd days = (0 + 0 + 6 + 1) = 7 ≡ 0 odd day.

Given day is Sunday.

3.What was the day of the week on 17th June, 1998?

A.Monday B.Tuesday
C.Wednesday D.Thursday **[Sathyam 2000]**

Answer: Option **C**

Solution:

17th June, 1998 = (1997 years + Period from 1.1.1998 to 17.6.1998)

Odd days in 1600 years = 0

Odd days in 300 years = (5 x 3) ≡ 1

97 years has 24 leap years + 73 ordinary years.

Number of odd days in 97 years (24 x 2 + 73) = 121 = 2 odd days.

```
Jan.  Feb.   March    April    May      June
(31 +  28  +  31   +   30   +   31   +   17) = 168 days
```

∴ 168 days = 24 weeks = 0 odd day.

Total number of odd days = (0 + 1 + 2 + 0) = 3.

Given day is Wednesday.

4. What will be the day of the week 15^{th} August, 2010?

A.Sunday B.Monday

C.Tuesday D.Friday **[TCS 2006]**

Answer: Option **A**

Solution:

15^{th} August, 2010 = (2009 years + Period 1.1.2010 to 15.8.2010)

Odd days in 1600 years = 0

Odd days in 400 years = 0

9 years = (2 leap years + 7 ordinary years) = (2 x 2 + 7 x 1) = 11 odd days ≡ 4 odd days.

```
Jan.   Feb.    March     April     May   June   July   Aug.
(31 +   28  +  31    +    30    +   31  + 30   + 31   + 15) = 227 days
```

∴ 227 days = (32 weeks + 3 days) ≡ 3 odd days.

Total number of odd days = (0 + 0 + 4 + 3) = 7 ≡ 0 odd days.

Given day is Sunday.

5. Today is Monday. After 61 days, it will be:

A.Wednesday B.Saturday

C.Tuesday D.Thursday

Answer: Option **B**

Solution:

Each day of the week is repeated after 7 days.

So, after 63 days, it will be Monday.

∴ After 61 days, it will be Saturday

6. If 6^{th} March, 2005 is Monday, what was the day of the week on 6^{th} March, 2004?

A.Sunday B.Saturday

C.Tuesday D.Wednesday

Answer: Option **A** **[I-CET-2007]**

Solution:

The year 2004 is a leap year. So, it has 2 odd days.

But, Feb 2004 not included because we are calculating from March 2004 to March 2005. So it has 1 odd day only.

∴ The day on 6^{th} March, 2005 will be 1 day beyond the day on 6^{th} March, 2004.

Given that, 6^{th} March, 2005 is Monday.

∴ 6^{th} March, 2004 is Sunday (1 day before to 6^{th} March, 2005).

7. On what dates of April, 2001 did Wednesday fall?
A. 1^{st}, 8^{th}, 15^{th}, 22^{nd}, 29^{th}
B. 2^{nd}, 9^{th}, 16^{th}, 23^{rd}, 30^{th}
C. 3^{rd}, 10^{th}, 17^{th}, 24^{th}
D. 4^{th}, 11^{th}, 18^{th}, 25^{th}

Answer: Option **D** **[INFOSYS 2003]**

Solution:

We shall find the day on 1^{st} April, 2001.

1^{st} April, 2001 = (2000 years + Period from 1.1.2001 to 1.4.2001)

Odd days in 1600 years = 0

Odd days in 400 years = 0

Jan. Feb. March April
(31 + 28 + 31 + 1) = 91 days ≡ 0 odd days.

Total number of odd days = (0 + 0 + 0) = 0

On 1^{st} April, 2001 it was Sunday.

In April, 2001 Wednesday falls on 4^{th}, 11^{th}, 18^{th} and 25^{th}.

8. How many days are there in x weeks x days?
A. $7x^2$
B. $8x$
C. $14x$
D. 7

Answer: Option **B**

Solution: x weeks x days = $(7x + x)$ days = $8x$ days.

CLOCK:

9. An accurate clock shows 8 o'clock in the morning. Through how may degrees will the hour hand rotate when the clock shows 2 o'clock in the afternoon?

A. 144° B. 150° **[RRB 2009]**
C. 168° D. 180°

Answer: Option **D**

Explanation:

Angle traced by the hour hand in 6 hours $= \left(\frac{360}{12} \times 6\right)^\circ = 180^\circ$.

10. The reflex angle between the hands of a clock at 10.25 is:

A. 180° B. $192\frac{1}{2}^\circ$

C. 195° D. $197\frac{1}{2}^\circ$

Answer: Option **D**

Explanation:

Angle traced by hour hand in $\frac{125}{12}$ hrs $= \left(\frac{360}{12} \times \frac{125}{12}\right)^\circ = 312\frac{1}{2}^\circ$.

Angle traced by minute hand in 25 min $= \left(\frac{360}{60} \times 25\right)^\circ = 150^\circ$.

$\therefore$ Reflex angle $= 360^\circ - \left(312\frac{1}{2} - 150\right)^\circ = 360^\circ - 162\frac{1}{2}^\circ = 197\frac{1}{2}$.

11. A clock is started at noon. By 10 minutes past 5, the hour hand has turned through:

A. 145° B. 150°
C. 155° D. 160°

Answer: Option **C**

Explanation:

Angle traced by hour hand in 12 hrs = 360°.

Angle traced by hour hand in 5 hrs 10 min. *i.e.*, $\frac{31}{6}$ hrs $= \left(\frac{360}{12} \times \frac{31}{6}\right)^\circ = 155^\circ$.

12. A watch which gains 5 seconds in 3 minutes was set right at 7 a.m. In the afternoon of the same day, when the watch indicated quarter past 4 o'clock, the true time is:

A. $59\frac{7}{12}$ min. past 3 B. 4 p.m. **[AAO EXAM 2003]**

C. $58\frac{7}{11}$ min. past 3 D. $2\frac{3}{11}$ min. past 4

Answer: Option **B**

Explanation:

Time from 7 a.m. to 4.15 p.m. = 9 hrs 15 min. = $\frac{37}{4}$ hrs.

3 min. 5 sec. of this clock = 3 min. of the correct clock.

$\Rightarrow \frac{37}{720}$ hrs of this clock = $\frac{1}{20}$ hrs of the correct clock.

$\Rightarrow \frac{37}{4}$ hrs of this clock = $\left(\frac{1}{20} \times \frac{720}{37} \times \frac{37}{4}\right)$ hrs of the correct clock.

= 9 hrs of the correct clock.

∴ The correct time is 9 hrs after 7 a.m. *i.e.*, 4 p.m.

13. How much does a watch lose per day, if its hands coincide every 64 minutes?

A. $32\frac{8}{11}$ min. B. $36\frac{5}{11}$ min.

C. 90 min. D. 96 min.

Answer: Option **A** **[CTS 2005]**

Explanation:

55 min. spaces are covered in 60 min.

60 min. spaces are covered in $\left(\frac{60}{55} \times 60\right)$ min. $= 65\frac{5}{11}$ min.

Loss in 64 min. $= \left(65\frac{5}{11} - 64\right) = \frac{16}{11}$ min.

Loss in 24 hrs $= \left(\frac{16}{11} \times \frac{1}{64} \times 24 \times 60\right)$ min. $= 32\frac{8}{11}$ min.

14. At what time between 7 and 8 o'clock will the hands of a clock be in the same straight line but, not together?

A. 5 min. past 7 B. $5\frac{2}{11}$ min. past 7

C. $5\frac{3}{11}$ min. past 7 D. $5\frac{5}{11}$ min. past 7

Answer: Option **D**

Explanation: When the hands of the clock are in the same straight line but not together, they are 30 minute spaces apart.

At 7 o'clock, they are 25 min. spaces apart.

∴ Minute hand will have to gain only 5 min. spaces.

55 min. spaces are gained in 60 min.

5 min. spaces are gained in $\left(\frac{60}{55} \times 5\right)$ min $= 5\frac{5}{11}$ min.

∴ Required time = $5\frac{5}{}$ min. past 7.

15. At what time between 5.30 and 6 will the hands of a clock be at right angles?

A. $43\frac{5}{11}$ min. past 5 B. $43\frac{7}{11}$ min. past 5

C. 40 min. past 5 D. 45 min. past 5 **[IAS 1997]**

Answer: Option **B**

Explanation:

At 5 o'clock, the hands are 25 min. spaces apart.

To be at right angles and that too between 5.30 and 6, the minute hand has to gain (25 + 15) = 40 min. spaces.

55 min. spaces are gained in 60 min.

40 min. spaces are gained in $\left(\frac{60}{55} \times 40\right)$ min $= 43\frac{7}{11}$ min.

∴ Required time = $43\frac{7}{11}$ min. past 5.

Exercise Problems:

CALENDAR:

1. The last day of a century cannot be

A.Monday B.Wednesday
C.Tuesday D.Friday

Answer: Option **C**

Solution:100 years contain 5 odd days.

∴ Last day of 1st century is Friday.

200 years contain (5 x 2) $\equiv$ 3 odd days.

∴ Last day of 2nd century is Wednesday.

300 years contain (5 x 3) = 15 $\equiv$ 1 odd day.

∴ Last day of 3rd century is Monday.

400 years contain 0 odd day.

∴ Last day of 4th century is Sunday.

This cycle is repeated.

∴ Last day of a century cannot be Tuesday or Thursday or Saturday.

2. On 8th Feb, 2005 it was Tuesday. What was the day of the week on 8th Feb, 2004?

A.Tuesday B.Monday
C.Sunday D.Wednesday

Answer: Option **C** **[CTS-2000]**

Solution:

The year 2004 is a leap year. It has 2 odd days.

∴ The day on 8th Feb, 2004 is 2 days before the day on 8th Feb, 2005.

Hence, this day is Sunday.

3. The calendar for the year 2007 will be the same for the year:

A.2014 B.2016

C.2017 D.2018

Answer: Option **D**

Solution:

Count the number of odd days from the year 2007 onwards to get the sum equal to 0 odd day.

```
Year    : 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017
Odd day : 1    2    1    1    1    2    1    1    1    2    1
```

Sum = 14 odd days $\equiv$ 0 odd days.

$\therefore$ Calendar for the year 2018 will be the same as for the year 2007.

4. Which of the following is not a leap year?

A.700 B.800

C.1200 D.2000

Answer: Option **A** **[TCS 2003]**

Solution:

The century divisible by 400 is a leap year.

$\therefore$ The year 700 is not a leap year.

5. On 8th Dec, 2007 Saturday falls. What day of the week was it on 8th Dec, 2006?

A.Sunday B.Thursday

C.Tuesday D.Friday

Answer: Option **D**

Solution:

The year 2006 is an ordinary year. So, it has 1 odd day.

So, the day on 8th Dec, 2007 will be 1 day beyond the day on 8th Dec, 2006.

But, 8th Dec, 2007 is Saturday.

∴ 8th Dec, 2006 is Friday.

6. January 1, 2008 is Tuesday. What day of the week lies on Jan 1, 2009?

A. Monday
B. Wednesday
C. Thursday
D. Sunday **[INFOSYS-2002]**

Answer: Option **C**

Solution:

The year 2008 is a leap year. So, it has 2 odd days.

1st day of the year 2008 is Tuesday (Given)

So, 1st day of the year 2009 is 2 days beyond Tuesday.

Hence, it will be Thursday.

7. January 1, 2007 was Monday. What day of the week lies on Jan. 1, 2008?

A. Monday
B. Tuesday
C. Wednesday
D. Sunday

Answer: Option **B**

Solution: The year 2007 is an ordinary year. So, it has 1 odd day.

1st day of the year 2007 was Monday.

1st day of the year 2008 will be 1 day beyond Monday.

Hence, it will be Tuesday.

8.Wbat was the day of the week on, 16th July, 1776?

A. Sunday
B. Thursday
C. Tuesday
D. Friday **[I-CET 2005]**

Answer: Option **C**

Solution: 16th July, 1776 = (1775 years + Period from 1st Jan., 1776 to 16th July, 1776)

Counting of odd days :1600 years have 0 odd day. 100 years have 5 odd days.

75 years = (18 leap years + 57 ordinary years)

= [(18 x 2) + (57 x 1)] odd days = 93 odd days

= (13 weeks + 2 days) = 2 odd days.
.. 1775 years have (0 + 5 + 2) odd days = 7 odd days = 0 odd day.
Jan. Feb. March April May June July
31 + 29 + 31 + 30 + 31 + 30 +16 = 198days= (28 weeks + 2 days) =2da
:. . Total number of odd days = (0 + 2) = 2. Required day was 'Tuesday'.

9. What was the day of the week on 16th August, 1947?

A.Sunday B.Saturday
C.Tuesday D.Friday

Answer: Option D

Solution: 15th August, 1947 = (1946 years + Period from 1st Jan., 1947 to 15^{th}

Counting of odd days:

1600 years have 0 odd day. 300 years have 1 odd day.

47 years = (11 leap years + 36 ordinary years)
= [(11 x 2) + (36 x 1») odd days = 58 odd days = 2 odd days.
Jan. Feb. March April May June July Aug.
31 + 28 + 31 + 30 + 31 + 30 + 31 + 15
= 227 days = (32 weeks + 3 days) = 3,
Total number of odd days = (0 + 1 + 2 + 3) odd days = 6 odd days.
Hence, the required day was 'Saturday'.

10. What was the day of the week on 16th April, 2000 ?

A.Sunday B.Thursday **[CTS 2003]**
C.Tuesday D.Friday

Answer: Option **A**

Solution:16th April, 2000 = (1999 years + Period from 1st Jan., 2000 to 16thA'
Counting of odd days:
1600 years have 0 odd day. 300 years have 1 odd day.
99 years = (24 leap years + 75 ordinary years)
= [(24 x 2) + (75 x 1)] odd days = 123 odd days
= (17 weeks + 4 days) = 4 odd days.
Jan. Feb. March April
31 + 29 + 31 + 16 = 107 days = (15 weeks + 2 days) = 2 odd,
Total number of odd days = (0 + 1 + 4 + 2) odd days = 7 odd days = 0 odd day.
Hence, the required day was 'Sunday'.

11. On what dates of Jull.2004 did Monday fall?

A.1^{st}, 8^{th}, 15^{th}, 22^{nd}, 29^{th} B.5^{th}, 12^{th}, 19^{th}, 26^{th}
C.4^{th}, 11^{th}, 18^{th}, 25^{th} D.6^{th}, 13^{th}, 20^{th}, 27^{th}

Answer: Option **B**

Solution:. Let us find the day on 1st July, 2004.

2000 years have 0 odd day. 3 ordinary years have 3 odd days.
Jan. Feb. March April May June July
31 + 29 + 31 + 30 + 31 + 30 + 1
= 183 days = (26 weeks + 1 day) = 1 t .
Total number of odd days = (0 + 3 + 1) odd days = 4 odd days. '
:. 1st July 2004 was 'Thursday',-,-
Thus, 1st Monday in July 2004 _as on 5th July.
Hence, during July 2004, Monday fell on 5th, 12th, 19th and 26th. .

12. Prove that the calendar for the year 2008 will serve for the year 20ll
A.2010 B.2011
C.2014 D.2015 **[RRB 2002]**

Answer: Option C

Sol. In order that the calendar for the year 2003 and 2014 be the same, 1^{st} January of both the years must be on the same day of the week.
For this, the number of odd days between 31st Dec., 2002 and 31st Dec.,2013 must be the same.
We know that an ordinary year has 1 odd day and a leap year has 2 odd During this period, there are 3 leap years, namely 2004, 2008 and 2012 and 8 ordinary years.
Total number of odd days = (6 + 8) days = 0 odd day.
Hence, the calendar for 2003 will serve for the year 2014.

13. Prove that any date in March of a year is the same day of the week corresponding date in November that year.
A.Same day B.Not same day
C.Next day D.Day by day

Answer: Option A

We will show that the number of odd days between last day of February and last day of October is zero. .
March April May June July Aug. Sept. Oct.
31 + 30 + 31 + 30 + 31 + 31 + 30 + 31
= 241 days = 35 weeks = 0 odd day. ,Number of odd days during this period = 0.
Thus, 1st March of an year will be the same day as 1st November of that year. Hence, the result follows.

CLOCK:

14) Find the angle between the hour hand and the minute hand of a clock when 3.25.
A) 32^o B)47*1/2^o C)49*1/2^o D)37^o
Answer:B

Solution: angle traced by the hour hand in 12 hours = 360°

Angle traced by it in three hours 25 min (i.e.) 41/12 hrs=(360*41/12*12)° =102*1/2°

angle traced by minute hand in 60 min. = 360°.
Angle traced by it in 25 min. = (360 X 25)/60= 150°
Required angle = 1500 – 102*1/2°= 47*1/2°

15) At what time between 2 and 3 o'clock will the hands of a clock be together?
A) 45 min. past 2 B) 40 min. past 2
C) 120*1/11min.past 2 D)54*6/11 min.past 2 [Sathyam-2000]

Answer:B

Solution: At 2 o'clock, the hour hand is at 2 and the minute hand is at 12, *i.e.* they are 10 min spaces apart.
To be together, the minute hand must gain 10 minutes over the hour hand.
Now, 55 minutes are gained by it in 60 min.
10 minutes will be gained in (60 x 10)/55 min. = 120/11 min.

The hands will coincide at 120/11 min. past 2.

16) At what time between 4 and 5 o'clock will the hands of a clock be at right angle?
A) 45 min. past 4 B) 40 min. past 4
C) 40*1/11min.past 4 D)54*1/11 min.past 4 **[IAS 2000]**
Answer: C

Solution: At 4 o'clock, the minute hand will be 20 min. spaces behind the hour hand, Now, when the two hands are at right angles, they are 15 min. spaces apart. So, they are at right angles in following two cases.
Case I. When minute hand is 15 min. spaces *behind the hour hand:*
In this case min. hand will have to gain (20 - 15) = 5 minute spaces. 55 min. spaces are gained by it in 60 min.
5 min spaces will be gained by it in 60*5/55 min=60/11min.

:. They are at right angles at 60/11min. past 4.

Case II. When the minute hand is 15 min. spaces *ahead* of the *hour* hand:
To be in this position, the minute hand will have to gain (20 + 15) = 35 minute spa' 55 min. spaces are gained in 60 min.

35 min spaces are gained in (60 x 35)/55 min =40/11
:. They are at right angles at 40/11 min. past 4.

17) Find at what time between 8 and 9 o'clock will the hands of a clock being the same straight line but not together**.**

A) 45 min B) 40 min
C) 20*6/11min.past 4 D)120*1/11 min.past 4

Answer:D

Solution: At 8 o'clock, the hour hand is at 8 and the minute hand is at 12, i.e. the two hands_ are 20 min. spaces apart.
To be in the same straight line but not together they will be 30 minute spaces apart. So, the minute hand will have to gain (30 - 20) = 10 minute spaces over the hour hand.
55 minute spaces are gained. in 60 min.

10 minute spaces will be gained in (60 x 10)/55 min. = 120/11min.

:. The hands will be in the same straight line but not together at 120/11 min.

18) At what time between 5 and 6 o'clock are the hands of a clock 3min apart?

A) 45 min. past 5 B) 140 min. past 5
C) 346*1/11min.past 4 D)354*1/11 min.past 4 **[LICAAO 2003]**

Answer: C
Solution: At 5 o'clock, the minute hand is 25 min. spaces behind the hour hand.
Case I. Minute hand is 3 min. spaces *behind the hour hand.*
In this case, the minute hand has to gain' (25 - 3) = 22 minute spaces. 55 min. are gained in 60 min.

22 min. are gaineg in (60*22)/55min. = 24 min.

:. The hands will be 3 min. apart at 24 min. past 5.
Case II. Minute hand is 3 min. spaces *ahead* of *the hour hand.*
In this case, the minute hand has to gain (25 + 3) = 28 minute spaces. 55 min. are gained in 60 min.

28 min. are gained in (60 x 28_)/55=346/11

The hands will be 3 min. apart at 346/11 min. past 5.

19) Tbe minute hand of a clock overtakes the hour hand at intervals of 65 minutes of the correct time. How much a day does the clock gain or lose?

A) 450 min. B) 470 min
C) 440/43 min D)546 min **[SCRA 1996]**

Answer: C

Solution: In a correct clock, the minute hand gains 55 min. spaces over the hour hand in 60 minutes.
To be together again, the minute hand must gain 60 minutes over the hour hand. 55 min. are gained in 60 min.

60 min are gained in $\frac{60}{55}$ x 60 min =720/11 min.

But, they are together after 65 min.
Gain in 65 min =720/11-65 =5/11min.

Gain in 24 hours =(5/11 * (60*24)/65)min =440/43
The clock gains 440/43 minutes in 24 hours.

20) A watch which gains uniformly, is 6 min. slow at 8 o'clock in the morning Sunday and it is 6 min. 48 sec. fast at 8 p.m. on following Sunday. When was it correct?

A. Sunday
B. Wednesday
C. Tuesday
D. Friday **[RRB 2010]**

Answer: Option B

Solution: Time from 8 a.m. on Sunday to 8 p.m. on following Sunday
= 7 days 12 hours = 180 hours

The watch gains (5 + 29/5) min. or 54/5 min. in 180 hrs.
Now 54/5 min. are gained in 180 hrs.

5 min. are gained in (180 x 5/54 x 5) hrs. = 83 hrs 20 min. = 3 days 11 hrs 20 min.

Watch is correct 3 days 11 hrs 20 min. after 8 a.m. of Sunday.
It will be correct at 20 min. past 7 p.m. on Wednesday.

21) A clock is set right at 6 a.m. The clock loses 16 minutes in 24 hours. What will be the true time when the clock indicates 10 p.m. on 4th day?
A)12 am B)06 am C)11 p.m D)10 p.m

Answer:C

Solution: Time from 5 a.m. on a day to 10 p.m. on 4th day = 89 hours.
Now 23 hrs 44 min. of this clock = 24 hours of correct clock.

356/15 hrs of this clock = 24 hours of correct clock.

89 hrs of this clock = (24 x 31556 x 89) hrs of correct clock.

= 90 hrs of correct clock.
So, the correct time is 11 p.m.

22) A clock is set right at 8 a.m. The clock gains 10 minutes in 24 hours will be the true time when the clock indicates 1 p.m. on the following day?

A) 45 min. past 12 B)48 min. past 12

C) 40 min.past 12 D)54min.past 12

Answer:B

Solution: Time from 8 a.m. on a day 1 p.m. on the following day = 29 hours.

24 hours 10 min. of this clock = 24 hours of the correct clock.

145 /6 hrs of this clock = 24 hrs of the correct clock

29 hrs of this clock = (24 x 6/145 x 29) hrs of the correct clock

= 28 hrs 48 min. of correct clock

The correct time is 28 hrs 48 min. after 8 a.m.

This is 48 min. past 12.

23) The angle between the minute hand and the hour hand of a clock when the time is 4.20, is:

A. 0^o B. 10^o

C. 5^o D. 20^o **[AAO EXAM 2003]**

Answer: Option **B**

Explanation:

Angle traced by hour hand in $\frac{13}{3}$ hrs $= \left(\frac{360}{12} \times \frac{13}{3}\right)^o = 130^o$.

Angle traced by min. hand in 20 min. $= \left(\frac{360}{60} \times 20\right)^o = 120^o$.

$\therefore$ Required angle $= (130 - 120)^o = 10^o$.

24) At what angle the hands of a clock are inclined at 15 minutes past 5?

A. $58\frac{1}{2}^o$ B. 64^o

C. $67\frac{1}{2}^o$ D. $72\frac{1}{2}^o$

Answer: Option **C**

Explanation:

Angle traced by hour hand in $\frac{21}{4}$ hrs $= \left(\frac{360}{12} \times \frac{21}{4}\right)^o = 157\frac{1}{2}^o$

Angle traced by min. hand in 15 min. $= \left(\frac{360}{60} \times 15\right)^{o} = 90^{o}$.

∴ Required angle $= \left(157\frac{1}{2}\right)^{o} - 90^{o} = 67\frac{1}{2}^{o}$

25) At 3.40, the hour hand and the minute hand of a clock form an angle of:

A.120º B.125º
C.130º D.135º

Answer: Option **C**

Explanation:

Angle traced by hour hand in 12 hrs. = 360º.

Angle traced by it in $\frac{11}{3}$ hrs $= \left(\frac{360}{12} \times \frac{11}{3}\right)^{o} = 110^{o}$.

Angle traced by minute hand in 60 min. = 360º.

Angle traced by it in 40 min. $= \left(\frac{360}{60} \times 40\right)^{o} = 240^{o}$.

∴ Required angle $(240 - 110)^{o} = 130^{o}$.

26) How many times are the hands of a clock at right angle in a day?

A.22 B.24
C.44 D.48 **[TCS-2010]**

Answer: Option **C**

Explanation:

In 12 hours, they are at right angles 22 times.

∴ In 24 hours, they are at right angles 44 times.

27) The angle between the minute hand and the hour hand of a clock when the time is 8.30, is:

A.80º B.75º
C.60º D.105º

Answer: Option **B**

Explanation:

Angle traced by hour hand in $\frac{17}{2}$ hrs = $\left(\frac{360}{12} \times \frac{17}{2}\right)^{o}$ = 255.

Angle traced by min. hand in 30 min. = $\left(\frac{360}{60} \times 30\right)^{o}$ = 180.

∴ Required angle = $(255 - 180)^{o} = 75^{o}$.

28) How many times in a day, are the hands of a clock in straight line but opposite in direction?

A. 20 B. 22

C. 24 D. 48

Answer: Option **B**

Explanation:

The hands of a clock point in opposite directions (in the same straight line) 11 times in every 12 hours. (Because between 5 and 7 they point in opposite directions at 6 o'clcok only).

So, in a day, the hands point in the opposite directions 22 times.

29) At what time between 4 and 5 o'clock will the hands of a watch point in opposite directions?

A. 45 min. past 4 B. 40 min. past 4

C. $50\frac{4}{11}$ min. past 4 D. $54\frac{6}{11}$ min. past 4

Answer: Option **D**

Explanation:

At 4 o'clock, the hands of the watch are 20 min. spaces apart.

To be in opposite directions, they must be 30 min. spaces apart.

∴ Minute hand will have to gain 50 min. spaces.

55 min. spaces are gained in 60 min.

50 min. spaces are gained in $\left(\frac{60}{55} \times 50\right)$ min. or $54\frac{6}{11}$ min.

∴ Required time = $54\frac{6}{11}$ min. past 4.

30) At what time between 9 and 10 o'clock will the hands of a watch be together?

A. 45 min. past 9 | B. 50 min. past 9
C. $49\frac{1}{11}$ min. past 9 | D. $48\frac{2}{11}$ min. past 9

Answer: Option **C**

Explanation:

To be together between 9 and 10 o'clock, the minute hand has to gain 45 min. spaces.

55 min. spaces gained in 60 min.

45 min. spaces are gained in $\left(\frac{60}{55} \times 45\right)$ min or $49\frac{1}{11}$ min.

∴ The hands are together at 49^{1} min. past 9.

31) At what time, in minutes, between 3 o'clock and 4 o'clock, both the needles will coincide each other?

A. $5\frac{1}{11}$ ″ | B. $12\frac{4}{11}$ ″
C. $13\frac{4}{11}$ ″ | D. $16\frac{4}{11}$ ″

Answer: Option **D**

Explanation:

At 3 o'clock, the minute hand is 15 min. spaces apart from the hour hand.

To be coincident, it must gain 15 min. spaces.

55 min. are gained in 60 min.

15 min. are gained in $\left(\frac{60}{55} \times 15\right)$ min $= 16\frac{4}{11}$ min.

∴ The hands are coincident at $16\frac{4}{11}$ min. past 3.

32. How many times do the hands of a clock coincide in a day?

A. 20 | B. 21
C. 22 | D. 24

Answer: Option **C**

Explanation:

The hands of a clock coincide 11 times in every 12 hours (Since between 11 and 1, they coincide only once, *i.e.*, at 12 o'clock).

AM

12:00
1:05
2:11
3:16
4:22
5:27
6:33
7:38
8:44
9:49
10:55

PM

12:00
1:05
2:11
3:16
4:22
5:27
6:33
7:38
8:44
9:49
10:55

The hands overlap about every 65 minutes, not every 60 minutes.

∴ The hands coincide 22 times in a day.

33) How many times in a day, the hands of a clock are straight?

A. 22
B. 24
C. 44
D. 48

Answer: Option **C**

Explanation: In 12 hours, the hands coincide or are in opposite direction 22 times.

∴ In 24 hours, the hands coincide or are in opposite direction 44 times a day.

34) A watch which gains uniformly is 2 minutes low at noon on Monday and is 4 min. 48 sec fast at 2 p.m. on the following Monday. When was it correct?

A. 2 p.m. on Tuesday
B. 2 p.m. on Wednesday
C. 3 p.m. on Thursday
D. 1 p.m. on Friday

Answer: Option **B**

Explanation: Time from 12 p.m. on Monday to 2 p.m. on the following Monday = 7 days 2 hours = 170 hours.

∴ The watch gains $\left(2 + 4\frac{4}{5}\right)$ min. or $\frac{34}{5}$ min. in 170 hrs.

Now, $\frac{34}{5}$ min. are gained in 170 hrs.

∴ 2 min. are gained in $\left(170 \times \frac{5}{34} \times 2\right)$ hrs $= 50$ hrs.

∴ Watch is correct 2 days 2 hrs. after 12 p.m. on Monday *i.e.*, it will be correct at 2 p.m. on Wednesday.

35) Alpha, Beta , gamma, delta and epsilon are friends and have birthdays on consecutive days though may not be in order. Gamma is as many days old to Alpha as Beta is younger to Epsilon. Delta is two days older then Epsilon. Gamma's Birthday is on Wednesday. Tell whose birthday is when.

Answer: **[infosys, july 2003]**

Alpha: Friday
Beta : Saturday
Gamma: Wednesday
Delta: Tuesday
Epsilon: Thursday

36) The quarter of the time from midnight to present time added to the half of the time from the present to midnight gives the present time. What is the presenttime?

Answer:

9hrs past 36 minutes AM **[infosys, july 2003]**

37) A, B, C, D&E are having their birthdays on consecutive days of the week not necessarily in the same order. A 's birthday comes before G's as many days as B's birthday comes after E's. D is older than E by 2 days. This time G's birthday came on Wednesday. Then find the day of each of their birthdays?

Answer: **[infosys, july 2003]**
Birthday of D on SUNDAY
Birthday of B on MONDAY
Birthday of E on TUESDAY
Birthday of G on WEDNESDAY
Birthday of A on THURSDAY

38) A clock showing 6 o'clock takes 30 secs to strike 6 times.How long will it take to strike 12 at midnight? **[infosys, 2006]**

Answer:
66 Secs

39) Light glows for every 13 seconds . How many times did it between 1:57:58 and 3:20:47 am

Answer: **[infosys, 1997]**
383 + 1 = 384

40)when the actual time pass 1hr wall clock is 10 min behind it .when 1 hr is shown by wall clock, table clock shows 10 min ahead of in when table clock shows 1 hr the alarm clock goes 5minbehind it, when alarm clock goes 1 hr wrist watch is 5 min ahead of it assuming that all clocks are correct with actual time at 12 noon what will be time shown by wrist watch after 6 hr

Answer: 5:47:32.5 **[infosys, 1999]**
(n X 60)50/60 X 70/60 X 55/60 X 65/60

41)A man walks from 9.15 to 5.15 from Monday to Friday and 9.00
to 12.00 on saturday.Each day 0.45 min lunch. How much time he walks in a week.

Answer: 39hrs15min **[Citil]**

42) If a clock takes 7seconds to strike 7, how long will the same clock take to strike 10?

Answer: The clock strikes for the first time at the start and takes 7 seconds for 6 intervals-thus for one interval time taken=7/6.

Therefore, for 10 seconds there are 9 intervals and time taken is 9*7/6=10 and 1/2 seconds. **[VIT]**

43) Given that April 1 is Tuesday.A, B, C are 3 persons told that their farewell party was on A **- May 8, Thursday B - May 10,Tuesday C - June 5, Friday .**Out of A, B, C only one made a completely true statement concerning date, day andmonth. Of the rest one told the day right and the other the date right. What are correctdate, month, and day?

Answer:B - (May 10) SUNDAY. C - June 6 (Friday). **[VIT]**

44) Fifty minutes ago if it was four times as many minutes past three o'clock, how many minutes is it to six o'clock?

Answer: 26 minutes. **[VIT]**

45)A clock strikes '6' in 5 seconds. How long does it take to strike '12'?
11 seconds [VIT]

Answer: There is an interval of 1 second between each stroke. If the clock strikes 6, there are 5 intervals. If the clock strikes 12 there are 11 intervals.

46) How many birth days does the average man have? [VIT]

Answer: One, he may have many Birthdays, but only one birth day!

Question Bank for Mock Test

1. Monday falls on 4th April 1988. What was the day on 3rd November, 1987?

a) Tuesday b) Monday c) Saturday d) Sunday

2.First January, 1981 was Sunday. What day of the week was 1st Jan 1980?

a) Tuesday b) Monday c) Saturday d) Friday

3.On what dates of August 1988 did 'Friday' falls?

a) 6, 13, 20, 27 b) 4, 11, 18, 25 c) 5, 12, 19, 26 d) 3, 10, 17, 25

4.The year next to 1973 having the same calendar as that of 1973 is ____

a) 1976 b) 1977 c) 1978 d) 1979

5.The year next to 1988 having the same calendar as that of 1988 is ____

a) 2016 b) 2010 c) 2004 d) 1999

6.Any day in April is always on the same day of the week as the corresponding day is

a) May b) March c) June d) July

7.One of the following day which cannot be the last day of the century

a) Sunday b) Monday c) Wednesday d) Saturday

8.What was the day on 1st January, 1 A.D.?

a) Sunday b) Monday c) Tuesday d) Wednesday

9.What was the day on 31st December, 1 A.D.?

a) Sunday b) Monday c) Tuesday d) Wednesday

10.How many days are there from 2nd Jan 1993 to 15th March 1993?

a) 73 b) 71 c) 37 d) 80

11.Find the number of odd days in 200 days.

A)2 B)4 C)5 D)6

12.Find the number of odd days in 425 days.

A)3 B)4 C)5 D)6

13. Find the number of odd days in 49 years.

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

14.What day of the week on 26th Jan 1950?

a) Monday b) Tuesday c) Wednesday d) Thursday

15.Gandhiji was born on 2nd October, 1869. What day was it of the week?

a) Thursday b) Friday c) Saturday d) Sunday

16.What day of the week on 2nd June, 1988?

a) Thursday b) Friday c) Sunday d) Saturday

17.What day of the week on 15th August, 1947?

a) Thursday b) Friday c) Sunday d) Saturday

18.What day of the week on 31st October, 1984?

a) Thursday b) Friday c) Sunday d) Saturday

19.What day of the week on 14th March, 1993?

a) Thursday b) Friday c) Sunday d) Saturday

20.What day of the week on 14th November, 1889?

a) Monday b) Wednesday c) Thursday d) Saturday

21. It was Sunday on Jan 1, 2004. What was the day of the week Jan 1, 2005?

A.Sunday B.Saturday
C.Friday D.Wednesday

22. On 8th March, 2005 it was Tuesday. What was the day of the week on 8th , 2004?

A.Tuesday B.Monday
C.Sunday D.Wednesday

23. The calendar for the year 2005 will be the same for the year:

A.2010 B.2011
C.2012 D.2013

24. On what dates of April, 2001 did Sunday fall?

A.1st, 8th, 15th, 22nd, 29th B.2nd, 9th, 16th, 23rd, 30th
C.4th, 11th, 18th, 25th D.6th, 13th, 20th, 27th

25. What will be the day of the week 1st January, 2010?

A.Friday B.Saturday
C.Sunday D.Monday

26. What was the day of the week on 17th June, 1998?

A.Monday B.Tuesday
C.Wednesday D.Thursday

27. What was the day of the week on 28th May, 2003?

A.Thursday B.Friday
C.Saturday D.Sunday

28. Today is Friday. After 62 days, it will be:

A.Wednesday B.Saturday
C.Tuesday D.Thursday

29. The first Republic day of India was celebrated on 26th January, 1950.It was:

A.Tuesday B.Wednesday
C.Thursday D.Friday

30)A clock is started at noon.By 10minutes past 5,the hour hand has turned through:

A)145 degrees B)150 degrees
C)155 degrees D)160 degrees

31) An accurate clock shows 8'o clock in the morning. Through how many degrees will the hour hand rotate when the clock shows 2'o clock in the afternoon?

A)144 degrees B)150 degrees C)168 degrees D)180 degrees

32)At 3.40 , the hour and the minute hand of a clock form an angle of :

A)120 degrees B)125 Degrees C)130 degrees D)135 Degrees

33)The angle between the hour hand and the minute hand of a clock when the time is 8.30am is:

A)80 degrees B)75 degrees C) 60 degrees D)105 degrees

34) The angle between the hour hand and the minute hand of a clock when the time is 4.20 is:

A)0 degrees B)10 degrees C) 5 degrees D)20 degrees

35)At what angle the hands of a clock are inclined at 15 minutes past 5?

A) $58*1/2^o$ B)64^o C)$67*1/2^o$ D)$72*1/2^o$

36)The reflex angle between the hands of clock at 10.25 is :

A) 180^o B)$192*1/2^o$ C)195^o B)$192*1/2^o$

37)How many times do the hands of the clock coincide in a day?

A)20 B)21 C)22 D)24

38) How many times in a day, the hands of the clock are straight?

A) 22 B)24 C)44 D)48

39) How many times do the hands of the clock are at right angle in a day?

A) 22 B)24 C)44 D)48

40) How many times in a day do the hands of the clock in straight line but opposite in direction?

A) 20 B) 22 C)24 D)48

41) How much does a watch lose per day, if its hands coincide every 64 minutes?

A)32* 8/11 min B)36*5/11min C)90 min D) 96 min

42) At what time, in minutes, between 3'o clock and 4'0 clock,both the needles will coincide with each other

A)5*1/11" B)12*4/11" C)13*4/11" D)16*4/11"

43) At what time, between 9'o clock and 10'0 clock will the hands of watch be together

A) 45 min. past 9 B) 50 min. past 9
C) 49*1/11min.past 9 D)48*2/11 min.past 9

44) At what time, between 7'o clock and 8'0 clock will the hands of clock be in straight line but, not together

A) 5 min. past 7 B) 5*2/11min. past 7
C) 5*3/11min.past 7 D)5*5/11 min.past 7

45)At what time, between 4'o clock and 5'0 clock will the hands of watch point in opposite directions

A) 45 min. past 4 B) 40 min. past 4
C) 50*4/11min.past 4 D)54*6/11 min.past 4

46)At what time, between 5.30 and 6'0 clock will the hands of clocks be at right angles
A) 43*5/11 min. past 5 B) 43*7/11 min. past 5
C) 40min.past 5 D)45 min.past 5

47)A watch which gains uniformly is 2 minutes low at noon on Monday and is 4 min 48 sec fast at 2pm on the following Monday.when it is correct?

A) 2 p.m on Tuesday B) 2 p.m on Wednesday
C) 3 p.m on Thursday D) 1 p.m on Friday

48)A watch, which gains 5 seconds in 3 minutes, was set right at 7 a.m. in the afternoon of the same day, when the watch indicated quarter past 4'o clock,the true time is**:**

A) 59*7/12 min.past 3 B)4 p.m
C)58&7/11min.past 3 D)2*3/11 min.past 4

49) At a certain moment a watch showes 2 min lag althogh it is fast.if it showed a 3 min lag at that moment ,but gain 1/2 min more a day than it does. it would show the true time one day sooner than it usually does .how many mins does the watch gain per day. **[IIT Madras,98]**

a).2 b).5 c).6 d).4 e).75

50) There were two clock one is getting slow by two minutes/hr and another one is gaining 1 minute every hour and exactly after how many hours there two clock has a 1hr difference. **[infosys, june 2003]**

a).14 hrs b).12 hrs c).16 hrs d)20hrs

Answers

1.A	**2.D**	**3.C**	**4.D**	**5.A**	**6.D**
7.D	**8.B**	**9.B**	**10.A**	**11.B**	**12.A**
13.C	**14.D**	**15.C**	**16.A**	**17.B**	**18.D**
19.D	**20.C**	**21.B**	**22.B**	**23.C**	**24.A**
25.C	**26.C**	**27.B**	**28.D**	**29.C**	**30.C**
31.D	**32.C**	**33.B**	**34.B**	**35.C**	**36.D**
37.C	**38.C**	**39.C**	**40.B**	**41.A**	**42.D**
43.C	**44.D**	**45.D**	**46.B**	**47.B**	**48.B**
49.E	**50.D**				

Directions (Q. 1-5) Study the following information to answer the given questions.

i) There are 9 friends A, B, C, D, E, F, G, H seated in a circle facing the centre.
ii) AC, DG, HE and FB are seated adjacent to each other. A is also seated adjacent to H.
iii) B is 2^{nd} to the right of H.
iv) E is 3^{rd} to the right of C.

1. Who is 2^{nd} to the left of A?
   a) D b) G c) F
   d) Cannot be determined e) None of these

2. Who is 3^{rd} to the left of C?
   a) G b) D c) B
   d) Cannot be determined e) None of these

3. What is C's position with reference to E?
   a) 5^{th} to the right b) 4^{th} to the left c) 4^{th} to the right
   d) 3^{rd} to the right e) Cannot be determined

4. Who is 2^{nd} to the right of A?
   a) B b) E c) F
   d) Cannot be determined e) None of these

5. Who among the following pairs may not be seated adjacent to each other?
   a) AH b) DC c) EB
   d) Cannot be determined e) None of these

Directions (Q. 6-11) Read the following information carefully and answer the questions that follow.

Seven friends A, B, C, D, E, F and G are sitting around a circular table facing either the centre or outside. Each one of them belongs to a different department viz. Finance, Marketing Sales, HR, Corporate Finance, Investment Banking and Operations but not necessarily in the same order.

C sits third to the right of G. G faces the centre. Only one person sits between C and the person working in the HR department immediate neighbours of C face outside. Only one person sits between F and D. Both F and D face the centre. D does not work in the HR department. A works in Investment Banking Department. A faces the centre. Two people sit between the persons who work in Investment Banking and Marketing Departments. The person who works in Corporate Finance sits to the immediate left of E. C faces same direction as E. The person who works in corporate finance sits to the immediate left of the person who works for Operations Department.

6. For which of the following departments does B work?
   a) Finance b) Marketing c) HR
   d) Corporate Finance e) Operations

7. What is position of B with respect to the person who works for Sales Department?
   a) Immediate right b) Third to the left c) Second to the right
   d) Second to the left e) Fourth to the right

8. Who sits to the immediate right of E?
   a) The person who works for Marketing Department
   b) C
   c) B
   d) The person who works for HR Department

e) A

9. Who amongst the following sits exactly between C and the person who works for HR Department?
   a) B
   b) The person who works for Marketing Department
   c) The person who works for Operations Department
   d)D
   e) G

10. Who amongst the following sit between the persons who work for Marketing and Investment Banking departments when counted for the left hand side of the person working for Marketing Department?
    a) F and G b) E and C c)C and B
    d) F and D e) B and D

11. How many people sit between the person who workds for Operations Department and A, when counted from the right hand side of A?
    a) One b) Two c) Three
    d) Four e) None of these

Directions (Q. 12-19) Read the following information carefully to answer the given questions.

Eight persons from different banks viz., Bank of India, Punjab National Bank, Canara Bank, Bank of Baroda, Oriental Bank of Commerce, Dena Bank, Union Bank of India and Bank of Maharashtra are sitting in two parallel rows containing four people each, in such a way that there is an equal distance between adjacent persons. The names of these persons are A, B, C, D, E, F, G and H. Each members seated in a row faces another member of the other row. (All the information given above does not necessarily represents the order of seating as in the final arrangement)

- A faces north and seated second to the left of the person, who is from Punjab National Bank. The person from Oriental Bank of Commerce is opposite to one who is second to the left of H.
- The persons from Bank of Baroda is not near to H and F and not at the end of the row. The person from Canara Bank is opposite to the person who is from Dena Bank.
- The person from Bank of India is not at the end of the row but left of the person who is from Canara Bank.
- D is immediately right of the person who is from Bank of Maharashtra. The person from Canara Bank faces north while D faces South and opposite to B.

The person from Union Bank of India is not opposite to E. The person from Canara Bank is opposite to C.

12. Which of the following is true regarding E?
    a) The person from Bank of Maharashtra faces E
    b) The person from Dena Bank is an immediate neighbour of E
    c) The person who is second to the right of G faces E
    d) E is from Union Bank of India
    e) E sits at one of the extreme end of the row

13. Who is seated between G and the person from Bank of Maharashtra?
    a) The person from Bank of Baroda
    b)H

c) F
d) E
e) The person from Dena Bank

14. Who amongst the following sit at extrememe end of the row?
a) A and the person from Bank of Maharashtra
b) The person from Punjab National Bank and Union Bank of India
c) The person from Dena Bank and E
d) The person from Union Bank of India and C
e) G and B

15. Who amongst the following faces the person from Bank of Baroda?
a) The person from Bank of India
b) F
c) A
d) The person from Union Bank of India
e) The person from Oriental Bank of Commerce

16. 'B' is related to 'Dena Bank' in the same way as 'F' is related to 'Bank of Baorda' on the given arrangement, who amongst the following is 'G' related to following the same pattern?
a) Oriental Bank of Commerce
b) Punjab National Bank
c) Bank of India
d) Canara Bank
e) Union Bank of India

17. Four of the following five are alike in a certain way based on the given seating arrangement and thus form a group, which is the one that does not belong to that group?
a) Canara Bank
b) C
c) Union Bank of India
d) Oriental Bank of Commerce
e) Bank of Maharashtra

18. G is from which of the following banks?
a) Oriental Bank of Commerce
b) Dena Bank
c) Bank of Maharashtra
d) Canara Bank
e) Punjab National Bank

19. Who amongst the following is from Punjab National Bank?
a) E b) H c) G
d) C e) None of these

Directions (Q. 20-26) Study the following information carefully to answer the questions that follows.

Eight persons namely A, B, C, D, E, F, G and H are sitting in a straight line from East to West. Some are facing North direction and some are facing South direction.

H sits to the third left of C and faces South. F is sitting at one of the extreme ends and is facing North. B and G are facing in same direction and person sitting between them is facing in opposite direction. A is sitting third from left end and is facing South direction. A is sitting adjacent to E and both are facing in opposite direction. D is sitting to the right of B and both are facing in same direction. C is facing in North direction. A and D are not neighbours. Neighbors of H are facing in same direction which is opposite to the direction of H is facing. E sits to the right of A.

20. Who is sitting between A and H?
    a) F b) E c) G
    b) B e) None of these

21. Which of the following pairs has the person facing the same direction?
    a) E, A b) G, H c) A, G
    d) H, D e) B, D

22. How many persons are facing in North direction?
    a) 2 b) 3 c) 4
    d) 5 e) 6

23. Who is sitting third from the eastern end of the arrangement?
    a) E b) G c) B
    d) C e) None of these

24. How many persons are sitting between E and B?
    a) 2 b) 3 c) 4
    d) 5 e) 6

25. Which one of the following statement is correct?
    a) A sits between G and B
    b) D sits to thesecond left of H
    c) H and B are facing same direction
    d) Person sitting to the left of A faces direction
    e) All of the above

26. Who sits 3^{rd} to the left of A?
    a) B b) D c) H
    d) G e) None of these

Directions (Q. 27-31) Study the following information and answer the question given below.

Eight people E, F, G, H, J , K, L and M are sitting around a circular table facing the centre. Each of them is of a different profession Chartered Accountant, Colomnist, Doctor, Engineer, Financial Analyst, Lawyer, Professor and Scientist but not necessarily in the same order. F I s sitting second to the left of K. The Scientist is an immediate neighbour of K. There are only three people between the Scientist and E. Only one person sits between the Engineer and E. The Coloumnist is to t he immediate r ight of the Engineer. M is second to the right of K. H is the Scientist. G and J are immediate neighboursof each other. Neither G nor J is an Engineer. The Financjial Analyst is to the immediate left of F. The Lawyer is second to the right of the Coloumnist. The Professor is an immediate neighbour of the Engineer. G is second to the right of the Chartered Accountant.

27. Who is sitting second to the right of E?
    a) The Lawyer b) G c) The Engineer
    d) F e) K

28. Who amongst the following is the Professor?
    a) F b) L c) M
    d) K e) None of these

29. Four of the following five are alike in a certain way based on the given arrangement and hence from a group. Which of the following does not belong to that group?
    a) Chartered Accountant
    b) M – Doctor
    c) J – Engineer
    d) Financial Analyst – L
    e) Lawyer - K

30. What is the position of L with respect to the Scientist?
    a) Third to the left
    b) Second to the right
    c) Second to the left
    d) Third to the right
    e) Immediate right

31. Which of the following statements is true according to the given arrangement?
    a) The Lawyer is second to the left of the Doctor
    b)E is an immediate neighbour of the Financial Analyst
    c)H sits exactly between F and the Financial Analyst
    d)Only four people sit between the Coloumnist and F
    e)All of the given statements are true

Directions (Q. 32-36) Study the following information carefully and answer the given questions:-

D, E, F, H and I are seated in a circle facing the centre. A, B and C are also seated in the same circle but two of them are not facing the centre. F is second to the left of C. E is third to the right of A. B is third to left of D, who is immediate neighbor of H and I. C is second to the right of D and third to the right of B.

32. Which of the following pairs is not facing the centre?
    a) BC b) AC c) CA
    d) BD e) None of these

33. What is the position of D with respect to F?
    a) Second to the right
    b) Third to the left
    c) Fifth to the right
    d) Cannot be determined
    e) None of these

34. Who among the following is second to the left of B?
    a) A b) H c) I
    d) Either H or I e) None of these

35. If H is on the immediate right of E then what is H's position with respect to C?
    a) Third to the left
    b) Third to the right
    c) Fifth to the left
    d) Cannot be determined
    e) None of these

36. Which of the following is/are the possible position(s) of I with respect to A?
    a) Fourth to the right
    b) Second to the left
    c) Fourth to the left

d) Only a and c
e) All of the above

Directions (Q. 37-41) Study the following information and answer the questions that follow:

Eight students A, B, C, D, E, F, G and H in a school sports competition participated in a game in which they were sitting around a circular ring. The seats of the ring are not directed towards the centre. All the eight students are in four groups I, II, IIII and IV, i..e two students I n each group, but not necessarily in the same order. These s tudents are from different sport houses, viz. Maharishi Vyas, Aryabhatt, Vashistha, Shankaracharya, Balmiki, Dhruv and Dayanand.

- No two students of the same group are sitting adjacent to each other except those of group III. Students from group IV are sitting opposite each other.
- D is neither in Dayanand nor in Aryabhatt house.
- The student from Dhruv house is sitting on the immediate right of the students from Dayanand house.
- C, who is in Vashistha house, is in group I. She is sitting on the immediate right of F, who is in group III.
- F is not in Aryabhatt house and she has also participated in other sports.
- B from Vyas house is neither in group IV nor in group I or II.
- B is sitting opposite E. Only Balmiki participant A is sitting b etweenDhruvparticipaint E and t heShankaracharya participant.
- Both the students of group II are sitting adjacent to students of group IV.

37. Who is in Maharishi house?
    a) G b) F c) H
    d) Can’t say e) None of these

38. ‘H’ is in which house?
    a) Dayanand b) Shankaracharya c) Maharishi
    d) Can’t say e) None of these

39. Who among the following students are in group IV?
    a) A and B b) A and C c) G and H
    d) Data inadequate e) None of these

40. The student from which house is sitting opposite the Vashistha house participant?
    a) Dayanand b) Shankracharya c) Maharishi
    d) Can’t say e) None of these

41. Which of the following statements is false?
    a) The Balmiki representative is sitting opposite the Maharishi house representative
    b) The Vyas house representative is sitting opposite the Dhruv house representative
    c) H and G are sitting opposite each other
    d) The two girl participants are sitting opposite each other
    e) None of these

Directions (Q. 42-46) Read the following information carefully and answer the questioins that follow.

Twelve friends are sitting in two squares. One square is inside another. P, Q, R, S, T and V are in the outer square facing inward. A, B, C, D, E and F are sitting in the inner square facing outward. They all are s itting in such a way that in each square four persons are sitting in the middle of the sides and two persons are sitting on diagonally opposite corners. Each friend in the inner square is facing another friend of the outer square. There are exactly two persons sitting between P and T. E sits second to the left of A. R is on the immediate left of the one who is f acing A. Neither E nor A faces either T or P. S is facing F an d Q is not opposite R in the outer square. T is not sitting adjacent to S. B is not facing P. Between B and D there are as many persons as between R and V.

42. Who is sitting opposite B?
    a) V　　b) Q　　c) T
    d) Data inadequate　　e) None of these

43. V is facing which of the following persons?
    a) E　　b) D　　c) A
    d) Data inadequate　　e) None of these

44. Who is sitting on the immediate left of R?
    a) A　　b) S　　c) P
    d) Data inadequate　　e) None of these

45. Four of the five are alike in a certain manner. Select the one which is not similar to the other four.
    a) R, E　　b) A, S　　c) D, T
    d) F, Q　　e) C, E

46. Who is sitting second to the left of D?
    a) A　　b) E　　c) F
    d) Data inadequate　　e) None of these

Directions (Q. 47-51) Study the following information carefully and answer the given questions:

E, F, G, H, I, J, K and L are eight feiends sitting around a circle facing the centre, but not necessarily in the same order.

I is second to the left of F, who is next to the right of L. J is not the neighbour of F or K, and is on the immediate left of H.

47. Which of the following pairs represents the neighbours of G?
    a) H, F　　b) E, H　　c) J, K
    d) I, E　　e) None of these

48. Who among the following is on the immediate left of J?
    a) K　　b) H　　c) I
    d) L　　e) None of these

49. Who among the following is on the immediate right of E?
    a) F　　b) L　　c) G
    d) H　　e) None of these

50. Which of the following statements is true with respect to H?
    a) Immediate left of J

b) Opposite L
c) Second to the right of F
d) All are true
e) None of these

51. How many persons sit between G and I?
a) None b) One c) Two
d) Three e) None of these

Directions (Q. 52-56) Study the given information carefully and answer the given questiions.

Eight people – A, B, C, D, E, F, G and H are sitting around a circular table facing the centre, not necessarily in the same order. Three people are sitting between A and D. B is sitting second to the right of A. C is to the immediate right of F. D is not an immediate neighbour of either F or E. H is not an immediate neighbour of B.

52. What is E's position with respect to G?
a) Third to the left
b) Second to the right
c) Third to the right
d) Second to the left
e) None of these

53. Four of the following are based on above arrangement and so form a group. Which one does not belong to the group?
a) GE b) DC c) AF
d) AB e) CE

54. Who is sitting third to the right of the one who is sitting to the immediate right of H?
a) A b) B c) E
d) C e) G

55. Which of the following is true regarding the given arrangement?
a) E is second to the left of C
b) B is an immediate neighbour of G
c) H is an immediate neighbour of A
d) D is not an immediate neighbour of H
e) None of these

56. How many people are sitting between H and A when counted from the right side of H?
a) Three b) None c) More than three
d) One e) Two

Directions (Q. 57-61) Study the following Information to answert these questions.

(i) P, Q, R, S, T, U and V are sitting along the circle facing the centre.
(ii) T is 2^{nd} to t he left of P.
(iii) R is 3^{rd} to the right of U who is the immediate left of V.
(iv) Q is between P and S.

57. Which of the following is true statement?
a) P is between Q and T
b) R is between P and V
c) P is 4^{th} to the right of U

d) U is between V and Q
e) None of these

58. Which of the following pairs has its second member sitting to the immediate left of first member?
a) VT b) PQ c) SU
d) UV e) None of these

59. Which of the following is the false statement?
a) R is to the immediate left of P
b) V is to the immediate right of T
c) R is 4^{th} to the right of S
d) T is between V and R
e) None of these

60. What is the position of S?
a) To the immediate left of U
b)Between V and Q
c)3^{rd} to the right of T
d)To the immediate right of P
e)None of these

61. Which of the following pairs has members sitting adjacent to each other?
a) PS b) QU c) UT
d) TR e) None of these

Directions (Q. 62-66) Study the following information and answer the questions which follow.

(i) K, L, M, N, O, P and Q are sitting around a circular table facing the centre.
(ii) L sits between N and O.
(iii) K is third to the left of O.
(iv) Q is second to the left of M, who is to the immediate left of P.

62. Which is the correct position of L with respect to Q?
a) Second to the right
b) First to the left
c) First to the right
d) Third to the right
e) None of these

63. Which of the following pairs has the first person sitting to the immediate left of the second person?
a) LO b) MK c) QN
d) LN e) None of these

64. Who sits second to the left of L?
a) P b) M c) K
d) Q e) None of these

65. Who sits between M and Q?
a) O b) N c) K
d) L e) None of these

66. Which of the following has the middle person sitting between the other two?
a) NQL b) PMK c) MOP

d) POK e) None of these

Directions (Q. 67-72) Study the follow ing information carefully and answer the questions given below.

A, B, C, D, E, F, G and H are sitting around a circle facing at the centre. B is second to the right of H and third to the left of A. D is not an immediate neighbuor of either B or H and is second to the right of F. C is fourth to the right of G.

67. If E and F interchange their places, who will be second to the right of B?
    a) F b) C c) D
    d) Data inadequate e) None of these

68. In which of the following pairs is the second person sitting to the immediate left of the first person?
    a) BC b) HE c) FA
    d) GD e) None of these

69. Who is 4th to the right of H?
    a) B b) A c) F
    d) Data inadequate e) None of these

70. Who is to the immediate right of B?
    a) C b) E c) H
    d) Data inadequate e) None of these

71. Who is third to the right of E?
    a) C b) F c) D
    d) Data inadequate e) None of these

72. In a row of 45 boys facing South, T is 8th to the right of H, who is 10th from the right end. H is 14th to the left of R. What is R's position from the left end?
    a) 21st b) 23rd c) 24th
    d) Data inadequate e) None of these

Directions (Q. 73-78) Study the following information carefully and answer the questions given below:

P, M, D, A, F, H, R and B are sitting around a circle facing at the centre. R is 4th to the right of A, who is 3rd to the right of P. M is second t o the l eft of H, who is 2nd to the left of P. D is 3rd to the right of B.

73. Who is 3rd to the left of H?
    a) M b) A c) B
    d) F e) Data inadequate

74. Which of the following pairs represents the immediate neighbours of B?
    a) FM b) AP c) MP
    d) AF e) None of these

75. If R and B interchange their positions, who will be 2nd to the left of M?
    a) B b) H c) P
    d) Data inadequate e) None of these

76. Who is the immediate right of P?

a) F b) R c) B
d) Data inadequate e) None of these

77. Who is the immediate right of M?
a) H b) A c) D
d) Data inadequate e) None of these

78. In a row of 40 children, Q is 14^{th} from the left end and there are 16 children between Q and M. What is M's position from the right end of the row?
a) 11^{th} b) 10^{th} c) 30^{th}
d) Data inadequate e) None of these

Directions (Q. 79-83) Study the following information carefully and answer the questions given below.

B, D, M, K, P, Q, W and H are sitting around a circle facing at the centre. M is to the immediate right of B who is 4^{th} to the right of K. P is 2^{nd} to the left of B and is 4^{th} to the right of W. Q is 2^{nd} to the right of D who is 2^{nd} to the right of H.

79. Who is 3^{rd} to the right of B?
a) W b) M c) K
d) H e) None of these

80. Which of the following represents the immediate neighbours of D?
a) PQ b) KH c) PH
d) KQ e) PK

81. Who is 3^{rd} to the right of W?
a) P b) D c) K
d) R e) Data inadequate

82. Who is 2^{nd} to the left of P?
a) D b) H c) K
d) Data inadequate e) None of these

83. Who is to the immediate left of B?
a) Q b) P c) W
d) Data inadequate e) None of these

Directions (Q. 84-88) Study the following information carefully and answer the questions given below.

A, M, D, P, R, T, B and H are sitting around a circle facing at the centre. M is 3^{rd} to the left of Awho is 2^{nd} to the left of T. D is 2^{nd} to the right of H who is 2^{nd} to the right of T. R is 2^{nd} to the right of B who is not an immediate neighbour of T.

84. Which of the following combinations represents the first and the second to the left of B respectively?
a) MD b) DH c) AM
d) AR e) DM

85. Who is 3^{rd} to the right of T?
a) D b) B c) H
d) M e) None of these

86. Who is to the immediate left of H?
a) P b) M c) T
d) R e) Data inadequate

87. Who is 2nd to the left of B?
a) D b) H c) M
d) Data inadequate e) None of these

88. In which of the following combinations 3rd person is 2nd to the left of 2nd person?
a) BAR b) DBM c) TPH
d) PMH e) None of these

Directions (Q. 89-93) Study the following information carefully and answer the questions given below

10 people are sitting in two parallel rows containing five people each, in such a way that there is an equal distance between adjacent people. In row-1, Q, R, S, T and U are seated and all of them are facing north. In Row-2, L, M, N, O and P are seated and all of them are facing south. Therefore in the given sitting arrangement each member seated in a row faces another member of the other row.

S is sitting 2nd to the left of Q. Q is not sitting at any of the ends of the line. There are two persons between P and L. The person who faces T is to the immediately left of M. M is sitting at the extreme right end. Q is an immediate neighbour of U. The person who faces U is an immediate neighbour of both P and N.

89. Who among the following is sitting 2nd to the right of O?
a) P b) M c) L
d) Cannot be determined e) None of these

90. Who among the following sits exactly between Q and S?
a) T
b) U
c) R
d) There is no person between Q and S
e) Cannot be determined

91. Who among the following is sitting at the extreme right end of the Row-1?
a) Q b) U c) S
d) R e) Cannot be determined

92. Which of the following statements is true regarding R?
a) R is at the extreme left end of the row
b) R is an immediate neighbor of U
c) R is sitting second to the right of T
d) R is sitting exactly between T and U
e) There two persons between R and S

93. Who among the following is not seated at any extreme end of Row-1 and Row-2?
a) P b) S c) M
d) R e) O

Directions (Q. 94-98) Study the following information carefully and answer the questions given below

8 persons – E, F, G, H, I, J, K and L - are sitting around a circle at equidistance but not necessarily in the same order. Some of them are facing towards the centre while some others are facing outside the centre. L is sitting 3rd to the left of K. Both K and L are facing towards the outside. H is not an immediate neighbour of K or L. J faces the just opposite direction of H. (It implies that if H is facing towards the centre, J would face outside the centre). J is sitting 2nd to the left of H. Both the immediate neighbours of G face just opposite direction of G. E is an immediate neighbour of K. Both the immediate neighbour of H face just opposite direction of H. E faces towards the centre and he is an immediate n eighbour of both K and I. I faces towards the centre.

94. Who amongst the following are not facing towards the centre?
 a) E, F and I b) F, G and J c) H, K and L
 d) G, I and J e) None of these

95. What is the position of G with respect to E?
 a) 2nd to the left
 b) 3rd to the right
 c) 4th to the left
 d) 2nd to the right
 e) 5th to the right

96. Who among the following is sitting exactly between F and K?
 a) J b) I c) E
 d) G e) None of these

97. How many persons are sitting between H and K if we move clockwise starting from H?
 a) Three b) Four c) Five
 d) Two e) One

98. Which of the following statements is not true regarding the given sitting arrangement?
 a) L is sitting exactly between G and I
 b) H is sitting 3rd to the right of K
 c) F and I are sitting just opposite to each other
 d) E is sitting 3rd to the left of G
 e) All are true

Directions (Q. 99-103) Study the following information carefully and answer the questions.

A, B, C, D, E, F, G and H are sitting around a circle, facing the centre. A sits fourth to the right of H while second to the left of F. C is not the neighbour of F and B. D sits third to the right of C. H never sits next to G.

99. Who amongst the following sits between B and D?
 a) G b) F c) H
 d) A e) C

100. Which of the following pairs sit between H and G?
 a) BH b) EF c) CE
 d) DB e) None of these

101. Four of the following are alike I n a certain way based on their positions in the sitting arrangement and so form a group. Which is the one that does not belong to that group?
 a) AE b) HF c) BD

d) GE e) CH

102. Who is immediate right of A?
a) C b) D c) G
d) Data inadequate e) None of these

103. Who sits second to the right of B?
a) A b) C c) D
d) E e) None of these

Directions (Q. 104-108) Study the following carefully and answer the questions.

A, B, C, D, E, F, G and H are sitting around a circle, facing the centre. E and G always sit next to each other. D sits third to the right of C. F sits to the left of H. C never sits next to A while D never sits next to G. H is not the neighbour of D and C.

104. Who sits to immediate right of F?
a) D b) C c) B
d) A e) None of these

105. Four of the following are alike in a certain way based on their positions in the sitting arrangement and so form a group. Which is the one that does not belong to that group?
a) CH b) BA c) FE
d) DG e) AC

106. Which of the following pairs sits between B and F?
a) HB b) FD c) BG
d) GC e) AH

107. Who sits second to the left of B?
a) F b) G c) A
d) E e) None of these

108. Who sits between A and D?
a) B b) F c) C
d) E e) None of these

Directions (Q. 109-113) Study the following information carefully to answer these questions.

Ashwini, Priya, Sudha, Rani, Meeta, Geeta and Mukta are sitting around a circle facing the centre. Ashwini is third to the left of Mukta and to the immediate right o f Rani. Priya is second to the left of Geeta who is not an immediate neighbour of Meeta.

109. Who is to the immediate right of Priya?
a) Meeta b) Sudha c) Mukta
d) Cannot be determined e) None of the above

110. Who is second to the left of Rani?
a) Ashwini b) Meeta c) Priya
d) Sudha e) None of these

111. Which of the following pairs of persons has the first person sitting to the immediate left of second person?
a) Rani-Meeta b) Ashwini-Geeta c) Sudha-Priya
d) Geeta-Sudha e) None of these

112. Which of the following groups has the first person sitting between the other two?
a) Meeta-Ashwini-Geeta
b) Sudha-Rani-Geeta
c) Mukta-Priya-Rani
d) Mukta-Priya-Sudha
e) None of these

113. Which of the following is the correct position of Rani with respect to Mukta?
i) Third to the right
ii) Third to the left
iii) Fourth to the left
iv) Fourth to the right
a) i) only b) ii) only c) Both i) and ii)
d) Both ii) and iv) e) Both i) and iii)

Directions (Q. 114-118) Study the following information carefully to answer these questions.

A, B, C, D, E, F, G and H are sitting around a circle facing the centre. F is third to the right of C and second to the left of H. D is not an immediate neighbour of C or H. E is to the immediate right of A, who is second to the right of G.

114. Who is second to the left of C?
a) A b) B c) E
d) D e) None of these

115. Who is to the immediate right of C?
a) A b) B c) D
d) B or D e) None of these

116. Which of the following pairs of persons has first person sitting to the right of the second person?
a) CB b) AE c) FG
d) HA e) DB

117. Who sits between G and D?
a) H b) D c) F
d) E e) None of these

118. Which of the following is the correct position of B with respect to H?
I. Second to the right
II. Fourth to the right
III. Fourth to the left
IV. Second to the left
a) Only I b) Only II c) Only III
d) Both II and III e) None of these

Directions (Q. 119 - 123) Study the following information carefully to answer the question that follow.

Six couples have been invited to a dinner party. They are Nitika, Geetika, Lajwanti, Rekha, Savitri, Chameli and Faizal, Harbhajan, Akshay, Tirlochan, Ranveer, Aamir. They are seated on a circular table facing each other.

(i) Geetika refuses to sit next to Aamir.
(ii) Lajwanti wants to be between Akshay and Harbhajan.
(iii) Chameli refuses to sit next to Faizal.
(iv) Nitika is seated on Aamir's right hand side.
(v) Faizal and Tirlochan are seated exactly opposite to each other.
(vi) Ranveer and Savitri are seated to the left of Chameli.
(vii) Akshay and Rekha want to enjoy the company of Lajwanti and Tirlochan respectively and are seated closest to them.
(viii) The seating arrangement is such that minimum one woman is always between two men.

119. Which of the following statements is correct:
a) Lajwanti is on Tirlochan's right
b) Aamir is on Chameli's right
c) Geetika is on Hari's right
d) Geetika is on Faizal's left

120. If looked in an anti-clockwise manner, who are seated between Tirlochan and Faizal:
a) Savitri, Ranveer, Chameli, Aamir and Nitika
b) Savitri, Ranveer, Rekha, Akshay and Lajwanti
c) Savitri, Ranveer, Geetika, Harbhajan and Lajwanti
d) Savitir, Ranveer, Lajwanti, Akshay and Harbhajan

121. Which of the following close neighboring arrangements is correct:
a) Aamir, Chameli and Ranveer
b) Tirlochan, Ranveer and Aamir
c) Nitika, Faizal and Lajwanti
d) Harbhajan, Geetika and Akshay

122. Who sits between Geetika and Lajwanti:
a) Faizal
b) Akshay
c) Tirlochan
d) Ranveer
e) None of The Above

123. Who sits to the second left of Nitika:
a) Savitri
b) Ranveer
c) Chameli
d) Tirlochan
e) None of The Above

Directions (Q. 124 – 130) Study the information carefully and answer the questions given below.

Eight friends Prem, Queen, Rajan, Sooraj, Taksh, Vaani, Waqar and Yousuf are sitting around a square table. Out of eight, four persons are sitting at the corners of the table and other four are sitting at the mid - points of each side of the table. Persons at the corners are facing the center while the persons at the mid - points of side are facing outside. Sooraj is third to the right of Prem.

Prem is facing the center. Yousuf is not sitting beside Prem or Sooraj. Taksh is third to the right ofRajan. Rajan is not sitting at the mid - point of any side of the table. Rajan is also not beside Yousuf. There is only one person between Prem and Vaani. Queen is not sitting beside Vaani.

124. If all the persons are made to sit in alphabetical order in clockwise direction starting from Prem, then the position of how many persons remains the same (Excluding Prem)?
a) None
b) One
c) Two
d) Three
e) Four

125. Which among the following is true regarding Yousuf?
a) Taksh is not sitting beside Yousuf.
b) Yousuf is sitting at the mid - point of a side.
c) Rajan is second to the left of Yousuf.
d) Prem and Vaani are beside Yousuf
e) None of The Above

126. Who is 4th to the left of Vaani?
a) Yousuf
b) Rajan
c) Taksh
d) Queen
e) None of The Above

127. What is the position of Queen in respect of Rajan?
a) Immediate Left
b) Second to the Left
c) Third to the Left
d) Third to the Right
e) Immediate Right

128. Four out of following five are some how same and therefore they form a group. Which one of the following does not come into this group?
a) Yousuf
b) Waqar
c) Vaani
d) Rajan
e) Prem

129. Who is third to the right of Waqar?
a) Rajan
b) Sooraj
c) Queen
d) Yousuf
e) Can Not Be Determined

130. How many people are there between Taksh and Queen?
a) 1
b) 2
c) 3
d) 4
e) None

Directions (Q. 131 - 135) Read the following information carefully to answer the given questions.

Vicky, Urgit and Toni are sitting around a circle. Amar, Balu and Charu are sitting around the same circle but two of them are not facing center (they are facing the direction opposite to center). Vicky is second to the left of Charu. Urgit is second to the right of Amar. Balu is third to the left of Toni. Charu is second to the right of Toni. Amar and Charu are not sitting together.

131. Who among the following is not facing center:
a) Balu and Amar
b) Charu and Amar
c) Balu and Charu
d) Can Not Be Determined
e) None of The Above

132. Which of the following is the position of Toni in respect of Balu:
a) Third to the right
b) Second to the right
c) Third to the left
d) Third to the left or right
e) None of The Above

133. What is the position of Vicky in respect of Charu:
a) Second to the right
b) Third to the left
c) Fourth to the right
d) Fourth to the left
e) Can Not be determined

134. Which of the following statement is correct:
a) Amar, Balu and Charu are sitting together
b) Vicky, Urgit and Toni are sitting together
c) Sitting arrangement of two persons can not be determined
d) Those who are not facing center are sitting together
e) Only two people are sitting between Vicky and Toni.

135. What is the position of Amar in respect of Urgit:
a) Second to the left
b) Second to the right
c) Third to the right
d) Can not be determined
e) None of The Above

Directions (Q. 136 -140) Read the following information carefully and answer the questions that follow.

Twelve friends are sitting in two squares. One square is inside another. Paras, Qurbaan, Rajat, Singh, Tom and Vinod are in the outer square facing inward. Amar, Birbal, Chinku, Deep, Eshika and Farukh are sitting in the inner square facing outward. They all are sitting in such a way that in each square four persons are sitting in the middle of the sides and two persons are sitting on diagonally opposite corners.

Each friend in the inner square is facing another friend of the outer square. There are exactly two persons sitting between Paras and Tom. Eshika sits second to the left of Amar. Rajat is on the immediate left of the one who is facing Amar. Neither Eshika nor Amar faces either Tom or Paras.

Singh is facing Farukh and Qurbaan is not opposite Rajat in the outer square. Tom is not sitting adjacent to Singh. Birbal is not facing Paras. Between Birbal and Deep there are as many persons as between Rajat and Vinod.

136. Who is sitting opposite Birbal?
   a) Vinod
   b) Qurbaan
   c) Tom
   d) Data inadequate
   e) None of these

137. Vinod is facing which of the following persons?
   a) Eshika
   b) Deep
   c) Amar
   d) Data inadequate
   e) None of these

138. Who is sitting on the immediate left of Rajat?
   a) Amar
   b) Singh
   c) Paras
   d) Data inadequate
   e) None of these

139. Four of the five are alike in a certain manner. Select the one which is not similar to the other four.
   a) Rajat and Eshika
   b) Amar and Singh
   c) Deep and Tom
   d) Farukh and Qurbaan
   e) Chinku and Eshika

140. Who is sitting second to the left of Deep?
   a) Amar
   b) Eshika
   c) Farukh
   d) Data inadequate
   e) None of these

Directions (Q. 141 - 145) Study the following information carefully and answer the questions given below

8 persons – Ekam, Ford, Gabbar, Himmat, Inpreet, Johny, Karma and Loveleen - are sitting around a circle at equidistance but not necessarily in the same order. Some of them are facing towards the centre while some others are facing outside the centre. Loveleen is sitting 3^{rd} to the left of Karma. Both Karma and Loveleen are facing towards the outside. Himmat is not an immediate neighbour of Karma or Loveleen. Johny faces the just opposite direction of Himmat. (It implies that if Himmat is facing towards the centre, Johny would face outside the centre). Johny is sitting 2^{nd} to the left of Himmat. Both the immediate neighbours of Gabbar face just opposite direction of Gabbar. Ekam is an immediate neighbour of Karma. Both the immediate neighbour of Himmatface just opposite direction of Himmat.Ekam faces towards the centre and he is an immediate neighbour of both Karma and Inpreet. Inpreet faces towards the centre.

141. Who amongst the following are not facing towards the centre?

a) Ekam, Ford and Inpreet
b) Ford, Gabbar and Johny
c) Himmat, Karma and Loveleen
d) Gabbar, Inpreet and Johny
e) None of these

142. What is the position of Gabbar with respect to Ekam?
a) 2nd to the left
b) 3rd to the right
c) 4th to the left
d) 2nd to the right
e) 5th to the right

143. Who among the following is sitting exactly between Ford and Karma?
a) Johny b) Inpreet c) Ekam
d) Gabbar e) None of these

144. How many persons are sitting between Himmat and Karma if we move clockwise starting from Himmat?
a) Three b) Four c) Five
d) Two e) One

145. Which of the following statements is not true regarding the given sitting arrangement?
a) Loveleen is sitting exactly between Gabbar and Inpreet
b) Himmat is sitting 3rd to the right of Karma
c) Ford and Inpreet are sitting just opposite to each other
d) Ekam is sitting 3rd to the left of Gabbar
e) All are true

Directions (Q. 146 - 150) Study the following information carefully and answer the questions given below

10 people are sitting in two parallel rows containing five people each, in such a way that there is an equal distance between adjacent people. In row-1, Qartar, Rohan, Sooraj, Tarun and Uday are seated and all of them are facing north. In Row-2, Lucky, Manav, Neeraj, Opendra and Parkash are seated and all of them are facing south. Therefore in the given sitting arrangement each member seated in a row faces another member of the other row.

Sooraj is sitting 2nd to the left of Qartar. Qartar is not sitting at any of the ends of the line. There are two persons between Parkhash and Lucky. The person who faces Tarun is to the immediately left of Manav. Manav is sitting at the extreme right end. Qartar is an immediate neighbour of Uday. The person who faces Uday is an immediate neighbour of both Parkash and Neeraj.

146. Who among the following is sitting 2nd to the right of Opendra?
a) Parkash b) Manav c) Lucky
d) Cannot be determined e) None of these

147. Who among the following sits exactly between Q and S?
a) Tarun
b) Uday
c) Rohan
d) There is no person between Qartar and Sooraj

e) Cannot be determined

148. Who among the following is sitting at the extreme right end of the Row-1?
a) Qartar b) Uday c) Sooraj
d) Rohan e) Cannot be determined

149. Which of the following statements is true regarding Rohan?
a) Rohan is at the extreme left end of the row
b) Rohan is an immediate neighbor of Uday
c) Rohan is sitting second to the right of Tarun
d) Rohan is sitting exactly between Tarun and Uday
e) There two persons between Rohan and Sooraj

150. Who among the following is not seated at any extreme end of Row-1 and Row-2?
a) Parkash
b) Sooraj
c) Manav
d) Rohan
e) Opendra

Directions (Q. 151 - 155) Study the following information and answer the question given below.

Eight people Elan, Ford, Gliver, Hamilton, Joseph , Kelvin, Levis and Montek are sitting around a circular table facing the centre. Each of them is of a different profession Chartered Accountant, Colomnist, Doctor, Engineer, Financial Analyst, Lawyer, Professor and Scientist but not necessarily in the same order. Ford is sitting second to the left of Kelvin. The Scientist is an immediate neighbor of Kelvin. There are only three people between the Scientist and Elan. Only one person sits between the Engineer and Elan. The Columnist is to the immediate right of the Engineer. Montek is second to the right of Kelvin. Hamilton is the Scientist. Gliver and Levis are immediate neighbors of each other. Neither Gliver nor Levis is an Engineer. The Financial Analyst is to the immediate left of Ford. The Lawyer is second to the right of the Columnist. The Professor is an immediate neighbour of the Engineer. Gliver is second to the right of the Chartered Accountant.

151. Who is sitting second to the right of Elan?
a) The Lawyer b) Gliver c) The Engineer
d) Ford e) Kelvin

152. Who amongst the following is the Professor?
a) Ford b) Levis c) Montek
d) Kelvin e) None of these

153. Four of the following five are alike in a certain way based on the given arrangement and hence from a group. Which of the following does not belong to that group?
a) Ford - Chartered Accountant
b) Montek – Doctor
c) Joseph – Engineer
d) Financial Analyst – Levis
e) Lawyer - Kelvin

154. What is the position of Levis with respect to the Scientist?
a) Third to the left
b) Second to the right
c) Second to the left
d) Third to the right

e) Immediate right

155. Which of the following statements is true according to the given arrangement?
a) The Lawyer is second to the left of the Doctor
b) Elan is an immediate neighbor of the Financial Analyst
c) Hamilton sits exactly between Ford and the Financial Analyst
d) Only four people sit between the Coloumnist and Ford
e) All of the given statements are true

Directions (Q. 156 -160) Study the following information carefully and answer the questions given below.

Balwinder, Deepinder, Manjinder, Kulwinder, Pushwinder, Qartar, Waktawar and Harjit are sitting around a circle facing at the centre. Manjinder is to the immediate right of Balwinder who is 4th to the right of Kulwinder. Pushwinder is 2nd to the left of Balwinder and is 4th to the right of Waktawar. Qartar is 2nd to the right of Deepinder who is 2nd to the right of Harjit.

156. Who is 3rd to the right of Balwinder?
a) Waktawar b) Manjinder c) Kulwinder
d) Harjit e) None of these

157. Which of the following represents the immediate neighbours of Deepinder?
a) Pushwinder, Qartar
b) Kulwinder, Harjit
c) Pushwinder, Harjit
d) Kulwinder, Qartar
e) Pushwinder, Kulwinder

158. Who is 3rd to the right of Waktawar?
a) Pushwinder
b) Deepinder
c) Kulwinder
d) Rajinder
e) Data inadequate

159. Who is 2nd to the left of Pushwinder?
a) Deepinder
b) Harjit
c) Kulwinder
d) Data inadequate
e) None of these

160. Who is to the immediate left of Balwinder?
a) Qartar
b) Pushwinder
c) Waktawar
d) Data inadequate
e) None of these

Directions (161 – 165) - Read the following information carefully to answer the given questions.

Six People Aksar, Bashir, Chishti, Dullah, Eijaz and Faizal are seating on the ground in a hexagonal shape. All the sides of the hexagon, so formed are of same length.

- Aksar is not adjacent to Bashir or Chishti.
- Dullah is not adjacent to Chishti or Eijaz.
- Bashir and Chishti are adjacent to each other.
- Faizal is in the middle of Dullah and Chishti.

161. Which of the following is not a correct neighbor pair?
a) Aksar and Faizal
b) Dullah and Faizal
c) Bashir and Eijaz
d) Chishti and Faizal
e) None of The Above

162. Who is at the same distance from as Dullah as Eijaz is from Dullah?
a) Faizal
b) Bashir
c) Chishti
d) Aksar
e) None of The Above

163. If one neighbor of Aksar is Dullah, who is the second one?
a) Bashir
b) Chishti
c) Eijaz
d) Faizal
e) None of The Above

164. Who is placed opposite to Eijaz?
a) Bashir
b) Chishti
c) Dullah
d) Faizal
e) None of The Above

165. Who is placed opposite to Aksar?
a) Dullah
b) Chishti
c) Faizal
d) Bashir
e) None of The Above

Directions (Q. 166 – 170) Study the information carefully and answer the questions given below.

- Akram, Bakhtawar, Changez, Dayud, Ekam, Farah, Gulrejr and Humayun are seated in straight line facing north.
- Changez sits fourth to the left of Gulrej. Dayud sits second to right of Gulrej.
- Only two people sit between Dayud and Akram. Bakhtawar and Farah sits adjacent to each other.
- Humayun is not an immediate neighbor of Dayud.

166. Who among the following sits exactly in the middle of the persons who sit fifth from the left and the person who sits sixth from the right?
a) Changez
b) Humayun
c) Ekam

d) Farah
e) None of The Above

167. Who among the following sits third to the right of Changez?
a) Bakhtawar
b) Farah
c) Akram
d) Ekam
e) None of The Above

168. Which of the following represents persons seated at the two extreme ends of the line?
a) Changez and Dayud
b) Akram and Bakhtawar
c) Bakhtawar and Gulrej
d) Dayud and Humayun
e) None of The Above

169. What is the position of Humayun with respect to Farah?
a) Third to the Left
b) Immediate Right
c) Second to Right
d) Fourth to Left
e) None of The Above

170. How many persons are seated between Akram and Ekam?
a) One
b) Two
c) Three
d) Four
e) None of The Above

Answers:

1. Option D
2. Option E
3. Option A
4. Option B
5. Option B
6. Option A
7. Option D
8. Option D
9. Option B
10. Option C
11. Option A
12. Option B
13. Option A
14. Option D
15. Option A
16. Option B
17. Option E
18. Option A
19. Option B
20. Option C

21. Option E
22. Option E
23. Option C
24. Option B
25. Option B
26. Option A
27. Option B
28. Option D
29. Option C
30. Option B
31. Option A
32. Option A
33. Option E
34. Option D
35. Option B
36. Option E
37. Option B
38. Option D
39. Option C
40. Option B
41. Option D
42. Option C
43. Option A
44. Option C
45. Option E
46. Option A
47. Option B
48. Option A
49. Option C
50. Option B
51. Option D
52. Option D
53. Option B
54. Option C
55. Option B
56. Option C
57. Option C
58. Option E
59. Option B
60. Option A
61. Option D
62. Option E
63. Option D
64. Option A
65. Option C
66. Option B
67. Option E
68. Option D
69. Option C
70. Option A
71. Option B
72. Option E
73. Option B
74. Option D
75. Option E

76. Option A
77. Option C
78. Option A
79. Option D
80. Option E
81. Option B
82. Option C
83. Option A
84. Option E
85. Option D
86. Option A
87. Option C
88. Option B
89. Option C

L is sitting 2nd to the right of O.

90. Option A

T sits exactly between Q and S.

91. Option D

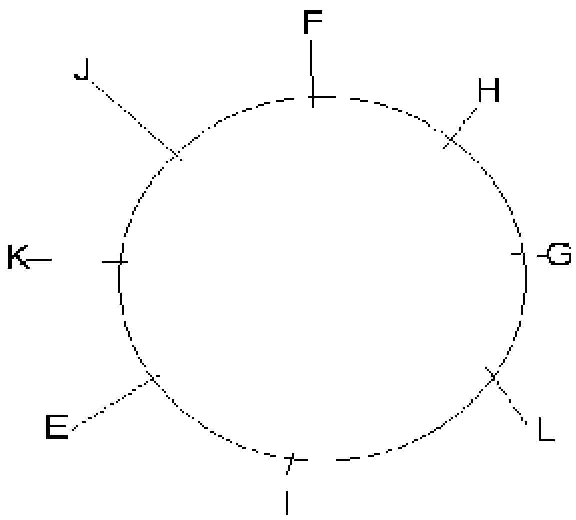
R is sitting at the extreme right end of the Row-1.

92. Option B

R is at the extreme right end.
R is to the immediate right of U.
R is sitting third to the right of T.
R is at one of the ends.
There are three persons – T, Q and U – between R and S

93. Option E

O is second from the left in Row-2.



94. Option C

H, K and L are facing outside.

95. Option D

E is facing towards the centre. G is 2^{nd} to the right or 5^{th} to the left of E.

96. Option A

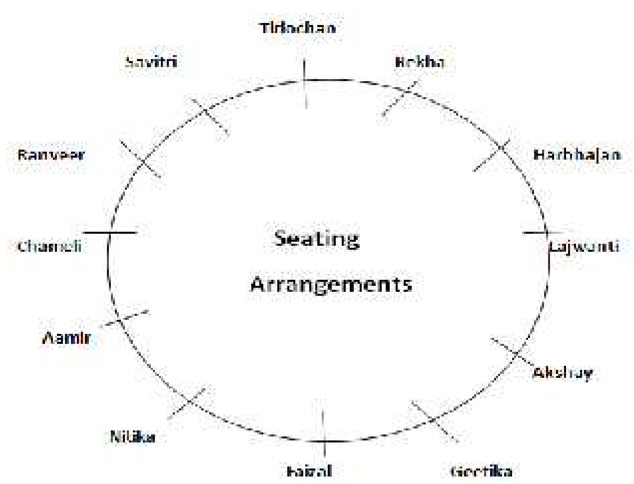
J is sitting exactly between F and K.

97. Option B

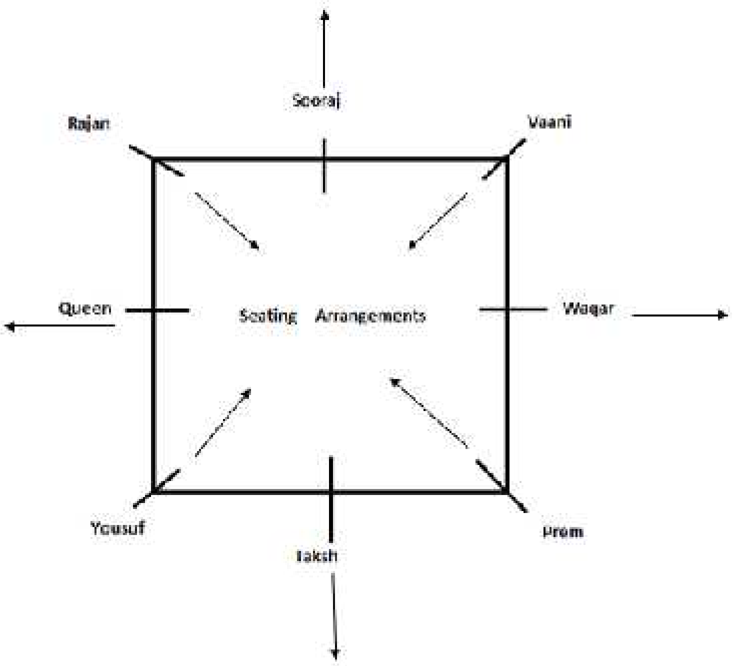
There are four persons – G, L, I and E – between H and K if we move clockwise from H.

98. Option E
All the statements are true.

99. Option B
100. Option C
101. Option A
102. Option B
103. Option D
104. Option D
105. Option E
106. Option E
107. Option C
108. Option B
109. Option C
110. Option E
111. Option D
112. Option B
113. Option E
114. Option A
115. Option B
116. Option E
117. Option C
118. Option D



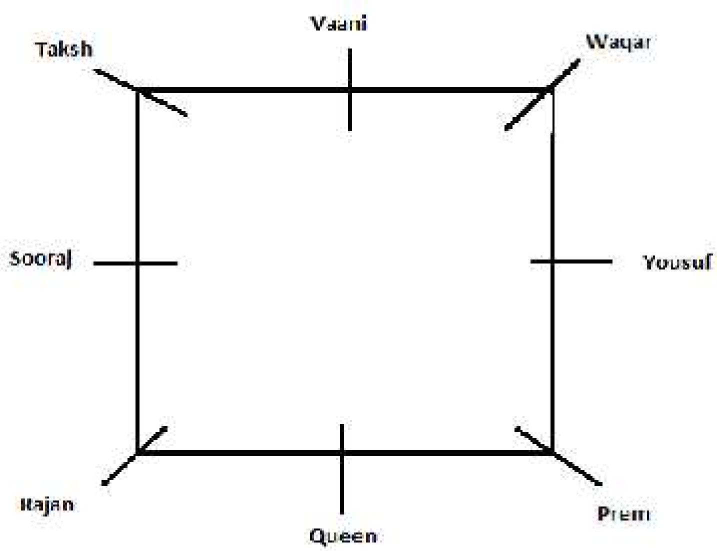
119. Option B
120. Option A
121. Option A
122. Option B
123. Option C



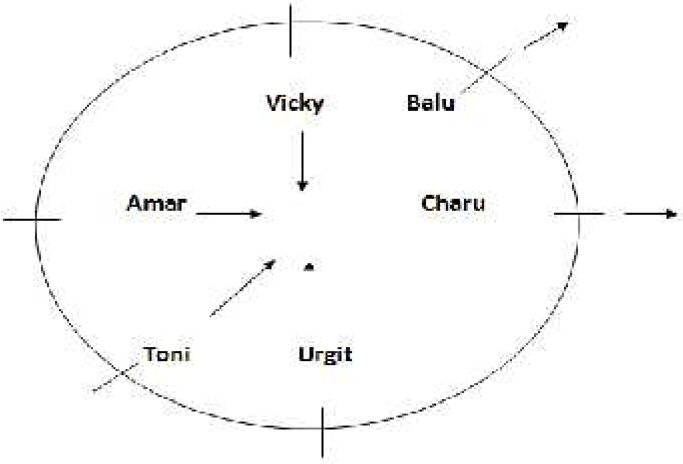
(Arrows shows the face direction of the persons)

124. Option A

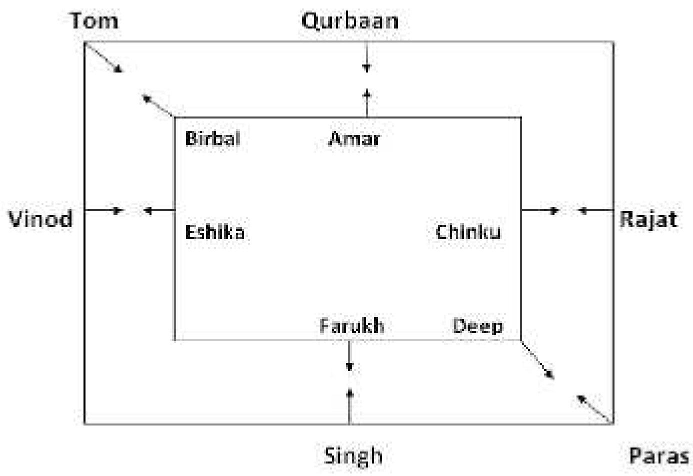
According to question, following new arrangement is obtained. Prem is on his previous position as per the question. Now all Persons have different positions after alphabetical arrangement starting from Prem so Answer is None because no one is on his same position.



125. Option C
126. Option A
127. Option E
128. Option B
129. Option D
130. Option A



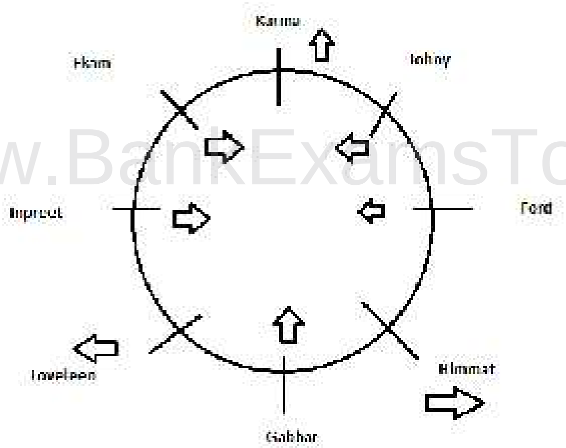
131. Option C
132. Option D
133. Option C
134. Option D
135. Option A



(Note - Arrows shows the face directions of persons)

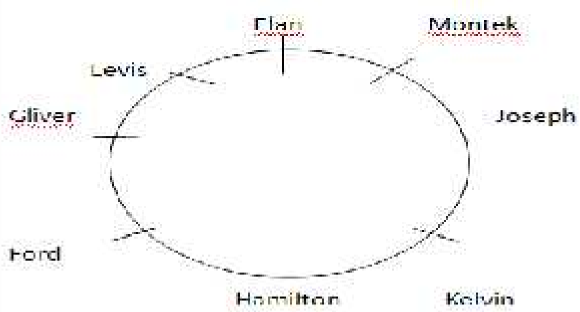
136. Option C
137. Option A
138. Option C
139. Option E
140. Option A

(Note - Arrows shows the face directions of 8 persons)



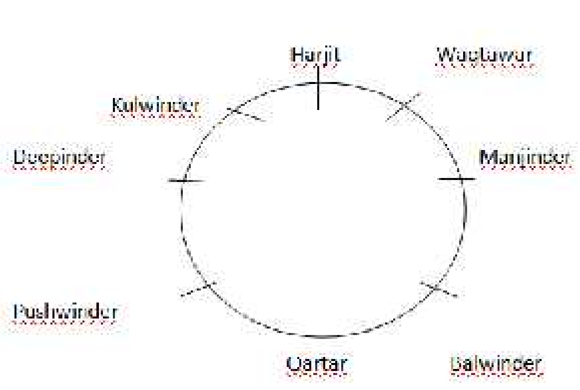
141. Option C
142. Option B
143. Option A
144. Option B
145. Option E
146. Option C
147. Option A
148. Option C
149. Option B
150. Option E

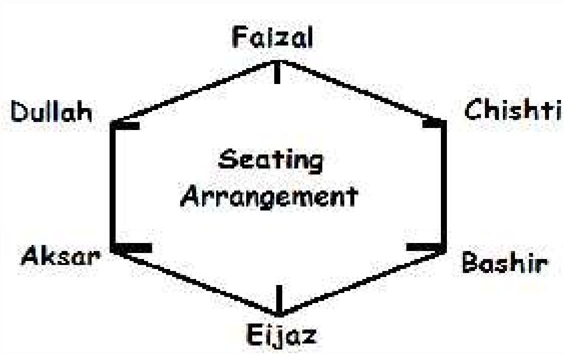
Person	Profession
Montek	Columnist
Hamilton	Scientist
Kelvin	Professor
Gliver	Financial Analyst
Levis	Lawyer
Ford	Doctor
Elan	Chartered Accountant
Joseph	Engineer



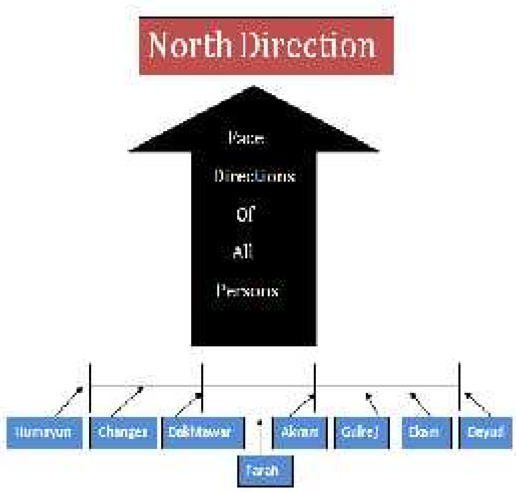
151. Option B

152. Option D
153. Option C
154. Option A
155. Option A
156. Option D
157. Option E
158. Option B
159. Option C
160. Option A





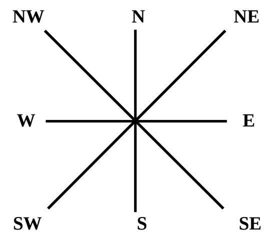
161. Option A
162. Option C
163. Option C
164. Option D
165. Option D



166. Option D
167. Option C
168. Option D
169. Option A
170. Option A

Direction Sense Test

In this test, the questions consist of a sort of direction puzzle. A successive follow-up of direction is formulated and the candidate is required to ascertain the final direction or the distance between two points. The test is meant to judge the candidate's ability to trace, follow and sense the direction correctly.



The figure shows the four main directions (North N, South S, East E, West W) and the four cardinals (North east NE, North west NW, South east SE, South west SW) to help the candidates know the directions.

Speed Developing Practice Test No. 8

1. Deepak starts walking straight towards east. After walking 75 m he turns to the left and walks 25 m straight. Again he turns to the left and walks a distance of 40m straight, again he turns to the left and walks a distance of 25 m. How far is he from the starting point?
(1) 140 m (2) 35 m (3) 115 m
(4) 25 m (5) None of these

2. Arun started walking towards North. After walking 30 m, he turned left and walked 40 m. He then turned left and walked 30 m. He again turned left and walked 50 m. How far is he from his original position?
(1) 50 m (2) 40 m (3) 30 m
(4) 20 m (5) None of these

3. Ramu went 15 km. to the west from his house, then he turned left and walked 20 km. He then turned east and walked 25 km. and finally turning left covered 20 km. How far is he from his house?
(1) 5 km. (2) 10 km. (3) 40 km.
(4) 80 km. (5) None of these

4. Rekha who is facing south turns to her left and walks 15 m, then she turns to her left and walks 7 metres, then facing west she walks 15m. How far is she from her original position?
(1) 22 m (2) 37 m (3) 44 m
(4) 7 m (5) None of these

5. Going 50 m to the south of her house, Radhika turns left and goes another 20 m. Then, turning to the north, she goes 30 m and then starts walking to her house. In which direction is she walking now?
(1) North-west (2) North (3) South-east
(4) East (5) None of these

6. Shailesh and Mohan start from a fixed point. Shailesh moves 3 km. northward, turns right and then covers 4 km. Mohan moves 5 km westwards, turns right and walks 3 km. The distance between Shailesh and Mohan now is
(1) 10 km (2) 9 km (3) 8 km
(4) 6 km (5) 4 km

7. A man walks 30 metres towards south. Then, turning to his right, he walks 30 metres. Then turning to his left, he walks 20 metres. Again, he turns to his left and walks 30 metres. How far is he from his initial position?
(1) 30 metres (2) 20 metres (3) 80 metres
(4) 60 metres (5) None of these

8. Suresh starts from his house towards west. After walking a distance of 30 m, he turned towards right and walked 20 metres. He then turned left and moving a distance of 10 metres, turned to his left again and walked 40 metres. He now turns to the left and walks 5 metres. Finally he turns to his left. In which direction is he walking now?
(1) North (2) South (3) East
(4) South-West (5) West

9. Raj travelled from a point X straight to Y at a distance of 80 m. He turned right and walked 50 m, then again turned right and walked 70 metres. Finally he turned right and walked 50 m. How far is he from the starting point?
(1) 20 metres (2) 50 metres (3) 70 metres
(4) 10 metres (5) None of these

10. A man walks 10 km towards north. From there he walks 6 km towards south. Then he walks 3 km towards east. How far and in which direction is he with reference to his starting point?
(1) 7 km east (2) 5 km west (3) 5 km north-east
(4) 7 km west (5) None of these

11. One morning after sunrise, Sumesh and Ratheesh were standing on a lawn with their backs towards each other. Sumesh's shadow fell exactly towards his left hand side. Which direction was Ratheesh facing?
(1) East (2) West (3) North
(4) South (5) North-east

12. A watch reads 4.30 if the minute hand points east, in what direction does the hour hand point?
(1) North (2) North-west (3) South-east
(4) North-east (5) None of these

13. Five students A, B, C, D and E are sitting in a row, D is on the right of E. B is on the left of E but is on the right of A. D is on the left of C. Who is sitting on the extreme left?
(1) A (2) B (3) C
(4) D (5) E

14. Five persons were playing card game sitting in a circle all facing the centre. Ashish was to the left of Milan Nitin was to the right of Anupam and between Anupam and Mukesh. Who was to the right of Mukesh?
(1) Nitin (2) Milan (3) Mukesh
(4) Ashish (5) Cannot be determined

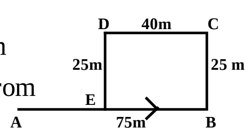
15. Facing the east, Rajesh turned left and walked 10 metres, then he turned to his left again and walked 10 m. He then turned 45^{o} towards his right and went straight to cover 25 metres. In which direction from his starting point is he?
(1) South-west (2) South-east (3) North-west
(4) North-east (5) East

Answers: Speed Developing Practice Test No. 8

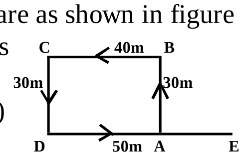
1. (2) 2. (5) 3. (2) 4. (4) 5. (1) 6. (2) 7. (5) 8. (1) 9. (4) 10. (3) 11. (4) 12. (4) 13. (1) 14. (4) 15. (3)

Explanatory Answers: Speed Developing Practice Test No. 8

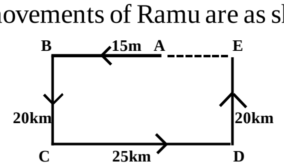
1. (2) The movements of Deepak are as shown in the figure
Clearly, EB = DC = 40 m
∴ Deepak's distance from the starting point
A = (AB - EB) = (75 - 40) = 35 metres



2. (5) The movements of Arun are as shown in figure from A to E, clearly Arun's distance from his original position = AE = (DE - DA)
= (DE - BC) = 10 m.

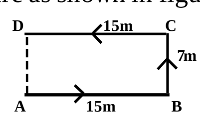


3. (2) The movements of Ramu are as shown in figure.

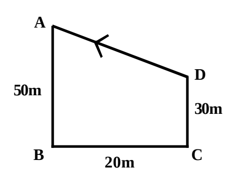


∴ Ramu's distance from his house at A = AE
= (BE - AB) = (CD - AB) = (25 - 15)km = 10 km

4. (4) The movements of Rekha are as shown in figure
∴ Rekha's distance from the starting point A
= AD = BC = 7 m.



5. (1) The movements of Radhika are as shown in the figure. Thus she is now moving in the direction DA i.e. North-west.

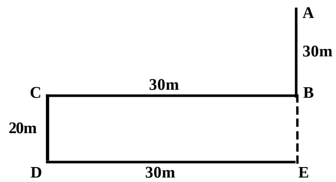


6. (2) Clearly, after travelling their total distances, Shailesh and Mohan are in the same horizontal line at E & C respectively. So distance between them is EC = EB + BC = DA + BC = 5 + 4 = 9 km.

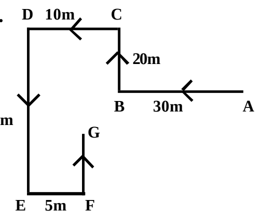
7. (5) The movements of the man are as shown in the figure.

$\therefore$ The man's distance from the initial position

$= AE = (AB + BE) = (AB + CD) = (30 + 20)\,m = 50\,m.$



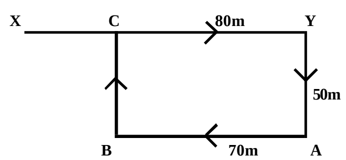
8. (1) The movements of Suresh are as shown in figure from A to G. Clearly, Suresh is walking in the direction FB, ie, North.



9. (4) The movements of Raj are as shown in figure. (X to Y, Y to A, A to B and B to C)

$\therefore$ Raj's distance from the starting point

$= XC = (XY - YC) = (XY - BA) = (80 - 70)\,m = 10\,m.$



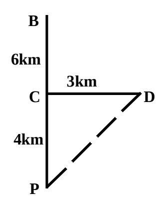
10. (3) The movements of the man are as shown in the figure. (P to B, B to C, C to D)

$PC = (PB - BC) = (10 - 6) = 4$ km.

Clearly D is to North-east of P.

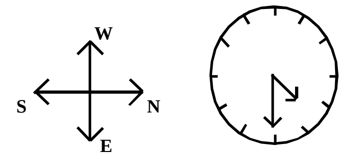
$\therefore$ The man's distance from the starting point $PD = PC^2 + CD^2$

$= 4^2 + 3^2 = 16 + 9 = 5$ km.



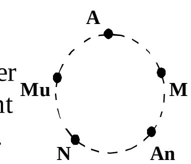
11. (4) Since Sumesh's shadow fell towards left, Sumesh is facing north. As, Ratheesh is standing with his back towards Sumesh, he will be facing south.

12. (4) Clearly to show 4.30, the position of the minute and hour hands of the clock will be as shown, if the minute hand points east, the hour hand will point to the North-east direction.

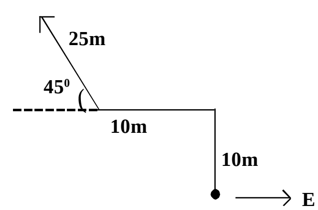


13. (1) D is to the right of E means the order is ED. B is on the left of E but right of A means ABE. D is to the left of C means DC. Combining the arrangements, we have ABEDC. So, A is to the extreme left.

14. (4) Ashish (A) is to the left of Milind (M) means that the order is A, M. Nithin N is to the right of Anupam (An) means An, N. So Nithin is between Anupam and Mukesh (Mu) means An, N, Mu. So the two possible arrangements are A, M, An, N, Mu and An, N, Mu, A, M. But in a cyclic arrangement both will be considered the same. So Ashish will be to the right of Mukesh.



15. (3) Clearly the route followed by Rajesh is as shown in figure. So matching his final direction with the direction diagram, he will be in North-west direction from the starting point.



Speed mathematics

First rule of the mathematics:

The easier the method you use to solve a problem, the faster you will solve it with less chance of making a mistakes.

Why mathematics is important?????

- People equate mathematical ability with general intelligence.
- If you are good at maths, you are generally regarded as highly intelligent.
- High achieving maths students are treated differently by their teachers and colleagues.
- Mental calculations improves concentration, develops memory, and enhances the ability to retain several ideas at once
- Mathematical knowledge boosts your confidence and self-esteem.
- These methods will give you confidence in your mental faculties, intelligence and problem-solving abilities.

1. MULTIPLYING NUMBERS UP TO 10:

We will begin by learning how to multiply numbers up to 10x10

E.g. 1 7X8=????

Solution- 7 x 8 =

3 x 2

- Go to the first number 7. How many more do you need to make 10? The answer is 3.
- Go to the next number 8. How many more do you need to make 10? The answer is 2
- Then subtract diagonally. Take either one of the number. (7-2 =5 8-3= 5)
- 7 x 8 =5(3 x 2)(put 5 on the left side and next to tat 5 put the multiplication of 3 and 2) and we get
- 7 x 8 =56.

2. MULTIPLYING NUMBERS GREATER THAN 10. (MULTIPLYING WITH A REFERENCE NUMBER)

Using 100 as a reference number.

100	96 x 97 = 9300		(96-100= -4, 97-100=-3,), (97-4= 93 (diagonally sub))
	-4 -3	+ 12	93x100=9300 (multiply with 100), (-4x-3=+12)
		9312	=> 9300+12=9312

Steps involved:

- Just take an example of multiplying 96 X 97

- Take 100 as a reference number.
- Just subtract 96-100 = -4 and 97-100 = -3
- Then subtract diagonally and take either of the number, we will get 93 and it was multiplied by 100.
- You will get 9300 and -4 X-3 gives you +12. Add this 12 with 9300 we will get 9312.

3. MULTIPLYING NUMBERS ABOVE 100:

100 106 x 104 = 11000 (106-100= +6, 104-100=-4,), (106+4=110 (diagonally add))

+6 +4 + 24 110x100=11000 (multiply with 100), (6x4=24)

11,024 =>11000+24=11024

- It's similar to the previous technique.
- Take 100 as reference number, 106-100 = +6, 104-100 = 4.
- This time just add diagonally. We will get 110 and it was multiplied by 100 we get 11000.
- Then multiply +6 and +4 we get 24 and it was added to 11024.

4. COMBINATIONAL METHOD:

100 92 x 93 = 8500

10 -8 -7 + 56

-2 -3 8556

- Suppose on subtracting the given numbers with the reference number we getting higher number, we need to do the same procedure for the number (which we will get on subtracting the main number from the reference number.

5. MULTIPLYING NUMBERS ABOVE AND BELOW THE REFERENCE NUMBERS:

100 98 x 135 = 13300

-2 +35 -70

13230

- The same principle is to be followed.
- Here 98 is lower than 100 and 135 is more than 100.
- Just subtract the multiplying number with the reference number. We will get -2 and +35.
- Then just follow the previous technique we will get 13300,
- Then multiply -2 and +35 we get -70.
- Then just add 13300-70 we will get 13230.

6. MULTIPLICATION BY FACTORS:

- It's easy to multiply by 20, as 20 are 2 times 10. And it is simple to multiply by 10 and by 2. This is called multiplication by factors, as 10 and 2 are factors of 20.

20 23 x 31 = 680 (23+11=31+3=34,)

+3 +11 33 (34 x 20=> 34x 10=340, 340x 2= 680)-> multiplication by factors

713

- Just do the same procedure.
- (23+11=31+3=34,)
- (34 x 20=> 34x 10=340, 440x 2= 680)-> multiplication by factors
- 3*11 gives 33 and 680+33 gives you 713 tats the answer.

7. MULTIPLYING BELOW 20

20 19 x 16 = 300 (19-4=16-1=15,)

-1 -4 04 (15X2X10=30x10=300)-> multiplication by factors

364

- Here the only difference we need to take 20 as reference number.
- And follow the same procedure.

8. MULTIPLYING USING DOUBLE REFERENCE NUMBER:

8 X 37=????

(10 x 4) 8 x 37 = 290

-2 -3 6

-8 296

- In this problem we have two reference nos. , for 8, the reference no is 10 and for 37, the reference no is 40.
- Its shows the reference no of 8 is four times the reference number of the 37.
- Just subtract the no from its reference no. (8 - 10= -2, 37- 40= -3)
- Then multiply the first difference (2) by 4 (the multiplies of the reference no 10) , -> -2 x 4 = -8,
- Then -8+37 = 29 , and multiply by the main reference no 10., 29x10 = 290.
- Then -2 x -3 = 6, 290+6 = 296.
- The answer is 296.

EASY MULTIPLICATION BY 9

9X486 = ?

(10 x 49)   9 x 486 = 4370

-1   -4   +4

-49   4374

- The reference no for 9 is 10, and for 486 is 490,
- And the second reference no is 49 times the first reference no.
- Just the subtract the respective no from their reference no.
- We will get 9-10 = -1, 486-490= -4
- Multiply the difference of first reference no (10) by the multiple of the second reference no. => -1 x 49 = -49.
- Subtract -49 from 486, => 486-50+1 = 437 and multiply by the first reference no. we will get - 4370.
- Then -1 x -4 we will get 4 and it was added to 4370 we will get 4374... That's the answer.

SHORTCUT FOR SUBTRACTION

- What is the easiest way to take 90 from a number?
  Take 100 and give back 10
- What is the easiest way to take 80 from a number?
  Take 100 and give back 20
- What is the easiest way to take 70 from a number?
  Take 100 and give back 30

100   98x135 = 13300-70 = 13230

-2   35   30

- How do we take 70 from 13,330?
- Take away 100 and give back 30

CHECKING THE ANSWERS BY USING SUBSTITUTE NUMBER:

- 13 x 14 = 182
- The first number is 13. Add its digits together to get the substitute (1+3=4: four becomes our substitute for 13)
- The next number we are working with is 14. The substitute is (1+4=5)
- Then multiply the substitute numbers (4 x 5=20: twenty is a two digit number so we add its digits together to get our check answer : 2+0=2).
- Do the same principle in the RHS Side too (1+8+2=11, 1+1= 2)

- So both LHS and RHS are equal. Hence our answer is correct.

DOUBLING AND HALVING NUMBERS

To use 20 and 50 as reference numbers, we need to be able to double and halve numbers easily.

- To halve 78, 78 = (80-2). and half of (80-2) is 40-1 = 39
- To double 78, do it the reverse manner. (80-2). Double of (80-2) is 160-4 = 156

MULTIPLYING THE DECIMALS:

1.3 X 1.4 =?

- Ignore the decimal point in the calculation.

1. 10 13 14 = 170

   +3 +4 12

   182

- In order to put the decimal points, count the number of digits after the decimal point in the given question.
- Here two digits after the decimal points. Hence place the decimal point after two digits (1.82 is the answer)

2. 8 x 68 =?

   Let take 8.0 x 68 =?.

   100 80 x 68 = 4800

   -20 -32 640

   5440

   - Let same principle for multiplying we got the answer 5440
   - Let count the no of digits, its 1
   - Then answer is 544.0.
   - Lets try 9 x 83 = , 9 x 67 =

MULTIPLICATION BY 11

- To multiply a two digit number by 11, simply add the two digits together and insert the result in between.
- For example, to multiply (23 x 11), add (2+3= 5), and insert the 5 in between 2 and 3, the answer is 235.

MULTIPLYING MULTIPLES OF 11.

EG: 330 x 12 = ?

- 330 = 3 x 10 x 11 (ignore the zero now)
- 3 x 11 x 12 = 11 x 36 = 396

- Now keep the zero now. We will get 3960.

CONVERTION OF KILOGRAMS INTO POUNDS:

- DOUBLE THE NUMBER, MULTIPLY BY 11, AND DIVIDE BY TEN TO ACCOUNT FOR THE DECIMAL PLACE. (TO CONVERT KG TO POUNDS YOU MULTIPLY BY 2.2)
  1. 80 KG TO POUNDS = ?
- 80 kg = (80 x 2.2) = 160x 11/10 = 176 pounds.

MULTIPLYING LARGER NUMBERS BY 11:

2. 12345 X 11 = ?

- Write zero in front of the number we are multiplying. (012345 x 11)
- Beginning with the units digit, add each digit to the digit on its immediate right. In this case add 5 to the digit on its right. There is no digit on its right, so add nothing
- 5+0=5, (write 5 as the last digit of your answer)

  012345 x 11
  5
- Now go to the 4. Five is the digit on the right of the 4: (4+5 =9)
- 012345 x 11, (continue the same procedure)
- 95
- 3+4 =7
- 2+3=5
- 1+2=3
- 0+1=1
- The answer is 135795

CHECKING YOUR ANSWERS:

1. 012345 x 11

   1 3 5 7 9 5

   - Write a cross under every second digit of the answer, beginning from the right hand end of the number. The calculation will now look like
   - <u>012345 x 11</u>

     1 3 5 7 9 5

     X X X
     - Now add the digits with the cross under them (1+5+9 = 15)
     - Add the digits without the cross (3+7+5 = 15)
     - We are getting both the answers are equal hence our answer is correct.
2. 0217475 x 11

   2 3 9 2 2 2 5

   X X X
   - Add the digits in the cross(3+2+2 = 7)
   - Add the digits in the without cross (2+9+2+5 = 18)

- The difference between two answers is 11.
- If the difference is 0,11,22,33,44,55,66 etc., then the answer is correct.

MULTIPLICATION BY 9 :

- There is an easy shortcut for multiplication by 11 because 11 is one more than 10, so there is an easy shortcut for multiplication by 9 because 9 is one less than 10.
- Instead of adding each digit to the digit on the right, we subtract each digit from the digit on the right.
- Because subtraction involves borrowing and carrying, we can make the following short cut..
- We subtract the units digit from 10, then subtract each successive digit from 9 and add the neighbor. We subtract 1 from the first digit of the number for the first digit of the answer.

ADDITION

The basic rule for mental addition:

To add 9, add 10 and subtract 1: to add 8, add 10 and subtract 2; to add 7 add 10 and subtract 3, and so on.

- If you wanted to add 47, you would add 50 and subtract 3,
- To add 196, add 200 and subtract 4.
- To add 38 to a number, add 40 and subtract 2,

TWO DIGIT MENTAL ADDITIONS:

If the units digit is high, round off to the next ten and then subtract the difference. If the units' digit is low, add the tens then the units.

- With two digit mental addition you add the tens digit of each number first, then the units. If the unit's digit is high, round off the number upwards and then subtract the difference. If you are adding47, add 50, and then subtract 3.
- To add 35, 67, and 43 together you would begin with 34, add 70 to get 105, subtract 3 to get 102, add 10 to get 142 then the 3 to get your answer of 145.

ADDING THREE DIGIT NUMBERS:

355+752+694 =?

- 355+700 = 1055
- 1055+50+2 = 1107
- 1107+700-6 = 1807-6 = 1801

  OR
  - You may prefer to add from left to right; adding the hundreds first, then the tens and then the units.

ADDITING LARGER NUMBERS:

8461

+5678

- We begin with the thousands column.8+5 = 13, since we are dealing with thousands, our answer is 13 thousand.
- Observe that the numbers in the hundreds column conveniently add to 10, so that gives us another thousand. Then answer is 14000.
- Then add 61 to 14000, we getting 14061.
- Add 80 to and subtract 2. To add 80 add 100 and subtract 20, (14061+100-20-2) = 14161-20-2=14141-2=14139 is the answer.
- An easy rule is: when adding a column of numbers add pairs of digits to make tens first, then add the other digits.

SUBTRACTION:

To subtract mentally, try and round off the number you are subtracting and then correct the answer.

To subtract 9, take 10 and add 1: to subtract 8, take 10 and add 2; to subtract 7, take 10 and add 3,

1. Eg: 56-9 =

   -1

(To take 9 from 56 in your head, the easiest and fastest method is to subtract 10, (46) and add1 we get 47.)

2. 54-38 = 16

   +2
   - 44-40, plus 2 makes 16

3. 436-87 =

   +13
   - Take 100 to get 336. Add 13 and we will get 349 easy.
   - **SUBTRACTING ONE NUMBER BELOW A HUNDREDS VALUE FROM ANOTHER WHICH IS JUST ABOVE THE SAME HUNDREDS NUMBERS.**

THREE DIGIT SUBTRACTIONS:

1. 461 -275 =

   25

   161+25 = 160+20+5+1 = 186
2. 834 – 286 =

   14

   534+14 = 530+10+4+4 = 540+8 = 548

SUBTRACTION METHOD ONE:

1. 7254-3897 =

6 1 '4
~~7~~ ~~2~~ ~~5~~ '4

3 3 9 7

3 3 5 7

- Subtract 7 from 4. We can't, so we borrow 1 from the tens column.
- Cross out the 5 and write 4.
- Don't say 7 from 14, we have to say 7 from 10 and add 4 we getting 3+4 = 7 (the first digit of the answer)
- Nine from 4 won't go, so borrow again. Nine from 10 is 1, plus 4, the next digit answer.
- Eight from 1 won't go, so borrow again. Eight from 10 is 2, plus 1 is 3, three from 6 is 3, the final digit of the answer.

SUBTRACTION METHOD TWO:

7 '2 '5 '4

– ,3 ,8 ,9 7

3 3 5 7

- Subtract 7 from 4. We can't, so we borrow 1 from the tens column. Put a 1 in front of the 4 to make 14 and write a small 1 alongside the 9 in the tens column. Don't say 7 from 14, but 7 from 10, add 4 on top gives 7, the first digit of the number.
- Ten (9+1) from 5 won't go so borrow again in a similar fashion. Ten from 15 is 5 or 10 is zero, plus 5 is 5.
- Nine from 2 won't go, so borrow again. Nine from 10 is 1 plus 2 is 3.
- Four from 7 is 3. You have your answer.

SUBTRACTION FROM A POWER OF 10:

The rule is : SUBTRACT THE UNITS DIGIT FROM 10, THEN EACH SUCCESSIVE DIGIT FROM 9, THEN SUBTRACT 1 FROM THE DIGIT ON THE LEFT.

1. 1000
   -574

- 10-4=6,
- 9 - 7 = 2,
- 9 - 5 = 4,
- 1 - 1 = 0

  The answer is 0426

SUBTRACTING SMALLER NUMBERS:

If the number we are subtracting has fewer digits than the one you are subtracting from, then add zeros before the number (at least, mentally) to make the calculation:

For instance:

23 000 – 46 =

$$\begin{array}{r} 23\,000 \\ \underline{0\,046} \\ 22\,954 \end{array}$$

Use the same principle as subtraction method 2.

SQUARING THE NUMBERS:

1. Squaring the numbers ending with 5.
   35^2 =
   - Separate the 5 from the digits in front. in this case there is only a 3 in front of the 5. Add 1 to 3 get 4 (3+1= 4)
   - Multiply these numbers together: 3 x 4 = 12
   - Write the square of 5 (25) after 12. We will get 1225.

135^2 = ??

- Take 13, add 1 to it we will get 14.
- Then 13 x 14 = 182
- Add the square of 5 next to it. We will get 18225.

SQUARING THE NUMBERS NEAR TO 50:

1. 46^2 =
   - Forty six squared means 46 x 46. Rounding upwards, 50 x 50 = 2500.
   - Take 50 and 2500 as our reference points.
     50   46^2
           - 4
     46 = 50-4, so 4 is a minus number.
     - So we take 4 from the 25 hundreds.
     - (25-4) x 100= 2100
     - To get the rest of the answer, we square the number in the minus. (4^2= 16)
     - Add 2100 and 16 we will get 2116 is the answer.

56^2 =

- Fifty six squared means 56 x 56. Rounding upwards, 50 x 50 = 2500.
- Take 50 and 2500 as our reference points.

50 56^2

+6

56 = 50+4, so 6 is a positive number.

- So we add 6 to 25 hundreds.
- (25+6) x 100= 3100
- To get the rest of the answer, we square the number in the minus. (6^2= 36)
- Add 3100 and 36 we will get 3136 is the answer.

SQUARING NUMBERS NEAR TO 500:

- This is similar to our strategy for squaring numbers near 50.
- Five hundred times 500 is 250000, we take 500 and 250000 as our reference number.

1. 506^2 =

   500 506^2

   +6

   500^2 = 250000

   - Five hundred and six is greater than 500,
   - Square of 500 is 250000
   - The number 6 is added to the thousands
   - (250+6) x1000 = 256000
   - Square 6 is 36.
   - 256000+36 =256036 is the answer.

Square the number ends with 1:

1. 31^2 =
   - First, subtract 1 from the number. The number now ends in zero and should be easy to square. (30^2 = 3 x 3 x 10 x 10) = 900
   - Add 30 and its next number 31 (30+31). We will get 61)
   - Add (900 + 61) = 961.
2. 351^2=?
   - 350^2 = 122500
   - 350 +351 = 701
   - 122500 +701 = 123201

WE CAN ALSO USE THE METHOD FOR SQUARING NUMBERS ENDING IN 1 FOR THOSE ENDING IN 6.

3. 86^2 =
   - 85^2 =7225
   - 85+86 = 171
   - 7225+171 = 7396

Squaring numbers ending with 9

1. 29^2 =

- Add 1 to the number. The number now ends in zero and is easy to square.
- 30^2 = 900
- Now add 30 with given number29 (30+29 =59)
- Then **sub** (900 - 59 = 841)

2. 349^2 =

- 350^2 = 122500
- 350+349 = 699
- Sub (122500 - 699 = 121801)

MULTIPLYING NUMBERS WHEN THE UNITS DIGITS ADD TO 10 AND THE TENS DIGITS DIFFER BY 1.

THERE IS RULE IN MATHEMATICS THAT IF YOU MULTIPLY TWO NUMBERS THAT DIFFER ABOVE AND BELOW A SQUARE BY THE SAME AMOUNT, THE ANSWER WILL BE THAT NUMBER SQUARED LESS THE DIFFERENCE SQUARED.

1. 67 x 73 =
    - 67 = 70 - 3
    - 73 = 70 + 3
    - 67 x 73 = $70^2 – 3^2$
    - = 4900 – 9 = 4891

MULTIPLYING NUMBERS NEAR 50

1. 54 x 58 =

    50   54   x   58

    4   8

    - Add 4 + 8 = 12
    - Halve the answer 12/2 = 6
    - Add that answer to 25 , we will get 25+6 = 31 (31 hundreds)
    - Multiply (4 x 8 = 32)
    - Add (3100 + 32 = 3132)

2. 46 x 48 =

    50   46   x   48

    -4   -2

    - Add (-4 -2 = -6)
    - Halve the answer (-6/2 = -3)

- Subtract (25 – 3 = 22) (22 hundreds)
- 4 x 2 = 8
- Add (2200 + 8 = 2208)

TEMPERATURE CONVERSION:

To change Fahrenheit to Celsius, subtract 30 degree and then halve.

To change Celsius to Fahrenheit, double and then add 30.

- Then answer you will get using this formula will not be exact, but its close enough for practical purposes.
- If you are told the temperature will be 8 ^{o} C, double it and add 30. We will get 46 ^{o} F. but the actual temperature would be 46.4^{o}F
- Easy temperature conversion formulas : (^{o} C x 2) +30 = ^{o} F, (^{o} F -30) / 2 = ^{o} C,
- Exact temperature conversion formulas : (^{o} C x 9/5) +32 = ^{o} F, (^{o} F -32) x 5/9 = ^{o} C,

TIME AND DISTANCES:

1. A common ruler is 30 cm. thirty divided by 12 gives approximately 2 ½. (2.5 cm is equal to 1 inch)
2. 100 km = 60 miles.

POUNDS TO KILOGRAMS

1. 1 KG = 2.2 POUNDS
   65 kg = 65 x 11 x 2/10
   =143 pounds

Reasoning

BLOOD RELATIONSHIP

Questions on Blood Relationship are related to our day to day life. We are bound by our kith and kin through a chain of relationships. The examiner defines the simple relationships by using rather complicated set of definitions and expects from us to comprehend these definitions rather quickly. In order to solve these problems, analyse the given statements carefully and systematically. For examples :

(i) My father's only child means I (Myself).

(ii) Ritu's husband's father-in-law's only daughter means

Ritu (Herself).

Pay particular attention to the information given in the question itself without your personal biases and pre-conceived notions and assumptions coming to the fore. Questions on Blood Relationship can be solved by any of the following methods:

(i) Deduction Method and

(ii) Pictorial Method

While attempting questions on Blood Relationship, first read all the pieces of information as quickly as possible and then point out the two persons between whom relationship is to be established. Finally, try to co-relate the given relationships. While concluding relationship between two persons be careful about the sexes of the persons involved. Majority of the students tend to define or derive relationship without caring for sex of the persons. ***Is it possible to define relationship between two persons without knowing their sex?*** Consider the following illustration:

A is the child of P and Q.

From this statement can we conclude that P is the father of A. No, it is not possible. Without knowing the sex of either P or Q, it is not possible to conclude that P is the father of A. What we can conclude from the above statement is that'P and Q are parents of A.

Thus, we see that the knowledge about the sex of persons is necessary to conclude relationship between the two persons.

Some Important Tips:

(i) First of all choose the two persons, between whom relationship is to be established.

' (ii) Next, pin-point the intermediate relationship i.e., such relationship through which long drawn relationship can be established between the required persons.

(iii) Finally, conclude the relationship directly between the two persons as per the requirement of the question.

(iv) From a particular name we cannot ascertain the sex (gender) of that person. The name does not always show the gender beyond reasonable doubt.

For example, we often hear the same name for male and female in the Punjabi community.

The names, Harvinder, Sukhwinder, Gurinder etc. are used for both the sexes in the Punjabi community.

There are certain other names which are used for both the sexes all over the country. For example, Suman, Kamal etc.

The list given below is quite helpful in recognising some indirect relationships:

Father's or mother's son	Brother
Father's or mother's daughter	Sister
Father's or mother's brother	Uncle
Father's or mother's sister	Aunt *
Father's or mother's mother	Grandmother
Father's or mother's father	Grandfather
Son's wife	Daughter-in-law
Husband's or wife's sister	Sister-in-law
Brother's or Sister's son	Nephew
Brothers daughter	Niece
Aunt's or Uncle's son or daughter	Cousin
Sister's husband	Brother-in-law
Brother's wife	Sister-in-law
Grandfather's or Grandmother's son	Father or Uncle
Grandfather's or Grandmother's only daughter-in-law (or daughter)	Mother
Grandfather's or Grandmother's daughter-in-law	Mother or Aunt
Only son of Grandfather (Paternal)	Father
Only daughter of Grandfather (Maternal)	Mother
Uncle's wife	Aunt
Father of father or mother	Grandfather
Mother of father or mother	Grandmother
Father of Grandfather or Grandmother	Great Grandfather
Mother of Grandfather or Grandmother	Great Grandmother
Only Daughter-in-law of Grandfather (Paternal)	Mother
Wife of Father	Mother
Husband of Mother	Father

The questions on Blood Relationship are asked in various formats but substantially there is no difference between them. However, consider the pattern of the question we are obliged to discuss them separately.

TYPR-I

Ex.l. Pointing to a man, a woman said, "His mother is the only daughter of my mother". How is the woman related to man?

(1) Mother (2) Grandmother

(3) Sister (4) Daughter

(5) None of these

Ex.2. Pointing to a man, a woman said, "His mother is the daughter of my mother's only daughter, How is the man related to that woman?
(1) Son (2) Father
(3) Brother (4) Grandson
(5) None of these

Ex.3. Pointing towards Waman, Madhav said "I am the only son of his father's one of the sons". How Waman is related to Madhav?
(1) Nephew (2) Uncle
(3) Either father or uncle
(4) Father (5) None of these

Ex.4. Pointing to a man in the photograph, a woman said, "He is the only son of my mother's father". How is the woman related to the man in the photograph?
(1) Niece (2) Sister
(3) Mother (4) Daughter
(5) None of these

Ex.5. Pointing to a gentleman, Deepak said, "His only brother is the father of my daughter's father", How is the gentleman related to Deepak?
(1) Father (2) Grandfather
(3) Uncle (4) Brother-in-law
(5) None of these

Ex.6. Pointing towards Neeru, Asha said, "I am the only daughter of her mother's son". How is Neeru related to Asha?
(1) Aunt ' (2) Cousin
(3) Niece (4) Mother
(5) None of these

Ex. 7. If Neha says, "Amruta's father Raj is the only son of my father-in-law, Mahesh"; then how Bindu, who is sister of Amruta, is related to Mahesh?
(1) Daughter (2) Wife
(3) Daughter-in-law (4) Niece
(5) None of these

Ex.8. Pointing towards a photograph of a girl, Rajan said, "She has no sisters or daughters but her mother is the only daughter of my mother". How is the girl in the photograph related to Rajan's mother?
(1) Sister-in-Law (2) Granddaughter
(3) Daughter-in-Law (4) Cannot be determined
(5) None of these

Ex.9. Pointing towards a person in a photograph, Raman said, "She is the only daughter of the mother of my brother's sister". How is the person in photograph related to Raman?'
(1) Daughter (2) Sister .
(3) Wife (4) Cousin
(5) None of these

Ex. 10. Pointing to a man in a photograph, a woman said, "His brother's father is the only son of my grandfather". How is the woman related to the man in the photograph?
(1) Sister (2) Mother
(3) Grandmother
(4) Aunt (5) Daughter

ANSWERS WITH EXPLANATION

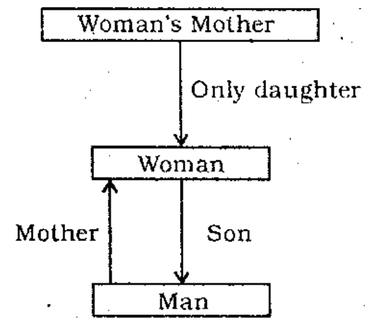
1. (1) The two persons between whom relationship is to established

Man ⟷ Woman

Only daughter of woman's mother means woman (herself). Only daughter of woman's mother is the mother of the man inthe photograph.

Therefore, the woman in question is the mother of man in the photograph.

PICTORIAL METHOD



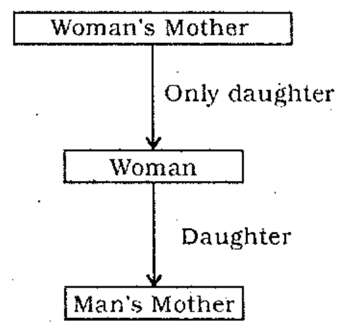
2. (4) The two persons between whom relationship has to be established.

Man ⟷ Woman

My (Woman's) mother's only daughter means the woman herself. Woman's daughter is the mother of man in question. Therefore, the woman (speaker) is the grandmother of the man.

Thus, man is the grandson of the woman (speaker).

PICTORIAL METHOD



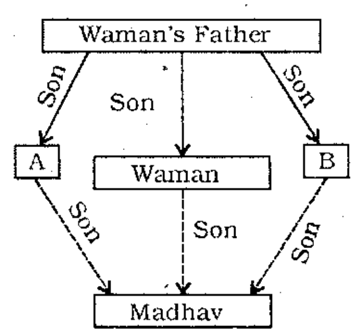
3. (3) The two persons between whom relationship is to be established.

Madhav ⟷ Waman

Waman's father has more than one son.

Madhav is the only son of one of the sons of Waman's father.

Therefore, Waman is either father or uncle of Madhav.



Note : The dotted arrows show doubtful relationship.

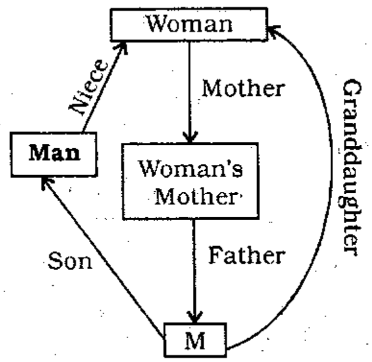
4. (1) The two persons between whom relationship is to be established.

Woman ←——→ Man

Woman's mother's father means grandfather of woman. Only son of woman's grandfather (from mother's side) means maternal uncle of the woman.

Therefore, the woman is the niece of the man in the photograph.

PICTORIAL METHOD



5. (3) The two persons between whom relationship is to be established.

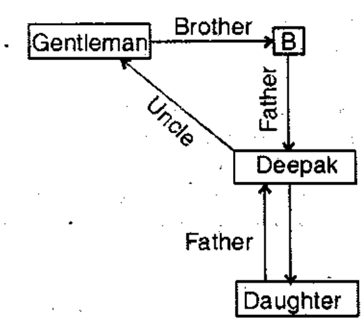
Gentleman ←——→ Deepak

Father of my (Deepak's) daughter's father means Deepak's father.

Deepak's father is the only brother of gentleman.

Therefore, gentleman is the uncle of Deepak.

PICTORIAL METHOD



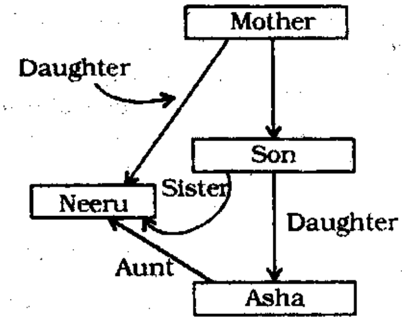
6. (1) The two persons between whom relationship is to be established.

Neeru ←——→ Asha

Female Female

Her (Neeru's) mother's son means brother of Neeru. Daughter of Neeru's brother means niece of Neeru. Therefore, Neeru is the aunt of Asha.

PICTORIAL METHOD



7. (5) The two persons between whom relationship is to be established.

Bindu ←——→ Mahesh

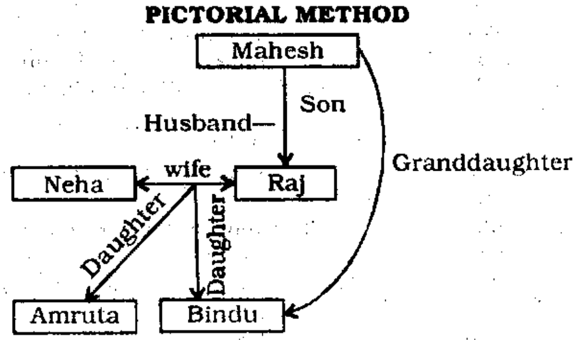
(Sister of Amruta)

Only son of Neha's father-in-law (Mahesh) means husband of Neha.

Thus, Amruta's father Raj is the husband of Neha and son of Mahesh.

Therefore, Amruta's and Bindu are daughters of Raj and Neha; and granddaughters of Mahesh.

PICTORIAL METHOD



8. (2) The two persons between whom relationship is to be established.

Girl ←——→ Rajan's mother

Only daughter of my (Rajan's) mother means sister of Rajan. Sister of Rajan is the mother of the girl in the photograph. Therefore, the girl is the granddaughter of Rajan's mother.

9. (2) The two persons between whom relationship is to be established.

Person ←——→ Raman

Female

Mother of my (Raman's) brother's sister means mother of Raman. Only daughter of Raman's mother means sister of Raman.

10. (1) The two persons between whom relationship is to be established.

Woman ←——→ Man

Only son of my (Woman's) grandfather means the father of woman.

Woman's father is man's brother's father.

Therefore, woman is the sister of man in the photograph.

TYPE-II

Ex.1. If A is B's brother, B is C's sister and C is D's father, D is A's...
(1) Brother (2) Sister
(3) Nephew (4) Cannot be determined
(5) None of these

Ex.2. P is brother of Q. R is the sister of Q. How P is related to R?
(1) Brother (2) Sister
(3) Uncle (4) Data inadequate
(5) None of these

Ex.3. Aparna's mother is the daughter of Vishnu's sister. How is Vishnu's mother related to Aparna's mother?
(1) Mother (2) Daughter
(3) Sister (4) Grandmother
(5) None of these

Ex.4. Q's mother is sister of P and dauhter of M. S is daughter of P and sister of T. How is M related to T?
(1) Father (2) Grandfather
(3) Grandmother
(4) Either grandfather of grandmother
(5) None of these

Ex.5. Ankit is the son of Zubin. Manju is the daughter of Anil. Sheela is the mother of Manju. Mohan is the brother of Manju. How is Mohan related to Sheela?
(1) Brother (2) Father
(3) Son (4) Cannot be determined
(5) None of these

Ex.6. Prakash is the son of Pramod. Neha is the daughter of Abhishek. Ruchi is the mother of Neha. Awadhesh is the brother of Neha. How is Awadhesh related to Ruchi?
(1) Brother (2) Father
(3) Son (4) Cannot be determined
(5) None of these

Directions (7-10) : Study the following information carefully and answer the questions given below :

Five persons are sitting around dinning table. - K, L, M, N and O - K is the mother of M, who is the wife of O. N is the brother of K and L is the husband of K.

Ex.7. How is L related to O?
(1) Father (2) Mother-in-law
(3) Brother-in-law (4) Father-in-law
(5) Niece

Ex.8. How is K related to O?
(1) Sister (2) Mother
(3) Mother-in-law (4) Brother-in-law
(5) Aunt

Ex.9. How is N related to L?
(1) Son (2) Cousin
(3) Brother (4) Brother-in-law
(5) Uncle

Ex.10. How is M related to L ?
(1) Aunt (2) Niece
(3) Daughter (4) Daughter-in-law
(5) Mother

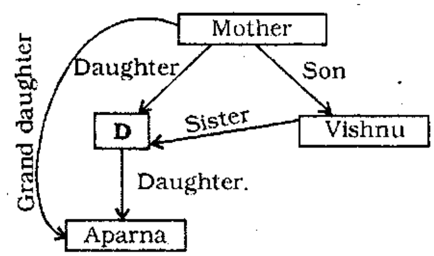
ANSWERS WITH EXPLANATION

1. (4) A is the brother of B. (A is male)
B is sister of C. (B is female)
C is father of D. (C is male)
The sex of D is not known.
A and C are brothers of B.
A is the uncle of D.
Since, sex of D is not clear, we cannot determine what is D to A.

2. (1) P is brother of Q. (P is male)
R is sister of Q. (R is female)
Therefore, P is the brother of R.

3. (4) Aparna's mother is the daughter of Vishnu's sister. Therefore, Vishnu's mother is the grandmother of Aparna's mother.

PICTORIAL METHOD



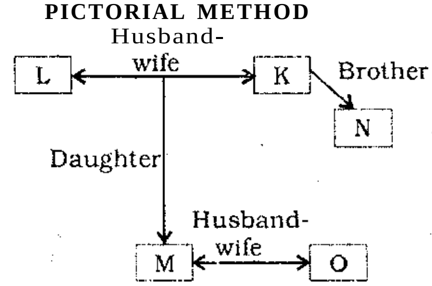
4. (4) Q's mother is sister of P. (Sex of P is not clear).
Q's mother is daughter of M. (Sex of M is not clear).
S is daughter of P and sister of T. (The sex of P and T is not clear)
M's Children : Q's mother and P.
P's children : S (female) and T.
Therefore, M is either grandfather or grandmother of T.

5. (3) Manju is the daughter of Anil. '
Sheela is the mother of Manju.
Therefore, Mohan is the son of Sheela.

6. (3) Neha is the daughter of Abhishek and Ruchi.
Abhiskek and Ruchi are husband and wife respectively.
Awadhesh is the brother of Neha and hence, he is the son of Abhishek and Ruchi.

(7-10) : K is the mother of M. M is the wife of O.
So, K is the mother-in-law of O, who is the husband of M.
N is the brother of K. L is the husband of K
Therefore, N is the brother-in-law of L.
L is the father-in-law of O.
M is the daughter of L and K.

PICTORIAL METHOD



7. (4) L is the father-in-law of O.
8. (3) K is the mother-in-law of O.
9. (4) N is the brother-in-law of L.
10. (3) M is the daughter of L.

SOLVED QUESTIONS

1. If A is the mother of D, B is not the son of C, C is the father of D, D is the sister of B, then how is A related to B ?
(1) Mother (2) Brother
(3) Step son (4) Sister
[SSC Stenographer (Grade 'C' & 'D') Exam, 09.01.2011]

Directions (2–3) : Read the following information carefully and answer the questions which follow :
If 'A × B' means 'A is son of B'.
If 'A + B' means 'A is daughter of B'.
If 'A ÷ B' means 'A is wife of B'.
If 'A – B' means 'A is father of B'.

2. What will come in the place of the question mark, to establish that Q is mother of N in the expression : 'N + O – P ? Q'
(1) + (2) ×
(3) – (4) ÷
(5) Either (1) or (2)

3. Which of the following relations are true based upon the relations given in the equation :
'S ÷ T × V – W ÷ Y' ?
(1) T is brother of Y
(2) S is daughter-in-law of W
(3) S is daughter-in-law of Y
(4) Y is daughter of V
(5) None is true
[Corporation Bank PO Exam, 16.01.2011]

Directions (4 – 8) : Read the following information carefully and answer the questions which follow:
If 'P ★ Q' means 'P is the mother of Q'.
If 'P × Q' means 'P is the father of Q'.
If 'P + Q' means 'P is the sister of Q'.
If 'P – Q' means 'P is the brother of Q'.
If 'P > Q' means 'P is the son of Q'.
If 'P < Q' means 'P is the daughter of Q'.

4. In the expression 'A × B + R > S' how is S related to A ?
(1) Daughter-in-law (2) Daughter
(3) Wife (4) Sister
(5) Cannot be determined

5. In the expression 'P + Q > A – B' how is P related to B ?
(1) Daughter (2) Son
(3) Niece (4) Nephew
(5) Cannot be determined

6. In the expression 'W > X < Y ★ Z' how is W related to Z ?
(1) Nephew (2) Uncle
(3) Son (4) Brother - in - law
(5) None of these

7. Which of the following means P is the father of S ?
(1) P × Q < R ★ S (2) R × P < Q – S
(3) R + S > Q + P (4) S + Q – R ★ P
(5) Cannot be determined

8. Which of the following means D is the aunt of C ?
(1) D > B ★ A ★ C (2) D + B – C ★ A
(3) D – B – A × C (4) D + B × A × C
(5) None of these
[SBI Associates Clerk Exam, 16.01.2011]

9. M and F are a married couple. A and B are sisters. A is the sister of F. Who is B to M ?
(1) Sister (2) Sister-in-law
(3) Niece (4) Daughter
[SSC Higher Secondary Level Data Entry Operator & LDC Exam, 28.11.2010]

10. A is the father of B, C is the daughter of B, D is the brother of B, E is the son of A. What is the relationship between C and E ?
(1) Brother and sister (2) Cousins
(3) Niece and uncle (4) Uncle and aunt
[SSC CPO Sub-Inspector Exam, 12.12.2010]

ANSWERS WITH EXPLANATION

1. (1) A is mother of B and D.
2. (2) N + O → N is daughter of O.
O – P → O is father of P.
P × Q → P is son of Q.
Thus, Q is mother of N.
3. (3) S ÷ T → S is wife of T.
T × V → T is son of V.
V – W → V is father of W.
W + Y → W is daughter of Y.
T is son of Y.
S is sister-in-law of W.
S is daughter-in-law of Y.
Y is wife of V.
4. (3) A × B → A is the father of B.
B + R → B is the sister of R.
R > S → R is the son of S.
Therefore, S is the wife of A.
5. (3) P + Q → P is the sister of Q.
Q > A → Q is the son of A.
A – B → A is the brother of B.
Therefore, P is the niece of B.
6. (1) W > X → W is the son of X.
X < Y → X is the daughter of Y.
Y ★ Z → Y is the mother of Z.
Therefore, W is the nephew of Z.
7. (1) P × Q → P is the father of Q.
Q < R → Q is the daughter of R.
R ★ S → R is the mother of S.
Therefore, P is the father of S.
8. (5) D > B → D is the son of B.
D is a male.
D + B → D is the sister of B.
B – C → B is the brother of C.
Therefore, D is the sister of C.
D – B → D is the brother of B.
D is a male.
D + B → D is the sister of B.
B × A → B is the father of A.
A × C → A is the father of C.
Therefore, D is the grand aunt of C.
9. (2) B is sister of F.
Therefore, B is sister-in-law of M.
10. (3) C is daughter of B and A is father of B.
E is son of A. Therefore, C is niece of E.

Directions (1-5) : In each of the following questions, choose the word which expresses nearly the **same** meaning to the word printed in **bold** at the question place.

1. Deteriorate
(1) to become better
(2) to become worse
(3) determinate (4) devalue

2. Susceptible
(1) likely to be harmed
(2) suspicion
(3) surplus
(4) unimpressionable

3. Compression
(1) compunction
(2) computation
(3) pressure
(4) compulsive

4. Obese
(1) very weak
(2) very strong
(3) very thin
(4) very fat

5. Dehydration
(1) loses of water
(2) gain of water
(3) degrading (4) degeneration

Directions (6-10): In each of the following questions, choose the word **opposite** in meaning to the word printed in **bold** at the question place.

6. Complication
(1) complex (2) problem
(3) easiness (4) completion

7. Constriction
(1) tightness (2) narrowness
(3) restriction (4) relaxation

8. Fatal
(1) causing death
(2) life saving
(3) very fat (4) disastrous

9. Superficial
(1) shallow (2) true
(3) on the surface
(4) deep

10. Contraction '
(1) shrinkage (2) expansion
(3) contractor (4) contradiction

Directions (11-15): Choose the correct meaning of the following idioms/phrases out of the four alternatives.

11. Touchdown
(1) make something begin
' (2) land
(3) improve some tiling
(4) grope

12. Whisk away
(1) take somebody somwhere quickly
(2) beat somebody
(3) embrace
(4) whistle-stop

13. Carry out
(1) to do and complete a task
(2) to leave a task
(3) to win
(4) to be in love

14. Trigger off
(1) to make something neater
(2) act of cutting
(3) to make something happen suddenly
(4) trick somebody

15. Bulge out
(1) irregular swelling
(2) to be empty
(3) to punish
(4) carry out

EXPLANATIONS

1. (2) The word **Deteriorate (Verb)** means : to become worse, decline degenerate.
Look at the sentence :
His health deteriorated rapidly and he died shortly afterwards.

2. (1) The word **Susceptible (Adjective)** means : Very likely to be influenced, harmed or affected by somebody/something: easily infiu enced by feelings and emotions; impressionable: responsive.
Look at the sentences :
Salt intake may lead to raised blood pressure in susceptible adults.
He is highly susceptible to flattery.

3. (3) The word **Compression (Noun)** means : pressure; to be pressed or squeezed to bring together; condensation; reduction of something to fit it into a smaller space.
Look at the sentence:
Her lips became a thin line under compression.

4. (4) The word Obese **(Adjective)** means ; very fat, in a way that is not healthy,

5. (1) The word **Dehydration (Noun)** means : removal of water from something especially food; loss of water from your body.
Look at the sentence :
One. should drink lots of water to avoid dehydration.

6. (3) The word **Complication (Noun)** means : a thing that makes a situation more difficult: illness that makes treatment of a previous one more difficult.
Look at the sentence :
He developed complications after a surgery.
Its antonym should be **easiness.**

7. (4) The word **constriction (Noun)** means : becoming tighter or narrower; limitation; restriction.
Look at the sentence :
He is suffering from throat constriction and can swallow hard.
The word **relaxation (Noun)** means : the act of making some form of control less strict or severe; making something become less tight or stiff.

8. (2) The word **Fatal (Adjective)** means : causing or ending in death; causing disaster, lethal; deadly.
Look at the sentence :
If he gets ill again, it could prove fatal.
Its antonym should be **life saving.**

9. (4) The word **superficial (Adjective)** means: not studying or looking at something thoroughly; of or on the surface of something; shallow.
Look at the sentence :
Superficial veins are damaged when crashed.
Its antonym should be **deep.**

10. (2) The word **contraction (Noun)** means : the process of becoming smaller; a short form of a word; a sudden and painful contracting of muscles.
Its antonym should be **expansion.**

11. (2) Phrase **touch down** means : to land (of plane).

12. (1) Phrase **whisk away** means: to take somebody/something very quickly and suddenly.
Look at the sentence :
The waiter whisked away the plates before we had finished.

13. (l) Phrase **carry out** means : to do and complete a task.
Look **at the sentence :**
Extensive tests have been carried out on the patient.

14. (3) Phrase **trigger** off means: to make something happen suddenly; set off.
Look at the sentence :
Nuts can trigger off a violent allergic reaction.

15. (1) Phrase **bulge out** means: to be completely full arid stick out from something in a round shape; irregular swelling.

Directions (1-5) : In each of the following questions, choose the word which expresses nearly the **same** meaning to the word printed in **bold** at the question place.

1. Deteriorate
(1) to become better
(2) to become worse
(3) determinate (4) devalue

2. Susceptible
(1) likely to be harmed
(2) suspicion
(3) surplus
(4) unimpressionable

3. Compression
(1) compunction
(2) computation
(3) pressure
(4) compulsive

4. Obese
(1) very weak
(2) very strong
(3) very thin
(4) very fat

5. Dehydration
(1) loses of water
(2) gain of water
(3) degrading (4) degeneration

Directions (6-10): In each of the following questions, choose the word **opposite** in meaning to the word printed in **bold** at the question place.

6. Complication
(1) complex (2) problem
(3) easiness (4) completion

7. Constriction
(1) tightness (2) narrowness
(3) restriction (4) relaxation

8. Fatal
(1) causing death
(2) life saving
(3) very fat (4) disastrous

9. Superficial
(1) shallow (2) true
(3) on the surface
(4) deep

10. Contraction '
(1) shrinkage (2) expansion
(3) contractor (4) contradiction

Directions (11-15): Choose the correct meaning of the following idioms/phrases out of the four alternatives.

11. Touchdown
(1) make something begin
' (2) land
(3) improve some tiling
(4) grope

12. Whisk away
(1) take somebody somwhere quickly
(2) beat somebody
(3) embrace
(4) whistle-stop

13. Carry out
(1) to do and complete a task
(2) to leave a task
(3) to win
(4) to be in love

14. Trigger off
(1) to make something neater
(2) act of cutting
(3) to make something happen suddenly
(4) trick somebody

15. Bulge out
(1) irregular swelling
(2) to be empty
(3) to punish
(4) carry out

EXPLANATIONS

1. (2) The word **Deteriorate (Verb)** means : to become worse, decline degenerate.
Look at the sentence :
His health deteriorated rapidly and he died shortly afterwards.

2. (1) The word **Susceptible (Adjective)** means : Very likely to be influenced, harmed or affected by somebody/something: easily infiu enced by feelings and emotions; impressionable: responsive.
Look at the sentences :
Salt intake may lead to raised blood pressure in susceptible adults.
He is highly susceptible to flattery.

3. (3) The word **Compression (Noun)** means : pressure; to be pressed or squeezed to bring together; condensation; reduction of something to fit it into a smaller space.
Look at the sentence:
Her lips became a thin line under compression.

4. (4) The word Obese **(Adjective)** means ; very fat, in a way that is not healthy,

5. (1) The word **Dehydration (Noun)** means : removal of water from something especially food; loss of water from your body.
Look at the sentence :
One. should drink lots of water to avoid dehydration.

6. (3) The word **Complication (Noun)** means : a thing that makes a situation more difficult: illness that makes treatment of a previous one more difficult.
Look at the sentence :
He developed complications after a surgery.
Its antonym should be **easiness.**

7. (4) The word **constriction (Noun)** means : becoming tighter or narrower; limitation; restriction.
Look at the sentence :
He is suffering from throat constriction and can swallow hard.
The word **relaxation (Noun)** means : the act of making some form of control less strict or severe; making something become less tight or stiff.

8. (2) The word **Fatal (Adjective)** means : causing or ending in death; causing disaster, lethal; deadly.
Look at the sentence :
If he gets ill again, it could prove fatal.
Its antonym should be **life saving.**

9. (4) The word **superficial (Adjective)** means: not studying or looking at something thoroughly; of or on the surface of something; shallow.
Look at the sentence :
Superficial veins are damaged when crashed.
Its antonym should be **deep.**

10. (2) The word **contraction (Noun)** means : the process of becoming smaller; a short form of a word; a sudden and painful contracting of muscles.
Its antonym should be **expansion.**

11. (2) Phrase **touch down** means : to land (of plane).

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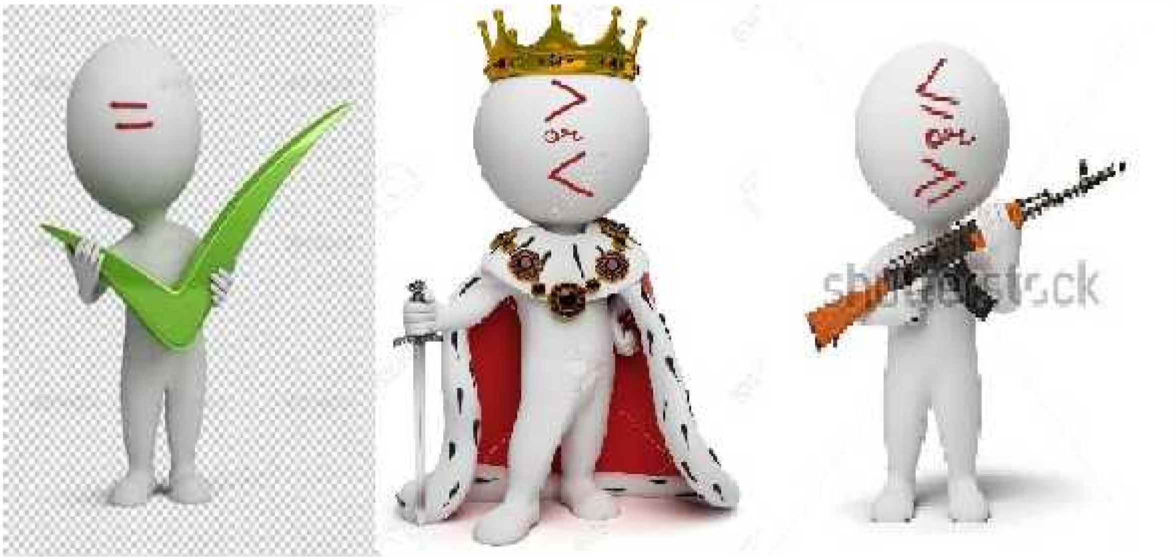
15. (1) Phrase **bulge out** means: to be completely full arid stick out from something in a round shape; irregular swelling.

Contents

Reasoning Inequality Trick - Solve any Question within 10 seconds

Today I am going to share King Soldiers and Public technique to solve Inequalities. By using this technique, you can solve any question from Inequalities within 10 seconds. In every exam, at least 5 questions are asked from this topic.



Points to remember

- King is more powerful than Soldiers
- Soldiers are more powerful than Public
- Whenever there is a conflict between two Kings, then there will be no conclusion
- When there is a conflict between two soldiers, then there will be no conclusion

Let King means < or >

Soldier means ≥ or ≤

Public means =

Case 1. 'King vs King'

Suppose there is a war going on between two kings.Whenever the two kings faces each other means war. In other words conclusion will be wrong.

Note: Two signs opposite to each other will make the conclusion wrong But again if the signs are in same manner that will not make it wrong.

like this
If A > B <C > D then A < C = False , C > A = False.

But
If E > F > G > H then E > G = True , F > H = True , E > H = True.

Statement: A < D > C < E > B
Conclusions:

- C > B → False
- A < E → False
- D > B → False

In simple way ,Whenever these two sign comes in opposite direction the answer will be false.

Case 2. ' Soldiervs Soldier'

Whenever the soldiers face each other means again war(same apply here). In other words conclusion will be wrong.

Note: Two signs opposite to each other will make the conclusion wrong But again if the signs are same then it will be true.

like this

If A ≥ B ≤C then A ≤ C = False , C ≥ A = False.

But
If A ≥ B ≥ C then A ≥ C = True , C ≤ A = True.

Example

Statement: B ≥ D ≤ A ≥ F ≤ C

Conclusions :

I. A ≥ C → False
II. B ≤ F → False
III. D ≥ C → False

Case 3. Sets Priority:

If they all are comes in order then kings' priority will be first ,soldier's second and public at last.

Statement: P ≥ R > Q = T ≥ S
Conclusions :
I. P ≥ Q → False
II. P > Q → True
III. Q ≥ S → True

Case 4.

When it occurs to you that the statement of order is opposite just change the sign into similar opposite direction

Change the sign into similar opposite /corresponding / alternative direction.
If A > B > F > C < D < E
than F < A → True **[A > B > F = F < B < A]**

Example:
Statements : A>B>F>C; D>E>C
Conclusions:

I. C < A → True
II. C > A → False

Statements : R ≥ S ≥ T > U > X ; T < V <W

Conclusions:
I. R >X → True [Note: Apply Case 3 here]
II. X< R → True [Note: Apply Case 3 & 4 here]

Statements **:** K ≤ L ≤ M = N ; P ≥ O ≥N
Conclusions:
K ≤ L ≤ M = N ≤ O ≤ P

I. K < O → False
II. K = N → False
Neither Nor

III. K ≤ M → True
IV. K < P → False

V K = P → False

Statement IV & V Apply Either Or

Case 5. Protocols

There are some rules in battle field which is that king only fights with king andsoldier only fights with soldier.

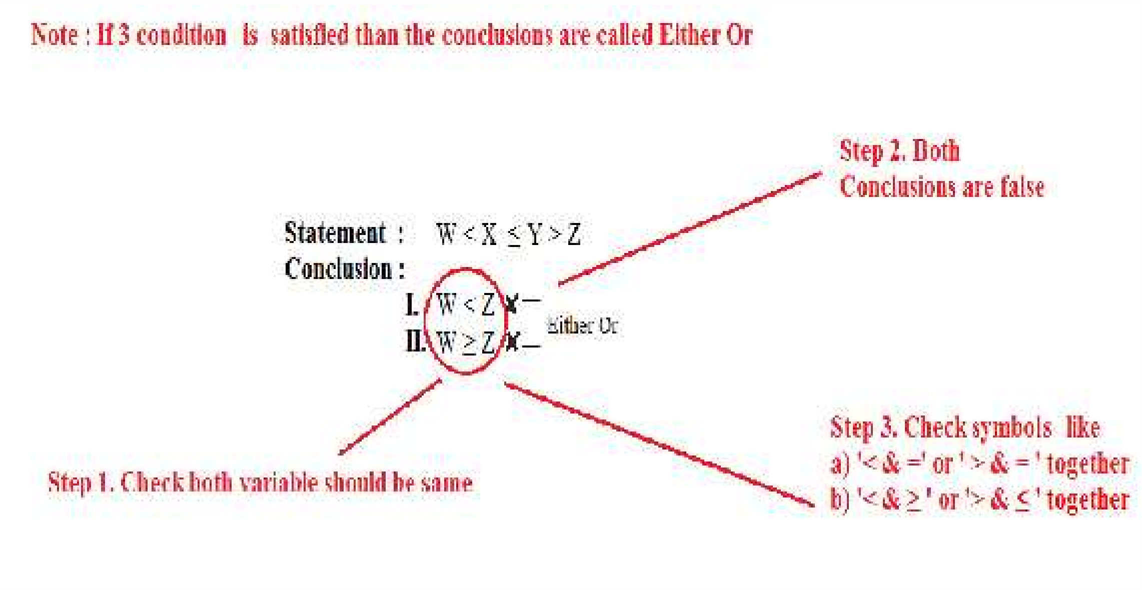
So Whenever you find two conclusions which are false Just check for these two symbols.In Most of case where two conclusions are false and these two similar signsare not there respectively then that statement you can call it as Either Or but should check there variable it should same.

#Case Either Or :

Note : First thing you need to check whether in your conclusion any 2 or more conclusions are wrong
then if it is there then check whether the two variables are same If It happens then write it as 'Either or' but after checking their symbols.

Rules:
1. Both conclusion should False
2. Should have Same Predicate or Variable
3. Check the symbols

If 3 Condition is satisfied then write it as '' Either Or' Other wise leave it.



Solved Questions :

Statement : $H = W \leq R > F$

Conclusion :

I. $R = H$ ✗
II. $R > H$ ✗

Either Or

Statement : $H > L = E < T$
Conclusion :

I. $H \leq T$ ✘
II. $H > T$ ✘
Either Or

Statement : $S < T \geq R \geq M$

Conslusion :

I. $M < T$ ✘
II. $M = T$ ✘
Either Or

Statement : $I \geq H = T > S \leq R$

Conclusion :

I. $I > T$ ✘
II. $I = T$ ✘
Either Or

#Case Neither Nor :

There are some rules in battle field which is that king only fights with king andsoldier only fights with soldier.
So Whenever you find two conclusions which are false Just check for these two symbols.In Most of case where two conclusions are false and these two signs are notthere respectively then that statement you can call it as Neither Nor.

Note : First thing you need to check whether in your conclusion any 2 or more conclusions are wrong
then write it as 'Neither Nor' but before checking their symbols.

Rules:
1. Both conclusion should False
2. Check the symbols

If Both Conditions are satisfied then write it as " Neither Nor' Other wise leave it.

Statement : $P > Q \geq S = R$

Conclusion :

I. $P \geq R$ ✗
II. $R > Q$ ✗

Neither nor

Statement : $L = T \leq J \geq K$

Conclusion :

I. $L > K$
II. $T \leq K$

Neither Nor

Statement : $V < L \geq J \leq T$

Conclusion :

I. $V < J$

II. $L = T$

Neither Nor

Statement : $G \leq K \leq F < M$

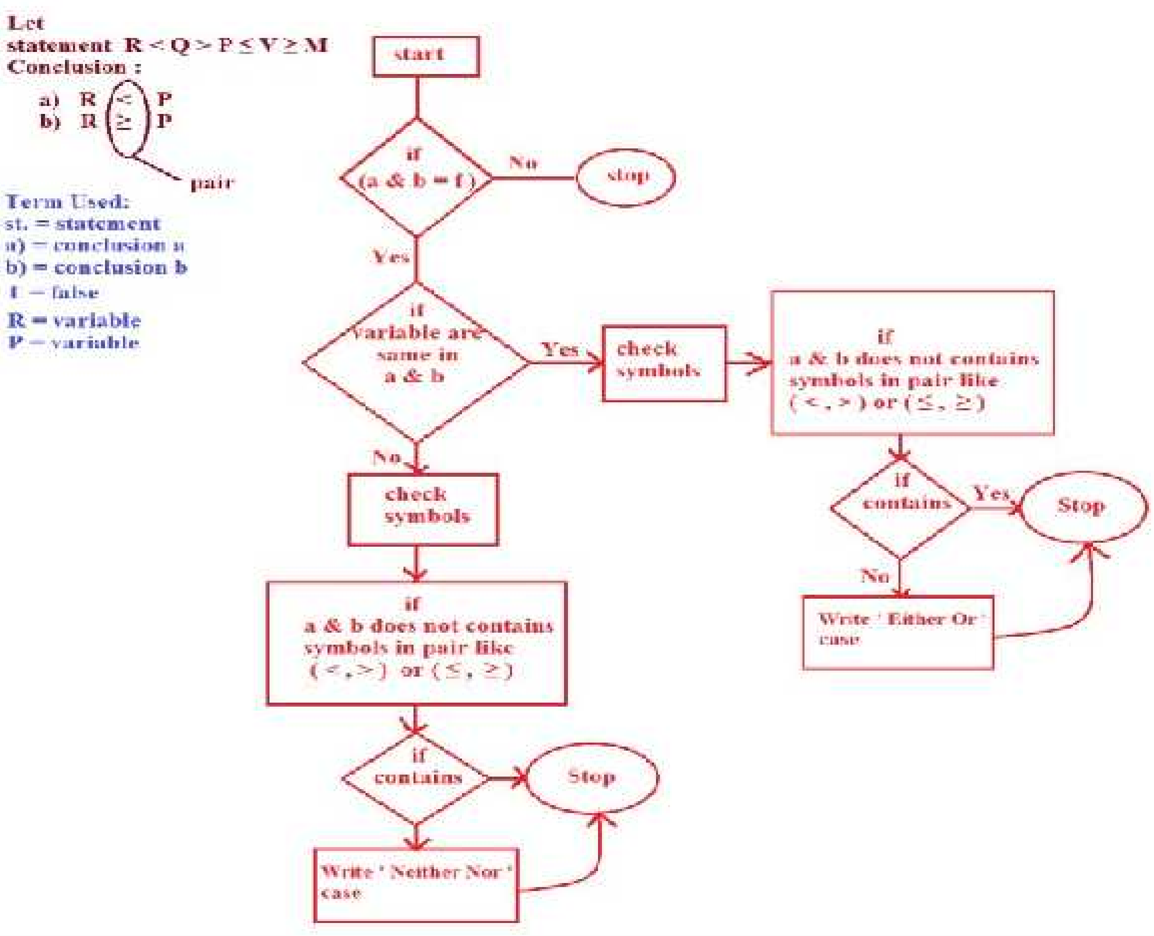
Conclusion :

I. $G > F$

II. $K \leq M$

Neither Nor

How to solve 'Either Or' & 'Neither Nor' Question



Inequality shortcut technique

Directions (**Q.** 1-**5)**

In the following questions, the symbol §,☆,@,# and $ are used with the following meaning as illustrated below.

‘P ☆Q’ means ‘P is not greater than Q’.
‘P $ Q’ means ‘P is not smaller than Q’.
‘P § Q’ means ‘P is neither smaller than nor greater than Q’.
‘P @ Q’ means ‘P is neither smaller than nor equals to Q’.
‘P # Q’ means ‘P is neither equal to nor greater than Q’.

Now in each of the following questions assuming the given statements to be true, find which of the three conclusions, 1,2,3 given below them is/are definitely true and give your answer accordingly.

#1

Statements N § B, B $ W,W # H, H ☆ M

Conclusions:

I. M @ W
II. H @ N
III. W § N
IV. W # N

1) Only I is true
2) Only III is true
3) Only IV is true
4) Only either III or IV is true
5) Only either III or IV and I is true

#2

Statements R ☆ D, D $ J, J # M, M @ K

Conclusions:

I. K # J
II. D @ M
III. R # M
IV. D @ K

1) None is true
2) Only I is true
3) Only II is true
4) Only III is true
5) Only IV is true

#3

Statements H @ T, T # F, F § E, E ☆ V

Conclusions:

I. V $ F
II. E @ T
III. H @ V
IV. T # V

1) Only I, II and III are true
2) Only I, II and IV are true
3) Only II, III and IV are true
4) Only I, III and IV are true
5) All I, II, III and IV are true

#4

Statements D @ R, R ☆ K, K @ F, F $ J

Conclusions:

I. J # R
II. J # K
III. R # F
IV. K @ D

1) Only I, II and III are true
2) Only II, III and IV are true
3) Only I, III and IV are true
4) All I, II, III and IV are true
5) None of the above

#5

Statements M $ K, K @ N, N ☆ R, R # W

Conclusions:

I. W @ K
II. M $ R
III. K @ W
IV. M @ N

1) Only I and II are true
2) Only I, II and III are true
3) Only III and IV are true
4) Only II, III and IV are true
5) None of the above

Directions (Q. 6-11)

In the following questions, the symbol @,©,%,☆ and $ are used with the following meaning as illustrated below.
'P © Q' means 'P is not greater than Q'.
'P $ Q' means 'P is not smaller than Q'.
'P @ Q' means 'P is neither smaller than nor greater than Q'.
'P ☆ Q' means 'P is neither greater than nor equals to Q'.
'P % Q' means 'P is neither equal to nor smaller than Q'.
Now in each of the following questions assuming the given statements to be true, find which of the three conclusions, 1,2,3 given below them is/are definitely true and give your answer accordingly.

#6

Statement : D @ M, M $ B, B ☆ R, R % T
Conclusion:
I. B ☆ D
II. B @ D
III. T ☆ M

1) None is true
2) Only I is true
3) Only II is true
4) Only III is true
5) Only either I or II is true

#7

Statement : W © F, F @ D, D ☆ K, K $ J
Conclusions: I. K % W
II. D $ W
III. F ☆ K

1) Only I and II are true
2) Only I and III are true
3) Only II and III are true
4) All I, II and III are true
5) None of the above

#8

Statements R * K,K © M,M % T,T $ J
Conclusions: : I. J * M

II. R * M

III. K © J

1) Only I is true
2) Only II is true
3) Only I and II are true
4) All I, II and III are true
5) None of the above

#9

Statements R @ K, T © K,T $ M,M * W

Conclusions: I. W % K

II.M © R

III. T © R

1) Only I is true
2) Only II is true
3) Only III is true
4) All I, II and III are true
5) None of the above

#10

Statements T $ N, N % B,B @ W,K © W

Conclusions: I. K $ B

II.K $ T

III. T % B

1) Only I and II are true
2) Only I and III are true
3) Only III is true
4) All I, II and III are true
5) None of the above

#11

Statements Z % V, V * J,J © M,M @ R

Conclusions: I. R % V

II.M % V

III. Z % M

1) Only I and II are true
2) Only I and III are true
3) Only II and III are true
4) All I, II and III are true
5) None of the above

Direction Q (12-16) In these questions relationships between different elements is shown in the statements. These statements are followed by two conclusions.

Give Answer
1) If only conclusion I follows
2) If only conclusion II follows
3) If either conclusion I or conclusion II follows
4) If neither conclusion I or conclusion II follows
5) If both conclusion I and II follow

#12

Statements $N \geq O \geq P = Q > R$

Conclusions

I. $N > R$

II. $R = N$

#13

Statements $W \leq X < Y = Z > A; W < B$

Conclusion

I. $B > Z$

II. $W < A$

#14

Statements : $H > I > J > K ; L > M < K$

Conclusions

I. $I > M$

II. $L < H$

#15

Statements : $C < D < E ; D > F \geq G$

Conclusions

I. $C \geq G$

II. $F > E$

#16

Statements : $R > S \geq T \geq U; V < T$

Conclusions:

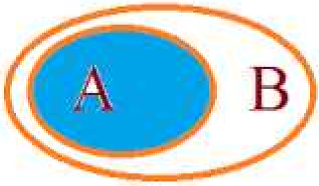
I. $V \geq U$

II. $V < R$

Syllogism Shortcuts - Systematic Method to Solve Questions

All

1) All A is B



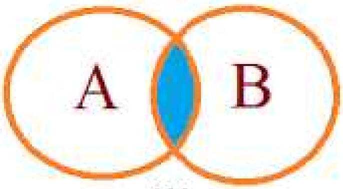
(1)

2) All B is A

(2)

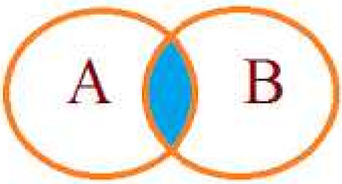
Some

1) Some A is B



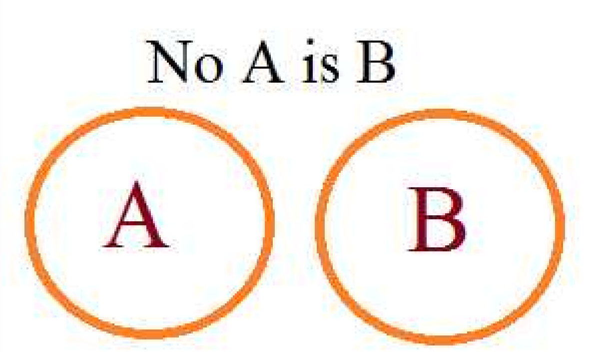
(1)

2) Some B is A



(2)

NO



Case # All - Some

Let!

You have 1000 $ in your pocket.One of your friend needs 600 $ to pay his Bill.He wants to borrows money from you.He comes to you and say,"Do you have 600 $?.What would you say," Of course Yes!".Even if He ask for 1 $, or 999 $ .Your answer will always "Yes!".

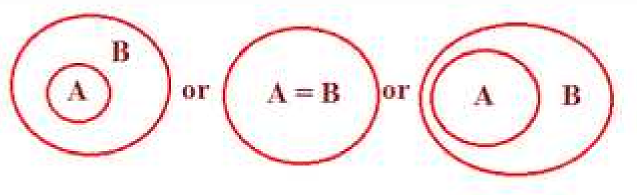
So Overall you had 1000 $ which is called "All " or All of the money you had & What is your friend want some of the money like here 600 or it could be 1$ or 999 $ and what we call that some portion of money out of it.or " Some".

That's why In " All " Case, "Some" is always true.

Example:

Statement : All A are B.

Possible Diagram



Conclusion

All A are B ✓

Some A are B ✓

Some B are A ✓

Some A are not B ✘

Some B are not A ✘

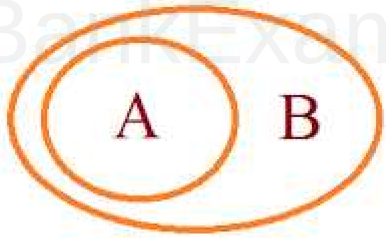
Statement : All A is B.

Conclusion

Some A is B ✓

Some B is A. ✓

All B is A ✘



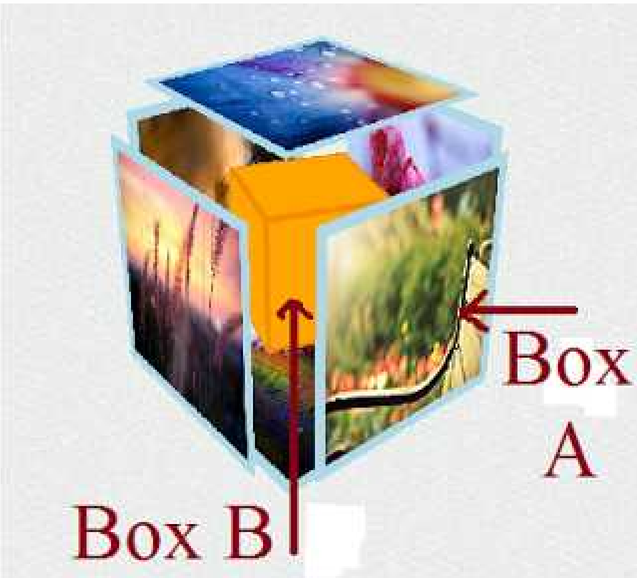
Let

B = { 1, 2, 3, 4, 5, 6, 7, 8 }

A = { 4, 5, 6, 7 }

Now Here we can see that A contains set of numbers. So we call it is as Set A and Same for B 'Set B'. All the numbers in A is contains by B hence All A is B true But All the numbers in B is not in A or not contain by A so All B is A → False.

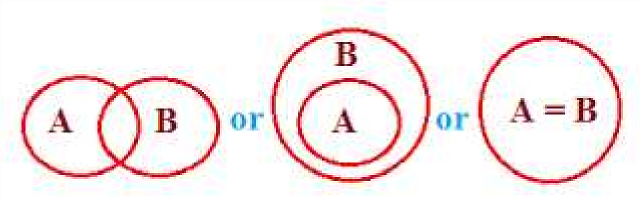
Now Let understand How All A is B → True But All B is A → False
Let Box A & Box B . Here We can see that Box B is inside the Box A Hence Box B can fit into Box A but Box A cannot fit into Box B.



Case # Some - Some Not

Assume you have given the exam & you passed with some marks that means you got some marks and some or not.even if you passed the exam with 99% marks still you missed the 1%. So Even 99% is count under the some case.and 1% is also count under some case.hence In 'Some' case 'Some Not' is true.

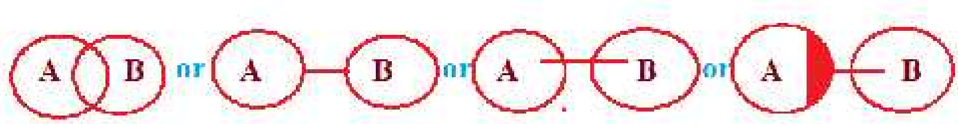
Statement : Some A are B
Possible Diagram



Conclusion

All B areA ✘
Some B are A ✓
No A is B ✘

Statement : Some A are not B
Possible Diagram



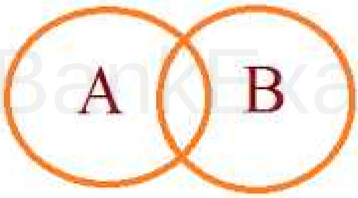
Statement : Some A is B

Conclusion

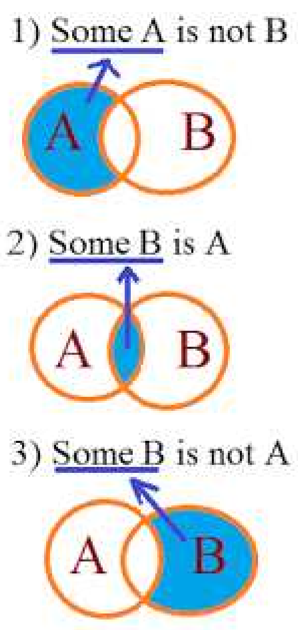
Some A is not B ✓

Some B is A ✓

Some B is not A ✓



Explanation



Let

B = { 1, 2, 3, 4, 5, 6, 7, 8 }

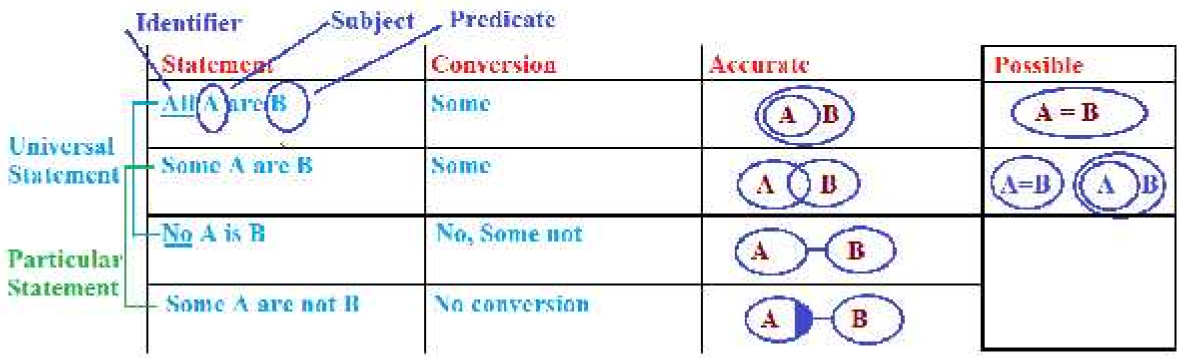
A = { 4, 5, 6, 7, 8, 9, 10, 11}

Here we see that Set A & Set B has some common values hence we can say that Some A is B & Some B is A But there also some values which are not common in both A & B.So We can also say that Some A are not B & Some B are not A.

Case # No- Some Not

"I'm sorry, son, but I'm not in the bad debt business anymore."

Assume You have no money in your pocket.So if you got no money.It means also that some money is not in your pocket.Having No means also some not.



Point to Remember while Solving Syllogism

- Anything is possible in a statement. like Some pens are fans. No fan is heater
- Negative Answer will never be there.

Simple Case

Statement	Conclusion
Some	All , No , [False] Some,Some Not [True]
All	No , Some Not [False] Some , All [True]
Some Not	Only Statement [True]
No	Some , All [False]

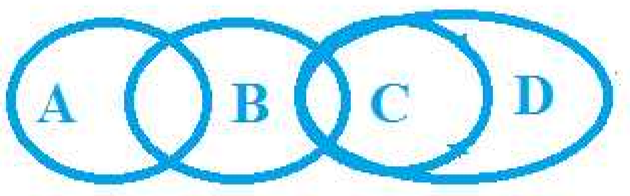
	No , Some Not [True]

Possibility

Statement	**Conclusion**
Some	No , Some [False] All , Some Not [True]
All	✘
No	✘
Some Not	Some Not , All [False] Some , No [True]

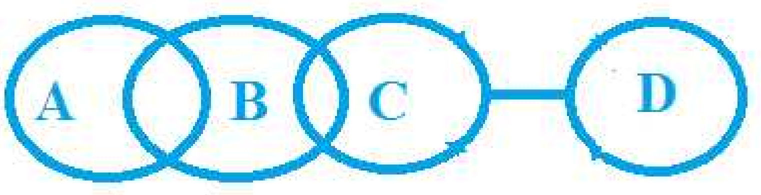
Some Examples

Statement : Some A are B, Some B are C , All C are D



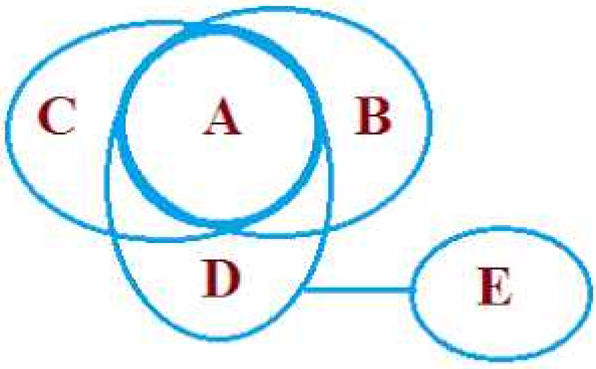
Conclusion
Some A are not D ✘
Some B are D ✓
Some A are C ✘

Statement Some A are B, Some B are C, No C is D



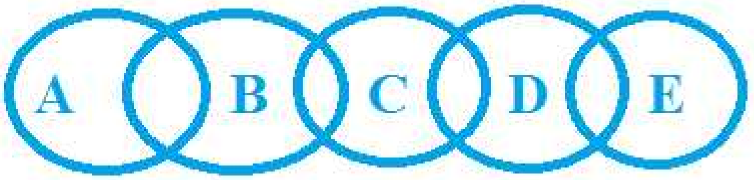
Conclusion
Some B are not D ✘
Some D are not B ✘
Some A are C ✘

Statement All A are B , All A are C , All A are D , No D is E



Conclusion
Some B are not E ✓
Some A are not E ✓
No C is E ✓
No A is E ✓
No E is A ✓

Statement : Some A are B, Some B are C, Some C are D, Some D are E



Conclusion
Some C are not A ✘
Some B are not D ✘
Some A are E ✘
All B are D ✘
No A is E ✘
Some C are A ✘
All B are E ✘
No B is E ✘

' Either Or ' & ' Neither Nor '

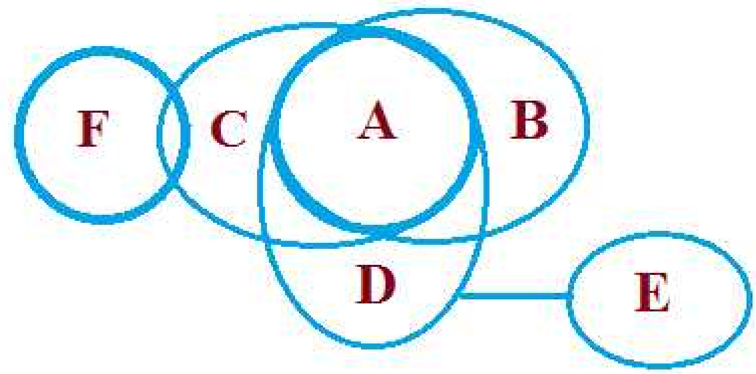
Complementary Pair

1. If One Conclusion is positive &One is Negative

No - Some
Some - Some Not
All - Some Not

2. Same Subject & Same Predicate are there
3. & not able to draw both the conclusion then answer will be Either Or

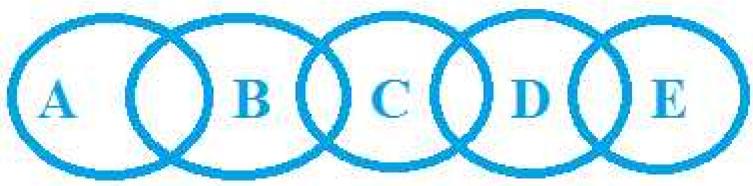
Example
Statement All A are B , All A are C , All A are D , No D is E, Some F is C



Conclusion

Some D are not E ✓
Some A are not E ✓
No C is E ✓
No A is E ✓
No E is A ✓
No E is C ✓
Some F is not E ✓
No E is F ✗
All F being C
is a possibility ✗

Statement : Some A are B, Some B are C, Some C are D, Some D are E



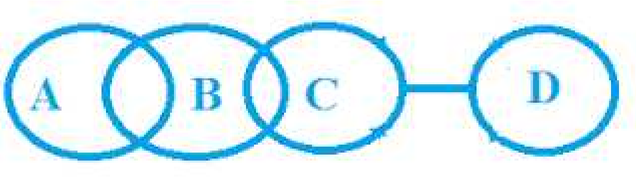
Conclusion

Some B are not D ✘
Some C are A ✘
Some A are not E ✘
All A are E ✘
Some B is D ✘
No C is A ✘
All A are D ✘
No A is D ✘

Note: Either Or

Exception
1. In case of Universal (like 'All &No') Conclusion Complementary pair does not work
2. In this type of Question " Neither Nor "

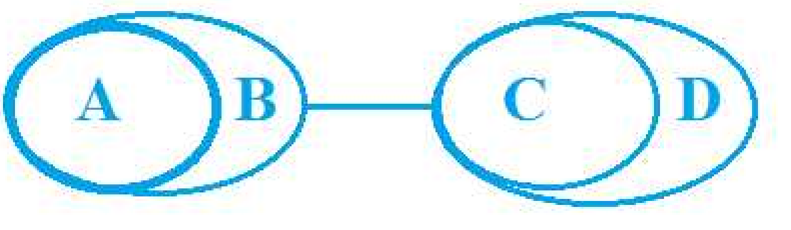
Statement Some A are B, All B are C, No C is D



Conclusion

Some A are not D ✘
No B is D ✘
Some A are C ✘
Some D are B ✘

Statement All A are B, No B is C , All C are D

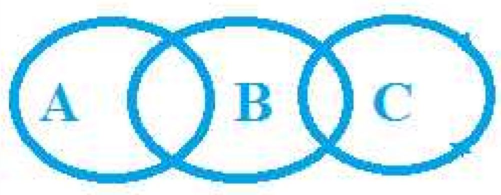


Conclusion

Some A are not D ✘
No D is B ✘
No A is C ✓
No A is D ✓
No D is A ✘

Possibility

Statement Some A are B, Some B are C



Conclusion

a) Some A are B ✓
b) Some B are A ✓
c) Some A are not C ✗
d) Some A are B is being a possibility ✗
e) Some B are A is a possibility ✗
f) Some A are not C is a possibility ✓

Explanation (Simple case A,B& C) :

Let A, B & C are three person. A & B knows each other. B & C knows each other But B knows both.Now Will A talk about C ? Answer is 'Not!,Neither Positive Nor Negative' because he doesn't knows him.So conclusion C is False.

Possibility Case (Conclusion : D,E & F) :

Now Lets take a look at conclusion E.Now Suppose there is raining outside your home and someone comes to you and say there is a possibility to rain today.What would you say to him,'Mad!''Same scenario is here By looking at diagram it clearly says that Some B are A then how could be say it is 'possible' which is actual there.Hence Possibility make it wrong or false the conclusion.So Conclusion E is wrong.

Now talk about conclusion F which says Some A are not c which we don't know but it says let it is a 'possibility' so anything could be possible which doesn't make our statement wrong or contradict with statement.If we make it like this below:

We talk here about possibility which could be anything which especially not contradict with our statement.So F which was False in Simple Case but When we talk about possibility is became true.
Let another example for this.Now Let There is a cloudy sky outside your home.Someone comes to you and say ," There is a possibility that there might be rain today",Now you have no idea whether it rain today or not.So you might be say ," Bro! It is possible".Now here you cannot talk about negative because in Syllogism Negative Answer will never be there.

In a statement word like these called possibility

- Can be
- Possible
- May be / might be
- Chances
- Occurs
- is being possibility
- is a possible

In a statement word like these called surety

- Can Never be
- Can

Reasoning Seating Arrangement Shortcut Trick

Today I am going to share technique to share seating arrangement (sitting arrangement) question sets.

Cases of Seating Arrangement

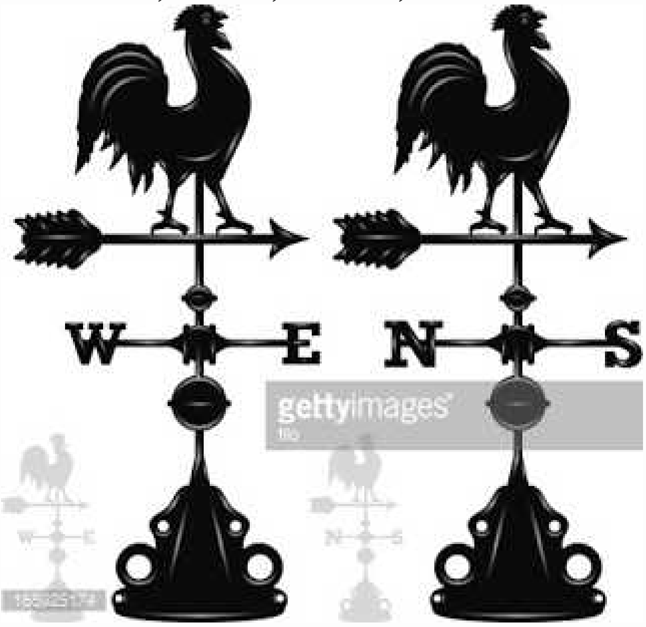
1. Circle
2. Square
3. Rectangle
4. Lines

Solving Seating Arrangement

Circle is the most important case from the exam point of view. Most of the times Circle kind of statements are there in exams.

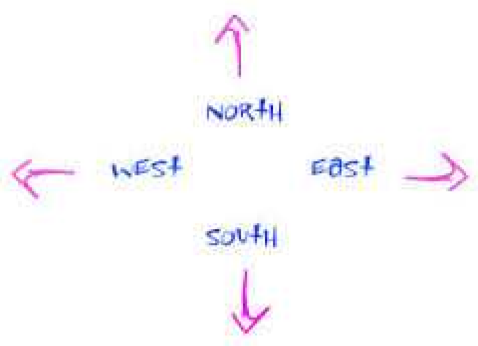
From the exam point of view ,In most cases they give 8 person sitting in the circle.
But Before Solving the important thing is their ' Sitting position '.

<u>Step 1</u> . Knowing NEWS! N= North , E= East , W=West , S= South



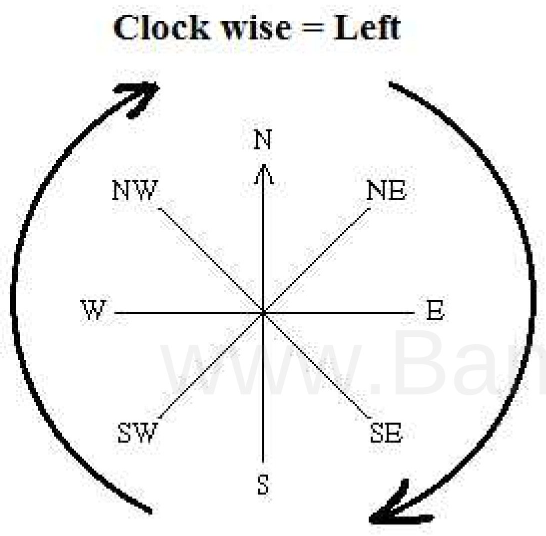
To remember this just remember combination ' North - South ' & ' West - East ' which comes together to each other respectively.

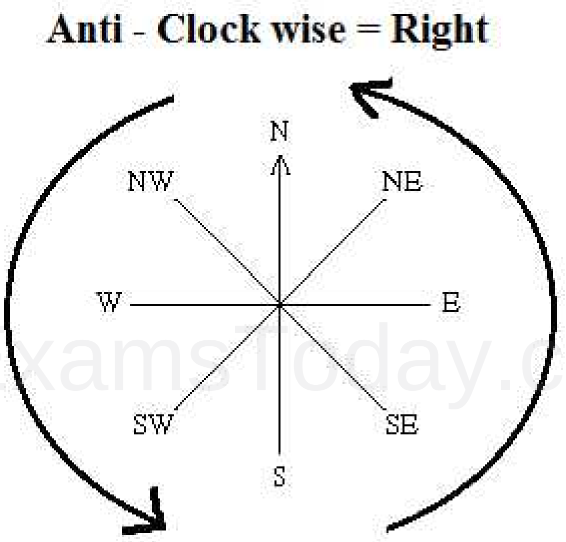
So remember " <u>WE</u> are <u>N</u>ot <u>S</u>mokers" for combination
Now just place like this on paper



<u>Step 2</u> : Picking Left & Right .

- Facing Center





- Facing Outside

If It is mention in the statement that all is facing outside then just do opposite of above like this:
Clock wise = Right & Anti- clock wise = Left

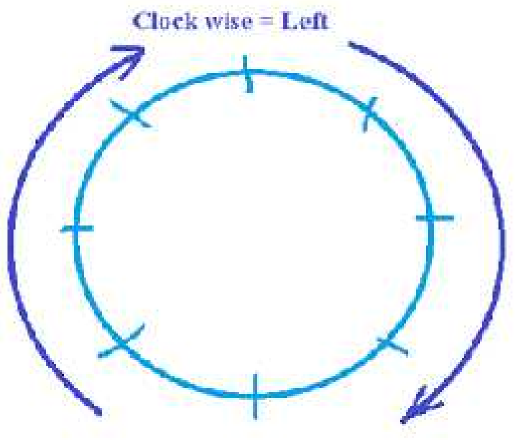
Step 3: Solving Step Wise the statement or Following the statement

Example :

Eight people E, F, G, H, J, K, L and M are sitting around a circular table facing the center.Each of them is of a different profession Charted Accountant, Columnist, Doctor, Engineer, Financial Analyst, Lawyer, Professor and Scientist but not necessarily in the same order. F is sitting second to the left of K. The Scientist is an immediate neighbor of K. There are only three people between the Scientist and E. Only one person sits between the Engineer and E. The Columnist is to the immediate right of the Engineer. M is second to the right of K. H is the Scientist, G and J are immediate neighbor of each other. Neither G nor J is an Engineer. The Financial Analyst is to the immediate left of F. The lawyer is second to the right of the Columnist. The Professor is an immediate neighbor of the Engineer. G is second to the right of Charted Accountant.

Before solving remember

1. No of Persons = 8 , No of Profession = 8
2. Facing Center
3. 8 persons → 8 profession

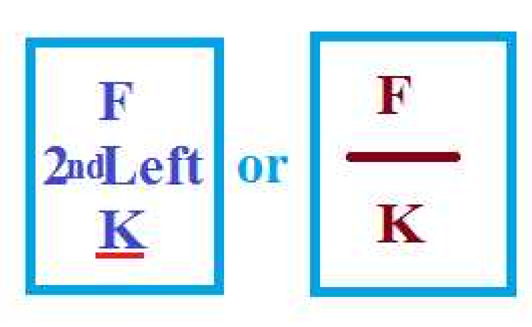


Persons	Professions
E	
F	
G	
H	
J	
K	
L	
M	

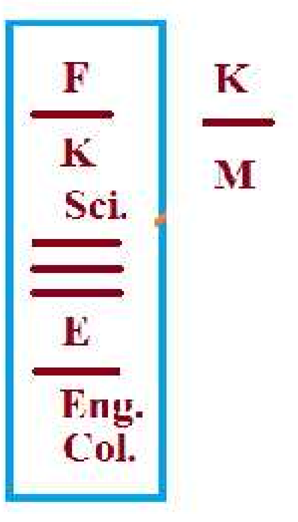
Step 4 : Break statement into Shortcuts

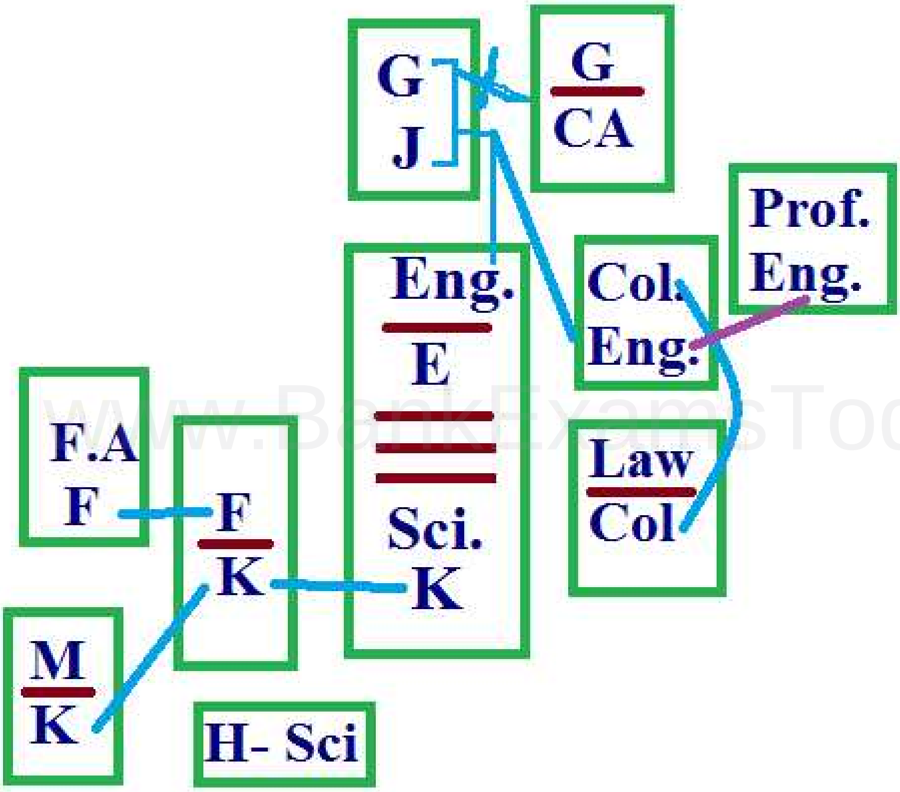
Statement: F is sitting second to the left of K.

We can write it as:



[Note : The Above diagram shows that there is one place vacant between F & K]
Will get like this:





<u>**Step 5**</u>**.** Applying these Shortcuts into Circle Diagram

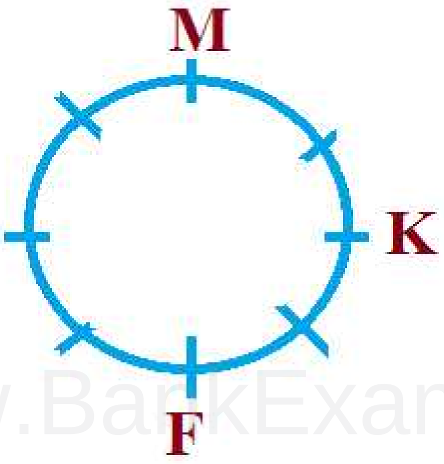
Be careful while positioning or placing Scientist and Engineer.There you need to make two diagram for each.

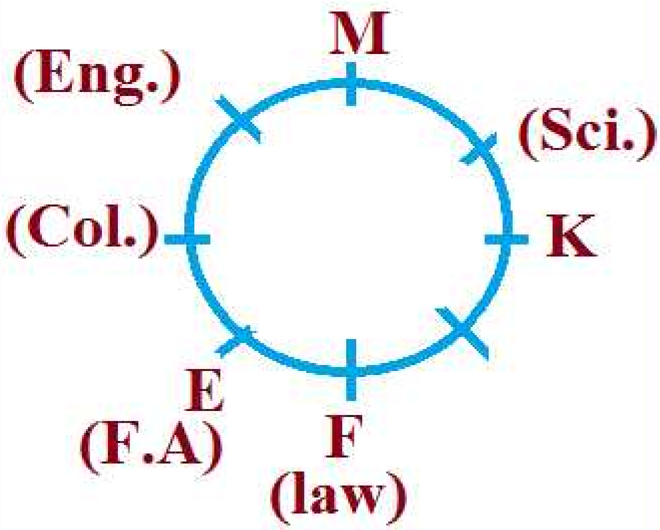
Step a) Pick any place and place it there the one person whom you want to be placed.
(Be careful while choosing that particular person or element like here E, F,G,H,J,K,L,M,N)

The one person or element you choose, should be relate with at least 2 element of the statement because it will make the other step easy for you.Try to choose the co-relating element which help you to fill the maximum space or seats or corners or places and Always choose the one in which you know the exact location (Left or Right).
Now here i choose F. F relates with K and M
[Note: Don't go again & again for reading whole statement,just use the shortcuts that you have made]

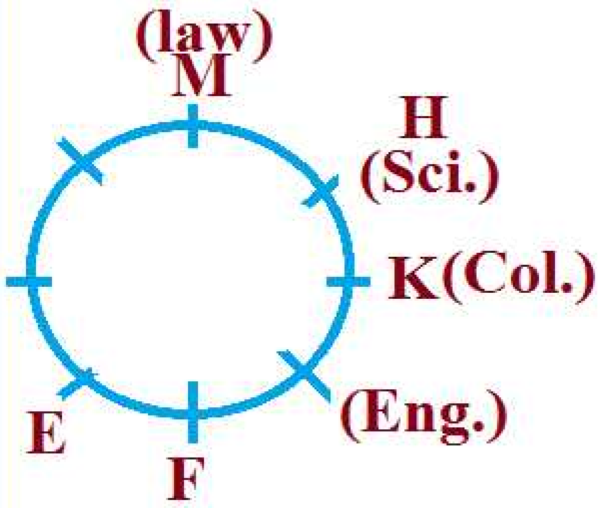
Step b) Now check whether the already placed element co-relate with any other elements.like here
The Scientist is an immediate neighbor of K.So here is the relation between K & Scientist.Now here we don't know the exact position of Scientist.So Most of cases you will find this kind of problem.When there is a two possibility then it is Called ' T ' point.

Step c) Find whether there is any T point in a statement.Solve it by making two different diagram.Like here 1(a) & 2(a) which will further be checked whether these diagram satisfied the other problems or condition or statement given in the question.If it is not then make other two diagram.Like Here (1b & 2b). At the end , you will get the answer.



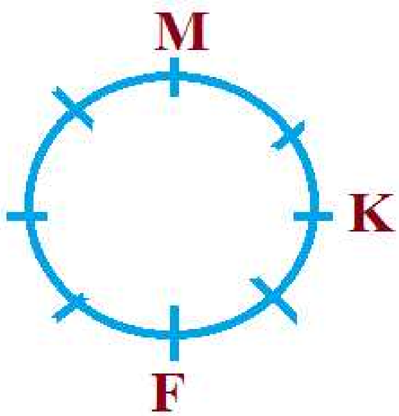


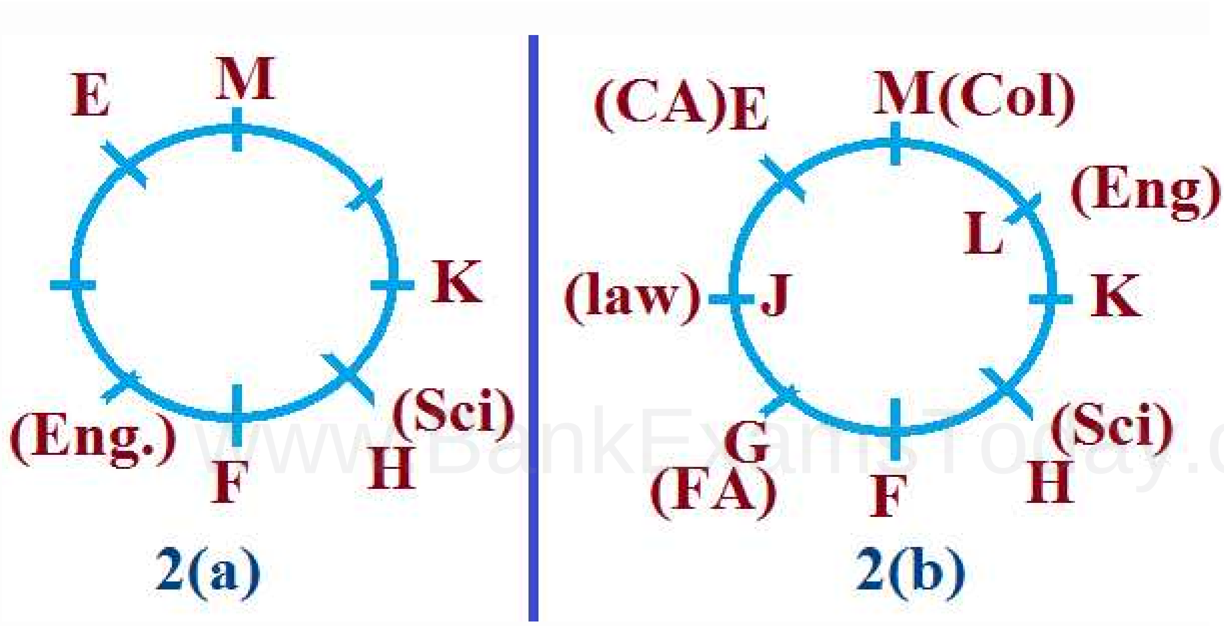
1(a)



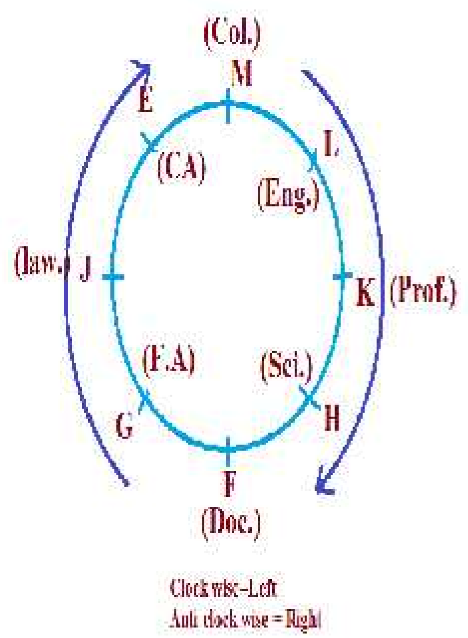
1(b)

In 1(a) & 1(b) We are unable to position the person G & J.So 1(a) & 1(b) diagram is not possible.Now Move to 2(a).





In 2(a) Engineer cannot be placed next to F.So 2(a) diagram is not possible.



Machine Input Output Shortcut Trick

Patterns

1. Pattern Based On Shifting
2. Pattern Based On Arrangement
3. Pattern Based On Mathematical Operation
4. Miscellaneous Approach Or Other Patterns

1. Based On Shifting

In this pattern ,you will find the elements are shifting from one place to other.

Important Note:

- In shifting problems, the previous step of any step can possibly be determined,so we can move in backward or reverse order which is not possible in some of the other type of problems.

How to solve Problems Based on Shifting

Lets take an Example

Input: Boy Crazy Guy Other Help Charm
Step 1. Boy Other Guy Crazy help Charm
Step 2. Boy Other Help Crazy Guy Charm
Step 3. Charm Other Help Crazy Guy Boy
Step 4. Charm Crazy Help Other Guy Boy
Step 5. Charm Crazy Guy Other Help Boy
Step 6. Boy Crazy Guy Other Help Charm

Shifting of element can easily be understood by marking them equivalent to number like
Boy = 1,Crazy = 2, Guy = 3, Other = 4, Help = 4, Charm = 5.
Input can be written as 1 2 3 4 5 6

Step 1, 2 and 4 interchanged
Step 2. 3 & 5 interchanged
Step 3. 1 & 6 interchanged
Step 4. Step 1, 2 & 3 are repeated again.

Input : 1 2 3 4 5 6

Step 1. 1 4 3 2 5 6

Step 2. 1 4 5 2 3 6

Step 3. 6 4 5 2 3 1

Step 4. 6 2 5 4 3 1

Step 5. 6 2 3 4 5 1

Step 6. 1 2 3 4 5 6

2. Based on Arrangement

Rules :

1. Previous Step can never be determined.Let we have given Step VI & then ask to find Step V or IV or III ,so this is clear gives you the answer 'Cannot be determined'
2. Let Total No. Of element or words or numbers in input is 8. So take n = 8 then Maximum step can be made through this input is (n - 1).It will only happen in the case of Arrangement.
3. To find particular step (Let x) for any input , logically pick 1st x alphabetical word or numbers in increasing order and just place them before the remaining word or numbers.This is the case Apply when given Input is an 'Increasing Order' & For Decreasing Order last x word or numbers should be picked.We will do this through example later in this article.

Different types of Arrangements:

1. From Left
2. From Right
3. Left-Right Alternate Arrangement
4. Increasing/Decreasing Arrangement of Numbers
5. Left-Right Alternate Arrangement of Numbers
6. Arrangement of word & Number simultaneously

1. **From Left**

Input : time drive lift ever when
Step I. drive time lift ever when
Step II. drive ever time lift when
Step III. drive ever lift time when

2. **From Right**

Input: fame tame line screw abstract
Step I. fame line screw abstract tame
Step II. fame line absract screw tame
Step III. fame abstract line screw tame
Step IV. abstract fame line screw tame

3. **Left- Right Alternate Arrangement**

Input :	Ravi got the first position
Step I.	first Ravi got the position
Step II.	first Ravi got position the
Step III.	first got Ravi position the
Step IV.	first got position Ravi the

4. **Increasing/Decreasing Arrangement**

Increasing

Input	82 49 53 79 13
Step I.	13 82 49 53 79
Step II.	13 49 82 53 79
Step III.	13 49 53 82 79
Step IV.	13 49 53 79 82

Decreasing

Input	37 19 82 49 61 52
Step I.	37 19 49 61 52 82
Step II.	37 19 49 52 61 82
Step III.	19 37 49 52 61 82

5. **Left-Right Alternate Arrangement of Numbers**

Input :	71 28 93 49 67 18
Step I.	18 71 28 93 49 67
Step II.	18 71 28 49 67 93
Step III.	18 28 71 49 67 93
Step IV.	18 28 49 67 71 93

6. **Arrangement of Word & Numbers Simultaneously**

Case 1.

Input :	74 draw bring 52 tall line 98 32 hit
Step I.	32 74 draw bring 52 tall line 98 hit
Step II.	32 bring 74 draw 52 tall line 98 hit
Step III.	32 bring 52 74 draw tall line 98 hit
Step IV.	32 bring 52 draw 74 tall line 98 hit
Step V.	32 bring 52 draw 74 hit tall line 98
Step VI.	32 bring 52 draw 74 hit 98 tall line
Step VI.	32 bring 52 draw 74 hit 98 line tall

Case 2.

Input : 84 jar pickle 15 journey long 46 sweet 23 94

Step I. jar 84 pickle 15 journey long 46 sweet 23 94
Step II. ar 15 84 pickle journey long 46 sweet 23 94
Step III. jar 15 journey 84 pickle long 46 sweet 23 94
Step IV. jar 15 journey 23 84 pickle long 46 sweet 94
Step V. jar 15 journey 23 long 84 pickle 46 sweet 94
Step VI. jar 15 journey 23 long 46 84 pickle sweet 94
Step VII. jar 15 journey 23 long 46 pickle 84 sweet 94

Case 3.

Input : she 91 hit 72 slow 12
Step I. 91 she hit 72 slow 12
Step II. 91 slow she hit 72 12
Step III. 91 slow 72 she hit 12
Step IV. 91 slow 72 she 12 hit

Case 4.

Input : mark 21 school 89 ahead 65
Step I. school mark 21 89 ahead 65
Step II. school 89 mark 21 ahead 65
Step III. school 89 mark 65 21 ahead 65
Step IV. school 89 mark 65 ahead 21

Example:

Input vain istanbul tomorrow mind blowing gesture of the elbow

Step 1. blowing vain istanbul the mind gesture of elbow
Step 2. blowing elbow vain istanbul the mind gesture of
Step 3. blowing elbow gesture vain istanbul the mind of
Step 4. blowing elbow gesture istanbul vain the mind of
Step 5. blowing elbow gesture istanbul mind vain the of
Step 6. blowing elbow gesture istanbul mind of vain the
Step 7. blowing elbow gesture istanbul mind of the vain

1. Input ' is you are again famous on this' Find the Step 3.
a) again are famous is you on this b) on this you is famous are again c) this on you is famous areagain d) famous this on you is are again e) None of these

2. If given, Step 4 'option pen rose Seema tape yolk ' , what will be the input?
a) pen option rose tape Seema yolk b) yolk Seema tape rose option pen

c) tapeSeema yolk rose option pen d) Cannot be determined e) None of these

3. Input 'no gum to sum fame game;Find the Step 1.
a) game no gum to sum fame b) gum no to sum fame game c) game gum no to sum fame
d) Cannot be determined e) None of these

4. Input ' He is a great Indian cricketer'.Find out the last step for this input.
a) 7
b) 6
c) 4
d) Cannot be determined
e) None of these

5. Input 'when men ten gain rain'.What would be the second step for this input?
a) gain when men ten rain b) gain men when ten rain c) rain ten men when gain
d) Cannot be determined e) None of these

Sol:

1. Applying Rule 3. Pick Alphabetically 3 words in forward order (again, are , famous) and place them before the remaining word that will give you :
Step 3.again are famous is you on this

2.Applying Rule 1. Hence Cannot be determined

3.Applying Rule 3. Step 1 : fame no gum to sum game Option e is correct.

4. Applying Rule 2. Total No of words = 6. n=6 then n-1 which is 6-1=5

Hence total No of Step can be made is 5. So Option a),b) & c) is wrong.
Now Apply Rule 3

Input : He is a great Indian cricketer.
In alphabetical order : A=1 , Cricketer =2, Great =3 , He = 4, Indian =5, Is= 6
Clearly After removing 1,2,3&6 (four words) the remaining words come in order
So, Total Steps = 4, Total words Removed = 4 & Last Step = 4.
Step 4 : A cricketer great he indian is.

5. Applying Rule 3
Step need to find = 2, Total Word = 2
Input : When men ten gain rain
Now pick the word alphabetically it will be men gain,Now placed them at front in ascending order before the other words like this : gain men and Now other words are when ten rain.
So it became Step 2: gain men when ten rain.

3. Based on Mathematical Operation

It will be better understood through an example
So lets take an example

Input : 31 45 87 54 25 68

Step 1	4	9	15	9	7	14

Step 2	3	20	56	20	10	48
Step 3	961	2025	7569	2916	625	4624
Step 4	29791	91125	658503	157464	15625	314432
Step 5	6.5	9	17.4	10.8	5	13.6
Step 6	4	9	6	9	7	5
Step 7	33	47	89	56	27	70
Step 8	26	40	82	49	20	63
Step 9	93	135	261	162	75	204
Step 10	8	18	30	18	14	28
Step 11	2	1	1	1	3	2
Step 12	9	81	225	81	100	196

Step 1: Digit sum of input.
Step 2. Product of the digits of input
Step 3. Square of the each number of the input
Step 4. Cube of the each number of the input
Step 5. Each number of the input is divided by 5
Step 6. Keep adding digits till they are converted into single digit
Step 7. Each number of the input + 2
Step 8. Each number of the input – 5
Step 9. Each number of the input * 3
Step 10. Digit's sum of each number of input * 2
Step 11. Difference between digits of each number of the input
Step 12. (Digit sum of each number of input)^2

4. Misc. Problems

There is no fixed pattern in regard of statement. Statement under this category will come before you as a real surprise.Such question are complete mind game.

Input :	78	239	154	126	654
Step I.	87	932	451	621	456
Step II.	708	2039	1054	1026	6054
Step III.	87	392	541	261	546
Step IV.	7	12	15	12	65
Step V.	780	2390	1540	1260	6540

Step I. Interchanged the first and last digit of the input.
Step II. Fix the zero after the first digit of the given input
Step III. 1st digit becomes last in two-digit numbers while middle digit becomes the 1st digit in three-digit numbers
Step IV. Last digit of the given input is removed
Step V. Just specify the zero at the end of the digit of the given input.

How to solve Reasoning Puzzles Quickly

Puzzles are a curious thing; they solve so easily when solving them at home and almost always let us down in exams. Why? Have you asked yourself?

Why at home we can solve hundreds of questions without mistake and in exam we can't even make A or B sit in the correct order to actually get an answer!

Sometimes you might have encountered a situation where having solved a puzzle , when clicking on options, you find that after 2-3 questions (where you were able to find your 'correct' option), in the 4/5th questions your answer according to your arrangement is not their in the options at all!

Has anyone of you encountered such a frustrating situation? I know I have, and many of friends have too.

It all happens because of tension. At home we don't take tension = puzzles get solved correctly. In exam we take a lot of tension = puzzles get more puzzled!

So let us try not to take tension and learn how to solve puzzles in an easy manner.

1. *Know your enemy* – or in this case, the ***<u>common puzzle structure</u>***.

Seating arrangements with Banks/Colour/Fruit/Language/State/car models etc. likes and dislikes and options.

Or, Days and subjects with the similar likes and dislikes thing. Or, maybe months/floors/single row/double row etc. with multiple likes/dislikes options.

The more complicated the better for them and worse for us!

2. *Every battle has a plan* – so should you!

I look at puzzles as a personal battle with the Gods of Luck, and I used to always lose – until the day I planned my puzzle solving quest.

Yes, dear readers, plan. How? Well, then read on …

3. *Read once, start drawing* –

A table or a circle or a row or multiple rows…whatever as per the given question.

Do no waste time reading the whole puzzle! In the two lines, you get to know if it's a seating arrangement in circle/square/row/multiple rows etc., immediately draw the required figure.

4. *Keep reading and arranging –*

Once you have the basic structure of arrangement, then keep reading and after **every** line, arrange the information given in that sentence.

Go one sentence at one time. Arrange the information given in one sentence and only then move on the next one.

5. *Use tables*

To solve puzzles of days/subjects/floors/persons where there is no seating order.

This is a great way to solve puzzles – and you'll see that your questions will start looking easy once you have all the information nicely arranged in a tabulated manner.

6. *Indirect clues*

After arranging as per the direct information available in question, you'll see that some are left un-arranged.

These will require your logical reasoning abilities to be able to solve these indirect relations.

Everyone can do it. You can do it. But the difference between a successful candidate and the unsuccessful one is – presence of mind/clarity of thinking/ and keeping calm and composed.

That said, here is one practice question to help you kick start your battle against the puzzles!

EXAMPLE

Four people were being interviewed for the same job, on the same day but in different rooms(R1, R2, R3 and R4), at different time and by different interviewers.(First sentence – what do you do? Make a table!)

Determine which candidate was interviewed by whom, at which time and in which room.(What can be arranged first in the table? What can logically be the first coloumn? – Room numbers, because other information cannot be logically arranged!)

(i) Teena's appointment was just after Mr. Sharma's, which was just after that of the person in room R2.

(ii) Mr. Narurkar's appointment was atleast two hours later than Bimal's.

(iii) Mr. Joshi's appointment was just after the person who had an interview in room R4, who had an appointment just after Chirag.

(iv) Three of the four people were: (1)Deepak, (2) the one with interview in room R1, and (3) the one who was interviewed at 1 p.m.(this is a crazy one!)

(v) Interview times were – 11 a.m., 12 noon, 1 p.m., and 2 p.m.(This could be a row heading.)

(vi) Sharma, Narurkar, Joshi and Zaidi were interviewers and Teena, Bimal, Chirag and Deepak were the interviewees.

Q1. Sharma's appointment is with

(a) Teena
(b) Bimal
(c) Chirag
(d) Deepak

Q2. Deepak's appointment was in room

(a) R1
(b)R3
(c)R2
(d) R4

Q3. Mr. Zaidi interviewed

(a) Deepak
(b) Teena
(c) Bimal
(d) Chirag

Q4. Who interviewed at 2 p.m.?

(a) Mr. Joshi
(b) Mr. Zaidi
(c) Mr. Narurkar
(d) Mr. Sharma

Q5. Which candidate was interviewed last?

(a) Deepak
(b) Teena
(c) Bimal
(d) Chirag

The option in *italics* is the correct answer. How many did you get right?! And a sample table of the solution:

Interviewee	Interviewer		11 a.m.	12 p.m.	1 p.m.	2 p.m.
Chirag	Sharma	R1	X	**Definite**	X	X
Bimal	Zaidi	R2	**Definite**	X	X	X
Deepak	Joshi	R3	X	X	X	**Definite**
Teena	Narurkar	R4	X	X	**Definite**	X

That's all for today friends!

Blood Relations Reasoning Shortcut Tricks

In Blood Relations certain information is given about the members of the family in the question, Based on that information we need to find out the relationship between particular member of the family. Generally the question deals with hierarchical structure which is based on seven generation three above & three below like this:

Generation	Male	Female
Three generations above↑↑↑	Great grandfather Maternal great grandfather Great grandfather-in-law	Great grandmother Maternal great grandmother Great grandmother-in-law
Two generations above ↑↑	Grandfather Maternal grandfather Grandfather-in-law	Grandmother Maternal grandmother Grandmother-in-law
One generations above ↑	Father, Uncle, Maternal uncle, Father-in-law	Mother, Aunt Maternal aunt, Mother-in-law
Current generation(Self) →	Husband, Brother Cousin, Brother-in-law	Wife, Sister Cousin, Sister-in-law
One generation below ↓	Son Nephew Son-in-law	Daughter Niece Daughter-in-law
Two generations below ↓↓	Grandson Grandson-in-law	Grand daughter Grand daughter-in-law
Three generations below ↓↓↓	Great grandson Great grandson-in-law	Great grand daughter Great grand daughter-in-law

Important Blood Relations

Father of grandfather or grandmother	Great grandfather	Daughter of father or mother	Sister
Mother of grandfather or grandmother	Great grandmother	Son of second wife of father	Step brother
Father of father or mother	Grandfather	Daughter of second wife of father	Step sister
Mother of father or mother	Grandmother	Son/daughter of uncle/aunt	Cousin
Wife of grandfather	Grandmother	Brother of husband or wife	Brother-in-law
Husband of grandmother	Grandfather	Sister of husband or wife	Sister-in-law

Father-in-law of father/mother	Grandfather	Husband of sister/sister-in-law	Brother-in-law
Mother-in-law of father/mother	Grandmother	Son of father	Oneself/Brother
Father's father/mother only	Father	Mother of son/daughter	Oneself/Wife
Only daughter-in-law of father's father/father's mother	Mother	Father of daughter/son	Oneself/husband
Husband of mother	Father	Son of son of grandmother/grandfather	Brother/Oneself /Cousin
Wife of father	Mother	Daughter of son of grandmother/grandfather	Cousin/Oneself /Sister
Second wife of father	Step mother	Son of brother or sister	Nephew
Brother of father	Uncle	Daughter of brother/sister	Niece
Brother of mother	Maternal Uncle	Grandson of father/mother	Son/Nephew
Sister of father	Aunt	Granddaughter of father/mother	Daughter or Niece
Sister of mother	Maternal Aunt	Husband of daughter	Son-in-law
Husband of aunt	Uncle	Wife of brother/brother-in-law	Sister-in-law
Wife of uncle	Aunt	Wife of son	Daughter-in-law
Son of grandfather/grandmother	Father/Uncle	Son of son/Daughter	Grandson
Daughter of father-in-law/mother-in-law of father	Mother/Aunt	Daughter of son/Daughter	Granddaughter
Father of wife/husband	Father-in-law	Son's/Daughter's grandson	Great Grandson
Mother of wife/husband	Mother-in-law	Son's/Daughter's granddaughter	Great granddaughter

Children of same parents	Siblings		
Father's/Mother's only son/daughter	Oneself		
Son of father or mother	Brother		

Representation through diagram

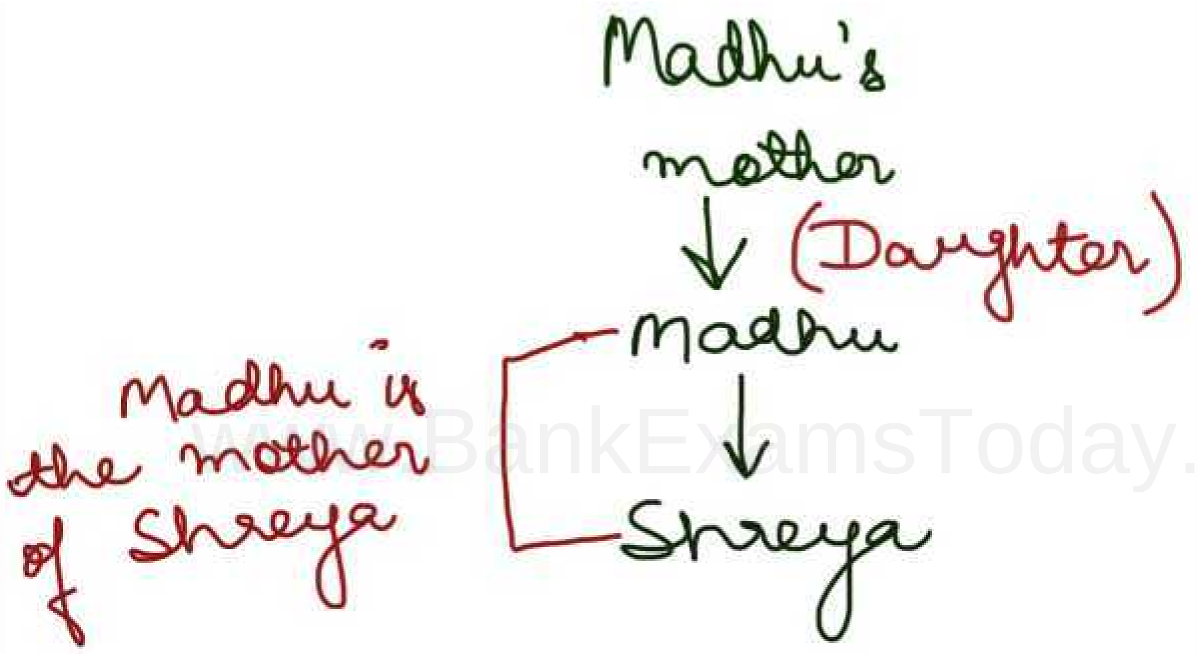
⊕ | ⊕	Father-Son
⊕ | Θ	Father-Daughter
Θ | ⊕	Mother-Son
Θ | Θ	Mother-Daughter

#Types

- Based on Dialogue or Conversation
- Based on Puzzles
- Based on Symbolically Coded

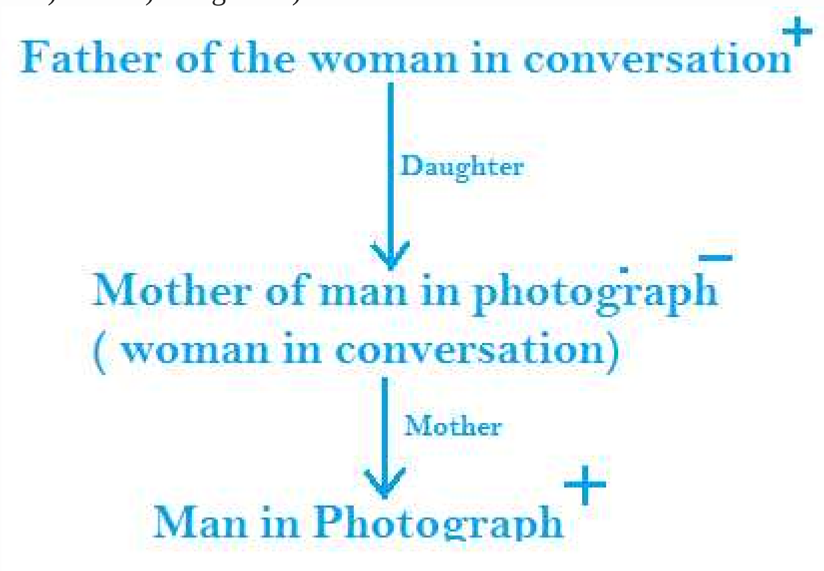
Conversation or Dialogue

In this type of question.the one person talking to or doing chit -chat with other person giving information throw pointing to some picture or person.
Madhu said, pointing to Shreya, " His mother is my fmother's only daughter".HowMadhu is related to Shreya?
a) Father b) Son c) Grandson d) Mother e) None of these



Pointing to a man in a photograph, a man said to a woman, "His mother is the only daughter of your father".How is the woman related to the man in the photograph?

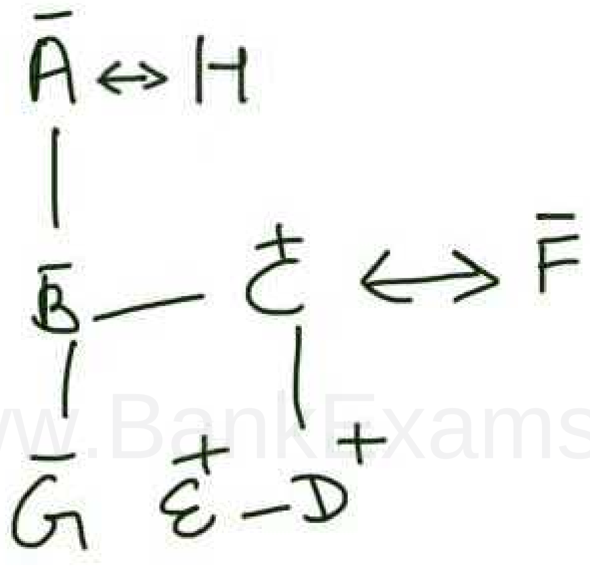
a)Sister b) Mother c) Wife d) Daughter e) None of these



Based on Puzzles

In this type of question ,You have to conclude the relation between two given person based on more than one information given in the question.

Example:
Direction:
A is the mother of B. B is the sister of C. D is the son of C. E is the brother of D. F is the mother of E. G is the granddaughter of A. H has only two children B and C.



Q1. How F related to H?
a) Son-in-law
b) Daughter-in-law
c) Father-in-law
d)Granddaughter
e) Cannot be determined

Q2. How is C related to E?
a)Father
b) Son
c) Mother
d) Cousin brother
e) Cannot be determined

Q3. Who is the mother of G?
a) C
b) B
c) F
d) Either B or F
e) Either C or F

Solution

(1)
Sol: Option (b)
From the above diagram it is clear that F is daughter-in-law of H.
(2)
Sol: Option (a)
From the above diagram.It is clear that C is father of E.
(3)
Sol: Option (b)
From the above diagram it is clear that B is mother of G.

Symbols

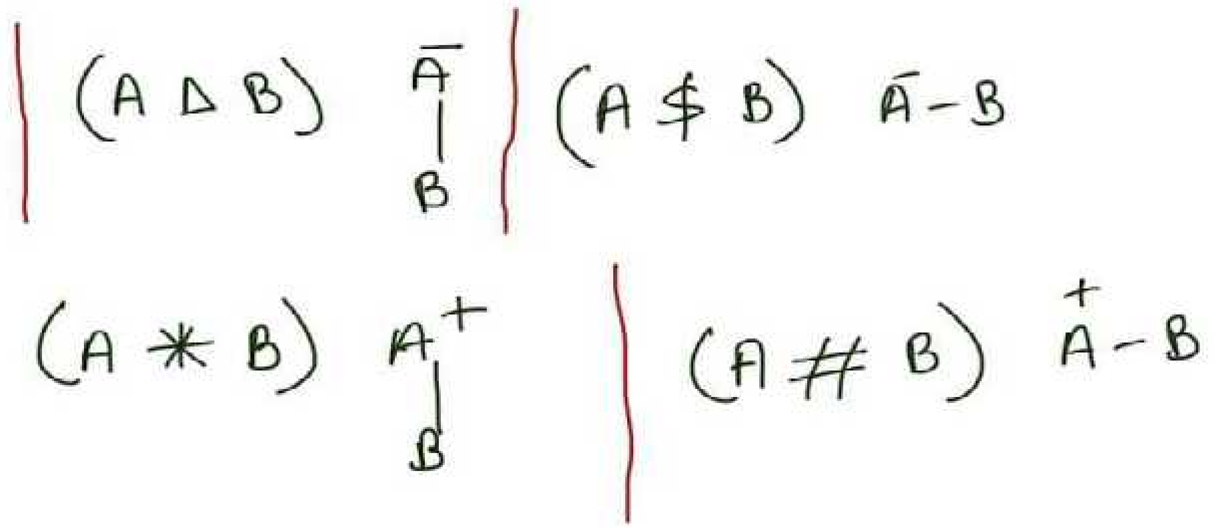
In this type of question information are coded in the form of Δ#$%&*÷+ etc,..

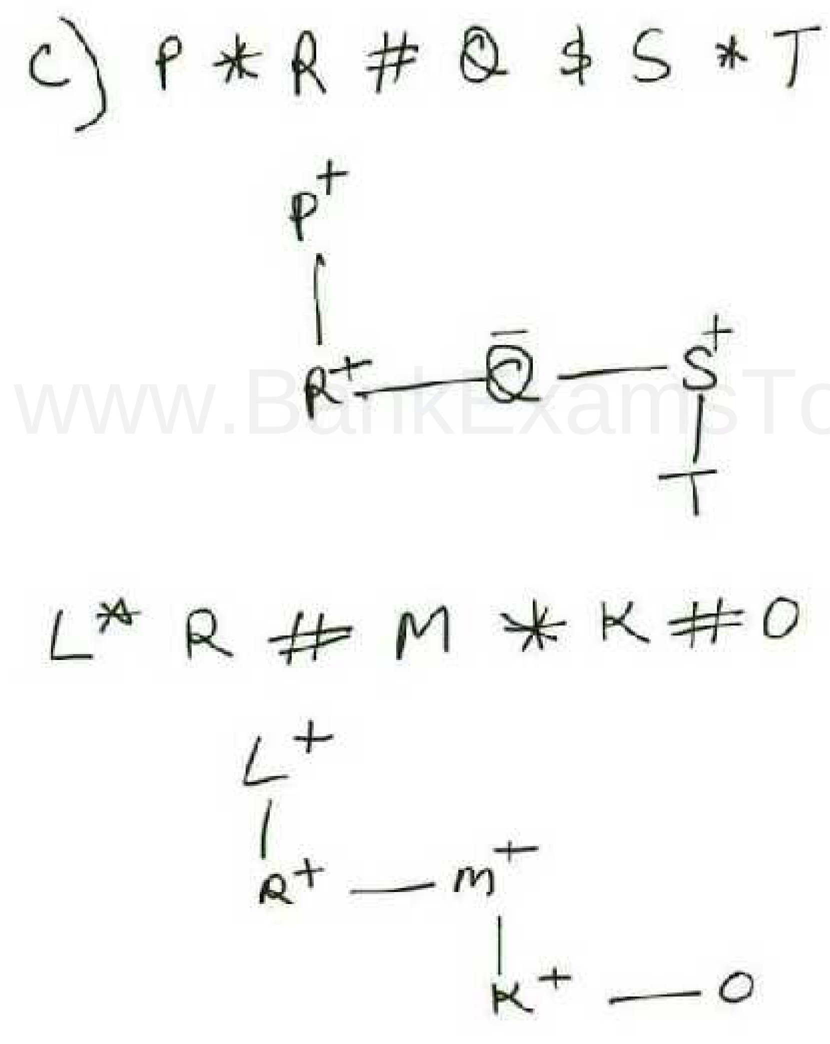
Direction:
Read the following information carefully and then answer the question given below.
a)AΔB means A is mother of B
b) A $B means A is sister of B
c) A*B means A is father of B
d) A #B means A is brother of B

Q1. Which of the following means R is uncle of T?
a) R*P#SΔQ$T b)S*P#R*U#T c) P*R#Q$S*T d)P*RQS*T e) None of these

q2. Which of the following means L is paternal grandfather of O ?
a) L*R$M#K#O b)R*LΔP#K$O c) L*MΔR*K#O d) L*R#M*K#O e) None of these

Solution





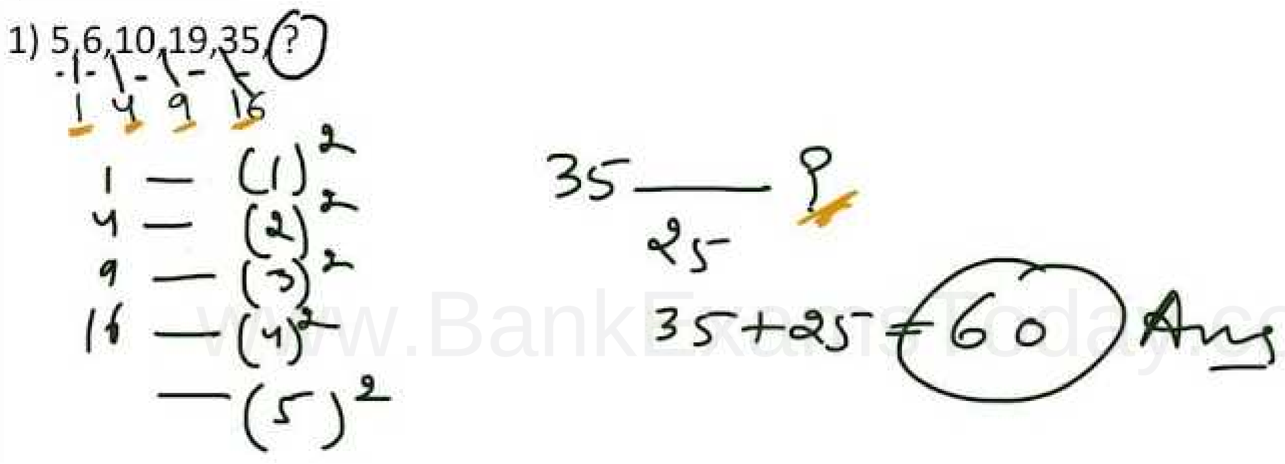
Sequence and Series - Types of Logic Used

Types of series on the basis of Logic :-

1. Simple addition and subtraction series
2. Prime number series
3. Square and cube series
4. Algebraic series
5. Misc.

Practice questions to explain the logic

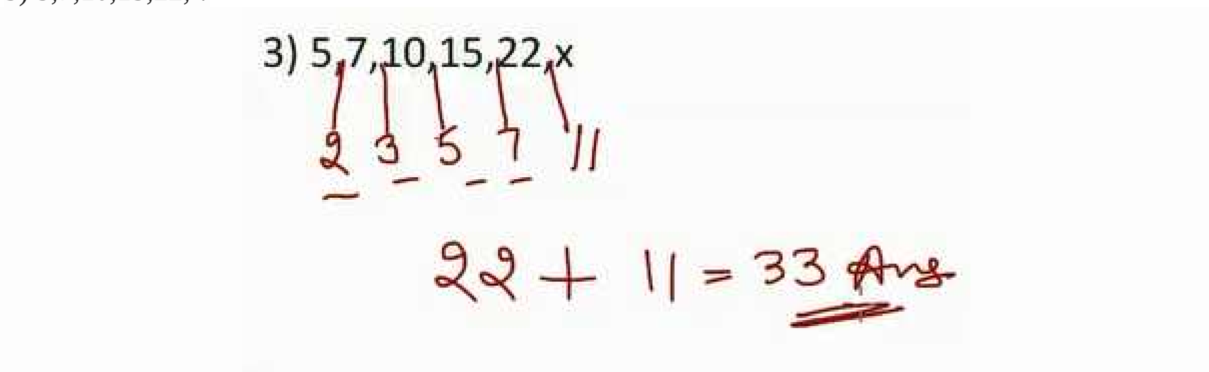
1) 5, 6, 10, 19, 35, ?



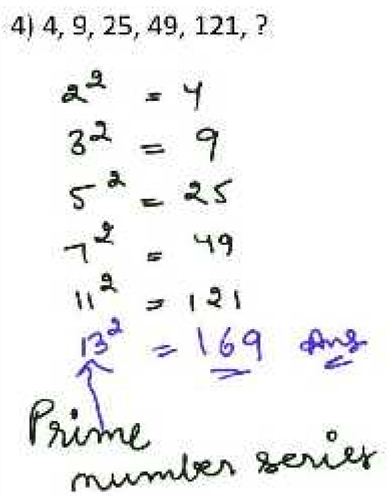
2) 11, 13, 17, 19, 23, ?

All are prime numbers so next number in the series will be 29.

3) 5,7,10,15,22, ?



4) 4, 9, 25, 49, 121, ?



5) 6, 13, 27, 55, 111, ?

5) 6, 13, 27, 55, 111, ?

$(6 \times 2) + 1 = 13$

$(13 \times 2) + 1 = 27$

$(x \times 2) +$

$(111 \times 2) + 1 = 222 + 1 = 223$

Ans

6) 3, 5, 9, 15, 23, ?

6) 3, 5, 9, 15, 23, ?

2 4 6 8 10

$\rightarrow 23 + 10 = 33$ Ans

7) 13, 14, 18, 27, 43, ?

7) 13, 14, 18, 27, 43, ?

1 4 9 16 25

$43 + 25 = 68$ Ans

$1 = 1^2$

$4 = 2^2$

$9 = 3^2$

$16 = 4^2$

$25 = 5^2$

8) 3, 6, 18, 90, 630, ?

8) 3, 6, 18, 90, 630

$3 \xrightarrow[\cancel{+3} \text{ or } \times 2]{} 6$

$6 \xrightarrow[\cancel{+12} \quad \times 3]{} 18$

$18 \xrightarrow[\times 5]{} 90$

$90 \xrightarrow[\times 7]{} 630$

$630 \times 11 = 6930$ Ans

9) 1, 4, 27, 16, 125, ?

9) 1, 4, 27, 16, 125, ?

$1^{2,3} = 1$

$2^2 = 4$

$3^3 = 27$

$4^2 = 16$

$5^3 = 125$

$? = (6)^2$

$\rightarrow 36$ Ans

10) 1, 2, 9, 4, 25, 6, 49, ?

10) 1, 2, 9, 4, 25, 6, 49, ?

$1^2 = 1$

$2^1 = 2$

$3^2 = 9$

$4^1 = 4$

$5^2 = 25$

$6^1 = 6$

$7^2 = 49$

$8^1 = 8$ Ans

Data Sufficiency Questions, Tips and Method

Data sufficiency is an important part of quantitative aptitude section of every competitive exam including IBPS, LIC, Civil services, CAT and GMAT. In almost every exam there are several questions from data sufficiency.

Most of the candidates try to solve data sufficiency questions by guess work. As every question carries same marks, questions in this part also deserve some time. Instead of guess work use a simple strategy as give below and avoid guessing the answer.

STEPS IN SOLVING DATA SUFFICIENCY QUESTIONS

1) Read the given problem. Don't assume anything except universal facts.
2) Take the first statement and combine it with main statement. Try to find the answer.
3) If you are unable to find the answer using 2nd step then combine second statement and combine it with main statement and try to find answer.
4) If you are unable to find an answer using second statement then add both statements with main statement and try to find answer
5) If even now you can't find answer, simply tick both statements are insufficient.

Directions :-
Marks A as answer if statement I alone is sufficient to answer the question
Marks B as answer if statement II alone is sufficient to answer the question
Marks C as answer if statement I and II together are sufficient to answer the question but neither statement aloneis sufficient to answer the question

DATA SUFFICIENCY QUESTIONS AND ANSWERS

Question 1. How many people are there in the plain ?
Statement I : 25% passengers are women and 35% are children.
Statement II : There are 24 men in the plain
Answer
From Statement I we can conclude that there are 40% men in the plain but we can't find the exact number of passengers
From Statement two : Number of men passengers = 24
By combining both the statements we get, total number of passengers = 24 * 100/40 = (you don’t need to calculate the answer)
Hence answer is C

Question 2. What is the difference between monthly income of Ram and Chaaru
Statement I : Ram earns Rs 6000 less than Shaam
Statement II :Chaaru earns Rs 6000 more than Shaam.
Answer : In this question we don't need to in depth. Simply there is difference of Rs 12000

Question 3. Is x divisible by 28 ?
Statement I : x is divisible by 20

Statement II : x is divisible by 84
Answer. Using statement I - x is divisible by 4 and 5
Using statement II - x is divisible by 3,4, and 7.
By using both statements we can conclude that x is divisible by 28 (4*7), hence answer is C.

Question 4. P,Q,R,S and T are five friends. Their mean age is 18. What is the age of R ?
Statement I : P's age is 18
Statement II : Q's age is 2 years less than T and T's age is 6 years less than S.
Statement III : R's age is 6 years more than B's age and 4 years more than T's age.
Answer : P+Q+R+S+T = 90
From Statement I : Q+R+S+T = 72
From Statement II : Q = T - 2 and T=S - 6
So S = T + 6
Statement III : R = Q+6 and R = T + 4
Age of every friend can be defined in terms of T's age by using all three statements. So we can reach the answer using all three statements. Hence answer is C.

TIPS TO SOLVE DATA SUFFICIENCY QUESTIONS

- Never try to reach final answer as it is not asked. You need to find whether the information provided is enough to solve the given problem or not.
- Never make any assumption. Use only universal rules { eg. a + b = a + b - (a U b) }
- Try to solve questions by using above strategies
- Solve question step by step. First try to find answer using first statement then second and finally with both. Then mark the answer
- Even if you find answer with only one statement, then try to find answer with remaining statement as sometimes there is an option that answer can be find with both statements separately.
- Move on quickly and mark answer can't be found in case you are unable to reach any conclusion with information provided.

PUZZLES

SET 1

Study the following information carefully and answer the questions given below:

Seven persons namely Paramjit, Tarun, Morya, Jeeva, Vaani, Ram and Waqar are good friends and are studying in M.Com, M.A. and M.Sc courses. Three are doing M.Com, two are in M.A. and another two are in M.Sc. Each of them has a very distinct and favorite color choice ranging from blue, red, yellow, white, black, pink and brown but not necessarily in the same order. None doing M.Com like either red or black. Morya is doing M.A. and he likes blue. Ram is doing M.Sc and likes brown. Jeeva is doing M.Com and likes yellow. Paramjit who does not like red is in the same discipline of Ram. Tarun is in the same discipline of Morya. Vaani does not like pink.

Q1. Which among the following groups is doing M. Com?
a) Jeeva, Vaani and Waqar
b) Vaani, Waqar and Tarun
c) Jeeva, Vaani and Tarun
d) Jeeva, Paramjit and Ram

Q2. What is the color combination choice of those who are in M.Sc discipline?
a) Brown and Pink
b) Black and White
c) Black and Brown
d) Yellow and Black
e) None of The Above

Q3. Which color does Vaani like?
a) Yellow
b) Pink
c) White
d) Brown
e) None of The Above

Q4. What is the color combination choice of those who are in M.A. discipline?
a) Red and Black
b) Blue and Red
c) Blue and Black
d) None of The Above

Q5. Morya is related with which discipline?
a) M.Sc.
b) M.A.
c) M.Com

Solution

Persons	**Courses**	**Colors**
Jeeva	M.Com	Yellow
Vaani	M.Com	White

Waqar	M.Com	Pink
Morya	M.A.	Blue
Tarun	M.A.	Red
Ram	M.Sc.	Brown
Paramjit	M.Sc.	Black

Answer 1. (Option A)
Answer 2. (Option C)
Answer 3. (Option C)
Answer 4. (Option B)
Answer 5. (Option B)

SET 2

Study the following information carefully and answer the questions given below:

M, K, J, T, R, D and W are seven members of a family. There are two married couples among them belonging to two different generations. Each of them has a different choice of cuisine - Chinese, Continental, Thai, Punjabi, South India, Gujarati and Malwani. The grandfather in the family likes Gujarati food. None of the ladies likes Continental or Thai food. T is the son of M, who likes Chinese food. W is J's daughter-in-law and she likes South Indian food. K is grandfather of D, who likes Punjabi food. J is mother of R, who likes Continental food.

1) How is R related to D?
(a) Father (b) Brother (c) Uncle (d) Data inadequate
(e) None of these

2) How many male members are there in the family?
(a) 3 (b) 4 (c) 5 (d) Data inadequate
(e) None of these

3) Which of the following group contains one each from the same generations?
(a) JRT (b) JRW (c) MRD (d) MWT
(e) None of these

4) Which food does T like ?
(a) Gujarati (b) Thai (c) Malwani (d) Data inadequate
(e) None of these

5) Which of the following combinations represents favourite food of the two married ladies ?
(a) Malwani, South Indian (b) South Indian, Punjabi
(c) Punjabi, Malwani (d) Data inadequate
(e) None of these

ANSWERS

1. (c) R is the brother of M, who is father of D. So, R is uncle of D.

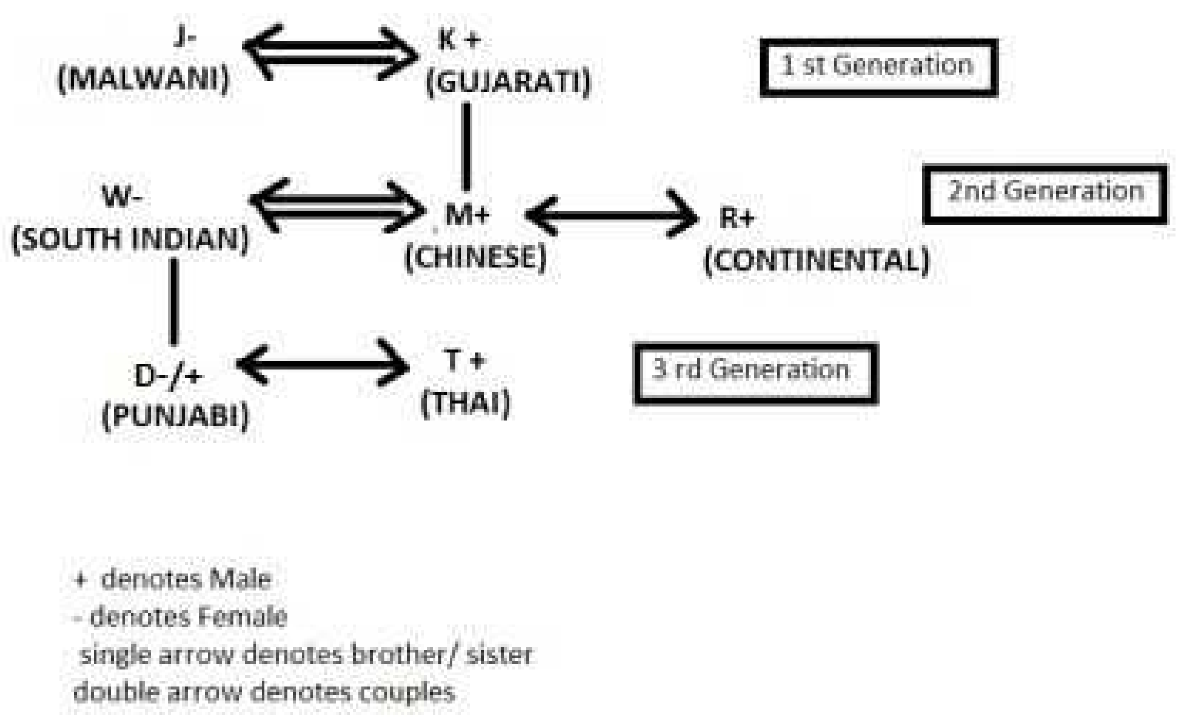
2. (d) We can not determine because there is nothing mentioned about D in the question.

3 (a) J belongs to 1st generation, R belongs to 2nd generation and T belongs to 3rd generation.

4 (b) Thai food

5 (a) J likesMalwani and W likes South Indian.

SOLUTION



PERSON	CUISINE	GENERATION	RELATIONSHIPS
K(MALE)	GUJARATI	1st	FATHER OF M AND R GRANDFATHER OF D AND T
J (FEMALE)	MALWANI	1st	WIFE OF K
M (MALE)	CHINESE	2nd	SON OF K AND J
W (FEMALE)	SOUTH INDIAN	2nd	WIFE OF M
R (MALE)	CONTINENTAL	2nd	BROTHER OF M
D(MALE/FEMALE)	PUNJABI	3rd	SON/DAUGHTER OF M &W
T (MALE)	THAI	3rd	SON OF M

SET 3

Read the following passage carefully and answer the question given below it.

Six friends Abhi, Deep, Myank, Prince, Rambo and Sumit married within a year in the months of February, April, July, September, November and December and in the cities of Ahmedabad, Bengaluru, Chennai, Delhi, Mumbai and Kolkata but not necessarily following the above order. The brides names were Geetu, Jasmeet, Harman, Bindia, Inpreet and Vanshika, once again not following any order. The following are some facts about their weddings.

(i) Myank's wedding took place in Chennai, however he was not married to Geetu or Vanshika

(ii) Abhi's wedding took place in Ahmedabad and Rambo's in Delhi; however neither of them was married to Jasmeet or Bindia.

(iii) The wedding in Kolkata took place in February

(iv) Harman's wedding took place in April, but not in Ahmedabad

(v) Geetu and Inpreet got married in February and November and in Chennai and Kolkata but not following the above order

(vi) Prince visited Bengaluru and Kolkata only after his marriage in December

(vii) Sumit was married to Jasmine to September

Q1. Harman's husband is

a) Abhi b) Deep c) Rambo
d) Prince e) Myank

Q2. Deep's wedding took place in

a) Bengaluru b) Mumbai c) Kolkata
d) Delhi e) Chennai

Q3. In Mumbai, the wedding of one of the friends took place in the month of

a) April b) September c) November
d) December e) July

Q4. Sumit's wedding was held in

a) Bengaluru b) Chennai c) Kolkata
d) Delhi e) Mumbai

Q5. Geetu was married to ____

a) Mayank b) Deep
c) Princ d) None of these

Solution

Answer 1. **Option c)**
Answer 2. **Option c)**
Answer 3. **Option d)**
Answer 4. **Option a)**
Answer 5. **Option b)**

Husband	Wife	Place	Month
Abhi	Vanshika	Ahmedabad	July
Deep	Geetu	Kolkata	February
Myank	Inpreet	Chennai	November
Prince	Bindia	Mumbai	December

Rambo	Harman	Delhi	April
Sumit	Jasmeet	Bengaluru	September

SET 4

Directions (Q. 1-5) Study the following information carefully and answer the questions given below :-

Five friends Pawan, Qureshi, Rajan, Sultan and Tango are Musician, Architect, Doctor, Engineer and Artist by profession and like White, Blue, Red, Yellow and Green colour but not necessarily in that order. Their hobbies are Net Surfing, Gardening, Reading, Painting and Dancing but not necessarily in the same order.

- The person whose hobby is dancing preferred lemonade to cola while others preferred cola to lemonade in beverages.
- The four friends who took cola were Pawan, the one who is an Engineer, the person whose favouritecolour is Green and the one whose hobby is net surfing.
- Sultan did not take lemonade and his favouritecolour is White.
- Qureshi'sfavouritecolour is Blue. He did not like lemonade.
- Tango's hobby is not painting, reading or gardening.
- Sultan clicks a picture of his friend who is an Engineer.
- The person whose favouritecolour is Red likes painting and the person who is artist likes gardening.
- Sultan is not a doctor. The person who is a doctor takes cola. The person who is an Engineer likes Blue colour.
- The musician's favouritecolour is not Yellow. Rajan'sfavouritecolour is Green.

Q1. Who among the following is a Doctor?

a) Rajan b) Pawan c) Sultan
d) Can't say e) None of these

Q2. Qureshi's hobby is

a) Reading b) Painting c) Gardening
d) Can't say e) None of these

Q3. The person who likes Blue colour is a/an

a) Architect b) Musician c) Engineer
d) Can't say e) None of these

Q4. Whose favouritecolour is Yellow?

a) Tango b) Rajan c) The one who is an artist
d) Can't say e) None of these

Q5. Which of the following combinations is not correctly matched?

a) Tango-Architect-Yellow-Dancing-Cola
b) Rajan-Artist-Green-Gardening-Cola
c) Qureshi-Engineer-Blue-Reading-Cola
d) Pawan-Doctor-Red-Painting-Cola

e) None of these

Answers
Q 1) B

Q 2) A

Q 3) C

Q 4) A

Q 5) A

P — Cola — Red — Doctor — Painting

Q — Cola — Blue — Engineer — Reading

R — Cola — Green — Artist — Gardening

S — Cola — White — Musician — Net Surfing

T — Lemonade — Yellow — Architect — Dancing

SET 5

Question:-

Arti, Baby, Chandni, Dolly, Esha, Falguni, Gopi and Himani are sitting around a square table in such a way that four of them sit at four corners of the square while four sit in the middle of each of the four sides. The one who sits at the four corners face the centre of the table while those who sit in the middle of the sides faces outside.

Each of them likes a different subject - Mathematics, Hindi, English, Biology, Chemistry, Physics, History and Geography. (None of the information given is necessarily in the same order)

- Chandni sits third to the left of the person who likes Geography.The one who likes Geography faces outside.There are only two persons sit between Chandni and Himani.
- Dolly sits on the immediate left of the one who likes Physics. Gopi does not likes Physics.
- Esha likes History. Esha is not immediate neighbour of Arti.

- The person who likes Hindi is an immediate neighbour of Esha.
- The person who likes Biology is an immediate neighbour of Falguni.
- The one who likes Mathematics sits in the immediate right of Himani.The one who likes Chemistry sits second to the right of Gopi. G is neither an immediate neighbour of Himani nor Chandni. Gopi does not like Geography.
- There is only one person sits between Arti and the one who likes Chemistry.

(A) Who among the following sits diagonally opposite the one who likes Mathematics?
1) The one who likes Hindi
2) Dolly
3) Arti
4) The one who likes English
5) The one who likes Biology

(B) Who among the following represent the immediate neighbours of the one who likes Chemistry?
1) Baby, Falguni
2) Chandni, Esha
3) Baby, Esha
4) Dolly, Falguni
5) Falguni, Himani

(C) Who among the followings select exactly between Himani and Baby?
1) Chandni
2) The one who likes Hindi
3) The one who likes Biology
4) Gopi
5) Arti

(D) Which of the following is true regarding Baby?
1) Baby is one of the immediate neighbours of Dolly
2) The one who likes Geography is an immediate neighbour of Baby
3) Baby sits second to the left of Himani
4) Baby likes History
5) Baby is the immediate neighbour of the one who like Mathematics.

(E) What is the position of the one who likes Physics with respect to Gopi?
1) Second to the Left
2) Third to the right
3) Fourth to the left
4) Second to the right
5) Third to the left

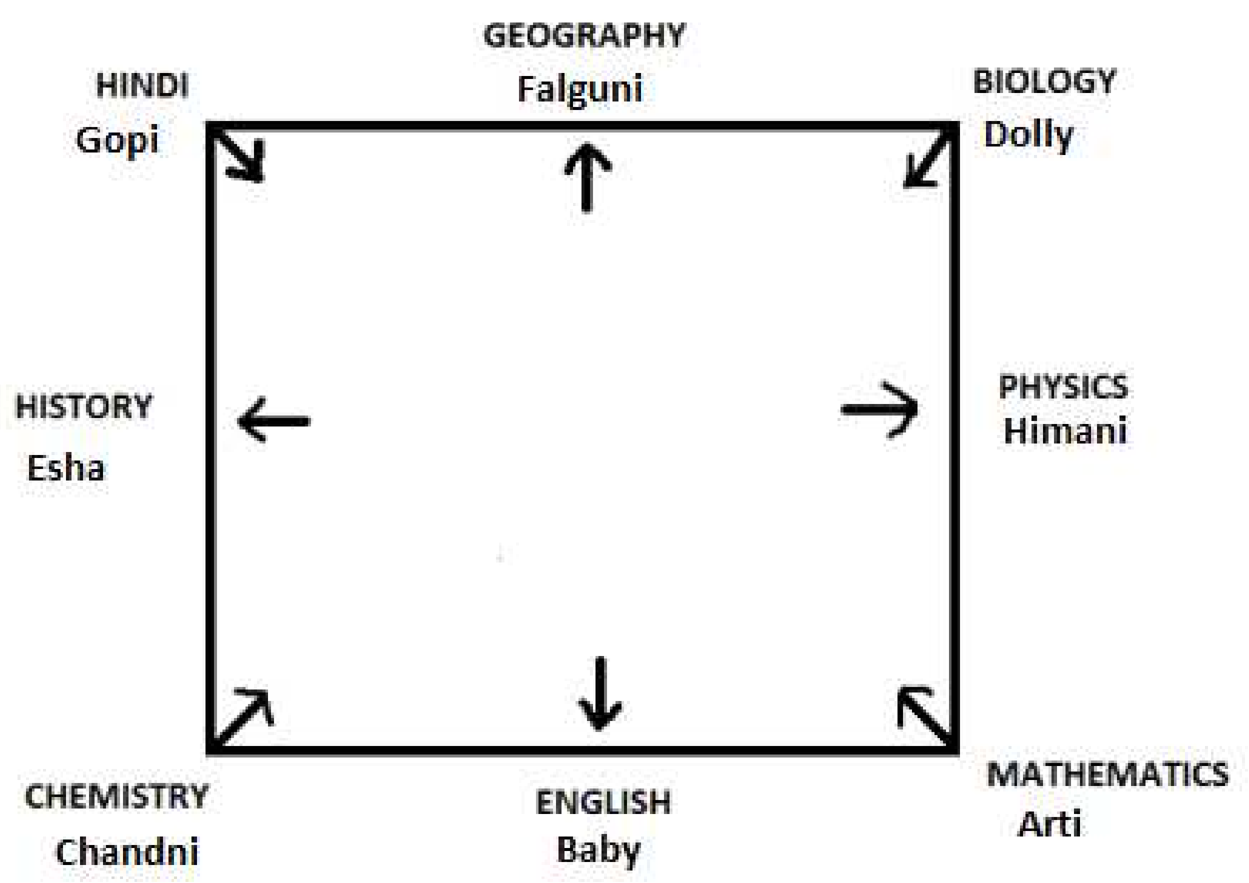
(F) Which of the following subjects does Dolly like?
1) Biology
2) Mathematics.
3) Hindi
4) Chemistry
5) English

(G) Who among the following likes Geography?
1) Baby
2) Faguni
3) Himani
4) Arti
5) Dolly

ANSWERS

(A) 1
(B) 3
(C) 5
(D) 5
(E) 5
(F) 1
(G) 2

SOLUTION



SET 6

Question:-

Four people were being interviewed for the same job, on the same day but in different rooms(R1, R2, R3 and R4), at different time and by different interviewers.(First sentence – what do you do? Make a table!)

Determine which candidate was interviewed by whom, at which time and in which room.(What can be arranged first in the table? What can logically be the first coloumn? – Room numbers, because other information cannot be logically arranged!)

(i) Teena's appointment was just after Mr. Sharma's, which was just after that of the person in room R2.
(ii) Mr. Narurkar's appointment was atleast two hours later than Bimal's.
(iii) Mr. Joshi's appointment was just after the person who had an interview in room R4, who had an appointment just after Chirag.
(iv) Three of the four people were: (1)Deepak, (2) the one with interview in room R1, and (3) the one who was interviewed at 1 p.m.(this is a crazy one!
(v) Interview times were – 11 a.m., 12 noon, 1 p.m., and 2 p.m.(This could be a row heading.
(vi) Sharma, Narurkar, Joshi and Zaidi were interviewers and Teena, Bimal, Chirag and Deepak were the interviewees.

Q1. Sharma's appointment is with
(a) Teena
(b) Bimal
(c) Chirag
(d) Deepak

Q2. Deepak's appointment was in room

(a) R1
(b)R3
(c)R2
(d) R4

Q3. Mr. Zaidi interviewed
(a) Deepak
(b) Teena
(c) Bimal
(d) Chirag

Q4. Who interviewed at 2 p.m.?
(a) Mr. Joshi
(b) Mr. Zaidi
(c) Mr. Narurkar
(d) Mr. Sharma

Q5. Which candidate was interviewed last?
(a) Deepak
(b) Teena
(c) Bimal
(d) Chirag

The option in *italics* is the correct answer. How many did you get right?! And a sample table of the

SOLUTION:

Interviewee	Interviewer		11 a.m.	12 p.m.	1 p.m.	2 p.m.
Chirag	Sharma	R1	X	**Definite**	X	X
Bimal	Zaidi	R2	**Definite**	X	X	X
Deepak	Joshi	R3	X	X	X	**Definite**
Teena	Narurkar	R4	X	X	**Definite**	X

SET 7

Read the following information carefully and answer the questions which follow.

Five friends A, B, C, D, and E are working in 5 different departments M, N, O, P and Q and they earn different salaries i.e. 10,000, 15,000, 20,000, 25,000 and 30,000 and they all are of different ages i.e. 24, 26, 28, 30 and 32 years. These all informations are not necessarily in the same order.

- B works in department M and earns more than 20,000. Person who is 28 years old works in department Q. 32 years old person earns at least 20,000.
- The person who is 26 years old earns 25,000. A earns 15,000, but does not work in department N or P.
- Person who is 30 years old earns highest salary but does not work in department M and N. E does not work in department P or Q, and his age is not 32. The salary of D is less than 20,000.

1. Who works in department N?
a) B b) C c) D
d) **Can't be determined** e) None of these

2. If the name of the person represents its salary then which of the following is true?
a) A + B = C b) C + D = B c) D + E = B
d) Can't be determined e) **None of these**

3. Which of the following combination is definitely true?
a) B-30 years-M-30,000
b) D-24 years-N-10,000
c) A-24 years-P-15,000
d) **E-30 years-O-30,000**
e) None of these

4. The person whose age is 30 works in which department?
a) M b) N c) **O**
d) P e) None of these

Answers:
1. Option D
2. Option E
3. Option D
4. Option C

SET 8

Directions (1-5): Read the following information carefully and answer the questions given below it—

Six exams Maths, science, History, Economics, English and Hindi are to be scheduled starting from 2nd March and ending on 8th march wit Sunday being an off day, not

necessarily in the same order. Each of the exam has different time duration: 40 mins, 50 mins, 60 mins, 75 mins, 90 mins and 100 mins, again not necessarily in the same order.
8th march is not sunday and an exam of 40 mins is scheduled on that day. Maths exam is for less than 60 mins and is scheduled immediately before English exam. There are two exams scheduled between Hindi exam which is for 100 mins and History exam which is for 60 mins. English exam is before Sunday and there are two days between sunday and maths exam. Economics exam which is for 75 mins is not scheduled on 2ndmarch. The exam schedules on saturday is of 100 mins.

1. How many exams are scheduled before sunday?
(1) Two (2) One
(3) Five (4) Three
(5) None of these

2. Which of the following combinations of exam - Day - Time Duration is correct ?
(1) English - Wednesday - 75 mins (2) Maths - Thursday - 50 mins
(3) History - Thursday – 60 mins (4) Hindi - Tuesday - 100 mins
(5) None is correct

3. What is the time duration of science exam?
(l) 90 mins (2) 75 mins
(3) 50 mins (4) 40 mins
(5) None of these

4. On which day is Economics exam scheduled?
(1) Monday (2) Saturday
(3) Tuesday (4) Friday
(5) Cannot be determined

5. Which day is sunday?
(1) 3rd march (2) 2nd march
(3) 5th march (4) 6th march
(5) Cannot be determined

Solutions

Solutions (1-5):

Date	Day	Exam	Time Duration
2nd March	Wednesday	History	60 mins
3rd March	Thursday	Maths	50 mins
4th March	Friday	English	90 mins
5th March	Saturday	Hindi	100 mins
6th March	Sunday	Off	Off
7th March	Monday	Economics	75 mins
8th March	Tuesday	Science	40 mins

1. (5)

2. (2)
3. (4)
4. (1)
5. (4)

SET 9

Directions (6-12): Each of these questions are based on the information given below:

P, Q, R, S, W, X, Y, Z are sitting around a circle facing centre but not necessarily in the same order. The husband of Z is sitting second to the right of Q who is sitting between two males. X sits second to the left of the daughter of S. X is the sister of Y. X is not an immediate neighbour of Z's husband. Only one person sits between P and X. P is the father of Y. S who is brother of Z sits to the immediate left of his mother. Only one person sits between Z's mother and W. Only one person sits between Z and Y. Y is mother of R. Y is not an immediate neighbour of W.

6. Which of following is true with respect to the given seating arrangement?
(1) R is the cousin of W
(2) Z and Z's husband are immediate neighbour of each other.
(3) No female is an immediate neighbour of R.
(4) Z sits third to the left of her daughter.
(5) Q is the mother of Z.

7. What is the position of P with respect to his grandchild?
(1) immediate right (2) third to the right
(3) third to the left (4) Second to the right
(5) fourth to the right

8. Four of the following five are alike in a certain way. Which one does not belong to that group?
(1) X (2) R
(3) W (4) Z
(5) Y

9. What is position of P with respect to his mother-in-law?
(1) Immediate right (2) third to the right
(3) third to the left (4) second to the right
(5) None of these

10. How many people sits between Y and her uncle?
(1)One (2) Two
(3) Three (4) Four
(5) Five

11. . Who amongst the following is S's daughter?
(1) Q (2) R
(3) W (4) Y
(5) Z

12. Who sits to the immediate left of R?
(1) X's grandmother (2) Y's son
(3) S's mother-in-law (4) P
(5) Y

Solutions (6-12):

6. (5)
7. (1)
8. (2)
9. (4)
10. (3)
11. (3)
12. (1)

SET 10

Direction (1 – 5): Read the following information and answer the questions that follow:

(1) There are seven persons A, B, C, D, E, F and G based in Delhi. Each of them is from a different state, has a different profession, and plays a different instrument.
(2) C, a doctor, is from Bihar.
(3) E and F play mandolin and violin, though not necessarily in that order.
(4) A is not from Kerala.
(5) The person from Kerala is an engineer and plays guitar.
(6) The lawyer plays sitar.
(7) The businessman from UP plays violin.
(8) The teacher and the cricketer play flute and piano, though not necessarily in that order.
(9) F is a pilot.
(10) The Maharashtrian is a teacher.
(11) The Gujarati plays piano.
(12) G, a Punjabi, does not play sarod.
(13) B is a cricketer.

1. Which state does A belong to?
A) Gujarat
B) Kerala
C) Maharashtra
D) Can't say
E) None of these

2. Which instrument does B play?
A) flute
B) piano
C) sarod
D) Can't say
E) sitar

3. Which instrument does C play?
A) mandolin
B) sitar
C) violin
D) None of these
E) sarod

4. What is D's profession?
A) Engineer
B) Lawyer
C) Teacher
D) Can't say

E) Cricketer

5. Which state does E belong to?
A) Gujarat
B) Kerala
C) UP
D) Can't say
E) none of these

SET 11

Directions (6 -10): Study the following information and answer the given question.

Eight friends−J, K, L, M, N, O, P and Q live on eight different floors of a building but not necessarily in the same order. The lowermost floor of the building is numbered one, the one above that is numbered two and so on till the topmost floor is numbered eight. J lives on floor numbered 4. Only one person lives between J and L. O lives on the floor immediately below L. Only one person lives between O and P. P lives above O. O lives on floor numbered 5. Only one person live between K and N, M lives on an even numbered floor but does not live on floor numbered 8. K lives below Q's floor.

6. Four of the following five are alike as per the given arrangement and thus form a group. Which of the following does not belong to that group?
(A) PO
(B) QL
(C) MJ
(D) LJ
(E) MN

7. Who lives exactly between the floors on which L and J live?
(A) K
(B) P
(C) O
(D) N
(E) M

8. Who amongst the following lives on floor numbered 2?
(A) M
(B) L
(C) O
(D) Q
(E) P

9. Which of the following is true about M as per given arrangement?
(A) M lives on the lowermost floor.
(B) K lives on one of the floor below M.
(C) All the given statements are true.
(D) Only two people live between M and O.
(E) M lives on an odd numbered floor.

10. If L and Q interchange their places and so do M and J, who amongst the following will live between the floors on which M and P live, as per the given arrangement?
(A) Only Q

(B) No one
(C) Only L
(D) Both P and L
(E) Both Q and O

Answers
1. c
2. b
3. e
4. a
5. c
6. e
7. c
8. a
9. d
10. e

SET 12

Directions (Questions 1 - 5): Study the following information carefully to answer the given questions:

Madan and Rohit are in the same team of hockey. Parth defeated Rohit in badminton but lost to Sachin in tennis. Nitin teams with Sagar in football and with Sachin in hockey. Rohit defeated Sachin in chess. Those who play cricket do not play badminton, volleyball or tennis. Madan and Parth are in opposite teams of basketball. Nitin represents his state in cricket while Sagar does so at the district level. Boys who play chess do not play football, basketball or volleyball. Madan and Parth are together in the volleyball team. Boys who play football also play hockey.

1. Name the boys who do not play football.
(a) Sachin, Nitin
(b) Rohit, Sagar
(c) Rohit, Sachin
(d) Rohit, Nitin
(e) None of these

2. Who plays both hockey and tennis?
(a) Sachin
(b) Rohit
(c) Nitin
(d) Parth
(e) None of these

3. Which is the most popular game with this group?
(a) Cricket
(b) Hockey
(c) Football
(d) Badminton
(e) None of these

4. Who plays the largest number of games?
(a) Sagar
(b) Rohit

(c) Parth
(d) Nitin
(e) None of these

5. Which boy plays both badminton and hockey?
(a) Sachin
(b) Rohit
(c) Nitin
(d) Parth
(e) None of these

Answers

	Madan	Rohit	Parth	Sachin	Nitin	Sagar
Hockey	Y	Y		Y	Y	Y
Badminton		Y	Y		N	N
Tennis			Y	Y	N	N
Chess		Y		Y		
Football		N		N	Y	Y
Basketball	Y	N	Y	N		
Volleyball	Y	N	Y	N	N	N
Cricket					Y	Y

1. c
2. a
3. b
4. c
5. b

SET 13

Directions (Questions 6 - 10): Study the following information carefully and answer the questions given below:

Seven boys A, D, Y, U, P, Q and J live in three different buildings – Ashiana, Top-view and Ridge. Each of them is flying kites of different colours i.e. red, green, blue white, black, yellow and pink, not necessarily in that order. Not more than three or less than two stay in any of the buildings. Q is flying a pink and does not live in Ridge building. U does not live in the same building as A or P and is flying a yellow coloured kite. D lives in Ridge building with only one more person and is flying a green kite. None in the Top-view building flies a white kite. P does not fly a blue kite.

6. Who live in Ridge building?
(a) D, U
(b) D, A, P
(c) Y, A, P
(d) A, P
(e) None of these

7. Who is flying the blue kite?
(a) A
(b) J
(c) P
(d) Data inadequate
(e) None of these

8. Who flies the red kite?
(a) A
(b) J
(c) P
(d) Data inadequate
(e) None of these

9. Who stay in Top-view building?
(a) Y, J, P
(b) A, P
(c) A, P, D
(d) Y, U, J
(e) None of these

10. What coloured kite is J flying?
(a) Blue
(b) White
(c) Black
(d) Data inadequate
(e) None of these

Solution

Boy	Building	Kite
A	Top-View	Blue
D	Ridge	Green
Y	Top-View	Black
U	Ridge	Yellow
P	Top-View	Red
Q	Ashiana	Pink
J	Ashiana	White

6. a
7. a
8. c
9. e
10. b

SET 14

Direction (1-5): Read the following information carefully and answer the questions given below:

Six persons A, B, C, D, E and F are sitting around a round table facing towards the centre of the table in a restaurant. They have ordered for different items (Pizza, Strawberry, Vanilla, Burger, Pastries and Patties) as their lunch. They are wearing T-shirts of different colours, i.e. white, black, green, red, yellow and blue. Order of items for the lunch and colours of T-shirts are not necessarily according to the order of their names.

I. The persons who have ordered for Pizza, Vanilla and Pastries are neither in white T-shirt nor in black.

II. The persons who are in green and yellow T-shirts have neither ordered for Pizza nor for Vanilla.
III. A is neither in white T-shirt nor on the immediate left of the person who has ordered for Burger.
IV. The only person who is between E and F eats Strawberry. The person who is on the left side of the person in white T-shirt does not eat Patties.
V. D has ordered Burger and the colour of his T-shirt is green. He is facing the person who has ordered for Strawberry.
VI. One who has ordered for Pizza is seated opposite to the person wearing blue T-shirt, while the person whose T-shirt is of green colour is on the left of the person who has ordered for Pastries.
VII. One who has ordered for Patties is on the immediate right of the person in white T-shirt but on the immediate left of the person who has ordered for Vanilla.
VIII. C has not ordered for Vanilla while F has not ordered for Pizza.

1.Who among the following is in white T-shirt?
a) A
b) B
c) C
d) E
e) None of these

2.The only person, who is between E and D, is wearing T-shirt of the colour
a) red
b) blue
c) black
d) yellow
e) None of these

3.Who among the following has ordered for Pastries?
a) A
b) B
c) C
d) E
e) None of these

4.Which of the following is correctly matched?
a) A - Yellow - Burger
b) B - Red - Vanilla
c) E - Red - Pizza
d) F - Black - Pastries
e) None of these

5.The colour of the T-shirt of the person, who has ordered for Patties, is
a) red
b) yellow
c) blue
d) black
e) None of these

Answers

1. C
2. D
3. A

4. C
5. D

SET 15

Directions (Questions 6 to 8): Read the following information carefully and answer the questions given below:

(i) There are five types of cards viz. A, B, C, D and E. There are three cards of each type. These are to be inserted in envelopes of three colours – Red, Yellow and Brown. There are five envelopes of each colour.
(ii) B, D and E type cards are inserted in red envelopes. A, B and C type cards are to be inserted in yellow envelopes and C, D and E type cards are to be inserted in brown envelopes.
(iii) Two cards each of B and D type are inserted in red envelopes.

6.Which of the following combinations of types of cards and the number of cards and colour of envelope is definitely correct?
a) A-2, B-2, C-1 : Yellow
b) C-2, D-1, E-2 : Brown
c) C-1, D-2, E-2 : Brown
d) B-2, D-2, A-1 : Red
e) None of these

7.Which of the following combinations of colour of the envelope and the number of cards is definitely correct in respect of E-type cards?
a) Red - 1, Yellow -2
b) Yellow – 1, Brown - 2
c) Red - 2, Brown - 1
d) Red - 2, Yellow -1
e) None of these

8.Which of the following combinations of the type of cards and the number of cards is definitely correct in respect of yellow coloured envelopes?
a) A - 2, E - 1, D - 2
b) A - 2, B - 1, C - 2
c) A - 3, B - 1, C - 1
d) B - 1, C - 2, D - 2
e) None of these

Answers
6. b
7. e
8. c

Directions (Questions 9 to 10): Read the following information carefully and answer the questions given below:
Three persons A, B and C wore shirts of black, blue and orange colours (not necessarily in that order) and pants of green, yellow and orange colours (not necessarily in that order). No person wore pant and shirt of the same colour. Further, it is given that

1) A did not wear shirt of black colour.
2) B did not wear shirt of blue colour.
3) C did not wear shirt of orange colour.

4) A did not wear pant of green colour.
5) B wore pant of orange colour.

9.What were the colours of pant and shirt worn by C, respectively?
a) Yellow and Black
b) Yellow and Blue
c) Green and Blue
d) Orange and Black
e) None of these

10.Who did not wear the orange colour?
a) A
b) B
c) C
d) A & C
e) None of these

Answers

9. c
10. c

SET 16

Direction (1-5): Read the following information carefully and answer the questions given below it :
There are six persons A, B, C, D, E and F in school. Each of the teachers teaches two subjects, one compulsory subject and the other optional subject. D's optional subject was History while three others have it as compulsory subject. E and F have Physics as one of their subjects. F's compulsory subject is Mathematics which is an optional subject of both C and E. History and English are A's subjects but in terms of compulsory and optional subjects, they are just reverse of those of D's. Chemistry is an optional subject of only one of them. The only female teacher in the school has English as her compulsory subject.

1.What is C's compulsory subject ?
(a) History
(b) Physics
(c) Chemistry
(d) English
(e) Mathematics

2.Who is a female member in the group ?
(a) A
(b) B
(c) C
(d) D
(e) E

3.Which of the following has same compulsory and optional subjects as those of F's ?
(a) D
(b) B
(c) A
(d) C

(e) None of these

4.Disregarding which is the compulsory and which is the optional subject, who has the same two subject combination as F ?
(a) A
(b) B
(c) E
(d) D
(e) None of these

5.Which of the following groups has History as the compulsory subject ?
(a) A, C, D
(b) B, C, D
(c) C, D
(d) A, B, C
(e) A, D

Answers

1. a
2. d
3. e
4. c
5. d

SET 17

Direction (6-10): Read the following information carefully and answer the questions that follow:

(i) Five friends P, Q, R, S and T travelled to five different cities of Chennai, Kolkata, Delhi, Bangalore and Hyderabad by different modes of transport of Bus,Train, Aeroplane, Car and Boat from Mumbai.
(ii) The person who travelled to Delhi did not travel by boat
(iii) R went to Bangalore by car and Q went to Kolkata by aeroplane
(iv) S travelled by boat whereas T travelled by train
(v) Mumbai is not connected by bus to Delhi and Chennai

6.Which of the following combinations of person and mode is not correct ?
(a) P – Bus
(b) Q – Aeroplane
(c) R – Car
(d) S – Boat
(e) T – Aeroplane

7.Which of the following combinations is true for S ?
(a) Delhi - Bus
(b) Chennai - Bus
(c) Chennai - Boat
(d) Data inadequate
(e) None of these

8.Which of the following combinations of place and mode is not correct ?
(a) Delhi - Bus
(b) Kolkata - Aeroplane

(c) Bangalore - Car
(d) Chennai - Boat
(e) Hyderabad – Bus

9.The person travelling to Delhi went by which of the following modes ?
(a) Bus
(b) Train
(c) Aeroplane
(d) Car
(e) Boat

10.Who among the following travelled to Delhi ?
(a) R
(b) S
(c) T
(d) Data inadequate
(e) None of these

Solutions
6. E
7. c
8. a
9. b
10.c

SET 18

Directions (Q. 1 - 5): Study the information carefully and answer the following questions:

A building has eight floors from 1 to 8 in such a way that ground floor is numbered 1, the above floor is numbered 2 and so on. The top most floor is numbered 8. Eight persons G, P, M, R, Q, A, D and C are staying each on one of these floors. A is staying on floor 6. There is a gap of three persons between G and R. C is staying on the topmost floor. Neither P nor M is staying on the floor 5. Q is staying middle of P and M. R is staying on the floor 1. M is not an immediate neighbor of G.

Q1. Who is staying on the floor no. 7?
1) A
2) P
3) D
4) R
5) M

Q2. How many persons are staying between D and P?
1) Three
2) Four
3) Two
4) One
5) None of these

Q3. Who is staying on the second floor?
1) Q
2) M
3) P

4) A
5) Q or M

Q4. If all persons are arranged in alphabetical order such as A occupies floor 1 then who will occupy floor 5?
1) G
2) Q
3) R
4) M
5) P

Q5. Immediate neighbors of the person who is staying in floor 3?
1) R and P
2) A and P
3) G and M
4) P and M
5) D and G

Solutions
1-3
2-3
3-2
4-4
5-4

Floor No.	Persons
8	C
7	D
6	A
5	G
4	P
3	Q
2	M
1	R

SET 19

Directions (Q. 6 - 10): Study the information carefully and answer the following questions:

Eight friends – Romil, Ramesh, Rakesh, Rohit, Rahul, Abhijit, Abhishek and Anil – are sitting around a circular table, not necessarily in the same order. Four of them are facing inside others are facing outside. They are belong to eight different cities – Bhopal, Patna, Kolkata, Delhi, Gwalior, Bengaluru, Chennai and Rajkot, but not necessarily in the same order.

Abhijit faces the Centre and sits third to the right of Rakesh. Rohit belongs to Kolkata and faces the person who belongs to Bengaluru. Abhishesk sits third to the right of Ramesh, who stays in Bhopal. The persons who belong to Delhi and Gwalior are facing to the same direction (inside or outside). Rahul is sitting between the person who belongs to Kolkata and the one from Rajkot respectively. Romil belongs to Gwalior and Rakesh belongs to Patna. The person who belongs to Chennai is facing outward and immediate neighbor of Rajkot. Anil is immediate neighbor of the persons who belong to Gwalior and Chennai. Rahul is immediate left of Rohit.

Q6. Who belongs to Bengaluru?
1) Romil
2) Rohit
3) Anil
4) Abhishek
5) Rahul

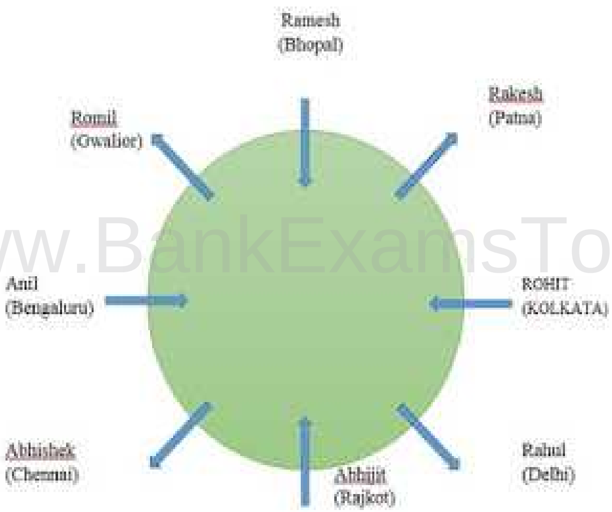
Q7. Immediate neighbors of Romil?
1) Romesh and Rakesh
2) Rahul and Rohit
3) Anil and Ramesh
4) Abhishek and Rahul
5) Rohit and Abhijeet

Q8. Which of the following pair is true?
1) Romil – Bhopal
2) Anil – Bengaluru
3) Rohit – Delhi
4) Abhijeet – Delhi
5) Abhishek – Patna

Q9. Position of Ramesh with respect to Rahul?
1) Third to the right
2) Fourth to the left
3) Fifth to the right
4) Second to the right
5) Third to the left

Q10. If Rohit and Anil interchange their positions and similarly Abhijit and Rakesh interchange their positions then what is the position of Romil with respect to Rakesh?
1) Third to the left
2) Third to the right
3) Second to the left
4) Immediate left
5) None of these

Solutions
6) 3
7) 3
8) 2
9) 5
10) 1



SET 20

Directions for questions: These questions are based on the information given below.

Eight members – P, Q, R, S, T, U, V, W of a family are sitting around a circular table. The family members belong to three generations and each couple has at least one daughter and one son. Q, the grandfather of U, has more number of children than the number of grandchildren. S is opposite his mother T, who is adjacent to her granddaughter. V is to the immediate left of her brother-in-law. P's daughter R, is to the immediate right of her aunt W. P is third to the right of his sister.

1. **What is the position of R with respect to T?**
   1) Immediate left
   2) Immediate right
   3) Second to the left
   4) Second to the right
   5) Either (1) or (2)

2. **How many couples are there in the family?**
   1) One
   2) Two
   3) Three
   4) Four
   5) Cannot be determined

3. **What is the position of Q with respect to S?**
   1) Second to the left
   2) Immediate right
   3) Second to the right
   4) Immediate left
   5) Cannot be determined

4. **How is S related to U?**
   1) Uncle
   2) Mother

3) Father
4) Aunt
5) Grand mother

5. **Which of the following pairs are not siblings?**
1) SW
2) PS
3) UR
4) WP
5) PV

Solutions
1) 1
2) 2
3) 5
4) 1
5) 5

SET 21

Directions (1-5) Study the following information and answer the following questions.

A, B, C, D, E, G, and I are seven friends who study in three different standards namely 5th, 6th, 7th such that not less than two friends study in the same standard. Each friend also has a differentfavourite subject namely History, Civics, English, Marathi, Hindi, Maths and Economics but not necessarily in the same order.

A like Maths and studies in 5th standard with only one other friends who likes Marathi. I studies with two other friends. Both the friends who study with I like language (here languages include only Hindi, Marathi and English).

D studies in 6th standard with only one person and does not like Civics. E studies with only one friend. The one who likes history does not study in 5th or 6th standard. E does not like languages. C does not like English, Hindi or Civics.

1. Which combination represents E's favourite subject and the standard in which he studies?
(1) Civics and 7th
(2) Economics and 5th
(3) Civics and 6th
(4) History and 7th
(5) Economics and 7th

2. Which of the following is I's favourite subject?
(1) History
(2) Civics
(3) Marathi
(4) Either English or Marathi
(5) Either English or Hindi

3. Who amongst the following studies in 7th standard?
(1) G

(2) C
(3) E
(4) D
(5) Either D or B

4. Which of the combination is definitely correct?
(1) I and Hindi
(2) G and English
(3) C and Marathi
(4) B and Hindi
(5) E and Economics

5. Which of the following subject does G like?
(1) Either Maths or Marathi
(2) Either Hindi or English
(3) Either Hindi or Civics
(4) Either Hindi or Marathi
(5) Either Civics or Economics

Answers:
1 (3)
2 (1)
3 (1)
4 (3)
5 (2)

SET 22

There are 5 houses in 5 different colours. In each house lives a person of a different nationality. The 5 owners drink a certain type of beverage, smoke a certain brand of cigar, and keep a certain pet.
Using the clues below can you determine who owns the fish?

a) The Brit lives in a red house.
b) The Swede keeps dogs as pets.
c) The Dane drinks tea.
d) The green house is on the immediate left of the white house.
e) The green house owner drinks coffee.
f) The person who smokes Pall Mall rears birds.
g) The owner of the yellow house smokes Dunhill.
h) The man living in the house right in the middle drinks milk.
i) The Norwegian lives in the first house.
j) The man who smokes Blend lives next door to the one who keeps cats.
k) The man who keeps horses lives next door to the man who smokes Dunhill.
l) The owner who smokes Blue Master drinks chocolate.
m) The German smokes Prince.
n) The Norwegian lives next to the blue house.
o) The man who smokes Blend has a neighbor who drinks water.

Answer:

This puzzle is usually attributed to Einstein, who may or may not have written it.

The German owns the fish and the table below details the full answer:

Nationality	Norweg	Dane	Brit	German	Swede
Color	Yellow	Blue	Red	Green	White
Beverage	Water	Tea	Milk	Coffee	Chocolate
Smokes	Dunhill	Blend	Pall Mall	Prince	Blue Master
Pet	Cats	Horses	Birds	Fish	Dogs

If in a cricket one day match, there were no wide balls, no wides, no extras and no overthrows. What is the maximum number of runs that a batsman can score in an ideal case scenario?

Solution
1653

Explanation:

For an ideal case, the batsman will hit a six on each ball. But if he hits six on the last ball of the over, the strike will change in the next over. Thus, the best he can do in the last ball is run 3 runs so that he retains the strike even in the next over. Thus the total runs that he can score in each over:
6 * 5 + 3 = 33

But this will have to go like it only till the 49th over. In the last over, he can hit a six in the last ball as well as that will be the last ball of the match.
Thus runs for the last over will be 6 * 6 = 36.
Hence the maximum runs = 33 * 49 + 36 = 1653

SET 23

Study the following information carefully to answer the questions given below.

A, B, C, D, E, F and G are 7 friends left for 7 different cities – Delhi, Chennai, Hyderabad, Bangalore, Kolkata, Chandigarh and Jaipur, each one on a different day of the week. C left for Jaipur on Monday. On the last day of the week, the person left for Bangalore. E left the next day of A who left for Chandigarh and on the previous day of G. D left for Kolkata on Friday. B didn't leave for either Hyderabad or Bangalore and G left for Delhi.

1. On which day of the week did B leave ?
   A)Sunday
   B)Saturday
   C)Monday
   D)Tueday
   E)None of these

2. Who left for Bangalore ?
   A)E
   B)B
   C)G
   D)F

E)None of these

3. Who left on Tuesday ?
   A)A
   B)C
   C)G
   D)F
   E)None of these

4. On which day of the week did E leave ?
   A)Friday
   B)Sunday
   C)Wednesday
   D)Thursday
   E)None of these

5. Which of the following Combination is not right ?
   A)C – Jaipur
   B)F – Bangalore
   C)A – Chandigarh
   D)E – Kolkata
   E)None of these

Solutions

Day	Person	City
Monday	C	Jaipur
Tuesday	A	Chandigarh
Wednesday	E	Hyderabad
Thursday	G	Delhi
Friday	D	Kolkata
Saturday	B	Chennai
Sunday	F	Bangalore

1. B
2. D
3. A
4. C
5. D

SET 24

Study the following information carefully to answer the questions given below.

P, Q, R, S, T, U and V are 7 friends who travel to college everyday by a particular train which stops at 5 stations – 1, 2, 3, 4 and 5 respectively after it leaves base stations. 3 among them get in the train at the base station. S gets down at the next station at which U gets down. Q gets in with 2 persons and does not get down with either P or T. V alone gets in at station 3 and gets down with R after 1 station. P travels between only 2 stations and gets down at station 5. None of them gets in at station 2. R gets in with U but does not get in with either Q or S. T gets in with 2 others and gets down alone after S. Q and S going to same college and they get down together at station 3. None of them gets down at station 1.

1. At which station does T get down ?
   A)Station 2
   B)Station 4
   C)Station 3
   D)Station 5
   E)None of these

2. At which station does R, U get in ?
   A)Base station
   B)Station 2
   C)Station 1
   D)Station 3
   E)None of these

3. After how many station does Q get down ?
   A)4
   B)3
   C)1
   D)2
   E)None of these

4. At which of the following station does Q and T get in ?
   A)Base Station
   B)Station 1
   C) Station 2
   D) Station 3
   E)None of these

5. Which of the following is correct ?
   A)T gets in at the base station
   B)R gets in at the Station 3
   C)V gets down at Station 5
   D)U gets down at Station 2
   E)None of these

Answers:

Station	Person Get in	Person Get down
Base	Q,S,T	
1	R,U	None
2	None	U
3	V	Q,S
4	P	T,
5		P ,R,V

1. B
2. C
3. D
4. A
5. A

Quantitative Aptitude Tricks - PDF Download

Topics :

1. Simplification
2. Number Series
3. Percentage
4. Profit and Loss
5. Simple Interest and Compound Interest
6. Ratio and Proportion
7. Time and Work
8. Time Speed and Distance

#1 SIMPLIFICATION

Q1.

$8^{12} \div 16^{2}$ of $32^{3} \times \sqrt{256} = 2^{?}$

Sol :

$(2^{3})^{12} \div (2^{4})^{2}$ of $(2^{5})^{3} \times 16 = 2$

$2^{36} \div 2^{8}$ of $2^{15} \times 2^{4} = 2^{?}$

$2^{17} = 2^{?}$

$? = 17$

Q2.

$108 \div 36$ of $\,^{1}/_{4} + \,^{2}/_{5} \times 3\,^{1}/_{4} = ?$

Sol :

$108 \div 9 + \,^{2}/_{5} \times \,^{13}/_{4} = ?$

$12 + \,^{13}/_{10}$

$? = 13\,^{3}/_{10}$

Q3.

$33\,^{1}/_{3}\%$ of $633 + 129 = 66\,^{2}/_{3}\%$ of $= ?$

Sol :

$\,^{1}/_{3} \times 633 + 129 = \,^{2}/_{3} \times ?$

$(211+129) \times \,^{3}/_{2} = ?$

$? = 340 \times \,^{3}/_{2} = 170 \times 3 = 510$

More Tricks on Simplification and Download PDF : Click Here

#2 NUMBER SERIES

Basic Concept Starts From Here : Click Here

Q1.

In each series only one number is wrong. Find out the Wrong number.

- 5531, 5506, 5425, 5304, 5135, 4910, 4621 **(IBPS PO 2012)**

Hint: -7^2, -9^2, -11^2

- 1, 3, 10, 36, 152, 760, 4632 **(IBPS PO 2012)**

Hint : ×1+2, ×2+4, ×3+6 ...

- 4, 3, 9, 34, 96, 219, 435 **(IBPS PO 2012)**

Hint : $+1^3$ -2 , $+2^3$ -2 , $+3^3$ -2, ...

- 5, 7, 16, 57, 244, 1245, 7506 **(Allahabad Bank PO 2010)**

Hint : $\times1+1^2, \times2+2^2$

- 2.5,3.5,6.5,15.5,41.25,126.75 **(Allahabad Bank PO 2010)**

Hint : $\times{}^1/2+{}^1/2$, ×1+1 , $\times{}^3/2+{}^3/2$ ....

#3 PERCENTAGE

Basic Concepts Starts Here : Click Here

Q1.

If the income of Ram is 10% more than that of Shayam's income. How much % Shyam's income is less than that of Ram's income ?

Method I.

By using formula

less% = r/100+r ×100 = 10/100+10 × 100

= 10/110 ×100 = 9 1/11%

Method II.

Since 10% more $\left\langle \begin{matrix} 100\% \\ 110\% \end{matrix} \right\rangle$ Two tools

Less% = $10 \times \frac{100}{110}$ .... (To decrease any number, we multiply with small number and divide with large number)

$= 9\frac{1}{11}\%$

Q2.

A man spends 40% on food, 20% on house rent, 12% on travel and 10% on education. After all these expenditure he saved Rs. 7200. Find the amount spent on travel ?

Method I.

Let total income x

total expenditure

= x × (40%+20%+12%+10%)

= x × 82%

Total saving = x - x × 82%

= x × 18%

Then x × 18% = 7200

x = 7200/18×100 = 40,000

Expenditure on travel = 12%

x × 12% = 40,000×12/100 = Rs. 4800

Method II.

Total income = 100% - represent total

Total Exp
- 40% - Total
- 20% - House Rent
- 12% - Travel
- 10% - Education

100% -82% = 18% (saving)

Expenditure on Travel = 7200/18×12

= 4800

Q3.

When numerator of a fraction is increased by 10% and denominator decreased by 20% the resultant fraction becomes 5/8. Find the original fraction ?

Method I.

Let the original fraction be x/y then -

$$\frac{x+\frac{x\times10}{100}}{y-\frac{y\times20}{100}}=\frac{5}{8}$$

$$\frac{\frac{x\times110}{100}}{\frac{y\times80}{100}}=\frac{5}{8}$$

$$\frac{x}{y}=\frac{5}{8}\times\frac{80}{110}=\frac{5}{11}$$

Method II.

Given Fraction = 5/8

Original fraction = 5/8×80/110

= 5/11 Ans.

Q4.

If the length of a rectangle is increased by 20% and breath is decreased by 10%. Find the net% change in the area of that rectangle.

Sol:

net% change = x+y+ x×y/100

(+20)×(-10)/100

= +10-2

=8

Increase % = 8% Ans.

Q5.

A reduction of 10% in the price of tea would enable and purchase to obtain 3 Kg. more for 2700 Rs. Find the reduced rate (new rate) of tea ?

Sol :

10% 2700 = Rs. 270

Rs. 270 is the rate of 3 kg. of tea

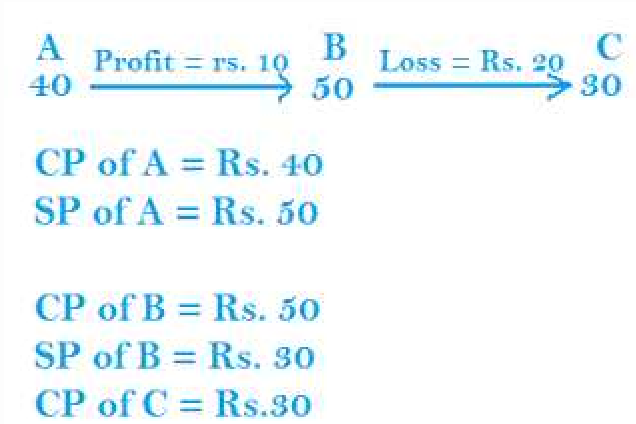
1 kg of tea = Rs. 90/- kg,

#4 Profit and Loss

Basic Concept Starts Here : Click Here

Statement

A purchase an article at Rs 40 Rs. and sells it to B at rs. 50 and B sells its to C at Rs. 30



For A, Profit = 50-40 = 10
For B, Loss = 50 -30 = 20

For A, P =SP-CP
For B, L= CP-SP

For A, Percent Profit = Profit of A/CP of A×100
For B, Percent loss = Loss of B/CP of B×100
For A, 10/40×100 = 25%
For B, 20/50×100 = 40%
P% = P/CP×100
L% = L/CP×100

Q1.

A person purchased an article for Rs. 80 and sold it for Rs. 100.Find his % profit.
Sol:
CP of the article = Rs. 80
SP of the article = Rs. 100
Profit of the person = 100-80 = Rs. 20
% Profit of the person = Profit /CP×100
%P = 20/80×100
%P = 25%

Trick:
%P = 20/80×100 = 25%

Q2.

A dishonest shopkeeper sells goods at his cost price but uses a weight of 900 gm for a kg. weight. Find his gain percent.

Sol:
The Cp of Shopkeeper = 900 gm
The Sp of Shopkeeper
= 1000 gm (1kg = 1000 gm)
The profit of shopkeeper
= 1000 -900 = 100 gm
% profit shopkeeper
= $^{\text{Profit of shopkeeper}}/_{\text{CP of shopkeeper}}\times 100$
%P = $^{100}/_{900}\times 100 = 11^{1}/_{9}\%$

Q3.

A person got 5% loss by selling an article for Rs. 1045. At what price should the article be sold to earn 5% profit ?
Sol:
Trick :
New SP = 1045/95×105 = 1155

Q4.

A person sold an article at profit of 12%. If he had sold it Rs. 3.60 more, he would have gain 18%. What is the cost price ?
Sol:
Trick :
CP = 3.60/6×100 = Rs. 60

Q5.

If the CP of 12 articles is equal to the SP of 9 articles. Find the gain or loss.
Sol : Let the CP of each article be Rs. 1
Then CP of 9 articles = Rs. 9
SP of 9 articles = Rs. 12
Gain % = $^{3}/9\times 100 = 33^{1}/_{3}\%$

5 Simple and Compound Interest

Basic Concept Starts From Here : Click Here

Q1.

At what rate of interest per annum will a sum double itself in 8 years ?
Sol:
Trick :

$$R = \left(\frac{N-1}{T}\right) \times 100$$

$$= \frac{2-1}{8} \times 100$$

$$= 12.5\%$$

Q2.

A sum of money double itself at compound interest in 15 years. In how many years will it become eight times.
Trick :

$$n_2 = (n_1)^{\frac{t_2}{t_1}}$$

n = no. of times

t = number of years

$$8 = (2)^{\frac{t_2}{15}}$$

$$2^3 = (2)^{\frac{t_2}{15}}$$

$$\frac{t_2}{15} = \frac{3}{1}$$

t_2 = 45 years

#6 Ratio and Proportion

Q1.

The ratio between the length and the breadth of a rectabgular field is 5:4 respectively. If the perimeter of that field is 360 meters. what is the breadth of that field in meters ?
Sol :
Perimeter = 2(5+4) = 18
Mean value of 18 = 360
Breadth = $^{360}/_{18} \times 4$ = 80 meters

Q2.

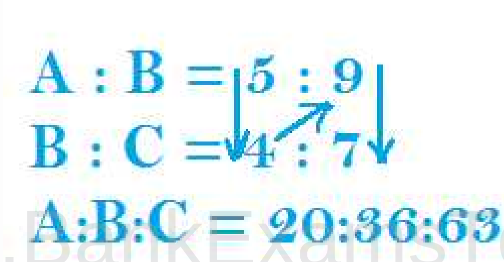
A bag contains 50 P, 25 P and 10 P coins in the ratio 5:9:4 amounting to Rs. 206. Find the number of coins of each type.
Sol:
Let the number of 50P,25P and 10P coins be 5x,9x and 4x respectively
$5x/2+9x/4+4x/10 = 206$
$50x + 45x + 8x = 4120$
$103x = 4120$
$x = 40$
No. of 50 P coins = 5×40 = 200
No. of 25 P coins = 4×40 = 160
No. of 10 P coins = 9×40 = 360

Q3.

A mixture contains alcohol and water in the ratio of 4:3. If 5 liters of water is added to the mixture the ratio becomes 4:5. Find the quantities of alcohol in the given mixture.
Sol:
Let the quantity of alcohal and water be 4x liters and 3x liters respectively.
$4x/_{3x+5} = 4/5$
$8x = 20$
$x = 2.5$

Q4.

A:B = 5:9 and B:C = 4:7 Find A:B:C.
Sol:

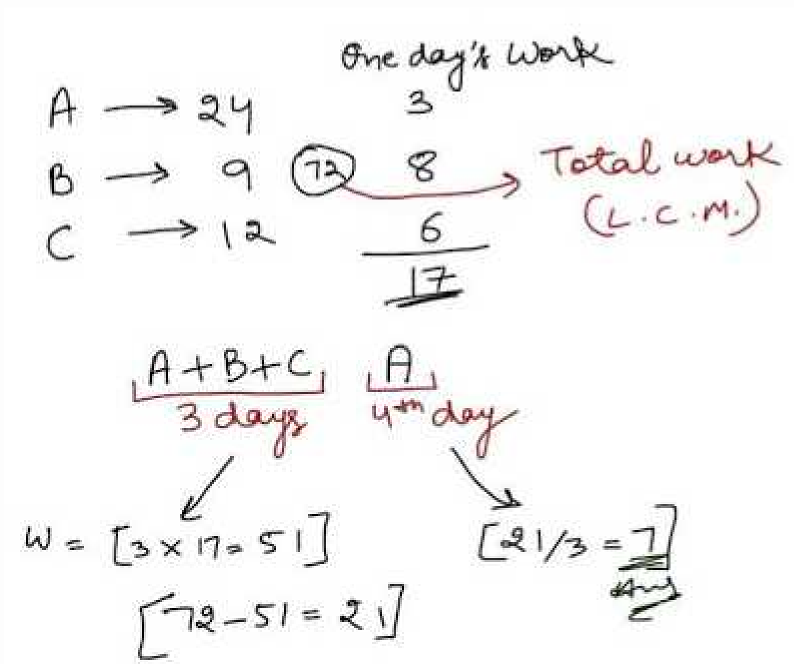


#7 Time and Work

Q1.

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 ?**(S.S.C.2003)**

Sol:



Q2.

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 ?

(Bank PO,2004)

Sol:

X 20 3

60

Y 12 5

$4 \times 3 = 12$

$60 - 12 = 48$

$\frac{48}{6} = 6$

$6 + 4 = 10$ days

Q3.

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

Sol :

A 2

12

B 12 1

$\frac{}{3}$

$12/3 = 4$

#8 Time, Speed and Distance

CONCEPTS

1) There is a relationship between speed, distance and time:

Speed = Distance / Time OR

Distance = Speed* Time

2) Average Speed = 2xy / x+y

where x km/hr is a speed for certain distance and y km/hr is a speed at for same distance covered.

**** Remember that average speed is not just an average of two speeds i.e. x+y/2. It is equal to 2xy / x+y

3) Always remember that during solving questions units must be same. Units can be km/hr, m/sec etc.

**** Conversion of km/ hr to m/ sec and m/ sec to km/ hr

x km/ hr = (x* 5/18) m/sec i.e. u just need to multiply 5/18

Similarly, x m/sec = (x*18/5) km/sec

4) As we know, Speed = Distance/ Time. Now, if in questions Distance is constant then speed will be inversely proportional to time i.e. if speed increases ,time taken will decrease and vice versa.

TIME AND DISTANCE PROBLEMS

Problem 1: A man covers a distance of 600m in 2min 30sec. What will be the speed in km/hr?

Solution: Speed =Distance / Time
⇒ Distance covered = 600m, Time taken = 2min 30sec = 150sec
Therefore, Speed= 600 / 150 = 4 m/sec
⇒ 4m/sec = (4*18/5) km/hr = 14.4 km/ hr.

Problem 2: A boy travelling from his home to school at 25 km/hr and came back at 4 km/hr. If whole journey took 5 hours 48 min. Find the distance of home and school.

Solution: In this question, distance for both speed is constant.

⇒ Average speed = (2xy/ x+y) km/hr, where x and y are speeds

⇒ Average speed = (2*25*4)/ 25+4 =200/29 km/hr

Time = 5hours 48min= 29/5 hours

Now, Distance travelled = Average speed * Time

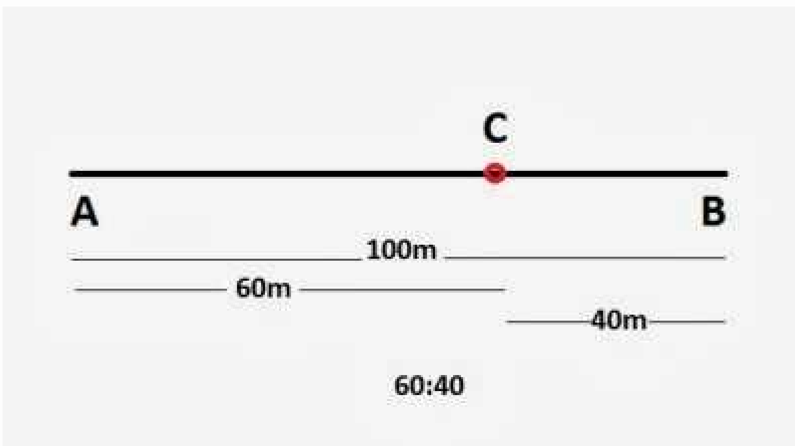
⇒ Distance Travelled = (200/29)*(29/5) = 40 km

Therefore distance of school from home = 40/2 = 20km.

Problem 3: Two men start from opposite ends A and B of a linear track respectively and meet at point 60m from A. If AB= 100m. What will be the ratio of speed of both men?

Solution: According to this question, time is constant. Therefore, speed is directly proportional to distance.

Speed∝Distance



⇒ Ratio of distance covered by both men = 60:40 = 3:2

⇒ Therefore, Ratio of speeds of both men = 3:2

Problem 4: A car travels along four sides of a square at speeds of 200, 400, 600 and 800 km/hr. Find average speed.

Solution: Let x km be the side of square and y km/hr be average speed

Using basic formula, Time = Total Distance / Average Speed

x/200 + x/400 + x/600 + x/800 = 4x/y ⇒ 25x/ 2400 = 4x/ y⇒ y= 384

⇒ Average speed = 384 km/hr

Number system

Natural Numbers: 1, 2, 3, 4…..
Whole Numbers: 0, 1, 2, 3, 4…..
Integers: ….-2, -1, 0, 1, 2 …..

Rational Numbers: Any number which can be expressed as a ratio of two integers for example a p/q format where 'p' and 'q' are integers. Proper fraction will have (p<q) and improper fraction will have (p>q)

Factors: A positive integer 'f' is said to be a factor of a given positive integer 'n' if f divides n without leaving a remainder. e.g. 1, 2, 3, 4, 6 and 12 are the factors of 12.

Prime Numbers: A prime number is a positive number which has no factors besides itself and unity.

Composite Numbers: A composite number is a number which has other factors besides itself and unity.

Factorial: For a natural number 'n', its factorial is defined as: n! = 1 x 2 x 3 x 4 x .... x n (Note: 0! = 1)

Absolute value: Absolute value of x (written as |x|) is the distance of 'x' from 0 on the number line. |x| is always positive. |x| = x for x > 0 OR -x for x < 0

Laws of Indices

$a^m \times a^n = a^m + n$

$a^m \div a^n = a^m \quad n$

$a^{(m)n} = a^{mn}$

$a^{1/m} = \sqrt[m]{a}$

$a \quad ^m = \frac{1}{a^m}$

$a^{m/n} = \sqrt[n]{a^m}$

$a^0 = 1$

HCF and LCM

For two numbers, HCF x LCM = product of the two.

HCF of Fractions = $\frac{HCF\ of\ Numerator}{LCM\ of\ Denominator}$

LCM of Fractions = $\frac{LCM\ of\ Numerator}{HCF\ of\ Denominator}$

Relatively Prime or Co-Prime Numbers: Two positive integers are said to be relatively prime to each other if their highest common factor is 1.

Divisibility Rules

A number is divisible by: 2, 4 & 8 when the number formed by the last, last two,last three digits are divisible by 2,4 & 8 respectively. 3 & 9 when the sum of the digits of the number is divisible by 3 & 9 respectively.

11 when the difference between the sum of the digits in the odd places and of those in even places is 0 or a multiple of 11.

6, 12 & 15 when it is divisible by 2 and 3, 3 and 4 & 3 and 5 respectively.

7, if the number of tens added to five times the number of units is divisible by 7.

13, if the number of tens added to four times the number of units is divisible by 13.

19, if the number of tens added to twice the number of units is divisible by 19.

Algebraic Formulae

$a^3 \pm b^3$ = (a ± b) ($a^2 \mp$ ab + b^2). Hence, $a^3 \pm b^3$ is divisible by ((a ± b) and ($a^2 \pm$ ab + b^2).

$a^n \quad b^n$ = (a b) ($a^{n \quad 1}$ + $a^{n \quad 2}$b + $a^{n \quad 3}b^2$ + … + $b^{n \quad 1}$) (for all n). Hence, $a^n \quad b^n$ is divisible by a b for all n.

$a^n \quad b^n$ = (a + b) ($a^{n \quad 1}$ + $a^{n \quad 2}$b + $a^{n \quad 3}b^2$ + … $b^{n \quad 1}$) (n even). Hence, $a^n \quad b^n$ is divisible by a + b for even n.

$a^n + b^n$ = (a + b) (a^{n-1} a^{n-2}b + $a^{n-3}b^2$ + … + b^{n-1}) (n   odd). Hence, $a^n + b^n$ is divisible by a + b for odd n.

$a^3 + b^3 + c^3$ 3abc = (a + b + c) ($a^2 + b^2 + c^2$ ab   ac   bc) Hence, $a^3 + b^3 + c^3$ = 3abc if a + b +c = 0

Average

Simple Average = $\frac{Sum\ of\ elements}{Number\ of\ elements}$

Weighted Average = $\frac{W1 \times 1 + W2x2 + \cdots + Wn \times n}{W1 + W2 + \cdots + Wn \times n}$

Arithmetic Mean = (a1 + a2 + a3 …an)/n

Geometric Mean = $\sqrt[n]{a1\ a2 \ldots an}$

Harmonic Mean = $\frac{n}{\frac{1}{x1} + \frac{1}{x2} + \cdots + \frac{1}{xn}}$

Percentage

Fractions and their percentage equivalents:

Fraction	Percentage	Fraction	Percentage
1/2	50%	1/9	11.11%
1/3	33.33%	1/10	10%
1/4	25%	1/11	9.09%
1/5	20%	1/12	8.33%
1/6	16.66%	1/13	7.69%
1/7	14.28%	1/14	7.14%
1/8	12.5%	1/15	6.66%

Interest

Amount = Principal + Interest
Simple Interest = PNR/100

Compound Interest = P$\left(1 + \frac{r}{100}\right)^n - P$

Population formula P' = P$\left(1 \pm \frac{r}{100}\right)^n$

Depreciation formula = initial value × $\left(1 - \frac{r}{100}\right)^n$

Growth and Growth Rates

Absolute Growth = Final Value – Initial Value
Growth rate for one year period = $\frac{Final\ value - Initial\ value}{Initial\ value}$ × 100

SAGR or AAGR = $\frac{Final\ value - Initial\ value}{No.of\ years}$ × 100

CAGR = $\left(\frac{Final\ value\ - Initial\ value}{Initial\ value}\right)\frac{1}{No.of\ years}$ 1

Profit and Loss

%Profit/Loss = $\frac{Selling\ Price - Cost\ Price}{Initial\ value}\ x$ 100

In case false weights are used while selling,

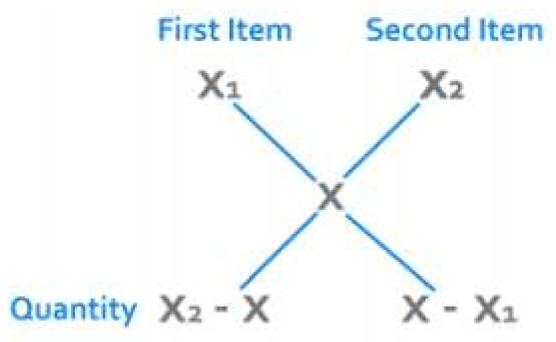
% Profit = $\left(\frac{Claimed\ Weight - Actual\ Weight}{Actual\ Weight}\right.$ 1) x 100

Discount % = $\frac{Marked\ Price - Selling\ Price}{Marked\ Price}$ × 100

Mixtures and Alligations

Alligation – The ratio of the weights of the two items mixed will be inversely proportional to the deviation of attributes of these two items from the average attribute of the resultant mixture

$\frac{Quantity\ of\ first\ item}{Quantity\ of\ second\ item} = \frac{x_2 - x}{x - x_1}$



Ratio and Proportion

Compounded Ratio of two ratios a/b and c/d is ac/bd,
Duplicate ratio of a : b is $a^2 : b^2$
Triplicate ratio of a : b is $a^3 : b^3$
Sub-duplicate ratio of a : b is $\sqrt{a} : \sqrt{b}$
Sub-triplicate ratio of a : b is $\sqrt[3]{a} : \sqrt[3]{b}$
Reciprocal ratio of a : b is b : a

Componendo and Dividendo

If $\frac{a}{b} = \frac{c}{d}$ & a $\neq$ b then $\frac{a+b}{a-b} = \frac{c+d}{c-d}$

Four (non-zero) quantities of the same kind a, b, c, d are said t o be in proportion if a/b = c/d.
The non-zero quantities of the same kind a, b, c, d are said be in continued proportion if a/b = b/c = c/d.

Proportion

a, b, c , d are said to be in proportion if $\frac{a}{b} = \frac{c}{d}$

a, b , c, d are said to be in continued proportion if $\frac{a}{b} = \frac{b}{c} = \frac{c}{d}$

Time Speed and Distance

Speed = Distance / Time

1 kmph = 5/18 m/sec; 1 m/sec = 18/5 kmph

$$Speed_{Avg} = \frac{Total\ distance\ covered}{Total\ time\ taken} = \frac{d_1 + d_2 + d_3 \dots d_n}{t_1 + d_1}$$

If the distance covered is constant then the average speed is Harmonic Mean of the values ($s_1, s_2, s_3 \dots s_n$)

$$Speed_{Avg} = \frac{n}{\frac{1}{s_1} + \frac{1}{s_2} + \frac{1}{s_3} \dots \frac{1}{s_n}}$$

$Speed_{Avg} = \frac{2s_1s_2}{s_1 + s_2}$ (for two speeds)

If the time taken is constant then the average speed is Arithmetic Mean of the values ($s_1, s_2, s_3 \dots s_n$)

$$Speed_{Avg} = \frac{s_1, s_2, s_3 \dots s_n}{n}$$

$Speed_{Avg} = \frac{s_1 + s_2}{2}$ (for two speeds)

Races & Clocks

Linear Races

Winner's distance = Length of race

Loser's distance = Winner's distance – (beat distance + start distance)

Winner's time = Loser's time – (beat time + start time)

Deadlock / dead heat occurs when beat time = 0 or beat distance = 0

Circular Races

Two people are running on a circular track of length L with speeds a and b in the same direction

Time for 1st meeting = $\frac{L}{a - b}$

Time for 1st meeting at the starting point = LCM ($\frac{L}{a}$, $\frac{L}{b}$)

Clocks: To solve questions on clocks, consider a circular track of length 360°. The minute hand moves at a speed of 6° per min and the hour hand moves at a speed of ½° per minute.

Time and Work

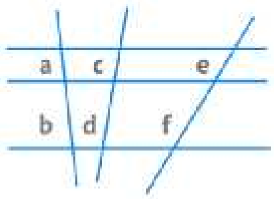
If a person can do a certain task in t hours, then in 1 hour he would do 1/t portion of the task.

A does a particular job in 'a' hours and B does the same job in 'b' hours, together they will take $\frac{ab}{a+b}$ hours

A does a particular job in 'a' hours more than A and B combined whereas B does the same job in 'b' hours more than A and B combined, then together they will take $\sqrt{ab}$ hours to finish the job.

Geometry

Lines and Angles



- Sum of the angles in a straight line is 180°
- Vertically opposite angles are always equal.
- If any point is equidistant from the endpoints of a segment, then it must lie on the perpendicular bisector.

- When two parallel lines are intersected by a transversal, corresponding angles are equal, alternate angles are equal and co-interior angles are supplementary. (All acute angles formed are equal to each other and all obtuse angles are equal to each other)

Fact

- The ratio of intercepts formed by a transversal intersecting three parallel lines is equal to the ratio of corresponding intercepts formed by any other transversal.

$$\frac{a}{b} = \frac{c}{d} = \frac{e}{f}$$

Triangles

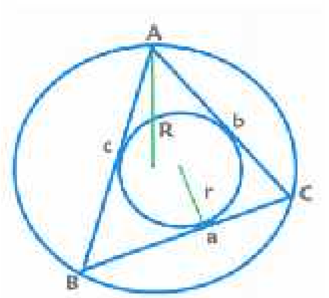
- Sum of interior angles of a triangle is 180° and sum
of exterior angles is 360°.

- Exterior Angle = Sum of remote interior angles.

- Sum of two sides is always greater than the third side and the difference of two sides is always lesser than the third side.

- Side opposite to the biggest angle is longest and the side opposite to the smallest angle is the shortest.

Area of a triangle:



= ½ x Base x Height
= ½ x Product of sides x Sine of included angle
= $\sqrt{s(s-a)(s-b)(s-c)}$ here s is the semi perimeter
[s = (a+b+c)/2]
= r x s [r is radius of incircle]
= $\frac{abc}{4R}$ [R is radius of circumcircle]

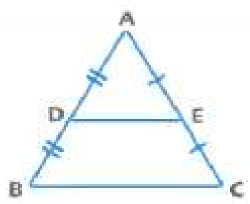
Median
A Median of a triangle is a line segment joining a vertex to the midpoint of the opposing side. The three medians intersect in a single point, called the Centroid of the triangle. Centroid divides the median in the ratio of 2:1

Altitude
An Altitude of a triangle is a straight line through a vertex and perpendicular to the opposite side or an extension of the opposite side. The three altitudes intersect in a single point, alled the Orthocenter of the triangle.

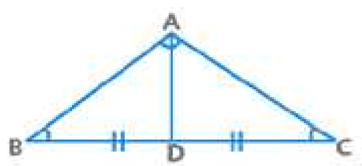
Perpendicular Bisector
A Perpendicular Bisector is a line that forms a right angle with one of the triangle's sides and intersects that side at its midpoint. The three perpendicular bisectors intersect in a single point, called the Circumcenter of the triangle. It is the center of the circumcircle which passes through all the vertices of the triangle.

Angle Bisector
An Angle Bisector is a line that divides the angle at one of the vertices in two equal parts. The three angle bisectors intersect in a single point, called the Incenter of the triangle. It is the center of the incircle which touches all sides of a triangle.

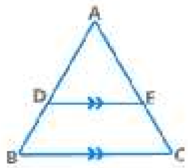
Theorems
Mid Point Theorem: The line joining the midpoint of any two sides is parallel to the third side and is half the length of the third side.



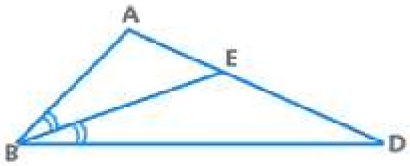
Apollonius' Theorem: $AB^2 + AC^2 = 2(AD^2 + BD^2)$



Basic Proportionality Theorem: If DE || BC, then AD/DB = AE/EC

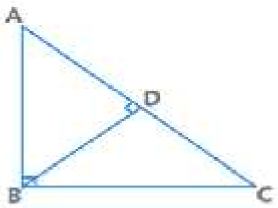


Interior Angle Bisector Theorem: AE/ED = BA/BD

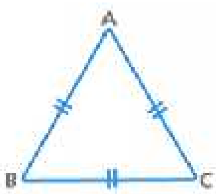


Special Triangles
Right Angled Triangle:

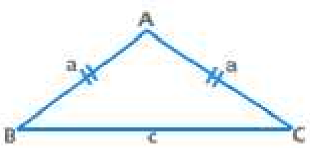
ABC ≈ ADB ≈ BDC
BD^2 = AD x DC and AB x BC = BD X DC



Equilateral Triangle:
All angles are equal to 60°. All sides are equal also.

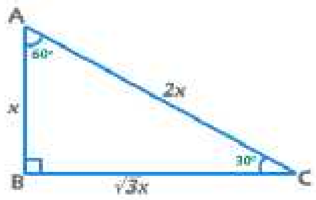


Isosceles Triangle:
Angles equal to opposite sides are equal.
Area = $\frac{c}{4}\sqrt{4a^2 - c^2}$



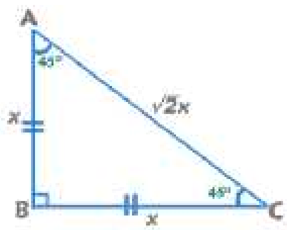
30°-60°-90° Triangle

Area = $\frac{\sqrt{3}}{2} \times x^2$

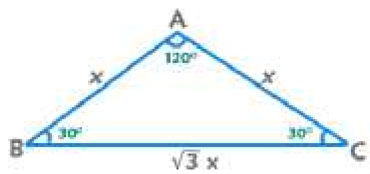


45°-45°-90° Triangle

Area = $\frac{x^2}{2}$



30°-30°-120° Triangle
Area = $\frac{\sqrt{3}}{4} \times x^2$



Similarity of Triangles

Two triangles are similar if their corresponding angles are congruent and corresponding sides are in proportion.

Tests of similarity: (AA / SSS / SAS)

- For similar triangles, if the sides are in the ratio of a:b
- Corresponding heights are in the ratio of a:b
- Corresponding medians are in the ratio of a:b
- Circumradii are in the ratio of a:b
- Inradii are in the ratio of a:b
- Perimeters are in the ratio of a:b
- Areas are in the ratio a2 : b2

Congruency of Triangles
Two triangles are congruent if their corresponding sides and angles are congruent.

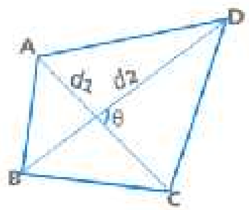
Tests of congruence: (SSS / SAS / AAS / ASA)
All ratios mentioned in similar triangle are now 1:1

Polygons

- Sum of interior angles = (n - 2) x 180° = (2n - 4) x 90°
- Sum of exterior angles = 360°
- Number of diagonals = $^nC_2 - n = \frac{n(n-3)}{2}$
- Number of triangles which can be formed by the vertices = $^nC_3$

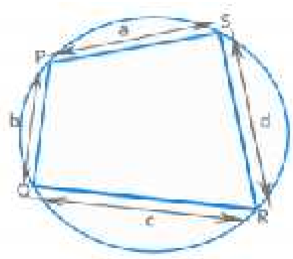
Regular Polygon :
- If all sides and all angles are equal, it is a regular polygon.
- All regular polygons can be inscribed in or circumscribed about a circle.
- Area = ½ × Perimeter × Inradius {Inradius is the perpendicular from centre to any side}
- Each Interior Angle = $\frac{(n-2)180°}{n}$; Exterior = $\frac{360°}{n}$

Quadrilaterals :



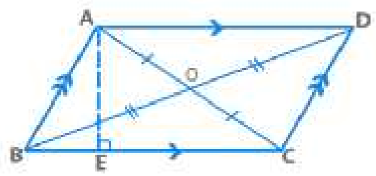
- Sum of the interior angles = Sum of the exterior angles = 360°
- Area for a quadrilateral is given by $\frac{1}{2}$ $^d1$ $^d2$ Sin θ

Cyclic Quadrilateral



- If all vertices of a quadrilateral lie on the circumference of a circle, it is known as a cyclic quadrilateral.
- Opposite angles are supplementary
- Area = $\sqrt{(s-a)(s-b)(s-c)(s-d)}$ where s is the semi perimeter s = $\frac{a+b+c+d}{2}$

Parallelogram

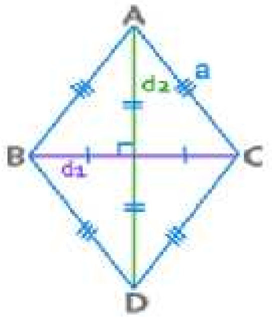


- Opposite sides are parallel and congruent.
- Opposite angles are congruent and consecutive angles are supplementary.
- Diagonals of a parallelogram bisect each other.
- Perimeter = 2(Sum of adjacent sides);
- Area = Base x Height = AD x BE

Facts
- Each diagonal divides a parallelogram in two triangles of equal area.
- Sum of squares of diagonals = Sum of squares of four sides
  - o $AC^2 + BD^2 = AB^2 + BC^2 + CD^2 + DA^2$

- A Rectangle is formed by intersection of the four angle bisectors of a parallelogram.

Rhombus



- A parallelogram with all sides equal is a Rhombus. Its diagonals bisect at 90°.
- Perimeter = 4a; Area = $\frac{1}{2}$ d_1 d_2
- Area = d x $\sqrt{a^2 - (\frac{d}{2})^2}$

Rectangle

A parallelogram with all angles equal (90°) is a Rectangle. Its diagonals are congruent.

- Perimeter = 2(l+b)
- Area = lb

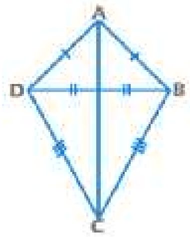
Square

A parallelogram with sides equal and all angles equal is a square. Its diagonals are congruent and bisect at 90°.

- Perimeter = 4a
- Area = a^2
- Diagonals = a $\sqrt{2}$

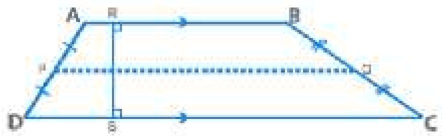
Fact: From all quadrilaterals with a given area, the square has the least perimeter. For all quadrilaterals with a given perimeter, the square has the greatest area.

Kite



- Two pairs of adjacent sides are congruent.
- The longer diagonal bisects the shorter diagonal at 90°.
- Area = $\frac{product\ of\ diagonals}{2}$

Trapezium / Trapezoid



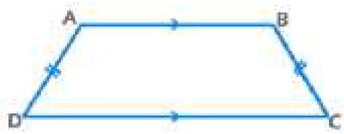
- A quadrilateral with exactly one pair of sides parallel is known as a Trapezoid. The parallel sides are known as bases and the non-parallel sides are known as lateral sides.
- Area = $\frac{1}{2}$ × (Sum of parallel sides) × Height
- Median, the line joining the midpoints of lateral sides, is half the sum of parallel sides.

Fact

- Sum of the squares of the length of the diagonals = Sum of squares of lateral sides + 2 Product of bases.

AC^2 + BD^2 = AD^2 + BC^2 + 2 × AB × CD

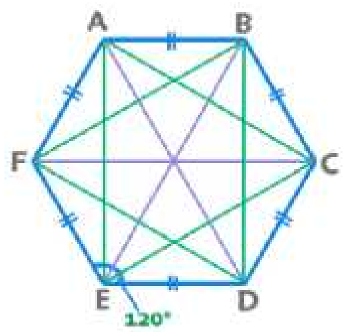
Isosceles Trapezium



The non-parallel sides (lateral sides) are equal in length. Angles made by each parallel side with the lateral sides are equal.

Facts: If a trapezium is inscribed in a circle, it has to be an isosceles trapezium. If a circle can be inscribed in a trapezium, Sum of parallel sides = Sum of lateral sides.

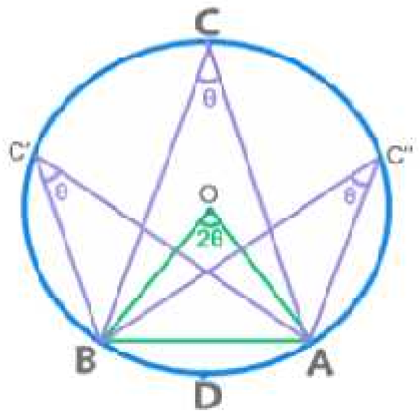
Hexagon (Regular)



- Perimeter = 6a; Area = $\frac{3\sqrt{3}}{2} \times a^2$
- Sum of Interior angles = 720°.
- Each Interior Angle = 120°. Exterior = 60°
- Number of diagonals = 9 {3 big and 6 small}
- Length of big diagonals (3) = 2a
- Length of small diagonals (6) = $\sqrt{3}$ a
- Area of a Pentagon = 1.72 a^2
- Area of an Octagon = 2($\sqrt{2}$ + 1) a^2

Facts: A regular hexagon can be considered as a combination of six equilateral triangles. All regular polygons can be considered as a combination of 'n' isosceles triangles.

Circles

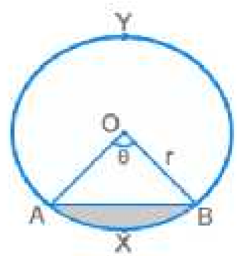


Diameter = 2r; Circumference = 2πr; Area = πr^2

Chords equidistant from the centre of a circle are equal. A line from the centre, perpendicular to a chord, bisects the chord. Equal chords subtend equal angles at the centre.

The diameter is the longest chord of a circle. A chord /arc subtends equal angle at any point on the circumference and double of that at the centre.

Chords / Arcs of equal lengths subtend equal angles.

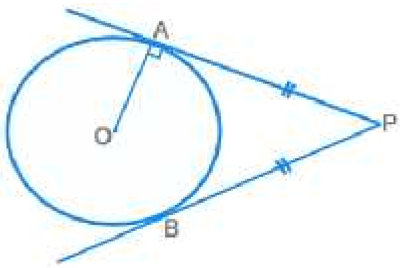


Chord AB divides the circle into two parts: Minor Arc AXB and Major Arc AYB

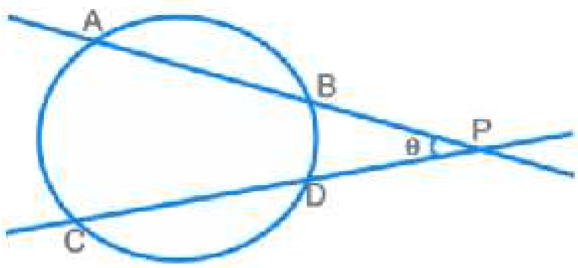
- Measure of arc AXB = ∠AOB = θ
- Length (arc AXB) = $\frac{\theta}{360°} \times 2\pi r$
- Area (sector OAXB) = $\frac{\theta}{360°} \times \pi r^2$
- Area of Minor Segment = Shaded Area in above figure

- Area of Sector OAXB - Area of ΔOAB
- $r^2\ [\frac{\pi\theta}{360^\circ} \quad \frac{sin\theta}{2}]$

Properties of Tangents, Secants and Chords

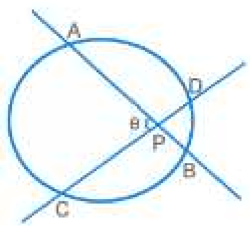


The radius and tangent are perpendicular to each other. There can only be two tangents from an external point, which are equal in length PA = PB



PA × PB = PC × PD

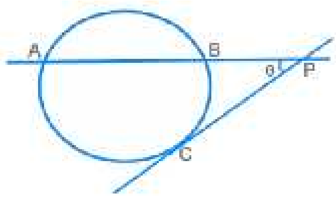
= $\frac{1}{2}$ [m(Arc AC) – m(Arc BD)]



PA × PB = PC × PD

= $\frac{1}{2}$ [m(Arc AC) + m(Arc BD)]

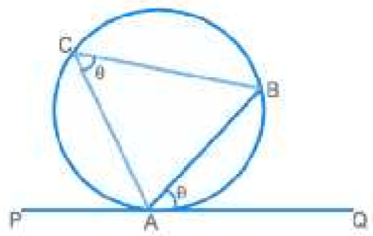
Properties



PA × PB = PC^2

= $\frac{1}{2}$ [m(Arc AC) - m(Arc BC)]

Alternate Segment Theorem

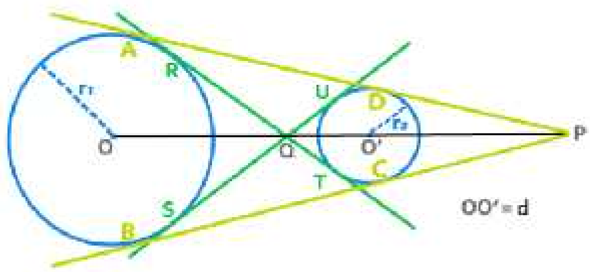


The angle made by the chord AB with the tangent at A (PQ) is equal to the angle that it subtends on the opposite side of the circumference.

∠BAQ = ∠ACB

Common Tangents

Two Circles	No. of Common Tangents	Distance Between Centers (d)
One is completely inside other	0	< r1 r2
Touch internally	1	= r1 r2
Intersect	2	r1 r2 < d < r1 + r2
Touch externally	3	= r1 + r2
One is completely outside other	4	> r1 + r2



- Length of the Direct Common Tangent (DCT) AD = BC = $\sqrt{d^2 - (r1 - r2)^2}$
- Length of the Transverse Common Tangent (TCT)

RT = SU = $\overline{d^2 \quad (r1 + r2)^2}$

Venn Diagram: A venn diagram is used to visually represent the relationship between various sets. What do each of the areas in the figure represent?

I – only A; II – A and B but not C; III – Only B; IV – A and C but not B; V – A and B and C; VI – B and C but not A; VII – Only C
n(A∪B∪C) = n(A) + n(B) + n(C) — n(A∩B) — n(A∩C) - n(B∩C) + n(A∩B∩C)

Permutation and Combination

When two tasks are performed in succession, i.e., they are connected by an 'AND', to find the total number of ways of performing the two tasks, you have to MULTIPLY the individual number of ways. When only one of the two tasks is performed, i.e. the tasks are connected by an 'OR', to find the total number of ways of performing the two tasks you have to ADD the individual number of ways.

Eg: In a shop there are‘d’ doors and ‘w’ windows.

Case1: If a thief wants to enter via a door or window, he can do it in – (d+w) ways.

Case2: If a thief enters via a door and leaves via a window, he can do it in – (d x w) ways.

Linear arrangement of ‘r’ out of ‘n’ distinct items (^np_r):
The first item in the line can be selected in 'n' ways AND the second in (n — 1) ways AND the third in (n — 2) ways AND so on. So, the total number of ways of arranging 'r' items out of 'n' is

(n)(n - 1)(n — 2)...(n - r + 1) = $\frac{n!}{n \quad r\,!}$

Circular arrangement of 'n' distinct items: Fix the first item and then arrange all the other items linearly with respect to the first item. This can be done in (n 1)! ways.

Probability

P(A) = $\frac{Number\ of\ favourable\ outcomes}{Total\ number\ of\ outcomes}$

For Complimentary Events: P(A) + P(A’) = 1
For Exhaustive Events: P(A) + P(B) +P(C)… = 1

Addition Rule:
P (A U B) = P(A) + P(B) – P(A∩B)

For Mutually Exclusive Events P(A∩ B) = 0
P (A U B) = P(A) + P(B)

Multiplication Rule: P(A∩B) = P(A) P(B/A) = P(B) P(A/B)

For Independent Events P(A/B) = P(B) and P(B/A) = P(B)
P(A∩B) = P(A).P(B)
P(A U B) = P(A) + P(B) – P(A).P(B)

Sequence, Series and Progression

Arithmetic Progression
$a_n = a_1 + (n \quad 1)d$
$s_n = \frac{n}{2}(a_1 + a_n) = \frac{n}{2}(2a_1 + (n \quad 1)d$

Geometric Progression

$a_n = ar^{n \quad 1}$
$s_n = \frac{a(1 \quad r^n}{1 \quad r}$
Sum till infinite terms = $\frac{a}{1 \quad r}$ (valid only when r < 1)

QUANTITATIVE ANALYSIS APPROACHES TO QUALITATIVE DATA: WHY, WHEN AND HOW - *Savitri Abeyasekera*

Statistical Services Centre, University of Reading, P.O. Box 240,
Harry Pitt Building, Whiteknights Rd., Reading RG6 6FN, UK.
Phone 0118 931 8459, e-mail s.abeyasekera@rdg.ac.uk

1. Introduction

In many research studies involving the use of participatory tools, much of the information gathered is of a qualitative nature. Some of this will contribute to addressing specific research questions, while other parts provide a general understanding of peoples' livelihoods and constraints. The aim of this paper is to focus on the former. The paper concentrates on some quantitative analysis approaches that can be applied to qualitative data. A major objective is to demonstrate how qualitative information gathered during PRA work can be analysed to provide conclusions that are applicable to a wider target population. Appropriate sampling is of course essential for this purpose, and it will be assumed in what follows that any sampling issues have been satisfactorily addressed to allow generalization of results from the data analysis to be meaningful.

Most emphasis in this paper will be given to the analysis of data that can be put in the form of ranks, but some analysis approaches suitable for other types of qualitative data will also be considered. The general questions of *why* and *when* are discussed first, but the main focus will be on issues relating to the *how* component of data analysis. It is not the intention to present implementation details of any statistical analysis procedures, nor to discuss how output resulting from the application of statistical software could be interpreted. The aim is to highlight a few types of research questions that can be answered on the basis of qualitative information, to discuss the types of data format that will lend themselves readily to appropriate data analysis procedures and to emphasise how the data analysis can be benefited by recognizing the data structure and paying attention to relevant sources of variation.

2. Why use quantitative approaches?

Quantitative methods of data analysis can be of great value to the researcher who is attempting to draw meaningful results from a large body of qualitative data. The main beneficial aspect is that it provides the means to separate out the large number of confounding factors that often obscure the main qualitative findings. Take for example, a study whose main objective is to look at the role of non-wood tree products in livelihood strategies of smallholders. Participatory discussions with a number of focus groups could give rise to a wealth of qualitative information. But the complex nature of inter-relationships between factors such as the marketability of the products, distance from the road, access to markets, percent of income derived from sales, level of women participation, etc., requires some degree of quantification of the data and a subsequent analysis by quantitative methods. Once such quantifiable components of the data are separated, attention can be focused on characteristics that are of a more individualistic qualitative nature.

Quantitative analytical approaches also allow the reporting of summary results in numerical terms to be given with a specified degree of confidence. So for example, a statement such as "45% of households use an unprotected water source for drinking" may be enhanced by providing 95% confidence limits for the true proportion using unprotected water as ranging from 42% to 48%. Here it is possible to say with more than 95% confidence that about half the households had no access to a protected water supply, since the confidence interval lies entirely below 50%.

Likewise, other statements which imply that some characteristic differed across two or more groups, e.g. that "infant mortality differed significantly between households with and without access to a community based health care clinic", can be accompanied by a statement giving the chance (probability) of error (say p=0.002) in this statement, i.e. the chance that the conclusion is incorrect. Thus the use of quantitative procedures in analysing qualitative information can also lend greater credibility to the research findings by providing the means to quantify the degree of confidence in the research results.

3. When are quantitative analysis approaches useful?

Quantitative analysis approaches are meaningful only when there is a need for data summary across many repetitions of a participatory process, e.g. focus group discussions leading to seasonal calendars, venn diagrams, etc. Data summarisation in turn implies that some common features do emerge across such repetitions. Thus the value of a quantitative analysis arises when it is possible to identify features that occur frequently across the many participatory discussions aimed at studying a particular research theme. If there are common strands that can be extracted and subsequently coded into a few major categories, then it becomes easier to study the more interesting qualitative aspects that remain.

For example, suppose it is of interest to learn about peoples' perceptions of what poverty means for them. It is likely that the narratives that result from discussions across several communities will show some frequently occurring answers like experiencing periods of food shortage, being unable to provide children with a reasonable level of education, not owning a radio, etc. Such information can be extracted from the narratives and coded. Quantitative approaches provide the opportunity to study this coded information first and then to turn to the remaining qualitative components in the data. These can then be discussed more easily, unhindered by the quantitative components.

Quantitative analysis approaches are particularly helpful when the qualitative information has been collected in some structured way, even if the actual information has been elicited through participatory discussions and approaches. An illustration is provided by a daily activity diary study (Abeyasekera and Lawson-McDowall, 2000) conducted as part of the activities of a Farming Systems Integrated Pest Management Project in Malawi. This study was aimed at determining how household members spend their time throughout the year. The information was collected in exercise books in text format by a literate member of a household cluster and was subsequently coded by two research assistants by reading through many of the diaries and identifying the range of different activities involved. Codes 1, 2, 3, 4, … were then allocated to each activity. In this study, the information was collected in quite a structured way since the authors of the diaries were asked to record daily activities of every household member by dividing the day into four quarters, i.e. morning, mid morning, afternoon and late evening, and recording the information separately within each quarter.

4. Data Structure

The data structure plays a key role in conducting the correct analysis with qualitative data through quantitative methods. The process is greatly facilitated by some attention to the data structure at the time of data collection. This does not imply any major change to the numerous excellent methodologies that researchers undertake when gathering qualitative information. Data structure refers to the way in which the data the can be visualized and categorized in different ways, largely as a result of the method of data collection. For example, many research studies involve a wealth ranking exercise, and data may be collected from each wealth group. Your data is then structured by wealth categories. During data collection, additional structure may arise, for example, by villagers' level of access to natural resources.

You may also find that your data are structured in many other ways, for instance, (a) by community level variables such as by the presence/absence of a community school or a health care clinic; (b) by focus group variables such as the degree of women participation in the discussions, the degree of agreement with respect to specific issues, etc; and (c) by household level variables such as their primary source of income, gender of household head, etc.

Thinking about the data structure forces the researcher to focus on what constitutes replicates for data summarization, and it helps to identify the numerous factors that may have a bearing on those components of the qualitative information that cannot be coded. Often the replicates may be several focus group discussions. If the data are to be later summarised over all groups, then some effort is needed to ensure that the information is collected in the same systematic way each time. For example, a member of the research team may record the information that emerges from any participatory discussions in a semi-structured way. This systematization helps in regarding the sample, consisting of many focus groups, as a valid sample for later statistical analysis.

Considering the data structure also helps the researcher to recognize the different hierarchical levels at which the data resides, e.g. whether at community level, focus group level or household level. The data hierarchy plays a key role in data analysis as well as in computerizing the information collected. If spreadsheets are to be used, then the data at each level of the hierarchy has to be organized in a separate sheet in a rectangular array. However, it must be noted that hierarchical data structures are more appropriately computerized using a suitable database rather than as a series of spreadsheets.

An example of a simple data structure is provided in Table 1. Here there is structure between women since they come from five villages, they fall into one of four wealth groups, their household size is known, and they have been identified according to whether or not they earn wages by some means. The data should also be recognized as being hierarchical since the information resides, both at the "between women" level (e.g. whether wage earner) and at the "within woman" level, e.g. preference for the four oils. The data structure comes into play when quantitative analysis approaches are used to analyse the data. An example using ranks was chosen here since this paper focuses on ranks and scores to illustrate some quantitative data analysis procedures. One or other is often used in participatory work to address similar objectives.

Table 1. An example data set showing ranked preference to four types of oil by a number of women. (The full data set extends over 5 villages, with 6, 8, 5, 11 and 14 women interviewed per village)

Village	*Wealth group*	*Household size*	*Wage earner*	*Covo*	*Superstar*	*Market*	*Moringa*
1	2	6	Yes	3	1	4	2
1	1	3	No	2	4	3	1
1	1	7	Yes	4	3	2	1
1	1	3	Yes	2	4	3	1
1	3	4	No	4	2	1	3
.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.

5. Objectives that may be addressed through ranking/scoring methods

The *"how"* component of any analysis approach must be driven by the need to fulfill the research objectives, so we consider here some examples that may form sub-component objectives of a wider set of objectives. The following list gives a number of objectives that may be addressed by eliciting information in the form of ranks or scores.

(a) Identifying the most important constraints faced by parents in putting their children through school;

(b) Identifying womens' most preferred choice of oil for cooking;

(c) Assessing the key reasons for depletion of a fisheries resource;

(d) Identifying elements of government policies that cause most problems for small traders;

(e) Assessing participants' perceptions of the value of health information sources.

Part of a typical data set, corresponding to example (b), was shown in Table 1. The primary aim was to compare womens' preference for four different oil types. Such data may arise if the oils are presented to a number of women in each of several villages for use in cooking, and they are asked, several weeks later, to rank the items in order of preference. Here, the results merely represent an ordering of the items and no numerical interpretation can be associated with the digits 1, 2, 3, 4 representing the ranks.

An alternative to ranking is to conduct a scoring exercise. To determine the most preferred choice from a given set of items, respondents may be asked to allocate a number of counters (e.g. pebbles, seeds), say out of a maximum of five counters per item, to indicate their views on the importance of that item. The number allocated then provides a score, on a 0-5 scale with 0 being regarded as being "worst" or "of no importance". An example data set is shown in Table 2. The "scores" in this table represent farmers' own perception of the severity of the pest.

Table 2. An example data set showing scores given by farmers to the severity of pest attack on beans, large scores indicating greater severity.

Farmer	Ootheca	Pod borers	Bean stem maggot	Aphids
1	4	2	1	2
2	5	4	1	3
3	4	1	2	1
4	4	5	1	4
5	1	2	1	1
6	1	4	1	2
7	5	1	1	5
8	2	5	5	3
Mean	3.3	3.0	1.6	2.6

Addressing objectives of the type presented in this section often involve either a ranking or a scoring exercise. The discussion that follows is aimed at researchers who may want to understand and appreciate the advantages and limitations of these two forms of elicitation when addressing such objectives.

6. Ranks or scores?

Does it matter whether the information is extracted from ranks or scores? Generally, ranks are better for elicitation as it is always easier to judge whether one item is better or worse, more or less important, than another item. However, the ease with which the information can be collected must be balanced against the fact that the information cannot be directly analysed through quantitative means.

The main difficulty in using ranks is that they give no idea of "distance". Say for example that two respondents each give a higher rank for item E than item B. However, the first respondent might have thought E was only slightly better than B while the second thought E was a lot better than B. This information is not elicited with ranks. Thus it is not possible to attribute a "distance" measure to differences between numerical values given to the ranks in Table 1.

Scores on the other hand have a numerical meaning. Usually "best" or "good" in some respect is associated with larger scores, whereas in ranking exercises, "best" is always associated with a rank of 1. In studies concerning livelihood constraints or problem identification, high scores or a rank of 1 are associated with the "most severe" constraint or problem.

A second point is that scores can have an absolute meaning while ranks are always relative to the other items under consideration. So a rank of 1 is not necessarily a favoured item, it is just "better than the rest". For example, four items A, B, C, D, ranked as 2, 3, 1, 4 by a respondent could receive scores 2, 1, 3, 0 by the same respondent on a 0-10 scale where 10 represents "best". The lack of a standard scale for ranks makes the task of combining ranks over several respondents difficult unless effort is made to ask supplementary questions to elicit respondents' absolute views on the "best" and "worst" ranked items. Such additional information may give a basis on which to convert ranks to a meaningful set of scores, so that the resulting set of scores can be analysed. Sometimes both the ranks and the (approximate) scores can be analysed. If the results are similar, then this indicates that the ranks may be usefully processed on their own.

Ranks thus represent an ordering of a list of items according to their importance for the particular issue under consideration. In interpreting ranks, it is therefore necessary to keep in mind that the digits 1, 2, 3, … etc., allocated to represent ranks, have little numerical significance. Ties should normally be allowed, i.e. permitting two or more items to occupy "equal" positions in the ordered list. This is because it is usually unrealistic to oblige the respondent to make a forced choice between two items if she/he has no real preference for one over the other. Each item involved in a tie can be given the average value of ranks that would have been allocated to these items had they not been tied.

Thus for example, suppose six items A, B, C, D, E and F are to be ranked. Suppose item B is said to be the best; item C the worst; item F second poorest but not as bad as C; and the remaining items are about the same. Then the ranks for the six items A, B… F should be 3, 1, 6, 3, 3, 5. This set of ranks is obtained by using 3 as the average of ranks 2, 3 and 4, i.e. the ranks that items A, D and E would have got if the respondent had perceived some difference in these items. One reason for using the full range from 1 to 6 rather than ranking the items as 2, 1, 4, 2, 2, 3 is that misleading results will otherwise be obtained in any further data summaries which combine information across respondents. Fielding *et al* (1998) give a fuller discussion on the use of ties

The above discussion assumes that the ranking or scoring exercise is done on the basis of one identified criterion. More typically, a number of criteria are first identified to form the basis on which to compare and evaluate a set of items. For example, respondents may identify yield, seed size, cooking time, disease resistance and marketability as criteria for evaluating a number of pigeonpea varieties. Once suitable criteria have been chosen, items for evaluation are scored with respect to each criterion in turn. This is what is essentially referred to as matrix scoring (Pretty *et al*, 1995). It is common to use scores from 1 to 5 although a wider range can be useful because it will give better discrimination between the items.

During scoring exercises, the greatest challenge is for the researcher facilitating the process. He/she needs to ensure that respondents clearly understand what exactly the scores are meant to represent. For example in using scores in a variety evaluation trial, the facilitator must ensure respondents are clear between views such as

"I will give this variety a high score because I have seen it is high yielding under fertiliser application although I could never afford the seed or the required amount of fertiliser"; and

"I will give this variety a high score because it is performing very well compared to the local variety I used to grow".

Assuming that scores have been elicited unambiguously by a good facilitator, their major advantage over ranks is that they are numerically meaningful. Differences between scores given to different items show the strength of the preference for one item over the other. Scores provide a ranking of the items but also something extra - a usable distance measure between preferences for different items. The availability of a meaningful measurement scale also means that the resulting scores usually correspond easily to the objectives of the study, and can usefully be summarised across respondents.

Various forms of scoring methods exist (Maxwell and Bart, 1995). Fully open scoring, where each item to be scored can be given any value within a particular range (say 1-5) is the most flexible since it leads to observations that are "independent" of each other – a requirement for most simple statistical analysis procedures. However, restricted forms of scoring, where a fixed number of "units" (e.g. bean seeds, pebbles) are distributed between a set of items, has to be used with some care, recognising that it is only a little improvement over ranks.

Say, for example, that a respondent is asked to allocate 10 seeds among four bean varieties, giving more seeds to the variety she/he most prefers. If the respondent allocates 5 seeds to variety C and 3 seeds to variety A because C and A are the varieties she/he most prefers, then the respondent is left with just 2 seeds to allocate to the remaining varieties B and D. This is a problem if she/he has only a marginal preference for A over B and D. Such a forced choice suffers the same difficulties faced by ranks in not being able to give a meaningful interpretation to the "distance" between the scores. A larger number of seeds, say 100, partially gets over this problem because now the respondent has more flexibility in expressing his/her strength of preference for one variety over another. One hundred seeds may however still be too few if the number of cells into which the seeds must be distributed is large (e.g. in matrix scoring exercises).

7. Some approaches to the analysis of ranked data

We illustrate analysis approaches to ranked data through some situation specific examples. There is no attempt to give a full coverage of analysis methods since the most appropriate form of analysis will depend on the objectives of the study.

Whatever the objective, it is usually advisable to begin by thinking carefully about the data structure and then to produce a few simple graphs or summary statistics so that the essential features of the data are clear. Often this form of summary may be all that is needed if extending the results beyond the sampled units is not a requirement. However if results are to be generalised to a wider population, sample sizes and methods of sampling are key issues that need consideration. See Wilson (2000) for details. Here we assume that participating respondents have been representatively chosen.

In section 7.1 below, we consider some data arising from a ranking exercise and simple methods of presentation. This is followed, in sections 7.2 and 7.3, by a brief discussion of more advanced methods of analysis applicable to ranking and scoring data, restricting attention largely to preference evaluations. Poole (1997) provides fuller coverage.

7.1 Simple methods of summary

The data structures that result from ranks/scores given to a fixed number of items, were shown using fictitious data in Tables 1 and 2. Although the numerical values shown look similar, a number of essential differences, as highlighted in section 6, must be recognised in interpreting this information. For example, mean values for columns in Table 2 are meaningful summaries and give some indication of the most serious pest problem. However, producing column totals for the ranks given in Table 1 assumes a common "distance" between any two consecutive ranks. This is particularly problematical if there are missing cells in the table, because some respondents have not ranked some items.

As illustration, suppose an overall ranking of the oils in Table 1 is required across all women sampled. A simple procedure is to give oils receiving a rank 1, 2, 3 and 4, corresponding scores of 4, 3, 2, 1, and then to average the resulting set of scores. This may result in mean scores of 3.2, 2.6, 2.4 and 1.8 respectively for oils *Covo, Superstar, Market* and *Moringa*. Of course, some would argue that this will lead to exactly the same conclusions as would be obtained if the numerical values given to each rank were averaged across the women. This is true, but the conversion to scores makes the assumptions involved in the averaging process clearer, i.e. the assumption that the degree of preference for one item over the next within an ordered list is the same irrespective of which two neighbouring ranks (or corresponding scores) are being considered, and the assumption that a missing value corresponds to a numerical zero score.

Alternative transformation scales could also be considered on the basis of comments made by those who rank the items. For example, ranks 1, 2, 3, 4 might be converted to scores 9, 5, 2, 1 respectively, if it were apparent during discussions with respondents that there is a much clearer preference for items at the top of the priority scale than those lower down.

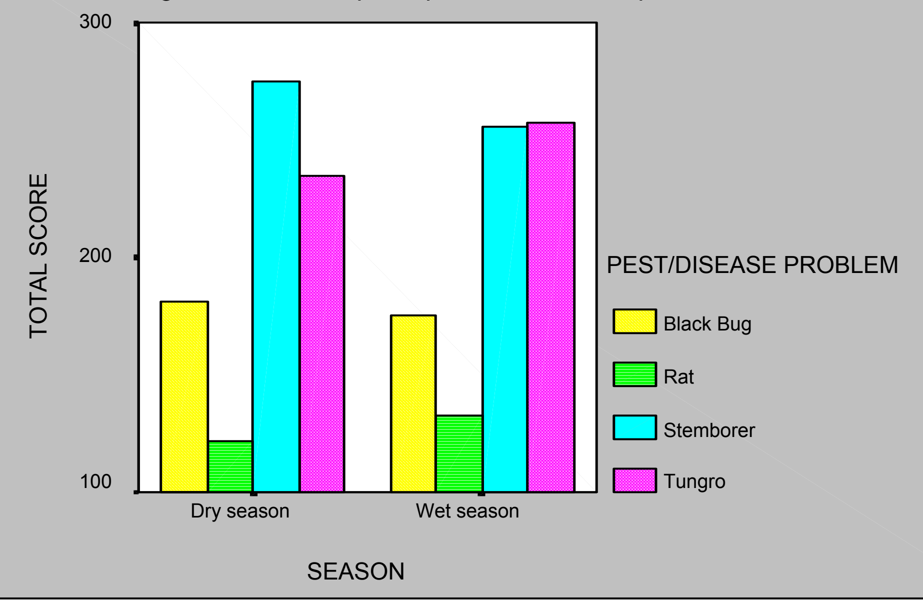
Consider now a situation where the specific items being ranked vary from respondent to respondent. Again, a transformation from ranks to scores can be made with a zero score for items omitted during the ranking. See Abeyasekera *et al* (2000) for details. Box 1 provides a further example aimed at investigating whether a disease, known to cause high yield losses in a crop, is regarded by farmers as being the most damaging to the crop compared to damage caused by other pests and diseases. The results are shown in Figure 1. The main point to note in this example is the difficulty of summing the ranks given to pest/disease problems since many problems had been mentioned by the 226 farmers. If one problem was mentioned by only a few farmers, but ranked highest by them, its average rank, based on just those farmers, would be unrepresentative of the farming population as a whole. Scores on the other hand, include a meaningful zero, so averages work out correctly.

Simple descriptive summaries as illustrated above have a place in the analysis irrespective of whether the study is intended for making generalisable conclusions concerning a wider target population or is a case study in one village with just a few farmers. In the former case, the summary also helps to identify statistical inferential procedures relevant for demonstrating the applicability of results beyond the research setting. Such procedures are also valuable because they allow the researcher to take account of the data structure.

Box 1. An example drawn from Warburton (1998) illustrating a descriptive summary of ranks given to the three most important pests and diseases

In a study concerning farmers' practices, experiences and knowledge of rice tungro disease, 226 farmers in the Philippines were asked to name and rank the three most damaging pests or diseases affecting their rice crop. Each pest and disease named by a farmer was given a score of 3, 2 or 1 according to whether they ranked the pest or disease as being the first, second or third most damaging in their attack on the crop. A score of zero was given to any pest/disease not mentioned by the farmer. These scores were *totalled* over all farmers and are shown in Figure 1 below, for each of two seasons, for pests/diseases receiving the four highest overall scores. Tungro is clearly a recognised problem but in the dry season, stemborer is identified as being the greater problem.

Figure 1. Farmer perceptions about four pests/diseases



7.2 Illustrating analysis of preference evaluations

Consider a situation where the raw data have been obtained by asking each respondent to order the items according to their preference so that a set of ranks results. We will assume that these ranks have been converted to scores in some meaningful way and that the researcher is interested in determining whether observed differences, in mean scores for the different items, signal real differences in preferences for these items among respondents in the target population. This is a situation where generalisability of study results is of primary concern. Assuming that the respondents have been sampled appropriately and that the sample size is adequate, such a question can be answered by applying appropriate statistical techniques.

Consider for example the ranked data shown in Table1, and suppose these have been converted to a set of scores. Suppose the main objective is to determine whether there is a greater preference for *Moringa*[*] oil compared to the other oils. But one could question whether an overall evaluation across all women in all villages is appropriate when there is a clear structure in the data. This structure raises additional questions, e.g.

- Do preferences differ according to whether the woman is a wage earner or not?
- Do preferences differ across the different wealth categories?
- If preferences differ according to whether the woman earns or not, do such differences differ across the wealth categories?

There may be many other pieces of information available concerning the women participating in this study, e.g. size of household to which they belong. Is it possible to disentangle confounding factors such as village and household size?

The answer is "yes" and a powerful statistical procedure for this purpose is the Analysis of Variance (*anova*). This procedure involves statistical modelling[†] of the data and enables questions like the above to be answered. The procedure allows relevant comparisons to be made, after making due allowance for possible effects of other confounding factors. (See Box 2 for another example).

Box 2. An example illustrating results from a statistical modelling exercise to compare four sweet potato varieties for their tolerance to *cylas puncticollis*

As part of an integrated pest management project in Malawi, four sweet potato varieties were studied in an on-farm trial for their tolerance to sweet potato weevils (*Ophiomyia* spp). One component of the variety evaluation involved asking twenty farmers to score separately, on a 1-5 scale (1=least tolerant; 5 = most tolerant) their assessment of each variety with respect to its tolerance to weevils. All farmers scored all four varieties resulting in 80 observations from 20 farmers. However, farmers were not divided equally by village or by gender, as is seen in the frequency table below. Modelling the data is still possible.

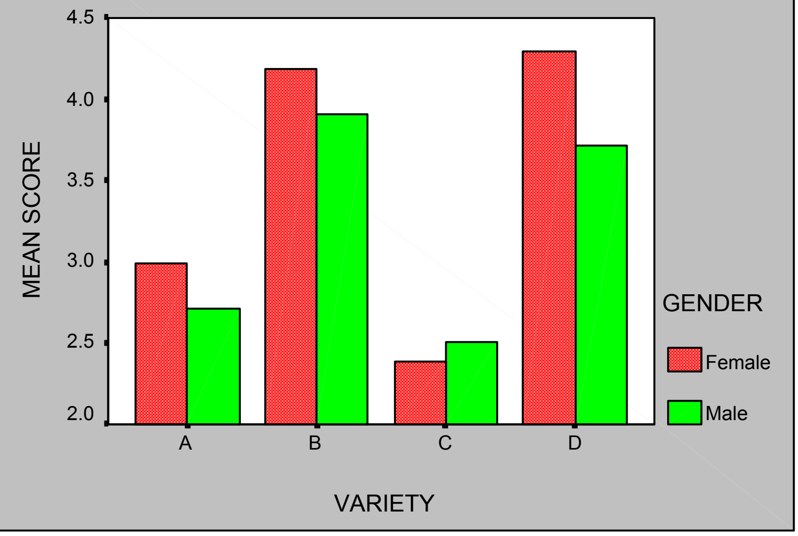
Village	Pindani	Chiwinja	Lidala	Maulana	Total
Female	5	1	2	2	12
Male	2	4	3	1	8

The modelling analysis demonstrated that there were no significant gender differences or differences between villages with respect to farmers' views on pest tolerance by the different varieties. There was however strong evidence ($p<0.001$) to indicate that two varieties, A and C, were regarded as being more susceptible than varieties B and D. Figure 2 shows some results. The modelling enables a valid comparison between male and female farmers, between villages and between varieties, despite the unequal replication of male and female farmers across the four villages. The modelling also allowed varieties to be compared "free" from possible effects due to gender and village differences, i.e. we excluded the alternative explanations that these effects might account for, or mess up, the picture of varietal differences.

[*] Moringa oil comes from pressing the seed of the tree *Moringa oleifera* to yield a high quality edible oil.

[†] Economists often use regression analysis, which is a special case of a general linear model where the response variate is quantitative, but the explanatory variables can be quantitative or binary or categorical qualitative variables.

Figure 2. Farmer scores given to four varieties for their tolerance to sweet potato weevils



Assumptions associated with the *anova* technique must also be kept in mind. The method assumes that (a) the individual evaluations are independent of each other; (b) scores given to each item come from populations of scores that have a common variance; and (c) that the data follow a normal distribution. Of these, (c) is the least problematical and can be mitigated if there are a sufficient number of respondents or respondent groups involved. See Wilson (2000) for some guidance on sample sizes.

Assumptions (b) and (c) can be checked via what statisticians refer to as a residual analysis. Data collection procedures should ensure that assumption (a) is met. For example, restricted scoring, where respondents are asked to distribute a fixed number of seeds among the items being scored, do not lead to independent observations. Responses can be regarded as being independent if ranks or scores given by one person do not directly influence the responses given by another person to the same item, or by the same person to a different item. This can be ensured during data collection, e.g. by interviewing respondents individually rather than collectively. Where it is more meaningful to collect the information in group discussions, many repeats of the process will provide the required replication.

If *anova* assumptions hold, then further analysis is possible, e.g. it would be possible to ascertain whether the oil receiving the highest mean score had a significantly higher preference than the oil receiving the next highest mean score.

The general technique used here is quite powerful and is based on an underlying general theory that can be applied even if some data are missing or if the number of items being evaluated differ across respondents. Appropriate statistics software (e.g. SPSS, Genstat, Minitab) is available to deal with the underlying data structures and other complexities.

More advanced methods of analysis do exist when large numbers of respondents are involved. For example, the frequency of farmers giving different ranks, or allocating scores, to each of a number of maize varieties, can be modelled using a proportional odds models (Agresti, 1996). The interpretation of results is then based on the odds of respondents preferring one item compared to another item. Some further advanced methods are described in SSC (2001).

7.3 *Are non-parametric methods useful?*

There is often a belief that non-parametric methods, i.e. methods which do not make distributional assumptions about the data, are appropriate for analysing qualitative data such as ranks. To illustrate the issues involved, we consider again the type of data shown in Table 1, assuming such data are available for a larger number of respondents or focus groups within the community targeted for research results. Firstly, a simple summary is useful. For example, in a study in India, aimed at investigating the potential for integrating aquaculture into small-scale irrigation systems managed by resource-poor farmers, 46 farmers were asked to rank four different uses of water bodies according to their importance (Felsing *et al* 2000). The data summary shown in Table 3 clearly indicates irrigation as the primary use of water bodies. Thirty-four farmers (74%) rank this as the most important use of water.

Table 3. Number of farmers giving particular ranks to different uses of water bodies

Rank	Irrigation	Livestock consumption	Household use	Clothes washing
1	34	6	5	1
2	8	16	14	8
3	1	16	14	15
4	3	8	13	22
N	46	46	46	46
R_j	65	118	127	150

The research was however intended for the larger community from which the representative sample of 46 farmers was chosen. An inferential procedure is then needed to determine whether the results of Table 3 are equally applicable to the wider population of farmers in the community. The Friedman's test (Conover, 1999) may be used to demonstrate that farmers' water uses differ significantly. The test demonstrated that the water uses ranked are not all perceived to be of equal importance. Further tests showed evidence that irrigation was indeed considered more important than other uses, and that there was insufficient evidence to distinguish the remaining three uses in terms of importance.

If ties occur in the data, an adjustment to the Friedman's test statistic is available. However, three other associated problems need consideration. The first is that the test is based on an approximation to the chi-squared distribution. If n is the number of farmers and k is the number of items being ranked, then nk must be reasonably large, say $\geq$ 30, for the approximation to be reasonable. Secondly, the test makes no allowance for missing data. If missing data do occur, because (say) the number of items ranked varies from farmer to farmer, then ranks need to be converted to scores in some fashion (Abeyasekera et al, 2000) and then analysed using procedures described in the previous section. Thirdly, the test cannot take into account the full data structure.

Friedman's test, as well as other alternatives (e.g. Anderson, 1959; Taplin, 1997), are examples of "non-parametric" methods. Many textbooks are devoted to non-parametric procedures but many of the methods apply to measurement data that are converted to ranks before analysis on the grounds that standard methods do not apply due to failure of assumptions such as normality. Their relevance is restricted to situations where testing a hypothesis is of primary concern, and this may not always be the case with many PRA studies. The tests are also less powerful because they do not make full use of the original data. This means that differences between items being compared have to be quite substantial for statistical significance. Although many non-parametric tests exist, their use in analysing data from PRA studies is quite limited.

8. Other quantitative methods for qualitative data

Many other procedures are available for dealing with qualitative information that can be coded either as binary variables, i.e. Yes/No, presence/absence type data, or as categorical variables, e.g. high, medium or low access to regional facilities, decreasing/static/increasing dependence on forest resources. If factors affecting qualitative features of the binary sort are to be explored, logistic regression modelling can be used. An illustration can be found in Martin and Sherington (1997).

If a categorical variable is of primary interest, e.g. in exploring factors influencing the impact of programmes introduced to improve health facilities in a region, using data in the form of peoples' perceptions of changes in their well-being (better, same, worse), then methods such as log-linear modelling or proportional odds modelling come into play. These are advanced statistical techniques and if they are relevant, some assistance from a statistician with knowledge of these techniques is advisable.

The advantage of using modelling procedures is that it enables the inter-relationships between a wide range of other factors to be taken into account simultaneously. All too often, researchers tend to look at one factor at a time, e.g. when interested in factors affecting successful co-management of forest resources. The one-factor-at-a-time approach may involve using a series of separate chi-square tests. The disadvantage in doing so is that the interactions between these factors is then ignored whereas modelling pays attention to possible interactions.

Once the results of these modelling procedures are available, the purely qualitative features of the data become important because they give breadth and depth to the formal research findings and provide the means to explain any special features that emerge. Typically, what happens is that the modelling procedure is followed by an analysis of residuals, i.e. the residual component associated with each data point after the variation in the main response variable has been adjusted for all other known factors. Some residuals may emerge as outliers. A return to the narratives is then essential for explaining and discussing these extreme cases. Identifying such cases is thus greatly facilitated by an initial quantitative treatment of the information gathered.

9. Final remarks

It is important to recognise that proceeding beyond straightforward data summaries and graphical presentations to formal statistical procedures and tests of significance has little value in helping research conclusions if sampling issues have not been appropriately addressed in the sample selection. One issue is whether the sample size gives an adequate representation of the communities being targeted for study. Here the sample size refers to the number of independent assessments obtained, either by interviewing respondents individually or by having separate discussions with a number of respondent groups. How large a sample is needed will depend on the specific objectives of the study.

In situations where the sample size is adequate and the sample has been appropriately chosen to represent the target population of interest, the application of statistical methods will provide greater validity to research conclusions. This paper provides guidance about some statistical analysis approaches for use in dealing with qualitative data, with emphasis on data in the form of ranks or scores. However many other approaches exist and some were briefly mentioned in section 8. In general, the exact approach for a particular study will be closely associated with the study objectives and other data collection activities (e.g. those related to on-farm trials). Drawing on the experiences of a survey statistician to identify the most appropriate analysis approach is likely to be beneficial.

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Blood Relations Shortcut Tricks - PDF

www.bankexamstoday.com/2015/10/blood-relations-shortcut-tricks-pdf.html

Blood Relations is one of the easiest chapter of Reasoning. It is scoring chapter. Once you know about the blood relations tricks, you can get full marks from this chapter in a few minutes.. Lets know more about this chapter.

Blood Relations (Meaning) - Simply blood relations means blood relationship among members of the family.

Structure of Different Blood Relations

Generation	Male	Female
Three Generation above ↑ ↑ ↑	1. Great Grandfather 2. Maternal Great Grandfather 3. Great Grandfather – in – Law	1. Great Grandmother 2. Maternal Great Grandmother 3. Great Grandmother – in - Law

Two Generation above ↑ ↑	1. Grandfather 2. Maternal Grandfather 3. Grandfather – in – Law	1. Grandmother 2. Maternal Grandmother 3. Grandmother – in - Law
One Generation Above ↑	1. Father 2. Uncle, 3. Maternal Uncle, 4. Father – in - Law	1. Mother 2. Aunt 3. Maternal Aunt 4. Mother – in – Law

Current Generation (Self) →	1. Husband 2. Brother 3. Cousin 4. Brother – in – Law	1. Wife 2. Sister 3. Cousin 4. Sister – in – Law
One Generation Below ↓	1. Son 2. Nephew 3. Son – in - Law	1. Daughter 2. Niece 3. Daughter – in - Law

Two Generation Below ↓ ↓	1. Grandson 2. Grandson – in - Law	1. Grand Daughter 2. Grand Daughter – in - Law
Three Generation Below ↓ ↓ ↓	1. Great Grandson 2. Great Grandson – in - Law	1. Great Grand Daughter 2. Great Grand Daughter – in - Law

From the above diagram, you get the knowledge of Generations. Lets know about different terms in blood relations that will provide you easy platform while solving the questions in competitive exams.

Important Terms in Blood Relations

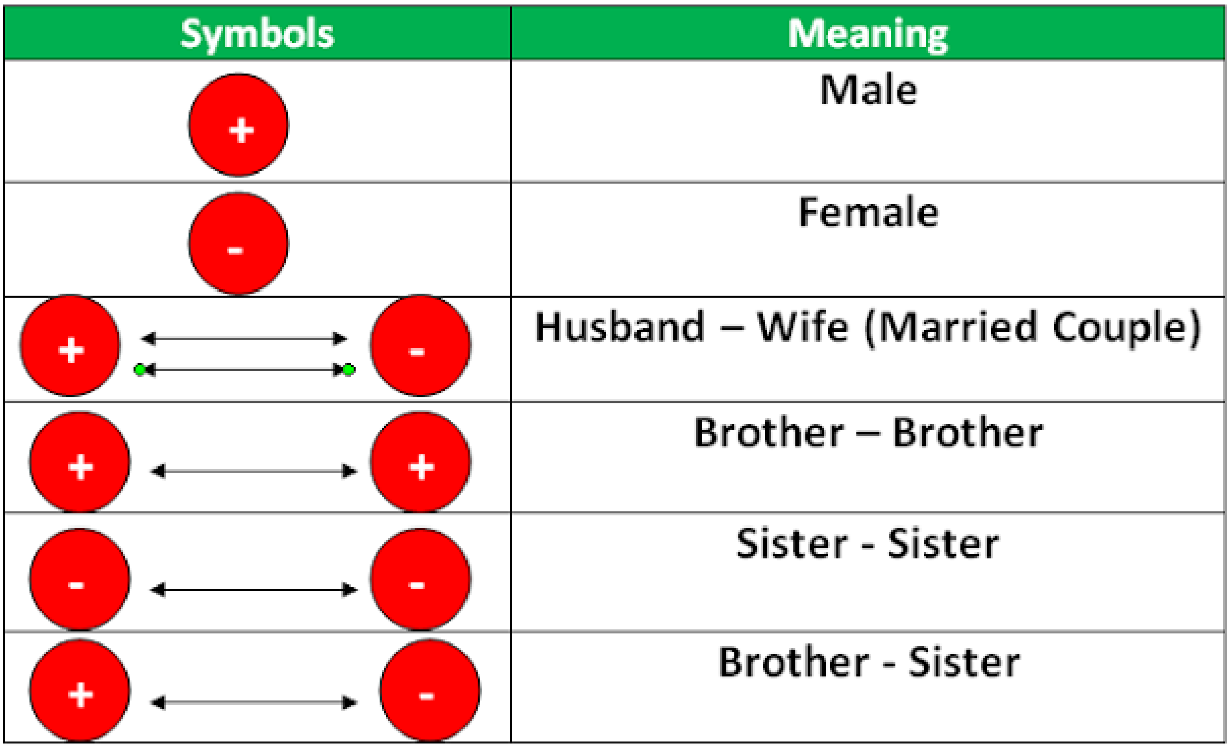
Father of Grandfather or Grandmother	= Great Grand Father
Mother of Grandfather or Grandmother	= Great Grand Mother
Father of Father or Mother	=Grand Father
Mother of Father or Mother	= Grand Mother
Wife of Grandfather	= Grand Mother
Husband of Grand Mother	= Grand Father
Father – in – Law of Father/Mother	= Grand Father
Mother – in – Law of Father/Mother	= Grand Mother
Father’s Father/Mother only son	= Father
Only Daughter – in – Law of Father’s Father/Father’s Mother	= Mother
Husband of Mother	= Father
Wife of Father	= Mother
Second Wife of Father	= Step Mother

Brother of Father or Mother	= Uncle
Sister of Father or Mother	= Aunt
Husband of Aunt	= Uncle
Wife of Uncle	= Aunt
Son of Grand Father/Grand Mother	=Father/Uncle
Daughter of Father – in – Law/Mother –in – Law of Father	= Mother / Aunt
Father of Wife/Husband	= Father – in – Law
Mother of Wife/Husband	= Mother – in – Law
Children of same parents	= Siblings
Father's / Mother's only son/daughter	= Oneself
Son of Father or Mother	= Brother
Daughter of Father or Mother	= Sister
Son of second Wife of Father	= Step Brother
Daughter of Second Wife of Father	= Step Sister
Son / Daughter of Uncle/Aunt	= Cousin
Brother of Husband or Wife	= Brother – in – Law
Sister of Husband or Wife	= Sister – in – Law
Husband of Sister/ Sister – in - Law	= Brother – In – Law
Son of Father	= Oneself / Brother
Mother of Son/ Daughter	= Oneself/ Wife
Father of Daughter / Son	= Oneself/Husband
Son of Son of Grand Mother/ Grand Father	= Cousin/Oneself/Brother
Daughter of Son of Grand Mother/Grand Father	= Cousin / Oneself / Sister
Son of Brother or Sister	= Nephew
Daughter of Brother or Sister	= Niece
Grandson of Father/Mother	= Son / Nephew
Grand Daughter of Father / Mother	= Daughter / Niece
Husband of Daughter	= Son – in – Law
Wife of Brother / Brother – in – Law	= Sister – in - Law
Wife of Son	= Daughter – in – Law
Son of Son/Daughter	= Grandson
Daughter of Son/Daughter	Grand Daughter

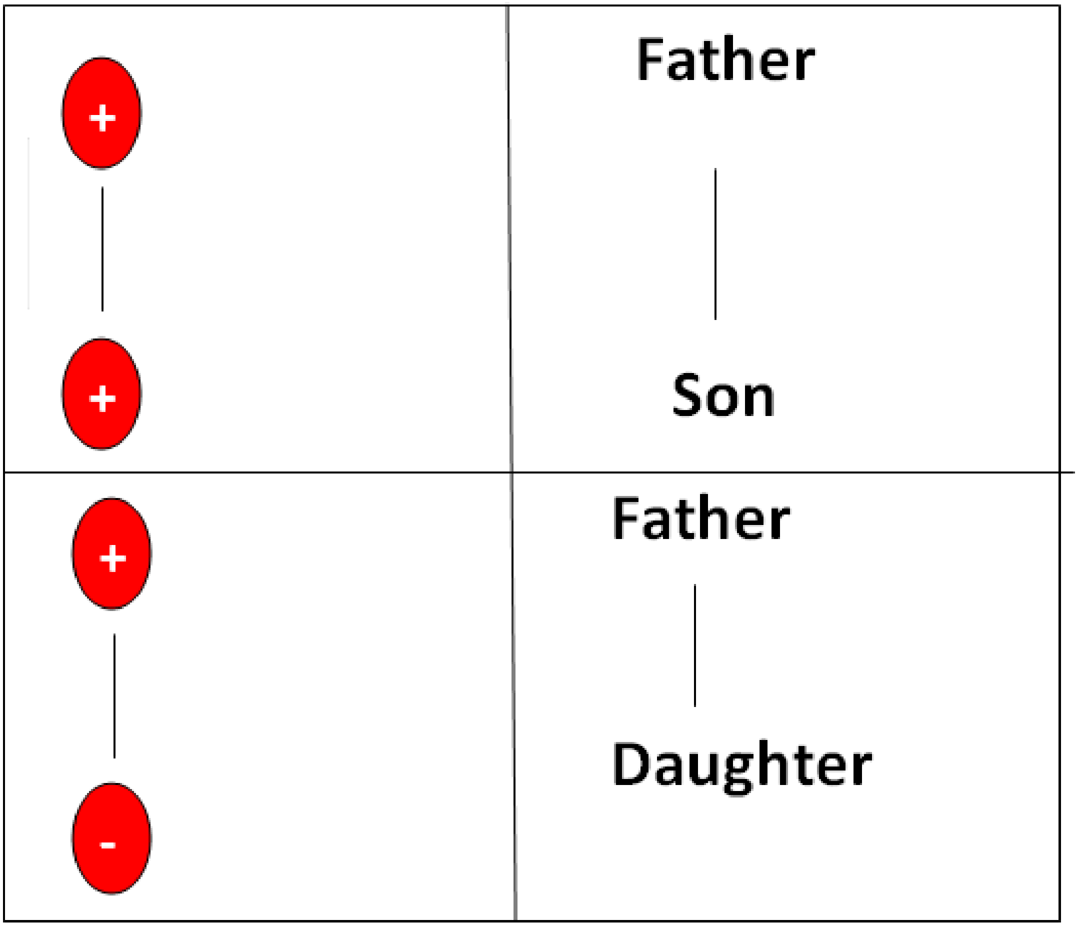
Son’s/ Daughter’s Grandson	Great Grand Son
Son’s /Daughter’s Grand daughter	Great Grand Daughter

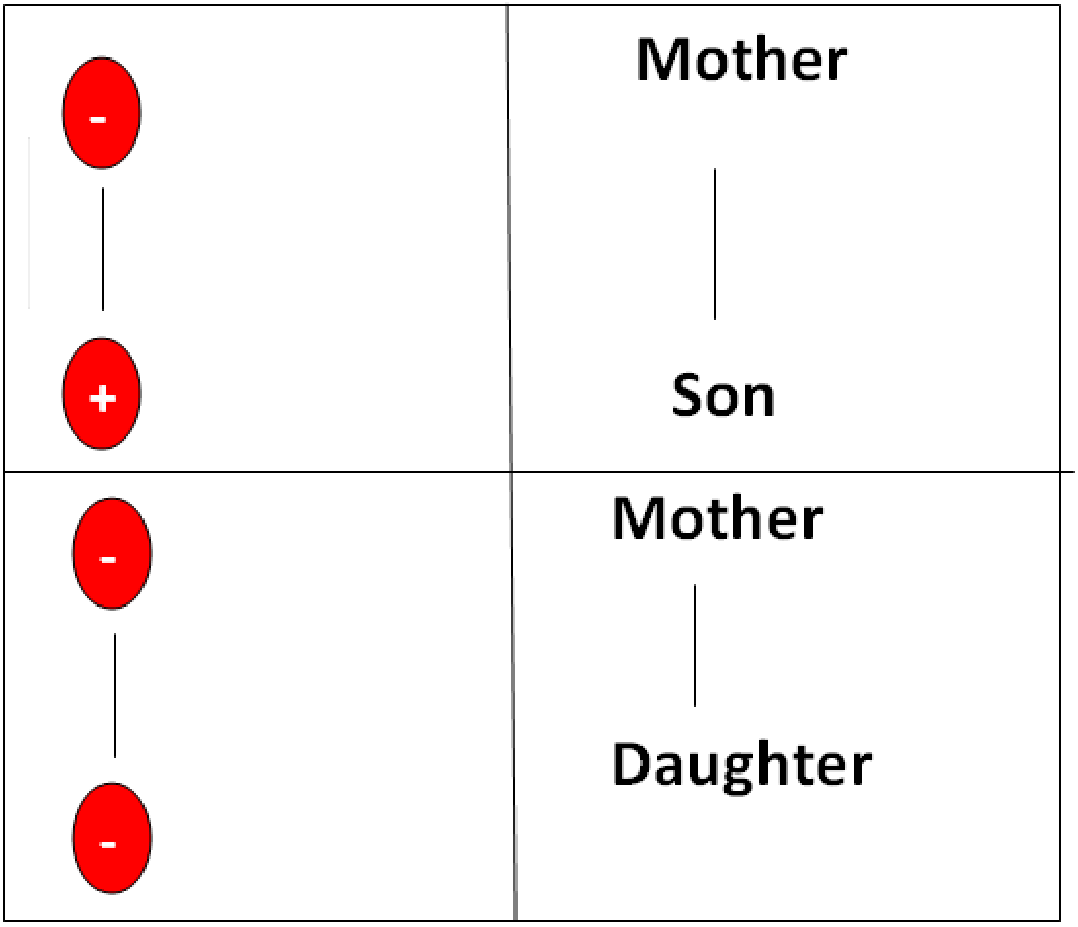
How to Draw a Family Diagram (Important Symbols)

Below are the some basic important symbols used to present the family relationships easily. On the basis of following diagram, you can find any blood relationships easily and quickly.



Some Basic Important blood relationships are shown below through diagram.


+
+
Father
Son
+
-
Father
Daughter

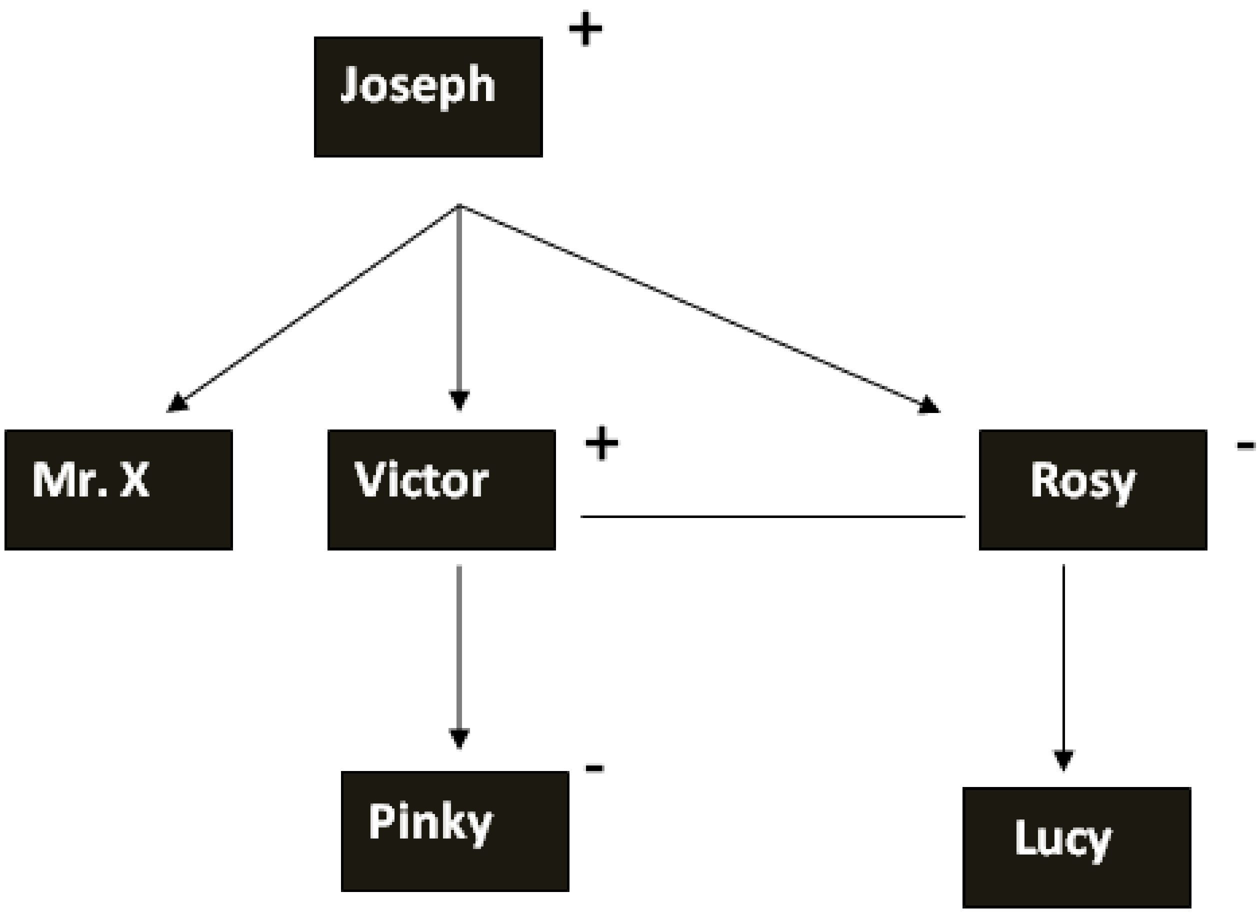


Lets Do Some Practice

Q1. Pinky, who is Victor's daughter, say to Lucy, "Your Mother Rosy is the younger sister of my Father, who is the third child of Joseph." How is Joseph related to Lucy?
a) Father - In - Law
b) Father
c) Maternal Uncle
d) Grand Father

Solution

(Option D)



> *Joseph has three children, One is X, second is Victor and Third is Rosy. It is not clear X is male or female. Rosy is the mother of Lucy so Joseph is the grandfather of Lucy that is clearly shown in the above diagram.*

Q2. Mohan is the Son of Arun's Father's sister. Prakash is the son of Reva, who is the mother of Vikas and Grandmother of Arun. Pranab is the father of Neela and the grandfather of Mohan. Reva is the wife of Pranab. How is the wife of Vikas related to the neela?

a) Sister

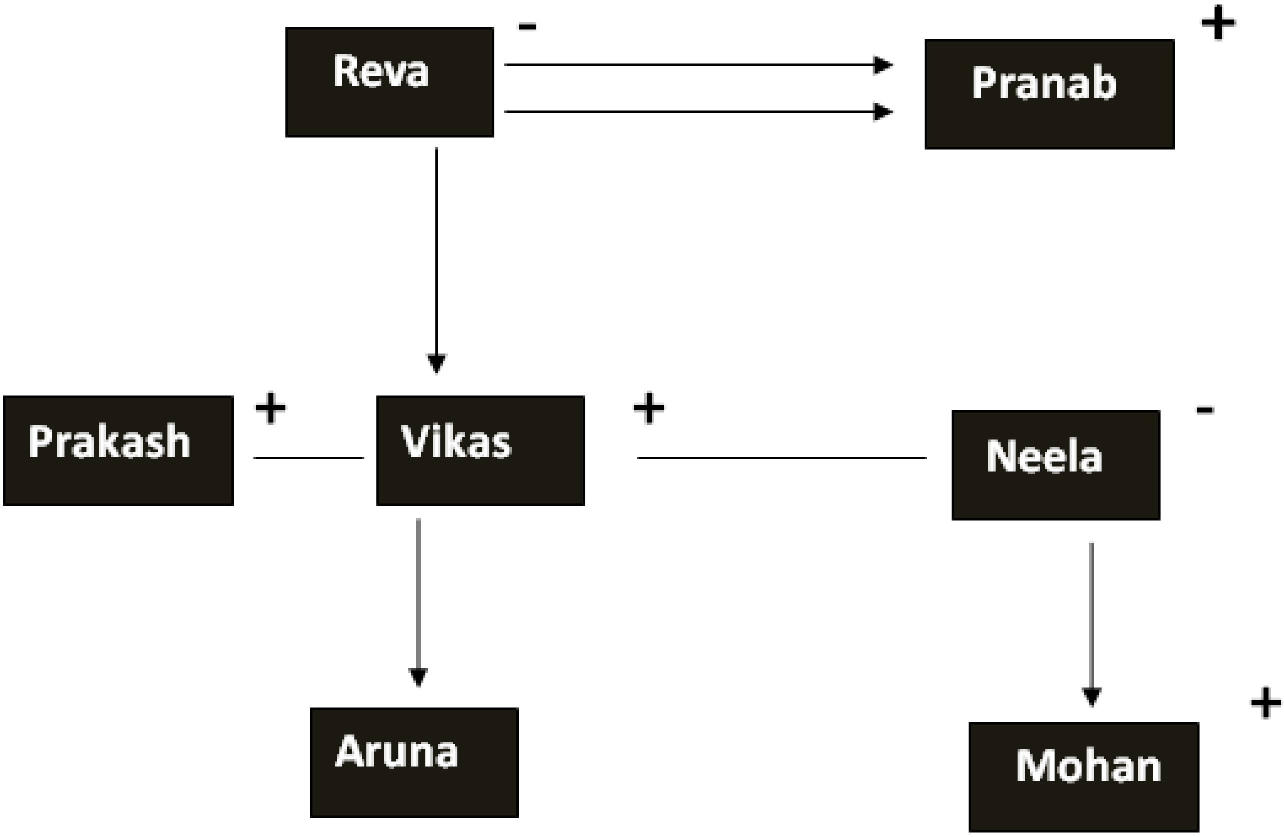
b) Sister - In - Law

c) Niece

d) None of The Above

Solution

(Option B)

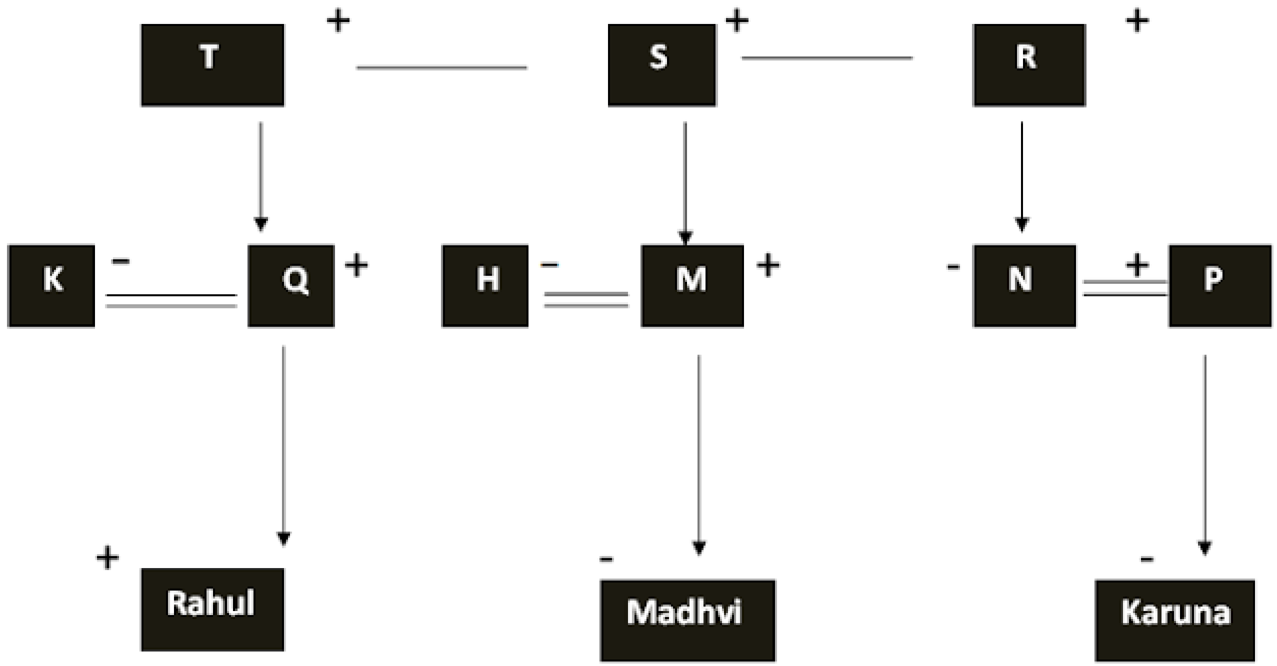


> *As the diagram shows that Vikas is Neela's brother so wife of Vikas will be Neela's Sister - in - Law.*

Q3. T, S and R are three brothers. T's son Q is married to K and they have one child Rahul blessed to them. M the son of S is married to H and this couple is blessed with a daughter Madhvi. R has a daughter N who is married to P. This couple has one daughter Karuna born to them. How is Madhvi related to S?
a) Daughter
b) Niece
c) Grand Daughter
d) None of The Above

Solution

(Option C)



> *In the above diagram, its clearly shows that Madhvi is granddaughter of S.*

Q4. Arti and Saurabh are the children of Mr and Mrs Shah. Ritu and Shakti are the children of Mr and Mrs. Mehra. Saurabh and Ritu are married to each other and two daughter Mukti and Shruti are born to them. Shakti is married to Rina and two children Subhash and Reshma are born to them. How is Arti related to Shruti?

a) Mother

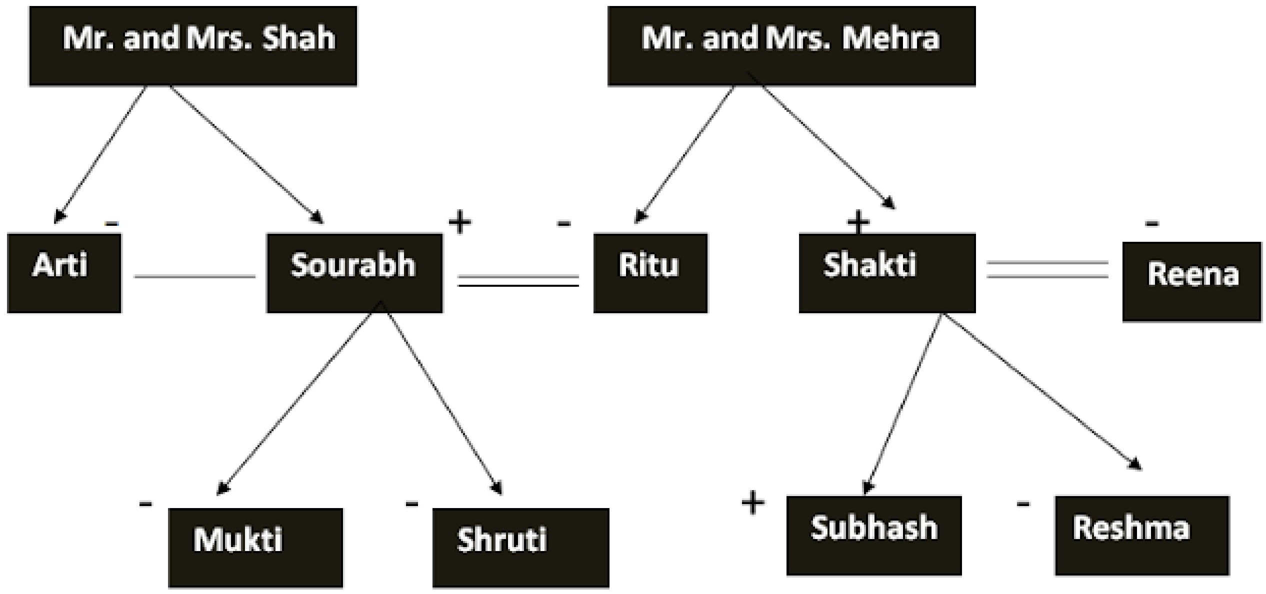
b) Mother - in - Law

c) Sister

d) Aunt

Solution

(Option D)



> *Arti is Aunt of Shruti. It can be seen clearly from the above diagram.*

Q5. In a family, there are seven persons, comprising two married couples. T is the son of M and the grandson of K. M is a widower. M and R are brothers and W is the daughter - in - Law of J, who is the mother of R and the grandmother of D. How is D related to M?

a) Son

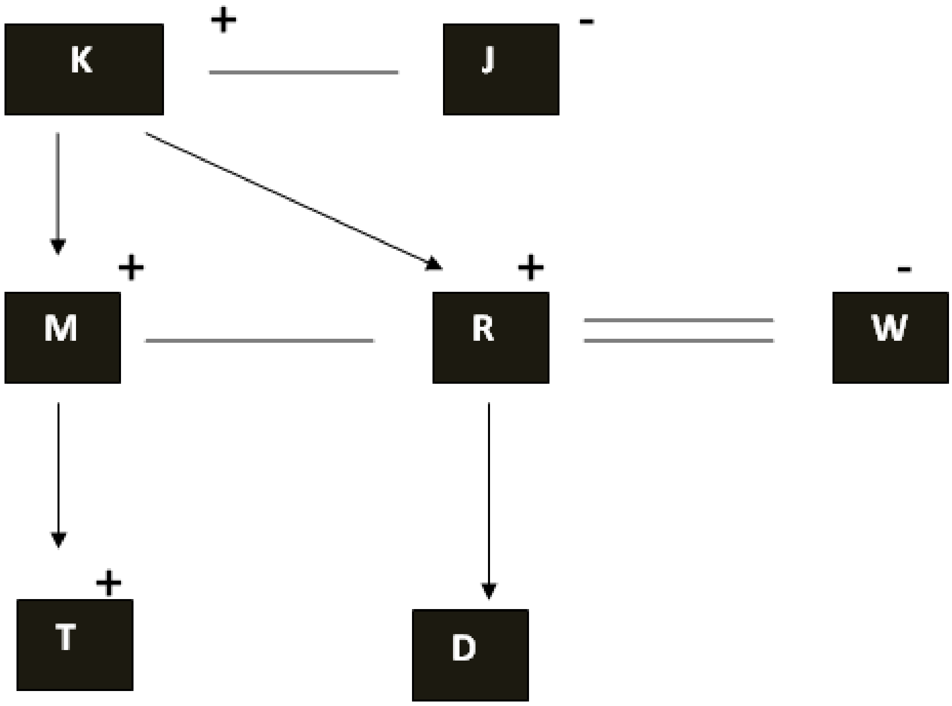
b) Son - in - Law

c) Nephew or Niece

d) Brother

Solution

(Option C)



> *D is Nephew or Niece of M because gender of D is not specify in the question.*

Multiplying by 11 shortcut

This technique teaches you how to multiply any number by eleven, easily and quickly. We will take a few examples and from these you will see the pattern used and also how easy they are to do.

So, to begin let's try 12 time 11.

First things first you will ignore the 11 for the moment and concentrate on the 12.

Split the twelve apart, like so:

$$\mathbf{1} \longleftrightarrow \mathbf{2}$$

Add these two digits together 1 + 2 = 3

$$\mathbf{1+2 = 3}$$

Place the answer, 3 in between the 12 to give 132

11 X 12 = 132

Let's try another:

48 X 11

again, leave the 11 alone for a moment and work with the 48

$$\mathbf{4 + 8 = 12}$$

So now we have to put the 12 in between the 4 and 8 but **don't** do this:
4128 as that is **wrong**...

First, do this: Place the 2 from the twelve in between the 4 and 8 giving 428.

Now we need to input the 1 from the twelve into our answer also, and to do this just add the one from 12 to the 4 of 428 giving 528!

Ok, one more

74 X 11

$$\mathbf{7+4 = 11}$$

7 (put the 1 from the right of 11 in) and 4
then add the 1 from the left of 11 to the 7

74 X 11 = 814

This is a really simple method and will save you so much time with your 11 times tables.

Is it divisible by four?

This little math trick will show you whether a number is divisible by four or not.

So, this is how it works.

Let's look at 1234

Does 4 divide evenly into 1234?

For 4 to divide into any number we have to make sure that the last number is even.

If it is an odd number, there is no way it will go in evenly.
So, for example, 4 will not go evenly into 1233 or 1235

now we know that for 4 to divide evenly into any number the number has to end with an even number.

Back to the question...

4 into 1234, the solution:

Take the last number and add it to 2 times the second last number. If 4 goes evenly into this number then you know that 4 will go evenly into the whole number.
So
4 + (2 X 3) = 10
4 goes into 10 two times with a remainder of 2 so it does not go in evenly.

Therefore 4 into 1234 does not go in completely.

Let’s try 4 into 3436546

So, from our example, take the last number, 6 and add it to two times the penultimate number, 4

6 + (2 X 4) = 14
4 goes into 14 three times with two remainder.
So it doesn't go in evenly.

Let's try one more.

4 into 212334436

6 + (2 X 3) = 12
4 goes into 12 three times with 0 remainder.

Therefore 4 goes into 234436 evenly.

So what use is this trick to you?
Well if you have learnt the tutorial at Memorymentor.com about telling the day in any year, then you can use it in working out whether the year you are calculating is a leap year or not.

Multiplying by 12 shortcut

So how does the 12's shortcut work?

Let's take a look.

12 X 7

the first thing is to always multiply the 1 of the twelve by the number we are multiplying by, in this case 7. So 1 X 7 = 7.

Multiply this 7 by 10 giving 70. (Why? We are working with BASES here. Bases are the fundamentals to easy calculations for all multiplication tables.

Now multiply the 7 by the 2 of twelve giving 14. Add this to 70 giving 84.

Therefore 7 X 12 = 84

Let's try another:

17 X 12

Remember, multiply the 17 by the 1 in 12 and multiply by 10
(**Just add a zero to the end**):

1 X 17 = 17, multiplied by 10 giving 170.

Multiply 17 by 2 giving 34.

Add 34 to 170 giving 204.

So 17 X 12 = 204

lets go one more

24 X 12

Multiply 24 X 1 = 24. Multiply by 10 giving 240.
Multiply 24 by 2 = 48. Add to 240 giving us 288

24 X 12 = 288 (these are Seriously Simple Sums to do aren’t they?!)

Converting Kilos to pounds

In this section you will learn how to convert Kilos to Pounds, and Vice Versa.

Let's start off with looking at converting Kilos to pounds. 86 kilos into pounds:

Step one, multiply the kilos by TWO.
To do this, just double the kilos.

86 x 2 = 172

Step two, divide the answer by ten.
To do this, just put a decimal point one place in from the right.

172 / 10 = 17.2

Step three, add step two's answer to step one's answer.

172 + 17.2 = 189.2

86 Kilos = 189.2 pounds

Let’s try:

50 Kilos to pounds:

Step one, multiply the kilos by TWO.
To do this, just double the kilos.

50 x 2 = 100

Step two, divide the answer by ten.
To do this, just put a decimal point one place in from the right.

100 / 10 = 10

Step three, add step two’s answer to step one’s answer.

100 + 10 = 110

50 Kilos = 110 pounds

Adding Time

Here is a nice simple way to add hours and minutes together:

Let's add 1 hr and 35 minutes and 3 hr 55 minutes together.

What you do is this:
make the 1 hr 35 minutes into one number, which will give us 135 and do the same for the other number, 3 hours 55 minutes, giving us 355

Now you want to add these two numbers together:

135
355
____
490

So we now have a sub total of 490.

What you need to do to this and all sub totals is **add the time constant of 40**.

No matter what the hours and minutes are, just add the 40 time constant to the sub total.

490 + 40 = 530

so we can now see our answer is 5 hrs and 30 minutes!

Temperature Conversions

This is a shortcut to convert Fahrenheit to Celsius and vice versa.

The answer you will get will not be an exact one, but it will give you an idea of the temperature you are looking at.

Fahrenheit to Celsius:

Take 30 away from the Fahrenheit, and then divide the answer by two. This is your answer in Celsius.

Example:
74 Fahrenheit - 30 = 44. Then divide by two, 22 Celsius.

So 74 Fahrenheit = 22 Celsius.

Celsius to Fahrenheit just do the reverse:

Double it, and then add 30.

30 Celsius double it, is 60, then add 30 is 90

30 Celsius = 90 Fahrenheit

Remember, the answer is not exact but it gives you a rough idea.

5 Squared Shortcut

Here is a really quick way to square any number with a 5 on the end.

Let's take 45^2

Ok, so what you have to do is split up the numbers, giving you

4 And 5^2

Forget about the 5^2 for the moment and do this:

Always add 1, adding 1 to the 4, so we get 4 + 1 = 5

Then multiply this answer, 5, by the original first number, 4

5 X 4 = 20

So what you have is 20 and 5^2

Everyone knows 5^2 = 25 right? Well it does. This is what makes it easy.

Put the two answers together and that's the answer!

<u>2025</u>

This works for any number ending in 5^2 but when the numbers get over 100 it tends to get a little trickier with the multiplication.

Give it a try with another number.

Try 85^2, it isn't difficult.

Split the numbers apart:

8 and 5^2

Again, forget about the 5^2

Add 1 to 8

8 + 1 = 9

Multiply 9 by the first number, which was 8

9 X 8 =72

Now, put all the numbers together, 72 and 5^2

5^2 = 25

So the answer is 7225

Try it out in a calculator once you have done it.

Decimals Equivalents of Fractions

With a little practice, it's not hard to recall the decimal equivalents of fractions up to 10/11!

First, there are 3 you should know already:

1/2 = .5
1/3 = .333...
1/4 = .25

Starting with the thirds, of which you already know one:

1/3 = .333...
2/3 = .666...

You also know 2 of the 4ths, as well, so there's only one new one to learn:

1/4 = .25
2/4 = 1/2 = .5
3/4 = .75

Fifths are very easy. Take the numerator (the number on top), double it, and stick a decimal in front of it.

1/5 = .2
2/5 = .4
3/5 = .6
4/5 = .8

There are only two new decimal equivalents to learn with the 6ths:

1/6 = .1666...
2/6 = 1/3 = .333...
3/6 = 1/2 = .5
4/6 = 2/3 = .666...
5/6 = .8333...

What about 7ths? We'll come back to them at the end. They're very unique.

8ths aren't that hard to learn, as they're just smaller steps than 4ths. If you have trouble with any of the 8ths, find the nearest 4th, and add .125 if needed:

1/8 = .125
2/8 = 1/4 = .25
3/8 = .375
4/8 = 1/2 = .5
5/8 = .625
6/8 = 3/4 = .75
7/8 = .875

9ths are almost too easy:

1/9 = .111...
2/9 = .222...
3/9 = .333...
4/9 = .444...
5/9 = .555...
6/9 = .666...
7/9 = .777...
8/9 = .888...

10ths are very easy, as well. Just put a decimal in front of the numerator:

1/10 = .1
2/10 = .2
3/10 = .3
4/10 = .4
5/10 = .5
6/10 = .6
7/10 = .7
8/10 = .8
9/10 = .9

Remember how easy 9ths were? 11th are easy in a similar way, assuming you know your multiples of 9:

1/11 = .090909...
2/11 = .181818...
3/11 = .272727...
4/11 = .363636...
5/11 = .454545...
6/11 = .545454...
7/11 = .636363...
8/11 = .727272...
9/11 = .818181...
10/11 = .909090...

As long as you can remember the pattern for each fraction, it is quite simple to work out the decimal place as far as you want or need to go!

Oh, I almost forgot! We haven't done 7ths yet, have we?

One-seventh is an interesting number:

1/7 = .142857142857142857...

For now, just think of one-seventh as: .142857

See if you notice any pattern in the 7ths:

1/7 = .142857...
2/7 = .285714...
3/7 = .428571...
4/7 = .571428...
5/7 = .714285...
6/7 = .857142...

Notice that the 6 digits in the 7ths ALWAYS stay in the same order and the starting digit is the only thing that changes!

If you know your multiples of 14 up to 6, it isn't difficult to work out where to begin the decimal number. Look at this:

For 1/7, think "1 * 14", giving us .14 as the starting point.
For 2/7, think "2 * 14", giving us .28 as the starting point.
For 3/7, think "3 * 14", giving us .42 as the starting point.

For 4/14, 5/14 and 6/14, you'll have to adjust upward by 1:

For 4/7, think "(4 * 14) + 1", giving us .57 as the starting point.
For 5/7, think "(5 * 14) + 1", giving us .71 as the starting point.
For 6/7, think "(6 * 14) + 1", giving us .85 as the starting point.

Practice these, and you'll have the decimal equivalents of everything from 1/2 to 10/11 at your finger tips!

If you want to demonstrate this skill to other people, and you know your multiplication tables up to the hundreds for each number 1-9, then give them a calculator and ask for a 2-digit number (3-digit number, if you're up to it!) to be divided by a 1-digit number.

If they give you 96 divided by 7, for example, you can think, "Hmm... the closest multiple of 7 is 91, which is 13 * 7, with 5 left over. So the answer is 13 and 5/7, or: 13.7142857!"

Converting Kilometres to Miles

This is a useful method for when travelling between imperial and metric countries and need to know what kilometres to miles are.

The formula to convert kilometres to miles is number of (kilometres / 8) X 5

So lets try 80 kilometres into miles

80/8 = 10

multiplied by 5 is 50 miles!

Another example

40 kilometres

40 / 8 = 5

5 X 5= 25 miles

Simplification Techniques and Tricks

Simplification is one of the most important part of Quantitative Aptitude section of any competitive exam. Today I am sharing all the techniques to solve Simplification questions quickly.

Rules of Simplification
V → Vinculum
B → Remove Brackets - in the order ( ) , { }, [ ]
O → Of
D → Division
M → Multiplication
A → Addition
S → Subtraction

Important Parts of Simplification

- Number System
- HCF & LCM
- Square & Cube
- Fractions & Decimals
- Surds & Indices

Number System

- Classification
- Divisibility Test
- Division& Remainder Rules
- Sum Rules

Classification

Types	Description
Natural Numbers:	all counting numbers (1,2,3,4,5....∞)
Whole Numbers:	natural number + zero(0,1,2,3,4,5...∞)
Integers:	All whole numbers including Negative number + Positive number(∞......-4,-3,-2,-1,0,1,2,3,4,5....∞)
Even & Odd Numbers :	All whole number divisible by 2 is Even (0,2,4,6,8,10,12.....∞) and which does not divide by 2 are Odd (1,3,5,7,9,11,13,15,17,19....∞)
Prime Numbers:	It can be positive or negative except 1, if the number is not divisible by any number except the number itself.(2,3,5,7,11,13,17,19,23,29,31,37,41,43,47,53,59,61....∞)

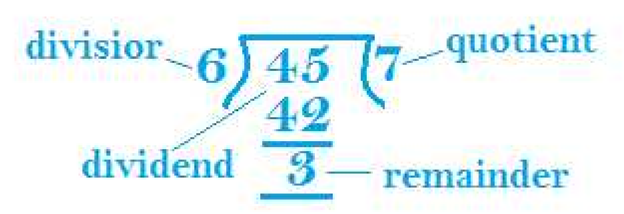
Composite Numbers:	Natural numbers which are not prime
Co-Prime:	Two natural number a and b are said to be co-prime if their HCF is 1.

Divisibility

Numbers	IF A Number	Examples
Divisible by 2	End with 0,2,4,6,8 are divisible by 2	254,326,3546,4718 all are divisible by 2
Divisible by 3	Sum of its digits is divisible by 3	375,4251,78123 all are divisible by 3. [549=5+4+9][5+4+9=18]18 is divisible by 3 hence 549 is divisible by 3.
Divisible by 4	Last two digit divisible by 4	5648 here last 2 digits are 48 which is divisible by 4 hence 5648 is also divisible by 4.
Divisible by 5	Ends with 0 or 5	225 or 330 here last digit digit is 0 or 5 that mean both the numbers are divisible by 5.
Divisible by 6	Divides by Both 2 & 3	4536 here last digit is 6 so it divisible by 2 & sum of its digit (like 4+5+3+6=18) is 18 which is divisible by 3.Hence 4536 is divisible by 6.
Divisible by 8	Last 3 digit divide by 8	746848 here last 3 digit 848 is divisible by 8 hence 746848 is also divisible by 8.
Divisible by 10	End with 0	220,450,1450,8450 all numbers has a last digit zero it means all are divisible by 10.
Divisible by 11	[Sum of its digit in odd places-Sum of its digits in even places]= 0 or multiple of 11	Consider the number 39798847 (Sum of its digits at odd places)-(Sum of its digits at even places)(7+8+9+9)-(4+8+7+3) (23-12) 23-12=11, which is divisible by 11. So 39798847 is divisible by 11.

Division & Remainder Rules

Suppose we divide 45 by 6



hence ,represent it as:

dividend = (divisor ✘ quotient) + remainder

or

divisior= [(dividend)-(remainder] / quotient

could be write it as

x = kq + r where (x = dividend,k = divisor,q = quotient,r = remainder)

Example:

On dividing a certain number by 342, we get 47 as remainder. If the same number is divided by 18, what will be the remainder ?

Number = 342k + 47

(18 ✘ 19k) + (18 ✘ 2) + 11

18 ✘ (19k + 2) +11.

Remainder = 11

Sum Rules

$(1+2+3+.........+n) = {}^{1}/_{2}\, n(n+1)$

$(1^2+2^2+3^2+.........+n^2) = {}^{1}/_{6}\, n\,(n+1)\,(2n+1)$

$(1^3+2^3+3^3+.........+n^3) = {}^{1}/4\, n^2\,(n+1)^2$

Arithmetic Progression (A.P.)

a, a + d, a + 2d, a + 3d, ...are said to be in A.P. in which first term = a and common difference = d.

Let the nth term be t_n and last term = l, then

a) nth term = a + (n - 1) d

b) Sum of n terms = ${}^{n}/_{2}$ [2a + (n-1)d]

c) Sum of n terms = ${}^{n}/_{2}$ (a+l) where l is the last term

Multiplication Tricks - Find solution within 20 seconds

Today I am going to share quick multiplication tricks that will help you find the solution within 20 seconds. Must read - 10 Coolest Maths tricks

Multiply by 9,99,999,etc...

56*99=5544

Step 1:Place a zero at the end for each 9 :5600

Step 2 : Subtract the original number from Step 1 like this 5600-56=5544

5425 x 99
5425 x (100 - 1)
542500 - 5425
=> 5307075

6289 x 99
6289 x (100 - 1)
628900 - 6289
=> 56611

Multiply by 125

68*125=8500
Step 1 :Place three zeros at the end of the number :68000
Step 2: Divide the number from Step 1 by 8:68000/8=8500

64*125 is the same as :
32*250 is the same as
16*500 is the same as
8*1000

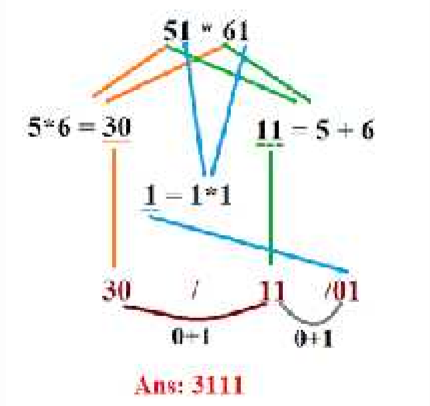
64*125
Step 1. Each time you just need to pick 125 multiply it by 8 will get 1000
Step 2. Pick 64 and divide it by 8 will get 8
Step 3. Multiply the results with each other 8* 1000
Hence Solution is 8000
[Hint: Just remember 125*8=1000]

Multiply two digits numbers ending in 1

51*31=1581
Step 1: Multiply the left most digits : 5*3=15
Step 2: Add the left most digits:5+3=8
Step 3: Places the result from Step 2 next to the result from Step 1:158
Step 4 : Places 1 next to the result from Step 3 : 1581

61 x 41
6 x 4 x 100   6 + 4
2400 + 100 + 1
= 2501

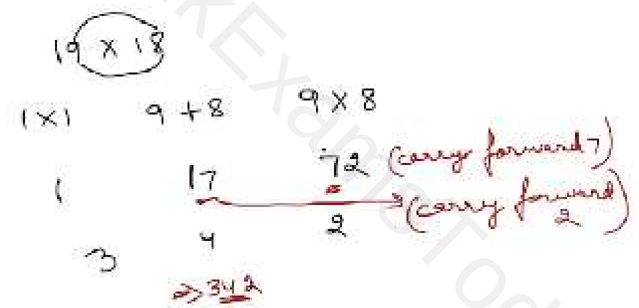
21 x 11
2 x 1   3
2 x 100 + 3 x 10 + 1
= 231



Multiply numbers between 11 and 19

14*18=252

Step 1: Add the larger number to the right most digit of the other number:18+4=22
Step 2: Put a 0 at the end of the result from step 1:220
Step 3 :Multiply the right most digits of both original numbers : 8*4=32
Step 4:Add Step 2 and step 3 :220+32=252



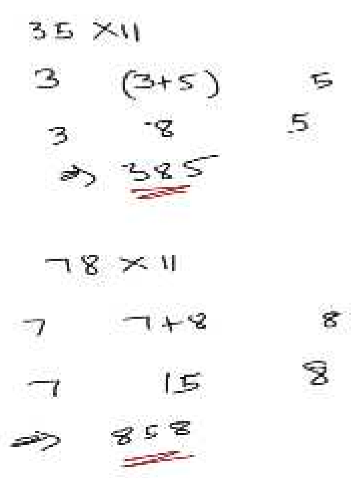
Multiply two digit number by 11

53*11=583

Step 1: Add the both digts of the two digit number:5+3=8
Step 2: Place the result in between both digits : 583

59*11=649

Step 1: 5+9=14
Step 2 : Carry the 1 when the result is greater than 9:5+1=6
Step 3: 649



Multiply by 5

1234 *5 =6170

Step 1 : Divide the number by 2 :1234/2=617

Step 2: Multiply the result from Step 1 by 10 : 617*10=6170

Multiply by 25

18*25=450

Step 1: Divide the number by 4:18/4

Step 2: Multiply the number from Step 1 by 100: 4.5 * 100 = 450

Multiply by 9

56*9=504

Step 1: Multiply the number by 10: 56*10=560

Step 2: Subtract the original number from Step 1: 560-56=504

Factorization

By Factoring number,you can break down problems into simpler multiplication tasks.Also,you may be able to apply some techniques you learned.

21*33

step 1 : 21*11*3

Step 2: 231*3

Step 3 :693

67*81

Step 1: 67*9*9

Step 2:603*9=5427

28*125=3500

Step 1: 28*125

Step 2: 28*25*5

Step 3:28*(100/4)*5

Step 4:28/4*100*5

Step 5:7*500=3500

Find the unit digit of $147^{128} * 138^{148}$?

Find unit digit of - $147^{128} \times 138^{148}$

$\Rightarrow 7^{128} \rightarrow (7^4)^{32} \Rightarrow 1$ (i.e. $7^4 = 2401$)

$\Rightarrow 6^{148} \rightarrow (6^3)^{49} \times 6^1$ (ie. $6^3 = 216$)

$\Rightarrow 6 \times 6 = 6$

$\Rightarrow 6 \times 1 = 6$ Ans

Unit Digit Shortcut - Find Last digit of any number

Suppose you have a series

P, Q, R, S ,T, P, Q, R, S ,T,P, Q, R, S ,T,P, Q, R, S ,T,P, Q, R, S , T,P, Q, R, S, T .....

And you have to find out the 16^{th} term of the series. How would you do this?

One way to solve this is by counting the 16^{th} term; you get your answer P.

The other way to solve: You can divide the 16 by 5 and get the remainder as 1. So now answer would be the 1^{st} term that is P.

Why we have divided by 5 because the terms in the series are repeated after a cycle of 5.

Let us take another question.

Find out the 25^{th} term of the above series. Following the same procedure you get

25/ 5 gives you the remainder zero (0)

In such case, your answer should be the last term of the cycle and the last term of the cycle is T

25^{th} term is T.

Find out the unit digit in 268 × 453?

Now to solve this question, you are going to pick up the only last digits and in this case

__ __ 8× _ _ 3 which means 8×3 = 2 4

Unit digit

So the unit digit in the product 268 × 453 is 4.

Remember in such questions, in such questions, you are only going to get concerned about the unit digits

What is the unit digit in the product 753 × 43 × 1236 × 864?

Solution: let us pick up the unit digits and multiply them

3 in 753

3 in 43

6 in 1236

4 in 864

3 × 3 × 6 × 4 = ____ 6 **(concern only about unit digit in the product)**

So the unit digit in the product 753 × 43 × 1236 × 864 is 6.

Now let us observe the pattern in the cycle of different digit in other words after how many cycles the last digit repeats itself.

2	3	4	5	6	7	8	9
$2^1=2$	$3^1=3$	$4^1=4$	$5^1=5$	$6^1=6$	$7^1=7$	$8^1=8$	$9^1=9$
$2^2=4$	$3^2=9$	$\mathbf{4^2=6}$	$5^2=5$	$6^2=6$	$7^2=9$	$8^2=4$	$\mathbf{9^2=1}$
$2^3=8$	$3^3=7$	$4^3=4$	$5^3=5$	$6^3=6$	$7^3=3$	$8^3=2$	$9^3=9$
$2^4=6$	$3^4=1$	$4^4=6$	$5^4=5$	$6^4=6$	$7^4=1$	$8^4=6$	$9^4=1$
$\mathbf{2^5=2}$	$\mathbf{3^5=3}$	$4^5=4$	$5^5=5$	$6^5=6$	$\mathbf{7^5=7}$	$\mathbf{8^5=8}$	$9^5=9$
$2^6=4$	$3^6=9$	$4^6=6$	$5^6=5$	$6^6=6$	$7^6=9$	$8^6=4$	$9^6=1$
$2^7=8$	$3^7=7$	$4^7=4$	$5^7=5$	$6^7=6$	$7^7=3$	$8^7=8$	$9^7=9$

From above table we can see that

In case unit digit is 2 or 3 or 7 or 8, it repeats itself after 4 cycles

Now let us pick up some questions based on this observation

Find the unit digit in 2^{49}?

We know in case of 2, it repeats itself after a cycle of 4 . We will divide 49 by 4

49/4 remainder is 1

We write it as

$2^{49} = 2^1 = 2$

That means the unit digit in the 2^{49} is 2.

Find the unit digit in 3^{52}.

Solution: Now here the power is 52 and we know that in case of 3, it repeats itself after a cycle of 4 .

52/4 the remainder is 0.

In such cases, our answer should be the 4th power

So answer is unit digit in 3^4 is 1.

Let us do some more complex examples

Find the last digit in the $7^{45304000}$

Solution: In this case we need to divide the power by 4

The power is 453040**00**

We know that a number is divisible by 4 if the number formed the last two digits is divisible by 4.

00/4 = 0 that means remainder is ZERO and we know that in case of 7 ,the cycle is 4 so we will find out the 4th power of 7

7^4 if you still find difficult, let us simplify it

$7^4 = 7^2 \times 7^2$

$= 9 \times 9$ (Unit digits)

= 81 Unit digit so the last digit in the $7^{45304000}$ is 1

From the table we also observe that

in case of 4

If the power is odd, the unit digit is 4 and if the power is even, the unit digit is 6

And same is the case with 9

If the power is odd, the unit digit is 9 and if the power is even, the unit digit is 1

Let us do some of its applications

Find out the unit digit in $4^{39} \times 9^{78}$? In 4^{39} the unit digit is 4 (the power is odd)

In 9^{78} the unit digit is 1 (the power is even)

The answer is $4 \times 1 = 4$

Multiply by 11,111,1111....so on

111111111 ✘ 111111111 = ?

Sol:

No of digits in multiplier = 9

Write in ascending order from left side like this:

987654321

and now 9-1=8

write it in descending order just after it

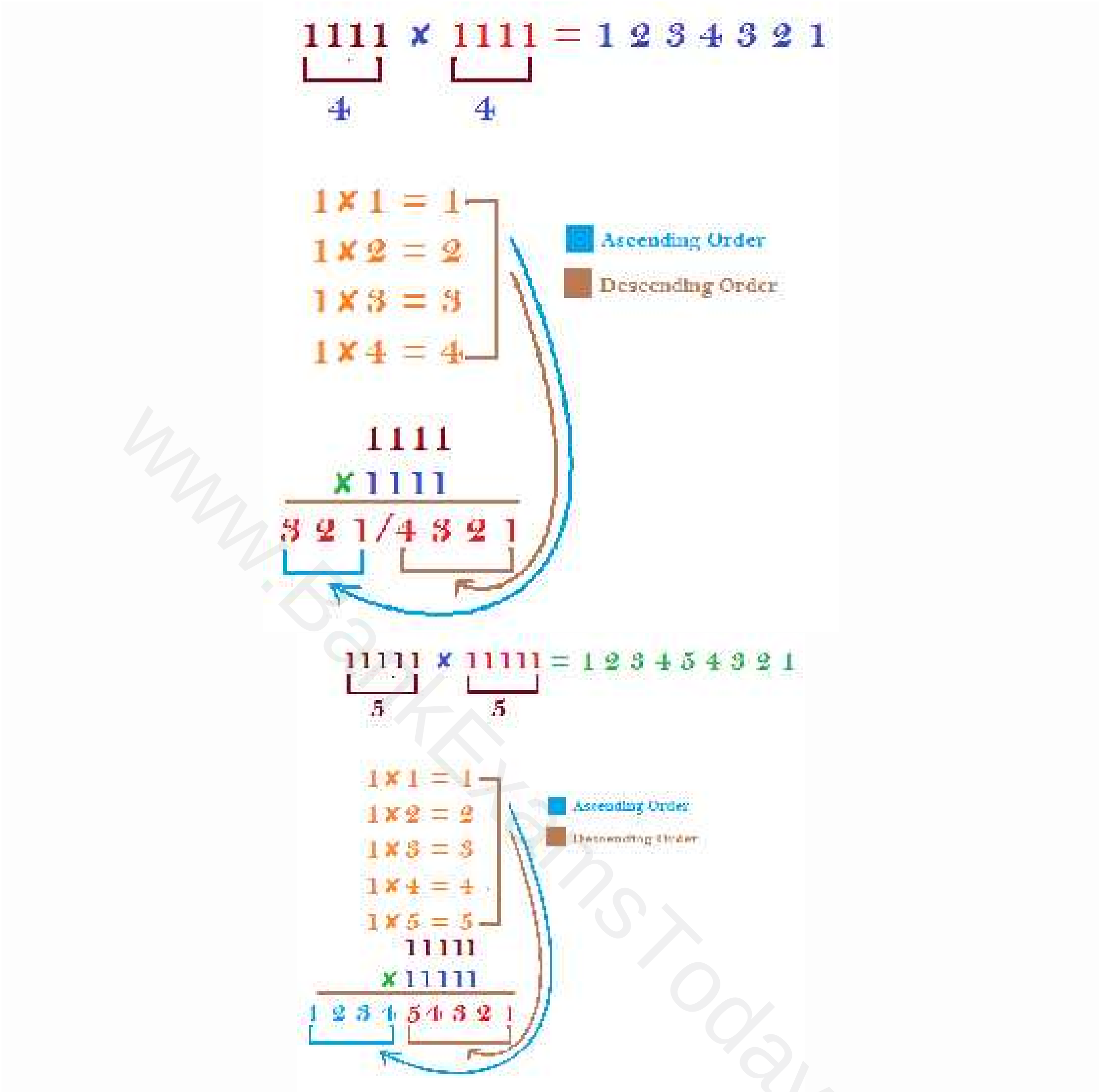
12345678

now you will get like this:

12345678987654321

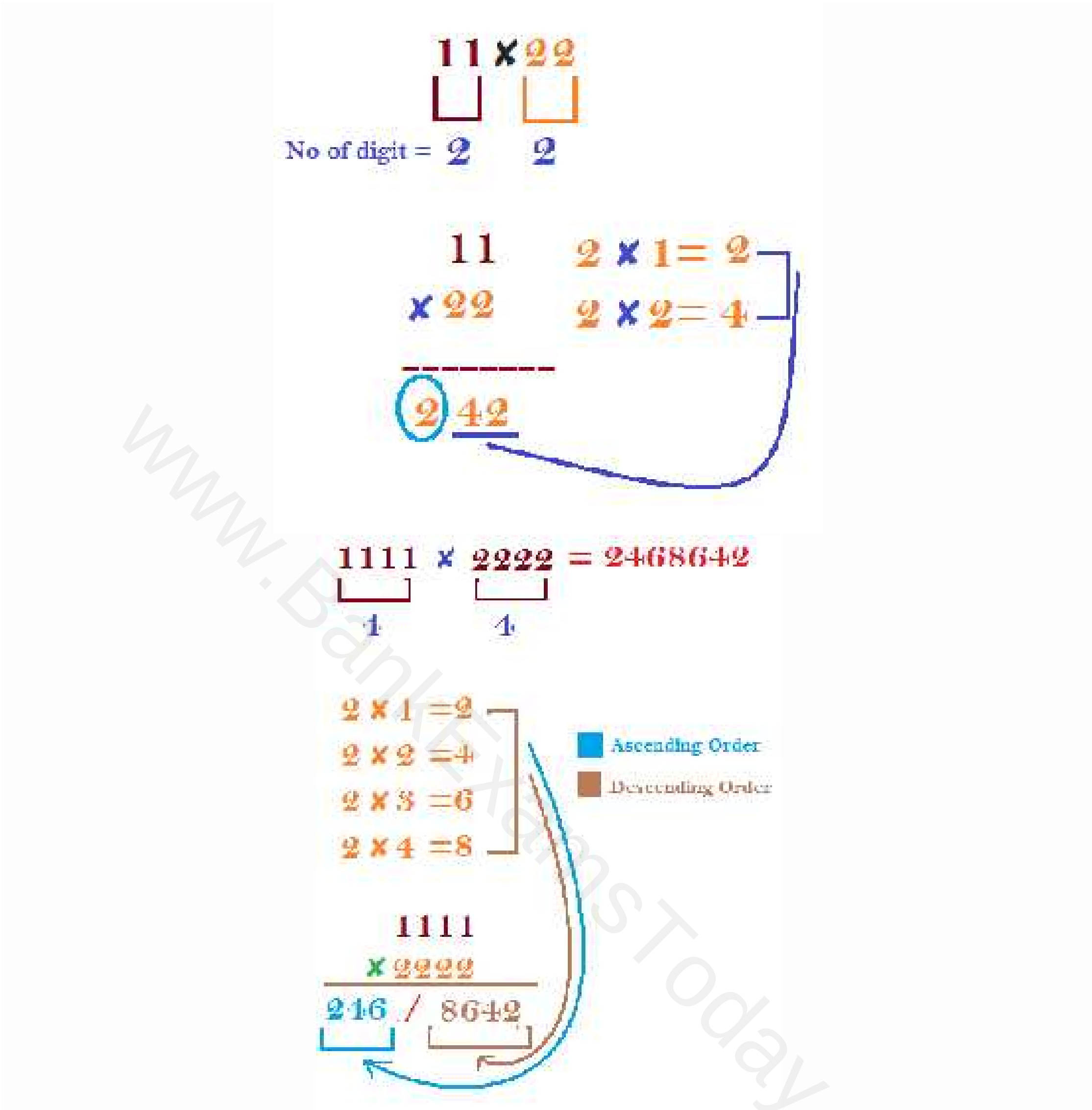
hence

111111111 ✘ 111111111 = 12345678987654321



1111111111 ✘ 1111111111 = ?

Sol:
No of digits in multiplier =10
Write in ascending order from left side like this:
10 9 8 7 6 5 4 3 2 1
and now 10-1=9
write it in descending order just after it
1 2 3 4 5 6 7 8 9
and after it just add **the carry**
1 2 3 4 5 6 7 8/ 9/ **10** 9 8 7 6 5 4 3 2 1
8+1/ 9+1 / 0
1 2 3 4 5 6 7 9 0 0 9 8 7 6 5 4 3 2 1
now you will get like this:
1234567900987654321
hence
1111111111 ✘ 1111111111 = 1234567900987654321

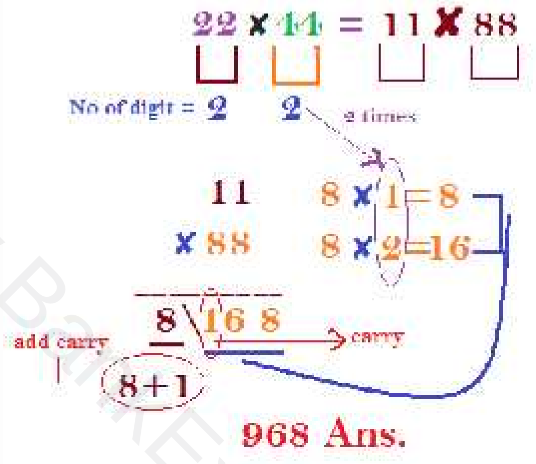


1111111 ✘ 2222222 = ?

Sol:
No of digit in the multiplier is 7 then let n=7;
Now Just multiply the digit 2 from 1 to 7 time & arrange them from extreme left to right in ascending order,you will get like this:
14 12 10 8 6 4 2
and now just subtract one from n.like this n=7,so n-1=6.
Multiply the digit 2 from 1 to 6 time & arrange them from just right after it,you will get like this:
2 4 6 8 10 12
Now placing both outcome like this & add the carry
2 4 6 8 **10 12 14 12 10** 8 6 4 2
8+1/0+1/2+1/4+1/2+1
You will get the answer:
2 4 6 9 1 3 5 3 0 8 6 4 2

1111111 ✘ 5555555 = ?
Sol:
No of digit = 7

Now Just multiply the digit 5 from 1 to 7 time & arrange them from extreme left to right in ascending order,you will get like this:
35 30 25 20 15 10 5
Just right after it perform same action but in descending order & till 6 times only.like this:
5 10 15 20 25 30
Now placing together ,just add the carry
5 10 15 20 25 30 35 30 25 20 15 10 5
6 1 7 2 8 3 8 2 7 1 6 0 5
1111111 ✘ 5555555=6172838271605



3 Step Multiplication Trick - A shortcut method

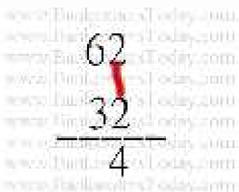
In the series of providing quantitative shortcuts and tricks, today I come up with multiplication trick.

While doing multiplication of a two digit number with another two digit number, we take at least 6 steps. Try yourself. Multiply 62 with 32.

Now let's do this with a trick

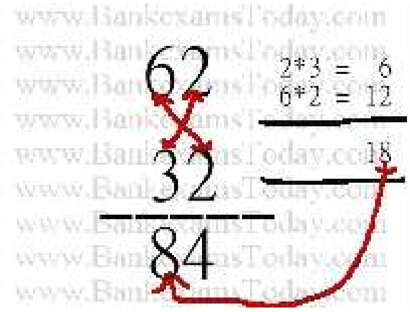
STEP 1

First step is same as conventional method, here we multiply 2 with 2.



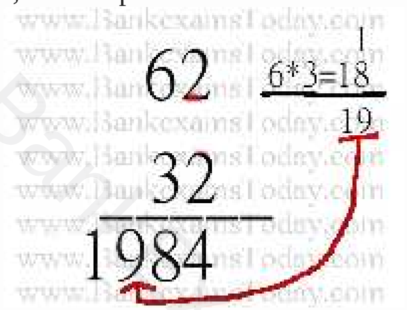
STEP 2

This is an interesting step. Now multiply last digit first value and first digit of second value and vice-versa. Then we add outcomes. But we need the last number that is 8 here.



STEP 3

This is the last step, in this step we do multiplication ten's digit of both value and add the remainder from previous calculation. That's it, we completed the calculation in 3 steps instead of six steps.



We can use this method for multiplication of three or even four digit numbers but time management is really important in IBPS exam and other recruitment exams so for longer calculations, estimation is the best trick. I will post an article about how to do long calculations using estimation and result is 95% accurate which is enough to arrive at answer.

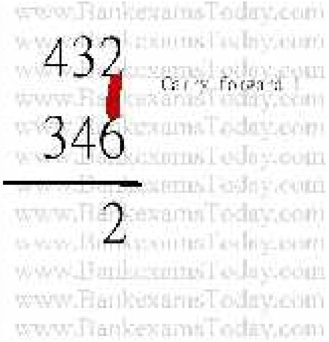
Update 06-09-2013

As two of the readers namely Rahul and Ansh have requested me to use this technique in longer calculations multiplications. I am updating this article.

MULTIPLICATION OF 3 DIGIT NUMBERS

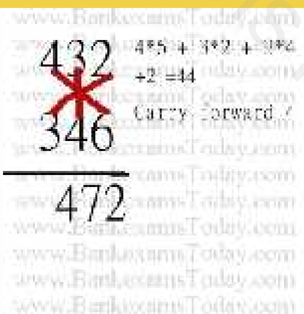
In this example I will multiply 432 with 346. Now the 3 step multiplication method will become 5 step. This method can be used for 4 and even 5 digit numbers but as in bank exams there is lack of time available for calculations I recommend you to use approximation for long calculations.

Step 1

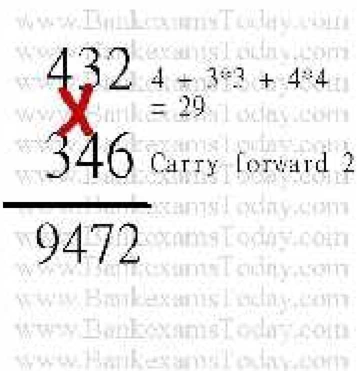


Step 2

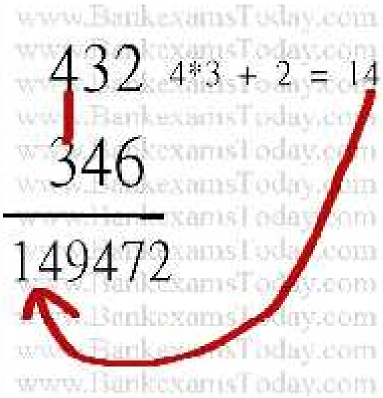
Step 3



Step 4



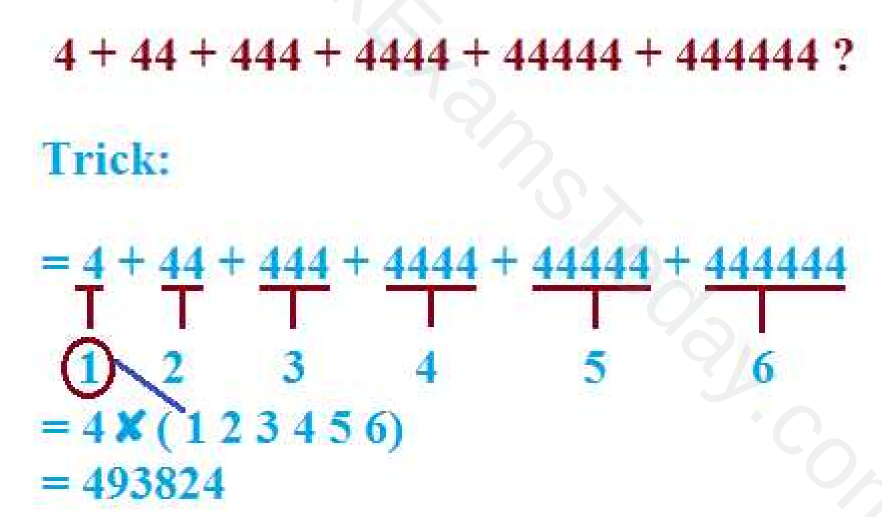
Step 5



In case you find any difficulty to understand the above multiplication method then ask your question in the comments. I will try to answer every query asap.

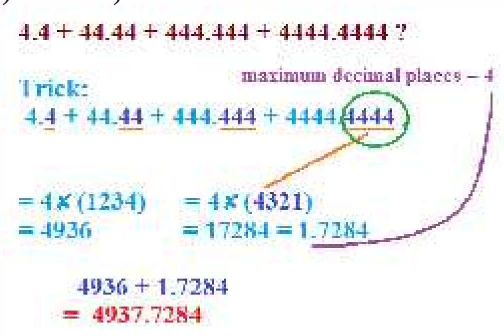
Tricks to Solve Simplification - Addition and Subtraction

Series/Addition/Subtraction



Q1 Find 8 + 888 + 8888 + 88888 ?

a) 97760 b) 98572 c) 98672 d) 97672 e) None of the above



Q2. Find 9.4 + 99.44 + 999.444 + 9999.4444 ?

a) 11207.728 b) 11107.728 c) 11106.728 d) 11111.728 e) None of these

$(15 - 6) = [(15)^2 + 15 \times 6 + (6)^2] = ?$

Trick:

$(a^3 - b^3) = (a - b)(a^2 + ab + b^2)$

$a = 15, b = 6;$

$(a)^3 = 625;$

$(b)^3 = 216;$

$[(a)^3 - (b)^3] = 109$

$(3 - 5)(3 + 5)[(3)^2 - (5)^2] = ?$

Trick:

$(a^4 - b^4) = (a - b)(a + b)(a^2 - b^2)$

$a = 3, b = -5;$

$a = 3; (a^4) = 81$

$b = 5; (b^4) = 625$

$(a^4 - b^4) = 544$

Q3. (2.3 + 3.3) [(2.3)^2 - 2.3 ✘ 3.3 + (3.3)^2] = ?

a) 48.104 b) 47.104 c) 47.204 d) 48.204 e) None of these

Q4. (3-2) [(3)^4+((3)^3 ✘ 2)+(3)^2 ✘ (2)^2+(3 ✘ 2^3)+2^4] = ?

a) 311 b) 211 c) 201 c) 221 d) 301 e) None of these

Q5. (125.824+124.654)^2 + (125.824-124.54)^2 / ((125.824)^2+(124.54)^2)

a) 1.166 b) 1 b) 2 c) 625 d) 250.478 e) None of these

$2 \div 2 \div 2 \div 2 \div 2 \div 2 = ?$

$\frac{2}{2 \times 2 \times 2 \times 2 \times 2} = ?$

$= \frac{1}{16}$

$2 \div 2 \div 2 \div 2 \div 2 \text{ of } 2 = ?$

$2 \div 2 \div 2 \div 2 \div 4 = ?$

$\frac{2}{2 \times 2 \times 2 \times 4} = ?$

$\frac{1}{16}$

$2 \div 2 \div 2 \div 2 \div 2 \times 2 = ?$

$2 \div 2 \div 2 \div 2 \div 4 = ?$

$\frac{2}{2 \times 2 \times 2 \times 2} \times 2 = ?$

$\frac{1}{4}$

$5 \div 5 \div 5 \div 5 \div 5 \div 5 = ?$

$\frac{5}{5 \times 5} + \frac{5}{5 \times 5} = ?$

$\frac{1}{5} + \frac{1}{5} = ?$

$\frac{2}{5}$

$$\frac{1}{1\times4}+\frac{1}{4\times7}+\frac{1}{7\times10}+\frac{1}{10\times13}+\frac{1}{13\times16}+\frac{1}{16\times19}$$

Difference of the number 4-1 = 3

7-4 = 3

10-7 = 3

$$\frac{1}{3}\left[1-\frac{1}{19}\right]=\frac{1}{3}\times\frac{18}{19}=\frac{6}{19}$$

$$\frac{1}{2}+\frac{1}{6}+\frac{1}{12}+\frac{1}{30}+\frac{1}{42}+\frac{1}{56}$$

$$1-\frac{1}{2}+\frac{1}{2}-\frac{1}{3}+\frac{1}{3}-\frac{1}{4}+\frac{1}{4}-\frac{1}{5}+\frac{1}{5}-\frac{1}{6}+\frac{1}{6}-\frac{1}{7}+\frac{1}{7}-\frac{1}{8}$$

$1-\frac{1}{8}=\frac{7}{8}$

Trick :

$\frac{1}{\text{Difference}}$ [first number- last number]

Q6. Evaluate 1 + $^{1}/_{1*3}$ + $^{1}/_{1*3*9}$ + $^{1}/_{1*3*9*27}$ + $^{1}/_{1*3*9*27*81}$ up to three places of decimals ?

a)1.367 b) 1.370 c) 1.361 d) 1.267 e) None of these

Q7. 2 ÷ [2+ 2÷{2+2 ÷ 4)}]= x / 19. Find x.

a) 3 b) 4 c) 5 d) 6 e) None of these

Q8. $\bar{4}.45 + 2.9\overline{27} + 0.\bar{6}$ **?**

a) 0.67 b) 0.77 c) 0.87 d) 0.97 e) None of these

Q9) Find the sum of all even natural numbers less than 75.

a) 1416 b) 1426 c) 1396 d) 1406 e) None of these

$$\sqrt{3\sqrt{3\sqrt{3}}}\ldots\infty$$

$$\sqrt{3\sqrt{3}}\ldots\infty = x$$

$$\Rightarrow \sqrt{3x} = x$$

$$\Rightarrow 3x = x^2$$

$$3 = x$$

Ans

$$\sqrt{6\sqrt{6\sqrt{6}\ldots\infty}} = x$$

$$\sqrt{6x} = x$$

$$\Rightarrow 6x = x^2$$

$$\Rightarrow 6 = x$$

Ans

Ques $\sqrt{20+\sqrt{20+\sqrt{20}\ldots\infty}} = x$

$$\Rightarrow \sqrt{20+x} = x$$

$$\Rightarrow 20 + x = x^2$$

$$\Rightarrow x^2 - x - 20$$

$$x^2 - 5x + 4x - 20$$

$$(x+4)(x-5)$$

$$x = \cancel{-4},\ 5$$

Ans

$$\sqrt{30-\sqrt{30-\sqrt{30}}\ldots\infty} = x$$

$$\Rightarrow \sqrt{30-x} = x$$

$$\Rightarrow 30 - x = x^2$$

$$\Rightarrow x^2 + x - 30$$

$$x^2 + 6x - 5x - 30$$

$$x(x+6) - 5(x+6)$$

$$x = 5,\ \cancel{-6}$$

Ans

$$\text{Given exp.} = \left(\frac{1}{1^2}-\frac{1}{2^2}\right)+\left(\frac{1}{2^2}-\frac{1}{3^2}\right)+\left(\frac{1}{3^2}-\frac{1}{4^2}\right)$$
$$+\left(\frac{1}{4^2}-\frac{1}{5^2}\right)+ - - - - - +\left(\frac{1}{9^2}-\frac{1}{10^2}\right)$$
$$\Rightarrow \left(\frac{1}{1^2}-\frac{1}{10^2}\right)=\left(1-\frac{1}{100}\right)=\frac{99}{100} \text{ Ans}$$

Solution:

(1)
Sol : Option (c)
8*(12345) - 88 = 98672

(2)
Sol: Option (b)
9✘(1234) = 11106
4✘(4321) = 17284
=1.7284
=11106+1.7284=11107.7284

(3)
Sol: Option (a)
$(a^3 + b^3)=(a+b)(a^2-ab+b^2)$
a = 2.3, b = 3.3;
$(a)^3 = 12.167$, $(b)^3 = 35.937$ $(a^3+b^3)=48.104$

(4)
Sol: option (b)
$(a^5-b^5)=(a-b)[a^4+a^3b+a^2b^2+ab^3+b^4] = ?$
a = 3, b = 2; (3)5=243, (2)5 =32;
$(a^5-b^5) = 243-32= 211$

(5)
Sol: Option (b)
$(a+b)^2 + (a-b)^2=2((a)^2+(b)^2)$ Hence Answer is 2

(6)
Sol: Option (a)
1+0.33+0.0370 ... hence (a) is the answer no further addition is required.

(7)
Sol: option (e)
Using VODMAS method
Step 1. [2+ 2/4] = 5/2.
Step 2.(2 + 2 ÷5/2) = 2÷ 2✘2/5 =14/5
Step 3. [2+2÷14/5]=2+2*5/14=19/7
Step 4. L.H.S = 2÷19/7=14/19 = x/19 Hence x=19

(8)
Sol: Option (c)
= -4 + 0.45 + 2 + ⁹²⁷⁻⁹/₉₉₀ +6/9
= -4 + 0.45 + 2 + ⁹¹⁸/990 +3/2
= (- 4 + 2) + (0.45+1.5) + (⁵¹/55)
= -2 + 1.95 + 0.92 = 0.87

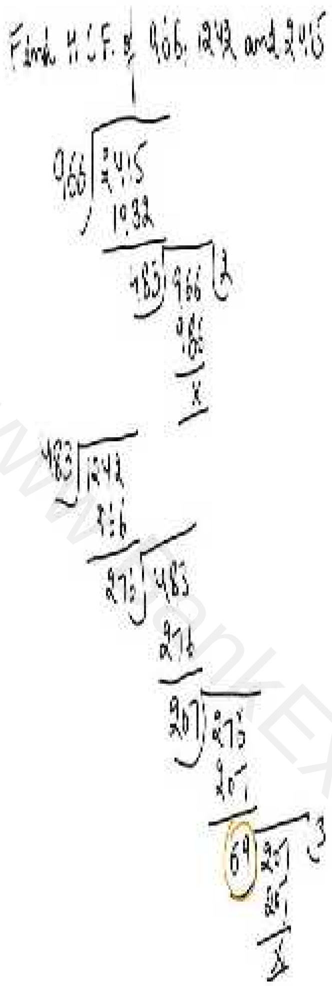
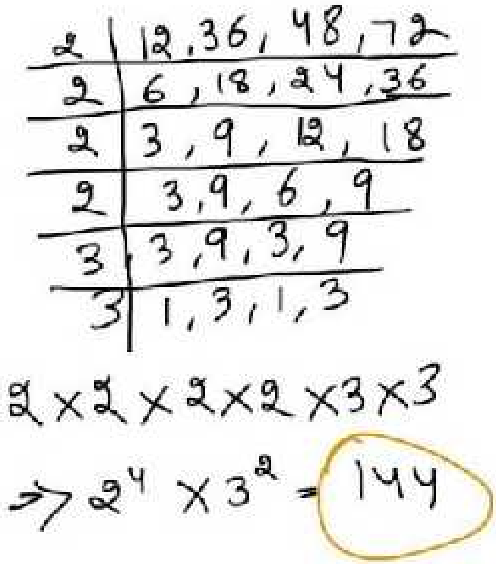
(9)
Sol: Option (d)
sum= 2 + 4 + 6 + ...+74 a=2 , d=(4-2)=2,l=74 n=37; sum= n/2 (a+l) 37/2✘(2+74)=(37✘38)
=37✘(40-2) =(37✘40)-(37✘2) =(1480-74)=1406

H.C.F. & L.C.M.

- Factorization & Division Method
- HCF & LCM of Fractions & Decimal Fractions

Methods

On Basis	H.C.F. or G.C.M	L.C.M.
Factorization Method	Write each number as the product of the prime factors. The product of least powers of common prime factors gives H.C.F. **Example:** Find the H.C.F. of 108, 288 and 360. 108 = 2^2✘3^3, 288 = 2^5✘32 and 360 = 23✘5✘32 H.C.F. = 22✘32=36	Write each numbers into a product of prime factors. Then, L.C.M is the product of highest powers of all the factors. **Examples:** Find the L.C.M. of 72, 108 and 2100. 72=23✘32,108=33✘22, 2100=22✘52✘3✘7. L.C.M.=23✘33✘52✘7=37800
Division Method	Let we have two numbers .Pick the smaller one and divide it by the larger one. After that divide the divisor with the remainder. This process of dividing the preceding number by the remainder will repeated until we got the zero as remainder.The last divisor is the required H.C.F. **Example:**	Let we have set of numbers. First of all find the number which divide at least two of the number in a given set of number.remainder and not divisible numbers will carry forward as it is. Repeat the process till at least two number is not divisible by any number except 1.The product of the divisor and the undivided numbers is the required L.C.M. **Example:** Find the L.C.M. of 12,36,48,72

	 H.C.F. of given numbers = 69	
H.C.F. & L.C.M. of Fractions	H.C.F. = H.C.F. of Numerator / L.C.M. of Denominators	L.C.M. = L.C.M. of Numerator / H.C.F. of Denominators
Product of H.C.F. & L.C.M.	H.C.F * L.C.M. = product of two numbers	
Decimal numbers	H.C.F. of Decimal numbers Step 1. Find the HCF of the given numbers without decimal. Step 2.Put the decimal point (in the HCF of Step 1) from right to left according to the MAXIMUM deciaml places among the given numbers.	L.C.M. of Decimal numbers Step 1. Find the LCM of the given numbers without decimal. Step 2.Put the decimal point (in the LCM of Step 1) from right to left according to the MINIMUM deciaml places among the given numbers.

HCF & LCM - Practice Set 1

- **Q1.** $12^2, 12^4, 12^{10}, 12^6$ Find the L.C.M.
- a) 12 b) 12^2 c) 12^6 d) 12^{10}
- **Q2.** $6^{-1}, 6^{-3}, 6^{-10}, 6^{-12}$ Find the H.C.F.
  a) 6^{-1} b) 1 c) 6^{-12} d) 6^{-11}

  Q3. The L.C.M of the fraction of $^2/3, ^4/9, ^5/6, ^7/12$ is:
- a) $^{35}/9$ b) $^1/36$ c) $^1/18$ d) $^{140}/3$

  Q4. The ratio of two number is 5:6, if their H,C.F. is 9 and L.C.M. is 270. Find the numbers.
  a) 72,63 b) 81,108 c) 45,54 d) 225,108

  Q5. The multiplication of two numbers is 20,000 if their L.C.M is 800. Find the H.C.F.
  a)400 b) 25 c) 2,000 d) 800

  Q6. Find the least number which when divided by 4,6,7,8,9,12. leaves the same remainder 3 in each case.
  a) 504 b) 501 c) 507 d) 506

  Q7. The smallest number which is divisible by 12,15,20 and is a perfect square is:
  a) 400 b) 900 c) 1600 d) 3600

  Q8. The largest number which divided by 77, 147 and 252 to leave the same remainder in each case is:
  a) 9 b) 15 c)35 d) 25

  Q9. The H.C.F. of the fraction of $^{36}/25, ^{48}/25, ^{72}/75$
  a) $^{12}/75$ b) $^4/25$ c) $^{36}/25$ d) ^{36}

- **Solution:**
- **(1)**
  Sol: Option (d)
- $12^2, 12^4, 12^{10}, 12^6$ Find the L.C.M.
  L.C.M. = 12^{10}

  (2)
  Sol: Option(c)
- $6^{-1}, 6^{-3}, 6^{-10}, 6^{-12}$ Find the H.C.F.
- $^1/_6, ^1/_6{}^3, ^1/_6{}^{10}, ^1/_6{}^{12}$
- H.C.F.= $^{\text{H.C.F.}}/_{\text{L.C.M.}}$= $^1/_6{}^{12}$
  = 16^{-12}

  (3)
  Sol: Option (d)
- Fraction of L.C.M. = $^{\text{L.C.M.}}$/H.C.F. =$^{140}/3$
  (4)
  Sol: Option (c)
  The ratio of numbers is 5:6
  The number is 5✘9=45
  =6✘9=54

(5)
Sol: Option (b)
L.C.M.✘H.C.F. = Ist No✘2nd No.
800✘H.C.F. = 20,000
H.C.F. = $^{20,000}/_{800}$ = 25

(6)
Sol: Option (c)
L.C.M. of the number 4,6,7,8,9,12
L.C.M. = 8✘9✘7 = 504
and Remainder = 3
So the number is L.C.M. + 3
504 + 3 = 507

(7)
Sol: Option (b)
L.C.M. = (3✘5✘2^2)
Required number = (3^2✘5^2✘2^2)=900

(8)
Sol: Option (c)
Required number = H.C.F. of (147-77)
(252-147) and (252-77)
= H.C.F. of 70,105 and 175
= 35
(70 = 2✘5✘7, 105 = 5✘3✘7 and 175=5✘5✘7)
H.C.F. =5✘7 = 35

(9)
Sol: Option (a)
= $^{\text{H.C.F. of numerator}}$/ L.C.M. of denominator
H.C.F.= ^{12}/75

HCF & LCM - Practice Set 2

Q1. 468 can be expressed as as a product of prime as :a) 2×2×13×7×2×3 b) 2×2×13×7 c) 2×2×13×3×3 d) 2×2×3×3 ×7 e) None of these

Q2. A number n is said to be perfect if the sum of all its divisor (excluding n itself) is equal to n. An example of perfect number is:
a) 27 b) 35 c) 21 d) 6 e) None of these

Q3. $^{70105}/_{21035}$ when expressed in simplest form is
a) ^{203}/601 b) ^{2003}/603 c) ^{2003}/601 d) ^{2001}/603 e) None of these

Q4. H.C.F. of $2^2×3^3×5^5$, $2^3×3^2×5^2×7$ and $2^4×3^4×7^2×5×11$ is :
a)22×32×5
b)22×32×5×7×11
c)24×34×55
d)24×34×55×7×11
e) None of these

5. $5^2 \times 3 \times 2^4 \times 2^2 \times 3^2 \times 7$ Find the L.C.M.
a) 12300 b) 12600 c) 24600 d) 25200

Q6. H.C.F. of 4×27×3125, 8×9×25×27 & 16×81×5×11×49 is:
a) 180 b) 360 c) 540 d) 1260 e) None of these

Q7. The greatest 5-digit number that is exactly divisible by 100 is:
a) 99899 b) 99800 c) 99900 d) 99889 e) None of these

Q8. What will be the remainder when $(29)^{36}$ is divided by 28 ?
a) 0 b) 1 c) 29 d) 5 e) Cannot be determined

Q9. A number when divided by 627 leaves a remainder 43. By dividing the same number by 19, the remainder will be
a)19 b) 24 c) 43 d) 5 e) 13

Q10. The numbers 1, 3, 5 ... 25 are multiplied together. The number of zeroes at the right end of the product is :
a) 22 b) 8 c) 13 d) 6 e) 0

Q11. When a certain number is multiplied by 21, the product consist oof only fours. The smallest such number is:
a) 21164 b) 4444 c) 444444 d) 444 e) None of these

Q12. In a question, divisor is 2/3 of the dividend and twice the remainder. If the remainder is 5, then the dividend is
a) 85 b) 145 c) 225 d) 65 e) None of these

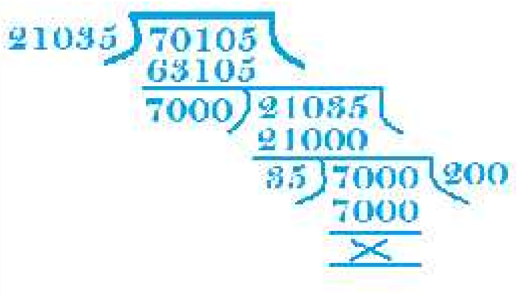
Solution

(1)
Sol : Option (c)
2✘2✘13✘3✘3 = 468

(2)
Sol : Option (d)

n	Divisors excluding n	Sum of divisor
27	3✘9✘1	13
35	5✘7✘1	13
21	3✘7✘1	11
6	3✘2✘1	6

(3)
Sol : Option (c)



(4)
Sol: Option (a)

(5)
Sol:Option (d)
50+75+150+250+350
=875

(6)
Sol: Option (a)
$4 \times 27 \times 3125 = 2^3 \times 3^3 \times 5^5$
$8 \times 9 \times 25 \times 7 = 2^3 \times 3^2 \times 5^{2 \times 7}$
$16 \times 81 \times 5 \times 11 * 49 = 2^4 \times 3^4 \times 7^2 \times 5 \times 11$
H.C.F. = $2^2 \times 3^2 \times 7 = 180$

(7)
Sol: Option (c)

(8)
Sol: Option (b)

(9)
Sol: Option (d)

(10)
Sol: Option (e)

(11)
Sol: Option (a)

(12)
Sol: Option (e)

Square & Cube

- Square & Cube
- Square Root & Cube Root
- Factorization Method

Perfect Square	Non-Perfect Square
last digit is 1, 4, 9, 6, 5	last digit is 2, 3, 7, 8

Chart of Perfect Squares 1 to 30

$1^2 = 1$	$11^2 = 121$	$21^2 = 441$
$2^2 = 4$	$12^2 = 144$	$22^2 = 484$
$3^2 = 9$	$13^2 = 169$	$23^2 = 529$
$4^2 = 16$	$14^2 = 196$	$24^2 = 576$
$5^2 = 25$	$15^2 = 225$	$25^2 = 625$
$6^2 = 36$	$16^2 = 256$	$26^2 = 676$
$7^2 = 49$	$17^2 = 289$	$27^2 = 729$
$8^2 = 64$	$18^2 = 324$	$28^2 = 784$
$9^2 = 81$	$19^2 = 361$	$29^2 = 841$
$10^2 = 100$	$20^2 = 400$	$30^2 = 900$

1	4	9	16	25	36	49	64	81	100
121	144	169	196	225	256	289	324	361	400
441	484	529	576	625	676	729	784	841	900
961	1024	1089	1156	1225	1296	1369	1444	1521	1600
1681	1764	1849	1936	2025	2116	2209	2304	2401	2500
2601	2704	2809	2916	3025	3136	3249	3364	3481	3600
3721	3844	3969	4096	4225	4356	4489	4624	4761	4900
5041	5184	5329	5476	5625	5776	5929	6084	6241	6400
6561	6724	6889	7056	7225	7396	7569	7744	7921	8100
8281	8464	8649	8836	9025	9216	9409	9604	9801	10000

Square Root & Cube Root

$\sqrt{1} = 1$ since $1^2 = 1$

$\sqrt{4} = 2$ since $2^2 = 4$

$\sqrt{9} = 3$ since $3^2 = 9$

$\sqrt{16} = 4$ since $4^2 = 16$

$\sqrt{25} = 5$ since $5^2 = 25$

$\sqrt{36} = 6$ since $6^2 = 36$

$\sqrt{49} = 7$ since $7^2 = 49$

$\sqrt{64} = 8$ since $8^2 = 64$

$\sqrt{81} = 9$ since $9^2 = 81$

$\sqrt{100} = 10$ since $10^2 = 100$

numbers	squares	last digit
1	1	1
2	4	4
3	9	9
4	16	6
5	25	5
6	36	6
7	49	9
8	64	4
9	81	1

$\sqrt{12544}$

11   2 or 8 (last digit)

$\Rightarrow 11^2 < 125 < 12^2$

$\Rightarrow$ Now $11 \times 12 = 132$

125 is less than 132 (hence 2)

$\Rightarrow$ 112 Ans

No.	Cube	Unit digit of cube
1	1	1
2	8	8
3	27	7
4	64	4
5	125	5
6	216	6
7	343	3
8	512	2
9	729	9
10	1000	0

$\sqrt[3]{19683}$ $(7^3 = 343)$

$2^3 < 19 < 3^3$

$= 2 \quad 7$

27 Ans

$1^3 = 1$
$2^3 = 8$
$3^3 = 7$
$4^3 = 4$
$5^3 = 5$
$6^3 = 6$
$7^3 = 3$
$8^3 = 2$
$9^3 = 9$

$\sqrt[3]{29791}$ $(1^3 = 1)$

$3^3 < 29 < 4^3$

$3 \quad 1$

31 Ans

Find Square of any number within 10 seconds

Today i am going to share an interesting vedicmaths trick. At first you will find it difficult but with practice, you will be able to find square of any number within 10 seconds.

Square numbers ending in 25

$325^2 = 105625$

Step 1. 325 = 3_25 => 3

Step 2. Square the number from Step 1: $3^2 = 9$

Step 3. Divide the number from Step 1 by 2: 3/2 =1.5

Step 4. Add Step 2 and Step 3 : 9 + 1.5 = 10.5

Step 5. Multiply the number from Step 4 by 10: 10.5 * 10 =105

Step 6. Write the number 625 next to the result from Step 5: 105_625 = 105625

Square numbers between 80 and 130

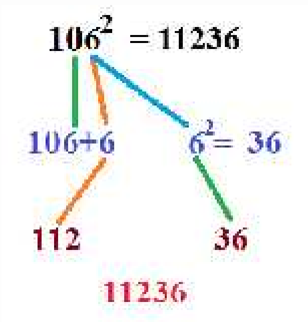
Above 100

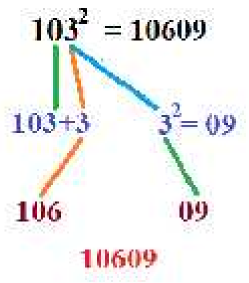
$103^2 = 10609$

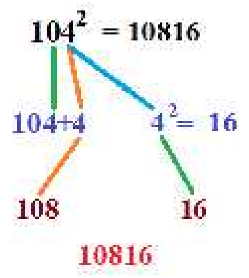
Step 1. Add the number to the ones digit:
103 + 3 = 106

Step 2. Square the ones digit number (if the result is a single digit put a 0 in front of it):
$3^2 = 09$

Step 3. Place the result from Step 2 next to the result from Step 1 : 10609







Below 100

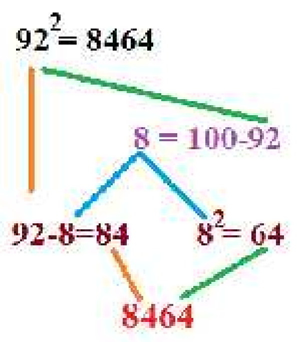
$97^2 = 9409$

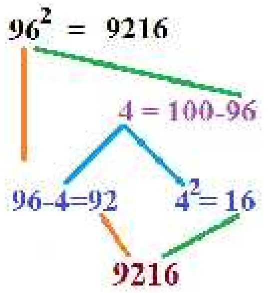
Step 1. Subtract the number from 100: 100- 97 = 3

Step 2. Subtract the number (from Step 1) from original number : 97-3 =94

Step 3. Square the result from Step 1 (if the result is a single digit put a 0 in front of it) : $3^2 = 09$

Step 4. Place the result from Step 3 next to the result from Step 2: 9409





Square numbers between 30 and 80

Below 50

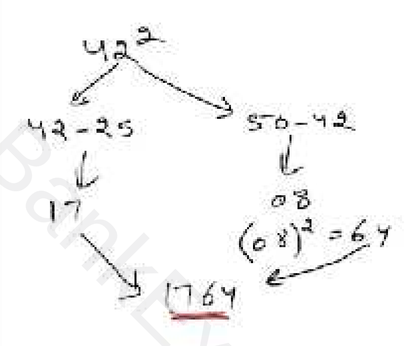
$48^2 = 2304$

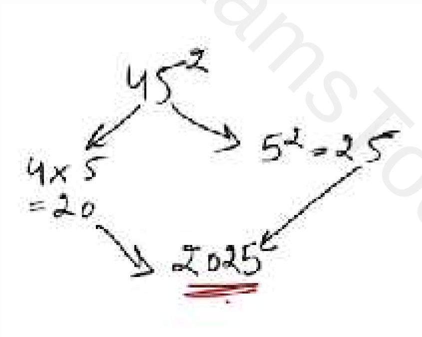
Step 1 . Subtract the number from 50: 50-48=2

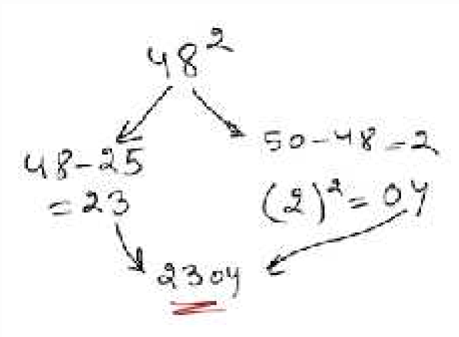
Step 2 . Subtract the result (from Step 1) from 25: 25-2 =23

Step 3 . Square the result from Step 1 (if the result is a single digit put a 0 in front of it) : $2^2 = 04$

Step 4 . Place the result from Step 3 next to the result from Step 2 : 2304







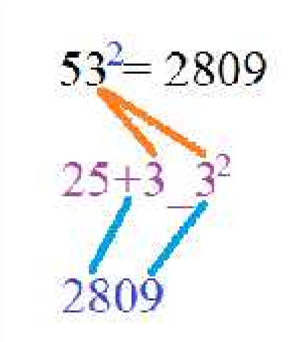
Above 50

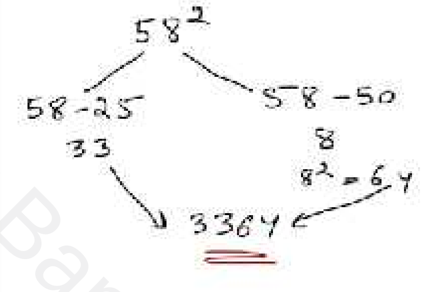
$53^2 = 2809$

Step 1. Add 25 to the ones digit: 25 + 3 = 28

Step 2. Square the ones digit number (if the result is a single digit put a 0 in front of it) : $3^2 = 09$

Step 3. Place the result from Step 2 next to the result from Step 1 : 2809



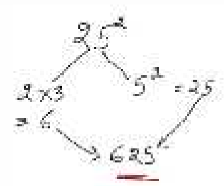


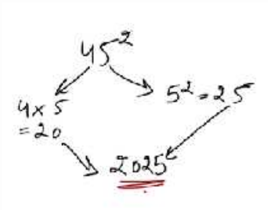
SQUARE NUMBERS ENDING IN 5

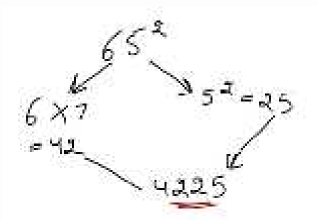
$35^2 = 1225$

Step 1. Multiply the first digit by the first digit plus one: 3 * (3 + 1) = 12

Step 2. Write the numbers 25 next to the result from Step 1 : 1225







Updated On 29th June 2015
Square numbers between 10 and 19

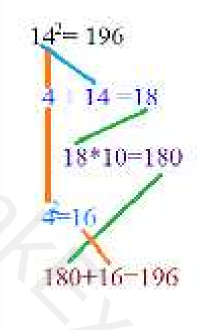
$14^2 = 196$

Step 1: Add the number to the ones digit : 14 + 4 = 18

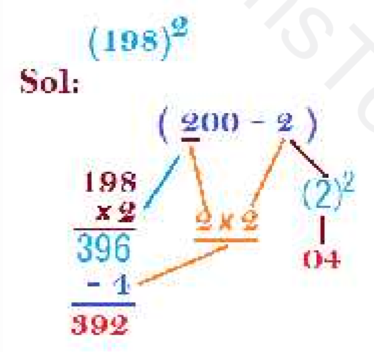
Step 2: Multiply the number from Step 1 by 10: 18 *10 = 180

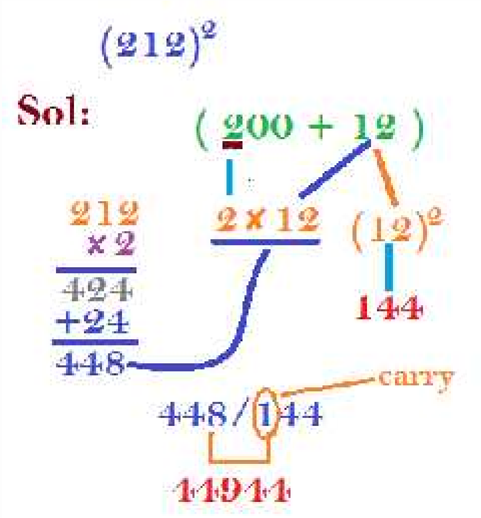
Step 3: Square the ones digit number $4^2 = 16$

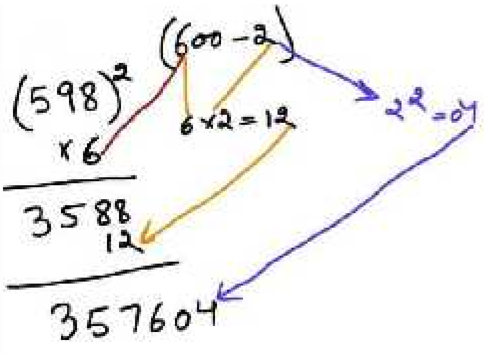
Step 4: Add Step 2 and Step 3 : 180 + 16 = 196

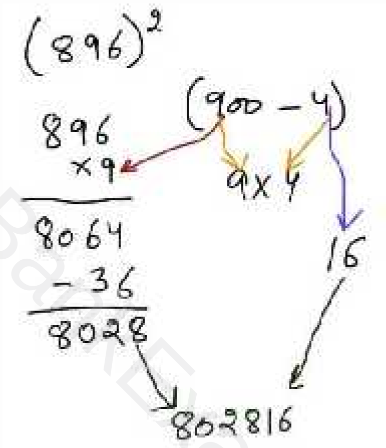


Square of Nearest value of 100,200,300...so on



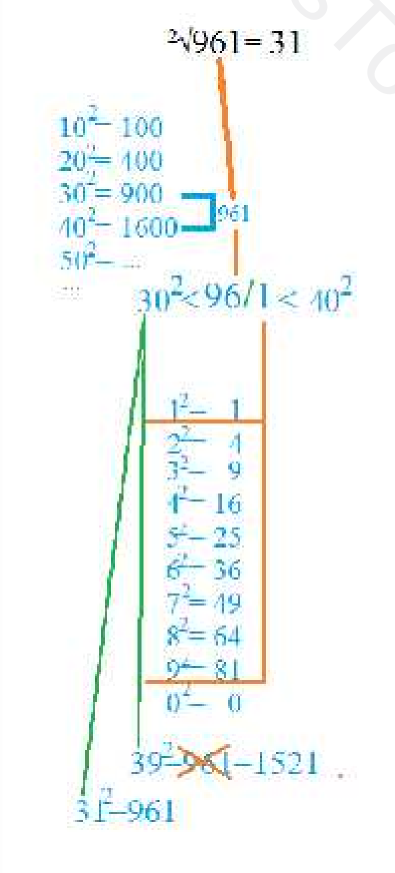


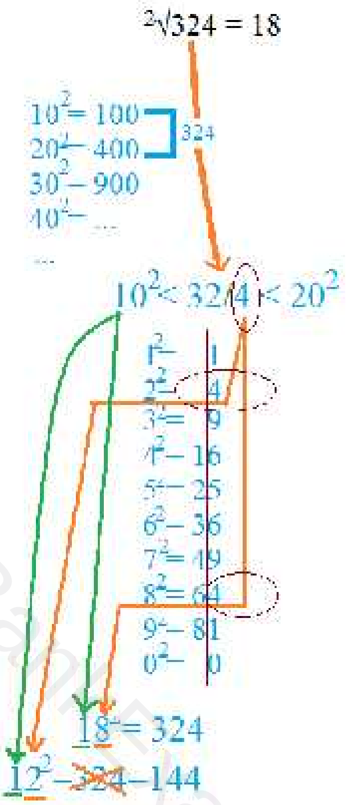




#nth root

Square root





Squaring Technique - Find Square of any number under 10 seconds

Simple technique to find square of a two digit or three digit number under 10 seconds.

Here we are going to use simple algebric formula that it

$[a+b]^2 = a^2 + 2ab + b^2$

By applying this formula, let's do some examples:-

Find 43^2
$\Rightarrow [43]^2$
$\Rightarrow [4|3]^2$
$\Rightarrow [4^2 \mid 2 \times 4 \times 3 \mid 3^2]$
$\Rightarrow [16 \mid 24 \mid 9]$
1849

More shortcut techniques

Find 114^2
$\Rightarrow [11|\ 4]^2$
$\Rightarrow [11^2 \mid 2 \times 11 \times 4 \mid 4^2]$

⇒ [121 | 88 | 16]
⇒[121| 88 + 1 | 6]
⇒ [121 | 89 | 6]
⇒ [129 | 9 | 6]
12996

Find 253^2
⇒$[25|3]^2$
⇒$[25^2 | 2 \times 25 \times 3 | 3^2]$
⇒[625 | 150 | 9]
64009

TECHNIQUE

In case of two digit number deduct last digit and add it to another number and then add square of same.

In this technique we simplify the squaring method by making one unit's digit zero. It is far easy to multiply 50*24 than 54*24. So I used this technique. Try practice more to become expert in this technique.

LET'S TAKE SOME EXAMPLES

Find square of 53.
=(53*53)
= (53+3) * (53-3) + (3*3)
=(56*50) + 9
= (560*5) + 9
= 2800 + 9 = 2809

Let's take another example
Find square of 69
= (69*69)
= (69+1) * (69-1) + (1*1)
= (70*68) + 1
= (680*7) + 1
= 4761

Let's take one more example
Find square of 45
= (45*45)
= (45-5)*(45+5) + (5*5)
= (40*50) + 25
= 2000+25
= 2025

Tricks to find Square Root and Cube Roots

$$\sqrt{16} = \sqrt{4 \times 4} = 4$$

$$\sqrt[3]{4} = \sqrt[3]{4 \times 4 \times 4} = 4$$

Division Method

- **Step 1**. Make Pair of digits of given number from left to right
- **Step 2.** Pick first pair, like here 6 find the square which is equals to 6 or less than it.Like 2
- **Step 3.** So Place it to in the section of Quotient as well as in the divisor.
- **Step 4:** then subtract from square of no which is equals to 6 or less than it with 6
- **Step 5.** Now comes to second pair bring it down like here 40,double the quotient like 2 = 4 and write the result on the left of 240 .It is just like division.Now repeat From Step 2 until you got the remainder zero.

$\sqrt{64009} = ?$

2	6 $\overline{40}$ $\overline{09}$	253 = Quotient
+2	4	
45	2 $\overline{40}$	
+5	2 25	(since 45 x 5 225)
503	15 $\overline{09}$	(since 503 x 3 1509)
	15 09	

$\sqrt{64009} = 253$ (i.e. Quotient)

Prime Factor Method

$\sqrt{11025} = ?$

3	11025
3	3675
5	1225
5	245
7	49
	7

$\sqrt{11025} = 3 \times 5 \times 7 = 105$

$$\sqrt{\frac{529}{900}} = ?$$

$$529 = 23^2$$
$$900 = 30^2$$

$$\sqrt{\frac{529}{900}} = \frac{23}{30}$$

Square Root of a Decimal Fraction

- Step 1. Make the pair of integer part first.
- Step 2. Now find whether the decimal part is odd or even if it is odd then make it odd by placing at the end of it zero.
- Now just find the square root by the division method as discussed above and don't forget to put the decimal point in the square root as the integer part is over.

$$\sqrt{387.09126} = ?$$

1 + 1	3 $\overline{87}$. $\overline{09}$ $\overline{12}$ $\overline{60}$ 1	19.674
29 + 9	2 $\overline{87}$ 261 (integer part is over)	since 29 x 9=261
386 6	26 $\overline{09}$ 23 16	since 386 x 6=2316
3927 7	2 93 $\overline{12}$ 2 7 4 8 9	since 3927 x 7=27489
39344	1 8 2 3 $\overline{60}$ 1 5 7 3 7 6	since 39344 x 4=157376

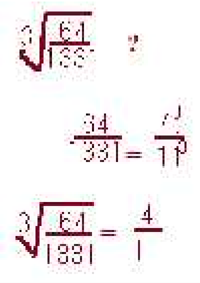
Method of Finding Cube Root of Perfect Cube

$$\sqrt[3]{2744} = ?$$

2	2744
2	1372
2	686
7	343
7	49
	7

$$\sqrt[3]{2744} = 2^3 \times 7^3$$

$$\sqrt[3]{2744} = 2 \times 7 = 14$$



Fractions & Decimals

On Basis	Explanation
Decimal Fractions	A number with a denominator of power of 10 is a decimal fractions. $^{1}/_{10}$= 1 tenth; $^{1}/_{100}$= 0.1;$^{38}/_{100}$=0.38
Vulgar Fractions	Conversion of 0.64(decimal number) into a Vulgar Fraction.First of all write the numeric digit 1 in the denominator of a number (like here 0.64) and add as many numeric zeros as the digit in the number after decimal point.After that removes the decimal point from the given number.At last step just reduce the fraction to its lowest terms. So, 0.64 = $^{64}/_{100}$=$^{16}/_{25}$;25.025 = $^{25025}/_{1000}$ = $^{1001}/_{4}$
Operations	**Addition & Subtraction** To perform the addition and subtraction of a decimal fraction could be done through placing them right under each other that the decimal points lie in one column. 3.424+3.28+.4036+6.2+.8+4 3. 424 3. 28 . 4036 6. 2 . 8 +4______ 18. 1076 **Multiplication of a Decimal Fraction** To find the multiplication of decimal fraction , first of all you need to remove the decimal point from the given numbers and then perform the multiplication after that assign the decimal point as many places after the number as the sum of the number of the decimal places in the given number. Step 1. 0.06*0.3*0.40 Step 2. 6*3*40=720 Step 3. 0.00720 Multiplication of a decimal fraction by power of 10 A multiplication of a decimal fraction by a power of 10 can be perform through shifting the decimal point towards right as many places as is the power of 10. like 45.6288*100=45628.8, 0.00452*100=0.452 **Division**

	$\frac{0.0204}{17} = \frac{204}{17} = 12$ $= 0.0012$ $\frac{0.00066}{0.11} = \frac{0.00066 \times 100}{0.11 \times 100} = \frac{0.066}{11} = .0066$
Comparison of Fractions	To compare the set of fractions numbers,first of all you need to convert each fraction number or value into a equal decimal value and then it will be became easy for you to assign them (the numbers or value) in a particular way(ascending or descending order). $^3/5, ^4/7, ^8/9$ and $^9/11$ Arranging in Ascending Order $^3/5 = 0.6$, $^4/7 = 0.571$, $^8/9 = 0.88$, $^9/11 = 0.818$. Now, 0.88 > 0.818 > 0.6 > 0.571 $^8/9 > ^9/11 > ^3/5 > ^4/7$
Recurring Decimal	**Recurring Decimal** A decimal number in which after a decimal point a number or set of number are repeated again and again are called recurring decimal numbers.It can be written in shorten form by placing a bar or line above the numbers which has repeated. $\frac{8}{3} = 2.666...... = 2.\overline{6}$ $\frac{1}{7} = 0.\ 142857142857142857$ $= 0.\overline{142857}$ **Pure Recurring Decimal** A decimal number in which all digits are repeated after a decimal point. $0.5 = \frac{5}{9};\ 0.\overline{53} = \frac{53}{99};\ 0.\overline{067} = \frac{67}{999}$ **Mixed Recurring Decimal** A decimal number in which certain digits are repeated only.

	$0.17333..... = 0.17\overline{3}$ $0.1\overline{6} = \frac{16-1}{90} = \frac{15}{90} = \frac{1}{6}$ $0.22\overline{73} = \frac{2273-22}{9900} = \frac{2251}{9900}$

Fraction - Techniques with Practice Questions

Types

- Proper
- Improper
- Mixed Fraction

I. Proper Fraction: [when numerator < denominator]

Eg. **$^4/_5$, $^6/8$, $^9/_7$**

II. Improper Fraction : [when numerator > denominator]

Eg. **$^4/_2$, $^5/_3$, $^6/_2$**

III. Mixed Fraction :

- Mixed with Proper Fraction
- Mixed with Improper fraction

a) Mixed with Proper Fraction: When a proper fraction is mixed with a whole number known as mixed with proper fraction.

Eg. **$5^2/_3$, $6^3/_4$, $7^1/_4$**

b) Mixed with Improper Fraction: When a proper fraction is mixed with a whole number known as mixed with Improper fraction.

Eg. **$2^3/_2$, $4^4/_1$, $6^6/_1$**

Rules

I. **$4 + {}^3/_8 = 4\ {}^3/_8$**

II. **$4+{}^8/_3= 4 + 2{}^2/_3$**
$= 6{}^2/_3$
III. **$4-{}^3/_8=3+(1-{}^3/_8)=3+{}^5/_8=3{}^5/_8$**

Q1. Arrange the fractions a=$^3/5$, b=$^4/7$, c=$^8/9$ and d=$^9/11$ in their descending order.
a) a,b,c,d
b)c,d,a,c
b) a,d,c,a,b
d) c,d,a,b
e) None of these
Q2.[0.00625 of 23/5], when expressed as a vulgar, fraction, equals:
a)23/80 b) 23/8000 c) 23/800 d) 125/23 e) None of these

Q3. Simplify : $$\frac{1\frac{1}{2}}{1+\dfrac{1}{1+\frac{1}{4}}}$$

a)5/6 b) 5/9 c) 15/18 d) 3/18 e) None of these

Q4.If 47.2506 = 4A +7/B+2C +5/D+6E, then the value of 5A + 3B + 6C + D + 3E is:

a) 153.6003 b)53.6003 c) 53.603 d) None of these e) 213.0003

Q5.4/15 of 5/7 of a number is greater than 4/9 of 2/5 of the same number by 8.What is half of that number?

a)215 b) 315 c) 305 d) 325 e)None of these

Q6. Find the value of $^1/_{2\times3}+{}^1/_{3\times4}+{}^1/_{4\times5}+{}^1/_{5\times6}+$............+ $^1/_{9\times10}$

a)$^4/_{10}$ b) $^2/10$ c) $^2/5$ d) $^4/_5$ e) None of these

Solution

(1)
Sol: Option d
Clearly $^3/5=0.6$, $^4/7 = 0.571$, $^8/9 = 0.88$, $^9/11= 0.818$
Now, 0.88 > 0.818 > 0.6 > 0.571

(2)
Sol: Option c
[0.000625 of $^{23}/5$]=[$^{625}/100000$ * $^{23}/5$]=$^{23}/800$

(3)
Sol: Option (a)

$$\frac{\frac{3}{2}}{1+\frac{1}{\frac{5}{4}}} = \frac{\frac{3}{2}}{\frac{9}{5}}$$

(4)
Sol: Option (a)
$4A + {}^7/B + 2C + {}^5/D + 6E = 47.2506$
$4A + {}^7/B + {}^2/C + {}^5/D + 6E = 40+7+0.2+0.05+0.0006$
Comparing the terms on both sides, we get
$4A=40$, ${}^7/B = 7$, $2C = 0.2$, ${}^5/D=0.05$, $6E=0.0006$
or
a=10, B=1, C=0.1, D = 100, E = 0.0001
5A+3B+6C+D+3E
=(5810)+(3*1)+(6*0.1)+100+(3*0.0001)
=50+3+0.6+100+0.0003=153.6003

(5)
Sol: Option B
Let the number be x. Then,
${}^4/_{15}$ of ${}^5/_7$ of x - ${}^4/_9$ of ${}^2/_5$ of x = 8
${}^4/_{21}x - {}^8/_{45}x = 8$
$[{}^4/_{21} - {}^8/_{45}]x = 8$
$[{}^{60-56}/_{315}]x = 8$
${}^4/_{315}x = 8$
$x = [{}^{8*315}/_4] = 630$
${}^1/_2\ x = 315$

(6)
Sol: Option C
Given expression $[{}^1/_2 - {}^1/_3]+[{}^1/3 - {}^1/4]+[{}^1/4 - {}^1/5]+[{}^1/5 - {}^1/6]+$.....................$+[{}^1/9 - {}^1/10]$
$=[{}^1/2 - {}^1/10]$
=4/10
=2/5

Surds & Indices

- Some Rules of Indices
- Some Rules of Surds

Law of Indices

i) $a^m \times a^n = a^{m+n}$

ii) $\dfrac{a^m}{a^n} = a^{m-n}$

iii) $(a^m)^n = a^{mn}$

iv) $(ab)^n = a^n b^n$

v) $\left(\dfrac{a}{b}\right)^n = \dfrac{a^n}{b^n}$

vi) $a^0 = 1$

Law of Surds

i) $\sqrt[n]{a} = a^{1/n}$

ii) $\sqrt[n]{ab} = \sqrt[n]{a} \times \sqrt[n]{b}$

iii) $\sqrt[n]{\dfrac{a}{b}} = \dfrac{\sqrt[n]{a}}{\sqrt[n]{b}}$

iv) $\left(\sqrt[n]{a}\right)^n = a$

v) $\sqrt[m]{\sqrt[n]{a}} = \sqrt[mn]{a}$

vi) $\left(\sqrt[n]{a}\right)^m = \sqrt[n]{a^m}$

Simple Interest and Compound Interest

Examples

$$\text{time} \times \text{rate} = \frac{S.I}{\text{Principal}} \times 100$$

$$\text{Amount} = S.I + \text{Principal}$$

1

Find the simple interest, If

1. P = Rs.1000, R = 20% per annum, T = 4 years.
2. P = Rs.600, R = 5% per annum, T = 4 months.
3. P = Rs.200, R = 6% per six months, T = 3 years.
4. P = Rs.500, R = 2% per six months, T = $^5/_2$ years.
5. P = Rs.400, R = 3% per three months, T = 2 months.
6. P = Rs.730, R = 10% per annum, T = 120 days.
7. P = Rs. 3000, R = 61/4 per annum, T = period from 4th Feb to 18th Apr.

Solution

1. **4×20×10 800**

$$20\times4 = \frac{S.I}{10\cancel{00}}\times 1\cancel{00}$$

$$20\times4\times10 = S.I$$

2. **2×5 = 10**

$$\frac{\cancel{4}}{\cancel{12}} \times 5 = \frac{S.I}{\cancel{600}} \times \cancel{100}$$

$$\frac{1}{3} \times 5 \times \cancel{6}^{\,2} = S.I$$

$$\boxed{\begin{aligned} S.I &= 5\times 2 \\ &= 10 \end{aligned}}$$

3. **6×2×3×2 = 72**

$$(6\times 2)\times 3 = \frac{S.I}{\cancel{200}}\times \cancel{100}$$

$$\boxed{6\times 2\times 3\times 2 = S.I}$$

4. **5×2×5=50**

$$\frac{5}{\cancel{2}}\times(\cancel{2\times 2})^{2} = \frac{S.I}{\cancel{500}}\times \cancel{100}$$

$$\boxed{5\times 2\times 5 = S.I}$$

5. **4×2=8**

$$(\text{time}\times\text{rate}) = \frac{S.I}{\text{Principal}}\times 100$$

$$\frac{\cancel{2}}{\cancel{12}_{\,6}}\times(3\times 4) = \frac{S.I}{\cancel{400}}\times \cancel{100}$$

$$\boxed{2\times 4 = S.I}$$

6. **73/3=24**

$$\frac{\cancel{4}}{\cancel{12}_{3}}\times 10 = \frac{S.I}{73\cancel{0}}\times 10\cancel{0}$$

$$\boxed{\frac{73}{10}\times 10\times\frac{1}{3} = S.I}$$

7. **37.50**

$$T = (24+31+18)\text{days} = 73 \text{ days} = \frac{73}{365} = \frac{1}{5}\text{yr.}$$

$$\frac{1}{\cancel{5}}\times\frac{\overset{5}{\cancel{25}}}{4} = \frac{S.I}{\cancel{3000}}\times \cancel{100}$$

$$\boxed{\frac{5}{4}\times 30 = S.I}$$

#2

Find the following:

1. P = Rs. 100, R = 3% per annum, T = 2 year, A= ?
2. P = Rs. 500, R = 6% per annum, T = 4 months, A= ?
3. P = Rs. 400, R = 3.65% per annum, T = 150 days, A= ?
4. A = Rs. 540, S.I = Rs. 108 , R = 5%, T = ?
5. A = Rs. 1,120, R = 5%, T = $2\,^{2}/_{5}$ yr, S.I = ?

Solution:

1. **S.I = 6 ; A = S.I + principal ; A = 6 + 100   106**

Method I

$$r \times t = \frac{S.I}{Principal}$$

$$3 \times 2 = \frac{S.I}{\cancel{100}} \times 1\cancel{00}$$

$$6 = S.I$$

$$Amount = S.I + Principal$$

$$Amount = 6 + 100$$

$$A = 106$$

Method II

$$A = P\left(1 + \frac{RT}{100}\right)$$

$$A = 100\left(1 + \frac{3 \times 2}{100}\right)$$

$$A = 100 \times \frac{106}{100}$$

$$Amount = 106$$

2. **S.I = 10 ; A = S.I + P ; A = 10+500 510**
3. **S.I = 6 ; A = 400 + 6 406**

$$R \times T = \frac{S.I}{Principal} \times 100$$

$$\frac{\cancel{365}}{\underset{2}{\cancel{100}}} \times \frac{\overset{3}{\cancel{150}}}{\cancel{365}} = \frac{S.I}{\cancel{400}} \times 1\cancel{00}$$

$$\frac{3}{\cancel{2}} \times \cancel{4}^{2}$$

$$6 = S.I$$

$$Amount = S.I + Principal$$

$$\boxed{A = 6 + 400}$$

4. **T = 5 yr.**

$$R \times T = \frac{S.I}{Principal} \times 100$$

$$T = \frac{108}{5 \times 432} \times 100$$

[27×4=108]
[27×16=432]

Note :
Divisibility Method: 9×3=27
1+0+8 = 9 , 4+3+2 = 9
9 which is divisible by 9 & 3
hence also divisible by 27

$$\boxed{T = 5 \text{ yr.}}$$

5. **120**

Method I

$$\frac{12}{5} \times 5 = \frac{S.I}{x} \times 100$$

$$\frac{12x}{100} = S.I$$

$$A = S.I + P$$

$$A = \frac{12x}{100} + x$$

$$1120 = \frac{112x}{100}$$

$$1000 = x$$

$$S.I = A - P$$

$$S.I = 1120 - 1000 \Rightarrow 120$$

Method II

$$\frac{A}{SI} = \left(1 + \frac{100}{RT}\right)$$

$$540 = 108\left(1 + \frac{100}{RT}\right)$$

$$\Rightarrow \frac{1120}{S.I.} = \frac{112}{12}$$

#3

1. A sum of money lent out at simple interest amounts to Rs. 720 after 2 years and to Rs. 1020 after a further period of 5 years. Find the sum and the rate %.
2. Adam borrowed some money at the rate of 6% p.a. for the first two years, at the rate of 9% p.a. for the next three years, and at the rate of 14% p.a. for the period beyond five years. If he pays a total interest of Rs. 11,400 at the end of nine years , how much money did he borrow ?**(Bank P.O 1999)**

3. A person borrows Rs. 5000 for 2 years at 4% p.a. simple interest. He immediately lends it to another person at $6^1/_4$% p.a. for 2 years. Find his gain in the transaction per year.**(S.S.C.2000)**
4. A certain sum of money amounts to Rs. 1008 in 2 years and to Rs. 1164 in $3^1/2$ years.Find the sum and the rate of interest?
5. The simple interest on a certain sum of money for $2^1/2$ years at 12% per annum is Rs. 40 less than the simple interest on the same sum for $3^1/2$ years at 10% per annum. Find the sum.

Solution

1. **Principal = 600, R = 10%**

$$\boxed{r \times t = \frac{SI}{P} \times 100}$$

$$SI = 1020 - 720 = 300$$

$$\text{In 2 Years} = SI = \frac{300}{5} \times 2$$

$$\Rightarrow \text{Rs. } 120$$

$$P = 720 - 120 \Rightarrow 600$$

$$\boxed{R = \frac{120}{2 \times 600} \times 100}$$

$$R = 10\%$$

2. **12000**

$$\left(\frac{x \times 6 \times 2}{100}\right) + \left(\frac{x \times 9 \times 3}{100}\right) + \left(\frac{x \times 14 \times 4}{100}\right) = 11400$$

$$\left(\frac{3x}{25} + \frac{27}{100} + \frac{14}{25}\right) = 11400$$

$$\frac{95x}{100} = 11400$$

$$x = \frac{11400 \times 100}{95}$$

3. **112.50**

Same Year & Same Amount

$$\left[6\frac{1}{4} - 4\right] \Rightarrow 6-4 = 2$$

Now, We have $2\frac{1}{4}$

$$\frac{9}{\cancel{4}_{2}} \times \cancel{2} = \frac{S.I}{\cancel{5000}_{25}} \times \cancel{100}$$

$$9 \times 25 = SI$$

Gain in 1 yr.

$$\boxed{\frac{225}{2} = 112.50}$$

4. [1164-1008 = 156] $^{156}/_{3\times4} = 208$; R = $^{208}/_{2\times800} \times 100$ 13
5. $^{7x}/_{20}$ - $^{3x}/_{10}$ = 40 x = (40 × 20) x = 800 [Hint : Given Below]

$$R \times T = \frac{SI}{P} \times 100$$

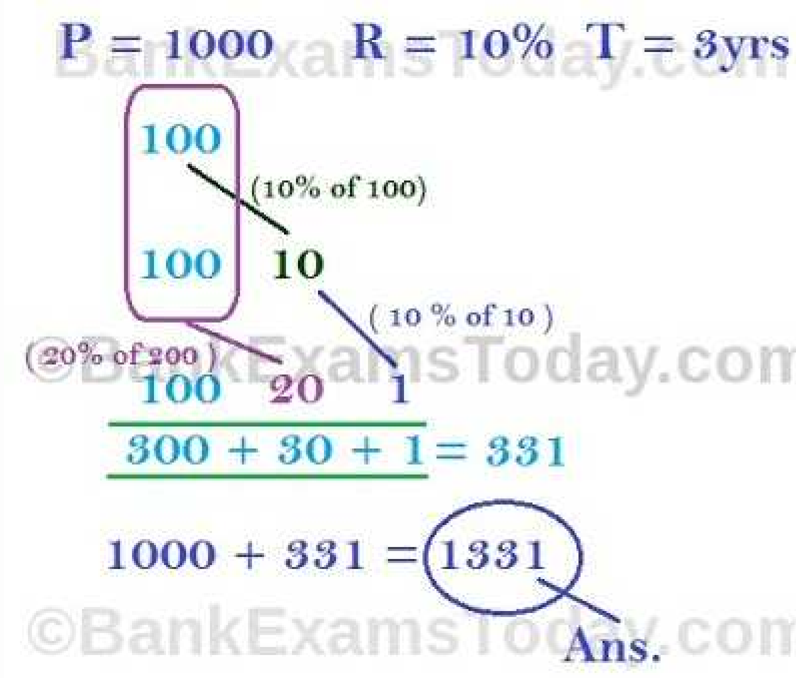
Let P = x

$$\frac{5}{\cancel{2}} \times \cancel{12} = \frac{SI}{x} \times 100$$

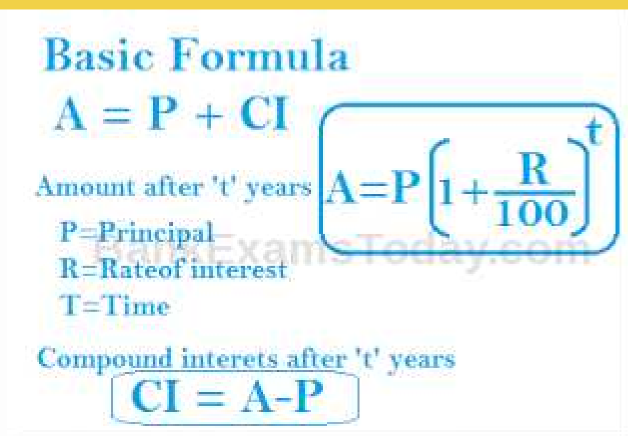
$$\frac{\cancel{30x}}{\cancel{100}} = SI$$

$$\boxed{SI = \frac{3x}{10}}$$

Compound Interest



Formulas



Case 1. When interest is not Compound yearly,

Amount after 't' years A = P $[1+ {}^{r}/_{n\times 100}]^{nt}$
n= no of compounding per year

When interest is compounded half yearly, n = 2

compounded quarterly, n = 4

compounded monthly, n = 12

Case 2. When rate % is no equal every year and interest is compounded yearly

Basic formula :

P $[1+ {}^{r}/_{100}]$ $[1+ {}^{r}/_{100}]$ ...upto 't' times

But as rate % is not same every year, so

$A = P[1+ {}^{r1}/_{100}]^{t1} [1+ {}^{r2}/_{100}]^{t2}$ .... and so on

Where R1 = Rate% p.a. for t1 years. and R2 = Rate % p.a. for t2 years.

Case 3 When interest is compounded yearly but time is in fraction

$T = 5^3/_{4}$ years

A= (whole part) × (fraction part of time)

$A = P [1+ {}^{r}/_{100}]^5 \times [1+ {}^{3r}/_{4/100}]$

Difference between Compound Interest and Simple Interest

CI - SI = P [R/100]2

When time t = 3 years

$CI - SI = P [({}^{R}/100^3 + 3 ({}^{R}/100)^2]$

Examples

#1

- If the compound interest on a certain sum for two years at 10% p.a. is Rs 2,100 the simple interest on it at the same rate for two years will be. **(RRB, 2009)**
- The compound interest on a sum for 2 years is Rs. 832 and the simple interest on the same sum for the same period is Rs. 800. The difference between the compound and simple interest for 3 years will be.
- The difference between simple interest and compound interest on a sum for 2 years at 8% when the interest is compounded annually is Rs. 16, if the interest were compounded half yearly, the difference in one interest would be nearly.
- The difference in C.I and S.I for 2 years on a sum of money is Rs. 160.If the S.I for 2 years be Rs. 2880, the rate of percent is .

Solution

1. **2000**

$$P\left[1+\frac{10}{100}\right]^2 - P = 2100$$

$$P\,(1.21 - 1) = 2100$$

$$P \times 0.21 = 2100$$

$$P = \frac{2100}{21} \times 100$$

$$P = 10{,}000$$

$$\boxed{SI = 2000}$$

2. **98.56**

Year	SI	CI
	800	832
	S.I	C.I
I.	400	400
II.	400	432

Rs. 32

8%

$$\boxed{r\% = 8\%}$$

III.	400	400+66.56

$$\boxed{SI\ 66.56+32 = 98.56}$$

3. **04**

$$P\left(\frac{r}{100}\right) = 16$$

$$P \times \frac{\overset{16}{\cancel{64}}}{\underset{25}{\cancel{100}}} \times 100 = \cancel{16}$$

$$P = 2500$$

S.I

$$r \times t = \frac{SI}{2500} \times 100$$

$$8 \times 2 = \frac{SI}{2500} \times 100$$

$$\boxed{16 \times 8 \times 2 = SI}$$

C.I

$$P\left(1+\frac{R}{100\times 2}\right) - P$$

$$= 2500\left(1+\frac{8}{100\times 2}\right) - 2500$$

$$= 2500 \times \frac{26}{25} + \frac{26}{25} - 2500$$

$$\boxed{676 \times 4 - 2500 \Rightarrow 204 \text{ CI}}$$

4.

$$\boxed{2880}$$

Year	S.I	C.I
I.	1440	1440
II.	1440	1600
		160

$$r\% = \frac{160}{1440} \times 100$$

$$= \frac{100}{9}$$

$$\boxed{= 11\frac{1}{9}\%}$$

18 km/hour = 5 metre/second, can be used to convert the speed given in km/hour to metre/second or vice - versa.

3 km/hour = (3 × 5 / 18) metre/second

and

3 metre/second = (3 × 18 / 5) km/hour

#2
If a train of length "L" at a speed "v "passes another object of length " *i*" at a speed x in time "t", then
t = time to cross the object = Total Distance / Relative Speed = L + *i* / v - x

- If object is stationary, then x = 0
- If object is opposite, then put x = -x
- and v - x making after is (v + x)

A train is said to have crossed an object (stationary or moving) only when the last coach (end) of the train crosses the said object completely. It implies that the total length of the train has crossed the total length of the object.

> *Hence, the distance covered by the train = length of train + length of object*

Basic Formula

1. Time = Distance / Speed
2. Time to cross an object moving in the direction of train =

Time to cross an object moving in the direction of train

$$= \frac{Length\ of\ train + Length\ of\ Object}{Speed\ of\ train - Speed\ of\ object}$$

Assume :
Length of Train = L_t
Length of Object = L
Speed of Train = V_t = time to cross
Speed of Object = V
Then basic formula can be represented as
$t = \dfrac{L_t + L}{V_t - V}$

Important Note

1. If the object is of negligible length, then put length of object, L = 0 (i.e. tree, man)
2. If the object is stationary, then put speed of object, V = 0
3. If the object is moving in opposite direction, then put (-) ve sign before V, so the denominator of the formula becomes

Different Types of Objects

$$V_t - (-V) = (V_t + V)$$

$$\text{Then } t = \frac{(L_t + L)}{(V_t + V)}$$

Case	Types of Objects	Time to Cross
1.	Object is stationary and is of negligible length e.g. train crosses lamp post, pole, standing man etc.	$t = \frac{\text{Length of Train}}{\text{Speed of Train}}$
2.	Object is stationary and is of some length, e.g. train crosses a bridge, a tunnel, platform, or another train at rest	$t = \frac{\text{Length of (Train+Object)}}{\text{Speed of Train}}$
3.	Object is moving and is of negligible length, e.g. train crosses a running man, a running car etc.	$t = \frac{\text{Length of Train}}{\text{Speed of (Train}-\text{Object)}}$
4.	Object is moving and has some length, e.g. train crosses another running train	$t = \frac{\text{Length of (Train+Object)}}{\text{Speed of (Train}-\text{Object)}}$

> *If the object is moving to opposite direction, then denominator becomes speed of (train + object)*

Two Trains Crossing Each Other in Both Directions

Two trains are crossing each other

Assume :
Length of One Train = L_1
Length of Second Train = L_2
They are crossing each other in opposite direction in t_1 seconds
They are crossing each other in same direction in t_2 seconds
Then
Speed of Faster Train = $\dfrac{L_1 + L_2}{2}\left[\dfrac{1}{t_1} + \dfrac{1}{t_2}\right]$
Speed of Slower Train = $\dfrac{L_1 + L_2}{2}\left[\dfrac{1}{t_1} - \dfrac{1}{t_2}\right]$

APPLICATIONS ON TRAINS.

1. How long will a train 130m long travelling at 40 km an hour take to pass a kilometer stone?

Solution: Time = $\dfrac{\textit{Total distance}}{\textit{Speed}} = \dfrac{0.130}{40}$ hr = $\dfrac{0.130 \times 60 \times 60}{40}$ = 11.7 sec.

2. How long will a train 60 m long travelling at 40 km an hour take to pass through a station whose platform is 90 m long?

Solution: Speed = 40 km/hr = $40 \times \frac{5}{18}$ m/s

$\therefore$ Time = $\dfrac{(60+90)}{40 \times 5} \times 18 = \dfrac{150 \times 18}{40 \times 5}$ = 13.5 seconds.

Solution: 30km/hr = $30 \times \frac{5}{18} = \frac{25}{3}$m/s

Length of train = $\frac{25}{\ } \times \frac{27}{\ } = \times \frac{225}{\ } = 112.5$m

$$\text{Length of train} = \frac{\ }{3} \times \frac{\ }{2} = \times \frac{\ }{2} = 112.5\text{m}$$

4. Find the length of a bridge which a train 130 m long, travelling at 45 km an hour, can cross in 30 secs.

Solution: $45 \text{ km/hr} = 45 \times \frac{5}{18} = \frac{25}{2} = 12.5\frac{m}{s}$

Distance covered by the train in 30 seconds = $12.5 \times 30 = 375\ m$

$\therefore$ Length of bridge = 375 – 130 = 245 m.

5. The length of the train that takes 8 seconds to pass a pole when it turns at a speed of 36 km/hr is ___________________ metres.

Solution: $36 \text{ km/hr} = 36 \times \frac{5}{18} = 10 \text{ m/s}$

Distance covered by train in 8 seconds= length of train = $8 \times 10 = 80$ m

6. A train 50 metres long passes a platform 100 metres long I 10 seconds. The speed of the train is ______________ km/hr.

Solution: Speed of train = $\frac{100+50}{10} = 15 \text{ m/s} = \frac{15 \times 18}{5} = 54$ km/hr.

7. How many seconds will a train 60 m in length, travelling at the rate of 42 km an hour, take to pass another train 84 m long, proceeding in the same direction at the rate of 30 km an hour?

Solution: Relative Speed = $42 - 30 = 12 \text{ km/hr} = 12 \times \frac{5}{18} = \frac{10}{3}$ m/s

$$\text{Time} = \frac{\textit{Total length of both theh train}}{\textit{Relative speed}} = \frac{84+60}{\frac{10}{3}} = \frac{144 \times 3}{10} = 43.\ 2 \text{ seconds}$$

8. A train 75 metres long overtook a person who was walking at the rate of 6 km an hour, and passed him in 7 $\frac{1}{2}$ seconds. Subsequently it overtook a second person, and passed him in 6 $\frac{3}{4}$ seconds. At what rate was the second travelling?

Solution: Relative Speed of train and the first person = $\frac{75}{\frac{15}{2}}$ = 10 m/s

= $10 \times \frac{18}{5}$ = 36 km/hr.

∴ Speed of train = 36 + 6 = 42 km /hr

Now, relative speed of train and 2nd person = $\frac{75}{27} \times 4$ m/s = $\frac{300}{27} \times \frac{18}{5}$ = 40 km/hr

∴ Speed of 2nd person = 42 - 40 = 2 km /hr.

Quicker Maths (Direct Formula): Speed of 2nd person = Relative Speed of train with respect of 1st person + Speed of first person – Relative speed of train with respect to 2nd person

$$= \left(\frac{75}{\frac{15}{2}} \times \frac{18}{5}\right) + 6 - \left(\frac{75}{27} \times 4 \times \frac{18}{5}\right) = 36 + 6 - 40 = 2 \text{ km/hr}$$

9. Two trains running at the rates 45 and 36 km an hour respectively, on parallel rails in opposite directions, are observed to pass each other in 8 seconds, and when they are running in the same direction at the same rate as before, a person sitting in the faster train observes that he passes the other in 30 seconds. Find the lengths of the trains.

Solution: Relative Speed of two trains = 45 + 36 = 81 km/hr (When two train are moving in opposite directions)

= $81 \times \frac{5}{18} = \frac{45}{2} = 22\frac{1}{2}$ m/s

∴ Length of both the trains = $\frac{45}{2} \times 8$ = 180 m.

Now, when two trains are moving in the same direction, the relative speed

= 45 – 36 = 9 km/hr = $\frac{9 \times 5}{18} = \frac{5}{2}$ m/s.

The man sitting in the faster train passes the length of the slower train in 30 seconds.

∴ Length of the slower train = $\frac{5}{2} \times 30 = 75\ m.$

∴ Length of the faster train = 180 – 75 = 105 m.

Quicker maths (Direct Formula):

Length of slower train = 30 $\times$ (Relative speed of two trains)= 30 (45 – 36) $\frac{5}{18}$ = 75 m

Length of faster train = Total length of both trains – length of slower train

= 8 (45 + 36) $\frac{5}{18}$ - 75

= 8 $\times$ $\frac{81 \times 5}{18}$ - 75 = 180 – 75 = 105 m.

10. Two trains measuring 100 m and 80 m respectively, run on parallel lines of rails. When travelling in opposite directions they are observed to pass each other in 9 seconds, but when they are running in the same direction at the rates as before, the faster train passes the other in 18 seconds. Find the speed of the two trains in km per hour.

Solution: Quicker Maths (Direct Formula):

R_1 = Relative speed, when they are moving in the same direction

$= \frac{100+80}{18} = 10m/s$

R_2 = Relative Speed, when they are moving in opposite directions

$= \frac{100 + 80}{9} = 20$ m/s

Speed of faster train = $\frac{R_1 + R_2}{2} = \frac{10+20}{2}$ = 15 m/s

= 15 $\times \frac{18}{5}$ = 54 km/hr

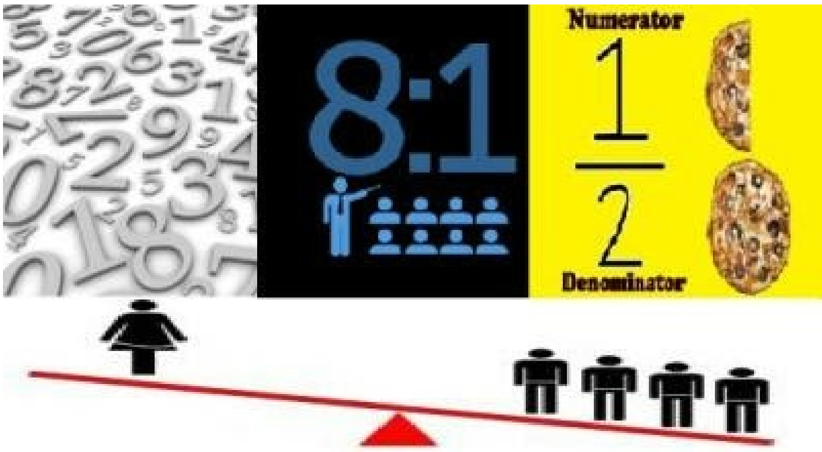
Speed of slower train = $\frac{R_2 - R_1}{2} = \frac{20-10}{2}$ = 5 m/s

= 5 $\times \frac{18}{5}$ = 18 km/hr.

Percentage Tricks with Questions (PDF Version)

Meaning and Examples

To understand the meaning of a percentage you have to go through the meaning of number , secondly the ratio and there after the fraction and then we learn about percentage.



Number

A number is a symbolic representation of each unit set in a particular priority

Ratio and Fraction

To compare those number with each other we use ratio which can also be represented in the form of fraction.Ratio and fraction are co-related to each other in a way. **In a fraction** the upper value is called as a numerator and the lower value is called as a denominator.The fraction is any value which does not contains zero in the denominator.

Percentage

Till now we have known about number ,ratio and the fraction and now we are comes to the part of percentage.

> *Percentage word which is a combination of a word " **per cent** " that means for every hundred.*
> *The number, which is in a fraction form whose denominator is "100" is called as a percentage and the numerator of the same number is called as a rate per cent .*

Examples :

1. A student get 50% marks in an examination if he obtained 250,then the total marks is ?

Sol:

This implies that 50 ' for every hundred '.then total marks is equals to 250/50× 100 = 500

it means 50 marks for every 100.then total marks is equals to 500 and to get that while solving percentage ,it will be easy for you some time to use fraction like 250/1×2 = 500.

2. A student get 33.33% marks in an examination if the total marks is 999, then find his marks ?

Sol:

1/3×999 = 333.

3. A man gave loan at 40% rate of interest.

Sol:

it implies

(i) he will get Rs. 40 on/for every Rs. 100 as a interest.

or

(ii) he will get 2/5 of the principal as a interest.

or

(iii) he will get 40/100 for every 100.

4. a) A seller get 12% profit on a product.) A seller get 12% profit on a product which is cost Rs. 225 to him/her.

Sol:

(a)

A seller get 12% profit implies for every 100% or 3/25 on/for every 100.

(b)

Now If a seller get 12% profit on Rs. 225 that means he get Rs. = 12/100×225 or 3/25×225

'Tips and Tricks'

Now we have two option/method/way to solve this question but we need to consider the which saves our time , so we follow

he get Rs. = 3/25×225 (fraction is more helpful in this case)

= Rs.27

To calculate it much faster, do remember at least table upto 30 and some important most used fractions:

$5\% = \frac{1}{20}$

$8\% = \frac{2}{25}$

$10\% = \frac{1}{10}$

$12\% = \frac{3}{25}$

$15\% = \frac{3}{20}$

$16\% = \frac{4}{25}$

$20\% = \frac{1}{5}$

$25\% = \frac{1}{4}$

$40\% = \frac{2}{5}$

$60\% = \frac{3}{5}$

$75\% = \frac{3}{4}$

$3\frac{1}{8}\% = \frac{1}{32}$, $6\frac{1}{4}\% = \frac{1}{16}$

$8\frac{1}{3}\% = \frac{1}{12}$, $12\frac{1}{2}\% = \frac{1}{8}$

$13\frac{1}{3}\% = \frac{1}{3}$, $14\frac{2}{7}\% = \frac{1}{7}$

$16\frac{2}{3}\% = \frac{1}{6}$, $33\frac{1}{3}\% = \frac{1}{3}$

$37\frac{1}{2}\% = \frac{3}{8}$, $62\frac{1}{2}\% = \frac{5}{8}$

$66\frac{2}{3}\% = \frac{2}{3}$, $87\frac{1}{2}\% = \frac{7}{8}$

5.(a) Find 13.33% of 300 ? (b) What percent is equivalent to 1/7 or express 1/7 as rate per cent ?

Sol:

(a) 1/3×300 = 4000 (b) 1/7×100 = $14^{2}/_{7}\%$

6. The income of a person has gone decrease from 1000 to 950.The percent value of income that has gone decreased is ?

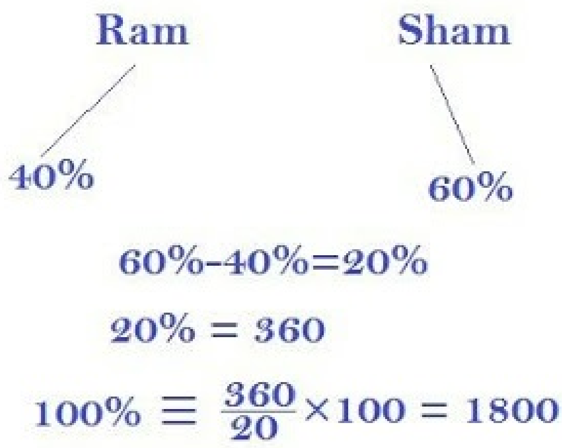
Sol:

decrease in income = 1000 - 950 = 50
Percentage Decrease = 50/1000×100 = 5%

7. In a election between two candidates (Ram and Sham), the one candidate (Ram) who gets 40% votes is rejected by a majority of 360 votes.Find the total no. of votes polled ?

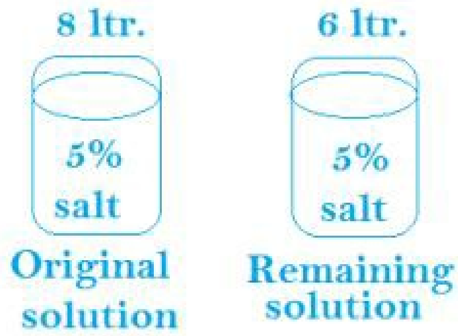
Sol:

(60% - 40% =) 20% ≡ 360
so ,100% ≡ 360/20×100 = 1800.



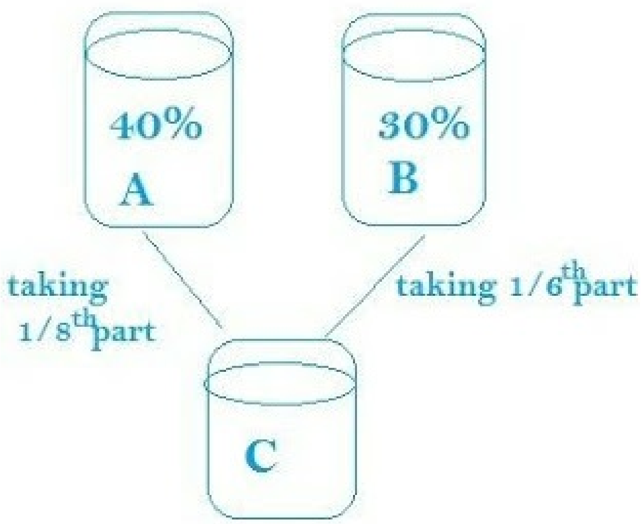
8. If 2 litres of water is evaporated on boiling from 8 litres of salt solution containing 5% salt, find the percentage of salt in the remaining solution.

Sol:
As we know that if we mix salt or sugar in a water and then boil it water will evaporate but salt or sugar will not that's why the quantity of salt or sugar in an original mixture or solution = the quantity of salt or sugar in the remaining mixture or solution
so 5% of 8 = x% of 6
x = 5×8/6
x = $6^2/_3$%

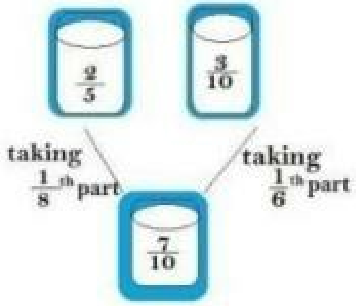


9. One type of mixture contains 40% of alcohol and the other contains 30% of alcohol with respect to it's water. A cane is filled with 8 parts of the first mixture and 6 parts of the second mixture. Find the percentage of alcohol in the new mixture ?

Sol:
Now to understand this type of problem , first of all you need to understand the fraction.
A number which is a unit set in particular priority , so to divide a unit into any number of equal parts, one or more of these part is known as a fraction of the unit. the lower number indicates the equal parts and the upper number indicates the number of part taken to form the fraction.



Method (1)



$$\boxed{\dfrac{\dfrac{\frac{2}{5}}{\frac{1}{8}}+\dfrac{\frac{3}{10}}{\frac{1}{6}}}{14}\times 100}$$

$$\frac{\frac{2}{5}\times\frac{8}{1}+\frac{3}{10}\times\frac{6}{1}}{14}\times 100$$

$$\frac{\frac{16}{5}+\frac{9}{5}}{14}\times 100$$

$$\frac{25}{5}\times\frac{1}{14}\times 100$$

$$=\frac{5}{1}\times\frac{50}{7}$$

$$=\frac{250}{7}\text{ or } 35\frac{5}{7}$$

Method (2)

$$\begin{array}{ccc} 40 & & 30 \\ & x & \\ 8 & & 6 \end{array}$$

$$\frac{30-x}{x-40}=\frac{8}{6} \quad \boxed{\frac{8}{6}\text{ or }\frac{4}{3}}$$

$$90-3x = 4x-160$$

$$x=\frac{250}{7}\ ;\ x = 35\frac{5}{7}$$

$$\frac{\text{Quantity of alcohol in the new mixture}}{\text{Quantity of the new mixture}}\times 100$$

$$\frac{\text{8 parts of 40\% alcohol + 6 parts of of 30\% alcohol}}{\text{(8 parts + 6 parts) of the mixture}}\times 100$$

$$\frac{8\times\frac{40}{100}+6\times\frac{30}{100}\times 100}{14}\times 100=\frac{\frac{16}{5}+\frac{9}{5}}{14}\times 100$$

$$=\frac{\frac{25}{5}}{14}\times 100=\frac{\frac{25}{5}}{\frac{14}{1}}\times 100=\frac{5}{1}\times\frac{1}{14}\times 100$$

$$=\frac{5}{7}\times 50=\frac{250}{7}=35\frac{5}{7}$$

10. Due to fall in manpower, the production decreased by 25%. By what per cent

should the working hour be increased to restore the original production ?

Sol:

Production = Manpower × Working Hour

Decrease in Production = Decrease in Manpower

Let Manpower = 100 units and Working Hour = 100 units, Suppose working hours increase by x%.

Then, (100-25) (100 + x) = 100 × 100

100 + x = 400/3

x = 100/3 ; x = $33^{1}/_{3}$%

11. What rate per cent is 6 paise of Rs. 1?

Sol:
Rs. 1 = 100 paise
$^{x \times 100}/_{100} = 6$
x = $^{6 \times 100}/_{100}$
x = 6%

12. The population of the town is 13,800 which was increased by 15% then find the population of the men . If the ratio of the men and women were 2:1?

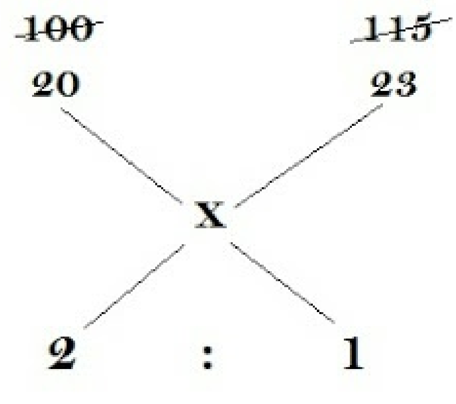
Sol:

13,800/115 × 100 = 12,000

2/3×12,000 = 8,000

13. If the price of a commodity be raised by 20%, find by how much per cent must a householder reduce his consumption of that commodity so as not to increase his expenditure?

Sol:



$$\frac{23 - x}{x - 20} = \frac{2}{1}$$

$$23 - x = 2x - 40$$

$$\frac{63}{3} = x \quad ; x = 21$$

14. Two numbers are 20% and 40% respectively more than a third number.

a) Find what percent is the first number of second ?

b) Find what percent less than is the first of second ?

c) Find what percent more than is the second of first ?
Sol:
Let there is a third number 100.so,

First = 120 and Second = 140

a) First of Second = 120/140 ×100 = $^{600}/_{7}$ or $85^{3}/_{7}$ %

b) Difference = 140 - 120 = 20

First of Second = $^{20}/_{140}$×100 = $^{100}/_{7}$ or $14^{2}/_{7}$%

c) Difference = 140 - 120 = 20

Second of First = $^{20}/_{120}$×100 = 50/3 or $16^{2}/_{3}$

Let 100 was the price of a commodity.

20% increased

Rs.100 Rs.120

120-100 = Rs. 20

need to manage

[20 is what percent of 120]

$$\frac{20}{120}\times 100 = 16\frac{2}{3}\%$$

15. The salary of a worker is first increased by 10% and thereafter it was reduced by 10%. What was the change in his salary ?

Sol:

Here what you need to find is (i) whether increase/ decrease (ii) how much percent Increase / decrease.Now we need to check increase/decrease

10% of 100 = +10 (increase) , here plus is the sign of increase

10% of 110 = -11 (decrease) , here minus is the sign of decrease

decrease% = -11+10 = -1 (because the outcome is negative so it is decrease)

100	110
$\frac{10\times100}{100} = 10$	$\frac{10\times110}{100} = 11$
+10	-11

$$\boxed{+10 - 11 = -1}$$

$$\boxed{\text{decrease}\% = -1}$$

Quicker Method:

Theorem : If the value of a number is first increased by x% and later decreased by x%, the net change is always a decrease which is equal to x% of x or $x^2/100$.

decrease % = (x^2/100) = 1%

16. If the population of a town is increased by 15% in the first year and is decrease by 15% in the next year, what effect can be seen in the population of that town ?

Sol:

$$\boxed{15\times\frac{115}{100} = 17.25}$$

100 (increased) +15

115 (decreased) -17.25

$$+15-17.25 = 2.25$$

$$\boxed{\text{increased}\% = 2.25}$$

Quicker Method:

decrease % = $x^2/100$ = 1%

decrease% = $(15)^2/100 = 225/100 = 2.25$

17. A shopkeeper marks the price of his goods 12% higher than its original price. After that , he allows a discount of 12%. What is his percentage profit or loss ?

Sol:

Quicker Method :

$(12)^2/100 = 144/100 = 1.44$

$$100 \qquad\qquad 112$$

$$\frac{12\times 112}{100} = 13.44$$

$$+12 \qquad\qquad -13.44$$

$$\boxed{+12 - 13.44 = -1.44}$$

$$\boxed{\text{decrease\%} = -1.44}$$

18. In an examination , a candidate must get 80% marks to pass. If a candidate who gets 210 marks fails by 50 marks, find the maximum marks.

Sol:

$$100\% \qquad\qquad 80\%$$

$$? \qquad\qquad \text{Let } x$$

$$x - 210 = 50$$

$$x = 260$$

$$\boxed{\frac{260}{80}\times 100} = 325$$

19.The number of seats in a cinema hall is increased by 25%. The price on a ticket is also increased by 10%. What is the effect on the revenue collected ?

Sol:

Revenue collection = No. of Seats × Ticket Price

Let Seats and Price was before = 100 so,

Revenue = 100 × 100 = 10,000 [Previous Income/Revenue]

No of Seats = $100 \xrightarrow{25\%\text{increases}} 125$

Ticket Price = $100 \xrightarrow[10\%\text{increases}]{} 110$

$$\left.\begin{aligned} &= 100 \times 100 = 10{,}000 \\ &= 125 \times 110 = 13{,}750 \end{aligned}\right] 3{,}750$$

$$\frac{3{,}750 \times 100}{10{,}000} = 37.5$$

20. A candidate who gets 30% of the marks in a test fails by 50 marks. Another candidate who get 320 marks fails by 30 marks. Find the maximum marks ?

Sol:

320 + 30 = x + 50

x = 300

300/30×100

x = 1000

21. A candidate scores 25% and fails by 30 marks, while another candidate who scores 50% marks, gets 20 marks more than the minimum required marks to pass the examination. Find the maximum marks for the examination?

Sol:

25% + 30 = passing marks

50%-20 = passing marks

25x + 30 = 50x - 20

x = 2

100x = 100×2 = 200

प्रतिशतता (Percentage)

प्रतिशत (Percent) शब्द, लेटिन भाषा के एक शब्द 'percentum' से लिया गया है जिसका अर्थ है 'प्रति एक सौ'। इसलिए प्रतिशत को इस तरह से परिभाषित किया जा सकता है– वह भिन्न जिसका हर 100 हो प्रतिशत कहलाती है। प्रतिशत को चिह्न % से प्रदर्शित किया जाता है।

इसलिए, $\frac{x}{100}$ का अर्थ है x %

उदाहरण $\frac{14}{100}$ = 14 %, $\frac{25}{100}$ = 25 % या

37 % = $\frac{37}{100}$

प्रतिशत के बारे मे महत्वपूर्ण बिंदू एवं शार्ट कट ट्रिक्स :

- भिन्नो को प्रतिशत मे बदला जा सकता है, जैसेः $\frac{1}{4} = \frac{1}{4} \times 100 =$ 25 %

- प्रतिशत को भिन्नों में बदला जा सकता है, जैसे : 50% = $\frac{50}{100} = \frac{1}{2}$

- दशमलव भिन्नों को प्रतिशत मे तथा प्रतिशत को दशमलव भिन्न में बदला जा सकता है। **उदाहरण** 0.75 = 0.75× 100% = 75% तथा 45% = $\frac{45}{100} = 0.45$

- A का B% = A×$\frac{B}{100}$ **उदाहरणः** 250 का 20% = 250 ×$\frac{20}{100}$ = 50, 1 कि.ग्रा. का 75% = 1000ग्राम ×$\frac{75}{100}$ = 750 ग्राम

- B का कितने % A है या A, B का कितना प्रतिशत है = $\frac{A}{B} \times 100\%$
  उदाहरणः 15 मीटर का कितना प्रतिशत 15 सेमी. है।
  हलः 15 मीटर = 1500 सेमी. इसलिए वांछित प्रतिशत = $\frac{15}{1500} \times 100\% = 10\%$ ans.

- एक नगर में x% महिलाएं, y% पुरुष तथा शेष बच्चे हैं। तब बच्चों का प्रतिशत होगा = (100 – x –y)%
  इसी तरह यदि एक आदमी की मासिक बचत x% हो तो खर्च का प्रतिशत होगा = (100 – x)%
  उदाहरणः रीना अपने वेतन का 19 % बचत करती है यदि उसका मासिक वेतन 4860रुपये हो ता उसकी मासिक आय क्या होगी?
  हलः बचत = 19 % इसलिए खर्च प्रतिशत = 100–19 = 81 %
  माना मासिक आय = x रुपये
  इसलिए x का 81 % = 4860 ⟹ x ×$\frac{81}{100} = 4860$ ⟹ x = $\frac{4860 \times 100}{81}$ = 6000 रुपये

- SHORT CUT: यदि A की आय B की आय से x% अधिक हो, तो B की आय A से जितने % कम है = $\left(\frac{x}{100+x} \times 100\right)\%$
  उदाहरण: यदि A की आय B की आय से 25% अधिक हो, तो B की आय A से जितने % कम है = $\left(\frac{25}{100+25} \times 100\right)\%$
  $= \frac{25}{125} \times 100 = 20\%$ उत्तर

- SHORT CUT: यदि A की आय B की आय से x% कम हो, तो B की आय A से जितने % अधिक है = $\left(\frac{x}{100-x}\times 100\right)\%$

  उदाहरणः यदि A की आय B की आय से 50% कम हो, तो B की आय A से जितने % अधिक है = $\left(\frac{50}{100-50}\times 100\right)\%$

  $=\frac{50}{50}\times 100 = 100\%$ उतर

- SHORT CUT: किसी वस्तु के मूल्य मे x% बढोतरी हो जाने पर उस वस्तु की खपत में जितने % की कमी करनी चाहिए जिससे घर के खर्च मे वृद्धि न हो = $\left(\frac{x}{100+x}\times 100\right)\%$

  उदाहरणः चीनी के मूल्य मे 20 % बढोतरी हो जाने पर चीनी की खपत में कितने % की कमी करनी चाहिए जिससे घर के खर्च मे वृद्धि न हो

  हल : वांछित प्रतिशत = $\left(\frac{20}{100+20}\times 100\right)\% = \frac{20}{120}\times 100 = 16\frac{2}{3}\%$

- SHORT CUT: किसी वस्तु के मूल्य मे x% कमी हो जाने पर उस वस्तु की खपत में जितने % की वद्धि करनी चाहिए जिससे घर के खर्च मे कमी न हो = $\left(\frac{x}{100-x}\times 100\right)\%$

  उदाहरणः चीनी के मूल्य मे 20 % कमी हो जाने पर चीनी की खपत में कितने % की वद्धि करनी चाहिए जिससे घर के खर्च मे कमी न हो

  हल : वांछित प्रतिशत = $\left(\frac{20}{100-20}\times 100\right)\% = \frac{20}{80}\times 100 = 25\%$ उतर

- SHORT CUT: किसी वस्तु का मूल्य पहले $x\%$ बढाया जाता है उसके बाद $y\%$ बढाया जाता है तो, उस वस्तु के मूल्य में कुल जितने प्रतिशत वृद्धि होगी = $\left(x+y+\frac{xy}{100}\right)\%$

  उदाहरणः डीजल का मूल्य पहले 10 % बढाया जाता है उसके बाद 30% बढाया जाता है तो, डीजल के मूल्य में कुल जितने प्रतिशत वृद्धि होगी = $\left(10+30+\frac{10\times 30}{100}\right)\% = 43\%$

  उदाहरणः यदि कम्प्यूटर के मूल्य में पहले 10% की कमी आ जाती है उसके बाद फिर 30% की कमी आ जाती है तो, कुल कमी ज्ञात करें।

  हलः मूल्य में अंतर = $\left(-10+(-30)+\frac{(-10)\times(-30)}{100}\right)\% = -40+3 = 37\%$

नोटः 1. कमी के लिए उपर्युक्त सूत्र में x की जगह –x तथ y की जगह –y लिया गया है।

- SHORT CUT: क्रमागत छूट वाले सवालों को भी इसी सूत्र द्वारा हल किया जाता है– उदाहरणः यदि किसी वस्तु के मूल्य में 50% तथा 30% क्रमागत छूट मिलती है तो कुल छूट % ज्ञात करो।

  हलः अभिष्ट प्रतिशत = $\left(-50+(-30)+\frac{(-50)\times(-30)}{100}\right)\% = -80+15 = 65\%$

- SHORT CUT: यदि किसी स्थान की जनसंख्या P है इसमे r% की वाषिक वृद्धि हो, तो (क) t वर्ष बाद जनसंख्या = P $\times\left(1+\frac{r}{100}\right)^t$

  (ख) t वर्ष पहले जनसंख्या = P $\times\left(1-\frac{r}{100}\right)^t$

- SHORT CUT: यदि किसी स्थान की जनसंख्या P है इसमे r% की वाषिक **कमी** हो, तो t वर्ष बाद जनसंख्या = P $\times\left(1-\frac{r}{100}\right)^t$

- SHORT CUT: यदि किसी स्थान की वर्तमान जनसंख्या P है तथा इसमें पहले, दूसरे व तीसरे वर्ष क्रमशः x%, y%, तथा z% की वृद्धि हो तो तीन वर्ष बाद जनसंख्या

$$= P\times\left(1+\frac{x}{100}\right)\left(1+\frac{y}{100}\right)\left(1+\frac{z}{100}\right)$$

Percentage- Assignment

1. एक चुनाव में दो उम्मीदवार थे। एक उम्मीदवार को 30 % मत हासिल हुए और वह 3200 मतों से हार गया, तो बताओ कि कुल कितने मत डाले गए ?
   01. 6000
   02. 7000
   03. 8000
   04. 9000
2. गेहूँ का मूल्य 25% बढ़ जाने पर एक आदमी 48 रुपये में 1.5 किग्रा गेहूँ कम खरीद पाता है, तो गेहूँ का आरंभिक मूल्य ज्ञात करो।
   01. 12.50 रुपये
   02. 8.60 रुपये
   03. 7.50 रुपये
   04. 6.40 रुपये
3. 74000 रुपये राम, श्याम और मोहन में इस प्रकार बॉटें कि राम को श्याम से 25% अधिक मिले तथा श्याम को मोहन से 20% अधिक मिल, मोहन का कितने रुपये प्राप्त होगे ?
   01. 20000 रुपये
   02. 25000 रुपये
   03. 27000 रुपये
   04. 30000 रुपये
4. एक दूकानदार ने टेलिविजन के मूल्य में 20% कमी कर दी जिसके कारण बिक्री 70% बढ़ गई। उसकी बिक्री पर कुल क्या प्रभाव पड़ा ?
   01. 56% वृद्धि
   02. 36% कमी
   03. 36% वृद्धि
   04. 56% कमी
5. किसी संख्या के $\frac{1}{7}$ का $\frac{2}{3}$ बराबर है 320 का 97.5 % , तो वह संख्या होगी–
   01. 3276
   02. 2426
   03. 2450
   04. इनमें से कोई नहीं।
6. रसोई गैस की कीमत 25% बढ़ जाने पर एक गृहणी को रसोई गैस के उपयोग में कितनी प्रतिशत की कमी करनी पड़ेगी जिससे परिवार का खर्च न बढ़े?
   01. 25 %
   02. 30 %
   03. 20 %
   04. इनमें से कोई नहीं।
7. 9 किग्रा दूध और पानी के मिश्रण में 50% दूध है, कितने किलोग्राम पानी मिलाया जाए, ताकि उसमें 30% दूध रह जाए?
   01. 5
   02. 6
   03. 7
   04. 8
8. मोनू की आय सोनू की आय से 10% अधिक है, तो सोनू की आय, मोनू की आय से कितने प्रतिशत कम है?
   01. 10 %
   02. $9\frac{1}{11}$
   03. $9\frac{1}{2}$
   04. इनमें से कोई नहीं।
9. $\frac{7}{8}$ को प्रतिशत में बदलो।
   01. $8\frac{3}{4}$
   02. $8\frac{3}{8}$
   03. $1142\frac{6}{7}$
   04. $1142\frac{3}{4}$
10. 25 का कितने प्रतिशत 16 है?
    01. 156.25
    02. 64
    03. 80
    04. इनमें से कोई नहीं।
11. यदि चीनी के मूल्य में पहले 10 प्रतिशत और उसके बाद फिर 20 प्रतिशत वृद्धि हो जाती है तो, चीनी के मूल्य में कुल जितने प्रतिशत वृद्धि होगी–
    01. 32 प्रतिशत
    02. 22 प्रतिशत
    03. 30 प्रतिशत
    04. 28 प्रतिशत
12. यदि किसी वस्तु के मूल्य में पहले 10 प्रतिशत कमी की जाती है उसके बाद फिर 20 प्रतिशत की जाती है तो उस वस्तु के मूल्य में कुल कितने प्रतिशत कमी आ जाती है?
    01. 32 प्रतिशत
    02. 22 प्रतिशत
    03. 30 प्रतिशत
    04. 28 प्रतिशत
13. यदि पहली संख्या दूसरी संख्या से 20 प्रतिशत कम हो तो, दूसरी संख्या पहली संख्या से कितने प्रतिशत अधिक है?
    01. 25 प्रतिशत
    02. $33\frac{1}{3}$ प्रतिशत
    03. 20 प्रतिशत
    04. इनमें से कोई नहीं।
14. यदि किसी वस्तु का मूल्य पहले 20 प्रतिशत बढाया जाता है तथा बाद में 20 प्रतिशत कम की दिया जाता है तो, वस्तु के मूल्य में–

01. कोई फर्क नहीं पड़ेगा।
02. 4 प्रतिशत की कमी हो जाएगी
03. 4 प्रतिशत वद्धि हो जाएगी
04. 1 प्रतिशत की कमी हो जाएगी

15. एक संख्या का 20 प्रतिशत उस संख्या के 10 प्रतिशत से 20 अधिक है तो वह संख्या होगी क्या होगी?
01. 100
02. 200
03. 400
04. 1000

16. किसी विद्यालय मे 200 छात्र एवं 300 छात्राएं है यदि 10 प्रतिशत छात्र एवं 20 प्रतिशत छात्राएं अनुतीर्ण हो तो कुल कितने प्रतिशत विद्यार्थी उतीर्ण होगें?
01. 15 प्रतिशत
02. 16 प्रतिशत
03. 84 प्रतिशत
04. 85 प्रतिशत

17. 12 का 70 प्रतिशत + 400 का 185 प्रतिशत = 824 का ? प्रतिशत
01. 25
02. 50
03. 75
04. 100

18. वह संख्या ज्ञात करो जिसमें से 400 का 75 प्रतिशत घटाने पर 120 प्राप्त होता है।
01. 200
02. 1920
03. 2000
04. इनमें से कोई नहीं।

19. दो संख्याएं तीसरी संख्या से कमशः 50 प्रतिशत और 55 प्रतिशत कम है। दूसरी संख्या पहली संख्या से कितने प्रतिशत कम है।
01. 10 प्रतिशत
02. 5 प्रतिशत
03. ज्ञात करना संभव नहीं है।
04. इनमें से कोई नहीं।

20. एक चुनाव में दो उम्मीद्वार थे। विजेता को कुल वैध मतों के 55 प्रतिशत मत प्राप्त होते हैं। कुल मतों का 25 प्रतिशत अवैध है। मतों की कुल संख्या 16800 है। तो बताईए कि हारने वाले उम्मीद्वार को कुल कितने मत प्राप्त हुए?
01. 5670
02. 3420
03. 3360
04. ज्ञात नही किया जा सकता।

21. एक परीक्षा में पास होने के लिए 40 प्रतिशत अंक प्राप्त करने आवश्यक है राकेश 80 अंक प्राप्त करता है और 20 अंको से फेल हो जाता है तो, बताएं कि परीक्षा में अधिकतम अंक कितनें थे?
01. 200
02. 250
03. 300
04. 350

22. एक शहर की जनसंख्या पहले वर्ष 10 प्रतिशत कम हो जाती है लेकिन दूसरे वर्ष 10 प्रतिशत बढ़ जाती है। यदि इसकी वर्तमान जनसंख्या 99000 हो तो, इो वष्र पहले इसकी जनसंख्या क्या थी?
01. 99000
02. 98010
03. 100000
04. 99990

23. तीन वष्र पहले एक शहर की जनसंख्या 100000 थी। यदि पहले वर्ष 6 प्रतिशत बढ़ी, दूसरे वर्ष 5 प्रतिशत बढ़ी तथा तीसरे वर्ष 4 प्रतिशत घटी हो तो, इस शहर की वर्तमान जनसंख्या क्या थी?
01. 107000
02. 106848
03. 94526
04. 105718

24. घी की कीमत 10% घट जाने पर एक गृहणी को घी के उपयोग में कितनी प्रतिशत की वद्धि करनी चाहिए जिससे परिवार का खर्च पर कोई असर न पड़े?
01. 10
02. $11\frac{1}{9}$
03. 9
04. ज्ञात नही कर सकते।

25. किसी संख्या के $\frac{1}{5}$ के 25 प्रतिशत का मान 30 है तो वह संख्या होगी–
01. 600
02. 700
03. 800
04. 1000

उतरमाला

1. 3
2. 4
3. 1
4. 3
5. 1
6. 3
7. 2
8. 2
9. 1
10. 2
11. 1
12. 4
13. 1
14. 2
15. 2
16. 3
17. 4
18. 2
19. 1
20. 1
21. 2
22. 3
23. 2
24. 2
25. 1

Quick Tricks for Multiplication

Why multiply?

A computer can multiply thousands of numbers in less than a second. A human is lucky to multiply two numbers in less than a minute. So we tend to have computers do our math.

But you should still know how to do math on paper, or even in your head. For one thing, you have to know a little math even to use a calculator. Besides, daily life tosses plenty of math problems your way. Do you really want to haul out Trusty Buttons every time you go shopping?

Of course, normal multiplication can get boring. Here's the secret: **shortcuts**. You might think of numbers as a dreary line from 0 to forever. Numbers do go on forever, but you can also think of them as **cycles**. Ten ones make 10. Ten tens make 100. Ten hundreds make 1000.

If numbers were just a straight highway, there'd be no shortcuts. But they're more like a winding road. If you know your way around, you can cut across the grass and save lots of time.

Multiply by 10: Just add 0

The easiest number to multiply by is 10. Just “add 0.”

3 x 10 = 3**0**   140 x 10 = 140**0**

Isn't that easy? This “trick” is really just using our number system. **3** means “3 ones.” Move 3 once to the left and you get **30**, which means, “3 tens.” See how our numbers cycle in tens? Whenever you move the digits once to the left, that's the same as multiplying by 10.

And that's the quick way to multiply by 10. **Move each digit once to the left. Fill the last place with a 0.**

Easy.

Exercise A:

1. Give two reasons to get good at doing math in your head.

2. Give two situations where you might need or want to do math in your head, not with a calculator.

3. Explain the quick way to multiply by ten.

4. Solve these problems without using a calculator.
    a. 4 x 10

    b. 15 x 10

    c. 400 x 10

    d. 23 x 10

    e. 117 x 10

Multiply by 9: It All Adds Up to 9

Have you ever heard of the *Amazing Facts of Nine?* Let's take a look.

2 x 9 = **18**	**1** + **8** = 9
3 x 9 = **27**	**2** + **7** = 9
4 x 9 = **36**	**3** + **6** = 9
5 x 9 = **45**	**4** + **5** = 9
6 x 9 = **54**	**5** + **4** = 9
7 x 9 = **63**	**6** + **3** = 9
8 x 9 = **72**	**7** + **2** = 9
9 x 9 = **81**	**8** + **1** = 9

See the pattern? When we multiply a single-digit number times 9:

- The tens digit is **one less** than our **original** number.

- The **tens** digit **plus** the **ones** digit **equals nine**!

This makes it easy to multiply any single digit times 9. Suppose you want to multiply 5 times 9. First, **subtract 1 from the original number to get the tens digit.**

5 - 1 = **4** tens digit of answer

Then **subtract this tens digit from 9 to get the ones digit.**

9 - 4 = **5** ones digit of answer

So the answer is **45**. Let's double check. Do the digits add up to 9?

4 + 5 = **9**

Yes! Isn't this a great trick?

Remember, it only works for single digits. Don't try it on 13 x 9 or 6,425 x 9!

Exercise B:

1. Explain the quick way to multiply a single digit times 9.

2. Solve the following problems without a calculator.

a. 4 x 9	b. 9 x 9
c. 9 x 8	d. 5 x 9
e. 7 x 9	f. 9 x 2
g. 3 x 9	h. 6 x 9

3. Look at these problems. Circle the problems that you could **not** use this lesson's trick for. Explain why not.

   a. 14 x 9

   b. 9 x 9

   c. 9 x 7

   d. 115 x 9

   e. 8 x 7

Multiply by 5: It's All 5s and 0s

Is there a trick to multiply by 5? Let's look at a few facts:

2 x 5 = 1**0**	3 x 5 = 1**5**
4 x 5 = 2**0**	5 x 5 = 2**5**
6 x 5 = 3**0**	7 x 5 = 3**5**

See a pattern? If we multiply by an **even** number, the ones digit is **0**. If the number's **odd**, the ones digit is **5**.

So what's the shortcut? Look at the tens digit. If we multiply by an **even** number, the **tens** digit is **half** that number. The ones digit is always 0.

2 x 5 = **1**0	2 / 2 = **1**
4 x 5 = **2**0	4 / 2 = **2**
6 x 5 = **3**0	6 / 2 = **3**

What if we multiply by an **odd** number? First subtract 1 from that number. Then take half the answer, and that's the tens digit. The ones digit is always 5.

3 x 5 = **1**5	3 – 1 = 2	2 / 2 = **1**
5 x 5 = **2**5	5 – 1 = 4	4 / 2 = **2**
7 x 5 = **3**5	7 – 1 = 6	6 / 2 = **3**

So here's the shortcut:

To multiply 5 by an **even** number: Get the **tens** digit by dividing the number by 2. The **ones** digit is 0.

To multiply 5 by an **odd** number: Subtract 1 from the number. Get the **tens** digit by dividing that answer by 2. The **ones** digit is 5.

You can use this to check your work, too. What if you multiply 5 by 3 and get 20? Since 3 is an odd number, your answer should end in 5, not 0. You know you made a mistake.

Exercise C:

1. What's the shortcut to multiply an even number by 5?

2. What's the shortcut to multiply an odd number by 5?

3. Solve these problems without a calculator.
    a. 5 x 4
    b. 5 x 12
    c. 5 x 19
    d. 5 x 15
    e. 5 x 7
    f. 5 x 20
    g. 5 x 13
    h. 5 x 21
4. *Don't* solve these problems. Instead, check whether each answer *could* be right or not. Explain your answer.

    Example: 4 x 5 = 25

    No. An even number x 5 should equal a number that ends in 0.

    a. 11 x 5 = 50

    b. 3 x 5 = 18

Multiply by 3: It All Adds Up

Remember the *Amazing Facts of Nine*? When you multiply by 9, the digits of the answer eventually add up to 9.

8 x 9 = **72**   **7** + **2** = 9

So how about that number 9? It's 3 times 3, isn't it? Let's see if 3 has any special properties.

4 x 3 = 12   1 + 2 = **3**

5 x 3 = 15   1 + 5 = **6**

6 x 3 = 18   1 + 8 = **9**

7 x 3 = 21   2 + 1 = **3**

Whoa! When you **multiply by 3**, **the digits of the answer add up to 3, 6, or 9**.

You can't really use this to multiply faster. But it is a quick way to check your work. Say you multiply 11 by 3 and get 34. Well, 3 + 4 = **7**. Oops. You must have made a mistake. The right answer is 33. And 3 + 3 = 6.

Of course, the trick can only show whether you're wrong. It can't prove you're right. Let's say you multiply 11 x 3 and get 36. Well, 3 plus 6 does equal 9, but 36 is still wrong.

Still, this is a neat trick. If you multiply *any* number by 3, the digits of the answer add up to 3, 6, or 9. Even *big* numbers.

524 x 3 = 1572

1 + 5 + 7 + 2 = 15   and 1 + 5 = **6**

91,317 x 3 = 273,951

2 + 7 + 3 + 9 + 5 + 1 = 27   and 2 + 7 = **9**

You can see that math has **patterns**. Thanks to patterns and cycles, the digits of your answer *have* to add up to three. Math works from every angle. That's what's so cool about it.

Exercise D:

1. Explain the trick about multiplying by 3.

2. Do you use this trick to solve a problem or check your work?

3. How might you get "tricked" by this trick?

4. *Don't* solve these problems. Instead, circle which answers *can't* be correct. Explain your answer.

    a. 4 x 3 = 13

    b. 19 x 3 = 57

    c. 27 x 3 = 85

    d. 101 x 3 = 303

    e. 15 x 3 = 45

    f. 64 x 3 = 192

Shortcuts and Chunks

It's easy to multiply by 10, isn't it? Which problem would you rather do?

20 x 7 = ?	19 x 7 = ?

The first, right? Maybe you figured it out just looking at it: 140. You forget about the 0 and multiply 2 by 7. Easy. But the second problem is a real *problem.* You'll have to use a pencil and paper to get the answer: 133. Rather hard.

Well, you can use the *easy* problem as a shortcut to the *harder* problem.

Twenty sevens is 140. Nineteen sevens is *one less seven* than 140. You don't have to figure out 19 x 7. You can jump from 20 x 7 to 140. Then go *back* to 19 x 7 by *subtracting* 7 from 140.

19 x 7 = ?	Ugh.
20 x 7 = 140	This is a close, easier answer.
140 – 7 = 133	Now subtract the extra seven...
19 x 7 = 133	And you're at the right place.

So you can **use an easier problem as a shortcut, then add or subtract the difference.**

A similar trick is to multiply by "chunks." **First multiply the tens, then multiply the ones, then add these sums together.** This is all you really do on paper, but you might not realize it.

32 x 8 = ?	Yikes.
30 x 8 = 240	Multiply the tens.
2 x 8 = 16	Multiply the ones.
240+16 = 256	Add the two answers.
32 x 8 = 256	And we have our final answer.

If you break a problem into smaller chunks, you can often do it more quickly than if you try to do the whole thing at once.

Name: ____

Exercise E:

1. How do you use an easy problem as a shortcut for a hard one? Write an example that shows how.

2. Write an example that shows how to multiply by chunks.

3. Solve this problem by using one of the tricks you learned in this lesson. Show your work.

   49 x 4

4. Solve these problems by using one of the tricks. Do them *in your head.*

   a. 13 x 6

   b. 71 x 7

   c. 19 x 9

Name: ____

Exercise F: Review

1. Solve these problems by using one of the tricks you learned in this unit. Show your work.

    a. 11 x 7

    b. 39 x 3

2. Solve these problems by using one of the tricks. Do them all *in your head.*

    a. 9 x 8

    b. 8 x 5

    c. 6 x 5

    e. 3 x 9

    f. 51 x 4

    g. 301 x 10

    h. 7 x 9

    i. 19 x 7

3. *Don't* solve these problems. Instead, circle which answers *can't* be correct. Explain why.

    a. 8 x 5 = 44

    b. 9 x 6 = 56

    c. 21 x 3 = 61

    d. 18 x 5 = 90

    e. 9 x 5 = 55

Math: *Quick Tricks for Multiplication*

Name: ____

Answer Key:

Exercise A

1. You don't need to carry around a calculator.
   It's fun/interesting/strengthening.
2. Answers vary.
3. Move each digit once to the left.
   Fill the last place with a 0.
4. a. 40
   b. 150
   c. 4000
   d. 230
   e. 1170

Exercise B

1. Subtract 1 from the original number to get the tens digit.
   Subtract this tens digit from 9 to get the ones digit.
   Double check by adding the digits together to get 9.
2. a. 36
   b. 81
   c. 72
   d. 45
   e. 63
   f. 18
   g. 27
   h. 54
3. a 14 isn't a single digit
   d. 115 isn't a single digit
   e. 8 x 7 isn't multiplying by 9!

Exercise C

1. Get the **tens** digit by dividing the number by 2. The **ones** digit is 0.
2. Subtract 1 from the number. Get the **tens** digit by dividing that answer by 2. The **ones** digit is 5.
3. a. 20
   b. 60
   c. 95
   d. 75
   e. 35
   f. 100
   g. 65
   h. 105
4. a. No. An odd number x 5 should end in 5.
   b. No. An odd number x 5 should end in 5.

Exercise D

1. If you multiply a number by 3, the digits of the answer add up to 3, 6, or 9.
2. Check your work
3. If your wrong answer is another multiple of 3, the digits will add up to 3 and you'll be fooled.
4. a and c. The digits don't add up to 3, 6, or 9.

Name: ____

Exercise E

Student examples may vary.

1. 19 x 7 = ?
   20 x 7 = 140
   140 – 7 = 133
   19 x 7 = 133
2. 32 x 8 = ?
   30 x 8 = 240
   2 x 8 = 16
   240 + 16 = 256
   32 x 8 = 256
3. a. 49 x 4
      50 x 4 = 200
      200 – 4 = 196
      49 x 4 = 196
4. a. 78
   b. 497
   c. 171

Exercise F

1. a. 11 x 7
      10 x 7 = 70
      1 x 7 = 7
      70 + 7 = 77
      11 x 7 = **77**
   b. 39 x 3
      40 x 3 = 120
      120 – 3 = 117
      39 x 3 = **117**

2. a. 72
   b. 40
   c. 30
   e. 27
   f. 204
   g. 3,010
   h. 63
   i. 133

3. a. The answer doesn't end in 5.
   b. The digits of the answer don't add up to 9.
   c. The digits of the answer don't add up to 3, 6, or 9.
   e. The digits don't add up to 9.

Mental Math with Tricks and Shortcuts

Addition

Technique: Add left to right

326 + 678 + 245 + 567 = 900, 1100, 1600, 1620, 1690, 1730, 1790, 1804, & **1816**

Note: Look for opportunities to combine numbers to reduce the number of steps to the solution. This was done with 6+8 = 14 and 5+7 = 12 above. Look for opportunities to form 10, 100, 1000, and etc. between numbers that are not necessarily next to each other. Practice!

Multiplication & Squaring

Some useful formulae

	Examples
$(a+b)^2 = a^2 + 2ab + b^2$	$49^2 = (40 + 9)^2 = 1600 + 720 + 81 = \mathbf{2401}$
$(a-b)^2 = a^2 - 2ab + b^2$	$56^2 = (60 - 4)^2 = 3600 - 480 + 16 = \mathbf{3136}$
$(a+b)(a-b) = a^2 - b^2$	$64 \times 56 = (60 - 4)(60 + 4) = 3600 - 16 = \mathbf{3584}$
$(a+b)(c+d) = (ac + ad) + (bc + bd)$	$23 \times 34 = (20 + 3)(30 + 4) = 600 + 80 + 90 + 12 = \mathbf{782}$
$(a+b)(c-d) = (ac - ad) + (bc - bd)$	$34 \times 78 = (30 + 4)(80 - 2) = 2400 - 60 + 320 - 8 = \mathbf{2652}$
$(a-b)(c-d) = (ac - ad) - (bc - bd)$	$67 \times 86 = (70 - 3)(90 - 4) = 6300 - 280 - 270 + 12 = \mathbf{5762}$
X = 1 to 9 & Y = Any Number	
$(X5)^2 = 100X(X+1) + 25$	$65^2 = 600(7) + 25 = 4200 + 25 = \mathbf{4225}$
$25 \times Y = (Y \times 100)/4$	$25 \times 76 = 7600/4 = \mathbf{1900}$
$50 \times Y = (Y \times 100)/2$	$50 \times 67 = 6700/2 = \mathbf{3350}$
$75 \times Y = 3(Y \times 100)/4$	$75 \times 58 = (5800 \times 3)/4 = 17400/4 = \mathbf{4350}$

Square any Two Digit Number (a = 10's digit & b = 1's digit)

$(ab)^2 = 100a^2 + 20(a \times b) + b^2$ $\qquad$ $67^2 = 100(36) + 20(42) + 49 = \mathbf{4489}$

Multiply any Two 2 Digit Numbers (a & c = 10's digit, b & d = 1'a digit)

$ab \times cd = 100(a \times c) + 10[(b \times c) + (a \times d)] + (b \times d)$ $\qquad$ $53 \times 68 = 3000 + 580 + 24 = \mathbf{3604}$

Tricks using $(X5)^2$

$(X5 - a)^2 = (X5)^2 - X5(2a) + a^2)$ $\qquad$ $63^2 = (65 - 2)^2 = 4225 - 260 + 4) = \mathbf{3969}$

$(X5 + a)^2 = (X5)^2 + X5(2a) + a^2)$ $\qquad$ $67^2 = (65 + 2)^2 = 4225 + 260 + 4) = \mathbf{4489}$

Squaring Numbers 52 to 99

$a^2 = [a - (100 - a)]100 + (100 - a)^2$ $\qquad$ $93^2 = (93 - 7)100 + 7^2 = \mathbf{8649}$

Squaring Numbers 101 to 148

$a^2 = [a + (a - 100)]100 + (a - 100)^2$ $\qquad$ $108^2 = (108 + 8)100 + 8^2 = \mathbf{11664}$

Mental Math with Tricks and Shortcuts (continued)

Squaring Numbers near 1000

Examples

$a^2 = [a - (1000 - a)]1000 + (1000 - a)^2$ $994^2 = (994 - 6)1000 + 6^2 =$ **988036**
$a^2 = [a + (a - 1000)]1000 + (a - 1000)^2$ $1007^2 = (1007 + 7)1000 + 7^2 =$ **1014049**

Squaring Numbers that end in 1

$a^2 = (a - 1)^2 + 2a - 1$ $61^2 = 60^2 + 122 - 1 = 3600 + 121 =$ **3721**

Squaring Numbers that end in 4

$a^2 = (a + 1)^2 - (2a + 1)$ $44^2 = 45^2 - (88 + 1) = 2025 - 89 =$ **1936**

Squaring Numbers that end in 6

$a^2 = (a - 1)^2 + (2a - 1)$ $56^2 = 55^2 + 112 - 1 = 3025 + 111 =$ **3136**

Squaring Numbers that end in 9

$a^2 = (a + 1)^2 - (2a + 1)$ $79^2 = 80^2 - (158 + 1) = 6400 - 159 =$ **6341**

<u>Using Squares to Help Multiply</u>

Two Numbers that Differ by 1

If $a > b$ then $a \times b = a^2 - a$ $35 \times 34 = 1225 - 35 =$ **1190**
If $a < b$ then $a \times b = a^2 + a$ $35 \times 36 = 1225 + 35 =$ **1260**

Two Numbers that Differ by 2

$a \times b = [(a + b)/2]^2 - 1$ $26 \times 28 = 27^2 - 1 = 729 - 1 =$ **728**

Two Numbers that Differ by 3 ($a < b$)

$a \times b = (a + 1)^2 + (a - 1)$ $26 \times 29 = 27^2 + 25 = 729 + 25 =$ **754**

Two Numbers that Differ by 4

$a \times b = [(a + b)/2]^2 - 4$ $64 \times 68 = 66^2 - 4 = 4356 - 4 =$ **4352**

Two Numbers that Differ by 6

$a \times b = [(a + b)/2]^2 - 9$ $51 \times 57 = 54^2 - 9 = 2916 - 9 =$ **2907**

Two Numbers that Differ by an Even Number: $a < b$ and $c = (b - a)/2$

$a \times b = [(a + b)/2]^2 - c^2$ $59 \times 67 = 63^2 - 4^2 = 3969 - 16 =$ **3953**

Mental Math with Tricks and Shortcuts (continued)

Two Numbers that Differ by an Odd Number: $a < b$ and $c = [1 + (b – a)]/2$

Examples

$a \times b = (a + c)^2 – [b + (c –1)^2]$ $79 \times 92 = 86^2 – (92 + 36) = 7396 – 128 =$ **7268**

Other Multiplying Techniques

Multiplying by 11

a x 11 = a + 10a 76 x 11 = 76 + 760 = **836**

a x 11 = If a > 9 insert a 0 between digits and
add sum of digits x 10 76 x 11 = 706 + 130 = **836**

Multiplying by Other Two Digit Numbers Ending in 1 (X = 1 to 9)

a x X1 = a + X0a 63 x 41 = 63 + (40 x 63) = 63 + 2520 = **2583**

Multiplying with Numbers Ending in 5 (X = 1 to 9)

a x X5 = a/2 x 2(X5) 83 x 45 = 41.5 x 90 = 415 x 9 = **3735**

Multiplying by 15

a x 15 = (a + a/2) x 10 77 x 15 = (77 + 38.5) x 10 = **1155**

Multiplying by 45

a x 45 = 50a – 50a/10 59 x 45 = 2950 – 295 = **2655**

Multiplying by 55

a x 55 = 50a + 50a/10 67 x 55 = 3350 + 335 = **3685**

Multiplying by Two Digit Numbers that End in 9 (X = 1 to 9)

a x X9 = (X9 + 1)a – a 47 x 29 = (30 x 47) – 47 = 1410 – 47 = **1363**

Multiplying by Multiples of 9 (b = multiple of 9 up to 9 x 9)

a x b = round b up to next highest 0 29 x 54 = 29 x 60 – (29 x 60)/10
multiply then subtract 1/10 of result = 1740 – 174 = **1566**

Multiplying by Multiples of 99 (b = multiple of 99 up to 99 x 10)

a x b = round up to next highest 0 38 x 396 = 38 x 400 – (38 x 400)/100
multiply and then subtract 1/100 of result = 15200 – 152 = **15048**

Mental Math with Tricks and Shortcuts (continued)

SUBTRACTION

Techniques:

1) Learn to calculate from left to right: 1427 – 698 = (800 – 100) + (30 – 10) + 9 = **729**
2) Think in terms of what number added to the smaller equals the larger: 785 – 342 = **443** (left to right)
3) Add a number to the larger to round to next highest 0; then add same number to the smaller and subtract: 496 – 279 = (496 + 4) – (279 + 4) = 500 – 283 = **217** (left to right)
4) Add a number to the smaller to round to the next highest 10, 100, 1000 and etc.; then subtract and add the same number to the result to get the answer: 721 – 587 = 721 – (587 + 13) = (721 – 600) + 13 = **134**
5) Subtract a number from each number and then subtract: 829 – 534 = 795 – 500 = **295**

DIVISION

Techniques: **Examples**

Divide by parts of divisor one at a time: 1344/24 = (1344/6)/4 = 224/4 = **56**

Method of Short Division

340 ← Remainders (3, 4, and 0 during calculations)
7)1792
256 ←Answer

Divide both divisor and dividend by same number to get a short division problem

10
972/27 divide both by 9 = 3)108
36

Dividing by 5, 50, 500, and etc.: Multiply by 2 and then divide by 10, 100, 1000, and etc.

365/5 = 730/10 = **73**

Dividing by 25, 250, 2500, and etc.: Multiply by 4 and divide by 100, 1000, 10000, and etc.

Dividing by 125: Multiply by 8 and then divide by 1000

36125/125 = 289000/1000 = **289**

It can be divided evenly by:

2 if the number ends in 0, 2, 4, 6, and 8
3 if the sum of the digits in the number is divisible by 3
4 if the number ends in 00 or a 2 digit number divisible by 4
5 if the number ends in 0 or 5
6 if the number is even and the sum of the digits is divisible by 3
7 sorry, you must just try this one
8 if the last three digits are 000 or divisible by 8
9 if the sum of the digits are divisible by 9
10 if the number ends in 0

Mental Math with Tricks and Shortcuts (continued)

11 if the number has an even number of digits that are all the same: 33, 4444, 777777, and etc.
11 if, beginning from the right, subtracting the smaller of the sums of the even digits and odd digits results in a number equal to 0 or divisible by 11:

406857/11 Even = 15 Odd = 15 = 0
1049807/11 Even = 9 Odd = 20 = 11

12 if test for divisibility by 3 & 4 work
15 if test for divisibility by 3 & 5 work
Others by using tests above in different multiplication combinations

SQUARE ROOTS **Examples**

Separate the number into groups of 2 digits or less beginning from the right

$(66049)^{1/2}$ 6 60 49

What number can be squared and be less than 6 = 2 with a reminder of 2
Bring down the second group of digits next to the remainder to give 260
Double the first part of the answer to get 4, divide into 26 of the 260 to get 6 as a trial number
Use 4 & 6 to get 46 and multiply by 6 to equal 276 which is larger than 260, therefore try 5
Use 4 & 5 to get 45, 45 x 5 = 225, 260 – 225 = 35, bring down the 49 to get 3549
Double the 25 to get 50, divide 50 into 354 to get 7 as a trial second part of divisor
Use 50 & 7 to get 507 and multiply 507 x 7 to get 3549 with no remainder.

See complete calculations below:

```
   6 60 49 (257 = Answer
   4
45)260
   225
507)3549
    3549
       0
```

CUBE ROOTS

Memorize the following:

Cube of 1 = **1**, 2 = **8**, 3 = **27**, 4 = **64**, 5 = **125**, 6 = **216**, 7 = **343**, 8 = **512**, 9 = **729**

Note: no result ends in the same digit

$(300763)^{1/3}$ Divide in to groups of 3 from right = 300 763

Note: the number ends in a 3. Last digit of cube will be 7 if this is a cube ***without a remainder***

Since 7 cubed = 343 and 6 cubed = 216, the left most group of 300 is between them and we must use the smaller, or 6.

The answer is **67** *This method works up to 1,000,000 for true cubes*

Mental Math with Tricks and Shortcuts (continued)

Cube Roots the Long Way

$(636056)^{1/3}$

What number cubed is less than 636 = 8. Put 8 down as first part of answer
Square 8 for 64 and multiply by 300 = 19200. Divide into 114056 = 6, add the 8 and 6 = 14
Multiply 14 x 30 = 420, add 420 to 19200 = 19620, square the 6 and add to 19620 = 19656
If 6 x 19656 is less than 124056, then it is not necessary to use lower number.

```
       636 056        = 86^3
       512
19656)124056
       117936
         7120
```

USE ESTIMATES

Use estimates to check your answers. Get in the habit of doing this for all calculations.

NOTE: Considerable care has been taken to eliminate errors in this document, but the author does not guarantee that the document is error free by implication or in fact.

TEST OF REASONING

CLASSIFICATION (ODDMAN OUT)

Classification means 'to assort the items of a given group on the basis of certain common qualities or characteristics they possess and to spot the stranger.' These types of questions are based on similar relationship that exists between the things, objects, words or letters. In this test, generally, you will be given a group of five items, out of which four are similar to one another in some way and the fifth is different. The candidate is required to choose the item which does not fit into the given group.

Types of Classification

(1) **Word classification:** In this type similar groups are found among the names, places, things, nouns, verbs, different sexes, races or any other matter out of which four things are similar and one is not.

(2) **Alphabet classification:** Here some groups of letters are formed according to a pattern and one of them is different.

(3) **Number classification:** Here out of a given group of numbers four will be similar one will be strange.

HINTS FOR CLASSIFICATION

★ Verbal classification aims to test your power of observation and ability to notice differences and similarities among various objects. So search for the relationship among the given items. Relationship may be based on meaning, interrelationship, consistency relationship etc.

★ Search for the similarities among alphabet groups. Particularly vowel-consonant relationship, capital-small letter relationship, repetition and frequency of letters skipping pattern in alphabet groups.

★ Remember that in classification you are not searching for a stranger but you are classifying different items into a group and one item which refuses to be a part of the group is the stranger.

★ If you straight away search for a stranger, you may land in trouble because every item in the given group will be a stranger in some way or another. So think of the possible group in which you can group different items and find the stranger.

Speed Developing Practice Test No. 1

1. (1) Ladder (2) Staircase (3) Bridge (4) Escalator (5) Lift
2. (1) Nephrology (2) Entomology (3) Astrology (4) Mycology (5) Pathology
3. (1) Swimming (2) Breathing (3) Walking (4) Dancing (5) Playing
4. (1) Arrow (2) Missile (3) Sword (4) Bullet (5) Spear
5. (1) Biscuit (2) Chocolate (3) Cake (4) Bread (5) Pastry
6. (1) Tortoise (2) Snail (3) Turtle (4) Spider (5) Oyster
7. (1) Virgo (2) Pisces (3) Libra (4) Sagittarius (5) Orion
8. (1) Japan (2) India (3) Sri Lanka (4) New Zealand (5) Malagasy
9. (1) Producer (2) Director (3) Investor (4) Financier (5) Entrepreneur
10. (1) Chariot (2) Car (3) Bus (4) Wagon (5) Sledge
11. (1) Crow (2) Pigeon (3) Parrot (4) Butterfly (5) Peacock
12. (1) Hepatitis (2) Tetanus (3) Cancer (4) Conjunctivitis (5) Measles
13. (1) Fox (2) Wolf (3) Jackal (4) Deer (5) Panther
14. (1) Nitrogen (2) Oxygen (3) Hydrogen (4) Phosphorus (2) Carbondioxide
15. (1) Man (2) Mother (3) Sister (4) Father (5) Brother
16. (1) EWZQ (2) OSLS (3) GFKD (4) VSPM (5) QBTV
17. (1) 26Z (2) 24X (3) 22V (4) 20S (5) 18R
18. (1) BTR (2) CTR (3) DTR (4) ETR (5) FTR

19. (1) NOOP (2) HIIJ (3) PQQR
(4) UVVX (5) XYYZ
20. (1) TYN (2) BFD (3) MQO
(4) LPN (5) QUS
21. (1) BCD (2) HIJ (3) MNP
(4) TUV (5) WXY
22. (1) MNO (2) CDE (3) GHI
(4) PQR (5) STU
23. (1) BEH (2) ILO (3) NQT
(4) GHK (5) RUX
24. (1) TAN (2) RAE (3) UCT
(4) AWS (5) YSX
25. (1) 135 (2) 286 (3) 371
(4) 591 (5) 719

Answers: Speed Developing Practice Test No. 1

1. (3) 2. (3) 3. (2) 4. (3) 5. (2) 6. (4) 7. (5) 8. (2) 9. (2) 10. (5) 11. (4)
12. (2) 13. (4) 14. (4) 15. (1) 16. (2) 17. (4) 18. (4) 19. (4) 20. (1) 21. (3) 22. (4)
23. (4) 24. (5) 25. (2)

Explanatory Answers: Speed Developing Practice Test No. 1

1. (3) All except bridge are used for up and down movement.
2. (3) All except Astrology are connected with biology.
3. (2) Breathing is the only natural action.
4. (3) All except sword strike the target at a distance.
5. (2) All except chocolate are baked items.
6. (4) All except spider have hard protective shells.
7. (5) All except orion are zodiac signs, while orion is a constellation.
8. (2) All except India are islands, while India is a peninsula.
9. (2) All except director spend money.
10. (5) All except sledge have wheels.
11. (4) All except butterfly are birds, whereas butterfly is an insect.
12. (2) All except tetanus are diseases caused by virus, while tetanus is caused by bacteria.
13. (4) All except deer are flesh eating animals.
14. (4) All others are gases.
15. (1) All other words define some relationship.
16. (2) No letter is repeated in any other group.
17. (4) In all other options, the number denotes the position of the letter in the English alphabet.
18. (4) No other group has a vowel.
19. (4) All other groups contain three consecutive letters with second letter repeated twice.
20. (1) In all other options there are three alternate letters.
21. (3) In all others the letters are consecutive.
22. (4) All except 4 are consecutive letters which end with a vowel.
23. (4) In all other groups there are 2 letters in the alphabet in between the 1st and the 2nd letter and the 2nd and the 3rd letter.
24. (5) In all others a meaningful word can be formed by the letters.
25. (2) In all others the numbers are odd numbers

Speed Developing Practice Test No. 2

1. (1) Painting (2) Art (3) Sculpture
(4) Drawing (5) Music
2. (1) Mountain (2) Plateau (3) Valley
(4) Peak (5) Hill
3. (1) Dynamics (2) Mechanics (3) Electronics
(4) Optics (5) Physics
4. (1) Consumer (2) Customer (3) Buyer
(4) Purchaser (5) Retailer
5. (1) Jasmine (2) Corriander (3) Lotus
(4) Lily (5) Rose
6. (1) Moth (2) Bee (3) Lizard
(4) Cockroach (5) Aphid
7. (1) Kiwi (2) Eagle (3) Emu
(4) Penguin (5) Ostrich
8. (1) Swimming (2) Diving (3) Driving
(4) Sailing (5) Fishing

9. (1) Pupil (2) Iris (3) Cornea
(4) Medulla (5) Retina
10. (1) Sahara (2) Thar (3) Gobi
(4) Sunderbans (5) Kalahari
11. (1) Skull (2) Pelvis (3) Fibula
(4) Appendix (5) Vertebra
12. (1) Cap (2) Turban (3) Helmet
(4) Veil (5) Hat
13. (1) Snore (2) Slumber (3) Yawn
(4) Doze (5) Dream
14. (1) Epicentre (2) Seismology (3) Focus
(4) Crater (5) Ritcher scale
15. (1) Curious (2) Humour (3) Wise
(4) Angry (5) Mighty
16. (1) Flat (2) Bunglow (3) House
(4) Temple (5) Palace
17. (1) Sweet (2) Cold (3) Sour
(4) Bitter (5) Salty
18. (1) Paper (2) Pencil (3) Eraser
(4) Ink (5) Sharpener
19. (1) Cotton (2) Rice (3) Wheat
(4) Gram (5) Barley.
20. (1) Cricket (2) Baseball (3) Football
(4) Billiards (5) Badminton
21. (1) 17 (2) 44 (3) 21
(4) 66 (5) 19
22. (1) DFI (2) MOQ (3) BDG
(4) RTW (5) IKN
23. (1) 341 (2) 679 (3) 385
(4) 495 (5) 561
24. (1) 250 (2) 150 (3) 125
(4) 116 (5) 105
25. (1) BdE (2) XpD (3) HQu
(4) MkV (5) PtZ

Answers: Speed Developing Practice Test No. 2

1. (5) 2. (3) 3. (5) 4. (5) 5. (2) 6. (3) 7. (2) 8. (3) 9. (4) 10. (4) 11. (4)
12. (4) 13. (3) 14. (4) 15. (5) 16. (4) 17. (2) 18. (4) 19. (1) 20. (4) 21. (3) 22. (2)
23. (2) 24. (4) 25. (3)

Explanatory Answers: Speed Developing Practice Test No. 2

1. (5) Except music all others can be seen where as music is to listen.
2. (3) All except valley are elevated features.
3. (5) All others are branches of physics.
4. (5) All other terms refer to someone who buys something.
5. (2) All except corriander are flowers.
6. (3) All except lizard are insects.
7. (2) All except eagle are flightless birds.
8. (3) All except driving are activities performed in water.
9. (4) All except medulla are parts of the eye, while medulla is a part of the brain.
10. (4) All except Sunderbans are deserts while Sunderbans is a delta.
11. (4) All except appendix are bones, while appendix is an organ.
12. (4) All except veil cover the head while veil covers the face.
13. (3) All except yawn are actions in sleep.
14. (4) All except crater are associated with earthquakes.
15. (5) All others are related to state of mind or sense.
16. (4) Except temple, all are places for living
17. (2) Except cold all others refer to taste.
18. (4) Except ink all others are solids.
19. (1) Except (1) all are edible.
20. (4) All except billiards are outdoor games.
21. (3) In all other numbers we find the sum of the two digits to be an even number.
22. (2) In all other groups the difference between the positions of the 2nd and the 3rd letters in the alphabet is 3.
23. (2) In all other numbers the last digit is the difference between the 1st and the 2nd digits.
24. (4) Except 116 all other numbers are divisible by 5.
25. (3) In all other groups the middle letter is small.

ANALOGY

Analogy means ‘correspondence’. In the questions based on analogy, a particular relationship is given and another similar relationship has to be identified from the alternatives provided. Analogy tools are therefore meant to test one’s ability to reason - how far you are able to compare and comprehend the relationship that exists between two objects, things or figures.

Verbal analogy measures the ability to understand the relationship between two given words or group of letters, presented in abbreviated form. See the following example.

Moon : Satellite : : Earth : Planet

This abbreviated form conveys the idea that moon is related to satellite in the same way as the earth is related to planet.

Look for the Kinds of Relationship

There are many possibilities in establishing a relationship. Here are some useful points on the basic knowledge required for the test.

Worker and Product

Eg: Carpenter : Furniture : : Mason : Wall

Carpenter makes Furniture and Mason builds a Wall.

1. Author	: Book	7. Editor	: Newspaper
2. Architect	: Design	8. Farmer	: Crop
3. Butcher	: Meat	9. Judge	: Justice
4. Chef	: Food	10. Poet	: Poem
5. Choreographer	: Ballet	11. Teacher	: Education
6. Cobbler	: Shoes	12. Tailor	: Clothes

Worker and Tool Relationship

Eg: Woodcutter : Axe : : Soldier : Gun

Axe is the tool used by a Woodcutter, likewise a Soldier uses a Gun to shoot.

1. Author	: Pen	9. Doctor	: Stethoscope
2. Astronomer	: Telescope	10. Farmer	: Plough
3. Barber	: Scissors	11. Gardener	: Harrow
4. Butcher	: Chopper	12. Painter	: Brush
5. Blacksmith	: Anvil	13. Sculptor	: Chisel
6. Bricklayer	: Trowel	14. Surgeon	: Scalpel
7. Carpenter	: Saw	15. Tailor	: Needle
8. Cobbler	: Awl		

Tool and Action

Eg: Pen : Write : : Knife : Cut

Pen is used for Writing and Knife is used for Cutting

1. Axe	: Grind	8. Spade	: Dig
2. Auger	: Bore	9. Shovel	: Scoop
3. Chisel	: Carve	10. Spoon	: Feed
4. Gun	: Shoot	11. Spanner	: Grip
5. Loudspeaker	: Amplify	12. Steering	: Drive
6. Microscope	: Magnify	13. Sword	: Slaughter
7. Oar	: Row		

Worker and Working Place

Eg: Farmer : Field : : Doctor : Hospital

A Farmer works on a Field while a Doctor works in a Hospital.

1. Artist	: Theatre	8. Pilot	: Cockpit
2. Actor	: Stage	9. Sailor	: Ship
3. Clerk	: Office	10. Scientist	: Laboratory
4. Driver	: Cabin	11. Teacher	: School
5. Engineer	: Site	12. Umpire	: Pitch
6. Lawyer	: Court	13. Worker	: Factory
7. Mechanic	: Garage	14. Warrior	: Battlefield

Product and Raw Material

Eg: Cloth : Fibre : : Petrol : Crude Oil

Cloth is made of Fibre and Petrol is extracted from Crude oil.

1. Book	: Paper	8. Omlette	: Egg
2. Butter	: Milk	9. Paper	: Pulp
3. Furniture	: Wood	10. Road	: Asphalt
4. Fabric	: Yarn	11. Rubber	: Latex
5. Jaggery	: Sugarcane	12. Shoes	: Leather
6. Metal	: Ore	13. Sack	: Jute
7. Oil	: Seed		

Quantity and Unit

Eg: Length : Metre : : Distance : Light Year

Metre is the unit of Length and Light year is the unit of Distance.

1. Angle	: Radians	7. Power	: Watt
2. Current	: Ampere	8. Pressure	: Pascal
3. Energy	: Joule	9. Resistance	: Ohm
4. Force	: Newton	10. Time	: Seconds
5. Mass	: Kilogram	11. Volume	: Litre
6. Potential	: Volt	12. Work	: Joule

Instrument and Measurement

Eg: Barometer : Pressure : : Speedometer : Speed
Barometer is used to measure Pressure. Speedometer is used to measure Speed.

1. Ammeter	: Current	5. Rain Gauge	: Rain
2. Anemometer	: Wind Velocity	6. Screw Gauge	: Thickness
3. Balance	: Mass	7. Seismograph	: Earth-quakes
4. Hygrometer	: Humidity	8. Sphygmomanometer	: Blood Pressure
9. Thermometer	: Temperature		

Study and Topic

Eg: Botany : Plants : : Ornithology : Birds
Botany is the study of Plants, Ornithology is the study of Birds.

1. Anthropology	: Man	9. Orography	: Mountains
2. Astrology	: Future	10. Palaeontology	: Fossils
3. Conchology	: Shells	11. Pedology	: Soil
4. Cardiology	: Heart	12. Pathology	: Diseases
5. Entomology	: Insects	13. Semantics	: Language
6. Haematology	: Blood	14. Seismology	: Earth-quakes
7. Nephrology	: Kidney	15. Taxonomy	: Classification
8. Oology	: Eggs	16. Zoology	: Animals

Animal and Young Ones

Eg: Cat : Kitten : : Dog : Puppy
Kitten is the young one of a Cat and Puppy is the young one of a Dog.

1. Butterfly	: Catterpillar	7. Lion	: Cub
2. Cow	: Calf	8. Man	: Child
3. Duck	: Duckling	9. Pig	: Piglet
4. Frog	: Tadpole	10. Stallion	: Colt
5. Hen	: Chicken	11. Sheep	: Lamb
6. Horse	: Pony	12. Swan	: Cygnet

Male and Female

Eg: Son : Daughter : : Nephew : Niece

1. Drone	: Bee	5. Lion	: Lioness
2. Dog	: Bitch	6. Stag	: Doe
3. Gentleman	: Lady	7. Tiger	: Tigress
4. Horse	: Mare	8. Uncle	: Aunt

Word and Synonym

Eg: Mend : Repair : : House : Home

1. Abode	: Dwelling	7. Fierce	: Violent
2. Abduct	: Kidnap	8. Happy	: Glad
3. Ban	: Prohibition	9. Presage	: Predict
4. Blend	: Mix	10. Solicit	: Request
5. Brim	: Edge	11. Substitute	: Replace
6. Dissipate	: Squander	12. Aborigine	: Native

Word and Antonym

Eg: Ignore : Notice : : Friend : Foe

1. Advance	: Retreat	8. Gentle	: Harsh
2. Best	: Worst	9. Gradual	: Abrupt
3. Cruel	: Kind	10. Initial	: Final
4. Chaos	: Peace	11. Kindle	: Extinguish
5. Create	: Destroy	12. Lend	: Borrow
6. Cordial	: Hostile	13. Robust	: Weak
7. Deep	: Shallow	14. Sink	: Float

13. Word and Intensity

Eg: Anger : Rage : : Joy : Ecstasy
Rage is greater degree of Anger and Ecstasy is greater degree of Joy.

1. Crime	: Sin	5. Refuse	: Deny
2. Error	: Blunder	6. Sink	: Drown
3. Famous	: Renowned	7. Unhappy	: Sad
4. Quarrel	: War	8. Wish	: Desire

Speed Developing Practice Test No. 3

Directions: In each of the following questions there is a certain relation between the two given words on one side of : : and one word is given on the other side of : : while another word is to be found from the given alternatives, having the same relation with this word as the words of the given pair. Choose the correct alternative.

1. Girl : Beautiful : : Boy : ?
   (1) Smart (2) Heroic (3) Courageous
   (4) Handsome (5) None of these
2. Anatomy : Zoology : : Paediatrics : ?
   (1) Chemistry (2) Medicine (3) Palaeontology
   (4) Mechanics (5) None of these
3. Matricide : Mother : : Homicide : ?
   (1) Humanbeing (2) Children (3) Father
   (4) Apes (5) None of these
4. Microphone : Loud : : Microscope : ?
   (1) Increase (2) Investigate (3) Examine
   (4) Magnify (5) None of these
5. Line : Square : : Arc : ?
   (1) Ring (2) Sphere (3) Circle
   (4) Ball (5) None of these
6. Meat : Vegetarian : : Liquor : ?
   (1) Insane (2) Introvert (3) Teetotaller
   (4) Foolish (5) None of these

7. Tuberculosis : Lungs : : Cataract : ?
(1) Ear (2) Throat (3) Skin
(4) Eye (5) None of these

8. Professor : Lecture : : Doctor : ?
(1) Hospital (2) Disease (3) Medicine
(4) Patient (5) None of these

9. Victory : Encouragement : : Failure : ?
(1) Sadness (2) Defeat (3) Anger
(4) Frustration (5) None of these

10. Doctor : Diagnosis : : Judge : ?
(1) Court (2) Punishment (3) Lawyer
(4) Judgement (5) None of these

Directions: The following questions consist of two words that have a certain relationship between each other, followed by four lettered pairs of words. Select the lettered pair that has the same relationship as the original pair of words.

11. Restaurant : Menu
(1) Library : Catalogue (2) Journal : Newspaper
(3) Book : Encyclopaedia (4) College : Account.
(5) None of these.

12. Heart : Cardiology
(1) Brain : Psychology (2) History : Histology
(3) Civics : Polity (4) Fossils : Palaeontology
(5) None of these.

13. Soldier : Regiment
(1) Flower : Bunch (2) Drop : Ocean
(3) Sailor : Crew (4) Deer : Jungle
(5) None of these.

14. Acoustic : Sound
(1) Mathematics : Geometry (2) Radio : Song
(3) Pathology : Disease (4) Communication : Phone
(5) None of these.

15. Yen : Currency
(1) Brass : Metal (2) Hen : Poultry
(3) Paper : Book (4) Karnataka : State
(5) None of these.

16. Bird : Wings
(1) Whale : Water (2) Dog : Lungs
(3) Car : Wheels (4) Pen : Paper
(5) None of these.

17. Aspirin : Headache
(1) Amoeba : Dysentry (2) Acid : Burns
(3) Quinine : Malaria (4) Iron : Aneamia
(5) None of these.

18. Sprain : Fracture
(1) Cool : Cold (2) Accident : Death
(3) Pneumonia : Fever (4) Fall : Slip
(5) None of these.

19. Ampere : Current
(1) Sound : Wave (2) Speed : Time
(3) Distance : Kilometre (4) Ohm : Resistance
(5) None of these.

20. Muslims : Quran
(1) Hindus : Temple (2) Sikhs : Avesta
(3) Christians : Christ (4) Jews : Torah
(5) None of these.

Directions: In each of the following questions the first two words have a definite relationship. Choose one word out of the given four alternatives which will fill in the blank space and show the same relationship with the third word as between the first two.

21. Soap is related to Wash in the same way as Broom is related to ————
(1) Clean (2) Dust (3) Sweep
(4) Floor (5) None of these

22. Happiness in related to Sorrow in the same way as Comfort is related to ————
(1) Hardship (2) Rest (3) Poverty
(4) Difficulty (5) None of these

23. Bicycle is to Pedal as Boat is to ————
(1) Steering (2) Water (3) Oar
(4) Sail (5) None of these

24. Hygrometer is to Humidity as Sphygmomanometer is to ————
(1) Pressure (2) Blood Pressure
(3) Precipitation (4) Heartbeat
(5) None of these

25. Drama is related to Scene in the same way as Book is related to ————
(1) Story (2) Page (3) Chapter
(4) Author (5) None of these

Answers: Speed Developing Practice Test No. 3

1. (4)	2. (2)	3. (1)	4. (4)	5. (3)	6. (3)	7. (4)	8. (3)	9. (4)	10. (4)	11. (1)
12. (4)	13. (3)	14. (3)	15. (4)	16. (3)	17. (3)	18. (1)	19. (4)	20. (4)	21. (3)	22. (1)
23. (3)	24. (2)	25. (3)								

Explanatory Answers: Speed Developing Practice Test No. 3

1. (4) "Beautiful' describes the quality of prettiness in girls while 'Handsome' describes the quality of prettiness in boys.
2. (2) Anatomy is a branch of Zoology. Likewise, Paediatrics is a branch of medicine.
3. (1) Matricide is killing of mother, in the same way Homicide is killing of human beings.
4. (4) A microphone makes sound louder and a microscope magnifies an object.
5. (3) First is a part of the second.
6. (3) A vegetarian never eats meat. Similarly, a teetotaller never drinks liquor.
7. (4) Tuberculosis is a disease of the lungs. Similarly, cataract is a disease of the eye.
8. (3) Professor delivers lecture to his students. Similarly, doctor gives medicine to his patients.
9. (4) Victory leads to encouragement whereas failure brings frustration.
10. (4) The function of a doctor is to diagnose a disease and that of a judge is to give judgement.
11. (1) Menu gives a list of the items presented in a restaurant. Calalogue gives the list of books in a library.
12. (4) The study of heart is called cardiology. Similarly, the study of fossils is called palaeontology.
13. (3) A group of soldiers is called a regiment. Similarly, a group of sailors is called a crew.
14. (3) Acoustic is the science of sounds. Similarly, pathology is the study of diseases.
15. (4) Yen is a currency. Similarly, Karnataka is a state.
16. (3) Wings help a bird to move car moves with the help of wheels.
17. (3) Aspirin is used to cure headache. Quinine cures Malaria
18. (1) Second is a more intensive form of the first.
19. (4) Ampere is the unit of current. Similarly, ohm is the unit of resistance.
20. (4) Quran is the holy book of Muslims. Similarly, Torah is the holy book of Jews.
21. (3) Second denotes the function of the first.
22. (1) The given words are opposite to each other.
23. (3) The second is the tool which is used to move the first.
24. (2) Hydrometer is an instrument to measure Humidity. Sphygmo manometer measures Blood Pressure.
25. (3) Second is a unit of the first.

Speed Developing Practice Test No. 4

Directions: In each of the following questions there is a certain relation between two given words on one side of : : and one word is given on the other side of : : while another word is to be found from the given alternatives, having the same relation with this word as the words of the given pair. Choose the correct alternative.

1. Arm : Elbow : : Leg : ?
   (1) Toe (2) Knee (3) Thigh
   (4) Ankle (5) None of these
2. Shoes : Cobbler : : Spectacles : ?
   (1) Optician (2) Eye (3) Read
   (4) See (5) None of these
3. Doctor : Patient : : Lawyer : ?
   (1) Customer (2) Accused (3) Client
   (4) Magistrate (5) None of these
4. Video : Cassette : : Computer : ?
   (1) Reels (2) Recordings (3) Files
   (4) Floppy (5) None of these
5. Rupee : India : : Yen : ?
   (1) Pakistan (2) Japan (3) Bangladesh
   (4) Turkey (5) None of these
6. Jews : Synagogue : : Buddist : ?
   (1) Temple (2) Vedas (3) Pagoda
   (4) Fire-temple (5) None of these

7. Major : Battalion : : Colonel : ?
   (1) Company (2) Regiment (3) Army
   (4) Soldiers (5) None of these
8. Dog : Rabies : : Mosquito : ?
   (1) Plague (2) Death (3) Malaria
   (4) Sting (5) None of these
9. Pesticide : Crop : : Antiseptic : ?
   (1) Wound (2) Clotting (3) Bandage
   (4) Bleeding (5) None of these
10. Igloos : Canada : : Rondavels : ?
   (1) Africa (2) Rangoon (3) Russia
   (4) Indonesia (5) None of these

Directions: The following questions consist of two words that have a certain relationship between each other, followed by four numbered pairs of words. Select the numbered pair that has the same relationship as the original pair of words.

11. Dove : Peace
   (1) Crow : Scavenge (2) Knife : Cut
   (3) Lull : Storm (4) Pearl : Purity
   (5) None of these
12. Horse : Mare
   (1) Duck : Geese (2) Dog : Puppy
   (3) Donkey : Pony (4) Fox : Vixen
   (5) None of these
13. Cricket : Pitch
   (1) Ship : Dock (2) Boat : Harbour
   (3) Wrestling : Track (4) Boxing : Ring
   (5) None of these
14. Preamble : Constitution
   (1) Word : Dictionary (2) Contents:Magazine
   (3) Explanation : Poetry (4) Preface : Book
   (5) None of these
15. Rocket : Fuel
   (1) Man : Energy (2) Machine : Oil
   (3) Current : Electricity (4) River : Water
   (5) None of these
16. Large : Enormous
   (1) Big : Small (2) Plump : Fat
   (3) Less : Greater (4) Pain : Ecstasy
   (5) None of these
17. Inn : Traveller
   (1) Lodging : Man (2) Country : Citizen
   (3) Dormitory : Students (4) Ashram : Gurus
   (5) None of these
18. Optimistic : Pessimistic
   (1) Difficult : Impossible (2) Study : Play
   (3) Tolerating : Disgusting (4) Export : Import
   (5) None of these
19. Acquire : Inherit
   (1) Profit : Loss (2) Learn : Discover
   (3) Instinct : Habit (4) Hierarchial: Succession
   (5) None of these
20. Balance : Weigh
   (1) Aeoroplane : Height (2) Radar : Detection
   (3) Satellite : Revolution (4) Television : Picture
   (5) None of these

Directions: In each of the following questions the first two words have definite relationship. Choose one word out of the given four alternatives which will fill in the blank space and show the same relationship with the third word as between the first two.

21. Taj Mahal is related to Love in the same way as Jallianwalabagh is related to ——— ?
   (1) Amritsar (2) Martyrdom (3) War
   (4) Punjab (5) None of these
22. Poison is related to Socrates in the same way as Crucification is related to ——— ?
   (1) Jesus (2) Christians (3) Aristotle
   (4) Church (5) None of these
23. Tempest is to Storm as Slim is to ——— ?
   (1) Fat (2) Plump (3) Slender
   (4) Beautiful (5) None of these
24. Ladies is to Purse as Gents is to ——— ?
   (1) Bag (2) Pocket (3) Wallet
   (4) Case (5) None of these
25. Article is to Magazine as Slokas is to ——— ?
   (1) Ascetic (2) Veda (3) Recite
   (4) Book (5) None of these

Answers: Speed Developing Practice Test No. 4

1. (2)	2. (1)	3. (3)	4. (4)	5. (2)	6. (3)	7. (2)	8. (3)	9. (1)	10. (1)
11. (4)	12. (4)	13. (4)	14. (4)	15. (1)	16. (2)	17. (3)	18. (4)	19. (4)	20. (2)
21. (2)	22. (1)	23. (3)	24. (3)	25. (2)					

Explanatory Answers: Speed Developing Practice Test No. 4

1. (4) Knee is related to leg in the same way as elbow is to arm.
2. (1) Shoes are made by a cobbler. Similarly spectacles are designed by an optician.
3. (3) First works for the second.
4. (4) Here the recording of the second are visualised on the first.
5. (2) Rupee is the currency of India and Yen is the currency of Japan.
6. (3) Jews worship in a Synagogue likewise Buddhists worship in a Pagoda.
7. (2) As Major heads a battalion, the Colonel commands a regiment.
8. (3) Dog bite causes rabies, similarly the bite of a mosquito causes malaria.
9. (1) Pesticide protects crops from insects and antiseptic protects wounds from germs.
10. (1) Igloos is the type of houses most commonly found in Canada and Rondavals in Africa.
11. (4) Dove is a symbol of peace similarly, pearl is a symbol of purity.
12. (4) Second is the feminine gender of the first.
13. (4) The game of cricket is played on a pitch similarly, the game of boxing is performed in a ring.
14. (4) Preamble is the introduction to the Constitution and mentions its main ideals and objectives. Similarly, preface is the introduction to a book.
15. (1) A rocket needs fuel for its working. Similarly a man needs energy to work.
16. (2) Enormous is the extreme of large. Similarly, fat is the extreme of plump.
17. (3) First is the place of night stay for the second.
18. (4) The given words are opposite to each other.
19. (4) First is acquired whereas the second is got by birth.
20. (2) A balance is used to weigh. Similarly a rader is used for detection.
21. (2) Taj Mahal reminds us of love. Similarly, Jallianwala bagh reminds us of martyrdom.
22. (1) First became the cause of death of the second.
23. (3) The first is of higher intensity than the second.
24. (3) Ladies and gents keep their money in purses and wallets respectively.
25. (2) A magazine consists of articles. Likewise, Veda consists of slokas

ALPHABET ANALOGY

There is another kind of analogy that can be asked in this section. In this type of question, two groups of letters related to each other in some way are given. The candidate is required to find this relationship and choose a group of letters which is related in the same way to a third group provided in the question.

Eg. 1. NFK : PHM : : AXH : ?

(1) BYI (2) ZWG (3) CZJ (4) DAK(5) YVF

Sol. (3) Each letter of the first group is moved two steps forward to obtain the corresponding letter of the second group. A similar relationship will exist between the third and the fourth groups.

Speed Developing Practice Test No. 5

1. EGI : JLO : : PRT : ?

   (1) AYW (2) WYA (3) YWA
   (4) VXA (5) VXZ

2. NOP : UVW : : PON : ?

   (1) VUW (2) WVU (3) WUV
   (4) UVW (5) UWV

3. GIKM : HKNQ : : HJLN : ?
(1) LIOR (2) LIRO (3) ILRO
(4) ILOR (5) IOLR

4. REYN : TGZO : : WJPA : ?
(1) QBRN (2) MQXB (3) ROMB
(4) YLQB (5) VWYA

5. PSXM : QRYL : : BFTV : ?
(1) AESU (2) CEUU (3) DHVW
(4) CGUV (5) AGSW

6. SADL : XFZH : : LIOE ?
(1) QNKA (2) POLB (3) PMJA
(4) QNKB (5) PMSI

7. PRLN : XZTV : : JLFH : ?
(1) RTNP (2) NPRT (3) NRPT
(4) NTRP (5) RPNT

8. KWMT : MXOU : : PSAQ : ?
(1) RCRT (2) QRTC (3) QTRC
(4) RQTC (5) RTCR

9. JNQS : OIVN : : EHMQ : ?
(1) IBQM (2) FINR (3) JBRL
(4) JCRL (5) IRLQ

10. NOPQ : PMRO : : ABCD : ?
(1) CZEB (2) CDEF (3) YZAB
(4) CDAB (5) YZEF

Answers: Speed Developing Practice Test No. 5

1. (4) 2. (2) 3. (4) 4. (4) 5. (2) 6. (1) 7. (1) 8. (5) 9. (4) 10. (1)

Explanatory Answers: Speed Developing Practice Test No. 5

1. (4) EGI forms a sequence of alternate letters, while in JLO, the first two letters are consecutive and there is a gap of two letters between second and third letters. Similarly PRT forms a sequence of alternate letters. The group having properties similar to JLO is VXA.

2. (2) PON is the reverse of NOP. Similarly, the reverse of UVW is WVU

3. (4) The first, second, third and fourth letters of the first group are moved one, two, three and four steps forward respectively to obtain the corresponding letters of the second group. A similar relationship will exist between the third and the fourth groups.

4. (4) The first and the second letters of the first group are each moved two steps forward to obtain the first and the second letters of the second group respectively. The third and the fourth letters of the first group each are moved one step forward to obtain the third and the fourth letters of the second group respectively.

5. (2) The first and the third letters of the first group are each moved one step forward to obtain the first and the third letters of the second group respectively. The second and the fourth letters of the first group are each moved one step backward to obtain the second and the fourth letters of the second group respectively.

6. (1) The first and the second letters of the first group are moved five steps forward to obtain the corresponding letters of the second group. The third and the fourth letters are moved four steps backward. A similar relationship will exist between the third and the fourth groups.

7. (1) Each letter of the first group is moved eight steps forward to obtain the corresponding letters of the second group. A similar relationship will exist between the third and the fourth group.

8. (5) The first and the third letters of the first group are each moved two steps forward to obtain the corresponding letters of the second group. The second and the fourth letters of the first group are each moved one step forward to obtain the corresponding letters of the second group.

9. (4) The first and the third letters of the first group are moved five steps forward and the second and the fourth letters are moved five steps backward to obtain the corresponding letters of the second group. The third and the fourth groups will also be related in the same way.

10. (1) The first and the third letters of the first groups are each moved two steps forward to obtain the first and the third letters of the second group. The second and the fourth letters are moved two steps backward.

Series Completion

This section deals with questions in which series of numbers or letters are given. The term follows a certain pattern throughout. The candidate is required to recognise this pattern either to complete the given series with the most suitable alternative or to find the wrong term in the series.

NUMBER SERIES

Eg. 1 Which number would replace the question mark (?) in the series 2, 7, 14, 23, ?, 47

(1) 28 (2) 34 (3) 31 (4) 38 (5) None

Ans: The given sequence is +5, +7, +9, ——

ie. 2+ 5 = 7, 7 + 7 = 14, 14 + 9 = 23

Missing Number = 23 + 11 = 34.

2. Which is the number that should come next in the following series?

4, 6, 12, 14, 28, 30, ——

(1) 32 (2) 64 (3) 62 (4) 60 (5) None

Ans: The given sequence is a combination of two series 4, 12, 28, ... and 6, 14, 30, ... Clearly the number to be found belongs to the first series. Now the pattern followed is +8, +16, +32.

So, missing number = (28 + 32) = 60

Hence the answer is (4)

3. Find the wrong number in the series.

7, 28, 63, 124, 215, 342

(1) 7 (2) 28 (3) 124 (4) 215 (5) None

Ans:The correct sequence is $2^3 - 1$, $3^3 - 1$, $4^3 - 1$, ...etc.

Here 28 is wrong; so the answer is (2)

ALPHABET SERIES

Alphabet series consists of letters of the alphabet placed in a specific pattern. If you keep in your mind the order of the letters with their respective numbers it will help you answer the questions quickly.

1	2	3	4	5	6	7	8	9	10	11	12	13
A	B	C	D	E	F	G	H	I	J	K	L	M
26	25	24	23	22	21	20	19	18	17	16	15	14
14	15	16	17	18	19	20	21	22	23	24	25	26
N	O	P	Q	R	S	T	U	V	W	X	Y	Z
13	12	11	10	9	8	7	6	5	4	3	2	1

Eg: 4 What will be the next term in BKS, DJT, FIU, HHV, ?

(1) IJX (2) IGX (3) JGW (4) IGU(5) JGU

Ans: (3). In each term, the first letter is moved two steps forward, the second letter one step backward and the third letter one step forward to obtain the corresponding letter of the next term. So, the missing term is JGW.

LETTER SERIES

This type of question usually consists of a series of small letters which follow a certain pattern. However some letters are missing from the series. These missing letters are then given in a proper sequence as one of the alternatives. The candidate is required to choose this alternative as the answer.

Eg: 5. aab - aaa - bba -

(1) baa (2) abb (3) bab (4) aab(5) bbb

1. The first blank space should be filled in by ‘b’ so that we have two a’s followed by two bs.
2. The second blank space should be fiiled in either by ‘a’. So that we have four as followed by two bs or by ‘b’. So that we have three as followed by three bs.
3. The last space must be filled in by ‘a’.
4. Thus we have two possible answers - ‘baa’ and ‘bba’. But only ‘baa’ appears in the alternatives. So the answer is (1).
5. In case we had both the possible answers in the alternatives, we should choose the one that forms a more prominent pattern, which is aabb/aaabbb/aa. and our answer would have been ‘bba’.

Speed Developing Practice Test No. 6

Directions: In each of the following questions a number series is given with one term missing. Choose the correct alternative that will continue the same pattern and fill in the blank spaces.

1. 4, 9, 13, 22, 35, ——

(1) 57 (2) 70 (3) 63
(4) 75 (5) None of these

2. 11, 13, 17, 19, 23, 29, 31, 37, 41, ——
(1) 43 (2) 47 (3) 51
(4) 53 (5) None of these

3. 15, 31, 63, 127, 255, ——
(1) 513 (2) 511 (3) 517
(4) 523 (5) None of these

4. 5, 11, 17, 25, 33, 43, ——
(1) 49 (2) 51 (3) 52
(4) 53 (5) None of these

5. 9, 12, 11, 14, 13, ——, 15
(1) 12 (2) 16 (3) 10
(4) 17 (5) None of these

Directions: In each of the following questions, one term in the number series is wrong. Find the wrong term.

6. 125, 126, 124, 127, 123, 129
(1) 123 (2) 124 (3) 126
(4) 127 (5) 129

7. 10, 26, 74, 218, 654, 1946, 5834
(1) 26 (2) 74 (3) 218
(4) 654 (5) 1946

8. 1, 2, 6, 15, 31, 56, 91
(1) 31 (2) 15 (3) 56
(4) 91 (5) 2

9. 3, 7, 15, 39, 63, 127, 255, 511
(1) 39 (2) 15 (3) 7
(4) 63 (5) 127

10. 56, 72, 90, 110, 132, 150
(1) 72 (2) 90 (3) 110
(4) 132 (5) 150

Directions: In each of the following questions, various terms of a letter series are given with one term missing. Choose the missing term out of the given alternatives.

11. cmw, hrb, ——, rbl, wgq, blv
(1) mwg (2) lvf (3) lwg
(4) mxg (5) wmx

12. DKY FJW HIU JHS ——
(1) KGR (2) LFQ (3) KFR
(4) LGQ (5) None of these

13. —— siy oeu kaq gwm csi
(1) wne (2) wnb (3) vne
(4) vme (5) None of these

14. BXJ ETL HPN KLP ——
(1) NHR (2) MHQ (3) MIP
(4) NIR (5) None of these

15. QPO, SRQ, UTS, WVU, ——
(1) XVZ (2) ZYA (3) YXW
(4) VWX (5) AZY

16. P3C, R5F, T8I, V12L, ——
(1) Y17O (2) X17M (3) X17O
(4) X16O (5) None of these

17. D-4, F-6, H-8, J-10, ——, ——
(1) K-12, M-13 (2) L-12, M-14 (3) L-12, N-14
(4) K-12, M-14 (5) K-12, N-14

18. G, H, J, M, ——, V
(1) T (2) S (3) R
(4) U (5) Q

19. OTE PUF QVG RWH ——
(1) SYJ (2) TXI (3) SXJ
(4) SXI (5) QWD

20. BD GI LN QS ——
(1) TV (2) VW (3) WX
(4) WY (5) VX

Directions: In each of the following letter series, some of the letters are missing which are given in that order as one of the alternatives below it. Choose the correct alternative.

21. ba-ba - bac - acb - cbac
(1) aacb (2) bbca (3) ccba
(4) cbac (5) None of these

22. adb - ac - da - cddcb - dbc - cbda
(1) bccba (2) cbbaa (3) ccbba
(4) bbcad (5) None of these

23. a - ba - cbaac - aa - ba
(1) ccbb (2) cabc (3) cbcb
(4) bbcc (5) None of these

24. - bc - - bb - aabc
(1) acac (2) babc (3) abab
(4) aacc (5) None of these

25. b - b - bb - - bbb - bb - b
(1) bbbbba (2) bbaaab (3) ababab
(4) aabaab

Answers: Speed Developing Practice Test No. 6

1. (1)	2. (1)	3. (2)	4. (4)	5. (2)	6. (5)	7. (4)	8. (4)	9. (1)	10. (5)
11. (1)	12. (4)	13. (5)	14. (1)	15. (3)	16. (3)	17. (3)	18. (5)	19. (4)	20. (5)
21. (3)	22. (2)	23. (2)	24. (1)	25. (3)					

Explanatory Answers:
Speed Developing Practice Test No. 6

1. (1) Sum of two consecutive numbers of the series gives the next number.
2. (1) The series consists of prime numbers.
   $\therefore$ The missing number is the next prime number, which is 43.
3. (2) Each number is double the preceding one plus 1.
   So, the next number is $(255 \times 2) + 1 = 511$
4. (4) The sequence is +6, +6, +8, +8, +10, ---------
   So the missing number = 43 + 10 = 53
5. (2) Alternatively we add 3 and subtract 1.
   Thus 9 + 3 = 12, 12 - 1 = 11, 11 + 3 =14 and so on.
   $\therefore$ the missing number = 13 + 3 = 16
6. (5) The sequence is +1, -2, +3, -4, +5. So 129 is wrong. The correct term should be 128.
7. (4) Each term is four less than the preceding number multiplied by 3. Thus 654 is wrong, the correct term being 650.
8. (4) The sequence is $+1^2, +2^2, +3^2, +4^2, +5^2, +6^2$. The correct term being 92 instead of 91.
9. (1) Each number in the series is multiplied 2 and the result is increased by 1 to obtain the next number $\therefore$ 39 is wrong. The correct term being 31.
10. (5) The numbers are 7×8, 8×9, 9×10, 10×11, 11×12, 12×13 so 150 is wrong.
11. (1) All the letters of each term are moved five steps forward to obtain the corresponding letters of the next term.
12. (4) The first letters of all the terms are alternate. The second letter of each term is moved one step backward to obtain the second letter of the successive term. The third letter of each term is moved two steps backward to obtain the third letter of the subsequent term.
13. (5) The letters in each term are moved four steps backward to obtain the letters of the next term.
14. (1) The first, second and third letters of each term are moved three steps forward, four steps backward and two steps forward respectively to obtain the corresponding letters of the successive term.
15. (3) Each term in the series consists of three consecutive letters in reverse order. The first letter of each term and the last letter of the term are the same.
16. (3) The first letters of the terms are alternate. The sequence followed by the numbers is +2, +3, +4, -------The last letter of each term is three steps ahead of the last letter of the preceding term.
17. (3) The letters in the series are alternate and the numbers indicate their position in the alphabet from the beginning.
18. (5) The first, second, third, fourth and fifth terms are moved one, two, three, four and five steps respectively forward to obtain the successive terms.
19. (4) The first letters of the terms are in alphabetical order, and so are the second and the third letter.
20. (5) Each term of the series consists of two alternate letters and there is a gap of two letters between the last letter of each term and the first letter of the next term.
21. (3) The series is bac/bac/bac/bac/bac/bac. Thus the pattern bac is repeated.
22. (2) The series is adb$\underline{c}$/ac$\underline{b}$d/a$\underline{b}$cd/dcb$\underline{a}$/dbc$\underline{a}$/cbda. Here the letters equidistant from the beginning and the end of the series are the same.
23. (2) The series is acba/acba/acba/acba. Thus, the pattern acba is repeated.
24. (1) The series is abc/cab/bca/abc. Thus the letters are in cyclic order.
25. (3) The series is b/$\underline{a}$/b$\underline{b}$bb/$\underline{a}$/$\underline{b}$bbb/$\underline{a}$/bb$\underline{b}$b. Thus, in each sequence, ‘a’ moves one step forward and ‘b’ takes its place and finally in the fourth sequence, it is eliminated.

CODING - DECODING

A code is a system of signals. Therefore, coding is a method of transmitting messages between the sender and receiver without a third person understanding it.

The Coding and Decoding test is set up to judge the candidate's ability to decipher the law that codes a particular message and break the code to reveal the message.

LETTER CODING

A particular letter stands for another letter in letter coding.

Eg: If COURSE is coded as FRXUVH, how is RACE coded in that code?

(1) HFDU (2) UCFH (3) UDFH
(4) UDHF (5) UDFG

In the given code, each letter is moved three steps forward than the corresponding letter in the word. So R is coded as U, A as D, C as F, E as H. Hence (3) is the answer.

NUMBER CODING

In these questions, either numerical code values are assigned to a word or alphabetical code values are assigned to numbers. The candidate is required to analyse the code as per directions.

Case I: When numerical values are assigned to words.

Eg: If in a certain code ROPE is coded as 6821, CHAIR is coded as 73456 what will be the code for CRAPE?

(1) 73456 (2) 76421 (3) 77246
(4) 77123 (5) None of these

Clearly, in the given code, the alphabets are coded as follows.

R	O	P	E	C	H	A	I
6	8	2	1	7	3	4	5

So CRAPE is coded as 76421

So the answer is (2)

Case II: When alphabetical code values are assigned to the numbers.

Eg: In a certain code 3456 is coded as ROPE. 15546 is coded as APPLE. Then how is 54613 coded?

(1) RPPEO (2) ROPEA (3) POEAR
(4) PAREO (5) None of these

Clearly in the given figures, the numbers are coded as follows.

3	4	5	6	1	4
R	O	P	E	A	L

So 54613 is coded as POEAR. The answer is (3)

MIXED CODING

In this type of question, three or four complete messages are given in the coded language and the code for a particular word is asked.

To analyse such codes, any two messages bearing the common word are picked up. The common code word will mean that word. Proceeding similarly by picking up all possible combinations of two messages the entire message can be analysed.

Eg: If *tee see pee* means *drink fruit juice*, *see kee lee* means *juice is sweet*, and *lee ree mee* means *he is intelligent*, which word in that language means *sweet*?

(1) see (2) kee (3) lee
(4) pee (5) tee

In the first and the second statements the common word is juice and the common code word is *see*. So *see* means juice. In the second and the third statements, the common word is 'is' and the common code is *lee*. So *lee* means is. Thus in the second statement, the remaining word sweet is coded as kee. Hence the answer is (2).

MIXED NUMBER CODING

In this type of questions, three or four complete messages are given in the coded language and the code number for a particular word is asked.

Eg: If in a certain code language, *851* means *good sweet fruit*; *783* means *good red rose* and *341* means *rose and fruit* which of the following digits stands for *sweet* in that language?

(1) 8 (2) 5 (3) 1
(4) 3 (5) None of these

In the first and the second statements, the common code digit is 8 and the common word is *good*. So 8 stands for *good*. In the first and the third statements, the common code digit is 1 and the common word is *fruit*. So 1 stands for *fruit*. Therefore in the first statement, 5 stands for sweet. Hence the answer is (2).

DECODING

In these questions, artificial or code values are assigned to a word or a group of words and the candidate is required to find out the original words.

Eg: If in a certain language FLOWER is written as EKNVDQ, what will be written as GNTRD?

(1) HEOUS (2) HOUES (3) HUOSE
(4) HOUSE (5) None of these

Each letter of the word is one step ahead of the corresponding letter of the code.

E	K	N	V	D	Q		G	N	T	R	D
↓	↓	↓	↓	↓	↓		↓	↓	↓	↓	↓
F	L	O	W	E	R		H	O	U	S	E

Thus HOUSE is written as GNTRD, So the answer is (4)

NEW TYPE OF CODING

This is a kind of coding recently included in the Reasoning section. In this type of questions either alphabetical code values are assigned to symbols or symbols are assigned to alphabets. The candidate is required to analyse the code as per direction.

Eg: 1. In a certain code 'TOME' is written as @ $ * ? and ARE is written as ' • £ ? ' How can 'REMOTE' be written in that code?

(1) £ ? • $ @ ? (2) @ ? * $ @ ? (3) £ ? * $ @ ?
(4) Cannot be determined (5) None of these

Sol: From the data we have

T ⇒ @ O ⇒ $ M ⇒ * E ⇒ ? and
A ⇒ • R ⇒ E ⇒ ?

Hence REMOTI coded as £ ? * $ @ ? So (3) is the answer.

Speed Developing Practice Test No. 7

1. If in a certain language CHAMPION is coded as HCMAIPNO, how can NEGATIVE be coded in that code?
(1) ENAGITEV (2) NEAGVEIT (3) MGAETVIE
(4) EGAITEVN (5) NEGATIEV

2. In a certain language KINDLE is coded as ELDNIK, how can EXOTIC be coded in that code?
(1) EXOTLC (2) CXOTIE (3) COXITE
(4) CITOXE (5) EOXITC

3. If in a certain language GAMBLE is coded as FBLCKF, how can FLOWER be coded in that language?
(1) GKPVFQ (2) EMNXDS (3) GMPVDS
(4) HNQYGT (5) EKNVDQ

4. If in a certain language FASHION is coded as FOIHSAN, how can PROBLEM be coded in that code?
(1) ROBLEMP (2) PLEBRUM (3) PRBOELM
(4) RPBOELM (5) PELBORM

5. If FRIEND is coded as HUMJTK, how can CANDLE be written in that code?
(1) EDRIRL (2) DCQHQK (3) ESJFME
(4) FYOBOC (5) DEQJQM

6. If in a certain code, TWENTY is written as 863985 and ELEVEN is written as 323039, how can TWELVE be written in that code?
(1) 863203 (2) 863584 (3) 863903
(4) 863063 (5) None of these

7. If PALE is coded as 2134, EARTH is coded as 41590, how can is PEARL be coded in that language?
(1) 29530 (2) 24153 (3) 25413
(4) 25430 (5) None of these

8. If ROSE is coded as 6821, CHAIR is coded as 73456 and PREACH is coded as 961473, what will be the code for SEARCH?
(1) 246173 (2) 214673 (3) 214763
(4) 216473 (5) None of these

9. In a certain code *nee tim see* means *how are you* ; *ble nee see* means *where are you*. What will be the code for *where*?
(1) nee (2) tim (3) see
(4) Cannot be determined (5) None of these

10. In a certain code language *pit nae tom* means *apple is green* ; *nae ho tap* means *green and white* and *ho tom ka* means *shirt is white*. Which of the following represents *apple* in that language?
(1) nae (2) tom (3) pit
(4) ho (5) ka

11. If *nitco sco tingo* stands for *softer than flower* ; *tingo rho mst* stands for *sweet flower fragrance* and *mst sco tmp* stands for *sweet than smile* what would *fragrance stand for?*
(1) rho (2) mst (3) tmp
(4) sco (5) None of these

12. In a certain code language, *743* means *Mangoes are good* ; *657* means *Eat good food* ; and *934* means *Mangoes are ripe*. Which digit means *ripe* in that language?
(1) 5 (2) 4 (3) 9
(4) 7 (5) Cannot be determined

13. In a certain code, *247* means *spread red carpet* ; *256* means *dust one carpet* and *264* means *one red carpet* which digit in that code means *dust*?
(1) 2 (2) 3 (3) 5
(4) 6 (5) Cannot say

14. In a certain code language, *134* means *good and tasty*, *478* means *see good pictures* ; and *729* means *pictures are faint*. Which of the following digits stands for *see*?
(1) 4 (2) 7 (3) 9
(4) 8 (5) None of these

15. In a certain code *253* means *books are old* ; *546* means *man is old* and *378* means *buy good books*. What stands for '*are*' in that code?
(1) 2 (2) 4 (3) 5
(4) 6 (5) 9

16. In a certain code language TSSNOFFQ is written as STRONGER then GQFDENN will be written as
(1) DOMEERF (2) FEEDORM (3)FREEDOM
(4) FREEDMO (5) None of these

17. If FULFNHW is the code for CRICKET, EULGH will be coded as
(1) PRIDE (2) BRIDE (3) BLADE
(4) BLIND (5) None of these

18. If in a certain language REMOTE is coded as ROTEME, which word would be coded as PNIICC?
(1) NPIICC (2) PICCIN (3) PINCIC
(4) PICNIC (5) PICINC

Directions (19-21): The number in each question below is to be codified in the following code.

Digit:	5	3	7	1	4	9	6	2	8
Letter:	C	J	O	X	N	Q	T	Z	F

19. 163542
(1) XTJCNZ (2) TXJCNZ (3) XTJCZN
(4) XTCJNZ (5) None of these

20. 925873
(1) ZQCFOJ (2) QZCFOJ (3) QZCOFJ
(4) QZCFJO (5) None of these

21. 741568
(1) ONCXTF (2) NOXCFT (3) ONCFCT
(4) ONXCTF (5) None of these

22. In a certain code ORANGE is written as '? ÷ @ • + * ' and EAT is written as ' * @ $'. How can ROTATE be written in that code?
(1) ÷ ? $ @ * $ (2) ÷ ? $ @ • * (3)÷ ? $ @ $ *
(4) ÷ ? $ * • @ (5) None of these

23. In a certain code 'PALM' is written as ' £ @ ? $ ' and 'ARM' is written as ' @ * $ '. How can 'ALARM' be written in that code?
(1) @ £ @ ? $ (2) @ $? £ @ (3) ? @ @ £ $
(4) @ ? @ £ $ (5) None of these

24. In a certain code 'HEAT' is written as ' ? * $ @ ' and 'FINGER' is written as '☸ £ • & *@'. How can 'FATHER' be written in that code?
(1) ☸$ @ ? *@ (2) $ @ ☸? @* (3)@ ? ☸@ $*
(4) ☸$ @ ? @* (5) None of these

25. In a certain code 'BODE' is written as ' @ $ * ? ' and 'EAT' is written as ' ? • £ ' How can 'DEBATE' be written in that code?
(1) ? * @ * £ • (2) * ? @ • £ ? (3)* ? @ * £ ?
(4) Cannot be determined (5) None of these

Answers: Speed Developing Practice Test No. 7

1. (1)	2. (4)	3. (2)	4. (5)	5. (1)	6. (1)	7. (2)	8. (2)	9. (5)	10. (3)
11. (1)	12. (3)	13. (3)	14. (4)	15. (1)	16. (3)	17. (2)	18. (4)	19. (1)	20. (2)
21. (4)	22. (3)	23. (5)	24. (1)	25. (2)					

Explanatory Answers: Speed Developing Practice Test No. 7

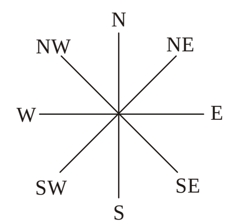
1. (1) In the code each of the two letters are reversed in arrangement.
2. (4) In the code the arrangement of the letters in the word is wholly reversed.
3. (2) The letters preceding the first, third and fifth letters of the given word and those succeeding the second, fourth and last letters of the word in the alphabet form the code.
4. (5) The 1st and the last letters of the word are kept as such in the code and all other letters in between them are wholly reversed.
5. (1) In the code, the first letter is the second alphabet, the second letter is the third alphabet, the third letter is the fourth alphabet and so on after the corresponding letter in the word.
6. (1) The letters are coded accordingly T as 8, W as 6, E as 3, L as 2, and V as 0. So TWELVE is coded as 863203.
7. (2) The letters are coded accordingly P as 2, E as 4, A as 1, R as 5 and L as 3. So PEARL is coded as 24153.
8. (2) The letters are coded accordingly S as 2, E as 1, A as 4, R as 6, C as 7 and H as 3. i.e., 214673
9. (5) In the first and the second statements the common words are '*are*' and '*you*' and the common code words are *nee* and *see*. So *nee* and *see* means *are* and *you*. In the second statement the remaining code *ble* means *where*.
10. (3) In the first and the second statements, the common code word is *nae* and the common word is green. So *nae* means *green*. In the first and the third statements, the common code word is *tom* and the common word is *is* so *tom* means *is*. Therfore in the first statement *pit* means *apple*.
11. (1) In the first and the second statements the common code is *tingo* and the common word is *flower*. So *tingo* means *flower*. In the second and the third statements, the common code is *mst* and the common word is *sweet*. So *mst* means *sweet*. Therefore in the second statement, *rho* means *fragranee*.
12. (3) In the first and the third statements, the common code digits are *4* and *3* ; and the common words are *mangoes* and *are*. So *4* and *3* are the codes for *mangoes* and *are*. Thus in the third statement *9* means *ripe*.
13. (3) In the first and the second statements, the common code digit is *2* and the common word is *carpet*. So *2* means *carpet*. In the second and the third statements, the common code digit is *6* and the common word is *one*. So *6* means one. Therefore in the second statement, *5* means *dust*.
14. (4) In the first and the second statements, the common code digit is *4* and the common word is *good*. So *4* stands for *good*. In the second and the third statements, the common code digit is *7* and the common word is *pictures*. So *7* stands for *pictures*. Thus in the second statement *8* stands for *see*.
15. (1) In the first and the second statements, the common code digit is *5* and the common word is *old*, so *5* stands for *old*. In the first and third statements, the common code digit is *3* and the common word is *books* so *3* stands for *books*. Thus in the first statement, *2* stands for *are*.
16. (3) The first letter is moved one step backward and second is moved one step forward the third letter is moved one step backward, the fourth letter one step forward and so on. So the answer is (3)
17. (2) Each letter of the word is three steps ahead of the corresponding letter of the code.
18. (4) The groups of second and third letters and fourth and fifth letters in the word interchange places in the code.
19. (1) As given 1 is coded as X, 6 is coded as T, 3 is coded as J, 5 is coded as C, 4 is coded as N and 2 is coded as Z. So 163542 is coded as XTJCNZ.
20. (2) As given 9 is coded as Q, 2 as Z, 5 as C, 8 as F, 7 as O and 3 as J. So 925873 is coded as QZCFOJ.
21. (4) 7 is coded as O, 4 as N, 1 as X, 5 as C, 6 as T and 8 as F. So 741568 is coded as ONXCTF.
22. (3) O R A N G E   E A T
↓ ↓ ↓ ↓ ↓ ↓   ↓ ↓ ↓
? ÷ @ • + *   * @ $

    So we can code ROTATE as ÷ ? $ @ $ *
23. (5) P ⇒ £ A ⇒ @ L ⇒ ? M ⇒ $ R ⇒ * M ⇒ $
ALARM ⇒ @ ? @ $ £ *
24. (1) H ⇒ ? A ⇒ $ T ⇒ @ F ⇒ ☸
I ⇒ £ N ⇒ • G ⇒ & E ⇒ * R ⇒ Δ
FATHER ⇒ ☸ $ @ ? * Δ
25. (2) B ⇒ @ O ⇒ $ D ⇒ * E ⇒ ? A ⇒ • T ⇒ £
DEBATE ⇒ * ? @ • £ ?

Direction Sense Test

In this test, the questions consist of a sort of direction puzzle. A successive follow-up of direction is formulated and the candidate is required to ascertain the final direction or the distance between two points. The test is meant to judge the candidate's ability to trace, follow and sense the direction correctly.

The figure shows the four main directions (North N, South S, East E, West W) and the four cardinals (North east NE, North west NW, South east SE, South west SW) to help the candidates know the directions.



Speed Developing Practice Test No. 8

1. Deepak starts walking straight towards east. After walking 75 m he turns to the left and walks 25 m straight. Again he turns to the left and walks a distance of 40m straight, again he turns to the left and walks a distance of 25 m. How far is he from the starting point?
   (1) 140 m (2) 35 m (3) 115 m
   (4) 25 m (5) None of these
2. Arun started walking towards North. After walking 30 m, he turned left and walked 40 m. He then turned left and walked 30 m. He again turned left and walked 50 m. How far is he from his original position?
   (1) 50 m (2) 40 m (3) 30 m
   (4) 20 m (5) None of these
3. Ramu went 15 km. to the west from his house, then he turned left and walked 20 km. He then turned east and walked 25 km. and finally turning left covered 20 km. How far is he from his house?
   (1) 5 km. (2) 10 km. (3) 40 km.
   (4) 80 km. (5) None of these
4. Rekha who is facing south turns to her left and walks 15 m, then she turns to her left and walks 7 metres, then facing west she walks 15m. How far is she from her original position?
   (1) 22 m (2) 37 m (3) 44 m
   (4) 7 m (5) None of these
5. Going 50 m to the south of her house, Radhika turns left and goes another 20 m. Then, turning to the north, she goes 30 m and then starts walking to her house. In which direction is she walking now?
   (1) North-west (2) North (3) South-east
   (4) East (5) None of these
6. Shailesh and Mohan start from a fixed point. Shailesh moves 3 km. northward, turns right and then covers 4 km. Mohan moves 5 km westwards, turns right and walks 3 km. The distance between Shailesh and Mohan now is
   (1) 10 km (2) 9 km (3) 8 km
   (4) 6 km (5) 4 km
7. A man walks 30 metres towards south. Then, turning to his right, he walks 30 metres. Then turning to his left, he walks 20 metres. Again, he turns to his left and walks 30 metres. How far is he from his initial position?
   (1) 30 metres (2) 20 metres (3) 80 metres
   (4) 60 metres (5) None of these
8. Suresh starts from his house towards west. After walking a distance of 30 m, he turned towards right and walked 20 metres. He then turned left and moving a distance of 10 metres, turned to his left again and walked 40 metres. He now turns to the left and walks 5 metres. Finally he turns to his left. In which direction is he walking now?
   (1) North (2) South (3) East
   (4) South-West (5) West
9. Raj travelled from a point X straight to Y at a distance of 80 m. He turned right and walked 50 m, then again turned right and walked 70 metres. Finally he turned right and walked 50 m. How far is he from the starting point?
   (1) 20 metres (2) 50 metres (3) 70 metres
   (4) 10 metres (5) None of these

10. A man walks 10 km towards north. From there he walks 6 km towards south. Then he walks 3 km towards east. How far and in which direction is he with reference to his starting point?
(1) 7 km east (2) 5 km west (3) 5 km north-east
(4) 7 km west (5) None of these

11. One morning after sunrise, Sumesh and Ratheesh were standing on a lawn with their backs towards each other. Sumesh's shadow fell exactly towards his left hand side. Which direction was Ratheesh facing?
(1) East (2) West (3) North
(4) South (5) North-east

12. A watch reads 4.30 if the minute hand points east, in what direction does the hour hand point?
(1) North (2) North-west (3) South-east
(4) North-east (5) None of these

13. Five students A, B, C, D and E are sitting in a row, D is on the right of E. B is on the left of E but is on the right of A. D is on the left of C. Who is sitting on the extreme left?
(1) A (2) B (3) C
(4) D (5) E

14. Five persons were playing card game sitting in a circle all facing the centre. Ashish was to the left of Milan Nitin was to the right of Anupam and between Anupam and Mukesh. Who was to the right of Mukesh?
(1) Nitin (2) Milan (3) Mukesh
(4) Ashish (5) Cannot be determined

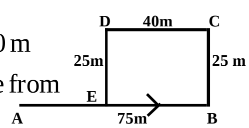
15. Facing the east, Rajesh turned left and walked 10 metres, then he turned to his left again and walked 10 m. He then turned 45° towards his right and went straight to cover 25 metres. In which direction from his starting point is he?
(1) South-west (2) South-east (3) North-west
(4) North-east (5) East

Answers: Speed Developing Practice Test No. 8

1. (2) 2. (5) 3. (2) 4. (4) 5. (1) 6. (2) 7. (5) 8. (1) 9. (4) 10. (3) 11. (4) 12. (4) 13. (1) 14. (4) 15. (3)

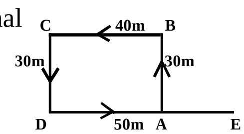
Explanatory Answers: Speed Developing Practice Test No. 8

1. (2) The movements of Deepak are as shown in the figure

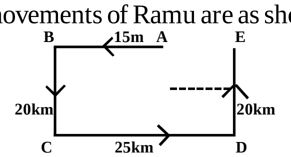


Clearly, EB = DC = 40 m
∴ Deepak's distance from the starting point
A = (AB - EB) = (75 - 40) = 35 metres

2. (5) The movements of Arun are as shown in figure from A to E, clearly Arun's distance from his original position
= AE = (DE - DA)
= (DE - BC) = 10 m.

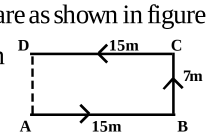


3. (2) The movements of Ramu are as shown in figure.

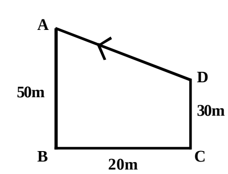


∴ Ramu's distance from his house at A = AE
= (BE - AB) = (CD - AB) = (25 - 15)km = 10 km

4. (4) The movements of Rekha are as shown in figure
∴ Rekha's distance from the starting point A
= AD = BC = 7 m.



5. (1) The movements of Radhika are as shown in the figure. Thus she is now moving in the direction DA i.e. North-west.

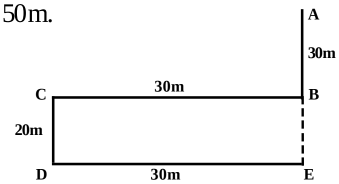


6. (2) Clearly, after travelling their total distances, Shailesh and Mohan are in the same horizontal line at E & C respectively. So distance between them is EC = EB + BC = DA + BC = 5 + 4 = 9 km.

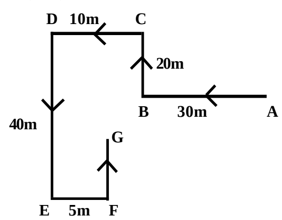
7. (5) The movements of the man are as shown in the figure.

$\therefore$ The man's distance from the initial position

$= AE = (AB + BE) = (AB + CD) = (30 + 20)\,m = 50m.$



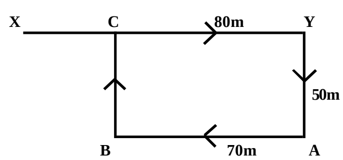
8. (1) The movements of Suresh are as shown in figure from A to G. Clearly, Suresh is walking in the direction FB, ie, North.



9. (4) The movements of Raj are as shown in figure. (X to Y, Y to A, A to B and B to C)

$\therefore$ Raj's distance from the starting point

$= XC = (XY - YC) = (XY - BA) = (80 - 70)\,m = 10m.$



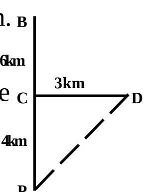
10. (3) The movements of the man are as shown in the figure. (P to B, B to C, C to D)

$PC = (PB - BC) = (10 - 6) = 4\,km.$

Clearly D is to North-east of P.

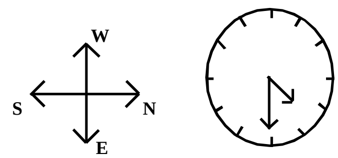
$\therefore$ The man's distance from the starting point $PD = \sqrt{PC^2 + CD^2}$

$= \sqrt{4^2 + 3^2} = \sqrt{16 + 9} = 5\,km.$



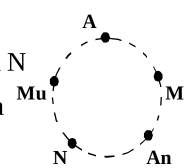
11. (4) Since Sumesh's shadow fell towards left, Sumesh is facing north. As, Ratheesh is standing with his back towards Sumesh, he will be facing south.

12. (4) Clearly to show 4.30, the position of the minute and hour hands of the clock will be as shown, if the minute hand points east, the hour hand will point to the North-east direction.

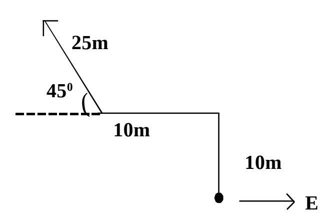


13. (1) D is to the right of E means the order is ED. B is on the left of E but right of A means ABE. D is to the left of C means DC. Combining the arrangements, we have ABEDC. So, A is to the extreme left.

14. (4) Ashish (A) is to the left of Milind (M) means that the order is A, M. Nithin N is to the right of Anupam (An) means An, N. So Nithin is between Anupam and Mukesh (Mu) means An, N, Mu. So the two possible arrangements are A, M, An, N, Mu and An, N, Mu, A, M. But in a cyclic arrangement both will be considered the same. So Ashish will be to the right of Mukesh.



15. (3) Clearly the route followed by Rajesh is as shown in figure. So matching his final direction with the direction diagram, he will be in North-west direction from the starting point.



PUZZLE TEST

This section comprises of questions put in the form of puzzles involving a certain number of items, be it persons or things. The candidate is required to analyse the given information, condense it in a suitable form and answer the questions asked.

Solved Example

Read the following information carefully and answer the questions given below:

There are five friends - Shailendra, Keshav, Madhav, Ashish and Rakesh. Shailendra is shorter than Keshav but taller than Rakesh. Madhav is the tallest. Ashish is a little shorter than Keshav and a little taller than Shailendra.

1. Who is the shortest?
   (1) Rakesh (2) Shailendra (3) Ashish
   (4) Keshav (5) None of these
2. If they stand in the order of their heights, who will be in the middle?
   (1) Keshav (2) Rakesh (3) Shailendra
   (4) Ashish (5) None of these
3. If they stand in the order of increasing heights, who will be the second?
   (1) Ashish (2) Shailendra (3) Rakesh
   (4) Keshav (5) None of these
4. Who is the second tallest?
   (1) Shailendra (2) Keshav (3) Ashish
   (4) Rakesh (5) None of these
5. Who is taller than Ashish but shorter than Madhav?
   (1) Rakesh (2) Keshav (3) Shailendra
   (4) Data inadequate (5) None of these

Ans: Let us denote the friends by the first letter of each name, namely S, K, M, A and R. It is given that Shailendra is shorter than Keshav but taller than Rakesh. Therefore $R < S < K$. Ashish is a little shorter than Keshav and a little taller than Shailendra ie $S < A < K$. Madhav is the tallest. From this we get $R < S < A < K < M$.

1. (1) Rakesh is the shortest.
2. (4) Ashish is in the middle.
3. (2) In the order of increasing heights, Shailendra is the second.
4. (2) Keshav is the second tallest.
5. (2) Keshav is taller than Ashish but shorter than Madhav.

Speed Developing Practice Test No. 9

Directions (Qs. 1-5): In a group of 5 persons A, B, C, D and E. B and C are intelligent in Mathematics and Geography. A and C are intelligent in Mathematics and History. B and D are intelligent in Political Science and Geography. D and E are intelligent in Political Science and Biology. E is intelligent in Biology, History and Political Science.

1. Who is intelligent in Political Science, Geography and Biology?
   (1) E (2) D (3) C (4) B (5) A
2. Who is intelligent in Mathematics, Political Science and Geography?
   (1) A (2) B (3) C (4) D (5) E
3. Who is intelligent in Mathematics and History but not in Geography?
   (1) C (2) E (3) A (4) B (5) D
4. Who is intelligent in Mathematics, Geography and History?
   (1) E (2) A (3) D (4) C (5) B
5. Who is intelligent in Political Science, History and Biology?
   (1) A (2) B (3) C (4) D (5) E

Directions (Qs. 6-10): Five friends A, B, C, D and E are sitting on a bench. A is sitting next to B, C is sitting next to D, D is not sitting near E, E is on the left end of the bench,. C is on second position from the right. A is on the right side of B and to the right side of E. A and C are sitting together

6. Where is A s
   (1) Between etween D and C
   (3) Between etween C and E
   (5) Between

7. Who is sitting in the centre?
(1) A (2) B (3) C (4) D (5) E
8. C is sitting between
(1) B and D (2) A and E (3) D and E
(4) A and D (5) A and B
9. What is the position of D?
(1) Extreme left (2) Extreme right
(3) Third from left (4) Second from left
(5) None of these
10. What is the position of B?
(1) Second from right (2) Centre
(3) Extreme left (4) Second from left
(5) None of these

Directions (Qs. 11-15): Read the following information and answer questions 11 to 15

(i) Eight friends A, B, C, D, E, F, G, & H are sitting in a circle facing the centre
(ii) A, who is sitting immediately between G and C, is just opposite to F.
(iii) E, who is sitting immediately between 'H' and 'C' is second to the right of A and second to the left of F.
(iv) D is sitting second to the left of G.

11. Who are the three friends sitting immediately to the right of B?
(1) DFH (2) GAC (3) ACE
(4) Cannot be determined (5) None of these
12. Who is sitting between D and G?
(1) A (2) F (3) B
(4) Cannot be determined (5) None of these
13. Who are the immediate neighbours of D?
(1) B and F (2) F and H (3) B and G
(4) B and H (5) None of these
14. Who is sitting directly opposite to G?
(1) E (2) F (3) H
(4) Cannot be determined (5) None of these
15. Who is sitting directly opposite to C?
(1) D (2) F (3) B
(4) Cannot be determined (5) None of these

Directions (Qs. 16-20): P, Q, R, S, T and X are members of a family. There are two married couples. Q is an engineer and is father of T. X is grandfather of R and is a lawyer. S is grandmother of T and is a housewife. There is one engineer, one lawyer, one teacher one housewife and two students in the family.

16. Who is the husband of P?
(1) R (2) X (3) Q (4) S (5) T
17. Which of the following are the two married couples?
(1) XS, QP (2) XS, QT (3) XS, RP
(4) TS, RX (5) None of these
18. Which of the following is definitely a group of male members?
(1) Q, X, T (2) X, T (3) Q, X, P
(4) Q, X (5) None of these
19. Who is the sister of T?
(1) R (2) S (3) P
(4) Data inadequate (5) None of these
20. Which of the following can be P's profession?
(1) Housewife (2) Engineer (3) Teacher
(4) Engineer or Teacher (5)Housewife or Teacher

V **Directions (Qs. 21-25):** Six plays A, B, C, D, E and F are to be staged one on each day from Monday to Saturday. The schedule of the plays is to be in accordance with the following:

A must be staged a day before E. C must not be staged on Tuesday. B must be staged on the day following the day on which F is staged. D must be staged on Friday only and should not be immediately preceded by B. E must not be staged on the last day of the schedule.

21. Which of the following plays immediately follows B?
(1) A (2) C (3) D (4) E (5) F
22. Which of the following plays is on Monday?
(1) E (2) F (3) C (4) B (5) A
23. Play D is between which of the following pairs of plays?
(1) B and E (2) E and F (3) A and E
(4) C and E (5) C and F
24. Which of the following is the schedule of plays, with the order of their staging from Monday?
(1) E, A, B, F, D, C (2) A, F, B, E, D, C (3)A,F,B,C,D,E
(4) F, A, B, E, D, C (5) None of these
25. Play C cannot definitely be staged on which of the following days in addition to Tuesday?
(1) Monday (2) Wednesday (3) Friday
(4) Thursday (5) Saturday

Answers: Speed Developing Practice Test No. 9

1. (2)	2. (2)	3. (3)	4. (4)	5. (5)	6. (5)	7. (1)	8. (4)	9. (2)	10. (4)
11. (2)	12. (3)	13. (1)	14. (3)	15. (1)	16. (3)	17. (1)	18. (4)	19. (4)	20. (3)
21. (1)	22. (2)	23. (4)	24. (5)	25. (3)					

Explanatory Answers: Speed Developing Practice Test No. 9

We can prepare a table from the given data as below:

	Maths	Geography	History	Political Science	Biology
A	✓	×	✓	×	×
B	✓	✓	×	✓	×
C	✓	✓	✓	×	×
D	×	✓	×	✓	✓
E	×	×	✓	✓	✓

1. (2) Clearly from the table D is intelligent in Political Science, Geography and Biology.
2. (2) B is intelligent in Mathematics, Political Science and Geography.
3. (3) A is intelligent in Mathematics and History but not in Geography.
4. (4) C is intelligent in Mathematics, History and Geography.
5. (5) E is intelligent in Political Science, History and Biology.

II C is sitting on the second position from right and A is sitting both with C and next to B. So A will be in the third position from right and B the on fourth position from right. E is on the left end of the bench. So D, who remains and who is sitting next to C will be on the right end. Thus the arrangement will be as shown.

E — B — A — C — D

6. (5) Clearly A is sitting between B and C.
7. (1) A is sitting in the centre.
8. (4) C is sitting between A and D.
9. (2) D is on the extreme right.
10. (4) B is second from the left.

III The seating arrangement is a shown in the fig.

11. (2) GAC are the three friends sitting immediate right of B.
12. (3) B is sitting between D and G.
13. (1) B and F are the immediate neighbours of D.
14. (3) H is sitting directly opposite to G.
15. (1) D is sitting directly opposite to C.

IV S is the grandmother of T and is a housewife. So X who is a lawyer and grandfather of R must be married to S. Thus R and T must be brother or sister and be the two students. Q who is an engineer and father of T will be father of T and R and must be married to P who shall be the only teacher in the family. Thus the questions can be answered as follows.

16. (3) Q is the husband of P.
17. (1) XS and QP are the two married couples.
18. (4) X and Q are definitely male members as they are grandfather and father.
19. (4) Nothing is mentioned about the sex of T and R. So, we cannot say if R is sister of T.
20. (3) Clearly P can be a teacher.

V Clearly, D must be staged on Friday. A must be staged before E i.e. order AE must be followed. But E cannot be staged on last day. Also, B must be staged immediately after F. i.e. order FB must be followed. But B cannot precede D. So F and B can be staged on Monday and Tuesday and A and E on Wednesday and Thursday. C, which cannot be staged on Tuesday shall be staged on Saturday. Thus the order followed will be

Mon.	Tue.	Wed.	Thu.	Fri.	Sat.
F	B	A	E	D	C

21. (1) Clearly, A immediately follows B.
22. (2) F will be staged on Monday.
23. (4) Play D is between E and C.
24. (5) Clearly, if the order of staging is as given above, none from amongst the choices.
25. (3) C cannot be staged on Friday as well because D has to be staged on that day.

Mathematical Operations

This section deals with questions on simple mathematical operations. Here, the four fundamental operations - addition, subtraction, multiplication and division and also statements such as 'less than', 'greater than', 'equal to', 'not equal to' etc. are represented by symbols different from the usual ones. The questions involving these operations are set using artificial symbols. The candidate has to substitute the real signs and solve the questions accordingly, to get the answer.

Eg. 1.If + means ÷, - means ×, ÷ means +, and × means — then 48 + 12 ÷ 15 × 2 - 5 = ?

(1) 8 (2) 18 (3) 9 (4) 3 (5) None of these

Ans: Putting the proper signs in the given expression, we get

48 ÷ 12 + 15 - 2 × 5 = 4 + 15 - 10 = 9

Hence the answer is (3)

Speed Developing Practice Test No. 10

1. If - means ×, × means +, + means ÷ and ÷ means -, what will be the value of 40 × 12 + 3 - 6 ÷ 60 = ?
   (1) 44 (2) 7.95 (3) 16 (4) 8 (5) None of these
2. If + means ÷, ÷ means -, - means × and × means + 36 × 12 + 3 ÷ 5 - 2 is
   (1) 85 (2) 22 (3) 30 (4) 9 (5) None of these
3. If + means ÷ , ÷ means -, - means × and × means +, what will be the value of the following expression?
   75 + 5 × 3 - 4 ÷ 6
   (1) 20 (2) 21 (3) 25 (4) 12.5 (5) None of these
4. ÷ means +, × means -, + means × and - means ÷ then 15 - 5 + 2 × 3 ÷ 2 = ?
   (1) 36 (2) 13 (3) 5 (4) 4 (5) None of these
5. + means ÷, × means -, ÷ means × and - means +. Then 5 - 12 + 2 × 3 ÷ 3 = ?
   (1) 22 (2) 32 (3) 15.9 (4) 2 (5) None of these
6. If P denotes +, Q denotes -, M denotes × and L denotes ÷, which of the following statements is true?
   (1) 32P8 L16Q4 = $\frac{-3}{2}$ (2) 6M18Q26L13P7 = $\frac{173}{13}$
   (3) 11 M34L17Q8L3 = $\frac{38}{3}$ (4) 9P9 L9Q9M9 = - 71
7. *a* denotes ×, *b* denotes ÷, *c* denotes + and *d* denotes - then 8*a*3*c*24*b*12*d*19 = ?
   (1) 70 (2) 7 (3) 14 (4) 31 (5) None of these
8. If + stands for divison, - stands for equal to, × stands for addition, ÷ stands for greater than, = stands for less than, > stands for multiplication and < stands for subtraction, which of the following alternatives is correct?
   (1) 5 + 2 × 1 = 3 + 4 >1 (2) 5 > 2 × 1 - 3 > 4 < 1
   (3) 5 × 2 < 1 - 3 < 4 × 1 (4) 5 < 2 × 1+ 3 > 4 × 1
9. $ means -, * means +, @ means ÷, # means ×, then 3 # 5 * 63 @ 7 $ 12 = ?
   (1) 52 (2) 22 (3) 12
   (4) 1 (5) None of these
10. M denotes ×, D denotes ÷, A denotes + , S denotes - Then 25S72D12A1M6 is
    (1) 25 (2) 20 (3) 35
    (4) 2 (5) None of these

Answers: Speed Developing Practice Test No. 10

1. (5) 2. (3) 3. (2) 4. (3) 5. (4) 6. (4) 7. (2) 8. (2) 9. (3) 10. (1)

Explanatory Answers:
Speed Developing Practice Test No. 10

1. (5) From the given expression 40 + 12 ÷ 3 × 6 - 60 = 40 + 4 × 6 - 60 = 40 + 24 - 60 = 4
2. (3) From the given expression36 +12 ÷ 3-5×2 = 30
3. (2) From the given expression 75 ÷ 5 + 3 × 4 - 6 = 15 + 12 - 6 = 21
4. (3) From the given expression 15÷5×2-3+2=3×2-3+2 = 6 - 3 + 2 = 5
5. (4) From the given expression5+12÷2-3×3=5+6-9=2
6. (4) Using proper notations in (4) we get the statement as 9 + 9 ÷ 9 - 9 × 9 = 9 + 1 - 81 = -71
7. (2) From the given expression 8 × 3 + 24 ÷ 12 - 19 = 24 + 2 - 19 = 7
8. (2) Using proper notations in (2), we get the statement as 5 × 2 + 1=3×4-1 or 11=11which is true.
9. (3) From the given expression 3 × 5 + 63 ÷ 7 - 12 = 15 + 9 - 12 = 12
10. (1) From the given expression25-72 ÷12+1×6= 25

ALPHABET TEST

In this type of questions, certain words will be given. The candidate is required to put them in the order in which they would be arranged in a dictionary and then state the word which is placed in the desired place. For such questions, the candidate requires a basic knowledge of the 'Dictionary Usage'. In a dictionary, the words are put in alphabetical order. The words beginning with a particular letter are again arranged in alphabetical order with respect to the second letter of the word and so on.

Eg. 1. Arrange the given words in alphabetical order and pick the one that comes first.
(1) Cloud (2) Middle (3) Grunt
(4) Mob (5) Chain

These words can be properly arranged as Chain, Cloud, Grunt, Middle, Mob. Clearly the first word is Chain. Hence the answer is (5)

Eg. 2. In the word 'PARADISE', how many pairs of letters are there which have as many letters between them in the word as in the alphabet.
(1) One (2) Three (3) Four
(4) Two (5) None

Such pairs are PRAE and AD. So the answer is (2).

Speed Developing Practice Test No. 11

1. Arrange the given words in alphabetical order and pick the one that comes last
(1) Abandon (2) Actuate (3) Accumulate
(4) Acquit (5) Achieve
2. Arrange the words in alphabetical order and pick the one that comes second.
(1) Explosion (2) Emergency(3) Ecstasy
(4) Eager (5) Entomology
3. Arrange the words in the alphabetical order and pick the one that comes second last
(1) Brook (2) Bandit (3) Boisterous
(4) Baffle (5) Bright

Directions (Qs. 4 - 7): Arrange the given words in alphabetical order and choose the one that comes first.

4. (1) Nature (2) Native (3) Narrate
(4) Nascent (5) Naughty
5. (1) Guarantee (2) Group (3) Grotesque
(4) Guard (5) Groan
6. (1) Science (2) Scrutiny (3) Scripture
(4) Scramble (5) Script
7. (1) Slander (2) Skeleton (3) Stimulate
(4) Similar (5) Summary

Directions (Qs. 8 -11): Arrange the given words in the alphabetical order and pick the one that comes in the middle.

8. (1) Radical (2) Radiate (3) Racket
(4) Radius (5) Radar
9. (1) Alive (2) Afforest (3) Anticipate
(4) Appreciate (5) Achieve
10. (1) Parasite (2) Party (3) Petal
(4) Paste (5) Prick
11. (1) Signature (2) Significance (3) Sight
(4) Sigh (5) Sieve
12. How many pairs of letters are there in the word 'HORIZON' which have as many letters between them in the word as in the English alphabet?
(1) One (2) Two (3) Three
(4) More than 3 (5) None of these
13. If the first and the third letters in the word NECESSARY were interchanged, also the fourth and the sixth letters, and the seventh and the ninth letters, which of the following would be the 7th letter from the left?
(1) A (2) Y (3) R (4) E (5) S
14. If it is possible to make a meaningful word with the second, the sixth, the ninth and the twelfth letters of the word 'CONTRIBUTION', which of the following will be the last letter of that word? If more than one such words can be made give M as the answer and if no such word is there, give X as the answer.
(1) T (2) O (3) N (4) M (5) X

Directions (Qs. 15-20): Each of the following questions is based on the following alphabet series

A B C D E F G H I J K L M
N O P Q R S T U V W X Y Z

15. Which letter is sixteenth to the right of the letter which is fourth to the left of I?
(1) S (2) T (3) U (4) V (5) None of these
16. Which letter is the seventh to the right of the thirteenth letter from your left?
(1) S (2) T (3) U (4) V (5) None of these

17. If the first half of the alphabet was written in the reverse order, which letter would be the nineteenth from your right?
(1) H (2) F (3) D (4) E (5) None of these

18. Which letter will be sixth to the right of the eleventh letter from the right end of the alphabet?
(1) K (2) V (3) J (4) U (5) None of these

19. If the above letters were in the reverse order, which will be the fifth letter to the left of the ninth letter from the right?
(1) P (2) N (3) D (4) W (5) None of these

20. Which letter will be midway between the fifteenth letter from the left and eighteenth letter from the right end?
(1) H (2) K (3) G (4) L (5) None of these

Answers: Speed Developing Practice Test No. 11

1. (2)	2. (3)	3. (5)	4. (3)	5. (5)	6. (1)	7. (4)	8. (2)	9. (1)	10. (4)
11. (3)	12. (4)	13. (2)	14. (2)	15. (3)	16. (2)	17. (2)	18. (2)	19. (5)	20. (4)

Explanatory Answers: Speed Developing Practice Test No. 11

12. (4) Such letter pairs are RO, ON, RN and HN

13. (2) The new letter sequence is CENSSEYRA. So from the left 7th letter is Y.

14. (2) The second, sixth, ninth and twelfth letters in the word contribution are O, I, T, N. The word formed is INTO.

15. (3) The fourth letter to the left of I is E. Then the sixteenth letter to the right of E is U.

16. (2) The thirteenth letter from the left is M. The seventh letter to the right of M is T.

17. (2) The new alphabet series is
M L K J I H G F E D C B A
N O P Q R S T U V W X Y Z
Counting from the right i.e. Z, the nineteenth letter is F.

18. (2) Counting from the right in the given alphabet series i.e. Z, the eleventh letter is P. The sixth letter to the right of P is V.

19. (2) The fifth letter to the ninth letter from the left means 14th letter from the right, i.e. N.

20. (4) The fifteenth letter from the left is O. The eighteenth letter from the right is I. The letter midway between I and O is L.

NUMBER, RANKING TEST

Number Test

In this catagory of questions, generally a long series of numbers is given. The candidate is required to find out how many times a number satisfying the condition specified in the question will occur.

E.g. 1. How many 9's are there in the following number sequence which are immediately preceded by 5 but not immediately followed by 3 ?

3 9 5 9 4 5 9 3 7 9 8 5 9 9 8 7 9 5 1 9 6 5 9 4 3 9 5 9 3 8

(1) One (2) Two (3) Three
(4) Four (5) More than four

The numbers satisfying the given conditions can be shown as follows.

3 9 5 $\boxed{9}$ 4 5 9 3 7 9 8 5 $\boxed{9}$ 9 8 7 9 5 1 9 6 5 $\boxed{9}$ 4 3 9 5 9 3 8.

So, the answer is (3)

Ranking Test: In this, generally the ranks of a person both from the top and from the bottom will be mentioned and the total number of persons is to be found.

E.g. 2. Radha ranks twentyfirst from the top and twentieth from the bottom in a certain examination. How many students are there in her class?

(1) 40 (2) 41 (3) 42
(4) 45 (5) None of these

Clearly the whole class consists of

(i) 20 students who have a rank higher than Radha
(ii) Radha
(iii) 19 students who have rank lower than Radha

i.e. (20 + 1 + 19) = 40. So, the answer is (1)

Speed Developing Practice Test No. 12

1. How many 9s are there in the following number sequence which are immediately preceded by 7 and also immediately followed by 8 ?
7 9 7 2 3 7 9 8 6 5 7 9 8 2 8 8 9 7 4 9 7 8 8 8
(1) 1 (2) 2 (3) 3
(4) 4 (5) None of these
2. How many 6s are there in the following number series which are immediately either preceded by 4 or followed by 7 ?
3 1 2 9 6 4 7 6 4 6 7 2 9 7 6 4 4 6 7
(1) One (2) Two (3) Three
(4) Four (5) Five
3. In the following series of numbers how many times have the numbers 9, 1 and 8 appeared together, 1 in the middle and 9 and 8 being on either side of 1?
2 1 9 8 1 9 8 3 7 1 9 7 8 1 2 9 1 9 8 1 8 2 1 2
(1) One (2) Six (3) Three
(4) Four (5) None of these
4. How many 1s are there in the following sequence which are immediately preceded by 9 but not immediately followed by 7 ?
7 1 9 1 1 7 1 8 9 1 7 1 2 1 3 1 4 5 7 1 3 9 1 7
(1) One (2) Two (3) Three
(4) Four (5) None of these
5. How many 7s immediately preceded by 6 but not immediately followed by 4 are there in the following series?
7 4 2 7 6 4 3 6 7 5 3 5 7 8 4 3 7 6 7 2 4 0 6 7 4 3
(1) One (2) Two (3) Four
(4) Six (5) None of these
6. In the given series how many instances are there in which an even number is followed by two odd numbers?
1 8 5 7 2 9 8 4 3 6 2 7 5 1 8 9 4 3 6 5 9
(1) Nil (2) One (3) Two
(4) Three (5) None of these
7. Ajay's position in a row is thirteenth from the front side and sixth from the back side. How many persons are standing in that row?
(1) 17 (2) 18 (3) 19
(4) 20 (5) 21
8. Ratan ranked 8th from the top and 37th from the bottom in a class. How many students are there in the class?
(1) 44 (2) 46 (3) 45
(4) 48 (5) None of these

9. In a row of boys Ganesh is twelfth from left and Rajan is fifteenth from right. When they interchange their positions, Rajan becomes twentieth from right. How many boys are there in the row?
(1) 29 (2) 31 (3) 32
(4) 30 (5) None of these

10. In a row of 16 boys when Ram was shifted by two places towards left, he became 7th from the left end. What was his earlier position from the right end of the row?
(1) 7th (2) 8th (3) 9th
(4) 10th (5) None of these

11. Hari ranks sixteenth in a class of thirty. What is his rank from the last?
(1) 13 (2) 15 (3) 16
(4) 17 (5) None of these

12. The Managing Director entered the conference room ten minutes before 12.30 hrs for interviewing. He came 20 minutes before the Chairman who was 30 minutes late. At what time, were the interviews scheduled?
(1) 12.50 (2) 12.40 (3) 12.20
(4) 12.10 (5) 12.50

13. A bus for Bangalore leaves every thirty minutes from a bustand. An enquiry clerk told a passanger that a bus had already left ten minutes ago and the next bus will leave at 9.35 am. At what time did the enquiry clerk give this information to the passenger?
(1) 9.10 am (2) 8.55 am (3) 9.08 am
(4) 9.05 am (5) 9.15 am

14. How many days will there be from 26th January, 1988 to 15th May 1988 ? (both days included)
(1) 110 (2) 111 (3) 112
(4) 113 (5) None of these

15. Raji remembers that Latha's birthday is after 19th but before 22nd November, whereas Deepthi remembers that Latha's birthday is after 20th but before 24th November. On which day is Latha's birthday?
(1) 20thNovember (2) 21st November
(3) 22nd November (4) 23rd November
(5) None of these

Answers: Speed Developing Practice Test No. 12

1. (2)	2. (2)	3. (1)	4. (1)	5. (2)	6. (4)	7. (2)	8. (1)	9. (2)	10. (2)
11. (2)	12. (4)	13. (5)	14. (2)	15. (2)					

Explanatory Answers:
Speed Developing Practice Test No. 12

1. (2) 7 9 7 2 3 7 $\boxed{9}$ 8 6 5 7 $\boxed{9}$ 8 2 8 8 9 7 4 9 7 8 8 8
2. (4) 3 1 2 9 6 4 7 6 4 $\boxed{6}$ 7 2 9 7 $\boxed{6}$ 4 4 7
3. (1) 2 1 9 8 $\boxed{1}$ 9 8 3 7 1 9 7 8 1 2 9 1 9 8 1 8 2 1 2
4. (1) 7 1 9 $\boxed{1}$ 1 7 1 8 9 1 7 1 2 1 3 1 4 5 7 1 3 9 1 7
5. (2) 7 4 2 7 6 4 3 6 $\boxed{7}$ 5 5 3 5 7 8 4 3 7 6 $\boxed{7}$ 2 4 0 6 7 4 3
6. (4) 1 $\boxed{8}$ 5 7 2 9 8 4 3 6 $\boxed{2}$ 7 5 1 8 9 4 3 $\boxed{6}$ 5 9
7. (2) Number of persons in that row = 12 + 1+5 = 18
8. (1) Number of students in the class =7+1+36 = 44
9. (2) After interchanging Rajan becomes twentieth from right i.e. earlier Ganesh was twentieth from right and twelfth from left. So the number of boys in the row = 11 + 1 + 19 = 31
10. (2) After shifting Ram becomes 7th from left means his earlier position was 9th from left i.e. 16 - 9 + 1 = 8th from right.
11. (2) Hari's rank from the last = 30 - 16 + 1 = 15
12. (4) Clearly the Managing Director came at 12.20. Thus the Chairman came at 12.40. Since the Chairman was late by 30 minutes, the interviews were scheduled to be held at 12.10.
13. (5) The bus will leave 20 minutes after the clerk gives the information to the passanger and at 9.35 a.m. He gave the information 20 minutes before 9.35 a.m. i.e. at 9.15 a.m.
14. (2) Number of days = (6 + 29 + 31 + 30 + 15) = 111. Since 1988 is a leap years, the number of days in February = 29.
15. (2) According to Raji, Latha's birthday is on one of the days among 20th and 21st November. According to Deepti, Latha's birthday is on one of the days among 21st, 22nd and 23rd November. The day common to both the groups is 21st November.
$\therefore$ Latha's birthday is on 21st November.

Number Locating Test

Here, a group of digits are given the candidates are asked to arrange the order of numbers according to descending/ ascending order and find out how many numbers are there in the arrangement that satisfy the condition specified in the question.

Solved Example

1. If the digits of the number 597841 are arranged in descending order, how many digits will be as far away from the beginning of the number as they are in the number ?

(1) None (2) One (3) Two
(4) Three (5) More than three

Ans : (4)

5 9 7 8 4 1
9 8 7 5 4 1

Number Sequance Test

In some cases, more than one group of numbers are given which is followed by 4 or 5 questions.

Solved Example

I These questions are based on the following 5 numbers.

479 637 854 285 769

1. If in each number the first and the third digits are interchanged, then which number will be the largest ?

(1) 479 (2) 637 (3) 854
(4) 285 (5) 769

2. If all the numbers are arranged in ascending order what will be the difference between the first digit of first number and third digit of third number ?

(1) 4 (2) 8 (3) 5
(4) 2 (5) None of these

3. If in each number the first and second digits are interchanged then which number will be the largest?

(1) 479 (2) 637 (3) 854
(4) 285 (5) 769

4. If 1 is added to the middle digit of each number and then the numbers are arranged in descending order, what will be the sum of the digits of fourth newly formed number ?

(1) 22 (2) 21 (3) 23
(4) 20 (5) None of these

5. If in each number first digit is replaced by the third digit, the third digit is replaced by the second digit and second digit is replaced by the first digit then which number will be the smallest ?

(1) 285 (2) 479 (3) 769
(4) 637 (5) 854

ANSWERS

1. **Ans : (1)**

$479 \Rightarrow 974$; $637 \Rightarrow 736$
$854 \Rightarrow 458$; $285 \Rightarrow 582$
$769 \Rightarrow 967$
Largest number = $974 \Rightarrow 479$

2. **Ans : (3)**

$\underline{285} < 479 < \underline{637} < 769 < 854$
$7 - 2 = 5$

3. **Ans : (4)**

$479 \Rightarrow 749$; $637 \Rightarrow 367$
$854 \Rightarrow 584$; $\underline{285} \Rightarrow 825$
$769 \Rightarrow 679$
Largest number = $825 \Rightarrow 285$

4. **Ans : (2)**

$479 \Rightarrow 489$; $637 \Rightarrow 647$
$854 \Rightarrow 864$; $285 \Rightarrow 295$
$769 \Rightarrow 779$
$864 > 779 > 647 > \underline{489} > 295$
$4 + 8 + 9 \Rightarrow \underline{21}$

5. **Ans : (5)**

$479 \Rightarrow 947$; $637 \Rightarrow 763$
$854 \Rightarrow 485$; $285 \Rightarrow 528$
$769 \Rightarrow 976$
Smallest number = $485 \Rightarrow 854$

Exercise

1. How many such digits are there in the number 5 2 3 6 1 9 8 4 each of which is as far away from the beginning of the numbers as when the digits are rearranged ascending order within the number ?
(1) None (2) One (3) Two
(4) Three (5) More than three

2. The positions of how many digits in the number will remain same after the digits within the number 8 2 6 1 4 7 9 are rearranged in ascending order?
(1) None (2) One (3) Two
(4) Three (5) More than three

3. How many such digits are there in the number 7 6 4 5 2 8 each of which is as far away from the beginning of the number as when the digits are arranged in descending order within the number?
(1) None (2) One (3) Two
(4) Three (5) More than three

4. How many such pair of digits are there in the number 4 2 1 5 7 9 3 6 8 each of which has as many digits between them in the number as when they are arranged in ascending order ?
(1) None (2) One (3) Two
(4) Three (5) More than three

5. In the case of how many digits in the number 2 13 8 5 7 4, their positions in the number and the positions when the digits of the number are arranged in the ascending order are identical ?
(1) Nil (2) Four (3) Three
(4) Two (5) None of these

ANSWERS

1. **Ans : (4)**

$5\ \boxed{2}\boxed{3}\ 6\ 1\ 9\ \boxed{8}\ 4$
$1\ \boxed{2}\boxed{3}\ 4\ 5\ 6\ \boxed{8}\ 9$

2. **Ans : (3)**

$8\ \boxed{2}\ 6\ 1\ 4\ 7\ \boxed{9}$
$1\ \boxed{2}\ 4\ 6\ 7\ 8\ \boxed{9}$

3. **Ans : (2)**

$7\ 6\ 4\ \boxed{5}\ 2\ 8$
$8\ 7\ 6\ \boxed{5}\ 4\ 2$

4. **Ans : (4)**

4 2 1 5 7 9 3 6 8

5. **Ans. (3)**

$2\ 1\ \boxed{3}\ 8\ \boxed{5}\ \boxed{7}\ 4$
$1\ 2\ \boxed{3}\ 4\ \boxed{5}\ \boxed{7}\ 8$

PRACTICE TEST

I. Direction (1-4) : Following questions are based on the five three digit numbers given below :

472 487 348 728 845

1. If the positions of the first and the third digits in each number are interchanged, which of the following will be middle digit of the highest number?
(1) 4 (2) 8 (3) 7
(4) 2 (5) 3

2. Which of the following will be the sum total of the three digits of the third lowest number among them ?
(1) 13 (2) 19 (3) 15
(4) 17 (5) 14

3. Which of the following will be the middle digit of the highest number ?
(1) 7 (2) 3 (3) 2
(4) 8 (5) 4

4. If the positions of the first and the last digits within each number are interchanged, which of the following will be second digit of the second largest number ?
(1) 8 (2) 4 (3) 3
(4) 5 (5) 2

II. Directions (5-9) : Study the sets of numbers given below and answer the qustions ; which follow :

972 682 189 298 751

5. If one is added to the lowest number and two is added to the highest number, what will be the difference between the second digit of the

smallest number and third digit of the highest number ?

(1) 5 (2) 7 (3) 9

(4) 8 (5) None of these

6. If in each number, first and the last digits are interchanged, which of the following will be the third highest number ?

(1) 972 (2) 682 (3) 189

(4) 298 (5) 751

7. If in each number, all the three digits are arranged in descending order, which of the following will be the third highest number ?

(1) 972 (2) 682 (3) 189

(4) 298 (5) 751

8. If in each number, second and the third digits are interchanged, what will be the sum of first digit of the smallest number and last digit of highest number ?

(1) 7 (2) 6 (3) 9

(4) 8 (5) None of these

9. If one is added to the smaller odd number and one is subtracted from the higher odd number, which of the following will be obtained if the second digit of the higher number is subtracted from the second digit of the lower number so formed?

(1) 6 (2) 5 (3) 4

(4) 3 (5) 2

III. **Direction (10 -14) :** Study the sets of numbers given below and answer the questions, which follow.
489 541 654 953 783

10. If in each number, all the three digits are arranged in ascending order, which of the following will be the lowest number ?

(1) 489 (2) 541 (3) 654

(4) 953 (5) 783

11. If five is subtracted from each of the numbers, which of the following numbers will be difference between the second digit of second highest number and the second digit of the highest number?

(1) Zero (2) 3 (3) 1

(4) 4 (5) 2

12. If in each number the first and second digits are interchanged, which will be the third highest number ?

(1) 489 (2) 541 (3) 654

(4) 953 (5) 783

13. Which of the following number will be obtained if the first digit of lowest number is subtracted from the second digit of highest number after adding one to each of the numbers ?

(1) 1 (2) 2 (3) 3

(4) 4 (5) 5

14. If in each number, the first and the last digits are interchanged, which of the following will be the second highest number ?

(1) 489 (2) 541 (3) 654

(4) 953 (5) 783

IV. **Direction (15-19) :** These questions are based on following set of numbers
319 869 742 593 268

15. If in each number the first and third digits are interchanged then which number will be the highest ?

(1) 319 (2) 869 (3) 742

(4) 593 (5) 268

16. If one is subtracted from the first and third digits of each of the numbers, what will be the difference between the first digit of the highest number and the first digit of the lowest number ?

(1) 2 (2) 3 (3) 4

(4) 5 (5) None of these

17. If in each number all the digits are arranged in ascending order, which number will be second lowest ?

(1) 319 (2) 869 (3) 742

(4) 593 (5) 268

18. If in each number first digit is replaced by the third digit, second digit is replaced by the first digit and third digit is replaced by the second digit, then which number will be the second highest ?

(1) 319 (2) 869 (3) 742

(4) 593 (5) 268

19. If all the numbers are arranged in descending order, what will be the difference between the second

digit of third number and third digit of second number ?

(1) 5 (2) 9 (3) 6
(4) 7 (5) None of these

V. Directions (20-25) : These questions are based on the following six numbers.

382 473 568 728 847 629

20. If the second and the third digits of each number are interchanged, which number will be third lowest ?
(1) 629 (2) 382 (3) 473
(4) 568 (5) None of these

21. If the first and the third digits of each number are interchanged, which number will be the third highest ?
(1) 473 (2) 728 (3) 847
(4) 629 (5) None of these

22. If the first and second digits of each number are interchanged, which number will be second highest ?
(1) 568 (2) 473 (3) 847
(4) 382 (5) None of these

23. If 382 is written as 238, 473 as 347 and so on, then which of the following number will have least difference between them ?
(1) 473 & 382 (2) 629 & 728
(3) 629 & 568 (4) 728 & 847
(5) 629 & 847

24. If the first and the third digits of each number are interchanged and one is added to the second digit of each number then which of the following pairs of numbers will have highest total of their numerical value ?
(1) 847 & 629 (2) 568 & 728
(3) 728 & 847 (3) 568 & 847
(5) 629 & 473

25. If the first digit of each number replaces the third digit of that number, third digit replaces the second digit and the second digit replaces the first digit, and then the numbers thus formed are arranged in the descending order, then which number will be the third ?
(1) 568 (2) 382 (3) 473
(4) 847 (5) None of these

ANSWERS

1. **Ans : (1)**
$472 \Rightarrow 274$ $487 \Rightarrow 784$
$348 \Rightarrow \underline{843}$ $728 \Rightarrow 827$
$845 \Rightarrow 548$

2. **Ans : (2)**
Third lowest number $\Rightarrow 487$
$4 + 8 + 7 = 19$

3. **Ans : (5)**
Highest number $\Rightarrow$ 845

4. **Ans : (5)**
$472 \Rightarrow 274$ $487 \Rightarrow 784$
$348 \Rightarrow 843$ $728 \Rightarrow 827$
$845 \Rightarrow 548$
Second largest number $\Rightarrow 8\boxed{2}7$

5. **Ans : (1)**
$189 + 1 = 190$
$972 + 2 = 974$
$9 - 4 = 5$

6. **Ans : (2)**
$972 \Rightarrow 279$; $682 \Rightarrow 286$
$189 \Rightarrow 981$; $298 \Rightarrow 892$
$751 \Rightarrow 157$
Third highest number = $286 \Rightarrow 682$

7. **Ans : (1)**
$972 \Rightarrow 972$; $682 \Rightarrow 862$
$189 \Rightarrow 981$; $298 \Rightarrow 982$
$751 \Rightarrow 751$

8. **Ans : (4)**
$972 \Rightarrow 927$; $682 \Rightarrow 628$
$189 \Rightarrow 198$; $298 \Rightarrow 289$
$751 \Rightarrow 715$

9. **Ans : (3)**
$189 + 1 = 190$
$751 - 1 = 750$
$9 - 5 = 4$

10. **Ans : (2)**
$489 \Rightarrow 489$; $541 \Rightarrow 145$;
$654 \Rightarrow 456$; $953 \Rightarrow 359$; $783 \Rightarrow 378$
Lowest number $\Rightarrow 145 \Rightarrow 541$

11. **Ans : (2)**

$489 - 5 \Rightarrow 484$; $541 - 5 \Rightarrow 536$

$654 - 5 \Rightarrow 649$; $953 - 5 \Rightarrow 948$

$783 - 5 \Rightarrow 778$

Second highest number = 778

Highest number = 948

$7 - 4 = 3$

12. **Ans : (4)**

$489 \Rightarrow 849$; $541 \Rightarrow 451$; $654 \Rightarrow 564$;

$953 \Rightarrow 593$; $783 \Rightarrow 873$

Third highest number = $593 \Rightarrow 953$

13. **Ans : (1)**

$489 + 1 \Rightarrow 490$; $541+1 = 542$

$654 +1 \Rightarrow 655$; $953 + 1 = 954$;

$783 + 1 \Rightarrow 784$

$5 - 4 = 1$

14. **Ans : (3)**

$489 \Rightarrow 984$; $541 \Rightarrow 145$

$654 \Rightarrow 456$; $953 \Rightarrow 359$

$783 \Rightarrow 387$

Second highest number = $456 \Rightarrow 654$

15. **Ans : (2)**

$319 \Rightarrow 913$; $869 \Rightarrow 968$;

$742 \Rightarrow 247$; $593 \Rightarrow 395$;

$268 \Rightarrow 862$

16. **Ans : (5)**

$319 \Rightarrow 218$; $869 \Rightarrow 768$; $742 \Rightarrow 641$;

$593 \Rightarrow 492$; $268 \Rightarrow 167$

$7 - 1 = 6$

Highest Number $\Rightarrow \boxed{7}\,6\,8$

Lowest Number $\Rightarrow \boxed{1}\,6\,7$

17. **Ans : (3)**

$319 \Rightarrow 139$; $869 \Rightarrow 689$; $742 \Rightarrow 247$;

$593 \Rightarrow 359$; $268 \Rightarrow 268$

Second lowest number $\Rightarrow 247 \Rightarrow 742$

18. **Ans : (1)**

$319 \Rightarrow 931$; $869 \Rightarrow 986$; $742 \Rightarrow 274$

$593 \Rightarrow 359$; $268 \Rightarrow 826$

Second highest number $\Rightarrow 931 \Rightarrow 319$

19. **Ans : (4)**

$869 > 742 > 593 > 319 > 268$

$9 - 2 = 7$

20. **Ans : (4)**

$382 \Rightarrow 328$; $473 \Rightarrow 437$; $568 \Rightarrow 586$;

$728 \Rightarrow 782$; $847 \Rightarrow 874$; $629 \Rightarrow 692$;

Third lowest number $\Rightarrow 586 \Rightarrow 568$

21. **Ans : (2)**

$382 \Rightarrow 283$; $473 \Rightarrow 374$; $568 \Rightarrow 865$;

$728 \Rightarrow 827$; $847 \Rightarrow 748$; $629 \Rightarrow 926$

Third highest number $\Rightarrow 827 \Rightarrow 728$

22. **Ans : (2)**

$382 \Rightarrow 832$; $473 \Rightarrow 743$; $568 \Rightarrow 658$;

$728 \Rightarrow 278$; $847 \Rightarrow 487$; $629 \Rightarrow 269$

Second highest number $\Rightarrow 743 \Rightarrow 473$

23. **Ans : (4)**

$382 \Rightarrow 238$; $473 \Rightarrow 347$; $568 \Rightarrow 856$;

$728 \Rightarrow 872$; $847 \Rightarrow 784$; $629 \Rightarrow 962$

(1) $473 \,\&\, 382 \Rightarrow 347 - 238 = 109$

(2) $629 \,\&\, 728 \Rightarrow 962 - 872 = 90$

(3) $629 \,\&\, 568 \Rightarrow 962 - 856 = 106$

(4) $\boxed{728 \,\&\, 847} \Rightarrow \boxed{872 - 784 = 88}$

(5) $629 \,\&\, 847 \Rightarrow 962 - 784 = 178$

24. **Ans : (2)**

(1) $847 \,\&\, 629 \Rightarrow 758 + 936 = 1694$

(2) $\boxed{568 \,\&\, 728} \Rightarrow \boxed{875 + 837 = 1712}$

(3) $728 \,\&\, 847 \Rightarrow 837 + 758 = 1595$

(4) $568 \,\&\, 847 \Rightarrow 875 + 758 = 1633$

(5) $629 \,\&\, 473 \Rightarrow 936 + 384 = 1320$

25. **Ans : (1)**

$382 \Rightarrow 823$; $473 \Rightarrow 734$; $568 \Rightarrow 685$

$728 \Rightarrow 287$; $847 \Rightarrow 478$; $629 \Rightarrow 296$

$823 > 734 > \boxed{685} > 478 > 296 > 287$

Blood Relationship

In this test, the success of a candidate depends upon the knowledge of the blood relations, some of which are summarised below to help you solve these tests

Mother's or father's son	- Brother
Mother's or father's daughter	- Sister
Mother's or father's brother	- Uncle
Mother's or father's sister	- Aunt
Mother's or father's mother	- Grandmother
Mother's or father's father	- Grandfather
Son's wife	- Daughter-in-law
Daughter's husband	- Son-in-law
Husband's or wife's brother	- Brother-in-law
Sister's or brother's son	- Nephew
Brother's or Sister'sdaughter	- Niece
Uncle's or aunt's son or daughter	- Cousin
Sister's husband	- Brother-in-law
Brother's wife	- Sister-in-law

Eg. Pointing to a man in a photograph, a woman said "His brother's father is the only son of my grandfather". How is the woman related to the man in the photograph?

(1) Mother (2) Aunt (3) Sister
(4) Daughter (5) Grandmother

The relation may be seen as follows.

The only son of the woman's grandfather-woman's father. Man's brother's father-Man's father. So the woman is the Man's sister.

Speed Developing Practice Test No. 13

1. Introducing a girl, Santhosh said, "Her mother is the only daughter of my mother-in-law". How is Santhosh related to the girl?
   (1) Uncle (2) Husband (3) Brother
   (4) Father (5) None of these
2. Pointing to a lady a man said, "the son of her only brother is the brother of my wife". How is the lady related to the man?
   (1) Mother's sister (2) Grandmother
   (3) Mother-in-law
   (4) Sister of the Man's father-in-law
   (5) None of these
3. Pointing to an old man, Kailas said, "his son is my son's uncle". How is the old man related to Kailas?
   (1) Brother (2) Uncle (3) Father
   (4) Grandfather (5) None of these
4. When Manoj saw Ashok, he recalled, he is the son of the father of the mother of his daughter. What is Ashok to Manoj?
   (1) Brother-in-law (2) Brother (3) Cousin
   (4) Uncle (5) Nephew
5. Pointing to a lady on the platform Geetha said, "she is the sister of the father of my mother's son". What is the lady to Geetha?
   (1) Mother (2) Sister (3) Aunt
   (4) Niece (5) None of these
6. Pointing to a lady a girl said, "she is the only daughter- in-law of the grandmother of my father's son". How is the lady related to the girl?
   (1) Sister-in-law (2) Mother (3) Niece
   (4) Mother-in-law (5) Cousin
7. Showing a lady in the park, Balu said, "she is the daughter of my grandmother's only son". How is Balu related to that lady?
   (1) Brother (2) Cousin (3) Father
   (4) Uncle (5) None of these
8. Lakshmi and Girija are Gopal's wives. Shalini is Girija's step-daughter. How is Lakshmi related to Shalini?
   (1) Sister (2) Mother-in-law(3) Mother
   (4) Step-mother (5) None of these
9. Showing the man receiving the prize Seema said, "he is the brother of my uncle's daughter". What is the man to Seema?
   (1) Son (2) Brother-in-law
   (3) Nephew (4) Uncle (5) Cousin
10. Introducing a man a woman said, "he is the only son of my mother's mother". How is the woman related to the man?
    (1) Mother (2) Aunt (3) Sister
    (4) Niece (5) None of these

Directions (Qs. 11-13): Read the following information and answer the questions given below:

A + B means A is the daughter of B
A × B means A is the son of B
A - B means A is the wife of B

11. If P × Q - S, which of the following is true?
    (1) S is the wife of Q (2) S is father of P
    (3) P is daughter of Q (4) Q is father of P
    (5) None of these
12. If T - S × B -M, which of the following is not true?
    (1) B is mother of S (2) M is husband of B
    (3) S is daughter of B (4) T is wife of S
    (5) None of these
13. If Z × T - S × U + P, what is U to Z?
    (1) Mother (2) Grandmother
    (3) Father (4) Can't be determined
    (5) None of these
14. If A★B means A is the sister of B, A ∇ B means A is the father of B, A ∈ B means A is the brother of B, which of the following means X is the aunt of Y?
    (1) X★D ∇ Y (2) A ∇ D ∈ Y (3)X ∇ D★Y
    (4) X ∈ D ∇ Y (5) None of these
15. If A + B means A is the sister of B, A - B means A is the brother of B, A × B means A is the daughter of B, which of the following shows the relation that E is the maternal uncle of D?
    (1) D + F × C (2) D - F × E (3)D×F+E+C
    (4) D × F × E (5) None of these

Directions (Qs. 16-20): Read the following information and answer the questions that follows:

A family consists of six members P, Q, R, S, T and U. There are two married couples. Q is a doctor and the father of T. U is the grandfather of R and is a contractor S is grandmother of T and is a housewife. There is one doctor, one contractor, one nurse, one housewife and two students in the family.

16. Who is the husband of P?
    (1) R (2) U (3) Q
    (4) S (5) T
17. Who is the sister of T?
    (1) R (2) U (3) T
    (4) Data inadequate(5) None of these
18. What is the profession of P?
    (1) Doctor (2) Nurse
    (3) Doctor-or nurse (4) House wife
    (5) None of these
19. Which of the following are two married couples?
    (1) US, QT (2) US, QP (3) TS,RU
    (4) US, RP (5) None of these
20. Which of the following is definitely a group of male members?
    (1) QU (2) QUT (3) QUP
    (4) UT (5) None of these

Answers: Speed Developing Practice Test No. 13

1. (4)	2. (4)	3. (3)	4. (1)	5. (3)	6. (2)	7. (1)	8. (3)	9. (5)	10. (4)
11. (2)	12. (3)	13. (2)	14. (1)	15. (3)	16. (3)	17. (4)	18. (2)	19. (2)	20. (1)

Explanatory Answers:
Speed Developing Practice Test No. 13

1. (4) Only daughter of mother-in-law → wife i.e. girl's mother is Santhosh's wife. Santhosh is the father of the girl.
2. (4) Brother of wife → brother-in-law. Son of lady's brother is his brother-in-law. So the lady's brother is man's father-in-law i.e. the lady is the sister of man's father-in-law.
3. (3) Old man's son is Kailas brother. So old man is Kailas father.
4. (1) Mother of my daughter → my wife. Son of father of wife → brother of wife i.e. brother-in-law. i.e. Ashok is the brother-in-law of Manoj.
5. (3) Mother's son → brother
   My brother's father → my father
   My father's sister → my aunt
   So the lady is Geetha's aunt.
6. (2) My father's son → my brother
   Grandmother of my brother → my grandmother
   Only daughter-in-law of my grandmother means my mother. So the lady is the girl's mother.
7. (1) Grandfather's only son → father
   Daughter of father → sister
   So Balu is lady's brother
8. (3) Girija's step-daughter means Lakshmi's daughter. So Lakshmi is the mother of Shalini.
9. (5) Brother of uncle's daughter → uncle's son → cousin i.e. Man is Seema's cousin.
10. (4) My mother's mother → my grandmother; my grandmother's only son → my maternal uncle. So the woman is the Man's niece.