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Quantitative Reasoning

Quantitative reasoning, as the name itself suggests, is reasoning involving numbers and numerical logic. Quantitative reasoning questions are common in all kinds of aptitude exams and require the student to work out numerical relationships as defined by the parameters in the problem.

The key skills involved in solving quantitative reasoning questions are the following:

(i)   The ability to understand the specific quantitative logic being utilised inside the questions

(ii) The ability to order the clues in the correct order of usage (as explained in the theory of logical reasoning)

(iii) The ability to understand basic mathematical concepts like percentages, averages, ratios. multiplications, etc.

(iv) The ability to create symbolic representations of the various clues provided so that you can bring together each of the relevant clues while creating the teams

(v)   The ability to wait for and reach the appropriate time in the problem solving situation from where the indirect clues provided in the question can be used.

Illustrated below are the solutions to a few typical questions on quantitative reasoning. We would urge you to first have a look at the questions and try to solve the same on your own before looking at the solutions.

Example 1 The classic quantitative reasoning question:

A man would like to take a new health insurance. An officer taking care of these matters says to the man, "Please tell me how many children you have." The man answers, "I have three of them." The officer, "What are the ages of your children?" The man answers, "The product of the ages is equal to 36." The officer replies, "This is not enough information Sir!"; the man replied, "Sorry that I was a little bit unclear, but the sum of the ages is equal to the number of shops in front of your office." The officer: "This still isn't enough information Sir!"; The man replies, "My oldest child loves chocolate." The officer: "Thanks for your cooperation, I now know the ages." Are you as smart as the officer? Then give the sum of the ages of the children.

1. 13   2. 22

3. 36*   4. 38

Solution:

The product of the ages is 36*. Using this one can make the following combination of ages:

1, 36, 1 sum = 38

1, 18, 2 sum = 22

1, 12, 3 sum = 16

1, 9, 4 sum = 14

1, 6, 6 sum = 13

2, 9, 2 sum = 13

2, 6, 3 sum = 11

3, 3, 4 sum = 10

After the man had said that the product of the ages is equal to 36, the officer didn't have enough information. Then he was told that the sum is equal to number of shops in front of the office. He replied by saying that this still isn't enough information. So the sum of the ages should be 13, because otherwise he would have known the ages immediately. The last statement is that that the oldest child loves chocolate. So there is an oldest child. Hence the officer concludes that the ages of the children are 2, 2 and 9 years.

Hence option (3) is the correct answer.

Example 2 Early one Monday morning, four snails—Aman, Bubbly, Charu and Devi, set off together down the garden path. Aman and Bubbly kept the same steady pace, slithering only 8 meters by the time Charu and Devi had already reached the azalea.

Charu was winded and had to stop for an hour to rest. Although Devi was tired, too, she pressed on, but reduced her pace to be the same as Aman's and Bubbly's.

Charu started off again just as Aman and Bubbly got even with her. She raced off at her original pace. Aman promptly sped up to the same speed as Charu and kept even with her. Bubbly just kept going at her original pace.

When Aman reached the end of the path, she was 1 meter ahead of Bubbly, but she was a half hour later than Devi was.

How many meters long was the path?

1. 10   2. 15

3. 8   4. None of these

Solution:

A few things are evident from the current situation:

Deduction i) Since Charu rests for 1 hour before Aman and Bubbly reach the azalea, it is clear that Devi would be exactly 1 hour ahead of Bubbly when she reaches the end point.

Deduction ii) Since Devi has already reached half an hour ago when Aman and Charu reach, Bubbly must be only half an hour from her destination. Since, Bubbly is 1 meter away from the destination, she would cover this 1 meter in 30 minutes. Thus, Bubbly's speed must be 2 m/hr. This would be the

slower of the two speeds.

This would also be the speed of Bubbly and Aman for the first 8 meters.

Deduction iii) Since, Bubbly and Aman take 4 hours to reach 8 meters, in 1 hour more (when Charu rests) they will cover 2 meters more. Thus, the azalea is at a distance of 10 meters from the starting point.

Deduction iv) The 10 meter distance to the azalea is covered in 4 hours by Charu and Devi. Thus, the faster speed would be 2.5 m/hr.

Deduction v) After the azalea, when Aman and Charu start moving at 2.5 m/hr, Bubbly would be moving at 2 m/hr. When Aman and Charu reach the end, Bubbly is 1 meter behind. This gap can only be created in a 2 hour journey.

Thus, the distance from the azalea to the end point is 5 meter. Total distance is $10 + 5 = 15$ meters.

Example 3 Dhiman was admiring the output of her new program to generate random number. She had printed out the first ten numbers of the results. She soon noticed something interesting. Each of the 10 numbers had exactly one digit, in the proper placement, of the 5 digit code she used to open her car door without a key.

In the first number 14073, for example, Dhiman's car code could not be 34170 (two digits correctly placed) or 92365 (none).

Find Dhiman's car entry code from these first 10 randomly generated numbers: 14073, 79588, 05892, 84771, 63136, 42936, 37145, 50811, 98174 and 29402?

1. 05892   2. 63136

3. 42936   4. None of these

Solution:

In the given grid of 10 five digit numbers, since every number has exactly 1 digit matched correctly with the correct code, there must be exactly 10 instances of correct code matches amongst the 50 possible instances (10x5).

If we were to look at the first digit it is clear that the first digit has 10 different values in the ten number. Thus, only 1 number can be correctly matched for the first digit's value.

The other 4 places in the 5 digit number must match 9 more times for the above grid to be correct. This can be principally done in 2 ways:

First way: 3+3+2+1 OR Second way: 2+2+2+3

If we were to observe the numbers the following deductions would come up:

First place	Second place	Third place	Fourth place	Fifth place
Each digit (from 0 to 9) happens only once	4 & 9 occur twice	1 occurs thrice & 8 occurs twice	7 occurs thrice & 3 occurs twice	1,2 & 6 occur twice each
	5,3,2,7,0 & 8 occur once each	0,5,7,9,8 occur once	8,9,4,1 & 0 occur once each	5,4,3 & 8 occur once each

Looking at the number 98174, it is clear that both 1 & 7 cannot occur in the third and fourth place

digits as then the number 98174 would have 2 numbers matched with the code.

Thus, the structure 1+2+3+3+1 or indeed 1+1+3+3+2 is ruled out (i.e., the use of two triplicate matches is ruled out).

Thus, the 10 matches between the code and the 10 random numbers must be in one of the following structures:

	First place	Second place	Third place	Fourth place	Fifth place
Number of digits matched with the code	1	2	3	2	2
Number of digits matched with the code	1	2	2	3	2

Thus, the number would be either xx13x or xx87x. The first possibility is rejected because 63136 contains both 1 & 3 in the third and fourth places of the number. Thus, the number must be of the form xx87x. From this point thinking about the second place digit gives us that the second place has to be occupied by 9 (as only 4 & 9 give us 2 matches with the code & amongst this 4 cannot be taken for the second place because if the number is x487x then the number 84771 contradicts the basic condition of the problem.)

Thus, the number must be x987x.

Thinking of the last digit— this digit must be either 1, 2 or 6. It cannot be 1 because of the presence of 84771 in the ten number. It cannot be 2 because the number 29402 would have 2 digits in the correct place. Hence, it must be 6. Thus, the number becomes x9876.

Thinking of the first digit, it has to be 3, because it is only the number 37145 which lacks a single digit matching with the 2nd to 5th digit of the code x9876. Thus, the code is 39876.

Example 4 Abe, Buddy, Carmen, Dennis and Earl all live on Pine Street which has house numbers from 10 to 111, both inclusive. Two of them live in the same house. The others all live in different houses. They all have made remarks about where they live, but not all the remarks are true.

Abe said, "My house number is a factor of Buddy's house number. Earl's house number is 10 greater than Dennis."

Buddy said, "My house number is greater than 70. Abe's house number is greater than 30."

Carmen said, "My house number is both a cube and a square. Dennis's house number is greater than 50."

Dennis said, "My house number is a square. Buddy's house number is a cube."

Earl said, "My house number is twice Buddy's."

But who's telling the truth? It turns out that all statements made by people living in houses with numbers greater than 50 were false. All the other statements were true.

Can you tell the house number of Earl?

1. 49   2. 16

3. 59   4. None of these

Solution:

In order to solve this question you need to look at the options for Earl's house number. Option 1

cannot be true since if Earl's house number is 49, he must be speaking the truth – but his statement cannot be true. If we take Earl's house number as 16 (Option 2), then Buddy must be 8 which is against the problem's basic condition that all house numbers are between 10 to 111.

If we go with Option 3—59, then if Abe is true then Dennis must be 49. Hence, Dennis's statements must be true. So Buddy's house number would be a cube. There are only 2 perfect cubes between 10 and 111— viz 27 and 64. If Buddy's house number is 27, then he must be speaking the truth—which is not true if we look at the statement of the problem. Thus, Buddy must be 64 and Abe's house number must be less than 30 – only factor of 64 less than 30 and greater than 10 is 16.

At this time we have the grid as:

Abe	16
Buddy	64
Earl	59
Dennis	49

We just need to place Carmen in this grid. Looking at Carmen's statement and looking at the numbers available below 50, the two numbers (16 and 49) do not satisfy the condition that the room number is both a square and a cube. Hence, Carmen must be lying and the possible values of Carmen is 59 and 64. If we were to place Carmen at 64, then Carmen's first statement becomes true— an internal contradiction. Thus, Carmen must be at 59. The final arrangements of house numbers are:

Abe	16
Buddy	64
Carmen and Earl	59
Dennis	49

Example 5 During a game of five card draw poker, played with a standard deck, you are dealt a hand with the following characteristics:

- It contains no aces or face cards.
- No two cards have the same value.
- All four suits are present.
- The total value of the odd cards equals the total value of the even cards.
- There are no three card straights.
- The total value of the black cards is 10.
- The total value of the hearts is 14.
- The card with the lowest value is a spade.

Exactly what are the five cards in your hand?

1. 2 of spades, 5 and 9 of diamonds, 4 of spades and 8 of clubs
2. 2 of diamonds, 5 and 9 of spades, 4 of hearts and 8 of clubs
3. 2 of clubs, 5 and 9 of hearts, 4 of diamonds and 8 of spades

4.   2 of spades, 5 and 9 of hearts, 4 of diamonds, 8 of clubs

Solution:

Deduction i) Since there are no aces or face cards, we only have 2, 3, 4, 5, 6, 7, 8, 9 or 10 as the value of the cards.

Deduction ii) Since total of odd = total of evens and the minimum even total is 12 (2 + 4 + 6), there must be 2 odds and 3 evens. Only then can the two odds add up to an even total and be equal to the total of 3 even cards.

Deduction iii) There are 2 cards of 1 suit and 1 card each of the other 3 suits. The two cards belonging to 1 suit must be hearts because there is no other way for the hearts to total up to 14.

Deduction iv) There are 3 cases:

a)   If the sum of the evens is 12, the odds would be 5 and 7 and the evens would be 2, 4, 6. This cannot happen because in such a case 2 cards would not add up to 14— which is the requirement for the 2 hearts.

b)   If the sum of the evens is 14, the odds would be 5 and 9 and the evens would be 2,4,8. This can happen if we put the hearts as 5 and 9 and 2 goes to spades, and since the total of the blacks is 10, clubs must be the 8 of clubs and 4 would be the 4 of diamonds.

c)   If the sum of the evens is 16, the evens should be 2, 4 and 10; the odds must be 7 and 9. But this is not possible because if we take the two hearts to total 14, it is not possible.

Thus, the solution is: 2 of spades, 5 and 9 of hearts, 4 of diamonds, 8 of clubs

Option 4 is correct.

EXERCISE ON QUANTITATIVE REASONING

Directions for Questions 1 to 5: A quiz competition was organised in a school and the performance of students was recorded on piece of paper with ink. But somehow some water fell on the paper and the information remained incomplete.

However the scorer has same clues which are:

	Average	Good	Excellent	Total
Male			12	
Female				36
Total		33		

(i)   Half the students were either excellent or good.

(ii)   40% of the students were females.

(iii) One-third of the males students were average.

1.   How many students are both female and excellent?

   (a) 0   (b) 8

   (c) 16   (d) None of these

2.   What proportion of good students are male?

(a) 0.73   (b) 0

(c) 0.4   (d) None of these

3. What proportion of female students are good?

(a) 0.25   (b) 0

(c) 0.5   (d) None of these

4. How many students are both male and good?

(a) 16   (b) 24

(c) 27   (d) None of these

5. Among average students, what is the ratio of males to females?

(a) 1:3   (b) 2:3

(c) 3:2   (d) None of these

Directions for Questions 6 to 10: A, B, C and D are four friends living together in a flat and they have an agreement that whatever edible comes they will share equally among themselves. One day A's uncle came to him and gave him a box of laddoos. Since no one was around, A divided the laddoos in four equal parts and ate his share after which he put the rest in the box. As he was closing the box, B walked in, took the Box from A & divided the ladoos in 4 equal parts & A & B took one part each and ate it. Suddenly C appeared and snatched the box. He again divided the laddoos in four equal parts, the three of them ate one part each and kept the remaining laddoos in the box. Later when D came he again divided the laddoos in four equal parts and all four ate their respective share. In total D ate 3 laddoos.

6. How many laddoos, in total did C eat?

(a) 12   (b) 15

(c) 39   (d) None of these

7. How many laddoos, in total did B eat?

(a) 24   (b) 15

(c) 39   (d) None of these

8. How many laddoos, in total did A eat?

(a) 56   (b) 68

(c) 71   (d) None of these

9. How many laddoos were given to A by his Uncle?

(a) 128   (b) 125

(c) 113   (d) None of these

10. How many laddoos did A eat the first time?

(a) 32   (b) 24

(c) 15   (d) None of these

Directions for Questions 11 to 14: Rajeev planted some plants in his lawn but in certain fixed pattern:

i.   In most of the rows there are neither Roses nor Marigolds.
ii.   There are two more rows of Orchids than Tulips and two more rows of Roses than Orchids.
iii.   There are four more rows of Roses than Tulips.
iv.   There aren't as many rows of Lilly as Fireball.
v.   There is one less Marigold row than Rose.
vi.   There is just one row of Tulips.
vii.   The maximum number of rows he planted is six.

11.   How many rows of rose did he planted?

(a) Two   (b) Five

(c) Four   (d) Cannot be determined

12.   Which of the above information is redundant and can be dispensed with?

(a) (i)   (b) (iii)

(c) (i) and (iii) both   (d) All are necessary

13.   What is the sum of the rows of Orchids and Marigold he planted?

(a) Three   (b) Nine

(c) Seven   (d) Cannot be determined

14.   How many rows of fireball did he plant?

(a) Two   (b) Six

(c) Two or Six   (d) Data inadequate

Directions for Questions 15 to 20: In a class of 540 students, for every 9 girls these are 11 boys. The weight of students varies from 40 to 50 kg. There are as many 44 kg girls as there are 46 kg boys and as many 40 kg boys as 50 kg girls. The number of 50 kg boys is 35 more than that of 44 kg girls while there are as many 44 kg boys as 46 kg girls. The ratio of 40 kg boys and girls is 4:3 while that of 50 kg girls and boys is 1:3.

15.   How many boys weigh 40 kg?

(a) 22   (b) 24

(c) 28   (d) None of these

16.   How many girls weigh 44 kg?

(a) 37   (b) 36

(c) 39   (d) None of these

17.   How many girls weight 46 kg?

(a) 165   (b) 164

(c) 146   (d) None of these

18. The number of boys weighing 50 kg is:

    (a) 72   (b) 74

    (c) 76   (d) None of these

19. The number of girls weighing 40 kg is:

    (a) 16   (b) 18

    (c) 22   (d) None of these

20. The number of students weighing 50 kg is:

    (a) 96   (b) 42

    (c) 201   (d) None of these

Directions for Questions 21 to 26: A, B, C, D and E are five different integer. When written in the ascending order of values, the difference between any two adjacent integers is 4. D is the greatest and A the least. B is greater than E but less than C. The sum of the integers is equal to E.

21. The value of A is:

    (a) –7   (b) –9

    (c) –5   (d) None of these

22. The sum of A and B is:

    (a) –10   (b) –15

    (c) 10   (d) None of these

23. The greatest number has the value:

    (a) 9   (b) –5

    (c) 3   (d) 7

24. The sum of the integers is:

    (a) 25   (b) –6

    (c) –15   (d) None of these

25. The product of the integers is:

    (a) –945   (b) 945

    (c) 315   (d) None of these

26. What is the positive difference between the lowest and the highest integers?

    (a) 8   (b) 6

    (c) 16   (d) None of these

In November the answers of a prestigious test held nationwide were leaked to a group of unscrupulous people. The CBI has arrested the Don, the mastermind behind it and nine other people—P, Q, R, S, T, U, V, W and X in this matter. On interrogation, certain facts came into light:

Their *modus operandi* consisted of the Don initially obtaining the answer key, then the other nine persons created their answer keys in the following manner:

They obtained the answer key from one or two sources, then he/she compares the answer keys to a question from both sources. If the key to a question from both sources is identical, it is copied, otherwise it is left blank. If the person has only one source, he/she copies the source's answer into his/her copy. Finally, each person compulsorily replaces one of the answers (not a blank one) with a wrong answer in his/her answer key.

The paper contained 150 questions. So the CBI has ruled out the possibility of two or more of them introducing wrong answer to the same question. The CBI has a copy of correct answer key and tabulated the following data. The data represents question numbers.

Name	Wrong Answer(s)	Blank Answer (s)
P	46	----------
Q	96	46, 90, 25
R	27, 56	17, 46, 90
S	17	----------
T	46, 90	----------
U	14, 46	92, 90
V	25	----------
W	46, 92	----------
X	27	17, 46, 90

27. Who among the following must have two sources?

    (a) P   (b) Q

    (c) R   (d) S

28. How many people (excluding the Don) needed to make answer keys before R could make his answer key?

    (a) 3   (b) 4

    (c) 6   (d) None of these

29. Both T and W were sources to:

    (a) U   (b) X

    (c) Q   (d) None of these

30. Which of the following is definitely true?

    (a) R introduced the wrong answer to question 27.

    (b) T introduced the wrong answer to question 46.

(c) U introduced the wrong answer to question 14.

(d) W introduced the wrong answer to question 46.

31. Which of the group has the same sources?

i. P, S & V   ii. T and W

(a) Only (i)   (b) Only (ii)

(c) both (i) & (ii)   (d) None of these

Directions for Questions 32 to 35: Three classmates—X, Y and Z live on the AN Jha Marg, yet they do not know the house number of each other. The houses are numbered from 1 to 99. Since Z is a regular student and attends every class sincerely, his notes are very good and updated. X and Y are not so regular, therefore they desire to meet Z at his house individually.

One day X asks Z, "The number of your house in which you reside is a perfect square or not?" Z replies. Then X asks, "Is it greater than 50?" He again replies. X thinks that he has got the address and decides to visit Z. When X reaches at the address he realises that he is wrong. He then thinks over it again and is not surprised as Z answered only the second question honestly.

Y not aware of X's conversation, asks Z two questions of his own. Y asks "Is your house number a perfect cube?" Z replies. Then Y asks "Is it greater than 25?"

He answers again. Y thinks that he has got the address but upon reaching there he finds the address incorrect and realises that Z answered only the second question honestly.

If Z's house number is less than the house number of X and Y and the sum of all three of their house numbers is twice the perfect square of some number then answer the following question:

32. What is X's house number?

(a) 64   (b) 81

(c) 49   (d) Cannot be determined

33. What is Y's house number?

(a) 64   (b) 81

(c) 36   (d) Cannot be determined

34. What is Z's house number?

(a) 55   (b) 65

(c) 25   (d) 85

35. What is the sum of house numbers of all the three X, Y and Z?

(a) 100   (b) 200

(c) 128   (d) Cannot be determined

Directions for Questions 36 to 41: Study the following information and answer the following questions.

It is very easy to remember the ID number of my ATM card which is a nine digit number and every

digit is distinct. If I tell you some clues then you will also be able to remember my ATM card ID number. Let us say the number is PQRSTUVWX and the digit corresponding to it are 1 to 9 though no respectively. The ID is divisible by 9.

If you delete the digit at its units place, the remaining 8-digit number of my ID is divisible by 8. If you again delete the last digit of the 8-digit number the remaining 7-digit number is divisible by 7 and the process goes on.

36. What is the sum of the digits of the ID number of my ATM card?

    (a) 55   (b) 45

    (c) 90   (d) Cannot be determined

37. What is the digit sum of the ID number of my ATM?

    (a) 9   (b) 8

    (c) 3   (d) Cannot be determined

38. What is the number represented by the letter R?

    (a) 9   (b) 8

    (c) 1   (d) Cannot be determined

39. The number 2 represents which letter?

    (a) V   (b) W

    (c) X   (d) Cannot be determined

40. What are the first 5-digits of the ID number of my ATM card?

    (a) 38165   (b) 61853

    (c) 65472   (d) 56427

41. What are the last 5-digits of the ID number of my ATM card?

    (a) 54729   (b) 74592

    (c) 65312   (d) 47295

Directions for Questions 42 to 45: Some friends went to Netram Sweets. Following is the information about the number of rosogollas they ate:

i. Gimmy ate 8 less than Akshit.

ii. Dileep and Raj together ate 37.

iii. Jugal ate 8 more than Dileep.

iv. Akshit ate 5 more than Dileep.

v. Akshit and Gimmy together ate 40.

42. How many rosogollas did Raj eat?

    (a) 18   (b) 24

    (c) 16   (d) 27

43. Jugal and Dileep together ate how many rosogollas?

   (a) 46

   (b) 36

   (c) 40

   (d) None of these

44. What is the difference between number of rosogollas eaten by Dileep and Raj?

   (a) 1

   (b) 2

   (c) 3

   (d) Data inadequate

45. If the cost of each rosogolla is ` 2, what was the total amount they had to pay?

   (a) ` 208

   (b) ` 200

   (c) ` 198

   (d) None of these

Directions for Questions 46 to 49: Coach Johan sat with the score cards of Indian players from the 3 games in a one-day cricket tournament where the same set of players played for India and all the major batsmen go out. John summarised the batting performance through three figures, one for each game. In each figure, the three outer triangles communicate the number of runs scored by the three top scorers from India. K, R, S, V and Y represent Kaif, Rahul, Saurav, Virender and Yuvraj respectively. The middle triangle in each diagram denotes the percentage of total score that was scored by the top three Indian scorers in that game. No two players score the same number of runs in the same game. John also calculated two batting indices for each players based on his scores it he tournament; the R-index of a batsman is the difference between his highest and lowest scores in the 3 games while the M-index is the middle number, if his scores are arranged in a non-increasing order.
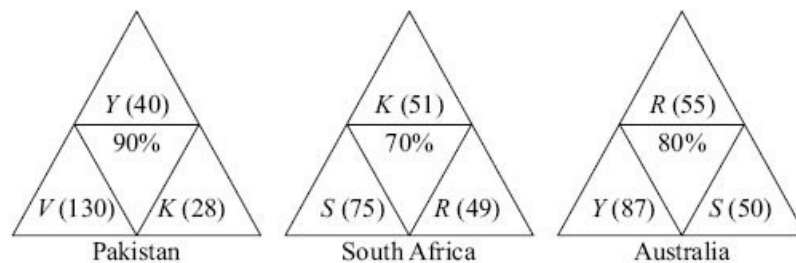
Batting performance of five Indian Batsmen in three Games of One-day International Cricke Tournament.

46. For how many Indian players is it possible to calculate the exact M-Index?

   (a) 0

   (b) 1

   (c) 2

   (d) More than 2

47. Among the players mentioned, who can have the lowest R-index from the tournament?

   (a) Only Kaif, Rahul or Yuvraj

   (b) Only Kaif or Rahul

   (c) Only Kaif or Yuvraj

   (d) Only Kaif

48. How many players among those listed definitely scored less than Yuvraj in the tournament?

(a) 0   (b) 1

(c) 2   (d) More then 2

49. Which of the players had the best M-index from the tournament?

(a) Rahul   (b) Saurav

(c) Virendra   (d) Yuvraj

Directions for Questions 50 to 52: Five women decided to go shopping to M.G. Road, Bangalore They arrived at the designated meeting place in the following order: 1. Archana, 2. Chellama, 3. Dhenuka, 4. Helen and 5. Sahnaz.

Each woman spent at least ` 1000. Below are some additional facts about how much they spent during their shopping spree.

i. The woman who spent ` 2234 arrive before the lady who spent ` 1193.

ii. One woman spent ` 1340 and she was not Dhenuka.

iii. One woman spent ` 1378 more than Chellamma.

iv. One woman spent ` 2517 and she was not Archana.

v. Helen spent more than Dhenuka.

vi. Shahnaz spent the largest amount and Chellamma the smallest.

50. The woman who spent ` 1193 is:

(a) Archana   (b) Chellamma

(c) Dhenuka   (d) Helen

51. What was the amount spent by Helen?

(a) ` 1193                 (b) ` 1340

(c) ` 2234                 (d) ` 2517

52. Which of the following amounts was spent by one of them?

(a) ` 1139                 (b) ` 1378

(c) ` 2571                 (d) ` 2718

53. Three travellers are sitting around a fire, and are about to eat a meal. One of them has five small loaves of bread, the second has three small loaves of bread. The third has no food, but has eight coins. He offers to pay for some bread. They agree to share the eight loaves equally among the three travellers, and the third traveller will pay eight coins for his share of the eight loaves. All loaves were of the same size. The second traveller (who had three loaves) suggests that he be paid three coins, and that the first traveller be paid five coins. The first traveller says that he should get more than five coins. How much the first traveler should get?

(a) 5   (b) 7

(c) 1   (d) None of these

54. My bag can carry no more than ten books. I must carry at least one book each of management, mathematics, physics and fiction. Also, for every management book I carry I must carry two or

more fiction books, and for every mathematics book I carry I must carry two or more physics books. I earn 4, 3, 2, and 1 points for each management, mathematics, physics and fiction book, respectively, I carry in my bag. I want to maximise the points I can earn by carrying the most appropriate combination of books in my bag.

The maximum points that I can earn are:

(a) 20

(b) 21

(c) 22

(d) 23

55. Eighty kilograms (kg) of store material is to be transported to a location 10 km away. Any number of couriers can be used to transport the material. The material can be packed in any number units of 10, 20 or 40 kg. Courier charges are ` 10 per hour. Couriers travel at the speed of 10 km/hr if they are not carrying any load, at 5 km/hr if carrying 10 kg, at 2 km/hr if carrying 20 kg and at 1 km/hr if carrying 40 kg. A courier cannot carry more than 40 kg of load.

The minimum cost at which 80 kg of store material can be transported to its destination will be:

(a) ` 180

(b) ` 160

(c) ` 140

(d) ` 120

Directions for Questions 56 to 57: Elle is three times older than Yogesh; Zaheer is half the age of Wahida. Yogesh is older than Zaheer.

56. Which of the following can be inferred?

(a) Yogesh is older than Wahida.

(b) Elle is older than Wahida.

(c) Elle may be younger than Wahida.

(d) None of the above.

57. Which of the following information will be sufficient to estimate Elle's age?

(a) Zaheer is 10 years old.

(b) Both Yogesh and Wahida are older than Zaheer by the same number of years.

(c) Both 1 and 2 above.

(d) None of the above.

58. On the walk through the park, Hamsa collected 50 coloured leaves, all either maple or oak. She sorted them by category when she got home, and found the following:

(i) The number of red oak leaves with spots is even and positive.

(ii) The number of red oak leaves without any spot equals the number of red maple leaves without spots.

(iii) All non-red oak leaves have spots, and there are five times as many of them as there

are red spotted oak leaves.

(iv) There are no spotted maple leaves that are not red.

(v) There are exactly 6 red spotted maple leaves.

(vi) There are exactly 22 maple leaves that are neither spotted nor red.

How many oak leaves did she collect?

(a) 22

(b) 17

(c) 25

(d) 18

59. I have a total of ` 1000. Item A costs ` 110, item B costs ` 90, item C costs ` 70, item D costs ` 40 and item E costs ` 45. For every item D that I purchase, I must also buy only two items of B. For every item A, I must buy one item of C. For every item, E, I must also buy two of item D and one of item B. For every item purchased I earn 1000 points and for every rupee not spent I earn a penalty of 1500 points. My objective is to maximise the points earned. What is the number of items that I must purchase to maximise my points?

(a) 13

(b) 14

(c) 15

(d) 16

60. Four friends Ashok, Bashir, Chirag and Deepak are out shopping. Ashok has less money than three times the amount that Bashir has. Chirag has more money than Bashir. Deepak has an amount equal to the difference of amounts with Bashir and Chirag. Ashok has three times the money with Deepak. Each of them have to buy at least one shirt, or one shawl, or one sweater, or one jacket that are priced ` 200, ` 400, ` 600, and ` 1000 a piece, respectively. Chirag borrows ` 300 from Ashok and buys a jacket. Bashir buys a sweater after borrowing ` 100 from Ashok and is left with no money. Ashok buys three shirts.

What is the costliest item that Deepak could buy with his own money?

(a) A shirt

(b) A shawl

(c) A sweater

(d) A jacket

Directions for Questions 61 to 63: Recently, Ghosh Babu spent his winter vacation on Kyakya Island. During the vacation, he visited the local casino where he came across a new card game. Two players, using a normal deck of 52 playing cards, play this game. One player is called the 'dealer' and the other is called the 'player'. First, the player picks a card at random from the deck. This is called the base card. The amount in rupees is equal to the face value of the base card and is called the base amount. The face values of Ace, King, Queen and Jack are ten. For other cards the face value is the number on the card. Once the 'player' picks a card from the deck, the 'dealer' pays him the base amount. Then the 'dealer' picks a card from the deck and this card is called the top card. If the top card is of the same suit as the base card, the 'player' pays twice the base amount to the 'dealer'. If the top card is of the same colours as the base card (but not the same suit), then the 'player' pays the base amount to the 'dealer'. If the top card happens to be of a different colour than the base card the 'dealer' pays the base amount to the 'player'.

Ghosh Babu played the game four times. The first time he picked eight of clubs and the 'dealer'

picked queen of clubs. Second time, he picked ten of hearts and the 'dealer' picked two of spades. Next time, Ghosh Babu picked six of diamonds and the 'dealer' picked ace of hearts. Lastly, he picked eight of spades and the 'dealer' picked Jack of spades.

Answer the following questions based on these four games.

61. If Ghosh Babu stopped playing the game when his gain would be maximised, the gain in rupees would have been;

(a) 12   (b) 2011

(c) 16   (d) 4

62. The initial money Ghosh Babu had (before the beginning of the game sessions) was ` X. At no point did he have to borrow any money. What is the minimum possible value of X?

(a) 16   (b) 8

(c) 100   (d) 24

63. If the final amount of money that Ghosh Babu had with him was ` 100, what was the initial amount he had with him?

(a) 120   (b) 8

(c) 4   (d) 96

Answer Key

1. (a)	2. (a)	3. (a)	4. (b)
5. (b)	6. (b)	7. (c)	8. (c)
9. (a)	10. (a)	11. (b)	12. (b)
13. (c)	14. (b)	15. (b)	16. (a)
17. (b)	18. (a)	19. (b)	20. (a)
21. (b)	22. (a)	23. (d)	24. (d)
25. (a)	26. (c)	27. (b)	28. (b)
29. (a)	30. (c)	31. (c)	32. (b)
33. (a)	34. (a)	35. (b)	36. (b)
37. (a)	38. (c)	39. (b)	40. (a)
41. (a)	42. (a)	43. (a)	44. (a)
45. (a)	46. (c)	47. (d)	48. (b)
49. (b)	50. (c)	51. (b)	52. (a)
53. (b)	54. (c)	55. (b)	56. (b)
57. (c)	58. (b)	59. (b)	60. (b)

Solutions

Questions 1 to 5

From Clue No. (iii),

40% of the total students are female

40% = 36

100% = 90

Total students = 90

	Average	Good	Excellent	Total
Male	18	24	12	54
Female	27	9	0	36
Total	45	33	12	90

Half of the students are either good or excellent means that total of (good + excellent) students = 45

\ Number of excellent = 12

1/3 of male = average male students = 18

Questions 6 to 10

The following structure would work:

	A	B	C	D	Total left
Last	3	3	3	3	0
Second last	12	12 24	12		12
Third last	24				48
First	32				96
Start					128

Hence, the answers are:

6. 3 + 12 = 15 (b)
7. 3 + 12 + 24 = 39 (c)
8. 3 + 12 + 28 + 32 = 71 (c)
9. 128 (a)
10. 32 (a)

Questions 11 to 14

From clues 1, 2, 3, 4, 5 we get:

Orchids = Tulips + 2, Rose = Tulips + 4 Marigold = Tulips + 3 and since Lily < Fireball.

If Tulips is 1 (Clue 6), we get

Tulip = 1, Orchids = 3, Marigold = 4, Rose = 5

Hence, Lily = 2 and Fireball = 6

The answer are:

11. Five (b)
12. Statement (iii) is redundant. Hence (b)
13. 3 + 4 = 7 (c)
14. Six (b)

Questions 15 to 20

Weight	Boys	Girls
40	(a+35)/3	(a+35)/4
44	a	a
46	b	b
50	a + 35	(a+35)/3
Total	297	243

Start from the fourth line and take 'a' as the number of girls of 44 kgs.

Questions 21 to 26

Reaction Tracker

First Statement	A, B, C, D & E
Second Statement	The numbers are in A.P. with common difference 4.
Third Statement	D _ _ _ A (Descending order from left to right)
Fourth Statement	D C B E A For the sum to be equal to E, the sum of A, B, C and D shall be zero. (Using options in Q21 the value of A should be 9.) Then the series becomes: D C B E A 7 3 –1 –5 –9

Hence the answer are:

21. (b)
22. –10 (a)
23. D is '7'. Hence (d).
24. The value of E is –5. Hence (d).
25. 7 ¥ 3 ¥ 1 ¥ –5 ¥ –9 = –945 (a).
26. 7–(–9) = 16. Hence (c).

Questions 27 to 31

Paragraph 1	Ten people P, Q, R, S, T, U, V, W, X and the Mastermind 3
Paragraph 2 & 3	Two ways of creating an answer key: <u>ONE SOURCE</u>: Copy entire answer key and introduce 1 wrong answer.

	Deduction: If you have one source, then you introduce only 1 wrong answer and carry over any wrong answers as well as any blanks from the answer key of the source.
	TWO SOURCES: Introduce blank if the two answer keys differ on one particular question. [This means that if one answer key has the answer correct and the other answer key has it wrong then we introduce a blank]. Note: If both answer keys are correct or if both answer keys are incorrect on a particular question, then they will give us the same answer and hence will not differ. Consequently their answer will be copied into the answer key 'under construction'.
Paragraph 4	Note also that since it is given that two or more people have not introduced a wrong answer to the same question, we can deduce that if two answer keys have the same answer wrong, they will be showing the same incorrect answer to that question.
	Consequently if someone has two sources who have the wrong answer to the same question both of them will show the same incorrect answer to that particular question and that answer will get replicated as it is, into the answer key which is constructed using them both.
	With this understanding we move to the information contained in the table.
Deductions from the table	The first thing we see when we see the table is that P, S and V have only 1 incorrect answer and no blanks. A little thought will give you that this can happen only if there is a single all-correct answer key as the source. Hence, P, S & V must have had the Don as their source and further that
	P must have introduced the wrong answer to Q 46.
	S must have introduced the wrong answer to Q 17
	& V must have introduced the wrong answer to Q 25.
	At this point we also know that—
	In case of 1 source, there will be the introduction of only 1 extra wrong answer and that blanks can only be introduced if there are two sources.
	From this point on move ahead in the question using two main objectives—
	(a) Decoding the answer key patterns of the remaining six people (Q, R, T, U, W & X) and (b) Trying to decode the introduction of the remaining wrong answers and the blanks.
	From the table, T and W are pretty easy to decode. P must have been the source for both of them and T must have introduced the wrong answer to Q 90, while W must have introduced the wrong answer to Q 92.
	At this point the table would look like:

Source	Wrong Answers	Blank Answers
Don	P 46	--
	Q 96	46, 90, 25
	R 27, 56	17, 46, 90
Don	S 17	--
P	T 46, 90	
	U 14, 46	92, 90
Don	V 25	--
P	W 46, 92	--
	X 27	17, 46, 90

	Q's Answer Key: He must have had T and V as his sources. In such a case his answer to Questions 25, 46 and 90 would remain blank and he would introduce the wrong answer to Q. 96.
	We are now left with R, U & X and need to think how these answer keys could have been created.
	It is evident that X must have been R's only source (since the blanks are just carried forward by R and he has introduced the wrong answer to Q. 56).
	Further, X's answer key could have been formed if he had his sources as S and T.

U's answer key could have been created only if his sources were T and W. In that case he would introduce the blank answers 90 and 92, copy the incorrect answer 46 as it is (since there would be no mismatch in that answer) and introduce the wrong answer to Q. 14. Thus the final table would look like:

Source		Wrong Answers	Blank Answers
Don	P	46	--
T and V	Q	96	46, 90, 25
X	R	27, 56	17, 46, 90
Don	S	17	--
P	T	46, 90	
T and W	U	14, 46	92, 90
Don	V	25	--
P	W	46, 92	--
S and T	X	27	17, 46, 90

Thus the answers to the questions are:

27. (b)
28. P, T, S, X. Hence 4, Option (b).
29. U. Option (a)
30. (c)
31. (c)

Questions 32 to 35

Paragraph 2	Since X has thought that he has the answer to the house number of Z, he must have got 'yes' as an answer to both questions he asked. In such a case he would think that Z's number is one of 64 or 81 (the two 2 digit perfect squares which are greater than 50). Also, we can deduce that since he thinks that he knows the answer he must be living in one of the two houses. Hence, X's house number is either 64 or 81.
Paragraph 3	By a similar logic Y's house number is either 27 or 64.
Paragraph 4	We know Z's house number is greater than 50 but less than Y's and X's house numbers. Hence Y's number must be 64 and X's number is 81. Also from options to Q. No. 34 we get that Z's number must be 55 since (81+64+55) is the only addition that satisfies the condition of the sum of the three numbers to be double of a perfect square.

Hence answers are:

32. (b)
33. (a)
34. (a)
35. (b)

Questions 36 to 41

The alphabets PQRSTUVWX represent the nine digit number with the given property.

Deduction1: Since all numbers having even digits have to be divisible by even numbers (i.e., PQ is

divisible by 2, PQRS is divisible by 4, PQRSTU is divisible by 6 and PQRSTUVW is divisible l 8), Q, S, U & W must be the 4 even numbers viz. 2, 4, 6 and 8 in some random order.

Consequently P, R, T, V & X (the odd placed digits) must be sharing the odd digits 1,3, 5,7 and 9 in some order.

Deduction 2: Since PQRST is divisible by 5, T must be equal to 5. Thus, the number must be PQRS5UVWX.

Deduction 3: PQR is divisible by 3 and PQRSTU is divisible by 6, hence STU must be divisible k 3. i.e., S + T + U = S + 5 + U must be divisible by 3. Also, S and U are even number. Through tria and error you should realise that there are only two ways this could happen:

      (a) lf STU represents 258

or   (b) lf STU represents 654

Note: S can only be 2 or 6 since for PQRS to be divisible by 4, RS should be divisible by 4 and F being an odd number S can only be 2 or 6.

Deduction 4: The following 4 options of filling in the other two even numbers (4 and 6 in case STU is 258 or 2 and 8 in case STU is 654) emerge:

	P	Q	R	S	T	U	V	W	X
Possibility 1		4		2	5	8		6	
Possibility 2		6		2	5	8		4	
Possibility 3		2		6	5	4		8	
Possibility 4		8		6	5	4		2	

36. Sum of digits—1+2+3+4+5+6+7+8+9=45.
     Hence (b)

37. Digit sum = 4 + 5 = 9. Hence (a)

38. R = l. Hence (c)

39. 2 = W. Hence (b)

Now solve Questions 40 and 41 through options.

40. The first five digits could only be 38165 (no other option fits). Hence (a)

41. lf 38165 are the first 5 digits, the last 5 emerge out of possibility 4 in the table above and it gives us 54729. Hence (a)

Questions 42 to 45

You will get the following equations:

$A + G = 40$ _____ (1)

$A + D = 5$ _____ (2)

$J + D = 8$ _____ (3)

This means that A is 3 less than J.

$D + R = 37$_____ (4)

$A - G = 8$ _____ (5)

Using (1) and (5) we get A = 24 and G = 16,

Hence D = 19, J = 27 and R = 18.

Thus the answer are:

42. R = 18 (a) .
43. 27 + 19 = 46 (a)
44. 19 – 18 = 1 (a)
45. 24 + 16 + 19 + 27 + 18 → 104 ¥ 2 = 208 (a)

Questions 46 to 49

Runs scored by top three batsmen against Pakistan

= 40 + 130 + 28

= 198

90% = 198

100% = 220 runs '

The rest of the players made only 22 runs.

Runs scored by top three batsmen against South Africa

= 51 + 75 + 49

= 175

70% = 175

100% = 250

The rest of the players made only 75 runs

Runs scored by top three batsmen against Australia

= 55 + 87 + 50

= 192

80% = 192

100 = 240

The rest of the players made only 48 runs Y→ 40 + South Africa + 87 = 127 + runs scored against South Africa.

V → 130 + South Africa + Australia =130 + runs scored against South Africa + Australia

K → 28 + 51 + Australia = 79 + Runs scored against Australia.

S → Pakistan + 75 + 50 = 125 + Runs scored against Pakistan.

R → Pakistan + 49 + 55 = 104 + Runs scored against Pakistan.

46. (c) For Yuvraj, middle index cannot be determined as we don't know the exact runs scored by him against South Africa.

    Same is the case with Virendra and Kaif.

    For Saurav the middle index will be 50 because whatever runs he scores against Pakistan, they could be maximum 22 or minimum zero. This will not affect the middle number 50.

For Rahul middle index will be 49. (Same logic)

47. (d) R-Index → Difference between highest and lowest score.

For Yuvraj minimum R-index can be 87 – 40 = 47

For Virendra minimum R-index can be 130 – 48 = 82

For Kaif minimum R-index can be 51 – 28 = 23

For Sourav 75 – 22 = 53

For Rahul 55 – 22 = 33

\ It is Kaif who can have minimum R-index.

48. (b) No. of players who definitely scored less than Yuvraj is 1.

In the worst case if we suppose that Yuvraj scored zero against South Africa, so we have to find how many players definitely scored less than 127.

This could be only Rahul who can score maximum 22 runs against Pakistan and will be able to get a score of 126, which is less than 127.

49. (b) Saurav's middle index is the best.

Questions 50 to 52

From the given information it is clear that four numbers which must have been the values of money spent would be: 2517 (Clue 4), 2234 (Clue 1), 1340 (Clue 2) and 1193 (Clue 1 again).

We need to work out the fifth value.

Also, since Chellamma spent the least and Shahnaz the maximum and since one woman spent ` 1378 more than Chellamma, a little bit of introspection will give you the following possibilities for the five numbers:

Possibility 1: If 1193 is the least value

The five numbers are:

1193, 1340, 2234, 2517 and 2571 (since 2571 = 1193 + 1378)

Possibility 2: If 2517 is the maximum value, the five numbers are:

1139 (since 1139 = 2517 – 1378), 1193, 1340, 2234 and 2517

Accordingly, we have the following possible arrangements for the five women and the amount they spent:

	Possibility 1	Possibility 2
A (x 2517)	2234	
C (least)	1193	
D (x 1340)	2517	
H	1340	
S (Max)	2571	

Note: The thought structure for placing the 5 values with 5 women in the case of possibility 1, goes as follows:

Step 1:

A
C 1193
D

```
H
S 2571
```

After placing the least and maximum.

Step 2: 2234 should be before 1193 and Dhenuka cannot have spent ` 1340.

```
A 2234
C 1193
D 2517
H 1340
G 2571
```

A close look at the above table shows that clue 5 (H > D) is not obeyed by this arrangement. Hence, this solution is wrong.

We thus move into possibility 2, i.e.:

1139, 1193, 1340, 2234, 2517, are the five values. The thought structure for placing the five numbers for the five women goes as:

Step 1: Place the maximum and least values for G and C respectively.

```
A (x 2517)
C (least, 1139
D (x 1340)
H
G (Maximum) 2517
```

This leaves us with 1340, 1193 and 2234 to place. ·

Step 2: We need to keep 2 constraints in mind while doing this.

(a) 2234 has to come before 1193 (remember not immediately before). At the same time H > D. (Clue 5)

We can arrange 2234 before 1193 in 3 ways as shown below and then 1340 automatically falls into the vacant space.

```
A 2234
C 1139
D 1193          (1)
H 1340
G 2517
```

```
(Not possible since Dhenuka cannot be
1340)
A 2234
C 1139          (2)
D 1340
H 1193
G 2517
```

```
(Not possible since H should be greater than D)
A  1340
C  1139
D  2234          (3)
H  1193
G  2517
```

Hence, the only possible arrangement is as in (1) above. Hence the answers are:

50. (c) Dhenuka
51. (b) 1340
52. (a) 1139
53. (b) Each loaf of bread is divided into 3 parts. So we have 24 parts and each traveller gets 8 parts.

    Ist traveller has 15 parts. He ate 8 parts and gave his 7 parts to the lllrd traveller.

    IInd traveller has 9 parts. He ate 8 parts and gave his1 part to the IIIrd traveller.

So 8 coins should be divided in the ratio 7: 1.

First traveller gets 7 coins.

54. (c) Maximum points of 22 can be achieved by taking (1 Management + 2 Fiction + 2 Maths + 5 Physics) books.

    $4 + 2 + 6 + 10 = 22$

55. Option (b) is correct.

Questions 56 and 57

Elle $3y$

Yogesh y Wahida $2z$

Zaheer z

56. (b) From the above table we can infer that Elle must be older than Wahida (as she is thrice a higher value (y) while Wahida's age is twice a lower value (z)).
57. (c) Using both pieces of information we get that if Zaheer = 10, then Wahida and Yogesh = 20 and hence Elle = 60 years.

Thus Option (c) is correct.

58. (b)
59. (b)
60. (b)

Questions 61 and 62

The following matrix will help you solve the problem.

Game	Starting Money with Ghosh Babu	Ghosh Babu Gives	Gets	Dealer Gets	Gives	End
I	0	0	8	16	0	−8
II	-8	0	10	0	10	12
III	12	0	6	6	0	12
IV	12	0	8	16	0	4

61. ` 12. Hence (a)

62. The maximum negative he goes to is – 8 after the first game. Hence, Option (b) is correct.

63. Ghosh Babu's net gain is ` 4. If after that he has ` 100 with him, he must have had ` 96 at the start. Hence, (d) is correct.