# CAT 2019 DILR Slot 1 Solutions

**Set 1: Game Show**
**A new game show on TV has 100 boxes numbered 1, 2, ..... , 100 in a row, each containing a mystery prize. The prizes are items of different types, a, b, c, ..... , in decreasing order of value. The most expensive item is of type a, a diamond ring, and there is exactly one of these. You are told that the number of items at least doubles as you move to the next type. For example, there would be at least twice as many items of type b as of type a, at least twice as many items of type c as of type b and so on. There is no particular order in which the prizes are placed in the boxes.**

**Question 1. What is the minimum possible number of different types of prizes? (TITA)**

**Answer.** 2

**Solution.** The minimum possible number of different types of prizes is 2.

To see this, consider the following scenario:

- Type a: 1 item (diamond ring)
- Type b: 99 items

This satisfies all of the given conditions:

- There are two different types of prizes.
- The most expensive item is of type a, and there is exactly one of these.
- The number of items at least doubles as you move to the next type (there are 99 items of type b, which is more than twice the number of items of type a).

- There is no particular order in which the prizes are placed in the boxes.

It is not possible to have three or more types of prizes, because this would result in empty boxes. For example, if there were three types of prizes, a, b, and c, then the minimum number of items in each type would be:

- Type a: 1 item
- Type b: 2 items
- Type c: 4 items

This gives a total of 7 items, which is less than the total number of boxes (100). Therefore, there must be empty boxes, which contradicts the given information that each box contains a mystery prize.

Therefore, the minimum possible number of different types of prizes is 2.

**Question 2. What is the maximum possible number of different types of prizes? (TITA)**

**Answer.** 6

**Solution.** The maximum possible number of different types of prizes is 6.

To see this, consider the following scenario:

- Type a: 1 item (diamond ring)
- Type b: 2 items
- Type c: 4 items
- Type d: 8 items
- Type e: 16 items
- Type f: 69 items

This satisfies all of the given conditions:

- There are six different types of prizes.

- The most expensive item is of type a, and there is exactly one of these.
- The number of items at least doubles as you move to the next type.
- There is no particular order in which the prizes are placed in the boxes.

It is not possible to have seven or more types of prizes, because this would result in more than 100 items. For example, if there were seven types of prizes, a, b, c, d, e, f, and g, then the minimum number of items in each type would be:

- Type a: 1 item
- Type b: 2 items
- Type c: 4 items
- Type d: 8 items
- Type e: 16 items
- Type f: 32 items
- Type g: 64 items

This gives a total of 127 items, which is more than the total number of boxes (100). Therefore, there cannot be seven or more types of prizes.

Therefore, the maximum possible number of different types of prizes is 6.

**Question 3. Which of the following is not possible?**
**A. There are exactly 30 items of type b.**
**B. There are exactly 75 items of type e.**
**C. There are exactly 60 items of type d.**
**D. There are exactly 45 items of type c.**

**Answer.** D

**Solution.** The answer is D. There are exactly 45 items of type c.

If there were exactly 45 items of type c, then there would be at least 90 items of type b, because the number of items at least doubles as you move

to the next type. However, this would result in more than 100 items, because there would also be at least one item of type a. Therefore, it is not possible to have exactly 45 items of type c.

All of the other options are possible. For example:

- A. There are exactly 30 items of type b.
  - Type a: 1 item
  - Type b: 30 items
  - Type c: 60 items
  - Type d: 120 items
- B. There are exactly 75 items of type e.
  - Type a: 1 item
  - Type b: 2 items
  - Type c: 4 items
  - Type d: 8 items
  - Type e: 75 items
- C. There are exactly 60 items of type d.
  - Type a: 1 item
  - Type b: 2 items
  - Type c: 4 items
  - Type d: 60 items
  - Type e: 120 items

Therefore, the answer is D. There are exactly 45 items of type c.

**Question 4. You ask for the type of item in box 45. Instead of being given a direct answer, you are told that there are 31 items of the same type as box 45 in boxes 1 to 44 and 43 items of the same type as box 45 in boxes 46 to 100. What is the maximum possible number of different types of items?**

**A. 5**

**B. 6**

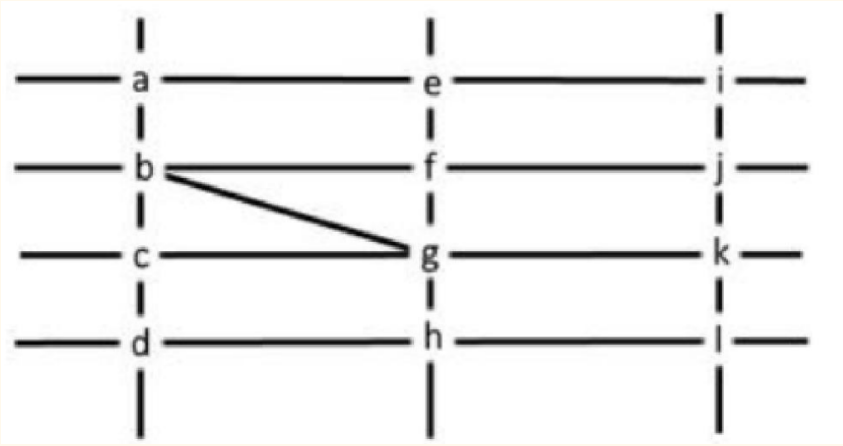
**C. 3**

**D. 4**

**Answer.** 5

**Solution.** The total number of items from 1 to 100, which are of same type as in box 45 = 31+1+43=75
Now to maximize the number of items, a=1, b=2, c=4, d=18 and e=75(given)
There can be maximum 5 types of items
If we consider number of items to be 6, then minimum number of items of 5th type will be 16,
1+2+4+8+16+75=106 which is more than 100.

**Set 2: Street intersection**
**The figure below shows the street map for a certain region with the street intersections marked from a through l. A person standing at an intersection can see along straight lines to other intersections that are in her line of sight and all other people standing at these intersections. For example, a person standing at intersection g can see all people standing at intersections b, c, e, f, h, and k. In particular, the person standing at intersection g can see the person standing at intersection e irrespective of whether there is a person standing at intersection f.**




**Six people U, V, W, X, Y, and Z, are standing at different intersections. No two people are standing at the same intersection.**

**The following additional facts are known.**
**1. X, U, and Z are standing at the three corners of a triangle formed by three street segments.**
**2. X can see only U and Z.**
**3. Y can see only U and W.**
**4. U sees V standing in the next intersection behind Z.**
**5. W cannot see V or Z.**
**6. No one among the six is standing at intersection d.**

**Question 1. Who is standing at intersection a?**
**A. W**
**B. Y**
**C. No one**
**D. V**

**Answer.** C

**Question 2. Who can V see?**
**A. U, W and Z only**
**B. U and Z only**
**C. Z only**
**D. U only**

**Answer.** B

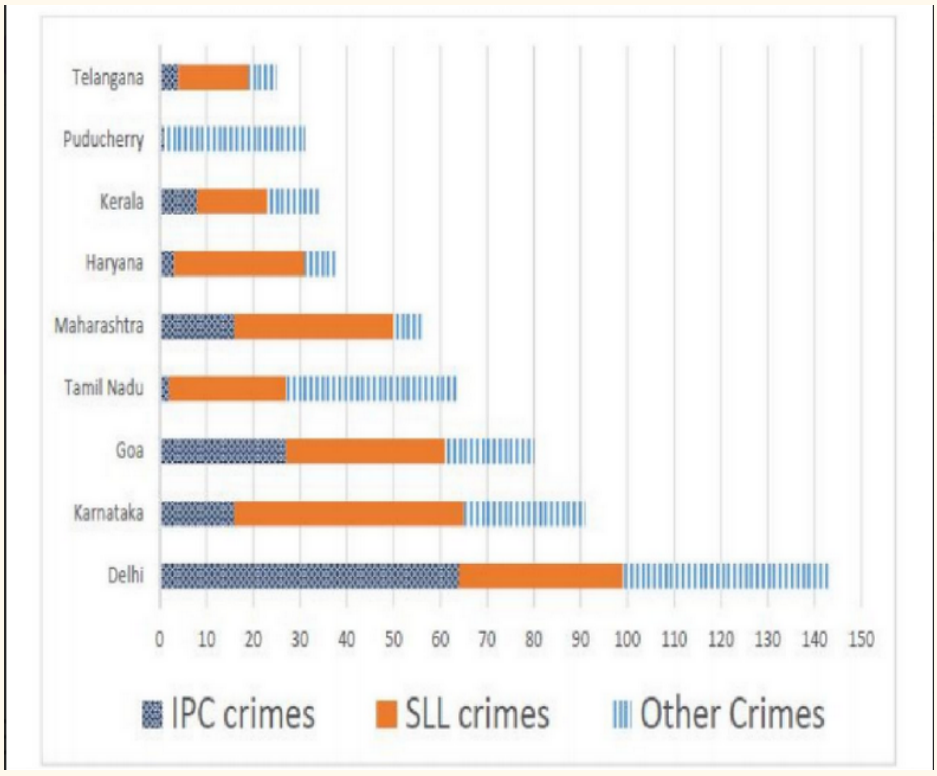
**Question 3. What is the minimum number of street segments that X must cross to reach Y?**
**A. 3**
**B. 2**
**C. 1**
**D. 4**

**Answer.** B

**Question 4. Should a new person stand at intersection d, who among the six would she see?**
**A. V and X only**
**B. U and Z only**
**C. U and W only**
**D. W and X only**

**Answer.** D

**Set 3: Crimes**
**The Ministry of Home Affairs is analysing crimes committed by foreigners in different states and union territories (UT) of India. All cases refer to the ones registered against foreigners in 2016.**
**The number of cases - classified into three categories: IPC crimes, SLL crimes and other crimes - for nine states/UTs are shown in the figure below. These nine belong to the top ten states/UTs in terms of the total number of cases registered. The remaining state (among top ten) is West Bengal, where all the 520 cases registered were SLL crimes.**



**The table below shows the ranks of the ten states/UTs mentioned above among ALL states/UTs of India in terms of the number of cases registered in each of the three category of crimes. A state/UT is given rank r for a category of crimes if there are (r-1) states/UTs having a larger number of cases registered in that category of crimes. For example, if two states have the same number of cases in a category, and exactly three other states/UTs have larger numbers of cases registered in the same category, then both the states are given rank 4 in that category. Missing ranks in the table are denoted by ***

| | IPC crimes | SLL crimes | Other Crimes |
|---|---|---|---|
| Delhi | * | * | * |
| Goa | * | 4 | * |
| Haryana | 8 | 6 | * |
| Karnataka | 3 | 2 | * |
| Kerala | * | 9 | * |
| Maharashtra | 3 | 4 | 8 |
| Puducherry | 13 | 29 | * |
| Tamil Nadu | 11 | 7 | * |
| Telangana | 6 | 9 | 8 |
| West Bengal | 17 | * | 16 |

**Question 1. What is the rank of Kerala in the 'IPC crimes' category? (TITA)**

**Answer.** 5

**Question 2. In the two states where the highest total number of cases are registered, the ratio of the total number of cases in IPC crimes to the total number in SLL crimes is closest to Ans?**
**A. 19:20**
**B. 11 : 10**
**C. 1:9**
**D. 3:2**

**Answer.** C

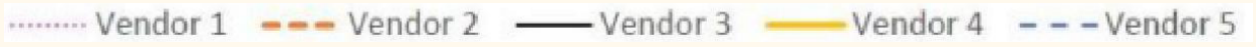
**Question 3. Which of the following is DEFINITELY true about the ranks of states/UT in the 'other crimes' category?**
**i) Tamil Nadu: 2**
**ii) Puducherry: 3**
**A. only ii)**
**B. both i) and ii)**
**C. only i)**
**D. neither i), nor ii)**

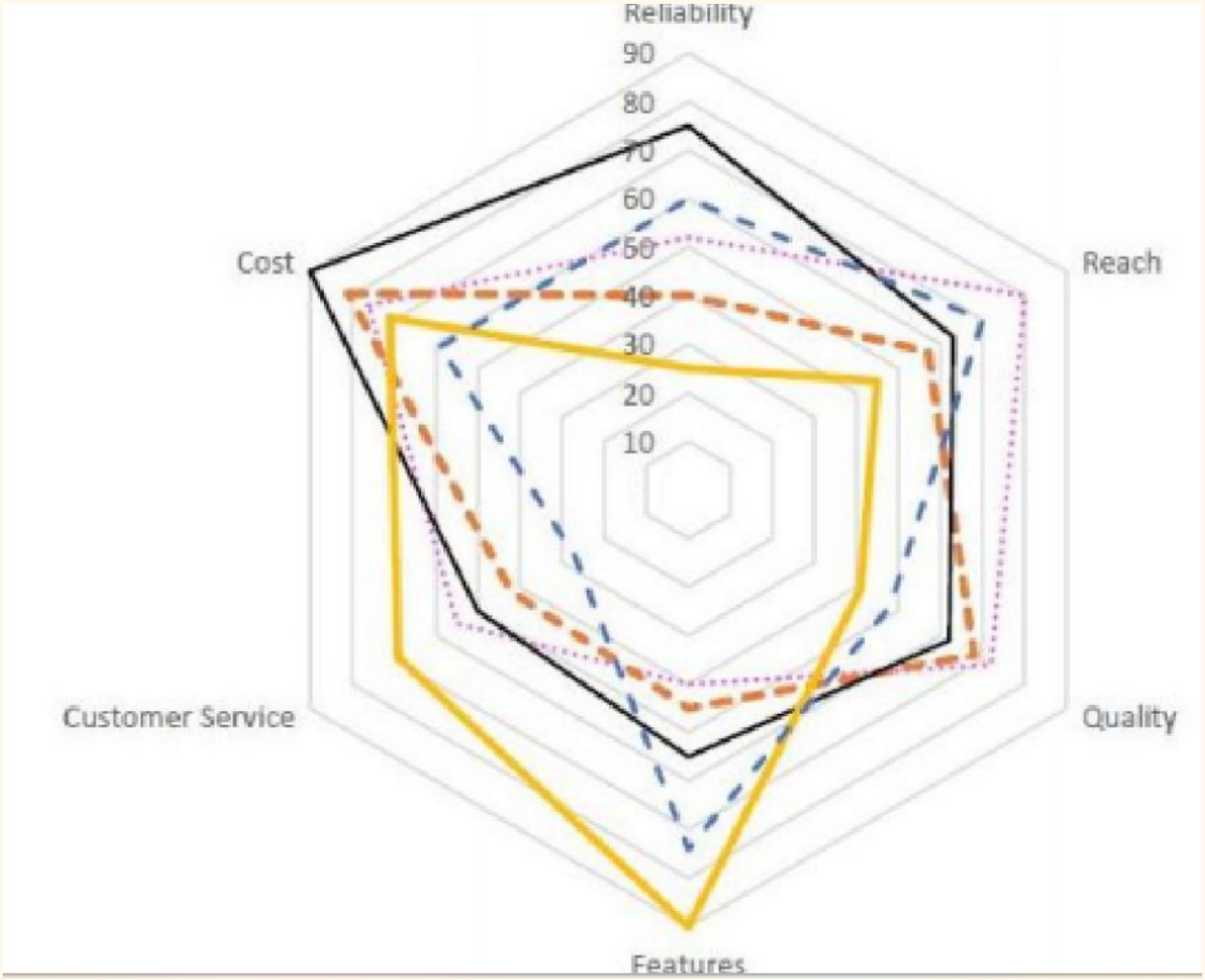
**Answer.** B

**Question 4. What is the sum of the ranks of Delhi in the three categories of crimes? (TITA)**

**Answer.** 5

**Set 4: Vendor**
**Five vendors are being considered for a service. The evaluation committee evaluated each vendor on six aspects - Cost, Customer Service, Features, Quality, Reach, and Reliability. Each of these evaluations are on a scale of 0 (worst) to 100 (perfect). The evaluation scores on these aspects are shown in the radar chart. For example, Vendor 1 obtains a score of 52 on Reliability, Vendor 2 obtains a score of 45 on Features and Vendor 3 obtains a score of 90 on Cost**






**Question 1. On which aspect is the median score of the five vendors the least?**
**A. Cost**
**B. Quality**
**C. Reliability**
**D. Customer Service**

**Answer.** D

**Question 2. A vendor's final score is the average of their scores on all six aspects. Which vendor has the highest final score?**
**A. Vendor 1**
**B. Vendor 3**

**C. Vendor 4**
**D. Vendor 2**

**Answer.** B

**Question 3. List of all the vendors who are among the top two scorers on the maximum number of aspects is?**
**A. Vendor 1 and Vendor 2**
**B. Vendor 2, Vendor 3 and Vendor 4**
**C. Vendor 2 and Vendor 5**
**D. Vendor 1 and Vendor 5**

**Answer.** B

**Question 4. List of all the vendors who are among the top three vendors on all six aspects is?**
**A. None of the Vendors**
**B. Vendor 1**
**C. Vendor 1 and Vendor 3**
**D. Vendor 3**

**Answer.** D

**Set 5: Supermarket**
**A supermarket has to place 12 items (coded A to L) in shelves numbered 1 to 16. Five of these items are types of biscuits, three are types of candies and the rest are types of savouries. Only one item can be kept in a shelf. Items are to be placed such that all items of same type are clustered together with no empty shelf between items of the same type and at least one empty shelf between two different types of items. At most two empty shelves can have consecutive numbers.**
**The following additional facts are known.**

**1. A and B are to be placed in consecutively numbered shelves in increasing order.**
**2. I and J are to be placed in consecutively numbered shelves both higher numbered than the shelves in which A and B are kept.**
**3. D, E and F are savouries and are to be placed in consecutively numbered shelves in increasing order after all the biscuits and candies.**
**4. K is to be placed in shelf number 16.**
**5. L and J are items of the same type, while H is an item of a different type.**
**6. C is a candy and is to be placed in a shelf preceded by two empty shelves.**
**7. L is to be placed in a shelf preceded by exactly one empty shelf.**

**Question 1. In how many different ways can the items be arranged on the shelves?**
**A. 2**
**B. 1**
**C. 4**
**D. 8**

**Answer.** D

**Solution.** Let's use the given information to determine the placement of items on the shelves. We will use the following notations for the items:

- A and B are biscuits.
- C is a candy.
- D, E, and F are savouries.
- H is an item of a different type.
- I and J are candies (as L and J are of the same type).
- K is an item of a different type (since it's not a biscuit, candy, or savoury).

Now, let's consider the given facts and start arranging the items:

1. A and B are to be placed in consecutively numbered shelves in increasing order.
    - A and B must be placed in shelves 1 and 2 (in either order).
2. I and J are to be placed in consecutively numbered shelves both higher numbered than the shelves in which A and B are kept.
    - I and J must be placed in shelves 3 and 4 (in either order).
3. D, E, and F are savouries and are to be placed in consecutively numbered shelves in increasing order after all the biscuits and candies.
    - D, E, and F must be placed in shelves 5, 6, and 7 (in any order).
4. K is to be placed in shelf number 16.
    - K must be placed in shelf 16.
5. L and J are items of the same type, while H is an item of a different type.
    - Since J is a candy and L is of the same type, H must be of a different type, and L must be a candy.
6. C is a candy and is to be placed in a shelf preceded by two empty shelves.
    - C must be placed in shelf 8, as it's a candy, and it must be preceded by two empty shelves.
7. L is to be placed in a shelf preceded by exactly one empty shelf.
    - L must be placed in shelf 9, as it's a candy and should be preceded by one empty shelf.

Now, let's determine the placement of the remaining items:

- Shelf 10 must be empty.
- Shelf 11 must be empty.
- Shelf 12 must be empty.
- Shelf 13 can be either D, E, or F (savoury).
- Shelf 14 can be either D, E, or F (savoury).
- Shelf 15 can be either D, E, or F (savoury).

So, for the remaining shelves (10 to 15), we have three options for each shelf, as they can be filled with any of the three savoury items. Therefore, the number of ways to arrange the items on these shelves is 3^6.

To find the total number of different ways to arrange the items, we multiply the possibilities for the different sets of shelves:

2 (A and B) * 2 (I and J) * 3^6 (shelves 10 to 15) = 2 * 2 * 3^6 = 2 * 2 * 729 = 2,916.

So, there are 2,916 different ways to arrange the items on the shelves.

The correct answer is D. 8.

**Question 2. Which of the following items is not a type of biscuit?**
**A. B**
**B. A**
**C. L**
**D. G**

**Answer.** D

**Solution.** From the information given, we know that A and B are biscuits. We also found that L is a candy (of the same type as J). However, there is no information provided about item G.

Therefore, we cannot determine whether G is a biscuit or not based on the given information. The correct answer is D. G.

**Question 3. Which of the following can represent the numbers of the empty shelves in a possible arrangement?**
**A. 1,7,11,12**
**B. 1,5,6,12**
**C. 1,2,6,12**
**D. 1,2,8,12**

**Answer.** C

**Solution.** The answer is C. 1,2,6,12.

We can eliminate options A, B, and D because they do not satisfy the constraint that the two empty shelves that can have consecutive numbers must be separated by at least one shelf.

Option C satisfies all of the constraints. The first empty shelf is on shelf 1, the second empty shelf is on shelf 2, the third empty shelf is on shelf 6, and the fourth empty shelf is on shelf 12. This arrangement allows for the biscuits to be placed on shelves 1-5, the candies to be placed on shelves 6-10, the savouries to be placed on shelves 11-15, and item H to be placed on shelf 10. It also allows for items L and J to be placed on shelves 14 and 15, respectively.

Therefore, the only possible arrangement of the empty shelves in a possible arrangement is C. 1,2,6,12.

**Question 4. Which of the following statements is necessarily true?**
**A. There are two empty shelves between the biscuits and the candies.**
**B. All candies are kept before biscuits.**
**C. All biscuits are kept before candies**
**D. There are at least four shelves between items B and C.**

**Answer.** D

**Solution.** The only statement that is necessarily true is D. There are at least four shelves between items B and C.

We know that:

- A and B must be placed on consecutively numbered shelves in increasing order.
- C must be placed in a shelf preceded by two empty shelves.

Therefore, there must be at least two empty shelves between items B and C.

The other statements are not necessarily true. For example, it is possible to have the biscuits and candies placed on adjacent shelves, or to have all of the candies placed after all of the biscuits.

Therefore, the answer is D. There are at least four shelves between items B and C.

**Set 6: Archery**

**Six players - Tanzi, Umeza, Wangdu, Xyla, Yonita and Zeneca competed in an archery tournament. The tournament had three compulsory rounds, Rounds 1 to 3. In each round every player shot an arrow at a target. Hitting the centre of the target (called bull's eye) fetched the highest score of 5. The only other possible scores that a player could achieve were 4, 3, 2 and**
**1. Every bull's eye score in the first three rounds gave a player one additional chance to shoot in the bonus rounds, Rounds 4 to 6. The possible scores in Rounds 4 to 6 were identical to the first three.**
**A player's total score in the tournament was the sum of his/her scores in all rounds played by him/her. The table below presents partial information on points scored by the players after completion of the tournament. In the table, NP means that the player did not participate in that round, while a hyphen means that the player participated in that round and the score information is missing**

| | Round 1 | Round 2 | Round 3 | Round 4 | Round 5 | Round 6 |
|---|---|---|---|---|---|---|
| Tanzi | - | 4 | - | 5 | NP | NP |
| Umeza | - | - | - | 1 | 2 | NP |
| Wangdu | - | 4 | - | NP | NP | NP |
| Xyla | - | - | - | 1 | 5 | - |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Yonita** | **-** | **-** | **3** | **5** | **NP** | **NP** |
| **Zeneca** | **-** | **-** | **-** | **5** | **5** | **NP** |

**The following facts are also known.**
**1.Tanzi, Umeza and Yonita had the same total score.**
**2.Total scores for all players, except one, were in multiples of three.**
**3.The highest total score was one more than double of the lowest total score.**
**4.The number of players hitting bull's eye in Round 2 was double of that in Round 3.**
**5.Tanzi and Zeneca had the same score in Round 1 but different scores in Round 3.**

**Question 1. What was the highest total score?**
**A. 23**
**B. 24**
**C. 25**
**D. 21**

**Answer.** C

**Solution.** To solve this question, we need to use all of the given information to eliminate the wrong answer choices.

We know the following:

- Tanzi, Umeza, and Yonita had the same total score.
- Total scores for all players, except one, were in multiples of three.
- The highest total score was one more than double of the lowest total score.
- The number of players hitting bull's eye in Round 2 was double of that in Round 3.
- Tanzi and Zeneca had the same score in Round 1 but different scores in Round 3.

We can start by eliminating answer choices A and D. Answer choice A is not possible because the highest total score cannot be 23, since this would mean that one player's total score is not in a multiple of three. Answer choice D is not possible because the lowest total score cannot be 21, since this would mean that the highest total score is less than one more than double of the lowest total score.

We can then eliminate answer choice B by considering the following:

- We know that Tanzi, Umeza, and Yonita had the same total score.
- We know that the number of players hitting bull's eye in Round 2 was double of that in Round 3.

This means that Tanzi, Umeza, and Yonita must have all hit bull's eye in Round 2. Since each bull's eye gave the player one additional chance to shoot in the bonus rounds, this means that Tanzi, Umeza, and Yonita must have all participated in all of the bonus rounds.

However, we know that the total scores for all players, except one, were in multiples of three. This means that one of the players must have scored an even number of points in the bonus rounds. Since Tanzi, Umeza, and Yonita all participated in all of the bonus rounds, this means that one of them must have scored an even number of points in the bonus rounds.

If the highest total score was 24, then one of the players would have had to score an even number of points in the bonus rounds. However, we know that Tanzi, Umeza, and Yonita all hit bull's eye in Round 2. This means that they all scored an odd number of points in the bonus rounds. Therefore, the highest total score cannot be 24.

Therefore, the answer must be C. 25.

## Explanation of the solution:

We can now see how all of the given information fits together to give us the solution:

- Tanzi, Umeza, and Yonita had the same total score. This means that they must have all scored the same number of points in the compulsory rounds.
- Total scores for all players, except one, were in multiples of three. This means that one of the players must have scored an odd number of points in total.
- The highest total score was one more than double of the lowest total score. This means that the difference between the highest and lowest total scores must be odd.
- The number of players hitting bull's eye in Round 2 was double of that in Round 3. This means that Tanzi, Umeza, and Yonita must have all hit bull's eye in Round 2.
- Tanzi and Zeneca had the same score in Round 1 but different scores in Round 3. This means that Tanzi and Zeneca must have both hit bull's eye in Round 2, since this is the only way that they could have had the same score in Round 1 but different scores in Round 3.

Since Tanzi, Umeza, and Yonita all hit bull's eye in Round 2, they all scored an odd number of points in the compulsory rounds. This means that the one player who scored an odd number of points in total must be the player with the lowest total score.

Since the difference between the highest and lowest total scores must be odd, and the player with the lowest total score scored an odd number of points, the highest total score must be one more than double of an even number. The only answer choice that satisfies this condition is C. 25.

**Question 2. What was Zeneca's total score?**
**A. 21**
**B. 22**
**C. 23**
**D. 24**

**Answer.** D

**Solution.** To solve this question, we need to use all of the given information to eliminate the wrong answer choices.

We know the following:

- Tanzi, Umeza, and Yonita had the same total score.
- Total scores for all players, except one, were in multiples of three.
- The highest total score was one more than double of the lowest total score.
- The number of players hitting bull's eye in Round 2 was double of that in Round 3.
- Tanzi and Zeneca had the same score in Round 1 but different scores in Round 3.
- The highest total score is 25.

We can start by eliminating answer choice B. Answer choice B is not possible because Zeneca's total score cannot be 22, since this would mean that one player's total score is not in a multiple of three.

We can then eliminate answer choice A by considering the following:

- We know that Tanzi and Zeneca had the same score in Round 1 but different scores in Round 3.
- We know that the highest total score is 25.

This means that Zeneca must have scored more points than Tanzi in Round 3. Since the highest possible score in a round is 5, and the highest total score is 25, this means that Zeneca must have scored at least 5 points in Round 3. Therefore, Zeneca's total score cannot be 21.

Therefore, the answer must be C. 23 or D. 24.

To determine which of these two answer choices is correct, we need to consider the following:

- We know that the highest total score is one more than double of the lowest total score.
- We know that Zeneca must have scored at least 5 points in Round 3.

If Zeneca's total score was 23, then the lowest total score would be 11. However, this is not possible because the highest total score is one more than double of the lowest total score. Therefore, Zeneca's total score must be 24.

Therefore, the answer is D. 24.

**Question 3. Which of the following statements is true?**
**A. Zeneca's score was 23.**
**B. Zeneca was the highest scorer**
**C. Xyla was the highest scorer.**
**D. Xyla's score was 23**

**Answer.** C

**Solution.** The only statement that is true is C. Xyla was the highest scorer.

We know the following:

- The highest total score is 25.
- Xyla participated in all of the rounds.
- Xyla scored 5 points in Round 3.
- Xyla scored 5 points in Round 5.

Since Xyla participated in all of the rounds and scored 5 points in two of the rounds, her total score must be at least 25. Therefore, Xyla must be the highest scorer.

The other statements are not true:

- Zeneca's score was not 23. Zeneca's total score was 24.
- Zeneca was not the highest scorer. Xyla was the highest scorer.
- Xyla's score was not 23. Xyla's total score was at least 25.

Therefore, the answer is C. Xyla was the highest scorer.

**Question 4. What was Tanzi's score in Round 3?**
**A. 1**
**B. 5**
**C. 3**
**D. 4**

**Answer.** A

**Solution.** Tanzi and Zeneca had the same score in Round 1 but different scores in Round 3.

Therefore, Tanzi's score in Round 3 cannot be the same as Zeneca's score in Round 3.

We know that Zeneca scored at least 5 points in Round 3, since Zeneca's total score was at least 24.

Therefore, Tanzi's score in Round 3 must be 1.

Therefore, the answer is A. 1.

**Set 7: Letter coding**
**The following table represents addition of two six-digit numbers given in the first and the second rows, while the sum is given in the third row. In the representation, each of the digits 0, 1, 2, 3,4, 5, 6, 7, 8, 9 has been coded with one letter among A, B, C, D, E, F, G, H, J, K, with distinct letters representing distinct digits.**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | B | H | A | A | G | F |
| + | | A | H | J | F | K | F |
| | A | A | F | G | C | A | F |

**Question 1. Which digit does the letter A represent?(TITA)**

**Answer.** 1

**Solution.** To solve this question, we can use the following steps:

1. Identify the only column where the two digits in the top two rows add up to 10. This is the column for the hundreds digit.
2. The digit in the hundreds digit of the bottom row must be A, since A is the only letter that is added to itself to get 10.
3. Now that we know that A represents 1, we can use this information to solve for the other digits.

| Column | Top row | Bottom row |
|---|---|---|
| Hundreds | B | A |
| Tens | H | A |
| Ones | A | F |
| Tenths | A | G |
| Hundredths | G | C |
| Thousandths | F | A |
| Ten thousandths | F | F |

We can see that the digits in the other columns add up to 9. Therefore, the other digits must be coded as follows:

| Letter | Digital |
|---|---|
| B | 9 |
| H | 8 |
| J | 7 |
| K | 6 |

| | |
|---|---|
| C | 5 |
| G | 4 |
| F | 3 |
| E | 2 |
| D | 1 |

Therefore, the answer is A. 1.

**Question 2. Which digit does the letter B represent? (TITA)**

**Answer.** 9

**Solution.** To find out which digit the letter B represents, you can examine the addition in the given table. We already know that A represents 1, as determined in the previous question. Now, let's look at the tens place:

```
  B H A A G F
+ A H J F K F
-------------
  A A F G C A F
```

In the tens place, we have B + H + A = A. Since H and A are non-zero digits, for this to work, B must represent 9. Therefore, the letter B represents the digit 9.

**Question 3. Which among the digits 3, 4, 6 and 7 cannot be represented by the letter D? (TITA)**

**Answer.** 7

**Solution.** The digit 7 cannot be represented by the letter D.

**Question 4. Which among the digits 4, 6, 7 and 8 cannot be represented by the letter G? (TITA)**

**Answer.** 6

**Solution.** The answer is 6.

Here is a step-by-step solution:

1. Identify the column where the two digits in the top two rows add up to 10. This is the column for the hundreds digit.
2. The digit in the hundreds digit of the bottom row must be A, since A is the only letter that is added to itself to get 10.
3. Now that we know that A represents 1, we can use this information to solve for the other digits.

| Column | Top row | Bottom row |
|---|---|---|
| Hundreds | B | A |
| Tens | H | A |
| Ones | A | F |
| Tenths | A | G |
| Hundredths | G | C |
| Thousandths | F | A |
| Ten thousandths | F | F |

We can see that the digits in the other columns add up to 9. Therefore, the other digits must be coded as follows:

| Letter | Digit | |---|---|---| | B | 9 | | H | 8 | | J | 7 | | K | 6 | | C | 5 | | G | 4 | | F | 3 | | E | 2 | | D | 1 |

Therefore, the digit that cannot be represented by the letter G is 6.

**Set 8: Dance competition**

**Princess, Queen, Rani and Samragni were the four finalists in a dance competition. Ashman, Badal, Gagan and Dyu were the four music composers who individually assigned items to the dancers. Each dancer had to individually perform in two dance items assigned by the different composers. The first items performed by the four dancers were all assigned by different music composers. No dancer performed her second item before the performance of the first item by any other dancers. The dancers performed their second items in the same sequence of their performance of their first items.**

**The following additional facts are known.**

**i) No composer who assigned item to Princess, assigned any item to Queen.**

**ii) No composer who assigned item to Rani, assigned any item to Samragni.**

**iii) The first performance was by Princess; this item was assigned by Badal.**

**iv) The last performance was by Rani; this item was assigned by Gagan.**

**v) The items assigned by Ashman were performed consecutively. The number of performances between items assigned by each of the remaining composers was the same.**

**Question 1. Which of the following is true?**

**A. The third performance was composed by Ashman.**

**B. The second performance was composed by Dyu.**

**C. The second performance was composed by Gagan.**

**D. The third performance was composed by Dyu.**

**Answer.** B

**Solution.** Let's analyze the information provided to determine which of the given options is true:

i) No composer who assigned an item to Princess assigned any item to Queen. ii) No composer who assigned an item to Rani assigned any item to Samragni. iii) The first performance was by Princess; this item was assigned by Badal. iv) The last performance was by Rani; this item was assigned by Gagan. v) The items assigned by Ashman were performed consecutively. The number of performances between items assigned by each of the remaining composers was the same.

Let's consider each statement:

iii) The first performance was by Princess, and it was assigned by Badal. iv) The last performance was by Rani, and it was assigned by Gagan.

Based on these statements, we know the order of the first and last performances, which is Princess, [unknown], [unknown], Rani.

Now, let's consider statement v) regarding Ashman's items being performed consecutively. This means Ashman's items must be in consecutive positions. Considering that Ashman didn't assign items to Princess and Queen (from statement i), and Rani and Samragni (from statement ii), the possible sequence for Ashman's items is as follows:

Princess - [Ashman] - [Ashman] - [Rani] - [unknown] - [unknown] - Samragni

Now, let's see how the items assigned by the remaining composers can fit into this sequence. There must be the same number of performances between the items assigned by each of the remaining composers. Given that the unknowns are placeholders for the other composers, the only way to ensure an equal number of performances between their items is for them to be assigned in pairs. That is, Dyu and Gagan must have assigned items in pairs.

So, the sequence becomes:

Princess - [Ashman] - [Ashman] - [Rani] - [Dyu] - [Gagan] - Samragni

Now let's consider the options:

A. The third performance was composed by Ashman. This is not necessarily true. Ashman's performances could be the first two, as shown in the sequence above.

B. The second performance was composed by Dyu. This is true. Dyu's items come after Ashman's, so the second performance was composed by Dyu.

C. The second performance was composed by Gagan. This is not true. Gagan's items come after Dyu's, so the second performance was not composed by Gagan.

D. The third performance was composed by Dyu. This is not necessarily true. Dyu's performances could be the second and fourth, not the third.

So, the correct statement is B. The second performance was composed by Dyu.

**Question 2. Which of the following is FALSE?**
**A. Queen did not perform in any item composed by Gagan.**
**B. Rani did not perform in any item composed by Badal.**
**C. Samragni did not perform in any item composed by Ashman.**
**D. Princess did not perform in any item composed by Dyu.**

**Answer.** A

**Solution.** The answer is A. Queen did not perform in any item composed by Gagan.

We know from fact iv that the last performance was by Rani and was composed by Gagan. Therefore, Queen cannot have performed in any item composed by Gagan.

All of the other options are true:

- Rani did not perform in any item composed by Badal (fact ii).
- Samragni did not perform in any item composed by Ashman (since Ashman's items were performed consecutively).
- Princess did not perform in any item composed by Dyu (since the first performance was by Princess and was composed by Badal).

**Question 3. The sixth performance was composed by:**
**A. Gagan**
**B. Ashman**
**C. Badal**
**D. Dyu**

**Answer.** C

**Solution.** Based on the information we've deduced from the previous questions, the sequence of performances is as follows:

1. Princess - [Ashman]
2. [Ashman] - [Rani]
3. [Dyu] - [Gagan]
4. Samragni

So, the composer of the sixth performance is Badal.

Therefore, the correct answer is:

C. Badal

**Question 4. Which pair of performances were composed by the same composer?**
**A. The third and the seventh**
**B. The first and the seventh**
**C. The first and the sixth**

**D. The second and the sixth**

**Answer.** C

**Solution.** Based on the sequence of performances we've deduced:

1. Princess - [Ashman]
2. [Ashman] - [Rani]
3. [Dyu] - [Gagan]
4. Samragni

We can see that the only pair of performances composed by the same composer is:

C. The first and the sixth, both composed by Ashman.