CAT 2021 DILR Solution Slot 2

Instructions for questions 5 to 10:

Ten objects ol, o2,.... o10 were distributed among Amar, Barat, Charles, Disha, and Elise. Each item went to exactly one person. Each person got exactly two of the items, and this pair of objects is called her/his bundle.

The following table shows how each person values each object.

	o1	o2	o3	o4	o5	o6	o7	o8	o9	o10
Amar	4	9	9	3	7	3	8	7	9	5
Barat	5	9	7	5	5	3	6	8	10	8
Charles	8	8	8	3	6	4	5	8	9	6
Disha	8	8	8	5	5	3	6	4	9	8
Elise	2	8	9	5	6	5	6	3	7	10

The value of any bundle by a person is the sum of that person's values of the objects in that bundle. A person X envies another person Y if X values Y's bundle more than X's own bundle.

For example, hypothetically suppose Amar's bundle consists of ol and o2, and Barat's bundle consists of o3 and o4. Then Amar values his own bundle at 4 + 9 = 13 and Barat's bundle at 9 + 3 = 12. Hence Amar does not envy Barat. On the other hand, Barat values

his own bundle at 7 + 5 = 12 and Amar's bundle at 5 + 9 = 14. Hence Barat envies Amar.

The following facts are known about the actual distribution of the objects among the five people.

1. If someone's value for an object is 10, then she/he received that object.
2. Objects o1, o2, and o3 were given to three different people.
3. Objects o1 and o8 were given to different people.
4. Three people value their own bundles at 16. No one values her/his own bundle at a number higher than 16.
5. Disha values her own bundle at an odd number. All others value their own bundles at an even number.
6. Some people who value their own bundles less than 16 envy some other people who value their own bundle at 16. No one else envies others.

Q. 5)
What BEST can be said about object o8?
[1] o8 was given to Amar, Charles, or Disha
[2] o8 was given to Disha
[3] o8 was given to Charles
[4] o8 was given to Charles or Disha

Solution.
Let's break down the given information step by step:

1. If someone's value for an object is 10, then she/he received that object.
From this, Barat received o9, and Elise received o10.

2. Objects o1, o2, and o3 were given to three different people.
No specific person mentioned, but we'll keep this in mind.

3. Objects o1 and o8 were given to different people.
No person is specified, but o1 and o8 are with different individuals.

4. Three people value their own bundles at 16. No one values her/his own bundle at a number higher than 16.
Based on the values provided:
- For Amar to have a total of 16, he can have o2 + o7 or o3 + o6 or o3 + o4.
- For Barat, o9 is already in his possession. For a total of 16, the only combination left is o6 + o9.
- Charles can have combinations like o1 + o9 or o2 + o8 or o3 + o7.
- For Disha, o2 + o7 or o3 + o6.
- For Elise, o10 is already in her possession, and none of the remaining combinations with o10 sum up to 16.

5. Disha values her own bundle at an odd number. All others value their own bundles at an even number.
With the above point, Disha cannot have a total of 16, which is even.

6. Some people who value their own bundles less than 16 envy some other people who value their own bundle at 16. No one else envies others.
This will be kept in mind when finalizing the bundles.

Now let's determine the bundles:

For Disha:
Given Disha's bundle value is odd and less than 16, the possible pairs are:
o3 + o4 = 13, o2 + o4 = 13, o1 + o4 = 13, o1 + o5 = 13
Out of these, o2 + o4 seems the best option since o2 and o3 are already counted in the 16 valued bundles.

For Amar:
Considering o3 + o6 = 12. Now, Amar values o3 and o6 as 12, which is less than 16. But he envies someone who has a 16 value, let's say Barat who has o6 + o9 = 16.

For Charles:

Considering o1 + o9 = 17, but this exceeds 16. So, o2 + o8 = 16 seems fitting.

So, where is o8?

Disha has odd value bundles, so she doesn't have o8.
Amar might envy Barat's 16-valued bundle, so Amar doesn't have o8.
Charles has o8.

Based on the above analysis, the answer is:
[3] o8 was given to Charles

Q. 6) Who among the following envies someone else?
[1] Barat
[2] Charles
[3] Amar
[4] Elise

Solution.
Let's recall the previous conclusions:

- Barat has o9, and his total value is 16.
- Amar has o3 + o6, with a total value of 12.
- Charles has o2 + o8, with a total value of 16.
- Disha has o2 + o4, with a total value of 13 (an odd number less than 16).
- Elise has o10, and with the other possible object, her total value is less than 16.

From Point 6 of the given facts: "Some people who value their own bundles less than 16 envy some other people who value their own bundle at 16."

Amar values his bundle at 12, which is less than 16. Considering the possibilities, Amar envies someone (for instance, Barat) who values their bundle at 16.

Therefore, the answer is:
[3] Amar

Q 7)
What is Amar's value for his own bundle?
From the earlier analysis:

Amar has o3 and o6.

Using the values from the table:
For o3, Amar's value is 9.
For o6, Amar's value is 3.

Adding these together:
9 + 3 = 12

Thus, Amar's value for his own bundle is 12

Q. 8) Object o4 was given to
[1] Elise
[2] Barat
[3] Charles
[4] Disha
Solution.

From the information provided, we can deduce that object o4 was given to Disha because her value for o4 is 5. So, the correct answer is:

[4] Disha

Q. 9) Object o5 was given to
[1] Disha
[2] Elise

[3] Amar
[4] Charles

Solution.
Given the data:

- Objects o1, o2, and o3 were given to three different people.
- Objects o1 and o8 were given to different people.
- Three people value their bundles at 16. No one values her/his own bundle at a number higher than 16.
- Disha values her own bundle at an odd number. All others value their own bundles at even numbers.

Values for o5:

Amar: 7
Barat: 5
Charles: 6
Disha: 5
Elise: 6

Since three individuals have their bundles valued at 16 and all individuals other than Disha have even valued bundles, we should focus on combinations that sum to 16:

For Amar:

Combining o5 with any other object value doesn't give a total of 16.

For Charles:

o5 + o2 = 6 + 8 = 14 (doesn't give 16)

For Elise:

o5 + o3 = 6 + 9 = 15 (doesn't give 16 either)

For Disha:

Since her total value is odd, combining o5 with any other single object's value doesn't give a total of 16.

considering the other information provided, if we observe the possible combinations of values, the most logical fit for o5 would be Amar since his other values also closely sum up to 16 with different objects, and it also fits the narrative that Disha values her bundle at an odd number.

Thus, the best answer would be:

[3] Amar.

Q.10) What BEST can be said about the distribution of object o1?
[1] o1 was given to Disha
[2] o1 was given to Charles
[3] o1 was given to Charles, Disha, or Elise
[4] o1 was given to Charles or Disha

Solution.
Given:

- Objects o1, o2, and o3 were given to three different people.
- Objects o1 and o8 were given to different people.
- Three people value their own bundles at 16. No one values her/his own bundle at a number higher than 16.
- Disha values her own bundle at an odd number. All others value their own bundles at an even number.

Amar's value for o1 is 4.
Barat's value for o1 is 5.
Charles' value for o1 is 8.
Disha's value for o1 is 8.
Elise's value for o1 is 2.

Since three people value their bundles at 16, and Disha values her own bundle at an odd number, we need to check combinations that sum up to 16 and other possible odd values for Disha.

Considering Disha's possible bundles:

o1 and o3 = 8 + 8 = 16
o1 and o2 = 8 + 8 = 16

Thus, it's possible Disha has o1.

Considering Charles' possible bundles:

o1 and o8 = 8 + 8 = 16

Thus, it's also possible that Charles has o1.

Considering the given choices, the best answer is:

[4] o1 was given to Charles or Disha.

Instruction for questions 11 to 14:

The game of Chango is a game where two people play against each other; one of them wins and the other loses, i.e., there are no drawn Chango games. 12 players participated in a Chango championship. They were divided into four groups: Group A consisted of Aruna, Azul, and Arif; Group B consisted of Brinda, Brij, and Biju; Group C consisted of Chitra, Chetan, and Chhavi; and Group D consisted of Dipen, Donna, and Deb.

Players within each group had a distinct rank going into the championship. The players have NOT been listed necessarily according to their ranks. In the group stage of the game, the second and third ranked players play against each other, and the winner of that game plays against the first ranked player of the

group. The winner of this second game is considered as the winner of the group and enters a semi-final.

The winners from Groups A and B play against each other in one semi-final, while the winners from Groups C and D play against each other in the other semi-final. The winners of the two semi-finals play against each other in the final to decide the winner of the championship.

It is known that:
1. Chitra did not win the championship.
2. Aruna did not play against Arif. Brij did not play against Brinda.
3. Aruna, Biju, Chitra, and Dipen played three games each, Azul and Chetan played two games each, and the remaining players played one game each.

Q. 11) Who among the following was DEFINITELY NOT ranked first in his/her group?
[1] Dipen
[2] Aruna
[3] Brij
[4] Chitra

Solution.
From our deductions:

Group A: Aruna won her group, which means she was ranked first.

Group B: Biju won his group, so Brij wasn't ranked first in his group.

Group C: Chitra won her group, meaning she was ranked first.

Group D: Dipen won his group, signifying he was ranked first.

So, among the options, the one who was DEFINITELY NOT ranked first in his/her group is:

[3] Brij.

Q. 12) Which of the following pairs must have played against each other in the championship?
[1] Deb, Donna
[2] Azul, Biju
[3] Donna, Chetan
[4] Chitra, Dipen

Solution.
Given the information:

1. Aruna, Biju, Chitra, and Dipen played three games each.
2. Azul and Chetan played two games each.

Let's analyze:

Group A:
- Aruna played three games.
- Aruna did not play against Arif, so Aruna played against Azul and then played against the winner of Arif vs Azul. Since Azul played two games, Azul won against Arif and then lost to Aruna.

Group B:
- Brij did not play against Brinda, so Brij played against Biju.
- Since Biju played three games, Biju won against Brij and then won the group stage.

Group C:
- Chitra played three games, so she won the group stage.
- This implies Chetan and Chhavi played against each other and Chetan, having played two games, won against Chhavi but lost to Chitra.

Group D:
- Dipen played three games, so he won the group stage.

- As Deb and Donna are left, they played against each other in the group stage.

Semi-finals:
- The winner of Group A played against the winner of Group B, which means Aruna vs Biju.
- The winner of Group C played against the winner of Group D, which means Chitra vs Dipen.

Based on the above analysis, the pairs that must have played against each other are:

[1] Deb, Donna
[4] Chitra, Dipen

So, the correct answer is:
[1] Deb, Donna
[4] Chitra, Dipen

Q. 13) Who won the championship?
[1] Chitra
[2] Aruna
[3] Brij
[4] Cannot be determined

Solution.
From the information provided:

Semi-finals:
- The winner of Group A played against the winner of Group B, which is Aruna vs Biju.
- The winner of Group C played against the winner of Group D, which is Chitra vs Dipen.

Given:

1. Chitra did not win the championship.

Considering Aruna, Biju, Chitra, and Dipen played three games each, and since Chitra did not win the championship, one of the games she played was a loss in the semi-final against Dipen.

Thus, the final would be between Dipen and either Aruna or Biju. Since we don't have enough information on who won between Aruna and Biju, we cannot determine who won the championship.

The answer is:
[4] Cannot be determined.

Q. 14) Who among the following did NOT play against Chitra in the championship?
[1] Aruna
[2] Chetan
[3] Dipen
[4] Biju

Solution.
From the information provided:

- Aruna, Biju, Chitra, and Dipen played three games each.
- In the group stage, the second and third ranked players play against each other, and the winner plays against the first-ranked player.
- Chitra did not win the championship, but she played three games, which means she played two games in her group and one in the semi-final.
- Chitra played against Chetan (since he played two games) and Chhavi in the group stage and against Dipen in the semi-final.

Thus, she did not play against:

[1] Aruna.

Instruction for question 15 to 20:

Ravi works in an online food-delivery company. After each delivery, customers rate Ravi on each of four parameters - Behaviour, Packaging, Hygiene, and Timeliness, on a scale from 1 to 9. If the total of the four rating points is 25 or more, then Ravi gets a bonus of ₹20 for that delivery. Additionally, a customer may or may not give Ravi a tip. If the customer gives a tip, it is either ₹30 or ₹50.

One day, Ravi made four deliveries - one to each of Atal, Bihari, Chirag, and Deepak, and received a total of ₹120 in bonus and tips. He did not get both a bonus and a tip from the same customer.

The following additional facts are also known.

1. In Timeliness, Ravi received a total of 21 points, and three of the customers gave him the same rating points in this parameter. Atal gave higher rating points than Bihari and Chirag in this parameter.
2. Ravi received distinct rating points in Packaging from the four customers adding up to 29 points. Similarly, Ravi received distinct rating points in Hygiene from the four customers adding up to 26 points.
3. Chirag gave the same rating points for Packaging and Hygiene.
4. Among the four customers, Bihari gave the highest rating points in Packaging, and Chirag gave the highest rating points in Hygiene.
5. Everyone rated Ravi between 5 and 7 in Behaviour. Unique maximum and minimum ratings in this parameter were given by Atal and Deepak respectively.
6. If the customers are ranked based on ratings given by them in individual parameters, then Atal's rank based on Packaging is the same as that based on Hygiene. This is also true for Deepak.

Q. 15) What was the minimum rating that Ravi received from any customer in any parameter?

Solution.

To solve this problem, we need to break down the information given:

Let's denote the ratings Ravi received for each parameter as follows:
- B = Behavior
- P = Packaging
- H = Hygiene
- T = Timeliness

From the information given:

1. In Timeliness, he received 21 points in total, with three customers giving him the same rating and Atal gave more points than Bihari and Chirag.
2. In Packaging, he received distinct points that totaled 29.
3. In Hygiene, he received distinct points that totaled 26.
4. Chirag gave the same rating for Packaging and Hygiene.
5. Bihari gave the highest in Packaging while Chirag gave the highest in Hygiene.
6. Everyone rated Ravi between 5 to 7 in Behavior, with Atal giving the maximum and Deepak giving the minimum.
7. Atal and Deepak had the same rank in Packaging and Hygiene.

Analysis:

Since the minimum rating Ravi can get is 1 and the maximum is 9, the minimum total rating Ravi can get from a customer (if he gets 1 in all four parameters) is 4, and the maximum total rating (if he gets 9 in all parameters) is 36.

Considering he must score at least 25 to get a bonus, and since he didn't get both bonus and tip from the same customer, we can determine which customers gave him a bonus or tip based on the ratings.

Calculations:

Given that he received a total of ₹120 in bonus and tips.

If all customers gave bonus then the total would be ₹80 (20x4) so the tips amount to ₹40. Since the tips can only be ₹30 or ₹50, two customers must have tipped him, one with ₹30 and one with ₹50.

From point 1: Three customers gave him the same rating in Timeliness and Atal gave more than Bihari and Chirag. Let's assume the three customers gave him 6 each, then Atal gave him 3 (because 3 x 6 = 18 + 3 = 21 total points in Timeliness).

Given the data, the minimum total for Ravi would be from Deepak, as he gave the lowest Behavior rating. But since we know the range of Behavior is 5 to 7, the minimum rating in Behavior is 5.

However, this does not necessarily mean 5 is the minimum rating Ravi received across all parameters. The Hygiene and Packaging ratings are distinct, and since they are from 1-9, he must've received a 1 in one of those categories.

Thus, the **minimum rating that Ravi received from any customer in any parameter is 1**.

Q. 16) The COMPLETE list of customers who gave the maximum total rating points to Ravi is
[1] Atal
[2] Bihari
[3] Bihari and Chirag
[4] Atal and Bihari

Solution.
Let's first analyze the data we have:

1. **Timeliness (T)**: Total of 21 points. Atal > Bihari and Chirag. Let's assume three of them (let's say Bihari, Chirag, and Deepak) each gave Ravi a rating of 6 (because 6 + 6 + 6 = 18). So, Atal must have given Ravi a rating of 3 in Timeliness (since 18 + 3 = 21).

2. **Packaging (P)**: Total of 29 points. They are distinct, and Bihari gave the highest. This means Bihari gave a 9. The other numbers can be 8, 7, and 5 (9 + 8 + 7 + 5 = 29).

3. **Hygiene (H)**: Total of 26 points. They are distinct, and Chirag gave the highest. So, Chirag must have given 9 in Hygiene. The other numbers can be 8, 6, and 3 (9 + 8 + 6 + 3 = 26).

4. **Behavior (B)**: Between 5 to 7. Atal has the maximum, and Deepak has the minimum. So, Atal's rating = 7, Deepak's rating = 5, and the other two are 6.

Now, let's calculate the total for each of them:

Atal: B = 7, P could be 8 or 5 (not 9, because Bihari gave that), H could be 8, 6, or 3, T = 3. Let's take the maximum values: 7 + 8 + 8 + 3 = 26. (Atal's total can't be more than 26.)

Bihari: B = 6, P = 9, H could be 8 or 6 or 3 (since 9 is given by Chirag), T = 6. Again, taking the maximum: 6 + 9 + 8 + 6 = 29.

Chirag: B = 6, P could be 7 or 5, H = 9, T = 6. Maximum value: 6 + 7 + 9 + 6 = 28.

Deepak: B = 5, P could be 7 or 5 (since 9 is given by Bihari and 8 is probably given by Atal), H could be 8 or 6 or 3, T = 6. Taking the maximum: 5 + 7 + 8 + 6 = 26.

From the calculations, **Bihari** has the maximum total rating of 29, while the others have less than that.

The answer is [2] **Bihari**.

Q. 17) What rating did Atal give on Timeliness?

Solution.

From the information given:

1. **Timeliness (T)**: Total of 21 points. Atal > Bihari and Chirag. Let's assume three of them (let's say Bihari, Chirag, and Deepak) each gave Ravi a rating of 6 (because 6 + 6 + 6 = 18). So, Atal must have given Ravi a rating of 3 in Timeliness (since 18 + 3 = 21).

Thus, Atal gave a rating of 3 on Timeliness.

Q. 18) What BEST can be concluded about the tip amount given by Deepak?
[1] Either ₹0 or ₹30 or ₹50
[2] Either ₹30 or ₹50
[3] ₹50
[4] ₹30

Solution.
Let's go step by step based on the provided information:

1. **Total Bonus and Tips**: Ravi received ₹120 in total for both bonuses and tips.
If he got a bonus for all 4 deliveries, he would have received ₹80 (4 x ₹20). This means that the combined tips amount to ₹40.

2. **Rating Points Requirement**: For Ravi to get a bonus, he needs a total rating of at least 25 points for that delivery.

3. **Timeliness (T)**: Total of 21 points. With Atal > Bihari and Chirag. Let's assume Bihari, Chirag, and Deepak gave Ravi a rating of 6 each (6 + 6 + 6 = 18). So, Atal gave a rating of 3 in Timeliness.

4. **Packaging (P)**: Distinct ratings adding up to 29.
Hygiene (H): Distinct ratings adding up to 26.
Given Bihari gave the highest rating in Packaging and Chirag gave the highest rating in Hygiene.

5. **Behaviour (B)**: Ratings between 5 and 7. Atal gave the highest, Deepak the lowest.

If we assume:
- Atal rated 7 in Behaviour, 3 in Timeliness, and considering his rank is the same in both Packaging and Hygiene, let's assume he rated 5 in both (making his total 20).
- Deepak rated 5 in Behaviour, 6 in Timeliness. To make his total > 25 (to get a bonus), he would need at least 8 each in Packaging and Hygiene (making it 27 in total).
- Chirag has the same rating in Packaging and Hygiene, and considering he gave the highest rating in Hygiene, he could've rated 9 in both. Plus, 6 in Timeliness and 6 in Behaviour (making it 30 in total).
- Bihari has 6 in Timeliness, 6 in Behaviour (being lower than Atal but higher than Chirag and Deepak), and considering he gave the highest rating in Packaging, let's assume 9. This makes his total in Hygiene at least 4 (total 25).

From the above:
- Atal didn't reach 25, so he didn't give a bonus but could've given a tip.
- Deepak reached 27, so he gave a bonus but didn't give a tip.
- Chirag reached 30, so he gave a bonus but didn't give a tip.
- Bihari reached 25, so he gave a bonus but didn't give a tip.

Considering the total tip is ₹40 and the bonus is ₹80, it implies two of the four customers gave a tip.

Given that Deepak, Chirag, and Bihari have accounted for the bonus, the tips were given by Atal and one more person.

Considering the choices, the best conclusion for Deepak is:

[1] Either ₹0 or ₹30 or ₹50

Q. 19) In which parameter did Atal give the maximum rating points to Ravi?

[1] Hygiene
[2] Behaviour
[3] Timeliness
[4] Packaging

Solution.
From our previous discussion:

Atal's ratings were:
- Behaviour (B): 7 (Maximum since Atal gave the highest rating and it's between 5 and 7)
- Timeliness (T): 3 (Atal > Bihari and Chirag but the total was 21 with three people rating the same.)
- Packaging (P): We assumed 5 based on the information about ranks being the same in Packaging and Hygiene for Atal.
- Hygiene (H): We also assumed 5 based on the same rank information.

Among these ratings, the maximum rating given by Atal to Ravi is in:

[2] Behaviour

Q. 20) What rating did Deepak give on Packaging?
[1] 7
[2] 8
[3] 5
[4] 6

Solution.
From the previous analysis:

Ravi received distinct rating points in Packaging from the four customers adding up to 29 points.

Atal gave Ravi a rating of 5 in Packaging (from previous conclusions).

Given that Bihari gave the highest rating in Packaging, and since the available highest value is 9, Bihari's rating for Packaging is 9.

From the previously concluded data:
Chirag = 8 (since Bihari = 9 and Atal = 5 and the ratings are distinct)

Thus, the total rating from Atal, Bihari, and Chirag for Packaging = 5 + 9 + 8 = 22

Deepak's rating for Packaging = Total ratings - Ratings from Atal, Bihari, and Chirag = 29 - 22 = 7.

Therefore, Deepak gave a rating of:
[1] 7 on Packaging.