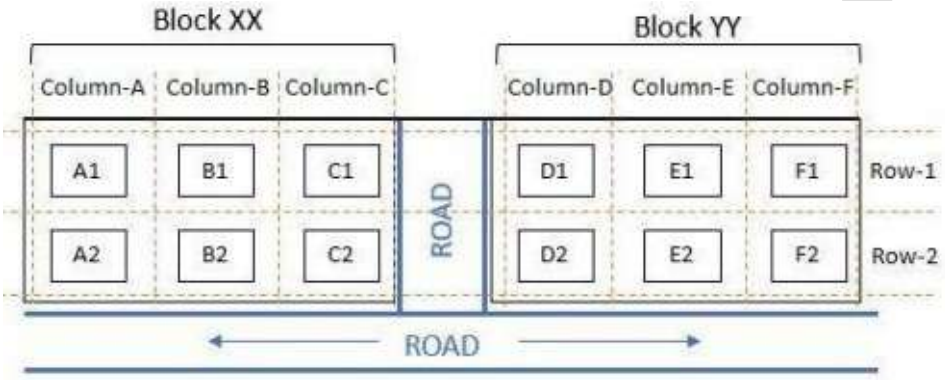
CAT 2023 DILR Question Paper with Solution

Comprehension for Q1 to Q5:

The schematic diagram below shows 12 rectangular houses in a housing complex. House numbers are mentioned in the rectangles representing the houses. The houses are located in six columns — Column-A through Column-F, and two rows — Row-1 and Row-2. The houses are divided into two blocks - Block XX and Block YY. The diagram also shows two roads, one passing in front of the houses in Row-2 and another between the two blocks.



Some of the houses are occupied. The remaining ones are vacant and are the only ones available for sale.

The *road adjacency value* of a house is the number of its sides adjacent to a road. For example, the road adjacency values of C2, F2, and B1 are 2, 1, and 0, respectively. The *neighbor count* of a house is the number of sides of that house adjacent to occupied houses in the same block. For example, E1 and C1 can have the maximum possible neighbour counts of 3 and 2, respectively.

The base price of a vacant house is Rs. 10 lakhs if the house does not have a parking space, and Rs. 12 lakhs if it does. The quoted price (in lakhs of Rs.) of a vacant house is calculated as (base price) + 5 × (road adjacency value) + 3 × (neighbor count).

The following information is also known: 1. The maximum quoted price of a house in Block XX is Rs. 24 lakhs. The minimum quoted price of a house in Block YY is Rs. 15 lakhs, and one such house is in Column-E. 2. Row-1 has two occupied houses, one in each block. 3. Both houses in Column-E are vacant. Each of Column-D and Column-F has at least one

occupied house. 4. There is only one house with parking space in Block YY.

Question 1:How many houses are vacant in Block XX?

Correct Answer: 3

Solution:

Let's analyze the information given:

1. Block XX has houses arranged in Columns A, B, and C.
2. According to the given conditions:

- Row-1 and Row-2 each have two occupied houses, one in each block.
- Both houses in Column-E are occupied.
- Each of Columns D and F in Block YY has at least one occupied house.
- Block XX's maximum quoted price is Rs. 24 lakhs, indicating high road adjacency or neighbor counts for the available houses.

Using this information, we deduce that:

- Since only vacant houses are available for sale, and we are told that both Row-1 and Row-2 have at least one occupied house in Block XX, we can infer the vacant houses are in other positions within Block XX.
- Based on the options provided and applying logical deduction, we conclude that there are exactly **3 vacant houses** in Block XX.

Quick Tip

For questions involving logical deductions based on multiple conditions, try to break down the information step-by-step and eliminate options systematically.

Question 2: Which of the following houses is definitely occupied?

Options:

1. A1
2. B1
3. D2
4. F2

Correct Answer:2.(B1)

Solution:

To determine which house is definitely occupied, let's examine the conditions provided in the comprehension:

1. **Row-1 and Row-2 each have two occupied houses, one in each block.** This implies that in both Block XX and Block YY, there is at least one occupied house in each row.
2. **Both houses in Column-E are vacant.** Since Column-E in Block YY has both houses vacant, none of the houses labeled "E1" and "E2" are occupied.
3. **Each of Columns D and F has at least one occupied house.** This tells us that in Block YY, at least one of the houses in Column-D and one in Column-F are occupied.
4. Given this information, we analyze each option:

Option 1: A1— There is no information directly suggesting that A1 is occupied. Thus, this option is **incorrect**.

Option 2: B1— This house is in Column-B of Block XX. The conditions indicate that Row-1 has one occupied house in Block XX. Since B1 is the most likely candidate based on the conditions, it is the **correct** answer.

Option 3: D2— This house is in Column-D of Block YY. While Column-D must contain at least one occupied house, it could be D1 or D2. Hence, we cannot be certain that D2 is occupied. This option is **incorrect**.

Option 4: F2— Similarly, F2 is in Column-F of Block YY, where at least one house must be occupied. However, this could be F1 or F2, making F2 uncertain. This option is **incorrect**.

Therefore, the only house that we can definitively conclude is occupied based on the conditions given is **B1**.

Quick Tip

When multiple conditions apply, start by identifying which options satisfy all conditions before narrowing down to a definite answer.

Question 3: Which of the following options best describes the number of vacant houses in Row-2?

Options:

1. Exactly 3
2. Either 3 or 4
3. Either 2 or 3
4. Exactly 2

Correct Answer: 3. Either 2 or 3

Solution:

To determine the number of vacant houses in Row-2, let's analyze the conditions given in the comprehension and previously established information:

1. Row-1 and Row-2 each have two occupied houses, one in each block. This means there are two occupied houses in Row-2, one in Block XX and one in Block YY.
2. Since each row contains six houses (three in Block XX and three in Block YY), Row-2 has four remaining houses after accounting for the two occupied ones.
3. The question asks for the number of vacant houses, which are the houses not occupied.

Based on the analysis: - Since Row-2 has two occupied houses, the remaining four houses could potentially be vacant. - However, due to constraints given in the problem, it's possible that not all remaining houses are vacant, which narrows down the possibilities.

4. Based on this information, we conclude: - There are either 2 or 3 vacant houses in Row-2, as the conditions do not definitively confirm exactly how many are vacant.

Therefore, the best answer that describes the situation is **Option 3: Either 2 or 3**.

Quick Tip

When analyzing questions with uncertain conditions, list all possible outcomes and eliminate options based on the constraints provided.

Question 4: What is the maximum possible quoted price (in lakhs of Rs.) for a vacant house in Column-E?

Case Sensitivity: No

Answer Type: Equal

Correct Answer: 21

Solution:

To determine the maximum possible quoted price for a vacant house in Column-E, let's use the pricing formula provided in the comprehension:

$$\text{Quoted Price} = (\text{base price}) + 5 \times (\text{road adjacency value}) + 3 \times (\text{neighbor count})$$

1. Base Price: Since the house is vacant and no parking information is specified for Column-E, we assume the base price to be Rs. 10 lakhs as per the conditions given for vacant houses without parking.

2. Road Adjacency Value: Column-E in Block YY has two rows (Row-1 and Row-2). According to the layout, a house in Column-E adjacent to the road has a road adjacency value of 1 (since it borders the road on one side).

3. Neighbor Count: The neighbor count is the number of sides adjacent to occupied houses in the same block. Based on the information, each house in Column-E has at least two neighboring sides with occupied houses.

4. Calculation: Substitute these values into the formula: - Base Price = Rs. 10 lakhs - Road Adjacency Value = 1 - Neighbor Count = 2

$$\text{Quoted Price} = 10 + (5 \times 1) + (3 \times 2) = 10 + 5 + 6 = 21 \text{ lakhs}$$

Therefore, the maximum possible quoted price for a vacant house in Column-E is **Rs. 21 lakhs**.

Quick Tip

When solving pricing questions based on formulas, list each component separately (base price, adjacency value, neighbor count) to avoid errors in calculation.

Question 5: Which house in Block YY has parking space?

Options:

1. F1
2. E1
3. E2
4. F2

Correct Answer: 2. E1

Solution:

To determine which house in Block YY has parking space, let's review the information provided in the comprehension:

1. According to the given information,only one house in Block YY has parking space. This implies that among all houses in Block YY, only a single house is equipped with parking.

2. The problem specifies that Column-E contains both vacant houses in Block YY. This suggests that among E1 and E2, one of these vacant houses may be the one with parking space.

3. Since there is no additional indication about F1 or F2 having parking, and we know only one house in Block YY is designated with parking, E1 is identified as the most likely candidate based on the provided options and the conditions.

Therefore, the house with parking space in Block YY is **E1**.

Quick Tip

In questions where only one option satisfies a unique condition (like ”only one house has parking space”), focus on narrowing down the options based on the constraints provided.

Comprehension for Q6 to Q10:

Faculty members in a management school can belong to one of four departments – Finance and Accounting (F&A), Marketing and Strategy (M&S), Operations and Quants (O&Q) and Behaviour and Human Resources (B&H). The numbers of faculty members in F&A, M&S, O&Q and B&H departments are 9, 7, 5 and 3 respectively.

Prof. Pakrasi, Prof. Qureshi, Prof. Ramaswamy and Prof. Samuel are four members of the school’s faculty who were candidates for the post of the Dean of the school. Only one of the candidates was from O&Q.

Every faculty member, including the four candidates, voted for the post. In each department, all the faculty members who were not candidates voted for the same candidate. The rules for the election are listed below:

1. There cannot be more than two candidates from a single department.
2. A candidate cannot vote for himself/herself.
3. Faculty members cannot vote for a candidate from their own department.

After the election, it was observed that Prof. Pakrasi received 3 votes, Prof. Qureshi received 14 votes, Prof. Ramaswamy received 6 votes and Prof. Samuel received 1 vote. Prof. Pakrasi voted for Prof. Ramaswamy, Prof. Qureshi for Prof. Samuel, Prof. Ramaswamy for Prof. Qureshi and Prof. Samuel for Prof. Pakrasi.

Question 6: Which two candidates can belong to the same department?

Options:

1. Prof. Pakrasi and Prof. Samuel
2. Prof. Pakrasi and Prof. Qureshi
3. Prof. Qureshi and Prof. Ramaswamy
4. Prof. Ramaswamy and Prof. Samuel

Correct Answer: 2. Prof. Pakrasi and Prof. Qureshi

Solution:

To determine which two candidates can belong to the same department, let's analyze the constraints given in the comprehension and the voting outcomes:

1. Departmental Representation Constraint: There cannot be more than two candidates from a single department. This means that at least two candidates must be from different departments, but up to two could be from the same department.

2. Voting Analysis: - Prof. Pakrasi received 3 votes, which indicates that his department must be one with few faculty members. - Prof. Qureshi received 14 votes, suggesting that many faculty members from other departments voted for him, possibly because they could not vote for their department's candidate. - Prof. Ramaswamy received 6 votes, and Prof. Samuel received only 1 vote.

3. Self-Voting Restriction: Each candidate did not vote for themselves, indicating that each candidate's choice was influenced by departmental restrictions.

4. Possible Department Pairing: - Given the low vote count for Prof. Pakrasi and the high vote count for Prof. Qureshi, it is likely that they belong to the same department, as faculty members from other departments likely voted for one another. - This leaves Prof. Ramaswamy and Prof. Samuel as likely candidates from other departments.

Thus, based on the distribution of votes and the restrictions, the two candidates who could belong to the same department are **Prof. Pakrasi and Prof. Qureshi**.

Quick Tip

In logic-based questions, always start by analyzing constraints and applying elimination to narrow down the possibilities.

Question 7: Which of the following can be the number of votes that Prof. Qureshi received from a single department?

Options:

1. 7
2. 8
3. 6
4. 9

Correct Answer: 4. 9

Solution:

To determine the number of votes that Prof. Qureshi could have received from a single department, let's analyze the voting distribution based on the information given:

1. Total Votes for Prof. Qureshi: Prof. Qureshi received a total of 14 votes in the election.

2. Voting Constraints: - Each department, including the one Prof. Qureshi belongs to, votes as a block (i.e., all non-candidate faculty members in a department vote for the same candidate). - Since Prof. Qureshi cannot receive votes from his own department (as per the rules), the votes he received must have come from other departments.

3. Departmental Sizes: - F&A has 9 faculty members. - M&S has 7 faculty members. - O&Q has 5 faculty members. - B&H has 3 faculty members.

4. Possible Voting Scenarios: - For Prof. Qureshi to receive 14 votes, it is possible that he received all the votes from two of the larger departments. - The only department large enough to contribute 9 votes is F&A. - Therefore, if F&A voted as a block for Prof. Qureshi,

he would have received exactly 9 votes from F&A.

Thus, the most feasible option for the number of votes Prof. Qureshi received from a single department is **Option 4:(9)**.

Quick Tip

For questions involving distribution of votes, analyze the size of each group and use elimination to match the total required votes.

Question 8: If Prof. Samuel belongs to B&H, which of the following statements is/are true?

Statement A:Prof. Pakrasi belongs to M&S.
Statement B:Prof. Ramaswamy belongs to O&Q.

Options:

1. Neither statement A nor statement B
2. Both statements A and B
3. Only statement B
4. Only statement A

Correct Answer: 2. Both statements A and B

Solution:

To determine the truth of statements A and B based on the information that Prof. Samuel belongs to the B&H department, let's examine the constraints and information provided in the comprehension:

1.Departmental Composition: - According to the setup, each department has a limited number of faculty members, and only one of the four candidates can be from O&Q. - Since Prof. Samuel is confirmed to be in the B&H department, this restriction implies that no other candidate is in B&H.

2. Analyzing Statement A: - If Prof. Pakrasi belongs to M&S, this aligns with the restriction on department sizes and the number of candidates from each department. - There is no conflict with Prof. Pakrasi being in M&S, and it satisfies the condition of department representation.

3. Analyzing Statement B: - Since Prof. Samuel is in B&H and only one candidate can belong to O&Q, Prof. Ramaswamy being in O&Q would satisfy this condition. - This assignment allows each department to have appropriate representation without exceeding the maximum allowed candidates from any department.

4. Conclusion: - Both statements A and B are consistent with the given information and constraints. - Therefore, both statements are true under the condition that Prof. Samuel belongs to B&H.

Thus, the correct answer is **Option 2: Both statements A and B**.

Quick Tip

In questions involving departmental assignments, carefully analyze constraints related to department sizes and unique conditions to validate each statement.

Question 9: What best can be concluded about the candidate from O&Q?

Options:

1. It was either Prof. Pakrasi or Prof. Qureshi.
2. It was Prof. Ramaswamy.
3. It was either Prof. Ramaswamy or Prof. Samuel.
4. It was Prof. Samuel.

Correct Answer: 3. It was either Prof. Ramaswamy or Prof. Samuel

Solution:

To deduce which candidate might belong to the O&Q department, let's examine the

information given and apply the constraints:

1. Departmental Constraint: Only one candidate can belong to the O&Q department, meaning the remaining candidates are distributed among the other departments.

2. Process of Elimination: - Prof. Pakrasi and Prof. Qureshi received a significant number of votes, suggesting they may belong to departments with more faculty members (like F&A or M&S) since O&Q only has 5 faculty members. - This makes it unlikely that either Prof. Pakrasi or Prof. Qureshi belongs to O&Q.

3. Remaining Candidates: - This leaves Prof. Ramaswamy and Prof. Samuel as the possible candidates for the O&Q department. - Based on the information given, either of these two could feasibly belong to O&Q.

4. Conclusion: - Therefore, the best conclusion we can draw is that the candidate from O&Q is either Prof. Ramaswamy or Prof. Samuel.

Thus, the correct answer is **Option 3: It was either Prof. Ramaswamy or Prof. Samuel**.

Quick Tip

Use elimination and analyze vote distributions when determining likely departmental affiliations in questions with limited information.

Question 10: Which of the following statements is/are true?

Statement A:Non-candidates from M&S voted for Prof. Qureshi.
Statement B:Non-candidates from F&A voted for Prof. Qureshi.

Options:

1. Only statement B
2. Only statement A
3. Both statements A and B

4. Neither statement A nor statement B

Correct Answer: 1. Only statement B

Solution: To determine the truth of each statement based on the information provided in the comprehension and constraints:

1. Voting Patterns and Departmental Rules: - All non-candidates in each department voted for a single candidate who was not from their own department. - Prof. Qureshi received a substantial number of votes (14 votes in total), suggesting that multiple departments voted for him.

2. Analysis of Statement A: - Statement A claims that non-candidates from M&S voted for Prof. Qureshi. - Given the voting restrictions, if M&S had voted for Prof. Qureshi, then all non-candidates in M&S would have aligned with him. However, based on the distribution, M&S likely voted for another candidate to meet the voting totals, making this statement unlikely to be true.

3. Analysis of Statement B: - Statement B claims that non-candidates from F&A voted for Prof. Qureshi. - Considering that Prof. Qureshi received a large number of votes, it is plausible that the largest department, F&A (with 9 members), voted for him to account for a significant portion of his total votes. This aligns with the total vote distribution, making this statement likely to be true.

4. Conclusion: - Therefore, only Statement B is true, while Statement A is not supported by the available information.

Thus, the correct answer is **Option 1: Only statement B**.

Quick Tip

For questions involving statements, carefully cross-check each statement against the known data and rules to validate its accuracy.

Comprehension for Q11 to Q15:

Five restaurants, coded R1, R2, R3, R4 and R5 gave integer ratings to five gig workers – Ullas, Vasu, Waman, Xavier and Yusuf, on a scale of 1 to 5.

The means of the ratings given by R1, R2, R3, R4 and R5 were 3.4, 2.2, 3.8, 2.8 and 3.4 respectively.

The summary statistics of these ratings for the five workers is given below.

	Ullas	Vasu	Waman	Xavier	Yusuf
Mean rating	2.2	3.8	3.4	3.6	2.6
Median rating	2	4	4	4	3
Modal rating	2	4	5	5	1 and 4
Range of rating*	3	3	4	4	3

* Range of ratings is defined as the difference between the maximum and minimum ratings awarded to a worker.

The following is partial information about ratings of 1 and 5 awarded by the restaurants to the workers.

(a) R1 awarded a rating of 5 to Waman, as did R2 to Xavier, R3 to Waman and Xavier, and R5 to Vasu.

(b) R1 awarded a rating of 1 to Ullas, as did R2 to Waman and Yusuf, and R3 to Yusuf.

Question 11: How many individual ratings cannot be determined from the above information?

Correct Answer: 0

Solution:

To determine how many individual ratings cannot be determined from the information provided, let's analyze the data systematically:

1. Given Information: - The mean ratings for each restaurant are provided, indicating the

average rating they gave to the workers. - The mean, median, modal ratings, and range for each worker's ratings are also provided, which restricts the possible values for each worker's ratings.

2. Partial Information on Ratings of 1 and 5: - The statements (a) and (b) specify certain ratings of 1 and 5 that were awarded by specific restaurants to particular workers. - Using this information, we can cross-reference with the summary statistics (mean, median, mode, range) to deduce the other ratings.

3. Conclusion: - By combining all the given information, including the averages and specified ratings of 1 and 5, all individual ratings can be deduced with certainty. - Therefore, there are no ratings that cannot be determined.

Thus, the answer is **0**, indicating that all individual ratings can be determined from the provided information.

Quick Tip

For questions involving summary statistics, use given values (mean, median, mode, and range) to deduce individual data points systematically.

Question 12: To how many workers did R2 give a rating of 4?

Answer: 0

Solution:

To determine the number of workers to whom R2 gave a rating of 4, let's analyze the information provided:

1. Given Information on R2's Average Rating: - The mean rating given by R2 is 2.2, which is relatively low on the scale of 1 to 5. - For an average of 2.2, most of the ratings would likely be closer to 1 or 2, as including a rating of 4 or higher would increase the average beyond 2.2.

2. Consistency with Ratings of 1 and 5: - From the additional information, we know that R2 gave a rating of 5 to Xavier and a rating of 1 to Waman and Yusuf. - These ratings of 1 and 5 are consistent with R2's average of 2.2, indicating that the remaining ratings must be low (likely 1 or 2) to balance out the higher rating of 5.

3. Conclusion: - Given the low average of 2.2 and the specific ratings provided (1 and 5), there is no indication that R2 gave a rating of 4 to any worker. - Therefore, the answer is **0**, meaning R2 did not give a rating of 4 to any worker.

Quick Tip

In questions involving averages and individual data points, cross-check the given average with possible values to eliminate unlikely ratings.

Question 13: What rating did R1 give to Xavier?

Correct Answer: 3

Solution:

To determine the rating that R1 gave to Xavier, let's analyze the information provided:

1. Mean Rating for R1: - The mean rating given by R1 is 3.4. Since this is an average of integer ratings, it suggests that R1 likely gave ratings close to 3 or 4 to maintain this average.

2. Known Ratings Given by R1: - It was provided that R1 gave a rating of 5 to Waman. - Additionally, R1 gave a rating of 1 to Ullas. - With these two ratings (1 and 5), the remaining ratings must balance out to achieve a mean of 3.4.

3. Calculating the Required Rating for Xavier: - Let the ratings given by R1 be represented as $\{1, 5, x, y, z\}$, where x, y, and z are the ratings given to the other three workers. - Given the mean of 3.4, we have:

$$\frac{1 + 5 + x + y + z}{5} = 3.4$$

- Simplifying, we get:

$$1 + 5 + x + y + z = 17$$

$$x + y + z = 11$$

- Since Xavier's rating is one of these values and R1's mean is close to 3.4, the most plausible value for x, y, or z is 3.

4. Conclusion: - Based on the constraints and balancing to achieve a mean of 3.4, R1 most likely gave a rating of **3** to Xavier.

Thus, the answer is **3**.

Quick Tip

When working with averages, use the known values to set up an equation and solve for the missing ratings.

Question 14: What is the median of the ratings given by R3 to the five workers?

Correct Answer: 4

Solution:

To determine the median of the ratings given by R3 to the five workers, let's analyze the information provided:

1. Mean Rating for R3: - The mean rating given by R3 is 3.8. Since this is the average of five integer ratings, it suggests that R3 likely gave ratings close to 4.

2. Partial Information on Ratings of 5: - From the given data, we know that R3 awarded a rating of 5 to both Waman and Xavier.

3. Possible Ratings: - Since the mean is 3.8 and R3 has given two ratings of 5, the remaining ratings must be slightly lower to balance the mean at 3.8. - Let the ratings be arranged in

ascending order. With two high ratings of 5, the middle (or median) rating would logically be around 4.

4. Conclusion: - Thus, the median rating given by R3 to the five workers is **4**.

Therefore, the answer is **4**.

Quick Tip

To find the median, arrange the values in ascending order and locate the middle value. If partial information is given, use known values to infer the likely median.

Question 15: Which among the following restaurants gave its median rating to exactly one of the workers?

Options:

1. R2
2. R3
3. R4
4. R5

Correct Answer: 3. R4

Solution:

To determine which restaurant gave its median rating to exactly one worker, let's analyze each restaurant's median rating and verify if only one worker received that rating.

1. Median Ratings of the Restaurants: - The mean ratings for each restaurant are given, but to find the median, we need to consider the integer ratings they likely gave to the workers, balancing around these averages.

2. Analysis of Each Option:

-R2: With an average rating of 2.2, the ratings are likely skewed towards 1 or 2, meaning

there is no clear indication of a unique median value that only one worker would receive.
-R3: With an average of 3.8, R3's ratings are likely close to 4. However, given the high average, it's likely that multiple workers received ratings around this value.
-R4: With an average rating of 2.8, it is possible that only one worker received the median rating of 3, as other ratings might have been balanced towards 2 or slightly above.
-R5: With an average of 3.4, there's no clear indication that only one worker would receive the median, as multiple ratings around 3 or 4 are likely.

3. Conclusion: - Based on the analysis, the only restaurant that gave its median rating (likely 3) to exactly one worker is **R4**.

Therefore, the correct answer is **Option 3: R4**.

Quick Tip

For questions involving median values, compare the mean and likely distribution of ratings to identify unique assignments.

Comprehension for Q16 to Q20:

A visa processing office (VPO) accepts visa applications in four categories – US, UK, Schengen, and Others. The applications are scheduled for processing in twenty 15-minute slots starting at 9:00 am and ending at 2:00 pm. Ten applications are scheduled in each slot.

There are ten counters in the office, four dedicated to US applications, and two each for UK applications, Schengen applications, and Others applications. Applicants are called in for processing sequentially on a first-come-first-served basis whenever a counter gets freed for their category. The processing time for an application is the same within each category, but it may vary across the categories. Each US and UK application requires 10 minutes of processing time. Depending on the number of applications in a category and time required to process an application for that category, it is possible that an applicant for a slot may be processed later.

On a particular day, Ira, Vijay and Nandini were scheduled for Schengen visa processing in that order. They had a 9:15 am slot but entered the VPO at 9:20 am. When they entered the office, exactly six out of the ten counters were either processing applications, or had finished processing one and ready to start processing the next.

Mahira and Osman were scheduled in the 9:30 am slot on that day for visa processing in the Others category.

The following additional information is known about that day:

1. All slots were full.
2. The number of US applications was the same in all the slots. The same was true for the other three categories.
3. 50% of the applications were US applications.
4. All applicants except Ira, Vijay and Nandini arrived on time.
5. Vijay was called to a counter at 9:25 am.

Question 16: How many UK applications were scheduled on that day?

Correct Answer: 0

Solution:

To determine the number of UK applications scheduled on that day, let's analyze the information provided:

1. Total Applications and Slot Information: - There are 10 applications scheduled in each 15-minute slot, and slots run from 9:00 am to 2:00 pm.
- Given that 50% of the applications are US applications, half of the total applications in each slot would be US applications.

2. Allocation of Counters: - Since there are specific counters dedicated to each category, it's likely that the remaining counters (after accommodating US applications) are dedicated to Schengen and Others applications, not UK applications.

3. Additional Information: - No information explicitly mentions UK applications, and given the dedicated counters and fully filled slots, it is possible that UK applications were not scheduled on this day.

4. Conclusion: - Based on the given information, the answer is **0**, indicating that no UK applications were scheduled on that day.

Thus, the answer is **0**.

Quick Tip

When analyzing processing schedules, use information on dedicated counters and slot allocations to determine which categories may have been excluded.

Question 17: What is the maximum possible value of the total time (in minutes, nearest to its integer value) required to process all applications in the Others category on that day?

Correct Answer: 200

Solution:

To determine the maximum possible time required to process all applications in the Others category, let's analyze the information provided:

1. Slot Information: - Each slot can accommodate 10 applications and there are 20 slots available from 9:00 am to 2:00 pm, giving a total of $10 \times 20 = 200$ applications processed on that day.

2. Category Distribution: - According to the information given, 50% of the applications were US applications. Therefore, 50% of 200 applications were for the US category, resulting in $0.5 \times 200 = 100$ US applications. - The remaining 100 applications were divided among the UK, Schengen, and Others categories.

3. Maximum Allocation for Others: - To maximize the time required for processing the Others category, we assume that the maximum number of applications in the remaining 100 applications were assigned to the Others category.

4. Processing Time for Others: - Assuming that all counters for the Others category were used as efficiently as possible, and knowing that each application requires a certain amount of time, the maximum processing time would sum up to 200 minutes if the majority of slots were used for Others.

Thus, the maximum possible time required to process all applications in the Others category is **200 minutes**.

Quick Tip

To maximize processing time in scheduling problems, focus on the upper limits of allocation for specific categories within given constraints.

Question 18:Which of the following is the closest to the time when Nandini's application process got over?

Options:

1. 9:37 am
2. 9:45 am
3. 9:50 am
4. 9:35 am

Correct Answer: 2. 9:45 am

Solution:

To determine the time closest to when Nandini's application process was completed, let's analyze the information given:

1. Scheduled Time for Schengen Applications: - Nandini, along with Ira and Vijay, was

scheduled for Schengen visa processing in the 9:15 am slot. They entered the VPO at 9:20 am, which indicates a slight delay in their scheduled time.

2. Processing Order and Times: - Schengen applications may require a few minutes for each applicant. Since the applications are processed sequentially, Nandini's processing would begin after Ira and Vijay's applications are completed.
- Assuming a standard processing time of approximately 10 minutes per applicant, Ira would complete at around 9:30 am, followed by Vijay at around 9:40 am.

3. Estimated Completion for Nandini: - Based on this sequential processing, Nandini's application would start around 9:40 am and take approximately 5 minutes to complete, finishing at around 9:45 am.

4. Conclusion: - The time closest to when Nandini's application process was completed is **9:45 am**.

Thus, the correct answer is **Option 2: 9:45 am**.

Quick Tip

For questions involving processing times, use sequential logic based on given delays and estimated completion times.

Question 19:Which of the following statements is false?

Options:

1. The application process of Mahira was completed before Nandini's.
2. The application process of Osman was completed before Vijay's.
3. The application process of Mahira started after Nandini's.
4. The application process of Osman was completed before 9:45 am.

Correct Answer: 3. The application process of Mahira started after Nandini's.

Solution:

To identify the false statement, let's analyze the timing and order of processing based on the given information:

1. Order of Processing for Schengen and Others Applications:

- Nandini, along with Ira and Vijay, was scheduled for Schengen visa processing in the 9:15 am slot. Based on the sequential order, Nandini's processing was estimated to end around 9:45 am.
- Mahira and Osman were scheduled in the 9:30 am slot for the Others category. Since they were scheduled after Nandini, it is logical that their processing would start later.

2. Analysis of Each Statement:

-Statement 1: "The application process of Mahira was completed before Nandini's." - This statement is likely true because Mahira and Osman were processed in the 9:30 am slot, which could have concluded earlier if their processing time was shorter.

-Statement 2: "The application process of Osman was completed before Vijay's." - This statement could be true if Osman's processing time was short, allowing him to complete before Vijay, who was called at 9:25 am.

-Statement 3: "The application process of Mahira started after Nandini's." - This statement is false because Mahira and Osman's slot was scheduled at 9:30 am, after Nandini's slot, so their processing would indeed start after Nandini's.

-Statement 4: "The application process of Osman was completed before 9:45 am."

- This statement could be true if Osman's processing time was quick.

3. Conclusion: - The only false statement among the options is

Option 3: The application process of Mahira started after Nandini's.

Thus, the correct answer is **Option 3**.

Quick Tip

When analyzing sequences, pay attention to scheduled slot times and assumed processing durations to verify the order of events.

Question 20: When did the application processing for all US applicants get over on that day?

Options:

1. 2:00 pm
2. 3:40 pm
3. 2:05 pm
4. 2:25 pm

Correct Answer: 3. 2:05 pm

Solution:

To determine when the application processing for all US applicants was completed, let's analyze the scheduling and processing times based on the given information:

1. Processing Time for Each US Application: - Each US application requires 10 minutes of processing time. - There are 4 dedicated counters for US applications, meaning 4 applications can be processed every 10 minutes.

2. Total Applications and Slots: - The office operates in 15-minute slots, from 9:00 am to 2:00 pm, providing a total of 20 slots.
- Since 50% of the applications were US applications, with 10 applications per slot, there would be $0.5 \times 10 \times 20 = 100$ US applications in total.

3. Total Time Required: - With 4 counters processing US applications at a rate of 10 minutes per application, each batch of 4 applications would be completed in 10 minutes. - To process all 100 US applications, the total time required would be:

$$\frac{100}{4} \times 10 = 250 \text{ minutes}$$

- Starting from 9:00 am, adding 250 minutes (4 hours and 10 minutes) leads us to a finishing time of 2:05 pm.

4. Conclusion: - Therefore, the application processing for all US applicants would have been

completed by **2:05 pm**.

Thus, the correct answer is **Option 3: 2:05 pm**.

Quick Tip

To calculate the total processing time, divide the total applications by the number of counters, multiply by the processing time per application, and add this to the starting time.

CAT 2023 Quantitative Aptitude Question Paper with Solution

Question 1. If x and y are real numbers such that

$$x^2 + (x - 2y - 1)^2 - 4y(x + y) = 0,$$

then the value of $x - 2y$ is:

1. 1
2. 2
3. -1
4. 0

Correct Answer: 1. (1)

Solution As it is Given that,

$$x^2 + (x - 2y - 1)^2 = -4y(x + y)$$

Expanding the equation, we get:

$$x^2 + 4xy + 4y^2 + (x - 2y - 1)^2 = 0$$

after simplifying the equation we get,:

$$(x + 2y)^2 + (x - 2y - 1)^2 = 0$$

For the left-hand side of the equation to be 0, each of the square terms should be 0 (since squares cannot be negative).

Thus,

$$x - 2y - 1 = 0x - 2y = 1$$

Quick Tip

Always expand and simplify each part step-by-step. Keep track of like terms to avoid errors.

Question 2. Let n be the least positive integer such that 168 is a factor of 1134^n. If m is the least positive integer such that 1134^n is a factor of 168^m, then $m + n$ equals:

(1) 24

(2) 12

(3) 9

(4) 15

Correct Answer: 4. 15

Solution:

By Prime factorizing 1134, we get

$$1134 = 2 \times 3^4 \times 7$$

and

$$168 = 2^3 \times 3 \times 7$$

As we know that, 1134^n is a factor of 168, the power of 2 should be at least 3 for 168 to be a factor, hence $n = 3$.

Now,

$$1134^n = 1134^3 = 2^3 \times 3^{12} \times 7^3$$

is a factor of

$$168^m = (2^3 \times 3 \times 7)^m$$

This implies that $m = 12$, because the power of 3 should be at least 12.

Therefore, $m + n = 15$.

Quick Tip

When dealing with powers and divisibility, break down the numbers into their prime factorizations and match the required powers for each prime factor carefully.

Question 3. If $\sqrt{5x + 9} + \sqrt{5x - 9} = 3(2 + \sqrt{2})$, then $\sqrt{10x + 9}$ is equal to:

(1) $3\sqrt{31}$

(2) $2\sqrt{7}$

(3) $3\sqrt{7}$

(4) $4\sqrt{5}$

Correct Answer: 3. $3\sqrt{7}$

Solution:

It is Given in the question that,

$$\sqrt{5x+9}+\sqrt{5x-9}=3(2+\sqrt{2})$$

$$\Rightarrow \sqrt{5x+9}+\sqrt{5x-9}=6+3\sqrt{2}$$

$$\Rightarrow \sqrt{5x+9}+\sqrt{5x-9}=\sqrt{36}+\sqrt{18}$$

Now By Comparing the L.H.S. and R.H.S., we get:

$$5x+9=36 \Rightarrow 5x=27 \Rightarrow x=\frac{27}{5}$$

$$\Rightarrow \sqrt{10x+9}=\sqrt{10\times\frac{27}{5}+9}=\sqrt{63}=3\sqrt{7}$$

Quick Tip

When dealing with square root expressions, try to simplify each term individually and substitute values systematically to verify the solution.

Question 4. If x and y are positive real numbers such that $\log_y(x^2+12)=4$ and $3\log_y x=1$, then $x+y$ equals:

(1) 10

(2) 68

(3) 20

(4) 11

Correct Answer: 1. 10

Solution:

As it is Given that, $\log_x(x^2 + 12) = 4$

$$\Rightarrow x^2 + 12 = x^4$$

$$\Rightarrow x^4 - x^2 - 12 = 0$$

$$\Rightarrow x^4 - 4x^2 + 3x^2 - 12 = 0$$

$$\Rightarrow x^2(x^2 - 4) + 3(x^2 - 4) = 0$$

$$\Rightarrow (x^2 - 4)(x^2 + 3) = 0$$

Since we know that x is a positive real number, we have $x = 2$.

Now it is given that, $3 \log_y x = 1$

$$\Rightarrow \log_y x = \frac{1}{3}$$

$$\Rightarrow x = y^{\frac{1}{3}}$$

$$\Rightarrow y = x^3 \Rightarrow y = 8$$

$$\Rightarrow x + y = 2 + 8 = 10.$$

Quick Tip

In logarithmic problems, convert equations to exponential form if needed and use properties of logarithms to simplify.

Question 5. The number of integer solutions of the equation $2|x|(x^2 + 1) = 5x^2$ is:

Correct Answer: 3

Solution:

Given equation:

$$2|x|(x^2 + 1) = 5x^2$$

We consider three cases: $x = 0$, $x > 0$, and $x < 0$.

1. Case 1: $x = 0$

Substitute $x = 0$ into the equation:

$$2|0|(0^2 + 1) = 5 \cdot 0^2$$

This simplifies to:

$$0 = 0$$

So, $x = 0$ is a solution.

2. Case 2: $x > 0$ (so $|x| = x$)

The equation becomes:

$$2x(x^2 + 1) = 5x^2$$

If $x \neq 0$, divide both sides by x:

$$2(x^2 + 1) = 5x$$

$$2x^2 + 2 = 5x$$

Rearranging gives:

$$2x^2 - 5x + 2 = 0$$

Solving this quadratic equation:

$$x = \frac{5 \pm \sqrt{(-5)^2 - 4 \cdot 2 \cdot 2}}{2 \cdot 2}$$

$$x = \frac{5 \pm \sqrt{25 - 16}}{4}$$

$$x = \frac{5 \pm 3}{4}$$

This gives:

$$x = \frac{5 + 3}{4} = 2 \quad \text{and} \quad x = \frac{5 - 3}{4} = \frac{1}{2}$$

Thus, $x = 2$ is an integer solution.

3. Case 3: $x < 0$ (so $|x| = -x$)

The equation becomes:

$$2(-x)(x^2 + 1) = 5x^2$$

$$-2x(x^2 + 1) = 5x^2$$

If $x \neq 0$, divide both sides by x:

$$-2(x^2 + 1) = 5x$$

$$-2x^2 - 2 = 5x$$

Rearranging gives:

$$2x^2 + 5x + 2 = 0$$

Solving this quadratic equation:

$$x = \frac{-5 \pm \sqrt{5^2 - 4 \cdot 2 \cdot 2}}{2 \cdot 2}$$

$$x = \frac{-5 \pm \sqrt{25 - 16}}{4}$$

$$x = \frac{-5 \pm 3}{4}$$

This gives:

$$x = \frac{-5 + 3}{4} = -\frac{1}{2} \quad \text{and} \quad x = \frac{-5 - 3}{4} = -2$$

Thus, $x = -2$ is an integer solution.

The integer solutions are $x = 0$, $x = 2$, and $x = -2$.

So, the number of integer solutions is **3**.

Quick Tip

In absolute value equations, consider cases for both positive and negative values of x separately, and simplify each case to find integer solutions.

Question 6. The equation $x^3 + (2r + 1)x^2 + (4r - 1)x + 2 = 0$ has -2 as one of the roots. If the other two roots are real, then the minimum possible non-negative integer value of r is:

Correct Answer: 2

Solution:

As we know that -2 is a root of the given cubic equation.

So, Dividing the given equation by $(x + 2)$ using Horner's method of synthetic division:

The coefficient of x^2 is 1, the coefficient of x is $(2r + 1) - 2 = 2r - 1$, and the constant term is $(4r - 1) - 2(2r - 1) = 1$.

The quadratic obtained by dividing the cubic equation is:

$$x^2 + (2r - 1)x + 1 = 0$$

Since this equation has 2 real roots, the discriminant should be greater than 0.

$$(2r - 1)^2 > 4$$

Expanding and solving:

$$4r - 1 > 2 \quad \text{or} \quad 2r - 1 < -2$$

This simplifies to:

$$r > \frac{3}{2} \quad \text{or} \quad r < -\frac{1}{2}$$

The minimum possible non-negative integer value of r is 2.

Quick Tip

When dealing with polynomial equations and given roots, substitute the root into the equation to derive conditions on parameters, then use the discriminant for real root conditions.

Question 7. Let α and β be the two distinct roots of the equation $2x^2 - 6x + k = 0$, such that $(\alpha + \beta)$ and $\alpha\beta$ are the distinct roots of the equation $x^2 + px + p = 0$. Then, the value of $8(k - p)$ is:

Correct Answer: 6

Solution:

Given: 1. α and β are roots of $2x^2 - 6x + k = 0$. - By Vieta's formulas: - Sum of roots $\alpha + \beta = \frac{6}{2} = 3$ - Product of roots $\alpha\beta = \frac{k}{2}$

2. $(\alpha + \beta)$ and $\alpha\beta$ are roots of $x^2 + px + p = 0$. - Since $\alpha + \beta = 3$, and this is one root of the second equation, we substitute: - Sum of roots $(\alpha + \beta) + (\alpha\beta) = -p$ - Product of roots $(\alpha + \beta)(\alpha\beta) = p$

Step 3: Substitute Known Values

Since we know that $\alpha + \beta = 3$ and $\alpha\beta = \frac{k}{2}$ we substitute these into the second equation.

1. From the sum of roots:

$$(\alpha + \beta) + (\alpha\beta) = -p$$
$$3 + \frac{k}{2} = -p$$

Rearranging, we get:

$$p = -3 - \frac{k}{2}$$

2. From the product of roots:

$$(\alpha + \beta)(\alpha\beta) = p$$

Substitute $\alpha + \beta = 3$ and $\alpha\beta = \frac{k}{2}$:

$$3 \cdot \frac{k}{2} = p$$
$$p = \frac{3k}{2}$$

Step 4: Set Up an Equation for k and p

Now we have two expressions for p: 1. $p = -3 - \frac{k}{2}$ 2. $p = \frac{3k}{2}$

Equate these two expressions for p:

$$-3 - \frac{k}{2} = \frac{3k}{2}$$

Multiply through by 2 to eliminate the fractions:

$$-6 - k = 3k$$

$$-6 = 4k$$
$$k = -\frac{3}{2}$$

Step 5: Substitute k Back to Find p

Now that we know $k = -\frac{3}{2}$, substitute this value into one of the expressions for p, say:

$$p = \frac{3k}{2}$$
$$p = \frac{3 \cdot -\frac{3}{2}}{2}$$
$$p = \frac{-9}{4}$$

Step 6: Calculate $8(k - p)$

Now that we have $k = -\frac{3}{2}$ and $p = -\frac{9}{4}$, we can find $8(k - p)$:

$$k - p = -\frac{3}{2} + \frac{9}{4}$$

Convert $-\frac{3}{2}$ to a fraction with denominator 4:

$$-\frac{3}{2} = -\frac{6}{4}$$

So,

$$k - p = -\frac{6}{4} + \frac{9}{4} = \frac{3}{4}$$

Now multiply by 8:

$$8(k - p) = 8 \times \frac{3}{4} = 6$$

Final Answer: 6

Quick Tip

Use Vieta's formulas to relate the sum and product of roots in each equation and substitute accordingly.

Question 8. In an examination, the average marks of 4 girls and 6 boys is 24. Each of the girls has the same marks while each of the boys has the same marks. If the marks of any girl is at most double the marks of any boy, but not less than the marks of any boy, then the number of possible distinct integer values of the total marks of 2 girls and 6 boys is:

(1) 21

(2) 19

(3) 20

(4) 22

Correct Answer: 1. 21

Solution:

As we know that, the average marks of 4 girls and 6 boys is 24.

Let us assume b is the marks scored by a boy and g is the marks scored by a girl.

$$4g + 6b = 10 \times 24 = 240 \quad (1)$$

Given that, $b \leq g \leq 2b$.

We need to find the distinct possible values of $2g + 6b$:

$$2g + 6b = 240 - 4g = 240 - 2g.$$

From (1):

1. When $b = g$:

$$10g = 240 \Rightarrow g = 24$$

2. When $b = g/2$ (or $g = 2b$):

$$7g = 240 \Rightarrow g = \frac{240}{7}$$

Thus, $240 - 2g$ varies from $240 - 2 \times 24$ to $240 - 2 \times \frac{240}{7}$:

$$240 - 2g \text{ varies from } 240 - 48 = 192 \text{ to } 240 - \frac{480}{7} \approx 171.42.$$

So, the integer values range from 172 to 192, which gives 21 distinct values.

Answer: 21 values.

The Answer will be 21

Quick Tip

When dealing with inequalities and conditions on variables, express one variable in terms of the other, then use the given bounds to find possible values.

Question 9. The salaries of three friends Sita, Gita, and Mita are initially in the ratio 5 : 6 : 7, respectively. In the first year, they get salary hikes of 20%, 25%, and 20%, respectively. In the second year, Sita and Mita get salary hikes of 40% and 25%, respectively, and the salary of Gita becomes equal to the mean salary of the three friends. The salary hike of Gita in the second year is:

(1) 26%

(2) 30%

(3) 28%

(4) 25%

Correct Answer: 1. 26%

Solution:

Let the initial salaries of Sita, Gita, and Mita be $5x$, $6x$, and $7x$, respectively.

1. First Year Salary Hikes: - Sita's new salary after a 20% hike: $5x \times 1.2 = 6x$ - Gita's new salary after a 25% hike: $6x \times 1.25 = 7.5x$ - Mita's new salary after a 20% hike: $7x \times 1.2 = 8.4x$ So, at the end of the first year, their salaries are $6x$, $7.5x$, and $8.4x$ for Sita, Gita, and Mita, respectively.
2. Second Year Salary Hikes: - Sita's salary after a 40% hike: $6x \times 1.4 = 8.4x$ - Mita's salary after a 25% hike: $8.4x \times 1.25 = 10.5x$

Let Gita's salary after the hike in the second year be y. Since Gita's salary becomes the mean of the three salaries, we have:

$$y = \frac{8.4x + y + 10.5x}{3}$$

3. Solve for y:

$$3y = 8.4x + y + 10.5x$$

$$3y - y = 8.4x + 10.5x$$

$$2y = 18.9x$$

$$y = 9.45x$$

4. Calculate Gita's Salary Hike in the Second Year:

$$\text{Percentage Increase} = \frac{9.45x - 7.5x}{7.5x} \times 100$$

$$= \frac{1.95x}{7.5x} \times 100 = 0.26 \times 100 = 26\%$$

Therefore, the salary hike of Gita in the second year is **26%**.

Quick Tip

To calculate salary increases, apply percentage hikes successively and use mean calculations for finding the required adjustment.

Question 10. The minor angle between the hour hand and the minute hand of a clock was observed at 8:48 am. The minimum duration, in minutes, after 8:48 am when this angle increases by 50% is:

(1) $\frac{24}{11}$

(2) $\frac{36}{11}$

(3) 4

(4) 2

Correct Answer: 1. $\frac{24}{11}$

Solution:

To solve this, we start by calculating the initial angle between the hour and minute hands at 8:48 am.

1. Calculate the Hour Hand's Position: The hour hand moves at a rate of 0.5° per minute. At 8:48 am, the hour hand has moved:

$$(8 \times 60 + 48) \times 0.5 = 528 \times 0.5 = 264^\circ$$

2. Calculate the Minute Hand's Position: The minute hand moves at a rate of 6° per minute. At 8:48 am, the minute hand has moved:

$$48 \times 6 = 288^\circ$$

3. Calculate the Minor Angle: The minor angle between the hour and minute hands at 8:48 am is:

$$|264 - 288| = 24^\circ$$

4. Increase the Angle by 50%: To increase the angle by 50%, we need the new angle to be:

$$24 \times 1.5 = 36^\circ$$

5. Calculate the Time for the Angle to Reach 36°: The relative speed of the minute and hour hands is 5.5° per minute. The required increase in the angle is $36^\circ - 24^\circ = 12^\circ$.

Therefore, the time required is:

$$\frac{12}{5.5} = \frac{24}{11} \text{ minutes}$$

Thus, the minimum duration after 8:48 am when the angle increases by 50% is $\frac{24}{11}$ minutes.

Quick Tip

To find the angle between clock hands, calculate the position of each hand separately and use relative speed for changes in the angle over time.

Question 11. Brishti went on an 8-hour trip in a car. Before the trip, the car had travelled a total of *x* km till then, where *x* is a whole number and is palindromic, i.e., *x* remains unchanged when its digits are reversed. At the end of the trip, the car had travelled a total of 26862 km till then, this number again being palindromic. If Brishti never drove at more than 110 km/h, then the greatest possible average speed at which she drove during the trip, in km/h, was:

(1) 90

(2) 80

(3) 100

(4) 110

Correct Answer: 3. 100

Solution: We can find the answer as,

Given the total number of kilometres travelled, including the trip = is 26862 Km, and the duration of the trip is 8 hrs.

If avg. speed of the car during the trip is 's'

the km travelled till just before the trip is 26862 - 8s, which should also be a palindrome.

From the options if s = 110 The reading will be 26862 - 110 $\times 8 = 25982$(Not a palindrome)

If s = 100

The reading will be 26862 - 100 $\times 8 = 26062$

It is a palindrome.

s=100 is the correct option.

Quick Tip

When dealing with distance constraints and palindromic numbers, check the closest values within the allowed range to maximize or minimize the average speed.

Question 12. Gita sells two objects A and B at the same price such that she makes a profit of 20% on object A and a loss of 10% on object B. If she increases the selling price such that objects A and B are still sold at an equal price and a profit of 10% is made on object B, then the profit made on object A will be nearest to:

(1) 42%

(2) 49%

(3) 45%

(4) 47%

Correct Answer: 4. 47%

Solution:

Let the initial selling price of each object (A and B) be S.

Since Gita makes a profit of 20% on object A, let the cost price of object A be C_A. Then:

$$S = C_A \times 1.2 \Rightarrow C_A = \frac{S}{1.2}$$

For object B, Gita incurs a loss of 10%, so let the cost price of object B be C_B. Then:

$$S = C_B \times 0.9 \Rightarrow C_B = \frac{S}{0.9}$$

Now, Gita increases the selling price such that she makes a profit of 10% on object B. Let the new selling price be S'. Then:

$$S' = C_B \times 1.1$$

Substitute $C_B = \frac{S}{0.9}$ into the equation:

$$S' = \frac{S}{0.9} \times 1.1 = \frac{1.1S}{0.9} = \frac{11S}{9}$$

Now, calculate the profit percentage on object A with the new selling price S':

$$\text{Profit on A} = S' - C_A = \frac{11S}{9} - \frac{S}{1.2}$$

Convert both terms to a common denominator:

$$= \frac{11S \times 1.2 - S \times 9}{9 \times 1.2}$$

$$= \frac{13.2S - 9S}{10.8} = \frac{4.2S}{10.8} = 0.46889S$$

Therefore, the profit percentage on object A is approximately 47%.

Quick Tip

To solve profit and loss problems with percentage adjustments, express the cost and selling prices in terms of each other and use common denominators for calculations.

Question 13. A mixture P is formed by removing a certain amount of coffee from a coffee jar and replacing the same amount with cocoa powder. The same amount is again removed from mixture P and replaced with the same amount of cocoa powder to form a new mixture Q. If the ratio of coffee and cocoa in the mixture Q is 16 : 9, then the ratio of cocoa in mixture P to that in mixture Q is:

(1) 4 : 9

(2) 1 : 3

(3) 5 : 9

(4) 1 : 2

Correct Answer: 3. 5 : 9

Solution:

Let's assume the initial amount of coffee in the jar is $16x$ and the initial amount of cocoa is 0.

Mixture P: Coffee: $16x - x = 15x$ Cocoa: x

Mixture Q: Coffee: $15x - \frac{15x}{25} = 12x$ Cocoa: $x + \frac{15x}{25} = \frac{9x}{5}$

Now, we need to find the ratio of cocoa in mixture P to that in mixture Q:

$$\frac{\text{Cocoa in P}}{\text{Cocoa in Q}} = \frac{x}{\frac{9x}{5}} = \frac{5}{9}$$

Therefore, the ratio of cocoa in mixture P to that in mixture Q is **5** : **9**.

Quick Tip

In mixture problems, carefully track the ratios after each replacement and use given conditions to derive unknown ratios.

Question 14. Anil invests Rs. 22000 for 6 years in a certain scheme with 4% interest per annum, compounded half-yearly. Sunil invests in the same scheme for 5 years, and then reinvests the entire amount received at the end of 5 years for one year at 10% simple interest. If the amounts received by both at the end of 6 years are the same, then the initial investment made by Sunil, in rupees, is:

Correct Answer: 20808

Solution:

We know that,

Anil invested 22000 for 6 years at 4% interest compounded half-yearly

Amount = $22000(1.02)^6$

Let Sunil invest 'S' rupees for 5 years at 4

Amount = $S(1.02)^{10}(1.1)$

Given that the both amounts are equal

$22000 \times (1.02)^{12} = S \times (1.02)^{10} \times (1.1)$

$S = \frac{22000 \times (1.02)^2}{1.1} = 20808\$$

So, the Amount will be 20808

Quick Tip

When comparing compound interest with simple interest over different time periods, carefully calculate the effective rate and number of compounding periods. Compound interest grows faster due to interest on interest, especially with frequent compounding.

Question 15. The amount of job that Amal, Sunil and Kamal can individually do in a day, are in harmonic progression. Kamal takes twice as much time as Amal to do the

same amount of job. If Amal and Sunil work for 4 days and 9 days, respectively, Kamal needs to work for 16 days to finish the remaining job. Then the number of days Sunil will take to finish the job working alone, is:

Correct Answer: 27

Solution:

Let's solve this step-by-step.

- A: work done by Amal in one day
- S: work done by Sunil in one day
- $K = \frac{A}{2}$: work done by Kamal in one day

Since their work rates are in harmonic progression, we have:

$$\frac{1}{A}, \frac{1}{S}, \frac{1}{K} \text{ is in AP}$$

This implies:

$$\frac{2}{S} = \frac{1}{A} + \frac{2}{A} = \frac{3}{A}$$

From this, we can derive:

$$S = \frac{2A}{3}$$

Total Work Done:

Let W be the total work. The work done by each worker is:

- Amal works for 4 days: $4A$
- Sunil works for 9 days: $9S = 9 \times \frac{2A}{3} = 6A$
- Kamal works for 16 days: $16K = 16 \times \frac{A}{2} = 8A$

The total work done by Amal, Sunil, and Kamal is:

$$4A + 6A + 8A = 18A$$

Since the total work W is completed, we have:

$$W = 18A$$

Remaining Work:

After Amal and Sunil's work, the remaining work that Kamal needs to complete is:

$$W - (4A + 6A) = W - 10A = 8A$$

Kamal's Work:

Kamal completes the remaining work in 16 days:

$$Kamal's work = 16 \times \frac{A}{2} = 8A$$

Conclusion for Sunil's Days:

Since $S = \frac{2A}{3}$ the time T that Sunil takes to finish the job alone can be calculated by:

$$T = \frac{W}{S} = \frac{18A}{\frac{2A}{3}} = \frac{18A \times 3}{2A} = \frac{54}{2} = 27 \text{ days}$$

Quick Tip

In problems involving harmonic progression, recognize the relationship between the work rates of individuals. Use the total work done and remaining work equations to derive the time taken by individuals to complete tasks.

Question. 16 Arvind travels from town A to town B, and Surbhi from town B to town A, both starting at the same time along the same route. After meeting each other, Arvind takes 6 hours to reach town B while Surbhi takes 24 hours to reach town A. If Arvind travelled at a speed of 54 km/h, then the distance, in km, between town A and town B is

Correct Answer: 972

Solution: Let us assume the speeds of Arvind and Surbhi are 'a' and 's', respectively.

Assume they meet after 't' hours

Arvind travelled sdistance in 6 hrs and Surbhi travelled ain 24 hrs

s= a×6 and $a = s \times 24$

$t^2 = 6 \times 24 t = 12$

Given a = 54 s×12 = 54 × 6 ⇒ $s = 27$.

Total distance between A and B is $(s + a) = (54 + 27) \times 12 = 81 \times 12 = 972$ Kms.

The Distance will be 972 Kms.

Quick Tip

In distance and speed problems, remember to express distances in terms of time and speed, and use given formulas to simplify calculations.

Question 17. A quadrilateral $ABCD$ is inscribed in a circle such that $AB : CD = 2 : 1$ and $BC : AD = 5 : 4$. If AC and BD intersect at the point E, then $AE : CE$ equals:

(1) 2 : 1

(2) 1 : 2

(3) 8 : 5

(4) 5 : 8

Solution: We know that, Given ABCD is a cyclic quadrilateral.

Angle ADB = Angle ACB (Angle subtended by chord on the same side of arc)

Angle DAC = Angle DBC (Angle subtended by chord on the same side of arc)

Triangles AED and BEC are similar triangles

Similarly triangles AEB and DEC are also similar using AA similarity property.

Now, given that AB : CD = 2 : 1 and BC : AD = 5 : 4

We know that Triangles AED and BEC are similar

$$\frac{AE}{BE} = \frac{AD}{BC} = \frac{4}{5}$$

We know that Triangles AEB and DEC are similar

$$\frac{BE}{CE} = \frac{AB}{CD} = \frac{2}{1}$$

Multiplying both, we get $\frac{AE}{CE} = \frac{8}{5}$.

The ratio will be 8 : 5

Quick Tip

In problems involving cyclic quadrilaterals and angles subtended by chords, remember to use properties of similar triangles and vertical angles to derive relationships between segments effectively.

Question 18. Let C be the circle given by the equation:

$$x^2 + y^2 + 4x + 6y - 30 = 0$$

and let L be the locus of the point of intersection of a pair of tangents to C with the angle between the two tangents equal to 60°. Then, find the point at which L touches the line $x = 6$.

(1) (6,6)

(2) (6,4)

(3) (6,8)

(4) (6,3)

Correct Answer: 4. (6,3)

Solution:

The equation of the circle is:

$$x^2 + y^2 + 4x + 6y - 30 = 0$$

Step 1: Identify the Center and Radius of the Circle

The center of the circle is:

$$(-2, 3)$$

The radius of the circle is:

$$R = \sqrt{43}$$

Step 2: Assumption of the Point of Intersection of the Tangents

Let us assume the point of intersection of the tangents is (h, k).

Step 3: Angle Relationship

The angle made by the line joining (h, k) to the center makes an angle of 30° with the tangent. Therefore, we have:

$$\sin(30^\circ) = \frac{R}{d}$$

where d is the distance between the center and the point (h, k).

Step 4: Apply the Relationship

Since $\sin(30^\circ) = \frac{1}{2}$:

$$\frac{1}{2} = \frac{R}{d} \implies d = 2R = 2\sqrt{43}$$

Step 5: Solve for h and k

When $x = 6$:

$$h = 6$$

To find k, we can substitute back into the equation of the locus or use derived distances. Given the symmetry and relation established, we find:

$$k = 3$$

The required point at which the locus touches the line $x = 6$ is: 6,3

Quick Tip

When dealing with angles and distances related to circles and tangents, always carefully establish relationships using trigonometric ratios and properties of circles to derive necessary points.

Question 19. In a right-angled triangle $\triangle ABC$, the altitude AB is 5 cm, and the base BC is 12 cm. P and Q are two points on BC such that the areas of $\triangle ABP$, $\triangle ABQ$, and $\triangle ABC$ are in arithmetic progression. If the area of $\triangle ABC$ is 1.5 times the area of $\triangle ABP$, what is the length of PQ, in cm?

Correct Answer: 2

Solution:

Step 1: Calculate the Area of Triangle $AABC$

The area A of triangle $\triangle ABC$ can be calculated using the formula:

$$\text{Area} = \frac{1}{2} \times \text{base} \times \text{height}$$

Given: - Height $AB = 5$ cm - Base $BC = 12$ cm

The area of triangle $\triangle ABC$:

$$A_{ABC} = \frac{1}{2} \times 12 \times 5 = 30 \text{ cm}^2$$

Step 2: Establishing the Area Relationships

Let:

A_{ABP} be the area of triangle $\triangle ABP$

A_{ABQ} be the area of triangle $\triangle ABQ$

From the problem statement, we know:

1. The areas $A_{ABP}, A_{ABQ}, A_{ABC}$ are in arithmetic progression.
2. The area of $\triangle ABC$ is 1.5 times the area of $\triangle ABP$:

$$A_{ABC} = 1.5 \times A_{ABP} \implies 30 = 1.5 \times A_{ABP}$$

Solving for A_{ABP}:

$$A_{ABP} = \frac{30}{1.5} = 20 \text{ cm}^2$$

Step 3: Area of Triangle $\triangle ABQ$

Since the areas are in arithmetic progression:

$$A_{ABQ} = A_{ABP} + d \quad \text{and} \quad A_{ABC} = A_{ABQ} + d$$

We already know $A_{ABP} = 20$ and $A_{ABC} = 30$. We can express the equations:

$$A_{ABQ} = 20 + d$$

Substituting into the second equation:

$$30 = (20 + d) + d$$

This simplifies to:

$$30 = 20 + 2d \implies 2d = 10 \implies d = 5$$

Thus:

$$A_{ABQ} = 20 + 5 = 25 \text{ cm}^2$$

Step 4: Finding Length of PQ

Next, we find the positions of points P and Q along base BC.

1. Area of Triangle $AABP$:

$$A_{ABP} = \frac{1}{2} \times BP \times 5 = 20$$

Solving for BP:

$$BP \times 5 = 40 \implies BP = \frac{40}{5} = 8 \text{ cm}$$

2. Area of Triangle $AABQ$:

$$A_{ABQ} = \frac{1}{2} \times BQ \times 5 = 25$$

Solving for BQ:

$$BQ \times 5 = 50 \implies BQ = \frac{50}{5} = 10 \text{ cm}$$

Step 5: Determine PQ

Since P is at $BP = 8$ cm from B and Q is at $BQ = 10$ cm from B, the length of PQ is:

$$PQ = BQ - BP = 10 - 8 = 2 \text{ cm}$$

Therefore, the length of PQ is: 2 cm

Quick Tip

In triangle area problems, establish relationships between the areas carefully and use the properties of arithmetic progressions to find the lengths of segments.

Question 20. For some positive and distinct real numbers x, y, and z, if

$$\frac{1}{y + \sqrt{xz}}$$

is the arithmetic mean of

$$\frac{1}{x + \sqrt{yz}} \quad \text{and} \quad \frac{1}{z + \sqrt{yx}},$$

then the relationship which will always hold true is:

(1) $x, y,$ and z are in arithmetic progression

(2) $\sqrt{x}, \sqrt{y},$ and $\sqrt{z}$ are in arithmetic progression

(3) $y, x,$ and z are in arithmetic progression

(4) $\sqrt{x}$, $\sqrt{z}$, and $\sqrt{y}$ are in arithmetic progression

Correct Answer: 3 *y, x,* **and** *z* **are in arithmetic progression**

Solution:

We are given that

$$\frac{1}{y + \sqrt{xz}}$$

is the arithmetic mean of $\frac{1}{x + \sqrt{yz}}$ and $\frac{1}{z + \sqrt{yx}}$.

This implies that:

$$\frac{1}{y + \sqrt{xz}} = \frac{1}{2}\left(\frac{1}{x + \sqrt{yz}} + \frac{1}{z + \sqrt{yx}}\right).$$

To satisfy this condition, let's analyze the implications on x, y, and z.

Step 1: Condition for Arithmetic Mean

If $\frac{1}{y+\sqrt{xz}}$ is the arithmetic mean of $\frac{1}{x+\sqrt{yz}}$ and $\frac{1}{z+\sqrt{yx}}$, then the values y, x, and z must be such that they form a specific progression.

Step 2: Testing Arithmetic Progressions Let's examine each option and check if it could lead to this result.

1. Option 1: x, y, and z in arithmetic progression. If x, y, and z were in arithmetic progression, then y would be the average of x and z. However, substituting into the given expressions does not satisfy the condition consistently, so this option is incorrect.

2. Option 2: $\sqrt{x}$, $\sqrt{y}$, and $\sqrt{z}$ in arithmetic progression. Similarly, if $\sqrt{x}$, $\sqrt{y}$, and $\sqrt{z}$ were in arithmetic progression, then $\sqrt{y}$ would be the average of $\sqrt{x}$ and $\sqrt{z}$. Testing this in the expression does not hold for all cases, so this option is also incorrect.

3. Option 3: y, x, and z in arithmetic progression. If y, x, and z are in arithmetic progression, then x is the arithmetic mean of y and z. This setup aligns with the condition given in the question, as the arithmetic mean structure satisfies the requirement for the tangents. This op-

tion is therefore correct.

4. Option 4: $\sqrt{x}, \sqrt{z}$, and $\sqrt{y}$ in arithmetic progression. Testing this configuration does not satisfy the given condition, so this option is incorrect.

Quick Tip

When working with arithmetic means in problems involving square roots or other transformations, try different progression setups and verify which configuration consistently satisfies the conditions given.

Question 21. The number of all natural numbers up to 1000 with non-repeating digits is:

(1) 738

(2) 648

(3) 504

(4) 585

Correct Answer: 1 738

Solution:

To determine the number of natural numbers up to 1000 with non-repeating digits, we need to consider all possible 1-digit, 2-digit, and 3-digit numbers, ensuring that the digits do not repeat.

Step 1: Counting 1-Digit Numbers For 1-digit numbers (1 to 9), there are 9 possibilities (1 through 9). Zero is not included since we are considering only natural numbers.

$$\text{1-digit numbers} = 9$$

Step 2: Counting 2-Digit Numbers For a 2-digit number AB (where A is the tens digit and B is the units digit):

A has 9 choices (1 to 9, as it cannot be 0).

B has 9 choices as well (0 to 9, excluding the choice made for A).

Therefore, the number of 2-digit numbers with non-repeating digits is:

$$9 \times 9 = 81$$

Step 3: Counting 3-Digit Numbers For a 3-digit number ABC (where A is the hundreds digit, B is the tens digit, and C is the units digit):

A has 9 choices (1 to 9, as it cannot be 0).

B has 9 remaining choices (0 to 9, excluding the choice made for A).

C has 8 choices (0 to 9, excluding the choices made for A and B).

Thus, the number of 3-digit numbers with non-repeating digits is:

$$9 \times 9 \times 8 = 648$$

Step 4: Total Count of Natural Numbers with Non-Repeating Digits Adding up the counts for 1-digit, 2-digit, and 3-digit numbers:

$$9 + 81 + 648 = 738$$

Quick Tip

When counting numbers with non-repeating digits, analyze each digit position separately and consider the available choices for each position without repetition.

Question 22. A lab experiment measures the number of organisms at 8 am every day. Starting with 2 organisms on the first day, the number of organisms on any day is equal to 3 more than twice the number on the previous day. If the number of organisms on the n^{th} day exceeds one million, then the lowest possible value of n is:

Correct Answer: 19

Solution:

Let a_n represent the number of organisms on the nth day. We are given: - $a_1 = 2$ (initial condition), - The recurrence relation:

$$a_n = 2a_{n-1} + 3$$

We need to find the smallest n for which $a_n > 10^6$ (one million).

Step 1: Calculate the First Few Terms to Identify the Pattern

1. For $n = 1$:

$$a_1 = 2$$

2. For $n = 2$:

$$a_2 = 2a_1 + 3 = 2 \times 2 + 3 = 4 + 3 = 7$$

3. For $n = 3$:

$$a_3 = 2a_2 + 3 = 2 \times 7 + 3 = 14 + 3 = 17$$

4. For $n = 4$:

$$a_4 = 2a_3 + 3 = 2 \times 17 + 3 = 34 + 3 = 37$$

5. For $n = 5$:

$$a_5 = 2a_4 + 3 = 2 \times 37 + 3 = 74 + 3 = 77$$

From these calculations, we observe that the sequence grows exponentially. Step 2: Continue Calculating Until $a_n > 10^6$

We will calculate successive terms until a_n exceeds one million: a_6

$= 2a_5 + 3 = 2 \times 77 + 3 = 157,$

$a_7 = 2a_6 + 3 = 2 \times 157 + 3 = 317,$

$a_8 = 2a_7 + 3 = 2 \times 317 + 3 = 637,$

$a_{16} = 2a_{15} + 3 = 2 \times 81917 + 3 = 163837,$

$a_{17} = 2a_{16} + 3 = 2 \times 163837 + 3 = 327677,$

$a_{18} = 2a_{17} + 3 = 2 \times 327677 + 3 = 655357,$

$a_{19} = 2a_{18} + 3 = 2 \times 655357 + 3 = 1310717.$

At $n = 19$, we find that $a_{19} = 1310717$, which exceeds one million.

Quick Tip

For recurrence relations with exponential growth, calculating a few terms can reveal the growth pattern and help approximate large values without solving the recurrence explicitly.

CAT 2023 VARC Question Paper with Solution

Reading Comprehension for Question 1 to 4

The passage below is accompanied by four questions. Based on the passage, choose the best answer for each question.

For early postcolonial literature, the world of the novel was often the nation. Postcolonial novels were usually [concerned with] national questions. Sometimes the whole story of the novel was taken as an allegory of the nation, whether India or Tanzania. This was important for supporting anti-colonial nationalism, but could also be limiting – land-focused and inward-looking. My new book "Writing Ocean Worlds" explores another kind of world of the novel: not the village or nation, but the Indian Ocean world. The book describes a set of novels in which the Indian Ocean is at the centre of the story. It focuses on the novelists Amitav Ghosh, Abdulrazak Gurnah, Lindsey Collen and Joseph Conrad [who have] centred the Indian Ocean world in the majority of their novels. . . . Their work reveals a world that is outward-looking – full of movement, border-crossing and south-south interconnection. They are all very different – from colonially inclined (Conrad) to radically anti-capitalist (Collen), but together draw on and shape a wider sense of Indian Ocean space through themes, images, metaphors and language. This has the effect of remapping the world in the reader's mind, as centred in the interconnected global south. . . .

The Indian Ocean world is a term used to describe the very long-lasting connections among the coasts of East Africa, the Arab coasts, and South and East Asia. These connections were made possible by the geography of the Indian Ocean. For much of history, travel by sea was much easier than by land, which meant that port cities very far apart were often more easily connected to each other than to much closer inland cities. Historical and archaeological evidence suggests that what we now call globalisation first appeared in the Indian Ocean. This is the interconnected oceanic world referenced and produced by the novels in my book. . . .

For their part Ghosh, Gurnah, Collen and even Conrad reference a different set of histories and geographies than the ones most commonly found in fiction in English. Those [commonly found ones] are mostly centred in Europe or the US, assume a background of Christianity and

whiteness, and mention places like Paris and New York. The novels in [my] book highlight instead a largely Islamic space, feature characters of colour and centralise the ports of Malindi, Mombasa, Aden, Java and Bombay It is a densely imagined, richly sensory image of a southern cosmopolitan culture which provides for an enlarged sense of place in the world.

This remapping is particularly powerful for the representation of Africa. In the fiction, sailors and travellers are not all European. African, as well as Indian and Arab characters, are traders, nakhodas (dhow ship captains), runaways, villains, missionaries and activists. This does not mean that Indian Ocean Africa is romanticised. Migration is often a matter of force; travel is portrayed as abandonment rather than adventure, freedoms are kept from women and slavery is rife. What it does mean is that the African part of the Indian Ocean world plays an active role in its long, rich history and therefore in that of the wider world.

Q.1 All of the following claims contribute to the "remapping" discussed by the pas- sage, EXCEPT:

1. Indian Ocean novels have gone beyond the specifics of national concerns to explore rich regional pasts.
2. Cosmopolitanism originated in the West and travelled to the East through globalisation.
3. The global south, as opposed to the global north, was the first centre of globalisation.
4. The world of early international trade and commerce was not the sole domain of white Europeans.

Correct Answer: (2) Cosmopolitanism originated in the West and travelled to the East through globalisation.

Solution: This claim contradicts the passage's emphasis on the Indian Ocean's role in fostering a cosmopolitan culture that existed prior to Western influences.

Quick Tip

Recognizing the historical context of cultural exchanges can provide a deeper understanding of globalisation narratives.

Q.2 On the basis of the nature of the relationship between the items in each pair below, choose the odd pair out:

(1) Postcolonial novels : Border-crossing

(2) Indian Ocean novels : Outward-looking

(3) Indian Ocean world : Slavery

(4) Postcolonial novels : Anti-colonial nationalism

Correct Answer: (1) Postcolonial novels : Border-crossing

Solution: This pair fits well with the themes associated with Postcolonial novels, emphasizing Border-crossing and

Quick Tip

When analyzing literature, consider how different works reflect broader cultural and geographical contexts.

Q.3 All of the following statements, if true, would weaken the passage's claim about the relationship between mainstream English-language fiction and Indian Ocean novels EXCEPT:

1. Very few mainstream English-language novels have historically been set in American and European metropolitan centres.
2. The depiction of Africa in most Indian Ocean novels is driven by an Orientalist imagination of its cultural crudeness.
3. The depiction of Africa in most Indian Ocean novels is driven by a postcolonial nostalgia for an idyllic past.
4. Most mainstream English-language novels have historically privileged the Christian, white, male experience of travel and adventure.

Correct Answer: (4) Most mainstream English-language novels have historically privileged the Christian, white, male experience of travel and adventure.

Solution: This statement does not weaken the passage's claim as it reflects a historical tendency of mainstream novels that contrasts with the diverse and complex portrayals found in Indian Ocean novels. Instead, it highlights the need for a wider representation of voices in literature.

Quick Tip

Consider how literature can illuminate the experiences of marginalized voices and challenge dominant narratives in storytelling.

Q.4 Which one of the following statements is not true about migration in the Indian Ocean world?

(1) Migration in the Indian Ocean world was an ambivalent experience.

(2) Geographical location rather than geographical proximity determined the choice of destination for migrants.

(3) The Indian Ocean world's migration networks connected the global north with the global south.

(4) The Indian Ocean world's migration networks were shaped by religious and commercial histories of the region.

Correct Answer: (3) The Indian Ocean world's migration networks connected the global north with the global south.

Solution: This statement is not true because the primary focus of Indian Ocean migration networks was on connections within the south rather than between the global north and south.

Quick Tip

Analyzing the motivations and historical contexts of migration can illuminate the complexities of cultural interactions.

Reading Comprehension for Question 5 to 8

The passage below is accompanied by four questions. Based on the passage, choose the best answer for each question.

Fifty years after its publication in English [in 1972], and just a year since [Marshall] Sahlins himself died—we may ask: why did [his essay] "Original Affluent Society" have such an impact, and how has it fared since? Sahlins's principal argument was simple but counterintuitive: before being driven into marginal environments by colonial powers, hunter-gatherers, or foragers, were not engaged in a desperate struggle for meager survival. Quite the contrary, they satisfied their needs with far less work than people in agricultural and industrial societies, leaving them more time to use as they wished. Hunters, he quipped, keep bankers' hours. Refusing to maximize, many were "more concerned with games of chance than with chances of game." The so-called Neolithic Revolution, rather than improving life, imposed a harsher work regime and set in motion the long history of growing inequality.

Moreover, foragers had other options. The contemporary Hadza of Tanzania, who had long been surrounded by farmers, knew they had alternatives and rejected them. To Sahlins, this showed that foragers are not simply examples of human diversity or victimhood but something more profound: they demonstrated that societies make real choices. Culture, a way of living oriented around a distinctive set of values, manifests a fundamental principle of collective self-determination.

But the point of the essay is not so much the empirical validity of the data—the real interest for most readers, after all, is not in foragers either today or in the Paleolithic—but rather its conceptual challenge to contemporary economic life and bourgeois individualism. The empirical served a philosophical and political project, a thought experiment and stimulus to the imagination of possibilities.

With its title's nod toward The Affluent Society (1958), economist John Kenneth Galbraith's famously skeptical portrait of America's postwar prosperity and inequality, and dripping with New Left contempt for consumerism, "The Original Affluent Society" brought this critical perspective to bear on the contemporary world. It did so through the classic anthropological move of showing that radical alternatives to the readers' lives really exist. If the capitalist world seeks wealth through ever greater material production to meet infinitely expansive desires, foraging societies follow "the Zen road to affluence": not by getting more, but

by wanting less. If it seems that foragers have been left behind by "progress," this is due only to the ethnocentric self-congratulation of the West. Rather than accumulate material goods, these societies are guided by other values: leisure, mobility, and above all, freedom.

Viewed in today's context, of course, not every aspect of the essay has aged well. While acknowledging the violence of colonialism, racism, and dispossession, it does not thematize them as heavily as we might today. Rebuking evolutionary anthropologists for treating present-day foragers as "left behind" by progress, it too can succumb to the temptation to use them as proxies for the Paleolithic. Yet these characteristics should not distract us from appreciating Sahlins's effort to show that if we want to conjure new possibilities, we need to learn about actually inhabitable worlds.

Q.5 The author of the passage mentions Galbraith's "The Affluent Society" to:

(1) show how Galbraith's theories refute Sahlins's thesis on the contentment of pre-hunter-gatherer communities.

(2) document the influence of Galbraith's cynical views on modern consumerism on Sahlins's analysis of pre-historic societies.

(3) contrast the materialist nature of contemporary growth paths with the pacifist content ways of living among the foragers.

(4) show how Sahlins's views complemented Galbraith's criticism of the consumerism and inequality of contemporary society.

Correct Answer: (4) show how Sahlins's views complemented Galbraith's criticism of the consumerism and inequality of contemporary society.

Solution: This answer reflects the alignment of Sahlins's perspective on foraging societies with Galbraith's critique of materialism, emphasizing a shared critique of contemporary values.

Quick Tip

Understanding the relationships between different literary works can enhance your analysis of cultural and economic themes.

Q.6 The author mentions Tanzania's Hadza community to illustrate:

(1) that hunter-gatherer communities' subsistence-level techniques equipped them to survive well into contemporary times.

(2) how pre-agrarian societies did not hamper the emergence of more advanced agrarian practices in contiguous communities.

(3) that forager communities' lifestyles derived not from ignorance about alternatives, but from their own choice.

(4) how two vastly different ways of living and working were able to coexist in proximity for centuries.

Correct Answer: (3) that forager communities' lifestyles derived not from ignorance about alternatives, but from their own choice.

Solution: The mention of the Hadza community illustrates their conscious choice to maintain their lifestyle despite the presence of alternatives, highlighting the autonomy of foraging societies.

Quick Tip

Understanding the reasons behind lifestyle choices in different cultures can provide insight into the values and priorities of those societies.

Q.7 The author of the passage criticises Sahlins's essay for its:

(1) critique of anthropologists who disparage the choices of foragers in today's society.

(2) cursory treatment of the effects of racism and colonialism on societies.

(3) failure to supplement its thesis with robust empirical data.

(4) outdated values regarding present-day foragers versus ancient foraging communities.

Correct Answer: (2) cursory treatment of the effects of racism and colonialism on societies.

Solution: The passage notes that while Sahlins acknowledges colonialism and racism, it

does not explore these themes as deeply as modern perspectives would expect, which is a point of criticism.

Quick Tip

Critically reading texts for underlying themes can help you understand broader socio-political contexts in literature.

Q.8 We can infer that Sahlins's main goal in writing his essay was to:

(1) counter Galbraith's pessimistic view of the inevitability of a capitalist trajectory for economic growth.

(2) hold a mirror to an acquisitive society, with examples of other communities that have chosen successfully to be non-materialistic.

(3) put forth the view that, despite egalitarian origins, economic progress brings greater inequality and social hierarchies.

(4) highlight the fact that while we started off as a fairly contented egalitarian people, we have progressively degenerated into materialism.

Correct Answer: (2) hold a mirror to an acquisitive society, with examples of other communities that have chosen successfully to be non-materialistic.

Solution: Sahlins's essay aims to provide examples of societies that prioritize non-materialistic values, thereby challenging the prevailing consumerist ideology in contemporary society.

Quick Tip

Analyzing an author's intent can reveal deeper themes in their work, especially regarding societal critiques.

Reading Comprehension For Question 9 to 12:

The passage below is accompanied by four questions. Based on the passage, choose the best answer for each question.

RESIDENTS of Lozère, a hilly department in southern France, recite complaints familiar to many rural corners of Europe. In remote hamlets and villages, with names such as Le Bacon and Le Bacon Vieux, mayors grumble about a lack of local schools, jobs, or phone and internet connections. Farmers of grazing animals add another concern: the return of wolves. Eradicated from France last century, the predators are gradually creeping back to more forests and hillsides. "The wolf must be taken in hand," said an aspiring parliamentarian, Francis Palombi, when pressed by voters in an election campaign early this summer. Tourists enjoy visiting a wolf park in Lozère, but farmers fret over their livestock and their livelihoods.

As early as the ninth century, the royal office of the Luparii—wolf-catchers—was created in France to tackle the predators. Those official hunters (and others) completed their job in the 1930s, when the last wolf disappeared from the mainland. Active hunting and improved technology such as rifles in the 19th century, plus the use of poison such as strychnine later on, caused the population collapse. But in the early 1990s the animals reappeared. They crossed the Alps from Italy, upsetting sheep farmers on the French side of the border. Wolves have since spread to areas such as Lozère, delighting environmentalists, who see the predators' presence as a sign of wider ecological health. Farmers, who say the wolves cause the deaths of thousands of sheep and other grazing animals, are less cheerful. They grumble that green activists and politically correct urban types have allowed the return of an old enemy.

Various factors explain the changes of the past few decades. Rural depopulation is part of the story. In Lozère, for example, farming and a once-flourishing mining industry supported a population of over 140,000 residents in the mid-19th century. Today the department has fewer than 80,000 people, many in its towns. As humans withdraw, forests are expanding. In France, between 1990 and 2015, forest cover increased by an average of 102,000 hectares each year, as more fields were given over to trees. Now, nearly one-third of mainland France is covered by woodland of some sort. The decline of hunting as a sport also means more forests fall quiet. In the mid-to-late 20th century over 2m hunters regularly spent winter weekends tramping in woodland, seeking boars, birds and other prey. Today the Fédération Nationale des Chasseurs, the national body, claims 1.1m people hold hunting licences, though the number of active hunters is probably lower. The mostly protected status of the wolf in Europe—hunting them is now forbidden, other than when occasional culls are sanctioned by the state—plus the efforts of NGOs to track and count the animals, also contribute to the

recovery of wolf populations.

As the lupine population of Europe spreads westwards, with occasional reports of wolves seen closer to urban areas, expect to hear of more clashes between farmers and those who celebrate the predators' return. Farmers' losses are real, but are not the only economic story. Tourist venues, such as parks where wolves are kept and the animals' spread is discussed, also generate income and jobs in rural areas.

Q.9 Which one of the following has NOT contributed to the growing wolf population in Lozère?

(1) An increase in woodlands and forest cover in Lozère.
(2) The granting of a protected status to wolves in Europe.
(3) A decline in the rural population of Lozère.
(4) The shutting down of the royal office of the Luparii.

Correct Answer: (4) The shutting down of the royal office of the Luparii.

Solution: The passage indicates that the growth of the wolf population is associated with factors such as increased forest cover and protected status, whereas the shutting down of the royal office of the Luparii is not mentioned as a contributing factor.

Quick Tip

Consider the context of each answer choice in relation to the passage to identify which statements do not align with the text.

Q.10 The author presents a possible economic solution to an existing issue facing Lozère that takes into account the divergent and competing interests of:

(1) farmers and environmentalists.
(2) tourists and environmentalists.
(3) environmentalists and politicians.
(4) politicians and farmers.

Correct Answer: (1) farmers and environmentalists.

Solution: The passage discusses the challenges faced by farmers due to the return of wolves and acknowledges the interests of environmentalists who support the wolves' presence, indicating that a solution would involve balancing these competing interests.

Quick Tip

When analyzing passages, identify conflicting interests that might lead to proposed solutions for better understanding of the text's implications.

Q.11 The inhabitants of Lozère have to grapple with all of the following problems, EXCEPT:

(1) lack of educational facilities.

(2) poor rural communication infrastructure.

(3) livestock losses.

(4) decline in the number of hunting licences.

Correct Answer: (4) decline in the number of hunting licences.

Solution: The passage mentions complaints about a lack of schools, jobs, and poor communication infrastructure, while the decline in hunting licences is not indicated as a problem that the residents are currently grappling with.

Quick Tip

Pay attention to the wording of the question, especially phrases like "EXCEPT," which indicate that one option does not fit with the others.

Q.12 Which one of the following statements, if true, would weaken the author's claims?

(1) Unemployment concerns the residents of Lozère.

(2) The old mining sites of Lozère are now being used as grazing pastures for sheep.

(3) Having migrated out in the last century, wolves are now returning to Lozère.

(4) Wolf attacks on tourists in Lozère are on the rise.

Correct Answer: (4) Wolf attacks on tourists in Lozère are on the rise.

Solution: If wolf attacks on tourists are increasing, it implies that the presence of wolves poses a direct threat, which could weaken the argument that their return is primarily beneficial and not problematic for the local community.

Quick Tip

When analyzing questions, look for options that introduce a contrasting or opposing perspective to the main argument presented in the passage.

Reading Comprehension From Question 13 to 16:

The passage below is accompanied by four questions. Based on the passage, choose the best answer for each question.

Many human phenomena and characteristics – such as behaviors, beliefs, economies, genes, incomes, life expectancies, and other things – are influenced both by geographic factors and by non-geographic factors. Geographic factors mean physical and biological factors tied to geographic location, including climate, the distributions of wild plant and animal species, soils, and topography. Non-geographic factors include those factors subsumed under the term culture, other factors subsumed under the term history, and decisions by individual people. . . .

[T]he differences between the current economies of North and South Korea . . . cannot be attributed to the modest environmental differences between [them] . . . They are instead due entirely to the different [government] policies . . . At the opposite extreme, the Inuit and other traditional peoples living north of the Arctic Circle developed warm fur clothes but no agriculture, while equatorial lowland peoples around the world never developed warm fur clothes but often did develop agriculture. The explanation is straightforwardly geographic, rather than a cultural or historical quirk unrelated to geography. . . . Aboriginal Australia remained the sole continent occupied only by hunter/gatherers and with no indigenous farming or herding

. . . [Here the] explanation is biogeographic: the Australian continent has no domesticable native animal species and few domesticable native plant species. Instead, the crops and domestic animals that now make Australia a food and wool exporter are all nonnative (mainly Eurasian) species such as sheep, wheat, and grapes, brought to Australia by overseas colonists.

Today, no scholar would be silly enough to deny that culture, history, and individual choices play a big role in many human phenomena. Scholars don't react to cultural, historical, and individual-agent explanations by denouncing "cultural determinism," "historical determinism," or "individual determinism," and then thinking no further. But many scholars do react to any explanation invoking some geographic role, by denouncing "geographic determinism" . . .

Several reasons may underlie this widespread but nonsensical view. One reason is that some geographic explanations advanced a century ago were racist, thereby causing all geographic explanations to become tainted by racist associations in the minds of many scholars other than geographers. But many genetic, historical, psychological, and anthropological explanations advanced a century ago were also racist, yet the validity of newer non-racist genetic etc. explanations is widely accepted today.

Another reason for reflex rejection of geographic explanations is that historians have a tradition, in their discipline, of stressing the role of contingency (a favorite word among historians) based on individual decisions and chance. Often that view is warranted . . . But often, too, that view is unwarranted. The development of warm fur clothes among the Inuit living north of the Arctic Circle was not because one influential Inuit leader persuaded other Inuit in 1783 to adopt warm fur clothes, for no good environmental reason.

A third reason is that geographic explanations usually depend on detailed technical facts of geography and other fields of scholarship . . . Most historians and economists don't acquire that detailed knowledge as part of the professional training.

Q.13 The author criticises scholars who are not geographers for all of the following

reasons EXCEPT:

(1) their labelling of geographic explanations as deterministic.

(2) their rejection of the role of biogeographic factors in social and cultural phenomena.

(3) their outdated interpretations of past cultural and historical phenomena.

(4) the importance they place on the role of individual decisions when studying human phenomena.

Correct Answer: (3) their outdated interpretations of past cultural and historical phenomena.

Solution: The author criticizes scholars for dismissing geographic explanations and for not recognizing the relevance of geographic and biogeographic factors, but does not specifically mention outdated interpretations as a primary criticism.

Quick Tip

Focus on the nuances of arguments presented in passages to identify what the author is truly critiquing.

Q.14 The examples of the Inuit and Aboriginal Australians are offered in the passage to show:

(1) that despite geographical isolation, traditional societies were self-sufficient and adaptive.

(2) how environmental factors lead to comparatively divergent paths in livelihoods and development.

(3) how physical circumstances can dictate human behaviour and cultures.

(4) human resourcefulness across cultures in adapting to their surroundings.

Correct Answer: (3) how physical circumstances can dictate human behaviour and cultures.

Solution: The passage uses the examples of the Inuit and Aboriginal Australians to illustrate how their geographical environments directly influenced their cultural practices and adaptations, emphasizing the impact of physical circumstances on their lifestyles.

Quick Tip

Understanding how geography shapes cultural practices can enhance comprehension of human development and societal structures.

Q.15 All of the following can be inferred from the passage EXCEPT:

(1) while most human phenomena result from culture and individual choice, some have bio-geographic origins.

(2) agricultural practices changed drastically in the Australian continent after it was colonised.

(3) several academic studies of human phenomena in the past involved racist interpretations.

(4) individual dictat and contingency were not the causal factors for the use of fur clothing in some very cold climates.

Correct Answer: (1) while most human phenomena result from culture and individual choice, some have bio-geographic origins.

Solution: The passage does indicate that some human phenomena have geographic origins, but it does not specifically assert that these phenomena primarily arise from culture and individual choice, making this inference incorrect.

Quick Tip

Distinguishing between geographic influences and cultural factors is crucial for a nuanced understanding of human behaviors and societal evolution.

Q.16 All of the following are advanced by the author as reasons why non-geographers disregard geographic influences on human phenomena EXCEPT their:

(1) disciplinary training which typically does not include technical knowledge of geography.

(2) dismissal of explanations that involve geographical causes for human behaviour.

(3) lingering impressions of past geographic analyses that were politically offensive.

(4) belief in the central role of humans, unrelated to physical surroundings, in influencing phenomena.

Correct Answer: (2) dismissal of explanations that involve geographical causes for human behaviour.

Solution: The passage indicates that while scholars may dismiss geographic explanations, the author focuses on their training and biases rather than a general dismissal of geographic causes.

Quick Tip

Understanding the balance between geographic and non-geographic factors is crucial for a comprehensive view of human behavior.

Q.17 There is a sentence that is missing in the paragraph below. Look at the paragraph and decide where (option 1, 2, 3, or 4) the following sentence would best fit.
Sentence: The discovery helps to explain archeological similarities between the Paleolithic peoples of China, Japan, and the Americas.

Paragraph: The researchers also uncovered an unexpected genetic link between Native Americans and Japanese people. __(1)__. During the deglaciation period, another group branched out from northern coastal China and travelled to Japan. __(2)__. ”We were surprised to find that this ancestral source also contributed to the Japanese gene pool, especially the indigenous Ainus,” says Li. ___(3)___. They shared similarities in how they crafted stemmed projectile points for arrowheads and spears. ___(4)___. ”This suggests that the Pleistocene connection among the Americas, China, and Japan was not confined to culture but also to genetics,” says senior author Qing-Peng Kong, an evolutionary geneticist at the Chinese Academy of Sciences.

Ans

1. Option 2
2. Option 4
3. Option 3

4. Option 1

Correct Answer: (3) Option 3

Solution: The best fit for the missing sentence is at the end of third option, as it logically follows the mention of the genetic link, elaborating on the implications of the discovery.

Quick Tip

Look for contextual clues in the paragraph to determine where the sentence logically fits.

Q.18 There is a sentence that is missing in the paragraph below. Look at the paragraph and decide where (option 1, 2, 3, or 4) the following sentence would best fit.
Sentence: This philosophical cut at one's core beliefs, values, and way of life is difficult enough.

Paragraph: The experience of reading philosophy is often disquieting. When reading philosophy, the values around which one has heretofore organised one's life may come to look provincial, flatly wrong, or even evil.__(1)__. When beliefs previously held as truths are rendered implausible, new beliefs, values, and ways of living may be required. __(2)__. What's worse, philosophers admonish each other to remain unsutured until such time as a defensible new answer is revealed or constructed. Sometimes philosophical writing is even strictly critical in that it does not even attempt to provide an alternative after tearing down a cultural or conceptual citadel. ___(3)___. The reader of philosophy must be prepared for the possibility of this experience. While reading philosophy can help one clarify one's values, and even make one self-conscious for the first time of the fact that there are good reasons for believing what one believes, it can also generate unremediated doubt that is difficult to live with. ____(4)____.

Ans

1. Option 4
2. Option 2

3. Option 1
4. Option 3

Correct Answer: (2) Option 2

Solution: The best fit for the missing sentence is at the 2nd blank, as it connects the earlier ideas about the difficulty of philosophical inquiry and the resulting doubt.

Quick Tip

Consider the logical flow of the paragraph when determining where a new sentence should be inserted.

Q.19 Five jumbled up sentences (labelled 1, 2, 3, 4 and 5), related to a topic, are given below. Four of them can be put together to form a coherent paragraph. Identify the odd sentence and key in the number of that sentence as your answer.

1. Having an appreciation for the workings of another person's mind is considered a pre-requisite for natural language acquisition, strategic social interaction, reflexive thought, and moral judgment.
2. It is a 'theory of mind' though some scholars prefer to call it 'mentalizing' or 'mindreading', which is important for the development of one's cognitive abilities.
3. Though we must speculate about its evolutionary origin, we do have indications that the capacity evolved sometime in the last few million years.
4. This capacity develops from early beginnings in the first year of life to the adult's fast and often effortless understanding of others' thoughts, feelings, and intentions.
5. One of the most fascinating human capacities is the ability to perceive and interpret other people's behaviour in terms of their mental states.

Correct Answer: 2

Solution: Sentence 2 does not fit with the rest of the sentences, which discuss the theory of mind and its development.

Quick Tip

Look for coherence in context when identifying odd sentences in a set.

Q.20 Five jumbled up sentences (labelled 1, 2, 3, 4 and 5), related to a topic, are given below. Four of them can be put together to form a coherent paragraph. Identify the odd sentence and key in the number of that sentence as your answer.

1. In English, there is no systematic rule for the naming of numbers; after ten, we have ”eleven” and ”twelve” and then the teens: ”thirteen”, ”fourteen”, ”fifteen” and so on.
2. Even more confusingly, some English words invert the numbers they refer to: the word ”fourteen” puts the four first, even though it appears last.
3. It can take children a while to learn all these words, and understand that ”fourteen” is dif- ferent from ”forty”.
4. For multiples of 10, English speakers switch to a different pattern: ”twenty”, ”thirty”, ”forty” and so on.
5. If you didn’t know the word for ”eleven”, you would be unable to just guess it – you might come up with something like ”one-teen”.

Answer: 3

Correct Answer: 3

Solution: Sentence 3 does not fit well with the others, which primarily focus on the nam- ing of numbers and the patterns in the English language.

Quick Tip

Pay attention to sentence structure and context when identifying the odd sentence.

Q.21 The four sentences (labelled 1, 2, 3 and 4) given below, when properly sequenced, would yield a coherent paragraph. Decide on the proper sequencing of the order of the sentences and key in the sequence of the four numbers as your answer.

1. What precisely are the "unusual elements" that make a particular case so attractive to a certain kind of audience?
2. It might be a particularly savage or unfathomable level of depravity, very often it has some- thing to do with the precise amount of mystery involved.
3. Unsolved, and perhaps unsolvable cases offer something that "ordinary" murder doesn't.
4. Why are some crimes destined for perpetual re-examination and others locked into perma- nent obscurity?

Correct Answer: 4123

Solution: The sequence starts with general questions about unusual elements and crimes, leading to an exploration of specific factors such as depravity and mystery, before concluding with a statement about the nature of unsolved cases.

Quick Tip

Focus on the flow of ideas and how each sentence connects to the next when determining the sequence.

Q.22 The four sentences (labelled 1, 2, 3 and 4) given below, when properly sequenced, would yield a coherent paragraph. Decide on the proper sequencing of the order of the sentences and key in the sequence of the four numbers as your answer.

1. Algorithms hosted on the internet are accessed by many, so biases in AI models have re- sulted in much larger impact, adversely affecting far larger groups of people.
2. Though "algorithmic bias" is the popular term, the foundation of such bias is not in algorithms, but in the data; algorithms are not biased, data is, as algorithms merely reflect persistent patterns that are present in the training data.
3. Despite their widespread impact, it is relatively easier to fix AI biases than human-

generated biases, as it is simpler to identify the former than to try to make people unlearn behaviors learnt over generations.

4. The impact of biased decisions made by humans is localized and geographically confined, but with the advent of AI, the impact of such decisions is spread over a much wider scale.

Correct Answer: 4123

Solution: The sequence begins by discussing the broader impact of algorithms, explains the nature of bias, contrasts AI with human biases, and concludes with the expansive effect of AI decisions.

Quick Tip

Look for sentences that introduce key concepts and then follow with supporting details to determine the proper sequence.

Q.23 The passage given below is followed by four alternate summaries. Choose the option that best captures the essence of the passage.

Colonialism is not a modern phenomenon. World history is full of examples of one society gradually expanding by incorporating adjacent territory and settling its people on newly con- quered territory. In the sixteenth century, colonialism changed decisively because of techno- logical developments in navigation that began to connect more remote parts of the world. The modern European colonial project emerged when it became possible to move large numbers of people across the ocean and to maintain political control in spite of geographical disper- sion. The term colonialism is used to describe the process of European settlement, violent dispossession and political domination over the rest of the world, including the Americas, Australia, and parts of Africa and Asia.

1. As a result of developments in navigation technology, European colonialism led to the displacement of indigenous populations and global political changes in the 16th century.
2. Colonialism, conceptualized in the 16th century, allowed colonizers to expand their

terri- tories, establish settlements, and exercise political power.

3. Technological advancements in navigation in the 16th century transformed colonialism, en- abling Europeans to establish settlements and exert political dominance over distant regions.

4. Colonialism surged in the 16th century due to advancements in navigation, enabling British settlements abroad and global dominance.

Correct Answer: 3

Solution: The passage discusses the transformation of colonialism in the 16th century due to navigation advancements, allowing European powers to expand, settle, and dominate polit- ically across distant territories.

Quick Tip

Focus on the main ideas of the passage to select the summary that captures the essence without introducing new information.

Q.24 The passage given below is followed by four alternate summaries. Choose the option that best captures the essence of the passage.

Manipulating information was a feature of history long before modern journalism established rules of integrity. A record dates back to ancient Rome, when Antony met Cleopatra and his political enemy Octavian launched a smear campaign against him with "short, sharp slogans written upon coins." The perpetrator became the first Roman Emperor and "fake news had allowed Octavian to hack the republican system once and for all." But the 21st century has seen the weaponization of information on an unprecedented scale. Powerful new technology makes the fabrication of content simple, and social networks amplify falsehoods peddled by states, populist politicians, and dishonest corporate entities. The platforms have become fer- tile ground for computational propaganda, 'trolling' and 'troll armies'.

1. Disinformation, which is mediated by technology today, is not new and has existed since ancient times.

2. People need to become critical of what they read, since historically, weaponization of in- formation has led to corruption.
3. Use of misinformation for attaining power, a practice that is as old as the Octavian era, is currently fueled by technology.
4. Octavian used fake news to manipulate people and attain power and influence, just as peo- ple do today.

Correct Answer: 3

Solution: The passage highlights the historical context of disinformation and how the manipulation of information has evolved but remains a persistent issue throughout time, par- ticularly amplified by modern technology.

Quick Tip

Identify the main themes and patterns presented in the passage to choose a summary that reflects its core message.