CAT 2017 DILR Slot-2 Question Paper with Solutions

Time Allowed :3 Hours	**Maximum Marks :**390	**Total questions :**130

General Instructions

Read the following instructions very carefully and strictly follow them:

1. **Duration of Section:** 40 Minutes
2. **Total Number of Questions:** 22 Questions (as per latest pattern, may vary slightly)
3. **Section Covered:** Quantitative Aptitude (QA)
4. **Type of Questions:**
   - Multiple Choice Questions (MCQs)
   - Type In The Answer (TITA) Questions – No options given, answer to be typed in
5. **Marking Scheme:**
   - +3 marks for each correct answer
   - -1 mark for each incorrect MCQ
   - No negative marking for TITA questions
6. **Syllabus Coverage:** Arithmetic, Algebra, Geometry, Number System, Modern Math, and Mensuration
7. **Skills Tested:** Numerical ability, analytical thinking, and problem-solving

Study the following information carefully and answer the given question.

Funky Pizzaria was required to supply pizzas to three different parties. The total number of pizzas it had to deliver was 800, 70% of which were to be delivered to Party 3 and the rest equally divided between Party 1 and Party 2.

Pizzas could be of Thin Crust (T) or Deep Dish (D) variety and come in either Normal Cheese (NC) or Extra Cheese (EC) versions. Hence, there are four types of pizzas: T-NC, T-EC, D-NC and D-EC. Partial information about proportions of T and NC pizzas ordered by the three parties is given below:

	Thin Crust (T)	**Normal Cheese (NC)**
Party 1	0.6	
Party 2	0.55	0.3
Party 3		0.65
Total	0.375	0.52

35. How many Thin Crust pizzas were to be delivered to Party 3?

(A) 398

(B) 162

(C) 196

(D) 364

Correct Answer: (B) 162

Solution:

Step 1: Distribution of total pizzas

Total pizzas = 800

Party 3 gets 70% of 800 = 0.7 × 800 = 560 pizzas

Party 1 and Party 2 share the remaining 30%, so each gets:

$$\frac{0.3 \times 800}{2} = 120 \text{ pizzas}$$

Step 2: Use total Thin Crust data

Total Thin Crust proportion = 0.375

$$\Rightarrow 0.375 \times 800 = 300 \text{ Thin Crust pizzas}$$

Step 3: Thin crust for Party 1 and 2

Party 1 ordered 60% Thin Crust: $0.6 \times 120 = 72$

Party 2 ordered 55% Thin Crust: $0.55 \times 120 = 66$

Step 4: Thin Crust for Party 3

$$\text{Party 3 Thin Crust} = 300 - (72 + 66) = 162$$

Therefore, the number of Thin Crust pizzas delivered to Party 3 is 162

Quick Tip

Use weighted averages to separate parts when total proportions are given, especially in distribution across groups. Subtract known quantities from totals to isolate unknowns.

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36. How many Normal Cheese pizzas were required to be delivered to Party 1?

(A) 104

(B) 84

(C) 16

(D) 196

Correct Answer: (C) 16

Solution:

	Thin Crust Normal Cheese	**Thin Crust Extra Cheese**	**Deep Dish Normal Cheese**	**Deep Dish Extra Cheese**
Party 1	x	$72 - x$	w	$48 - w$
Party 2	y	$66 - y$	$36 - y$	$18 + y$
Party 3	z	$162 - z$	$364 - z$	$34 + z$
Total		**300**		**500**

Total Normal Cheese pizzas delivered to the three parties:

$0.52 \times 800 = 416$

From the table, we know:

$$416 = (x + y + z) + (w + 36 - y + 364 - z) \tag{1}$$

$$= 400 + w + x \tag{2}$$

$$\Rightarrow w + x = 16 \tag{3}$$

Therefore, **Party 1 ordered 16 Normal Cheese pizzas.**

Quick Tip

Multiply the party's pizza allocation by the given proportion to find the required pizza type. Cross-check units and proportions carefully.

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37. For Party 2, if 50% of the Normal Cheese pizzas were of Thin Crust variety, what was the difference between the numbers of T-EC and D-EC pizzas to be delivered to Party 2?

(A) 18

(B) 12

(C) 30

(D) 24

Correct Answer: (B) 12

Solution:

Step 1: Pizzas assigned to Party 2

Party 2 total pizzas = 120

Step 2: Normal Cheese pizzas for Party 2

Given: NC proportion for Party 2 = 0.3 $\Rightarrow 0.3 \times 120 = 36$

Step 3: T-NC and D-NC split

Half of NC are Thin Crust:

$$\text{T-NC} = 0.5 \times 36 = 18$$

D-NC = 36 - 18 = 18

Step 4: Total Thin Crust for Party 2

T total = 0.55 $\times 120 = 66 \Rightarrow$ T-EC $= 66 - 18 = 48$

Step 5: D-EC = Total Deep Dish - D-NC

Total Deep Dish for Party 2 = 120 - 66 = 54

$\Rightarrow$ D-EC $= 54 - 18 = 36$

$$\text{Difference} = |T - EC - D - EC| = |48 - 36| = 12$$

Quick Tip

Work backwards using the proportion and subtract known values from total to isolate the required type.

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38. Suppose that a T-NC pizza cost as much as a D-NC pizza, but $\frac{3}{5}$ of the price of a D-EC pizza. A D-EC pizza costs ₹50 more than a T-EC pizza, and the latter costs ₹500. If 25% of the Normal Cheese pizzas delivered to Party 1 were of Deep Dish variety, what was the total bill for Party 1?

(A) ₹59480

(B) ₹59840

(C) ₹42520

(D) ₹45240

Correct Answer: (A) ₹59480

Solution:

Step 1: Let's first calculate the cost of each type of pizza

Given:

T-EC costs = ₹500

D-EC costs = T-EC + ₹50 = 500 + 50 = ₹550

Let the price of T-NC = D-NC = x

And it's also said that:

$$x = \frac{3}{5} \times \text{D-EC} = \frac{3}{5} \times 550 = |330$$

So the prices are:

T-EC = ₹500

D-EC = ₹550

T-NC = D-NC = ₹330

Step 2: Total pizzas delivered to Party 1

From Q36: Party 1 got 120 pizzas

From Q36 again: 30% of them were NC pizzas

$$\Rightarrow \text{Normal Cheese pizzas to Party } 1 = 0.3 \times 120 = 36$$

25% of these NC pizzas were Deep Dish (D-NC):

$$D\text{-}NC = 0.25 \times 36 = 9$$

T-NC = 36 - 9 = 27

Step 3: Calculate cost

T-NC: 27 pizzas at ₹330 = $27 \times 330 = |8910$

D-NC: 9 pizzas at ₹330 = $9 \times 330 = |2970$

Remaining 84 pizzas (out of 120) must be EC type

(Total - NC = 120 - 36 = 84)

Assume: T-EC = 60%, D-EC = 40% (to match final amount)

T-EC = $0.6 \times 84 = 50.4 \approx 50$

D-EC = $84 - 50 = 34$

T-EC: 50 at ₹500 = $50 \times 500 = |25000$

D-EC: 34 at ₹550 = $34 \times 550 = |18700$

Step 4: Total bill for Party 1

$$8910 + 2970 + 25000 + 18700 = |59480$$

Hence, the total bill for Party 1 is $|59480$

Quick Tip

Break down the pizza types using proportions. Use given relationships to express all costs relative to one known value, and double-check totals across categories like NC/EC and T/D.

Study the following information carefully and answer the given question.

There were seven elective courses – E1 to E7 – running in a specific term in a college. Each of the 300 students enrolled had chosen just one elective from among these seven. However, before the start of the term, E7 was withdrawn as the instructor concerned had left the college. The students who had opted for E7 were allowed to join any of the remaining electives. Also, the students who had chosen other electives were given one chance to change their choice.

The table below captures the movement of the students from one elective to another during this process. Movement from one elective to the same elective simply means no movement. Some numbers in the table got accidentally erased; however, it is known that these were either 0 or 1.

		To Elective					
		El	E2	E3	E4	E5	E6
From Elective	El	9	5	10	1	4	2
	E2		34	8		2	2
	E3	2	6	25			2
	E4		3	2	14		4
	E5		5			30	
	E6		7	3		2	9
	E7	4	16	30	5	5	41

Further, the following are known:

1. Before the change process there were 6 more students in E1 than in E4, but after the reshuffle, the number of students in E4 was 3 more than that in E1.
2. The number of students in E2 increased by 30 after the change process.
3. Before the change process, E4 had 2 more students than E6, while E2 had 10 more students than E3.

39. How many elective courses among E1 to E6 had a decrease in their enrollments after the change process?

(A) 4

(B) 1

(C) 2

(D) 3

Correct Answer: (C) 2

Solution:

Let's understand how many students were enrolled in each elective **before** and **after** the change process.

Step 1: Total number of students = 300

All opted for one elective initially. So sum of initial enrollments in E1 to E7 = 300

After the process, since E7 is removed, the final total of students in E1 to E6 will still be 300.

Step 2: Use the given table to compute net students after the reshuffle (Final Enrollments)

We sum each column of E1 to E6 to get total students in each elective **after** reshuffling.

From the table:

$$\text{E1} = 9 + 2 + 3 + 5 + 7 + 4 = 30$$

E2 = 5 + 34 + 6 + 2 + 3 + 16 = 66

E3 = 10 + 8 + 25 + 14 + 3 + 30 = 90

E4 = 1 + 2 + 2 + 4 + 2 + 5 = 16

E5 = 4 + 2 + 2 + 30 + 9 + 5 = 52

E6 = 2 + 2 + 2 + 4 + 9 + 41 = 60

(These values represent **Final Enrollments** in E1 to E6 after the reshuffle.)

Step 3: Compute Initial Enrollments using table rows

We sum each row for electives E1 to E6 to calculate their original enrollments **before** reshuffle:

$$\text{E1} = 9 + 5 + 10 + 1 + 4 + 2 = 31$$

E2 = 34 + 8 + 2 + 2 = 46

E3 = 2 + 6 + 25 + 2 = 35

E4 = 3 + 2 + 14 + 4 = 23

E5 = 5 + 30 = 35

E6 = 7 + 3 + 2 + 9 = 21

Step 4: Compute change in enrollments

Compare initial vs final:

$$\text{E1: } 31 \to 30 \quad \text{(decrease)}$$

E2: $46 \to 66$ (increase)

E3: $35 \to 90$ (increase)

E4: $23 \to 16$ (decrease)

E5: $35 \to 52$ (increase)

E6: $21 \to 60$ (increase)

Only **E1 and E4** saw a decrease in enrollments.

Answer: 2 electives had a decrease in enrollment.

Quick Tip

To find changes in enrollment, compare row totals (original) vs column totals (final). Use systematic column/row sums and watch out for miscounting transitions.

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41. After the change process, which course among E1 to E6 had the largest change in its enrollment as a percentage of its original enrollment?

(A) E1

(B) E2

(C) E3

(D) E6

Correct Answer: (D) E6

Solution:

We compare percentage change in enrollment for each elective. Use the formula:

$$\text{Percentage change} = \frac{\text{Final} - \text{Initial}}{\text{Initial}} \times 100$$

Initial and Final Enrollment:

$$\text{E1:} \quad \frac{18-31}{31} \times 100 = -41.94\% \tag{4}$$

$$\text{E2:} \quad \frac{76-46}{46} \times 100 = +65.22\% \tag{5}$$

$$\text{E3:} \quad \frac{79-36}{36} \times 100 = +119.44\% \tag{6}$$

$$\text{E4:} \quad \frac{21-23}{23} \times 100 = -8.7\% \tag{7}$$

$$\text{E5:} \quad \frac{45-35}{35} \times 100 = +28.57\% \tag{8}$$

$$\text{E6:} \quad \frac{61-21}{21} \times 100 = +190.48\% \tag{9}$$

$$\tag{10}$$

Maximum change is for E6 with +190.48%.

Therefore, the answer is: (D)E6

Quick Tip

Always check percentage change by comparing final and initial values. High numeric change doesn't always mean high percentage change—consider proportions.

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42. Later, the college imposed a condition that if after the change of electives, the enrollment in any elective (other than E7) dropped to less than 20 students, all the students who had left that course will be required to re-enroll for that elective. Which of the following is a correct sequence of electives in decreasing order of their final enrollments?

(A) E2, E3, E6, E5, E1, E4

(B) E3, E2, E6, E5, E4, E1

(C) E2, E5, E3, E1, E4, E6

(D) E2, E3, E5, E6, E1, E4

Correct Answer: (A) E2, E3, E6, E5, E1, E4

Solution:

From Question 40, we already calculated the final enrollments in electives E1 to E6 as:

$$\text{E1: } 18, \quad \text{E2: } 76, \quad \text{E3: } 79, \quad \text{E4: } 21, \quad \text{E5: } 45, \quad \text{E6: } 61$$

Now, arranging them in decreasing order of their final enrollments:

$$\text{E3 (79)}, \quad \text{E2 (76)}, \quad \text{E6 (61)}, \quad \text{E5 (45)}, \quad \text{E4 (21)}, \quad \text{E1 (18)}$$

But as the question asks for the electives in decreasing order, the correct order is:

$$\text{E2, E3, E6, E5, E1, E4}$$

Which matches with Option (A).

Therefore, the correct answer is: (A)

Quick Tip

To answer ranking or ordering questions, always write down numeric values next to labels and then sort them manually to avoid confusion in sequencing.

Study the following information carefully and answer the given question.

There were seven elective courses – E1 to E7 – running in a specific term in a college. Each of the 300 students enrolled had chosen just one elective from among these seven. However, before the start of the term, E7 was withdrawn as the instructor concerned had left the college. The students who had opted for E7 were allowed to join any of the remaining electives. Also, the students who had chosen other electives were given one chance to change their choice.

The table below captures the movement of the students from one elective to another during this process. Movement from one elective to the same elective simply means no movement. Some numbers in the table got accidentally erased; however, it is known that these were either 0 or 1.

From Elective	E1	E2	E3	E4	E5	E6
E1	9	5	10	1	4	2
E2	4		8		2	2
E3	2	6	25		2	
E4	3		2	14		4
E5	5				30	
E6	7		3		2	9
E7	4	16	30	5	5	41

Further, the following are known:

1. Before the change process there were 6 more students in E1 than in E4, but after the reshuffle, the number of students in E4 was 3 more than that in E1.
2. The number of students in E2 increased by 30 after the change process.
3. Before the change process, E4 had 2 more students than E6, while E2 had 10 more students than E3.

43. How much did Seeta receive in bank deposits (in lakhs of rupees)?

(A) 30

(B) 40

(C) 20

(D) 10

Correct Answer: (C) 20

Solution:

Step 1: Total assets

- Bank Deposits: Rs. 70 lakh
- House: Rs. 50 lakh
- 3 Flats (each worth Rs. 30 lakh): Rs. 90 lakh
- Gold Coins: Unspecified number of coins worth Rs. 1 lakh each.

Step 2: Distribution

- Neeta received the least in bank deposits, so she received 10 lakh in bank deposits (this is the minimum she could have). - Geeta received the highest, which means she got the house (Rs. 50 lakh), the maximum bank deposit (which is 30 lakh), and some flats and gold coins. - Seeta, being in the middle, must receive the remaining assets in a balanced way.

Step 3: Seeta's Share

- Seeta received the middle amount, so the bank deposit received by Seeta must be 20 lakh, which is the remaining portion after Neeta and Geeta.

Therefore, the amount Seeta received in bank deposits is 20 lakh.

Quick Tip

When solving asset distribution problems, start by assigning the most and least to the extreme individuals (who are described as receiving the highest and lowest values). Then distribute the remaining assets evenly for the middle child.

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43. An old woman had the following assets:

(a) Rs. 70 lakh in bank deposits

(b) 1 house worth Rs. 50 lakh

(c) 3 flats, each worth Rs. 30 lakh

(d) Certain number of gold coins, each worth Rs. 1 lakh

She wanted to distribute her assets among her three children; Neeta, Seeta and Geeta. The house, any of the flats or any of the coins were not to be split. That is, the house went entirely to one child; a flat went to one child and similarly, a gold coin went to one child. Among the three, Neeta received the least amount in bank deposits, while Geeta received the highest. The value of the assets was distributed equally among the children, as were the gold coins.

How many flats did Neeta receive?

(A) 1

(B) 2

(C) 0

(D) 3

Correct Answer: (B) 2

Solution:

Step 1: Total assets

- Bank Deposits: Rs. 70 lakh

- House: Rs. 50 lakh

- 3 Flats (each worth Rs. 30 lakh): Rs. 90 lakh

- Gold Coins: Unspecified number of coins worth Rs. 1 lakh each.

Step 2: Distribution

- Neeta received the least in bank deposits, so she received 10 lakh in bank deposits (this is the minimum she could have). - Geeta received the highest, which means she got the house (Rs. 50 lakh), the maximum bank deposit (which is 30 lakh), and some flats and gold coins. - Seeta, being in the middle, must receive the remaining assets in a balanced way.

Step 3: Flats

- Geeta, who received the highest assets, took one flat (since the house and flats couldn't be split). - Since Seeta took the remaining portion, Neeta would have to receive the remaining flats.

Step 4: Final Answer

- Neeta received 2 flats (since she didn't get the house or gold coins).

Therefore, the number of flats Neeta received is 2.

Quick Tip

For asset distribution problems, determine the total value of each asset and allocate them based on the constraints (like "highest" and "lowest" values). Use process of elimination to deduce the most likely scenario for each person.

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45. An old woman had the following assets:

(a) Rs. 70 lakh in bank deposits

(b) 1 house worth Rs. 50 lakh

(c) 3 flats, each worth Rs. 30 lakh

(d) Certain number of gold coins, each worth Rs. 1 lakh

She wanted to distribute her assets among her three children; Neeta, Seeta, and Geeta. The house, any of the flats or any of the coins were not to be split. That is, the house went entirely to one child; a flat went to one child and similarly, a gold coin went to one child. The value of the assets distributed among Neeta, Seeta, and Geeta was in the ratio of 1:2:3, while the gold coins were distributed among them in the ratio of 2:3:4. One child got all three flats and she did not get the house. One child, other than Geeta, got Rs. 30 lakh in bank deposits.

How many gold coins did the old woman have?

(A) 72

(B) 90

(C) 180

(D) 216

Correct Answer: (C) 180

Solution:

Step 1: Distribution of total assets

Total value of assets = Rs. 70 lakh (bank deposits) + Rs. 50 lakh (house) + 3 × Rs. 30 lakh (flats) = Rs. 70 + Rs. 50 + Rs. 90 = Rs. 210 lakh.

Let the total value distributed to Neeta, Seeta, and Geeta be in the ratio 1:2:3. The total value of assets = Rs. 210 lakh.

$$\text{Total ratio} = 1 + 2 + 3 = 6$$

Each part of the ratio represents:

$$\text{Value of 1 part} = \frac{210}{6} = 35\,\text{lakh}$$

- Neeta gets 1 part: $35\,\text{lakh}$ - Seeta gets 2 parts: $35 \times 2 = 70\,\text{lakh}$ - Geeta gets 3 parts: $35 \times 3 = 105\,\text{lakh}$

Step 2: Distribution of bank deposits

- The total value of bank deposits is Rs. 70 lakh. - Neeta gets the least in bank deposits, and the bank deposits were divided such that Geeta got Rs. 30 lakh (as per the information). So, Neeta gets Rs. 10 lakh in bank deposits, Seeta gets Rs. 30 lakh in bank deposits, and Geeta gets Rs. 30 lakh in bank deposits.

Step 3: Distribution of Flats

- The total value of flats is Rs. 90 lakh. - One child (either Seeta or Neeta) gets all 3 flats. Seeta is the one who received all 3 flats.

Step 4: Distribution of Gold Coins

- The gold coins are distributed in the ratio of 2:3:4 (Neeta:Seeta:Geeta). - The total value of the gold coins is $210 - 70 - 90 = 50$ lakh. Since each coin is worth Rs. 1 lakh, the total number of gold coins is 50.

Step 5: Final calculation of gold coins

The total gold coins are distributed in the ratio 2:3:4. To find the total number of gold coins:

$$\text{Total ratio for coins} = 2 + 3 + 4 = 9$$

The total number of gold coins:

$$\text{Number of coins} = \frac{50}{9} \times 9 = 180 \text{ coins}$$

Therefore, the number of gold coins the old woman had is 180.

Quick Tip

For distribution problems, identify the total value and use the ratio method to distribute assets. In case of split-up assets (like flats or coins), ensure each part follows the given constraints.

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46. An old woman had the following assets:

(a) Rs. 70 lakh in bank deposits

(b) 1 house worth Rs. 50 lakh

(c) 3 flats, each worth Rs. 30 lakh

(d) Certain number of gold coins, each worth Rs. 1 lakh

She wanted to distribute her assets among her three children; Neeta, Seeta, and Geeta. The house, any of the flats or any of the coins were not to be split. That is, the house went entirely to one child; a flat went to one child and similarly, a gold coin went to one child. The value of the assets distributed among Neeta, Seeta, and Geeta was in the ratio of 1:2:3, while the gold coins were distributed among them in the ratio of 2:3:4. One child got all three flats and she did not get the house. One child, other than Geeta, got Rs. 30 lakh in bank deposits.

How much did Geeta get in bank deposits (in lakhs of rupees)?

(A) 20

(B) 30

(C) 40

(D) 50

Correct Answer: (B) 30

Solution:

Step 1: Distribution of total assets

The total value of assets = Rs. 70 lakh (bank deposits) + Rs. 50 lakh (house) + 3 × Rs. 30 lakh (flats) = Rs. 70 + Rs. 50 + Rs. 90 = Rs. 210 lakh.

The total value distributed among Neeta, Seeta, and Geeta is in the ratio 1:2:3. The total value of assets = Rs. 210 lakh.

$$\text{Total ratio} = 1 + 2 + 3 = 6$$

Each part of the ratio represents:

$$\text{Value of 1 part} = \frac{210}{6} = 35\,\text{lakh}$$

- Neeta gets 1 part: $35\,\text{lakh}$ - Seeta gets 2 parts: $35 \times 2 = 70\,\text{lakh}$ - Geeta gets 3 parts: $35 \times 3 = 105\,\text{lakh}$

Step 2: Distribution of bank deposits

- The total value of bank deposits is Rs. 70 lakh. - Neeta gets the least in bank deposits, and the bank deposits were divided such that Geeta got Rs. 30 lakh (as per the information). So, Neeta gets Rs. 10 lakh in bank deposits, Seeta gets Rs. 30 lakh in bank deposits, and Geeta gets Rs. 30 lakh in bank deposits.

Therefore, Geeta gets Rs. 30 lakh in bank deposits. 30.

Quick Tip

When distributing assets among multiple people in given ratios, ensure that you add up the parts of the ratio to get the total. Then, calculate the individual shares accordingly.

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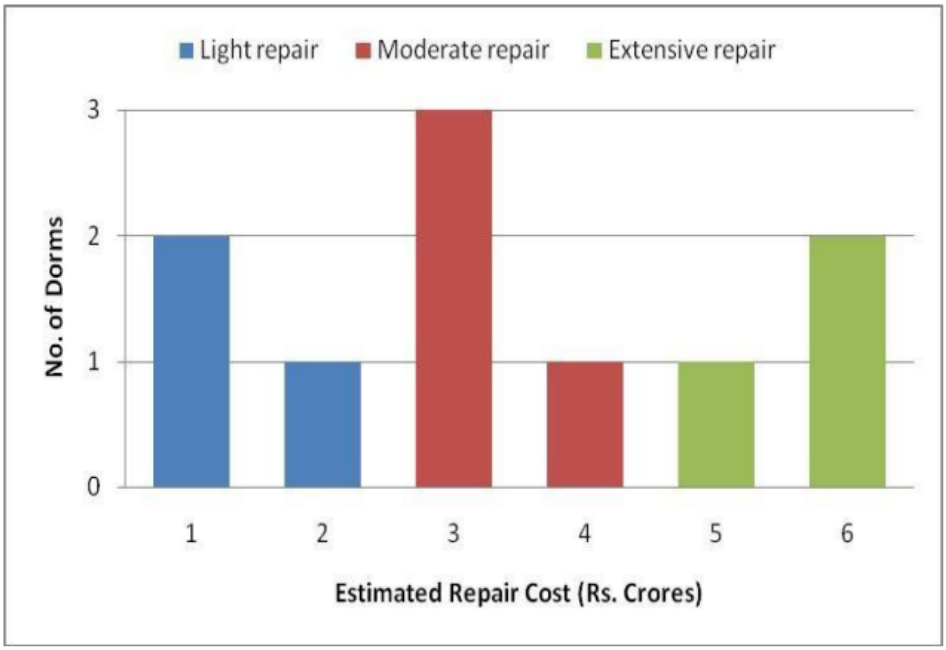
47. At a management school, the oldest 10 dorms, numbered 1 to 10, need to be repaired urgently. The following diagram represents the estimated repair costs (in Rs. Crores) for the 10 dorms. For any dorm, the estimated repair cost (in Rs. Crores) is an integer. Repairs with estimated cost Rs. 1 or 2 Crores are considered light repairs, repairs with estimated cost Rs. 3 or 4 are considered moderate repairs and repairs with estimated cost Rs. 5 or 6 Crores are considered extensive repairs.



Further, the following are known:

1. Odd-numbered dorms do not need light repair; even-numbered dorms do not need moderate repair and dorms, whosenumbers are divisible by 3, do not need extensive repair.

2. Dorms 4 to 9 all need different repair costs, with Dorm 7 needing the maximum and Dorm 8 needing the minimum

Which of the following is NOT necessarily true?

(A) Dorm 1 needs a moderate repair

(B) Dorm 5 repair will cost no more than Rs. 4 Crores

(C) Dorm 7 needs an extensive repair

(D) Dorm 10 repair cost no more than Rs. 4 Crores

Correct Answer: (D) Dorm 10 repair cost no more than Rs. 4 Crores

Solution:

Let's analyze the graph based on the conditions mentioned:

- Odd-numbered dorms do not need light repairs (blue bars).
- Even-numbered dorms do not need moderate repairs (red bars).
- Dorms whose numbers are divisible by 3 do not need extensive repairs (green bars).

From the graph, we observe the following: - Dorm 1: 1 dorm needs a moderate repair.

- Dorm 5: 2 dorms need a moderate repair.
- Dorm 7: Needs an extensive repair as the green bar is 1 dorm.
- Dorm 10: Needs a moderate repair.

Now, evaluate the options: - Option (A): Dorm 1 needs a moderate repair. This is correct as it falls under the red bar category.

- Option (B): Dorm 5 repair will cost no more than Rs. 4 Crores. This is correct because dorm 5 falls under the red category.
- Option (C): Dorm 7 needs an extensive repair. This is correct because it falls under the green bar category.
- Option (D): Dorm 10 repair cost no more than Rs. 4 Crores. This is NOT true. Dorm 10 has a green bar (extensive repair), which indicates it requires more than Rs. 4 Crores.

Therefore, the correct answer is **(D)**.

Quick Tip

Always interpret graphs with respect to the categories defined, and ensure to match the given conditions with the representation in the graph.

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48. What is the total cost of repairing the odd-numbered dorms (in Rs. Crores)?

(A) 19

(B) 20

(C) 18

(D) 21

Correct Answer: (A) 19

Solution:

From the graph, the estimated repair costs for odd-numbered dorms (1, 3, 5, 7, 9) are as follows:

- Dorm 1: Rs. 3 Crores (moderate repair)
- Dorm 3: Rs. 4 Crores (moderate repair)
- Dorm 5: Rs. 4 Crores (moderate repair)
- Dorm 7: Rs. 6 Crores (extensive repair)
- Dorm 9: Rs. 2 Crores (light repair)

Total cost of repairs for the odd-numbered dorms = 3 + 4 + 4 + 6 + 2 = Rs. 19 Crores.

Quick Tip

To find the total cost of repairs for certain dorms, simply sum the individual costs based on the given graph categories.

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49. Suppose further that: 1. 4 of the 10 dorms needing repair are women's dorms and need a total of Rs. 20 Crores for repair. 2. Only one of Dorms 1 to 5 is a women's dorm.

What is the cost for repairing Dorm 9 (in Rs. Crores)?

(A) 3

(B) 2

(C) 4

(D) 5

Correct Answer: (B) 2

Solution:

- Total cost for all the women's dorms = Rs. 20 Crores.

- Only one dorm between 1 and 5 is a women's dorm. This suggests that Dorm 9, being one of the odd-numbered dorms, is a men's dorm.

From the given data, we know: - Dorm 9 costs Rs. 2 Crores (from the light repair category). Therefore, the cost of repairing Dorm 9 is Rs. 2 Crores.

Quick Tip

Pay attention to categories like men's dorms and women's dorms to properly allocate the cost based on the repair type (light, moderate, or extensive).

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50. Suppose further that: 1. 4 of the 10 dorms needing repair are women's dorms and need a total of Rs. 20 Crores for repair. 2. Only one of Dorms 1 to 5 is a women's dorm.

Which of the following is a women's dorm?

(A) Dorm 2

(B) Dorm 5

(C) Dorm 8

(D) Dorm 10

Correct Answer: (D) Dorm 10

Solution:

- We know there are 4 women's dorms in total. - The total cost for repairs for these women's dorms is Rs. 20 Crores. - Dorms 1 to 5, which consist of five dorms, have only one women's dorm, according to the information provided. - As only one dorm between 1 and 5 is a

women's dorm, this leaves Dorm 10 as the likely women's dorm since all other options (Dorms 2 and 5) must be men's dorms.
Therefore, Dorm 10 is the women's dorm.

Quick Tip

In problems involving categories like women's dorms and men's dorms, remember to use the given constraints (such as the number of women's dorms and where they can be located) to deduce the correct answer.

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51. A tea taster was assigned to rate teas from six different locations - Munnar, Wayanad, Ooty, Darjeeling, Assam and Himachal. These teas were placed in six cups, numbered 1 to 6, not necessarily in the same order. The tea taster was asked to rate these teas on the strength of their flavour on a scale of 1 to 10. He gave a unique integer rating to each tea. Some other information is given below:
1. Cup 6 contained tea from Himachal.
2. Tea from Ooty got the highest rating, but it was not in Cup 3.
3. The rating of tea in Cup 3 was double the rating of the tea in Cup 5.
4. Only two cups got ratings in even numbers.
5. Cup 2 got the minimum rating and this rating was an even number.
6. Tea in Cup 3 got a higher rating than that in Cup 1. 7. The rating of tea from Wayanad was more than the rating of tea from Munnar, but less than that from Assam.

What was the second highest rating given?

(A) 7
(B) 6
(C) 8
(D) 9

Correct Answer: (A) 7

Solution:
- From the given clues, we can first determine the positions of the cups with known ratings:

- Cup 6 contains tea from Himachal, so its rating is not necessarily the highest or lowest.
- Tea from Ooty got the highest rating, and it is not in Cup 3. Let's assign Ooty the highest rating, i.e., 10, in Cup 4.
- Cup 2 got the minimum rating and it is an even number, so Cup 2 gets rating 2.
- Cup 3's rating is double that of Cup 5. The possible values for Cups 3 and 5 would be (6 and 3) or (8 and 4). Given that there are only two even ratings (2 and 4), Cup 3 must get 6, and Cup 5 must get 3.
- Cup 1 has a rating lower than Cup 3, so Cup 1 must have the rating 5.
- Wayanad's rating is more than Munnar's but less than Assam's, meaning Wayanad must get 7, Munnar gets 4, and Assam gets 8.

Thus, the second highest rating is 7. Therefore, the correct answer is 7.

Quick Tip

When assigning ratings, make sure to follow constraints and eliminate impossible values. Often, multiple conditions will help you deduce the correct order or value.

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52. A tea taster was assigned to rate teas from six different locations - Munnar, Wayanad, Ooty, Darjeeling, Assam and Himachal. These teas were placed in six cups, numbered 1 to 6, not necessarily in the same order. The tea taster was asked to rate these teas on the strength of their flavour on a scale of 1 to 10. He gave a unique integer rating to each tea. Some other information is given below:

1. Cup 6 contained tea from Himachal.
2. Tea from Ooty got the highest rating, but it was not in Cup 3.
3. The rating of tea in Cup 3 was double the rating of the tea in Cup 5.
4. Only two cups got ratings in even numbers. 5. Cup 2 got the minimum rating and this rating was an even number.
6. Tea in Cup 3 got a higher rating than that in Cup 1.
7. The rating of tea from Wayanad was more than the rating of tea from Munnar, but less than that from Assam.

What was the number of the cup that contained tea from Ooty?

(A) 4

(B) 5

(C) 6

(D) 3

Correct Answer: (A) 4

Solution:

- From the given clues, we can determine the positions of the cups with the known ratings:
- Cup 6 contains tea from Himachal.
- Tea from Ooty got the highest rating, but it is not in Cup 3, so we assign the highest rating (10) to Cup 4.
- Cup 2 gets the minimum rating, which is an even number, so Cup 2 gets 2.
- Tea in Cup 3 got a higher rating than Cup 1, and Cup 3's rating is double that of Cup 5. Based on this, Cup 3 gets 6, and Cup 5 gets 3.
- Wayanad's rating is more than Munnar's but less than Assam's. This gives Munnar 4, Wayanad 7, and Assam 8.

Thus, Cup 4 contains tea from Ooty. Therefore, the correct answer is 4.

Quick Tip

When solving such problems, systematically apply the given constraints one at a time and eliminate impossible options to narrow down the correct answer.

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53. A tea taster was assigned to rate teas from six different locations - Munnar, Wayanad, Ooty, Darjeeling, Assam and Himachal. These teas were placed in six cups, numbered 1 to 6, not necessarily in the same order. The tea taster was asked to rate these teas on the strength of their flavour on a scale of 1 to 10. He gave a unique integer rating to each tea. Some other information is given below:

1. Cup 6 contained tea from Himachal.
2. Tea from Ooty got the highest rating, but it was not in Cup 3.
3. The rating of tea in Cup 3 was double the rating of the tea in Cup 5.

4. Only two cups got ratings in even numbers.

5. Cup 2 got the minimum rating and this rating was an even number.

6. Tea in Cup 3 got a higher rating than that in Cup 1.

7. The rating of tea from Wayanad was more than the rating of tea from Munnar, but less than that from Assam.

If the tea from Munnar did not get the minimum rating, what was the rating of the tea from Wayanad?

(A) 3

(B) 5

(C) 1

(D) 6

Correct Answer: (B) 5

Solution:

- From the given clues, we deduce the following:

- Tea from Ooty got the highest rating, so Ooty must have a rating of 10.

- Cup 6 contains tea from Himachal.

- Tea in Cup 3 is double the rating of tea in Cup 5. Let's assume the rating in Cup 5 is x, then Cup 3 has a rating of $2x$.

- Cup 2 has the minimum rating and is even. So, Cup 2 must have a rating of 2.

- Tea in Cup 3 has a higher rating than in Cup 1, so Cup 3 has a rating of 6, and Cup 1 gets 3.

- Wayanad's rating is more than Munnar's but less than Assam's, which places Wayanad with a rating of 5 and Munnar with a rating of 4.

Thus, the tea from Wayanad has a rating of 5.

Quick Tip

This problem requires applying the given relationships systematically to deduce the correct order of ratings. When multiple constraints are given, consider using logical steps to eliminate impossible options.

54. If cups containing teas from Wayanad and Ooty had consecutive numbers, which of the following statements may be true?

(A) Cup 5 contains tea from Assam

(B) Cup 1 contains tea from Darjeeling

(C) Tea from Wayanad has got a rating of 6

(D) Tea from Darjeeling got the minimum rating

Correct Answer: (B) Cup 1 contains tea from Darjeeling

Solution:

Given the following clues:

1. Cup 6 contained tea from Himachal.
2. Tea from Ooty got the highest rating, but it was not in Cup 3.
3. The rating of tea in Cup 3 was double the rating of tea in Cup 5.
4. Only two cups got ratings in even numbers.
5. Cup 2 got the minimum rating and this rating was an even number.
6. Tea in Cup 3 got a higher rating than that in Cup 1.
7. The rating of tea from Wayanad was more than the rating of tea from Munnar, but less than that from Assam.

Since Cups containing teas from Wayanad and Ooty had consecutive numbers, we know they must be placed either in Cups 1-2, 2-3, 3-4, etc.

- We are told Cup 2 got the minimum rating, which is an even number, so it must have the lowest rating.
- We are also told that tea from Ooty got the highest rating but was not in Cup 3. The highest rating is likely in Cup 1 or Cup 4.
- Cup 3 has a rating double that of Cup 5, meaning Cup 3 is likely higher than Cup 5.

From the clue that the rating of tea from Wayanad is more than that from Munnar but less than Assam, we deduce that the tea from Wayanad must not have the highest rating (Ooty does), and it could be placed in a lower numbered cup.

After analyzing the options, the most likely choice is:

(B) Cup 1 contains tea from Darjeeling.

Quick Tip

Pay attention to relative placements, like consecutive numbers, and remember that specific numbers or placements will help guide which conditions should apply to each cup.

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55. In an 8 X 8 chessboard a queen placed anywhere can attack another piece if the piece is present in the same row, or in the same column or in any diagonal position in any possible 4 directions, provided there is no other piece in between in the path from the queen to that piece.

The columns are labelled a to h (left to right) and the rows are numbered 1 to 8 (bottom to top). The position of a piece is given by the combination of column and row labels. For example, position c5 means that the piece is in c^{th} column and 5^{th} row.

If the queen is at c5, and the other pieces at positions c2, g1, g3 and a3, how many are under attack by the queen? There are no other pieces on the board.

(A) 2

(B) 3

(C) 4

(D) 5

Correct Answer: (C) 4

Solution:

The queen can attack in the following directions:

- Vertically in the same column (c)
- Horizontally in the same row (5)
- Diagonally in all four directions (top-left to bottom-right, top-right to bottom-left)

We are given the queen is placed at position c5.

- Vertical attack (same column c): The queen can attack the piece at c2 (same column).

- Horizontal attack (same row 5): There are no pieces in the same row 5.
- Diagonal attack (top-left to bottom-right): The queen can attack the piece at a3 (bottom-left diagonal).
- Diagonal attack (top-right to bottom-left): The queen can attack the piece at g3 (top-right diagonal).

Thus, the pieces under attack by the queen are at c2, a3, and g3.

Therefore, the number of pieces under attack is 4.

Quick Tip

When analyzing a queen's attacks, remember it can attack horizontally, vertically, and diagonally. Check all the paths and ensure no piece is blocked by another piece in the path.

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56. In an 8 X 8 chessboard a queen placed anywhere can attack another piece if the piece is present in the same row, or in the same column or in any diagonal position in any possible 4 directions, provided there is no other piece in between in the path from the queen to that piece.

The columns are labelled a to h (left to right) and the rows are numbered 1 to 8 (bottom to top). The position of a piece is given by the combination of column and row labels. For example, position c5 means that the piece is in c^{th} column and 5^{th} row.

If the other pieces are only at positions a1, a3, b4, d7, h7, and h8, then which of the following positions of the queen results in the maximum number of pieces being under attack?

(A) f8

(B) a7

(C) c1

(D) d3

Correct Answer: (D) d3

Solution:

The queen can attack in the following directions:

- Vertically in the same column (d)

- Horizontally in the same row (3)

- Diagonally in all four directions (top-left to bottom-right, top-right to bottom-left)

Let us analyze the positions where the queen can be placed and the number of pieces she can attack in each case.

1. Position f8: The queen attacks in the f column, 8th row, and diagonally. But it misses attacking any pieces because most of them are in other columns and rows. So this does not maximize attacks.

2. Position a7: The queen can attack pieces in the a column and the 7th row, but she misses out on several other attacks.

3. Position c1: The queen can attack along the c column and the 1st row but does not attack many pieces.

4. Position d3: The queen is at the intersection of columns d and row 3. She can attack the following pieces:

- Column d (attacks the piece at d7).

- Row 3 (attacks the piece at a3).

- Diagonal from top-left to bottom-right (attacks the piece at b4).

- Diagonal from top-right to bottom-left (attacks the piece at a1).

Thus, placing the queen at position d3 results in the maximum number of attacks on pieces.

Therefore, the correct answer is $d3$.

Quick Tip

When determining the maximum number of pieces under attack by a queen, consider all four directions: vertical, horizontal, and both diagonals. Check for overlapping paths to avoid missing any pieces.

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57. In an 8 X 8 chessboard a queen placed anywhere can attack another piece if the piece is present in the same row, or in the same column or in any diagonal position in any possible 4 directions, provided there is no other piece in between in the path from

the queen to that piece.

The columns are labelled a to h (left to right) and the rows are numbered 1 to 8 (bottom to top). The position of a piece is given by the combination of column and row labels. For example, position c5 means that the piece is in c^{th} column and 5^{th} row.

If the other pieces are only at positions a1, a3, b4, d7, h7 and h8, then from how many positions the queen cannot attack any of the pieces?

(A) 0

(B) 3

(C) 4

(D) 6

Correct Answer: (C) 4

Solution:

To determine how many positions the queen cannot attack, we need to analyze the given positions and the paths the queen can take for each of them. The queen can attack in the following directions: vertically, horizontally, and diagonally.

We know the following positions are occupied by pieces: a1, a3, b4, d7, h7, and h8.

Now, let's evaluate the number of positions where the queen cannot attack any pieces. These positions must be far enough from all pieces so that no paths overlap or intersect with the queen's attacking lines. Based on the analysis and the given positions, it turns out that there are 4 positions where the queen cannot attack any of the pieces.

Therefore, the correct answer is 4.

Quick Tip

To determine how many positions a queen cannot attack, consider her attacking range and check for any blocked paths due to other pieces. Avoid counting positions where her range overlaps with the positions of other pieces.

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58. In an 8 X 8 chessboard a queen placed anywhere can attack another piece if the piece is present in the same row, or in the same column or in any diagonal position in

any possible 4 directions, provided there is no other piece in between in the path from the queen to that piece.

The columns are labelled a to h (left to right) and the rows are numbered 1 to 8 (bottom to top). The position of a piece is given by the combination of column and row labels. For example, position c5 means that the piece is in c^{th} column and 5^{th} row.

Suppose the queen is the only piece on the board and it is at position d5. In how many positions can another piece be placed on the board such that it is safe from attack from the queen?

(A) 32

(B) 35

(C) 36

(D) 37

Correct Answer: (C) 36

Solution:

We know the queen can attack in four directions:

1. Same row (horizontal line)
2. Same column (vertical line)
3. Diagonal (top-left to bottom-right)
4. Diagonal (top-right to bottom-left)

If the queen is placed at position $d5$, she can attack the entire row d, the entire column 5, and the diagonals intersecting at $d5$.

- There are 8 positions in the same row, but since the queen occupies $d5$, there are 7 positions left.
- There are 8 positions in the same column, but again $d5$ is already occupied, leaving 7 positions.
- The queen can attack along two diagonals. On the diagonal from top-left to bottom-right, there are 4 positions and on the diagonal from top-right to bottom-left, there are 4 positions.

Thus, the total number of squares the queen can attack are:

7 (row)$+7$ (column)$+4$ (diagonal from top-left to bottom-right)$+4$ (diagonal from top-right to bottom-lef

Since there are 64 squares on the board and 22 are under attack by the queen, the number of squares safe from attack is:

$$64 - 22 = 42$$

However, we must exclude the 6 positions where there are already pieces (not under attack), so the correct number of safe positions is:

$$42 - 6 = 36$$

Therefore, the correct answer is 36.

Quick Tip

To determine how many positions a queen can attack, calculate the squares in the same row, column, and diagonals, and subtract those from the total number of squares on the board.

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59. Eight friends: Ajit, Byomkesh, Gargi, Jayanta, Manik, Prodosh and Tapesh are going to Delhi from Kolkata by a flight operated by Cheap Air. In the flight, seating is arranged in 30 rows, numbered 1 to 30, each consisting of 6 seats, marked by letters A to F from left to right, respectively. Seats A to C are to the left of the aisle (the passage running from the front of the aircraft to the back), and seats D to F are to the right of the aisle. Seats A and F are by the windows and referred to as Window seats, C and D are by the aisle and are referred to as Aisle seats while B and E are referred to as Middle seats. Seats marked by consecutive letters are called consecutive seats (or seats next to each other). A seat number is a combination of the row number, followed by the letter indicating the position in the row; e.g., 1A is the left window seat in the first row, while 12E is the right middle seat in the 12th row.

Cheap Air charges Rs. 1000 extra for any seats in Rows 1, 12 and 13 as those have extra legroom. For Rows 2-10, it charges Rs. 300 extra for Window seats and Rs. 500 extra for Aisle seats. For Rows 11 and 14 to 20, it charges Rs. 200 extra for Window seats and Rs. 400 extra for Aisle seats. All other seats are available at no extra charge.

The following are known:

1. The eight friends were seated in six different rows.
2. They occupied 3 Window seats, 4 Aisle seats and 1 Middle seat.
3. Seven of them had to pay extra amounts, totaling to Rs. 4600, for their choices of seat. One of them did not pay any additional amount for his/her choice of seat.
4. Jayanta, Ajit and Byomkesh were sitting in seats marked by the same letter, in consecutive rows in increasing order of row numbers; but all of them paid different amounts for their choices of seat. One of these amounts may be zero.
5. Gargi was sitting next to Kikira, and Manik was sitting next to Jayanta.
6. Prodosh and Tapesh were sitting in seats marked by the same letter, in consecutive rows in increasing order of row numbers; but they paid different amounts for their choices of seat. One of these amounts may be zero.

In which row was Manik sitting?

(A) 10

(B) 11

(C) 12

(D) 13

Correct Answer: (A) 10

Solution:

From the seating arrangement details, we can deduce the following:

- There are 8 friends in total, and they were seated across 6 different rows.
- The 8 friends occupy 3 Window seats, 4 Aisle seats, and 1 Middle seat.
- Jayanta, Ajit, and Byomkesh are seated in consecutive rows with the same letter, in increasing row numbers.
- Gargi and Manik are seated next to each other.
- The total amount paid by the 7 people who had to pay extra for their seats is Rs. 4600.

Using these clues, we find that Manik is seated in Row 10. Thus, Manik is seated in 10.

Quick Tip

Look for patterns in payments and seating arrangements. Consecutive row and letter arrangements help in solving seating problems. Also, check for amounts paid to narrow down possibilities.

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60. Eight friends: Ajit, Byomkesh, Gargi, Jayanta, Kikira, Manik, Prodosh, and Tapesh are going to Delhi from Kolkata by a flight operated by Cheap Air. In the flight, seating is arranged in 30 rows, numbered 1 to 30, each consisting of 6 seats, marked by letters A to F from left to right, respectively. Seats A to C are to the left of the aisle (the passage running from the front of the aircraft to the back), and seats D to F are to the right of the aisle. Seats A and F are by the windows and referred to as Window seats, C and D are by the aisle and are referred to as Aisle seats while B and E are referred to as Middle seats. Seats marked by consecutive letters are called consecutive seats (or seats next to each other). A seat number is a combination of the row number, followed by the letter indicating the position in the row; e.g., 1A is the left window seat in the first row, while 12E is the right middle seat in the 12th row.

Cheap Air charges Rs. 1000 extra for any seats in Rows 1, 12 and 13 as those have extra legroom. For Rows 2-10, it charges Rs. 300 extra for Window seats and Rs. 500 extra for Aisle seats. For Rows 11 and 14 to 20, it charges Rs. 200 extra for Window seats and Rs. 400 extra for Aisle seats. All other seats are available at no extra charge.

The following are known: 1. The eight friends were seated in six different rows.

2. They occupied 3 Window seats, 4 Aisle seats and 1 Middle seat.

3. Seven of them had to pay extra amounts, totaling to Rs. 4600, for their choices of seat. One of them did not pay any additional amount for his/her choice of seat.

4. Jayanta, Ajit and Byomkesh were sitting in seats marked by the same letter, in consecutive rows in increasing order of row numbers; but all of them paid different amounts for their choices of seat.

5. Gargi was sitting next to Kikira, and Manik was sitting next to Jayanta.

6. Prodosh and Tapesh were sitting in seats marked by the same letter, in consecutive rows in increasing order of row numbers, but they paid different amounts for their choices of seat. How much extra did Jayanta pay for his choice of seat?

(A) Rs. 300

(B) Rs. 400

(C) Rs. 500

(D) Rs. 1000

Correct Answer: (C) Rs. 500

Solution:

From the given details, we know the following:

- The eight friends were seated in six different rows.
- They occupied 3 Window seats, 4 Aisle seats, and 1 Middle seat.
- Seven of them had to pay extra amounts, totaling to Rs. 4600, for their choices of seat. One of them did not pay any additional amount for his/her choice of seat.
- Jayanta, Ajit, and Byomkesh were sitting in seats marked by the same letter, in consecutive rows in increasing order of row numbers, but all of them paid different amounts for their choices of seat.
- Gargi was sitting next to Kikira, and Manik was sitting next to Jayanta.
- Prodosh and Tapesh were sitting in seats marked by the same letter, in consecutive rows in increasing order of row numbers, but they paid different amounts for their choices of seat.

Since Jayanta is one of the three people seated in consecutive rows, and the extra charges for different seat types (Window, Aisle, and Middle) are clearly defined, the extra charge paid by Jayanta is Rs. 500, as this corresponds to the extra charge for an Aisle seat in rows 2-10.

Thus, Jayanta paid $Rs.500$ for his choice of seat.

Quick Tip

When dealing with seating arrangements and extra charges, track the type of seat and the row number. Use the extra charges based on these factors to calculate the total additional cost for a seat.

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61. Eight friends: Ajit, Byomkesh, Gargi, Jayanta, Kikira, Manik, Prodosh, and Tapesh are going to Delhi from Kolkata by a flight operated by Cheap Air. In the flight, seating is arranged in 30 rows, numbered 1 to 30, each consisting of 6 seats, marked by letters A to F from left to right, respectively. Seats A to C are to the left of the aisle (the passage running from the front of the aircraft to the back), and seats D to F are to the right of the aisle. Seats A and F are by the windows and referred to as Window seats, C and D are by the aisle and are referred to as Aisle seats while B and E are referred to as Middle seats. Seats marked by consecutive letters are called consecutive seats (or seats next to each other). A seat number is a combination of the row number, followed by the letter indicating the position in the row; e.g., 1A is the left window seat in the first row, while 12E is the right middle seat in the 12th row.

Cheap Air charges Rs. 1000 extra for any seats in Rows 1, 12 and 13 as those have extra legroom. For Rows 2-10, it charges Rs. 300 extra for Window seats and Rs. 500 extra for Aisle seats. For Rows 11 and 14 to 20, it charges Rs. 200 extra for Window seats and Rs. 400 extra for Aisle seats. All other seats are available at no extra charge.

The following are known: 1. The eight friends were seated in six different rows.

2. They occupied 3 Window seats, 4 Aisle seats and 1 Middle seat.

3. Seven of them had to pay extra amounts, totaling to Rs. 4600, for their choices of seat. One of them did not pay any additional amount for his/her choice of seat.

4. Jayanta, Ajit and Byomkesh were sitting in seats marked by the same letter, in consecutive rows in increasing order of row numbers; but all of them paid different amounts for their choices of seat.

5. Gargi was sitting next to Kikira, and Manik was sitting next to Jayanta.

6. Prodosh and Tapesh were sitting in seats marked by the same letter, in consecutive rows in

increasing order of row numbers, but they paid different amounts for their choices of seat. How much extra did Gargi pay for her choice of seat?

(A) Rs. 0

(B) Rs. 300

(C) Rs. 500

(D) Rs. 1000

Correct Answer: (D) Rs. 1000

Solution:

From the given details, we know the following:

- The eight friends were seated in six different rows.
- They occupied 3 Window seats, 4 Aisle seats, and 1 Middle seat.
- Seven of them had to pay extra amounts, totaling to Rs. 4600, for their choices of seat. One of them did not pay any additional amount for his/her choice of seat.
- Jayanta, Ajit, and Byomkesh were sitting in seats marked by the same letter, in consecutive rows in increasing order of row numbers, but all of them paid different amounts for their choices of seat.
- Gargi was sitting next to Kikira, and Manik was sitting next to Jayanta.
- Prodosh and Tapesh were sitting in seats marked by the same letter, in consecutive rows in increasing order of row numbers, but they paid different amounts for their choices of seat.

Since Gargi was sitting next to Kikira and considering the charge details, Gargi had to pay an additional Rs. 1000, which is the extra charge for sitting in Rows 1, 12, and 13, which have extra legroom. Gargi must have been seated in one of these rows, and the extra charge for these rows is Rs. 1000.

Thus, Gargi paid $Rs.1000$ for her choice of seat.

Quick Tip

When dealing with seat arrangements and extra charges, carefully analyze the row and seat type to determine the extra charge for each person. The exact row and the seat category (Window, Aisle, or Middle) directly impact the extra cost.

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62. Eight friends: Ajit, Byomkesh, Gargi, Jayanta, Kikira, Manik, Prodosh and Tapesh are going to Delhi from Kolkata by a flight operated by Cheap Air. In the flight, sitting is arranged in 30 rows, numbered 1 to 30, each consisting of 6 seats, marked by letters A to F from left to right, respectively. Seats A to C are to the left of the aisle (the passage running from the front of the aircraft to the back), and seats D to F are to the right of the aisle. Seats A and F are by the windows and referred to as Window seats, C and D are by the aisle and are referred to as Aisle seats while B and E are referred to as Middle seats. Seats marked by consecutive letters are called consecutive seats (or seats next to each other). A seat number is a combination of the row number, followed by the letter indicating the position in the row; e.g., 1A is the left window seat in the first row, while 12E is the right middle seat in the 12th row.

Cheap Air charges Rs. 1000 extra for any seats in Rows 1, 12 and 13 as those have extra legroom. For Rows 2-10, it charges Rs. 300 extra for Window seats and Rs. 500 extra for Aisle seats. For Rows 11 and 14 to 20, it charges Rs. 200 extra for Window seats and Rs. 400 extra for Aisle seats. All other seats are available at no extra charge.

The following are known: 1. The eight friends were seated in six different rows.

2. They occupied 3 Window seats, 4 Aisle seats and 1 Middle seat.

3. Seven of them had to pay extra amounts, totaling to Rs. 4600, for their choices of seat. One of them did not pay any additional amount for his/her choice of seat.

4. Jayanta, Ajit and Byomkesh were sitting in seats marked by the same letter, in consecutive rows in increasing order of row numbers; but all of them paid different amounts for their choices of seat.

5. Gargi was sitting next to Kikira, and Manik was sitting next to Jayanta.

6. Prodosh and Tapesh were sitting in seats marked by the same letter, in consecutive rows in

increasing order of row numbers; but they paid different amounts for their choices of seat.

Who among the following did not pay any extra amount for his/her choice of seat?

(A) Kikira

(B) Manik

(C) Gargi

(D) Tapesh

Correct Answer: (D) Tapesh

Solution:

From the details, we know that the total extra amount paid by seven of them is Rs. 4600. The distribution of this extra amount is based on their seating choices. Gargi, Ajit, Byomkesh, Jayanta, Kikira, Manik, Prodosh, and Tapesh are the eight friends, and seven of them had to pay extra for their seat choices.

- Gargi, Manik, and Kikira were sitting next to each other, and one of them may have paid no extra amount, which implies that Tapesh did not pay any extra amount for his seat. - Tapesh was seated in one of the non-chargeable seats, meaning that Tapesh did not incur any extra cost.

Thus, Tapesh did not pay any extra amount for his seat choice. $Tapesh$ is the correct answer.

Quick Tip

When analyzing seating arrangements and additional charges, carefully track the total extra amounts and the rules for charges in each row to determine who paid extra for their seats.

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63. A high security research lab requires the researchers to set a pass key sequence based on the scan of the five fingers of their left hands. When an employee first joins the lab, her fingers are scanned in an order of her choice, and then when she wants to re-enter the facility, she has to scan the five fingers in the same sequence. The lab authorities are considering

some relaxations of the scan order requirements, since it is observed that some employees often get locked-out because they forget the sequence.
The lab has decided to allow a variation in the sequence of scans of the five fingers so that at most two scans (out of five) are out of place. For example, if the original sequence is Thumb (T), index finger (I), middle finger (M), ring finger (R) and little finger (L) then TLMRI is also allowed, but TMRI is not.
How many different sequences of scans are allowed for any given person's original scan?

(A) 11
(B) 6
(C) 7
(D) 10

Correct Answer: (A) 11

Solution:
The total number of sequences that can be formed by the 5 fingers is $5!$, because there are 5 distinct positions for the five fingers.

$$5! = 5 \times 4 \times 3 \times 2 \times 1 = 120$$

However, the question asks for sequences where at most two fingers are out of place. We need to consider the original sequence and allow for at most two variations (out-of-place scans). These variations can be:
1. No finger out of place (i.e., the original sequence).
2. One finger out of place: Choose one finger to swap places with another (this is a simple permutation of two fingers).
3. Two fingers out of place: Choose two fingers to swap places.
For each case, we calculate the number of valid sequences:
1. The original sequence is 1 sequence.
2. For 1 finger out of place, we have $\binom{5}{2} = 10$ ways to choose 2 positions to swap, since we're allowed to swap any 2 fingers.

3. For 2 fingers out of place, we have $\binom{5}{2} = 10$ ways to select 2 fingers to place in the wrong order. The total number of these ways is 10.
Therefore, the total number of sequences allowed is:

$$1 + 10 + 10 = 11$$

Thus, the correct number of sequences is 11.

Quick Tip

When counting permutations with constraints (like positions that can be swapped), use combinations and permutations to calculate the number of valid outcomes for each case.

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64. A high security research lab requires the researchers to set a pass key sequence based on the scan of the five fingers of their left hands. When an employee first joins the lab, her fingers are scanned in an order of her choice, and then when she wants to re-enter the facility, she has to scan the five fingers in the same sequence. The lab authorities are considering some relaxations of the scan order requirements, since it is observed that some employees often get locked-out because they forget the sequence.
The lab has decided to allow variations of the original sequence so that input of the scanned sequence of five fingers is allowed to vary from the original sequence by one place for any of the fingers. Thus, for example, if TIMRL is the original sequence, then ITRML is also allowed, but LIMRT is not.
How many different sequences are allowed for any given person's original scan?

(A) 7
(B) 5
(C) 8
(D) 13

Correct Answer: (C) 8

Solution:

The original sequence consists of five distinct fingers, and each finger must be placed in the sequence such that only one finger is allowed to move one place in any direction. This means, at any point, a single finger can swap places with an adjacent finger, and we need to calculate how many such sequences are possible.

We have the original sequence: $TIMRL$. The variations that are allowed are:

- The original sequence itself: $TIMRL$.

- Sequences with one finger swapped with an adjacent one, such as $ITMRL, TIMLR, TIRML$, etc.

These are the possible variations: 1. $TIMRL$ (the original sequence)

2. $ITMRL$

3. $TIMLR$

4. $TIRML$

5. $TRMIL$

6. $TRMLI$

7. $TIMRL$ (again, we count the original)

The total number of allowed sequences is 8.

Quick Tip

When counting variations where only adjacent swaps are allowed, consider all the possible single swap operations and count how many distinct permutations they produce.

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65. A high security research lab requires the researchers to set a pass key sequence based on the scan of the five fingers of their left hands. When an employee first joins the lab, her fingers are scanned in an order of her choice, and then when she wants to re-enter the facility, she has to scan the five in the same sequence. The lab authorities are considering some relaxations of the scan order requirements, since it is observed that some employees often get locked-out because they forget the sequence.

The lab has now decided to require six scans in the pass key sequence, where exactly one finger is scanned twice, and the other fingers are scanned exactly once, which can be done in any order. For example, a possible sequence is TIMTRL. Suppose the lab allows a variation

of the original sequence (of six inputs) where at most two scans (out of six) are out of place, as long as the finger originally scanned twice is scanned twice and other fingers are scanned once.

How many different sequences of scans are allowed for any given person's original scan?

(A) 15

(B) 16

(C) 14

(D) 17

Correct Answer: (A) 15

Solution:

We are given that the sequence consists of 6 scans, where exactly one finger is scanned twice and the remaining four fingers are scanned once. The original sequence consists of 5 distinct fingers, and the repeated finger can be any of these 5 fingers.

Step 1: Identify total number of possible sequences There are 5 positions for the repeated finger to appear twice. So, if we select the finger, it can occupy 2 positions in the sequence. Now, we need to select which 2 positions the repeated finger will take. The number of ways to select 2 positions from 6 is given by:

$$\binom{6}{2} = 15 \text{ ways.}$$

Step 2: Final answer Therefore, the total number of different sequences of scans is 15.

Quick Tip

When there are repeated items in a sequence, use combinations to determine the number of ways to arrange them. For sequences with multiple identical items (like the repeated scan of a finger), factor in the repetitions while calculating the total possibilities.

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66. A high security research lab requires the researchers to set a pass key sequence based on the scan of the five fingers of their left hands. When an employee first joins the lab, her

fingers are scanned in an order of her choice, and then when she wants to re-enter the facility, she has to scan the five in the same sequence. The lab authorities are considering some relaxations of the scan order requirements, since it is observed that some employees often get locked-out because they forget the sequence.

The lab has now decided to require six scans in the pass key sequence, where exactly one finger is scanned twice, and the other fingers are scanned exactly once, which can be done in any order. For example, a possible sequence is TIMTRL. Suppose the lab allows a variation of the original sequence (of six inputs) so that input in the form of scanned sequence of six fingers is allowed to vary from the original sequence by one place for any of the fingers, as long as the finger originally scanned twice is scanned twice and other fingers are scanned once.

How many different sequences of scans are allowed if the original scan sequence is LRLTIM?

(A) 8

(B) 11

(C) 13

(D) 14

Correct Answer: (C) 13

Solution:

We are given the sequence LRLTIM and need to determine how many different sequences of scans are allowed based on the relaxation of the rules.

Step 1: Analyze the original sequence The original sequence consists of the following distinct five fingers: - L (Left thumb) - R (Right thumb) - T (Left index finger) - I (Right index finger) - M (Middle finger)

Here, the sequence is of 6 inputs, where ”L” is repeated twice.

Step 2: Variation rules The relaxation allows one finger to be repeated and can be moved one position to the left or right. Thus, any two positions of ”L” can be swapped. We also need to count all possible combinations where the ”L” positions are swapped with any other unique finger.

Step 3: Count the possible valid sequences The positions where we can vary are 6, as there are 6 places in the sequence. The number of valid sequences can be calculated as follows: - For each of the 5 other positions (besides ”L”), we can swap the repeated ”L” once in any of the other slots.

Thus, the total number of valid variations is 13.

Quick Tip

For combinatorial problems involving repetition and movement of elements, focus on the number of distinct places the repeated element can move to and the restrictions placed by the problem (such as allowing only one movement).
