DATA INTERPRETATION & LOGICAL REASONING

CAT MOCK PRACTICE PAPER

Section I: Questions

> ***Direction for questions 1 to 4:*** *Read the data carefully and answer the questions that follow.*

An e-commerce company sells products in exactly two categories: Electronics and Apparel. The total sales in any month is the sum of the sales from these two categories. The table below provides the Minimum, Maximum, and Median monthly sales (in ₹ millions) recorded over a five-month period from May to September.

Category	Minimum	Maximum	Median
Electronics	50	100	70
Apparel	40	90	70
Total Sales	110	160	140

The following additional facts are known:

1. All monthly sales figures for Electronics, Apparel, and Total Sales were distinct multiples of 10 (i.e., no individual category or total had the same sales figure repeated across two different months).
2. In May, the Electronics sales were exactly twice the Apparel sales.
3. In June, the Total sales were the minimum among all five months, and the Apparel sales were also the minimum.
4. In July, the Electronics sales and Apparel sales were exactly equal.
5. In August, the Electronics sales were the minimum, while the Apparel sales were the maximum.

DIFFICULTY LEVEL: EASY

Q1. What were the Total sales (in ₹ millions) in May?

A) 130

B) 140

C) 150

D) 160

Q2. In which month were the Total sales exactly equal to the Median of the Total sales?

A) May

B) July

C) August

D) September

Q3. What were the Apparel sales (in ₹ millions) in September?

A) 50

B) 60

C) 70

D) 80

Q4. What is the ratio of Electronics sales in June to Apparel sales in July?

A) 3 : 4

B) 7 : 8

C) 4 : 5

D) 7 : 9

> ***Direction for questions 5 to 8:*** *Read the caselet carefully and answer the questions that follow.*

Four players—Pooja, Qasim, Riya, and Sahil—participated in a university hockey tournament consisting of exactly 5 matches (numbered Match 1 to Match 5 chronologically). The four players together scored a total of 10 goals in the tournament.

The following facts are known regarding the goals scored:

1. In each of the 5 matches, exactly two different players scored exactly one goal each. No other goals were scored.
2. Across the tournament, each of the four players scored at least one goal, and no two players scored the same total number of goals.

3. Pooja scored her only goal of the tournament in Match 1.
4. Qasim scored a goal in Match 2 and a goal in Match 4.
5. Both Riya and Sahil scored a goal in Match 5.
6. Sahil scored a goal in three consecutive matches.

DIFFICULTY LEVEL: MEDIUM

Q5. How many goals did Riya score in the entire tournament?

A) 2

B) 3

C) 4

D) 5

Q6. Who scored the second goal in Match 1 alongside Pooja?

A) Qasim

B) Riya

C) Sahil

D) Cannot be determined

Q7. Which of the following matches saw a goal scored by Sahil?

A) Match 1

B) Match 2

C) Match 3

D) Both Match 2 and Match 3

Q8. In how many matches did Riya and Qasim both score a goal together? *[Type-In-The-Answer (TITA)]*

> ***Direction for questions 9 to 12:*** *Read the caselet carefully and answer the questions that follow.*

Six angel investors (A, B, C, D, E, and F) participated in a funding round for five startups (P, Q, R, S, and T). Each investor gave out a "Funding Token" to whichever startups they liked.

A startup could receive at most one token from each investor. Each of the six investors has a unique token face value, which is a distinct prime number chosen from the set {2, 3, 5, 7, 11, 17}. Once all evaluations were complete, each startup received a total grant equal to ₹10,000 multiplied by the product of the face values of all the tokens they received.

The final grants received by the five startups were:

- **Startup P:** ₹5,100,000
- **Startup Q:** ₹3,300,000
- **Startup R:** ₹1,540,000
- **Startup S:** ₹1,050,000
- **Startup T:** ₹700,000

Additional facts known:

1. Investors A and B awarded exactly 4 tokens each across the five startups.
2. Investors C and D awarded exactly 3 tokens each across the five startups.
3. Investor E awarded exactly 2 tokens, and Investor F awarded exactly 1 token.
4. Investor A awarded a token to Startup R, but Investor B did not.
5. Investor C awarded a token to Startup P, but Investor D did not.

DIFFICULTY LEVEL: MEDIUM

Q9. What is the face value of the token awarded by Investor B?

A) 2

B) 3

C) 5

D) 7

Q10. Which investor awarded a token to Startup Q but NOT to Startup S?

A) Investor C

B) Investor D

C) Investor E

D) Investor F

Q11. What is the sum of the face values of the tokens received by Startup S?

A) 10

B) 15

C) 21

D) 25

Q12. Which investor awarded a token to exactly one startup? ***[Type-In-The-Answer (TITA) - Enter only the letter: A, B, C, D, E, or F]***

> ***Direction for questions 13 to 16:*** *Read the caselet carefully and answer the questions that follow.*

A TV game show features 50 identical boxes arranged in a row, each containing a mystery prize. The prizes are of different types, labeled *a, b, c, d, e...* in strictly decreasing order of monetary value (i.e., Type *a* is the most expensive, Type *b* is the second most expensive, and so on).

The host reveals the following rules about the distribution of the prizes:

1. There is exactly one prize of Type *a* (a diamond ring).
2. As you move down to the next less expensive type of prize, the total number of items of that type hidden in the boxes at least doubles. For example, there are at least twice as many items of Type *b* as Type *a*, at least twice as many items of Type *c* as Type *b*, and so on.
3. Every box contains exactly one prize.

DIFFICULTY LEVEL: DIFFICULT

Q13. What is the maximum possible number of different types of prizes hidden in the boxes?

A) 4

B) 5

C) 6

D) 7

Q14. If you are told that there are exactly 12 items of Type *c* hidden in the boxes, what is the maximum possible number of items of Type *d*?

A) 24

B) 31

C) 35

D) 37

Q15. Which of the following statements is ALWAYS TRUE?

A) There must be at least 4 items of Type *c*.

B) There can be exactly 3 items of Type *b*.

C) If there are 5 types of prizes, there must be exactly 16 items of Type *e*.

D) The number of items of the least expensive type must be strictly greater than 30.

Q16. Which of the following prize distributions is mathematically IMPOSSIBLE?

A) Exactly 15 items of Type *c*.

B) Exactly 30 items of Type *d*.

C) Exactly 5 items of Type *b*.

D) Exactly 20 items of Type *d*.

> ***Direction for questions 17 to 20:*** *Read the caselet carefully and answer the questions that follow.*

A designer is tiling a 4x4 wall grid using 16 colored tiles. Each tile is colored either Gold (G), Silver (S), or Bronze (B). All three colors must be used at least once in the grid. The placement of the tiles must adhere strictly to the following aesthetic rules:

1. Any two adjacent tiles (sharing an edge vertically or horizontally) must be of different colors.
2. If there are two Gold tiles in the same row or the same column, there must be at least one Silver tile placed somewhere between them in that same row or column.
3. If there are two Bronze tiles in the same row or the same column, there must be at least one Gold tile AND at least one Silver tile placed somewhere between them in that same row or column.

DIFFICULTY LEVEL: DIFFICULT

Q17. What is the maximum possible number of Bronze tiles that can be placed in a valid 4x4 grid? *[Type-In-The-Answer (TITA)]*

Q18. What is the maximum possible number of Gold tiles that can be placed in a valid 4x4 grid?

A) 6

B) 8

C) 9

D) 10

Q19. If a valid 4x4 grid contains exactly 4 Bronze tiles, what is the exact number of Silver tiles in that configuration?

A) 4

B) 6

C) 8

D) Cannot be uniquely determined

Q20. Which of the following statements is ALWAYS TRUE for any valid configuration of the 4x4 grid?

A) Every row must contain at least one Silver tile.

B) Every column must contain at least two Gold tiles.

C) The total number of Silver tiles is always an even number.

D) No row can contain more than one Bronze tile.

Section II: Answer Key

Q1: C (150)

Q2: C (August)

Q3: C (70)

Q4: B (7 : 8)

Q5: C (4)

Q6: B (Riya)

Q7: C (Match 3)

Q8: 1

Q9: C (5)

Q10: C (Investor E)

Q11: B (15)

Q12: F

Q13: B (5)

Q14: C (35)

Q15: A

Q16: D

Q17: 4

Q18: B (8)

Q19: B (6)

Q20: A

Section III: Detailed Solutions

SET 1: E-commerce Monthly Sales

Step-by-Step Derivation:

We need to deduce 5 distinct values (all multiples of 10) for Electronics (E), Apparel (A), and Total Sales (T) across 5 months (May to Sept).

- **Electronics (E):** Min = 50, Max = 100, Median = 70. Since there are 5 distinct multiples of 10, the set must be **{50, 60, 70, 80, 100}**.
- **Apparel (A):** Min = 40, Max = 90, Median = 70. The set must be **{40, 50, 70, 80, 90}**.
- **Total (T):** Min = 110, Max = 160, Median = 140. The set must be **{110, 130, 140, 150, 160}**.

Now, let's map the months using the constraints:

1. **June:** Total sales are minimum (110) and Apparel sales are minimum (40). Since T = E + A, E = 110 - 40 = 70.
2. **August:** Electronics sales are minimum (50) and Apparel sales are maximum (90). Thus, T = 50 + 90 = 140.
3. **July:** Electronics and Apparel sales are exactly equal (E = A). Looking at our remaining options, the only common remaining value is 80. Thus, E = 80 and A = 80, making T = 80 + 80 = 160.
4. **May:** Electronics sales are exactly twice the Apparel sales (E = 2A). From the remaining values (E: {60, 100}, A: {50, 70}), the only valid pairing is E = 100 and A = 50. This gives T = 100 + 50 = 150.
5. **September:** The final remaining values fall here: E = 60, A = 70, giving T = 60 + 70 = 130.

Final Deducement Table:

Month	Electronics (E)	Apparel (A)	Total Sales (T)
May	100	50	150
June	70	40	110
July	80	80	160
August	50	90	140
September	60	70	130

SET 2: University Hockey Tournament

Step-by-Step Derivation:

1. **Analyze Individual Totals:** 4 players scored a total of 10 goals. No two players scored the same total number of goals, and each scored at least 1. The only distinct integer partition of 10 into 4 parts is 1 + 2 + 3 + 4 = 10. Thus, individual totals must be {1, 2, 3, 4}.
2. **Assigning Totals:**
    - Pooja (P) scored her only goal in Match 1 → **P** = **1**.
    - Qasim (Q) scored in Match 2 and Match 4. He cannot score anywhere else or his total would exceed 2, which would break the unique partition. Thus, **Q** = **2**.
    - Sahil (S) scored in three consecutive matches ending in Match 5 → He scored in Match 3, 4, and 5. Thus, **S** = **3**.
    - This leaves Riya with the remaining total: **R** = **4**.
3. **Constructing the Grid:** Each match has exactly 2 goals scored by different players.
    - Match 5 contains R and S (Given).
    - Match 4 contains Q and S (Given). Since 2 slots are full, R did not score in M4.
    - Since R = 4 and did not score in M4, R must have scored in all other matches: M1, M2, M3, and M5.
    - Match 1 already has P, so the second slot is filled by R.
    - Match 2 has Q, second slot filled by R.
    - Match 3 has S, second slot filled by R.

Match-by-Match Scorers:

- **Match 1:** Pooja, Riya
- **Match 2:** Qasim, Riya
- **Match 3:** Sahil, Riya
- **Match 4:** Qasim, Sahil
- **Match 5:** Riya, Sahil

SET 3: Startup Funding Tokens

Step-by-Step Derivation:

Divide the grants by ₹10,000 to get the product of the prime values:

- **P:** $510 = 2 \times 3 \times 5 \times 17$
- **Q:** $330 = 2 \times 3 \times 5 \times 11$
- **R:** $154 = 2 \times 7 \times 11$
- **S:** $105 = 3 \times 5 \times 7$
- **T:** $70 = 2 \times 5 \times 7$

Let's map the frequency of each prime factor:

- Value 2 is used 4 times (P, Q, R, T). Investors A, B distributed 4 tokens → One of them is 2.
- Value 5 is used 4 times (P, Q, S, T). Investors A, B distributed 4 tokens → The other is 5.
- Value 3 is used 3 times (P, Q, S). Investors C, D distributed 3 tokens → One of them is 3.
- Value 7 is used 3 times (R, S, T). Investors C, D distributed 3 tokens → The other is 7.
- Value 11 is used 2 times (Q, R) → Belong to Investor E (2 tokens).
- Value 17 is used 1 time (P) → Belongs to Investor F (1 token).

Refining Specific Identities:

- Investor A awarded a token to R, but B did not. R contains 2 but not 5. Therefore, **A** = **2** and **B** = **5**.
- Investor C awarded a token to P, but D did not. P contains 3 but not 7. Therefore, **C** = **3** and **D** = **7**.

SET 4: The 50 Boxes Game Show

Step-by-Step Derivation:

- **Q13:** Minimum elements required for 5 types (a, b, c, d, e) is $1 + 2 + 4 + 8 + 16 = 31 \le 50$. For 6 types, the minimum sum would be $31 + 32 = 63$, which exceeds 50 boxes. Thus, 5 is the maximum number of types.
- **Q14:** Given $N_c = 12$. Since $N_d \ge 2N_c \implies N_d \ge 24$. If there were a type e, it would require at least 48 items, pushing the sum past 50. Hence, there are exactly 4 types. The remaining boxes to split between b and d is $50 - 1 - 12 = 37$. To maximize d, we must minimize b. Since $N_c \ge 2N_b \implies 12 \ge 2N_b \implies N_b \le 6$. The baseline constraint is $N_b \ge 2N_a = 2$. Minimizing $b = 2$ yields Max $N_d = 37 - 2 = 35$.
- **Q16:** Let's verify $N_d = 20$. If $N_d = 20$, then maximum possible values for prior types are $N_c = 10$, $N_b = 5$, $N_a = 1$. The sum of these four types is at most $1 + 5 + 10 + 20 = 36$. The remaining 14 boxes would have to go to type e. However, rule 2 states $N_e \ge 2N_d = 40$. Since 14 is less than 40, a distribution with exactly 20 items of Type d is impossible.

SET 5: The 4x4 Colored Grid

Step-by-Step Derivation:

- **Q17:** By Rule 3, two Bronze (B) tiles in any line must have both a G and an S between them, requiring a gap of at least 2 tiles. In a 4-tile line, B can only appear at the endpoints (index 1 and 4). Thus, B can only be placed at the four corners of the 4x4 grid. Max Bronze = 4.
- **Q18:** By Rule 2, two Gold tiles only need a Silver tile between them. We can place up to 2 Gold tiles per row by alternating with Silver (e.g., G S G S). Across 4 rows, this gives $2 imes 4 = 8$ Gold tiles.
- **Q19:** With exactly 4 Bronze tiles at the corners, Row 1 and Row 4 must look like `B _ _ B`. To satisfy Rule 3, the middle slots must contain exactly one G and one S (e.g., `B G S B`). Adjacency rules force the inner 2x2 grid to alternate between G and S completely. A fully worked symmetric grid shows:

  ```
  B G S B
  G S G S
  S G S G
  B S G B
  ```

  Counting the Silver tiles gives exactly 6.
- **Q20:** If any row contains 0 Silver tiles, it must alternate between Gold and Bronze to avoid adjacency penalties (i.e., `G B G B` or `B G B G`). In `G B G B`, the two Golds have no Silver between them (violates Rule 2). In `B G B G`, the two Bronzes have no Silver between them (violates Rule 3). Thus, a row without a Silver tile cannot exist. Option A is always true.