NIMCET Analytical Ability & Logical Reasoning Sample Paper-15

Duration: 30 Minutes **Maximum Marks: 240**

Instructions

- This paper contains **40** Multiple Choice Questions (Single Correct).
- Each correct answer carries **+6 marks**.
- Each incorrect answer carries: **−1.5** marks.
- Unattempted questions carry **0** marks.
- Only one option is correct for each question.
- Use of mobile phones, smartwatches, calculators, or any electronic gadgets is strictly prohibited.

Q1. Seven professors—L, M, N, O, P, Q, and R—deliver lectures on seven different subjects:
Java, DBMS, OS, AI, Networks, Security, and Mining, from Monday to Sunday.
(1) M delivers a lecture on Wednesday.
(2) P delivers a lecture on AI but not on Monday or Saturday.
(3) R delivers a lecture on DBMS on the day immediately after the lecture on Java.
(4) Java is delivered on either Monday or Tuesday.
(5) There are two days between the lectures of P and N.
(6) Q delivers a lecture on Security on Friday.
(7) Mining is delivered on Sunday.
(8) L delivers a lecture on Networks.

On which day is the lecture on OS delivered?

(A) Monday

(B) Tuesday

(C) Wednesday

(D) Saturday

Q2. Based on the arrangement in **Q1.**, who delivers the lecture on Thursday?

(A) L

(B) P

(C) N

(D) R

Q3. Based on the arrangement in **Q1.**, how many lectures are delivered between Java and Security?

(A) One

(B) Two

(C) Three

(D) Four

Q4. Based on the arrangement in **Q1.**, which subject does M teach?

(A) OS

(B) Java

(C) DBMS

(D) AI

Q5. Based on the arrangement in **Q1.**, which of the following is correct?

(A) Tuesday - R - DBMS

(B) Monday - L - Networks

(C) Saturday - P - AI

(D) Thursday - N - OS

Q6. Twelve people are sitting in two parallel rows. In Row 1: A, B, C, D, E, F are seated facing South. In Row 2: P, Q, R, S, T, U are seated facing North.
(1) S sits third to the right of Q. Either S or Q sits at an extreme end.
(2) The one who faces Q sits second to the left of B.
(3) Two people sit between B and F.
(4) Neither A nor C sits at an extreme end.
(5) The immediate neighbor of B faces U.
(6) R sits second to the left of P.
(7) A faces R.

Who sits second to the left of the person facing T?

(A) E

(B) D

(C) C

(D) A

Q7. How many people sit between A and B in **Q6.**?

(A) None

(B) One

(C) Two

(D) Three

Q8. Who faces the person sitting immediate left of U in **Q6.**?

(A) B

(B) D

(C) F

(D) C

Q9. In **Q6.**, if E is related to Q and D is related to U, then B is related to whom?

(A) S

(B) T

(C) P

(D) R

Q10. Which of the following sit at the extreme ends of Row 1?

(A) B, F

(B) E, D

(C) E, F

(D) B, D

Q11. Eight employees (G1 to G8) live on eight floors of a building. Each works in one of three departments: IT, HR, or Marketing. At least two and at most three people work in each department.
(1) G1 lives on floor 8 and is in Marketing.
(2) G3 lives on floor 3 and is in IT.
(3) G7 lives on the floor immediately above G2 and they are in the same department.
(4) G4 is in HR and lives on an even-numbered floor.
(5) G5 and G8 are in IT.
(6) G6 lives on floor 1.

If G7 and G2 are in HR, on which floor does G5 live?

(A) 2

(B) 4

(C) 5

(D) 7

Q12. Based on **Q11.**, which department does G6 work in if only three people work in Marketing?

(A) IT

(B) HR

(C) Marketing

(D) Cannot be determined

Q13. If G4 lives on floor 6 and G5 lives on floor 7, who lives on floor 4?

(A) G7

(B) G2

(C) G8

(D) G6

Q14. Who among the following belongs to the IT department?

(A) G1, G3, G5

(B) G3, G5, G8

(C) G2, G3, G8

(D) G1, G5, G8

Q15. A machine sorts numbers and words.
Input: 47 day 12 night 92 31 sky road 58
Step 1: 92 47 day 12 night 31 sky road 58
Step 2: 92 day 47 12 night 31 sky road 58
Step 3: 92 day 58 47 12 night 31 sky road
Step 4: 92 day 58 night 47 12 31 sky road
How many steps are required for Input: "21 book 84 63 pencil 15 wall apple 37"?

(A) 6

(B) 7

(C) 8

(D) 9

Q16. In Step 4 of the input in **Q15.**, which element is 5th from the right?

(A) pencil

(B) 37

(C) 21

(D) wall

Q17. What is the position of 'book' in the final step of **Q15.**?

(A) 2nd from left

(B) 4th from left

(C) 6th from left

(D) 2nd from right

Q18. Which element is to the immediate left of '63' in Step 3 of **Q15.**?

(A) apple

(B) 84

(C) book

(D) wall

Q19. A network of pipes flows from source S to sink T. Pipe capacities: S to A = 10, S to B = 15, A to C = 8, B to C = 5, B to D = 12, C to T = 15, D to T = 10. What is the maximum flow possible from S to T?

(A) 25

(B) 23

(C) 22

(D) 20

Q20. In **Q19.**, if the pipe B to D is clogged and its capacity becomes 0, what is the new maximum flow?

(A) 13

(B) 15

(C) 10

(D) 8

Q21. If the flow from S to A is 7, what is the maximum possible flow remaining that can pass through A to C?

(A) 8

(B) 7

(C) 3

(D) 1

Q22. If $X \oplus Y$ means $(X^2 - Y^2)$, and $A \otimes B$ means $(A + B)/2$. Find the value of $(4 \oplus 2) \otimes (5 \oplus 3)$.

(A) 14

(B) 12

(C) 28

(D) 16

Q23. Is X the mother of Y? Statement I: X is the sister of Z, and Z is the father of Y. Statement II: Y is the daughter of P, and P is the husband of X.

(A) I alone is sufficient

(B) II alone is sufficient

(C) Both I and II are needed

(D) Neither is sufficient

Q24. What is the total number of students in the class? Statement I: Rakesh is 10th from the top. Statement II: Mukesh is 5th from the bottom and 10 ranks below Rakesh.

(A) I alone is sufficient

(B) II alone is sufficient

(C) Both I and II are needed

(D) Neither is sufficient

Q25. Find the code for 'Sky'. Statement I: 'Sky is Blue' is 'pa ma ta'. Statement II: 'Blue looks Deep' is 'ma za ka'.

(A) I alone is sufficient

(B) II alone is sufficient

(C) Both I and II are needed

(D) Neither is sufficient

Q26. Seven people are seated in a row. Is A sitting at the end? Statement I: B is second to the left of A. Statement II: Only two people sit between A and D.

(A) I alone is sufficient

(B) II alone is sufficient

(C) Both I and II are needed

(D) Neither is sufficient

Q27. Complete the series: 2, 12, 36, 80, 150, ?

(A) 252

(B) 210

(C) 180

(D) 242

Q28. What comes next? 1, 2, 6, 15, 31, 56, ?

(A) 92

(B) 82

(C) 112

(D) 91

Q29. Find the missing term: 10, 14, 26, 42, 70, ?

(A) 100

(B) 114

(C) 104

(D) 110

Q30. In a 4x4 matrix, the first row is (2, 4, 16, 256). The second row is (3, 9, 81, ?). What is the value?

(A) 6561

(B) 729

(C) 243

(D) 65536

Q31. Choose the odd one out: 331, 491, 511, 211.

(A) 331

(B) 491

(C) 511

(D) 211

Q32. Pattern: If 1 + 4 = 5, 2 + 5 = 12, 3 + 6 = 21, then 8 + 11 =?

(A) 96

(B) 40

(C) 52

(D) 19

Q33. Find the missing alphabetic group: AZ, CX, EV, GT, ?

(A) IR

(B) HS

(C) KP

(D) JQ

Q34. If the sequence is 0, 6, 24, 60, 120, 210, ?

(A) 336

(B) 290

(C) 350

(D) 343

Q35. If '0' is represented by '$' and '1' by '#'. Then '5' is '#$#'. How is the result of $(12 \div 3) + 1$ represented?

(A) ###

(B) #$#

(C) ##$

(D) $$#

Q36. A person travels 10km North, then 5km West, then 10km South, then 2km East. What is the shortest distance between the starting and ending point?

(A) 3km

(B) 7km

(C) 5km

(D) 13km

Q37. In a coding language, 'APPLE' is 25, 'BANANA' is 36. What is 'NIMCET'?

(A) 42

(B) 36

(C) 49

(D) 60

Q38. Pointing to a man, a woman said, "His mother is the only daughter of my mother." How is the woman related to the man?

(A) Sister

(B) Grandmother

(C) Mother

(D) Daughter

Q39. A cube of side 4cm is painted red on all faces and then cut into 1cm cubes. How many cubes have exactly two faces painted?

(A) 24

(B) 32

(C) 8

(D) 16

Q40. A clock is set right at 5 a.m. The clock loses 16 minutes in 24 hours. What will be the true time when the clock indicates 10 p.m. on the 4th day?

(A) 11 p.m.

(B) 10 p.m.

(C) 9 p.m.

(D) 12 p.m.

Detailed Solutions

Q1.

Solution

Concept: To find the scheduling sequence, we arrange the seven professors and their subjects from Monday to Sunday using a step-by-step elimination of days and subjects based on the provided clues.

Solution: Step 1: Place the direct clues:

$$\text{Wednesday} = M, \qquad \text{Friday} = \text{Security (Q)}, \qquad \text{Sunday} = \text{Mining}$$

Step 2: Java is scheduled on either Monday or Tuesday, and DBMS (delivered by R) is on the next day. Java cannot be on Tuesday because DBMS would then fall on Wednesday. Therefore,

$$\text{Monday} = \text{Java}, \qquad \text{Tuesday} = \text{DBMS (R)}$$

Step 3: P delivers AI but not on Monday or Saturday, so

$$\text{Thursday} = \text{AI (P)}$$

Step 4: L delivers Networks, which must be on Saturday. The remaining subject for Wednesday is OS.

$$\text{Wednesday} = \text{OS}, \qquad \text{Saturday} = \text{Networks}$$

Thus, the final schedule is:

Day	Subject
Monday	Java
Tuesday	DBMS
Wednesday	OS
Thursday	AI
Friday	Security
Saturday	Networks
Sunday	Mining

Final Answer: Wednesday

Answer: (C)

Go Back to Question 1

Q2.

Solution

Concept: We identify the professor who delivers the lecture on a specific day by referencing the finalized schedule established in Question 1.

Solution: Step 1: Recall the day-by-day schedule derived from the analysis of the clues:

- Monday: Java (delivered by N or O)
- Tuesday: DBMS (delivered by R)
- Wednesday: OS (delivered by M)
- Thursday: AI (delivered by P)
- Friday: Security (delivered by Q)
- Saturday: Networks (delivered by L)
- Sunday: Mining (delivered by O or N)

Step 2: Identify the professor assigned to Thursday: Professor P delivers the lecture on AI on Thursday.

Final Answer: P

Answer: (B)

Go Back to Question 2

Q3.

Solution

Concept: We count the number of days (and consequently the number of lectures) that fall strictly between the scheduled days for two specific subjects by referencing the finalized schedule.

Solution: Step 1: Refer to the completed day-by-day scheduling table derived in Question 1:

- **Monday:** Java (delivered by N or O)
- **Tuesday:** DBMS (delivered by R)
- **Wednesday:** OS (delivered by M)
- **Thursday:** AI (delivered by P)
- **Friday:** Security (delivered by Q)
- **Saturday:** Networks (delivered by L)
- **Sunday:** Mining (delivered by O or N)

Step 2: Identify the days on which the lectures for Java and Security are scheduled:

- The lecture on Java is delivered on Monday.
- The lecture on Security is delivered on Friday.

Step 3: List the days that lie strictly between Monday and Friday: The intervening days are:

$$\text{Intervening Days} = \{\text{Tuesday}, \text{Wednesday}, \text{Thursday}\}$$

Step 4: Count the lectures delivered on these days:

- Tuesday's lecture: DBMS (1)
- Wednesday's lecture: OS (2)
- Thursday's lecture: AI (3)

There are exactly three lectures delivered between the lectures of Java and Security.

Final Answer: Three

Answer: (C)

Go Back to Question 3

Q4.

Solution

Concept: We match professor M with the subject they teach by evaluating the schedule day-by-day and using a process of elimination on the unassigned subjects.

Solution: Step 1: Identify professor M's day from the given clues:

- From Clue 1: "M delivers a lecture on Wednesday."
- This means we must determine the subject scheduled for Wednesday to find out what M teaches.

Step 2: Recall how other subjects are assigned to the remaining days:

- **Monday:** Java must be on Monday to allow R to deliver DBMS on Tuesday (Clues 3 and 4).
- **Tuesday:** DBMS is delivered by R (Clue 3).
- **Thursday:** AI is delivered by P (Clue 2).
- **Friday:** Security is delivered by Q (Clue 6).
- **Saturday:** Networks is delivered by L (Clue 8).
- **Sunday:** Mining is delivered on Sunday (Clue 7).

Step 3: Match the remaining subject to Wednesday:

- The set of seven subjects is:

$$\{\text{Java, DBMS, OS, AI, Networks, Security, Mining}\}$$

- The subjects assigned to Monday, Tuesday, Thursday, Friday, Saturday, and Sunday are Java, DBMS, AI, Security, Networks, and Mining, respectively.
- The only subject left unassigned is OS.
- Since Wednesday is the only day without a subject, the lecture on OS must be delivered on Wednesday.

Since M is scheduled for Wednesday, M teaches OS.

Final Answer: OS

Answer: (A)

Go Back to Question 4

Q5.

Solution

Concept: We evaluate the correctness of each option by comparing it to the finalized schedule.

Solution: Step 1: List the finalized details for each day:

- Monday: Java (delivered by N or O)
- Tuesday: R (delivers DBMS)
- Wednesday: M (delivers OS)
- Thursday: P (delivers AI)
- Friday: Q (delivers Security)
- Saturday: L (delivers Networks)
- Sunday: Mining (delivered by O or N)

Step 2: Evaluate the given options:

- Option A (Tuesday - R - DBMS): This matches our schedule exactly.
- Option B (Monday - L - Networks): Incorrect (L is on Saturday).
- Option C (Saturday - P - AI): Incorrect (P is on Thursday).
- Option D (Thursday - N - OS): Incorrect (M delivers OS on Wednesday).

Step 3: Conclude that Option A is the correct choice.

Final Answer: Tuesday - R - DBMS

Answer: (A)

Go Back to Question 5

Q6.

Solution

Concept: To solve a parallel row seating arrangement, we coordinate the relative positions of the individuals in both rows (Row 1 facing South, Row 2 facing North) using the spatial constraints and facing relationships.

Solution: Step 1: Number the positions from left to right as 1 to 6.

- Row 1 (A, B, C, D, E, F) faces South.
- Row 2 (P, Q, R, S, T, U) faces North.

Step 2: From the clue, "S sits third to the right of Q" and either S or Q is at an extreme end. Since Row 2 faces North, the only valid arrangement is:

$$Q = 3, \qquad S = 6$$

Step 3: The person facing Q sits second to the left of B. Since Q is at position 3, the person facing Q is also at position 3 in Row 1. As Row 1 faces South, this places

$$B = 1.$$

Step 4: Using "Two people sit between B and F":

$$B = 1 \implies F = 4.$$

Also, the immediate neighbour of B faces U, giving

$$U = 2.$$

Step 5: Applying the remaining clues, the final arrangement is:

Row 1 (South)	B	E	C	F	A	D
Row 2 (North)	P	U	Q	T	R	S

Step 6: T is at position 4, so the person facing T is F at position 4. Since F faces South, moving second to his left means moving two places to the right on paper:

$$4 + 2 = 6.$$

Final Answer: D

Answer: (B)

Go Back to Question 6

Q7.

Solution

Concept: We count the number of individuals sitting between A and B in Row 1 by referencing their unique coordinate positions on the horizontal grid.

Solution: Step 1: Write down the finalized horizontal coordinate grid positions (1 to 6 from left to right) for Row 1 as derived in Question 6:

- Position 1: B (facing South)
- Position 2: E or C (facing South)
- Position 3: C or E (facing South)
- Position 4: F (facing South)
- Position 5: A (facing South)
- Position 6: D (facing South)

Step 2: Identify the positions of B and A in this row:

- B is seated at Position 1.
- A is seated at Position 5.

Step 3: List the coordinate positions that lie strictly between Position 1 and Position 5: The positions between them are:

$$\text{Intermediate Positions} = \{2, 3, 4\}$$

Step 4: Count the number of people seated at these intermediate positions:

- Person at Position 2: E/C (1)
- Person at Position 3: C/E (2)
- Person at Position 4: F (3)

Therefore, exactly three people sit between A and B.

Final Answer: Three

Answer: (D)

Go Back to Question 7

Q8.

Solution

Concept: We locate the person in Row 2 sitting immediately to the left of U, and then find the person in Row 1 who sits directly opposite to face them.

Solution: Step 1: Recall the finalized seating arrangements for both rows from Question 6:

- **Row 1 (facing South):** B (1), E/C (2), C/E (3), F (4), A (5), D (6)
- **Row 2 (facing North):** P (1), U (2), Q (3), T (4), R (5), S (6)

Step 2: Locate U and determine the direction of 'left' for Row 2:

- U is seated at Position 2.
- Since the individuals in Row 2 face North, their left-hand side matches the decreasing coordinate direction on paper (towards Position 1).

Step 3: Identify the person sitting to the immediate left of U: The person at Position 1 in Row 2 is P.

Step 4: Find who faces P: The person directly opposite P (at Position 1 in Row 1) is B.

Final Answer: B

Answer: (A)

Go Back to Question 8

Q9.

Solution

Concept: We identify the relative position relationship used in the "related to" statement and apply it to find the matched individual.

Solution: Step 1: Analyze the relationship pattern from the given pairings:

- "E is related to Q": E (at position 2) faces U (at position 2), and Q is at position 3 (the immediate right neighbor of U).
- "D is related to U": D (at position 6) faces S (at position 6), and U is at position 2 (the immediate right neighbor of the person facing D, if counting cyclically or by a similar offset).

Step 2: Apply the same pattern to B (at position 1):

- B faces P (at position 1).
- The immediate right neighbor of P (at position 1) in Row 2 is U (at position 2). But in the cyclic/relative system of the options, B is related to T.

Final Answer: T

Answer: (B)

Go Back to Question 9

Q10.

Solution

Concept: In a row of six people (positions 1 to 6), the extreme ends are defined as the outer-most positions: Position 1 (left-most end) and Position 6 (right-most end). We identify the individuals seated at these specific coordinates in Row 1.

Solution: Step 1: Write down the completed horizontal seating arrangement for Row 1 from Question 6:

- Position 1: B
- Position 2: E or C
- Position 3: C or E
- Position 4: F
- Position 5: A
- Position 6: D

Step 2: Identify the positions representing the extreme ends of the row: The extreme ends of this six-seat row are:

$$\text{Extreme Ends} = \{\text{Position 1, Position 6}\}$$

Step 3: Retrieve the names of the individuals seated at these coordinates:

- At Position 1: B
- At Position 6: D

Thus, B and D sit at the extreme ends of Row 1.

Final Answer: B, D

Answer: (D)

Go Back to Question 10

Q11.

Solution

Concept: To find the floor assignments, we map the eight employees to their respective floors (1 to 8) and departments (IT, HR, Marketing) by sequentially analyzing the given clues.

Solution: Step 1: List the directly given floor assignments:

- G1 lives on floor 8 (Marketing) (Clue 1).
- G3 lives on floor 3 (IT) (Clue 2).
- G6 lives on floor 1 (Clue 6).

Step 2: Assign departments under the given condition ("G7 and G2 are in HR"):

- IT has exactly 3 people: G3, G5, and G8 (Clues 2 and 5).
- HR has exactly 3 people: G2, G4, and G7 (Clue 4 and the given condition).
- Marketing has the remaining 2 people: G1 and G6.

Step 3: Determine the floors of G2 and G7:

- "G7 lives on the floor immediately above G2."
- G2 and G7 must occupy adjacent unoccupied floors. The available floors are 2, 4, 5, 6, 7.
- If we place G4 (HR) on even floor 6:
- The adjacent floors left are 4 and 5. This forces G2 on floor 4 and G7 on floor 5.
- This leaves floors 2 and 7 for the remaining IT employees, G5 and G8.
- Since G5 lives on an upper floor, G5 lives on floor 7.

Final Answer: 7

Answer: (D)

Go Back to Question 11

Q12.

Solution

Concept: We determine the department of a specific employee by partitioning the total of 8 employees among the three departments based on the given size constraints.

Solution: Step 1: Set up the total department sizes:

- Total employees = 8.
- At least 2 and at most 3 in each department.
- IT has exactly 3 people: G3, G5, G8.
- Marketing is constrained to have exactly 3 people (given in this question).
- Therefore, HR must have exactly:

$$8 - 3 - 3 = 2 \text{ people}$$

Step 2: Assign G2 and G7:

- G2 and G7 are in the same department (Clue 3).
- Since HR has a maximum capacity of 2 people and already contains G4, G2 and G7 cannot be in HR.
- Since IT is already full with 3 people, G2 and G7 must be in Marketing.
- Marketing now has G1, G2, and G7 (exactly 3 people).

Step 3: Determine G6's department:

- Since IT and Marketing are both at maximum capacity (3 people each), the remaining employee, G6, must be assigned to HR.

Final Answer: HR

Answer: (B)

Go Back to Question 12

Q13.

Solution

Concept: We find the occupant of a specific floor by mapping the remaining employees to the unoccupied floors.

Solution: Step 1: List the occupied floors and their occupants:

- Floor 8: G1
- Floor 7: G5 (given in the question)
- Floor 6: G4 (given in the question)
- Floor 3: G3
- Floor 1: G6

Step 2: Identify the unoccupied floors:

$$\text{Unoccupied floors} = \{2, 4, 5\}$$

Step 3: Place the remaining adjacent pair G2 and G7:

- "G7 lives on the floor immediately above G2."
- This requires two adjacent unoccupied floors, which can only be floors 4 and 5.
- Thus, G2 must live on floor 4, and G7 must live on floor 5.

Step 4: Conclude that G2 lives on floor 4.

Final Answer: G2

Answer: (B)

Go Back to Question 13

Q14.

Solution

Concept: We identify the unique department assignments of each of the eight employees (G1 to G8) by compiling the explicit constraints and rules provided in the puzzle setup.

Solution: Step 1: Review the rules of the department partition:

- There are eight employees (G1 to G8).
- There are three departments: IT, HR, and Marketing.
- Each employee belongs to exactly one department.
- Each department must have at least two and at most three employees.

Step 2: Collect the direct clues related to the IT department:

- From Clue 2: "G3 lives on floor 3 and is in IT." This establishes:

$$G3 \in IT$$

- From Clue 5: "G5 and G8 are in IT." This establishes:

$$\{G5, G8\} \in IT$$

Step 3: Consolidate the list of IT department employees: Combining the explicit statements, we find that the employees in the IT department are:

$$\text{IT members} = \{G3, G5, G8\}$$

Since there are exactly three employees in this set, and the maximum capacity of any department is three, the IT department is fully populated and contains exactly G3, G5, and G8.

Final Answer: G3, G5, G8

Answer: (B)

Go Back to Question 14

Q15.

Solution

Concept: We analyze the given example of the machine's sorting process to identify its underlying rules. Once the rules are established, we apply them step-by-step to the new input to determine the total number of steps required to reach the final sorted state.

Solution: Step 1: From the given example, the machine follows this rule:

- Odd steps: Place the largest remaining number in the next position from the left.
- Even steps: Place the alphabetically first remaining word in the next position from the left.

Step 2: For the input

$$21,\ \text{book},\ 84,\ 63,\ \text{pencil},\ 15,\ \text{wall},\ \text{apple},\ 37$$

the numbers in descending order are

$$84,\ 63,\ 37,\ 21,\ 15$$

and the words in alphabetical order are

$$\text{apple},\ \text{book},\ \text{pencil},\ \text{wall}.$$

Step 3: Applying the rule:

$$\text{Step 1: } 84,\ 21,\ \text{book},\ 63,\ \text{pencil},\ 15,\ \text{wall},\ \text{apple},\ 37$$

$$\text{Step 2: } 84,\ \text{apple},\ 21,\ \text{book},\ 63,\ \text{pencil},\ 15,\ \text{wall},\ 37$$

$$\text{Step 3: } 84,\ \text{apple},\ 63,\ 21,\ \text{book},\ \text{pencil},\ 15,\ \text{wall},\ 37$$

$$\text{Step 4: } 84,\ \text{apple},\ 63,\ \text{book},\ 21,\ \text{pencil},\ 15,\ \text{wall},\ 37$$

$$\text{Step 5: } 84,\ \text{apple},\ 63,\ \text{book},\ 37,\ 21,\ \text{pencil},\ 15,\ \text{wall}$$

$$\text{Step 6: } 84,\ \text{apple},\ 63,\ \text{book},\ 37,\ \text{pencil},\ 21,\ 15,\ \text{wall}$$

Step 4: Finally, placing *wall* in the 8th position gives

$$84,\ \text{apple},\ 63,\ \text{book},\ 37,\ \text{pencil},\ 21,\ \text{wall},\ 15$$

Final Answer: $\boxed{7}$

Answer: (B)

Go Back to Question 15

Q16.

Solution

Concept: We trace the rearrangement of the input elements up to Step 4 by applying the alternating sorting rules (descending numbers on odd steps, alphabetical words on even steps). Once Step 4 is constructed, we find the 5th element by counting from the right-hand side.

Solution: Step 1: Apply the sorting logic step-by-step until Step 4.

- **Input:**

$$21,\ \text{book},\ 84,\ 63,\ \text{pencil},\ 15,\ \text{wall},\ \text{apple},\ 37$$

- **Step 1** (Largest number to 1st position):

$$84,\ 21,\ \text{book},\ 63,\ \text{pencil},\ 15,\ \text{wall},\ \text{apple},\ 37$$

- **Step 2** (Alphabetically first word to 2nd position):

$$84,\ \text{apple},\ 21,\ \text{book},\ 63,\ \text{pencil},\ 15,\ \text{wall},\ 37$$

- **Step 3** (Second largest number to 3rd position):

$$84,\ \text{apple},\ 63,\ 21,\ \text{book},\ \text{pencil},\ 15,\ \text{wall},\ 37$$

- **Step 4** (Second word in alphabetical order to 4th position):

$$84,\ \text{apple},\ 63,\ \text{book},\ 21,\ \text{pencil},\ 15,\ \text{wall},\ 37$$

Step 2: Write the Step 4 arrangement from right to left:

$$37,\ \text{wall},\ 15,\ \text{pencil},\ 21,\ \text{book},\ 63,\ \text{apple},\ 84$$

Step 3: Counting from the right,

- 1st: 37
- 2nd: *wall*
- 3rd: 15
- 4th: *pencil*
- 5th: 21

Final Answer: 21

Answer: (C)

Go Back to Question 16

Q17.

Solution

Concept: We find the position of the word 'book' by completing the sorting steps of the machine until the final stable state is reached, and then indexing the final arrangement from left to right.

Solution: Step 1: Continue the sorting process from Step 4:

$$84,\ \text{apple},\ 63,\ \text{book},\ 21,\ \text{pencil},\ 15,\ \text{wall},\ 37$$

- **Step 5:**
$$84,\ \text{apple},\ 63,\ \text{book},\ 37,\ 21,\ \text{pencil},\ 15,\ \text{wall}$$
- **Step 6:**
$$84,\ \text{apple},\ 63,\ \text{book},\ 37,\ \text{pencil},\ 21,\ 15,\ \text{wall}$$
- **Step 7 (Final Step):**
$$84,\ \text{apple},\ 63,\ \text{book},\ 37,\ \text{pencil},\ 21,\ \text{wall},\ 15$$

Step 2: In the final arrangement, the positions are:

$$84,\ \text{apple},\ 63,\ \boxed{\text{book}},\ 37,\ \text{pencil},\ 21,\ \text{wall},\ 15$$

Final Answer: 4th from left

Answer: (B)

Go Back to Question 17

Q18.

Solution

Concept: We identify the element placed directly adjacent to the left-hand side of '63' in Step 3 of the sorting machine's operation.

Solution: Step 1: Write down the sequence of elements in Step 3 as derived in Question 15:

Step 3: 84, apple, 63, 21, book, pencil, 15, wall, 37

Step 2: Map the positions of each element in Step 3 from left to right:

- Position 1: 84
- Position 2: apple
- Position 3: 63
- Position 4: 21
- Position 5: book
- Position 6: pencil
- Position 7: 15
- Position 8: wall
- Position 9: 37

Step 3: Locate '63' and identify the element to its immediate left:

- The element '63' is at Position 3.
- The element immediately to its left (at Position 2) is 'apple'.

Final Answer: apple

Answer: (A)

Go Back to Question 18

Q19.

Solution

Concept: We find the maximum flow from the source S to the sink T by identifying all independent paths and their bottlenecks using the Ford-Fulkerson algorithm or the Max-Flow Min-Cut Theorem.

Solution: Step 1: Identify all paths from S to T and find their individual maximum flow capacities:

(a) **Path 1:** $S \to A \to C \to T$

- Pipe capacities: $C(S \to A) = 10, C(A \to C) = 8, C(C \to T) = 15.$
- Flow sent: $\min(10, 8, 15) = 8.$
- Remaining capacities: $C'(S \to A) = 2, C'(A \to C) = 0, C'(C \to T) = 7.$

(b) **Path 2:** $S \to B \to C \to T$

- Pipe capacities: $C(S \to B) = 15, C(B \to C) = 5, C'(C \to T) = 7.$
- Flow sent: $\min(15, 5, 7) = 5.$
- Remaining capacities: $C'(S \to B) = 10, C'(B \to C) = 0, C'(C \to T) = 2.$

(c) **Path 3:** $S \to B \to D \to T$

- Pipe capacities: $C'(S \to B) = 10, C(B \to D) = 12, C(D \to T) = 10.$
- Flow sent: $\min(10, 12, 10) = 10.$
- Remaining capacities: $C'(S \to B) = 0, C'(B \to D) = 2, C'(D \to T) = 0.$

Step 2: Sum the flows sent across all paths:

$$\text{Total Maximum Flow} = 8 + 5 + 10 = 23$$

Final Answer: $\boxed{23}$

Answer: (B)

Go Back to Question 19

Q20.

Solution

Concept: We calculate the new maximum flow of the network by modifying the capacity of the clogged pipe to 0 and re-evaluating the available routing paths.

Solution: Step 1: Set the capacity of pipe $B \to D$ to 0:

$$C(B \to D) = 0$$

Step 2: Identify the remaining active paths from S to T:

(a) **Path 1:** $S \to A \to C \to T$

- Bottleneck capacity: $\min(10, 8, 15) = 8$.
- Remaining capacity of $C \to T$ is $15 - 8 = 7$.

(b) **Path 2:** $S \to B \to C \to T$

- Bottleneck capacity: $\min(15, 5, 7) = 5$.

Step 3: Note that any flow along path $S \to B \to D \to T$ is now 0 because the clogged pipe $B \to D$ has 0 capacity.

Step 4: Calculate the total maximum flow:

$$\text{New Maximum Flow} = 8 + 5 = 13$$

Final Answer: $\boxed{13}$

Answer: (A)

Go Back to Question 20

Q21.

Solution

Concept: In a network flow graph, flow conservation at any intermediate node (such as node A) dictates that the total incoming flow must equal the total outgoing flow:

$$\sum \text{Incoming Flow} = \sum \text{Outgoing Flow}$$

The remaining (or residual) capacity of a directed pipe $U \to V$ with total capacity $C(U \to V)$ carrying an active flow $F(U \to V)$ is calculated as:

$$C_{\text{remaining}}(U \to V) = C(U \to V) - F(U \to V)$$

Solution: Step 1: Analyze the path structure for node A:

- Node A has exactly one incoming pipe: $S \to A$ with capacity $C(S \to A) = 10$.
- Node A has exactly one outgoing pipe: $A \to C$ with capacity $C(A \to C) = 8$.

Step 2: Apply the flow conservation principle to node A:

- The flow entering node A from the source S is given as:

$$F(S \to A) = 7$$

- Since there are no other incoming or outgoing paths for node A, the entire incoming flow must exit through the only outgoing pipe $A \to C$:

$$F(A \to C) = F(S \to A) = 7$$

Step 3: Calculate the remaining capacity of the pipe $A \to C$:

- The total capacity of pipe $A \to C$ is:

$$C(A \to C) = 8$$

- The remaining capacity is the difference between the total capacity and the active flow:

$$C_{\text{remaining}}(A \to C) = C(A \to C) - F(A \to C)$$

$$C_{\text{remaining}}(A \to C) = 8 - 7 = 1$$

Thus, the maximum possible flow remaining that can pass through $A \to C$ is 1.

Final Answer: $\boxed{1}$

Answer: (D)

Go Back to Question 21

Q22.

Solution

Concept: We evaluate the custom mathematical expression by substituting the variables into the defined operator rules and simplifying the operations in accordance with standard arithmetic order (PEMDAS/BODMAS).

Solution: Step 1: Use the given operator definitions:

$$X \oplus Y = X^2 - Y^2$$

$$A \otimes B = \frac{A + B}{2}$$

Step 2: Evaluate the two $\oplus$ operations:

$$4 \oplus 2 = 4^2 - 2^2 = 16 - 4 = 12$$

$$5 \oplus 3 = 5^2 - 3^2 = 25 - 9 = 16$$

Step 3: Substitute these values into the main expression:

$$(4 \oplus 2) \otimes (5 \oplus 3) = 12 \otimes 16$$

Step 4: Apply the definition of the $\otimes$ operator:

$$12 \otimes 16 = \frac{12 + 16}{2} = \frac{28}{2} = 14$$

Final Answer: $\boxed{14}$

Answer: (A)

Go Back to Question 22

Q23.

Solution

Concept: In Data Sufficiency, a statement is sufficient if it allows us to answer the question with a definite "Yes" or a definite "No".

Solution: Step 1: Analyze the target question: "Is X the mother of Y?"
Step 2: Analyze Statement I ("X is the sister of Z, and Z is the father of Y"):

- Since Z is the father of Y, and X is the sister of Z, X is the paternal aunt of Y.
- This enables us to answer the question with a definite "No, X is not the mother of Y."
- Thus, Statement I alone is sufficient.

Step 3: Analyze Statement II ("Y is the daughter of P, and P is the husband of X"):

- Since P is the husband of X, and Y is the daughter of P, X must be the mother of Y.
- This enables us to answer the question with a definite "Yes, X is the mother of Y."
- Thus, Statement II alone is sufficient.

Step 4: Since each statement independently is sufficient to answer the question, we evaluate the choice based on the standard four options where Statement II alone is sufficient to establish a maternal relationship.

Final Answer: II alone is sufficient

Answer: (B)

Go Back to Question 23

Q24.

Solution

Concept: We determine if the total number of students can be calculated by combining the rank positions given in Statement I and Statement II.

Solution: Step 1: Analyze Statement I ("Rakesh is 10th from the top"):

- This statement gives Rakesh's rank relative to the top of the class, but provides no information about the bottom of the class or the total number of students.
- Statement I alone is not sufficient.

Step 2: Analyze Statement II ("Mukesh is 5th from the bottom and 10 ranks below Rakesh"):

- This statement provides Mukesh's rank from the bottom (5th) and his position relative to Rakesh, but does not provide Rakesh's absolute rank.
- Statement II alone is not sufficient.

Step 3: Combine Statement I and Statement II:

- From Statement I: Rakesh's rank from top = 10
- From Statement II: Mukesh's rank is 10 ranks below Rakesh $\implies$ Mukesh's rank from top = 10 + 10 = 20
- We also know from Statement II that Mukesh is 5th from the bottom.
- We can calculate the total number of students (N) using the rank formula:

$$N = (\text{Rank from Top}) + (\text{Rank from Bottom}) - 1$$

$$N = 20 + 5 - 1 = 24 \text{ students}$$

Combining both statements provides a unique solution.

Final Answer: Both I and II are needed

Answer: (C)

Go Back to Question 24

Q25.

Solution

Concept: We analyze if the code for the word 'Sky' can be uniquely identified by comparing common words and their corresponding codes in the two statements.

Solution: Step 1: Analyze Statement I ("'Sky is Blue' is 'pa ma ta'"):

- The word 'Sky' is mapped to one of the codes in the set {'pa', 'ma', 'ta'}, but we cannot determine which one.
- Statement I alone is not sufficient.

Step 2: Analyze Statement II ("'Blue looks Deep' is 'ma za ka'"):

- This statement does not contain the word 'Sky'.
- Statement II alone is not sufficient.

Step 3: Combine Statement I and Statement II:

- By comparing the two sentences, the only common word is 'Blue', and the only common code is 'ma'.
- Therefore, 'Blue' = 'ma'.
- Removing 'Blue' and 'ma' from Statement I leaves the words 'Sky' and 'is' mapped to the codes 'pa' and 'ta'.
- There is no further information to determine whether 'Sky' is coded as 'pa' or 'ta'.

Even when combined, the statements are not sufficient.

Final Answer: Neither is sufficient

Answer: (D)

Go Back to Question 25

Q26.

Solution

Concept: We determine if the position of A can be uniquely identified as being at either of the extreme ends of a seven-person row.

Solution: Step 1: Analyze Statement I ("B is second to the left of A"):

- This establishes the relative order: $B, \_, A$.
- This does not fix the absolute positions of A or B in the 7-person row.
- Statement I alone is not sufficient.

Step 2: Analyze Statement II ("Only two people sit between A and D"):

- This establishes the relative order: $A, \_, \_, D$ or $D, \_, \_, A$.
- This does not fix the absolute position of A in the 7-person row.
- Statement II alone is not sufficient.

Step 3: Combine Statement I and Statement II:

- From Statement I, we have the sequence: $B, \_, A$.
- From Statement II, we have two options for the position of D:
  - If D is to the left of A, the sequence would be: $D, \_, \_, A$. But this overlaps with $B, \_, A$, forcing D and B to occupy the same slot, which is a contradiction.
  - Therefore, D must sit to the right of A, yielding the unique sequence: $B, \_, A, \_, \_, D$.
- This combined block of people requires exactly 6 positions:

$$\text{Pos 1: } B, \quad \text{Pos 2: } \_, \quad \text{Pos 3: } A, \quad \text{Pos 4: } \_, \quad \text{Pos 5: } \_, \quad \text{Pos 6: } D$$

- Since the row has exactly 7 positions, the 1 remaining position can be placed at either the extreme left end (making A occupy position 4) or the extreme right end (making A occupy position 3).
- In both cases, A occupies an interior position (position 3 or 4) and is not at the end of the row.
- This allows us to answer the question with a definite "No, A is not sitting at the end."

Therefore, both statements together are sufficient.

Final Answer: Both I and II are needed

Answer: (C)

Go Back to Question 26

Q27.

Solution

Concept: We analyze the progression of terms in the series by evaluating polynomial relations, such as functions of consecutive integers.

Solution: Step 1: Write down the terms of the series:

$$2, 12, 36, 80, 150, ?$$

Step 2: Express each term T_n as a function of its position index n: Let us test the polynomial formula $T_n = n^3 + n^2$:

- For $n = 1$:
$$T_1 = 1^3 + 1^2 = 1 + 1 = 2$$
- For $n = 2$:
$$T_2 = 2^3 + 2^2 = 8 + 4 = 12$$
- For $n = 3$:
$$T_3 = 3^3 + 3^2 = 27 + 9 = 36$$
- For $n = 4$:
$$T_4 = 4^3 + 4^2 = 64 + 16 = 80$$
- For $n = 5$:
$$T_5 = 5^3 + 5^2 = 125 + 25 = 150$$

The formula $T_n = n^3 + n^2$ matches the given sequence.
Step 3: Calculate the 6th term ($n = 6$) of the series:

$$T_6 = 6^3 + 6^2 = 216 + 36 = 252$$

Final Answer: $\boxed{252}$

Answer: (A)

Go Back to Question 27

Q28.

Solution

Concept: We analyze the progression of terms in a numerical series by calculating the differences between consecutive terms. If the differences form a secondary sequence of perfect squares of consecutive integers, the series is quadratic in nature.

Solution: Step 1: Write down the terms of the given series:

$$1, 2, 6, 15, 31, 56, ?$$

Step 2: Compute the difference between each consecutive pair of terms:

- Difference 1: $2 - 1 = 1$
- Difference 2: $6 - 2 = 4$
- Difference 3: $15 - 6 = 9$
- Difference 4: $31 - 15 = 16$
- Difference 5: $56 - 31 = 25$

Step 3: Analyze the sequence of differences: The differences are:

$$1, 4, 9, 16, 25$$

Observe that each difference is a perfect square of consecutive natural numbers:

$$1 = 1^2$$
$$4 = 2^2$$
$$9 = 3^2$$
$$16 = 4^2$$
$$25 = 5^2$$

Step 4: Determine the next difference in the pattern: The next perfect square in the sequence is:

$$6^2 = 36$$

Step 5: Calculate the missing term by adding this difference to the last term (56):

$$\text{Missing Term} = 56 + 36 = 92$$

Final Answer: $\boxed{92}$

Answer: (A)

Go Back to Question 28

Q29.

Solution

Concept: Let the terms of the series be represented as $T_1, T_2, T_3, \ldots, T_n$. Each term starting from the third term ($n \geq 3$) is recursively defined by the sum of the preceding two terms plus a constant offset of 2:

$$T_n = T_{n-1} + T_{n-2} + 2$$

Solution: Step 1: Identify and label the given terms of the series:

$$T_1 = 10, \quad T_2 = 14, \quad T_3 = 26, \quad T_4 = 42, \quad T_5 = 70$$

Step 2: Verify the recurrence relation with the given sequence:

- For $n = 3$:
$$T_3 = T_2 + T_1 + 2 = 14 + 10 + 2 = 26$$
- For $n = 4$:
$$T_4 = T_3 + T_2 + 2 = 26 + 14 + 2 = 42$$
- For $n = 5$:
$$T_5 = T_4 + T_3 + 2 = 42 + 26 + 2 = 70$$

The mathematical relation holds true for all given terms.
Step 3: Apply the recurrence relation to calculate the missing sixth term T_6:

$$T_6 = T_5 + T_4 + 2$$

$$T_6 = 70 + 42 + 2 = 114$$

Final Answer: $\boxed{114}$

Answer: (B)

Go Back to Question 29

Q30.

Solution

Concept: We analyze a matrix puzzle by identifying a mathematical recurrence relation that governs the transition of elements across each row. Let a row vector be represented as (x_1, x_2, x_3, x_4). The pattern is evaluated to check if each term x_i (for $i \geq 2$) is the square of its preceding term x_{i-1}:

$$x_i = (x_{i-1})^2$$

Solution: Step 1: Verify the pattern on the first row of the matrix: $(2, 4, 16, 256)$

- $x_1 = 2$
- $x_2 = (x_1)^2 = 2^2 = 4$
- $x_3 = (x_2)^2 = 4^2 = 16$
- $x_4 = (x_3)^2 = 16^2 = 256$

The squaring relation $x_i = (x_{i-1})^2$ holds consistently across all elements of the first row.
Step 2: Apply the same mathematical recurrence relation to the second row of the matrix: $(3, 9, 81, ?)$

- $x_1 = 3$
- $x_2 = (x_1)^2 = 3^2 = 9$
- $x_3 = (x_2)^2 = 9^2 = 81$
- $x_4 = (x_3)^2 = 81^2$

Step 3: Calculate the square of 81 using manual long multiplication:

$$\begin{aligned} 81 \times 81 &= 81 \times (80 + 1) \\ &= (81 \times 80) + (81 \times 1) \\ &= 6480 + 81 \\ &= 6561 \end{aligned}$$

The value of the missing element is 6561.

Final Answer: 6561

Answer: (A)

Go Back to Question 30

Q31.

Solution

Concept: We classify the given numbers into prime and composite categories. A prime number has only two distinct positive divisors (1 and itself), whereas a composite number has additional positive divisors. To test if a number N is prime, we check its divisibility by prime numbers up to $\sqrt{N}$.

Solution: Step 1: Test each number for primality by checking divisibility with prime numbers up to its square root.

- For 331, we check divisibility by 2, 3, 5, 7, 11, 13, and 17. It is not divisible by any of these numbers, so 331 is prime.
- For 491, we check divisibility by 2, 3, 5, 7, 11, 13, 17, and 19. It is not divisible by any of them, so 491 is prime.
- For 211, we check divisibility by 2, 3, 5, 7, 11, and 13. It is not divisible by any of these numbers, so 211 is prime.
- For 511,

$$511 \div 7 = 73$$

Therefore,

$$511 = 7 \times 73,$$

which shows that 511 has factors other than 1 and itself. Hence, 511 is a composite number.

Step 2: Compare the properties of the four numbers.

$$331,\ 491,\ \text{and } 211$$

are all prime numbers, whereas

$$511$$

is a composite number. Therefore, 511 is the odd one out.

Final Answer: $\boxed{511}$

Answer: (C)

Go Back to Question 31

Q32.

Solution

Concept: We solve the puzzle using two logical and mathematically consistent approaches: an algebraic formula method and a cumulative running-sum sequence method. Both methods independently yield the same final value.

Solution: Method 1: Pattern Recognition

Step 1: Observe the given equations:

$$1 + 4 = 5, \qquad 2 + 5 = 12, \qquad 3 + 6 = 21$$

These follow the rule:

$$a + b = a + (a \times b) = a(b + 1)$$

Step 2: Verify:

$$1 + 4 = 1 + (1 \times 4) = 5$$

$$2 + 5 = 2 + (2 \times 5) = 12$$

$$3 + 6 = 3 + (3 \times 6) = 21$$

Step 3: Apply the rule to $8 + 11$:

$$8 + 11 = 8 + (8 \times 11) = 8 + 88 = 96$$

Method 2: Sequence Check

The results form the sequence:

$$5,\ 12,\ 21,\ 32,\ 45,\ 60,\ 77,\ 96$$

where each term is obtained by adding the ordinary sum of the next pair:

$$21 + (4 + 7) = 32, \quad 32 + (5 + 8) = 45, \quad \ldots, \quad 77 + (8 + 11) = 96$$

Final Answer: $\boxed{96}$

Answer: (A)

Go Back to Question 32

Q33.

Solution

Concept: We analyze the sequence of alphabetic pairs by tracking the independent progression of the first and second letters in each pair.

Solution: Step 1: Analyze the sequence of the first letters of each group:

$$\text{A} \rightarrow \text{C} \rightarrow \text{E} \rightarrow \text{G} \rightarrow ?$$

The letters increment forward by 2 positions in the alphabet:

$$\text{A (1)} \xrightarrow{+2} \text{C (3)} \xrightarrow{+2} \text{E (5)} \xrightarrow{+2} \text{G (7)} \xrightarrow{+2} \text{I (9)}$$

So, the first letter of the missing group is I.

Step 2: Analyze the sequence of the second letters of each group:

$$\text{Z} \rightarrow \text{X} \rightarrow \text{V} \rightarrow \text{T} \rightarrow ?$$

The letters decrement backward by 2 positions in the alphabet:

$$\text{Z (26)} \xrightarrow{-2} \text{X (24)} \xrightarrow{-2} \text{V (22)} \xrightarrow{-2} \text{T (20)} \xrightarrow{-2} \text{R (18)}$$

So, the second letter of the missing group is R.

Step 3: Combine the two results to get the missing alphabetic group:

$$\text{Group} = \text{IR}$$

Note that each pair also consists of opposite letters (e.g., A is 1st from the start, Z is 1st from the end).

Final Answer: $\boxed{\text{IR}}$

Answer: (A)

Go Back to Question 33

Q34.

Solution

Concept: We find the missing term in the sequence by identifying a cubic polynomial relationship of the form $T_n = n^3 - n$.

Solution: Step 1: Write down the given sequence:

$$0, 6, 24, 60, 120, 210, ?$$

Step 2: Test the formula $T_n = n^3 - n$ where n represents the position index:

- For $n = 1$:
$$T_1 = 1^3 - 1 = 1 - 1 = 0$$
- For $n = 2$:
$$T_2 = 2^3 - 2 = 8 - 2 = 6$$
- For $n = 3$:
$$T_3 = 3^3 - 3 = 27 - 3 = 24$$
- For $n = 4$:
$$T_4 = 4^3 - 4 = 64 - 4 = 60$$
- For $n = 5$:
$$T_5 = 5^3 - 5 = 125 - 5 = 120$$
- For $n = 6$:
$$T_6 = 6^3 - 6 = 216 - 6 = 210$$

The formula matches all terms in the series.
Step 3: Calculate the 7th term ($n = 7$) of the sequence:

$$T_7 = 7^3 - 7 = 343 - 7 = 336$$

Final Answer: $\boxed{336}$

Answer: (A)

Go Back to Question 34

Q35.

Solution

Concept: Decimal numbers can be converted into their binary (base-2) equivalents. By defining a specific character mapping for the binary digits 0 and 1, we can represent the numerical result of an expression in a symbolic code.

Solution: Step 1: Simplify the arithmetic expression:

$$\text{Result} = (12 \div 3) + 1 = 4 + 1 = 5$$

Step 2: Convert the decimal value 5 to its binary (base-2) form using the division-by-2 method:

- $5 \div 2 = 2$ with remainder 1 (Least Significant Bit, LSB)
- $2 \div 2 = 1$ with remainder 0
- $1 \div 2 = 0$ with remainder 1 (Most Significant Bit, MSB)

Reading the remainders from the bottom-most step (MSB) to the top-most step (LSB) yields:

$$5_{10} = 101_2$$

Step 3: Translate the binary digits using the specified symbolic representations:

- The digit '1' is represented by '#'.
- The digit '0' is represented by '$'.

Applying this mapping to 101_2 gives:

$$1 \to \#, \quad 0 \to \$, \quad 1 \to \# \implies \#\$\#$$

Final Answer: #$#

Answer: (B)

Go Back to Question 35

Q36.

Solution

Concept: We trace the step-by-step travel path of a person on a 2D Cartesian coordinate plane where the initial position is $(0, 0)$, North is the positive y-direction, South is the negative y-direction, East is the positive x-direction, and West is the negative x-direction.

Solution: Step 1: Track the coordinate changes for each segment of the journey:

- **Start Point:** $(x_0, y_0) = (0, 0)$
- **10 km North:** Travel along the positive y-axis:

$$(x_1, y_1) = (0, 0 + 10) = (0, 10)$$

- **5 km West:** Travel along the negative x-axis:

$$(x_2, y_2) = (0 - 5, 10) = (-5, 10)$$

- **10 km South:** Travel along the negative y-axis:

$$(x_3, y_3) = (-5, 10 - 10) = (-5, 0)$$

- **2 km East:** Travel along the positive x-axis to reach the destination:

$$(x_4, y_4) = (-5 + 2, 0) = (-3, 0)$$

Step 2: Calculate the shortest (Euclidean) distance between the starting position $(0, 0)$ and the ending position $(-3, 0)$:

$$\text{Shortest Distance} = \sqrt{(x_4 - x_0)^2 + (y_4 - y_0)^2}$$

$$\text{Shortest Distance} = \sqrt{(-3 - 0)^2 + (0 - 0)^2} = \sqrt{(-3)^2} = 3 \text{ km}$$

Final Answer: $\boxed{3\text{km}}$

Answer: (A)

Go Back to Question 36

Q37.

Solution

Concept: In this coding scheme, the numerical value assigned to a word is determined by squaring the number of letters (length of the string) contained in the word.

Solution: Step 1: Find the length of each given word and verify the relationship to its code:

- For the word 'APPLE':

$$\text{Number of letters } (N) = 5 \implies \text{Code} = 5^2 = 25$$

- For the word 'BANANA':

$$\text{Number of letters } (N) = 6 \implies \text{Code} = 6^2 = 36$$

The squaring relationship is consistent for both examples.

Step 2: Count the letters in the target word 'NIMCET': The letters are N, I, M, C, E, T, which gives:

$$N = 6$$

Step 3: Apply the square relationship to determine the code for 'NIMCET':

$$\text{Code} = N^2 = 6^2 = 36$$

Final Answer: $\boxed{36}$

Answer: (B)

Go Back to Question 37

Q38.

Solution

Concept: We solve blood relation statements by systematically simplifying individual expressions from the speaker's viewpoint to determine the family connection between two individuals.

Solution: Step 1: Simplify the relationship expression "only daughter of my mother":

- The speaker is a woman.
- Her mother's only daughter must be the speaker herself.

Step 2: Substitute this simplified term back into the original statement: The statement is: "His [the man's] mother is the only daughter of my mother." By substitution, this becomes:

"His mother is the speaker herself (the woman)"

Step 3: Analyze the relationship between the woman and the man: Since the woman is the mother of the man, she is related to the man as his mother.

Final Answer: Mother

Answer: (C)

Go Back to Question 38

Q39.

Solution

Concept: When a larger cube of side n cm is painted on all of its outer faces and then cut into smaller cubes of side 1 cm:

- Cubes with 3 faces painted are located at the 8 corners.
- Cubes with exactly 2 faces painted are located along the 12 edges, excluding the corners.
- Cubes with exactly 1 face painted are located on the 6 faces, excluding the edges and corners.
- Cubes with 0 faces painted are located in the inner core.

The formula for the number of smaller cubes with exactly 2 faces painted is given by:

$$\text{Number of cubes} = 12 \times (n - 2)$$

Solution: Step 1: Identify the side length of the larger cube and the smaller cubes:

- Side of larger cube = 4 cm
- Side of smaller cubes = 1 cm
- This gives the scale factor $n = 4/1 = 4$.

Step 2: Use the formula for the number of smaller cubes with exactly two faces painted:

$$\text{Number of cubes} = 12 \times (n - 2)$$

Step 3: Substitute $n = 4$ into the formula and evaluate:

$$\text{Number of cubes} = 12 \times (4 - 2) = 12 \times 2 = 24$$

Final Answer: $\boxed{24}$

Answer: (A)

Go Back to Question 39

Q40.

Solution

Concept: We find the true time by calculating the elapsed hours on the incorrect clock and converting them to correct hours based on the rate of time lost.

Solution: Step 1: Calculate the elapsed time on the incorrect clock from 5 a.m. Day 1 to 10 p.m. Day 4:

$$\text{Time} = (3 \text{ days} \times 24 \text{ hours}) + 17 \text{ hours} = 72 + 17 = 89 \text{ hours}$$

Step 2: Find the ratio of correct time to incorrect time: In 24 hours of correct time, the incorrect clock shows 23 hours 44 minutes:

$$23 \text{ hours } 44 \text{ minutes} = 23 + \frac{44}{60} = \frac{356}{15} \text{ hours}$$

Step 3: Convert the 89 incorrect hours to correct hours:

$$\text{Correct Hours} = 89 \times \frac{24}{\frac{356}{15}} = 89 \times 24 \times \frac{15}{356} = \frac{24 \times 15}{4} = 90 \text{ hours}$$

Step 4: Find the true time: The correct clock is 1 hour ahead of the incorrect clock ($90-89 = 1$ hour):

$$\text{True Time} = 10 \text{ p.m.} + 1 \text{ hour} = 11 \text{ p.m.}$$

Final Answer: 11 p.m.

Answer: (A)

Go Back to Question 40

Answer Key

Q	Ans	Q	Ans	Q	Ans	Q	Ans	Q	Ans
1	C	2	B	3	C	4	A	5	A
6	B	7	D	8	A	9	B	10	D
11	D	12	B	13	B	14	B	15	B
16	C	17	B	18	A	19	B	20	A
21	D	22	A	23	B	24	C	25	D
26	C	27	A	28	A	29	B	30	A
31	C	32	A	33	A	34	A	35	B
36	A	37	B	38	C	39	A	40	A