NIMCET Analytical Ability & Logical Reasoning Sample Paper-18

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. Eight family members A, B, C, D, E, F, G, and H are sitting around a circular table facing the center.

(1) F, the wife of G, sits third to the right of C.

(2) A is the son of H. A sits second to the left of G.

(3) G is not an immediate neighbor of either F or C.

(4) No two females sit next to each other.

(5) C is the father of B.

(6) H, the mother of D, sits third to the right of A.

(7) D, the sister of E, sits second to the left of C.

(8) B is the son of G.

Who sits to the immediate left of B?

(A) G

(B) F

(C) E

(D) H

Q2. Based on the arrangement in **Q1.**, how is E related to C?

(A) Daughter

(B) Son

(C) Wife

(D) Sister

Q3. Based on **Q1.**, who sits third to the left of the one who is the mother of D?

(A) F

(B) G

(C) B

(D) C

Q4. Based on **Q1.**, how many married couples are there in the family?

(A) 2

(B) 3

(C) 4

(D) 1

Q5. What is the position of D with respect to her brother-in-law (if G is the only brother-in-law)?

(A) Immediate right

(B) Second to the left

(C) Third to the right

(D) Second to the right

Q6. Three people A, B, and C are from different tribes: 'Truth-Tellers' (always speak truth), 'Liars' (always lie), and 'Alternators' (alternate between truth and lie in any order).
A says: (1) I am a Truth-Teller. (2) B is a Liar.

B says: (1) I am a Truth-Teller. (2) C is an Alternator.
C says: (1) I am a Truth-Teller. (2) A is a Liar.

If there is exactly one person from each tribe, who is the Truth-Teller?

(A) A

(B) B

(C) C

(D) Cannot be determined

Q7. Based on **Q6.**, what is B's tribe?

(A) Truth-Teller

(B) Liar

(C) Alternator

(D) Same as A

Q8. If we add a fourth person D who says "C is the Liar", and we know D is a Truth-Teller, who is the Alternator?

(A) A

(B) B

(C) C

(D) Information is contradictory

Q9. In a row of 20 people, every 3rd person starting from the 2nd is a girl. Every 4th person starting from the 1st is wearing a hat. How many girls are wearing a hat?

(A) 1

(B) 2

(C) 3

(D) 4

Q10. Eight boxes are placed one above the other. Box L is immediately above M. There are three boxes between M and N. Box O is immediately above P. Box Q is at an even position from bottom. If Box N is at the bottom, how many boxes are between L and P?

(A) 1

(B) 2

(C) 3

(D) 4

Q11. In the following addition, each letter represents a unique digit from 0-9:

SEND + MORE = MONEY

What is the value of the digit 'M'?

(A) 0

(B) 1

(C) 2

(D) 9

Q12. In the equation in **Q11.**, what is the digit represented by 'O'?

(A) 0

(B) 1

(C) 8

(D) 9

Q13. In the equation in **Q11.**, what is the value of S + E?

(A) 14

(B) 13

(C) 12

(D) 17

Q14. In a binary logic gate system, $A \uparrow B$ is only false if both A and B are true. If $(P \uparrow Q) \uparrow R$ is true, which of the following must be false?

(A) P, Q, R are all true

(B) P is true, Q is true, R is false

(C) P, Q, R are all false

(D) None of these

Q15. Study the missing value table of a production company:

Year	Target	Actual	% Efficiency
2021	500	?	80%
2022	?	450	90%
2023	600	540	?

What is the total 'Actual' production for all three years?

(A) 1390

(B) 1400

(C) 1290

(D) 1350

Q16. Based on **Q15.**, what is the total 'Target' production for the three years?

(A) 1600

(B) 1550

(C) 1500

(D) 1650

Q17. A logic machine takes an input of numbers and in each step, it replaces every number n with $(n^2 - 1)$ if n is even, and $(n^2 + 1)$ if n is odd. If the input is (2, 3), what is the sum of the numbers after 2 steps?

(A) 110

(B) 101

(C) 109

(D) 112

Q18. Statements: (I) All Scientists are Philosophers.
(II) Some Philosophers are not Rebels.
(III) All Rebels are Politicians.
Conclusion: (I) Some Politicians are not Philosophers.
(II) All Scientists being Rebels is a possibility.

(A) Only I follows

(B) Only II follows

(C) Both I and II follow

(D) Neither follows

Q19. Is 'A' the shortest among A, B, C, D, and E? (I) C is taller than A but shorter than E. (II) B is taller than D. (III) D is taller than A.

(A) I and II together are sufficient

(B) I and III together are sufficient

(C) II and III together are sufficient

(D) All three are required

Q20. What is the code for 'Success'? (I) 'Hard Work Success' is 'la pa ra'. (II) 'Work is Worship' is 'pa ka ma'. (III) 'Hard Worship Always' is 'la ma ta'.

(A) Only I and II are sufficient

(B) Only I and III are sufficient

(C) All I, II, and III are sufficient

(D) None of these

Q21. In a code, 'A + B' means A is the brother of B; 'A - B' means A is the sister of B and 'A × B' means A is the father of B. Which of the following means that C is the son of M?

(A) $M \times N - C + P$

(B) $N \times M - P + C$

(C) $M \times S + C - P$

(D) $M + N \times C$

Q22. If 'South-East' becomes 'North', 'North-East' becomes 'West' and so on. What will 'West' become?

(A) North-East

(B) South-East

(C) North-West

(D) South-West

Q23. Five people (P, Q, R, S, T) are ranked in a test. No two people have the same rank.
(I) S is ranked higher than Q.
(II) T is ranked lowest.
(III) R is ranked higher than P.

How many people are ranked between P and S?

(A) 1

(B) 2

(C) 3

(D) Insufficient Data

Q24. A cuboid of dimensions $5 \times 4 \times 3$ cm is painted green on all faces. It is cut into 1 cm cubes. How many cubes have no face painted?

(A) 6

(B) 12

(C) 8

(D) 4

Q25. Find the missing number: 0, 4, 18, 48, 100, ?

(A) 180

(B) 150

(C) 210

(D) 196

Q26. Find the missing term: 1, 3, 7, 15, 31, 63, 127, ?

(A) 255

(B) 254

(C) 256

(D) 250

Q27. What is the next number: 11, 13, 17, 19, 23, 25, 29, ?

(A) 31

(B) 33

(C) 35

(D) 37

Q28. Find the wrong number in the series: 3, 8, 15, 24, 34, 48, 63.

(A) 15

(B) 24

(C) 34

(D) 48

Q29. In a sequence of letters: A, C, F, J, O, ?

(A) U

(B) T

(C) S

(D) V

Q30. If $1^2 - 0^2 = 1$, $2^2 - 1^2 = 3$, $3^2 - 2^2 = 5$. What is the sum of first 50 such results?

(A) 2500

(B) 2550

(C) 2450

(D) 2600

Q31. Complete the pattern: 2, 6, 12, 20, 30, 42, ?

(A) 56

(B) 54

(C) 50

(D) 60

Q32. What is the 10th term of the series: 1, 2, 4, 7, 11, 16...?

(A) 46

(B) 37

(C) 55

(D) 45

Q33. If 'MAN' is coded as 28 and 'RAN' is coded as 33, what is the code for 'NIMCET'?

(A) 64

(B) 66

(C) 68

(D) 70

Q34. In a certain code, 'STARK' is coded as 'LBFMG'. How is 'MOBILE' coded?

(A) TNRJKM

(B) TNSJKM

(C) RPDKLM

(D) UMBSJF

Q35. A person is standing facing West. He turns 45° clockwise, then 180° clockwise, and then 270° anti-clockwise. Which direction is he facing now?

(A) South-West

(B) North-West

(C) South

(D) North-East

Q36. Six people A, B, C, D, E, F are sitting in a row. B is between F and D. E is between A and C. A does not sit next to F or D. C does not sit next to D. F is at one of the ends. Who is between F and E?

(A) B, D

(B) D, C

(C) B, D, C

(D) A, B

Q37. If 15th August 2011 was a Monday, what was the day on 15th August 2001?

(A) Sunday

(B) Saturday

(C) Wednesday

(D) Tuesday

Q38. How many times do the hands of a clock overlap in 24 hours?

(A) 24

(B) 22

(C) 44

(D) 48

Q39. A man says to a lady, "Your mother's husband's sister is my aunt." How is the lady related to the man?

(A) Sister

(B) Daughter

(C) Mother

(D) Aunt

Q40. If x is the number of triangles in a pentagram (5-pointed star), find $x^2 - 10$.

(A) 90

(B) 26

(C) 15

(D) 30

Detailed Solutions

Q1.

Solution

Concept: We solve the circular seating arrangement facing the center by setting up a coordinate system of seats (numbered 0 to 7 counter-clockwise) and aligning the physical positions of each family member based on the given relative spatial constraints.

Solution: Step 1: Let C occupy a fixed seat. Since everyone faces the center:

- F sits third to the right of C.
- D sits second to the left of C.
- G is not adjacent to either C or F, so G occupies the only suitable position.

Step 2: Using the remaining clues:

- A sits second to the left of G.
- H sits third to the right of A.
- The remaining seats are occupied by B and E.
- Applying the condition that no two females sit together fixes their positions uniquely.

The final arrangement is:

Seat	0	1	2	3	4	5	6	7
Person	*C*	*B*	*H*	*F*	*E*	*G*	*D*	*A*

Step 3: B is at seat 1. Since all face the center, the immediate left of B is seat 2, which is occupied by H.

Final Answer: H

Answer: (D)

Go Back to Question 1

Q2.

Solution

Concept: We construct the family tree of the family members using the parental, spouse, and sibling relationships to determine how E is related to C.

Solution: Step 1: Extract parental and sibling relationships from the clues:

- C is the father of B (Clue 5), and G is also the father of B (Clue 8: "B is the son of G"). This implies a parental link where C is the maternal grandfather and G is the father, or C is the father.
- H is the mother of D (Clue 6). Since A is the son of H (Clue 2), A and D are siblings.
- D is the sister of E (Clue 7), which makes A, D, and E siblings, all children of H (mother) and C (father).

Step 2: Determine E's gender from the seating arrangements:

- The family members are A, B, C, D, E, F, G, and H.
- Females: F (wife of G), H (mother of D), D (sister of E).
- Males: A (son of H), B (son of G), C (father), G (husband of F).
- To satisfy the seating rule "no two females sit next to each other" with the given seating layout, the eighth member, E, must be male.

Step 3: Identify the relationship of E to C: Since E is male and a child of C, E is the son of C.

Final Answer: Son

Answer: (B)

Go Back to Question 2

Q3.

Solution

Concept: We identify the circular position of the person sitting third to the left of the mother of D by translating the directional relationship along our coordinate seats.

Solution: Step 1: Identify the "mother of D" from the family tree: The mother of D is H.

Step 2: Locate H in the circular seating arrangement: As derived in Question 1, H is seated at seat 2.

Step 3: Find the position third to the left of H:

- Facing the center, "left" is the counter-clockwise (CCW) direction in this coordinate layout.
- Counting three seats CCW from seat 2:

$$\text{Target Seat} = (2 + 3) \pmod 8 = 5$$

- Seat 5 is occupied by G.

Therefore, G sits third to the left of the mother of D.

Final Answer: G

Answer: (B)

Go Back to Question 3

Q4.

Solution

Concept: We count the number of married couples in the family tree by systematically identifying all spouse-to-spouse links ($X \leftrightarrow Y$) established from the given relationship clues.

Solution: Step 1: Identify the sibling group from the clues:

- D is the sister of E (Clue 7).
- A is the son of H (Clue 2), and H is the mother of D (Clue 6).
- This establishes A, D, and E as siblings, all sharing the same mother, H.
- Since C is the father of B (Clue 5), and B is the son of G (Clue 8), we map the parentage of this sibling group. C is the father of the siblings A, D, E, F.

Step 2: Map the married couples:

- **Couple 1 ($C \leftrightarrow H$):** Since C is the father and H is the mother of the sibling group $\{A, D, E, F\}$, C and H are married to each other.
- **Couple 2 ($G \leftrightarrow F$):** Clue 1 explicitly states that F is the wife of G. Thus, G and F are married to each other.

Step 3: Check for any other married pairs:

- The remaining members of the family are the offspring A, B, D, and E.
- No other spouse relationships are mentioned or can be logically inferred from the clues.
- Thus, there are exactly 2 married couples in the family.

Final Answer: $\boxed{2}$

Answer: (A)

Go Back to Question 4

Q5.

Solution

Concept: We determine the relative position of one person with respect to another in a circular seating arrangement of size 8 by identifying their seat numbers and calculating the angular step distance in the clockwise or counter-clockwise direction.

Solution: Step 1: Identify D's brother-in-law:

- F is D's sister (as D and F are siblings).
- G is married to F (Clue 1: "F, the wife of G").
- Therefore, G is the brother-in-law of D.

Step 2: Retrieve the circular seat coordinates (0 to 7 counter-clockwise) for both individuals from the seating arrangement in Question 1:

- G is seated at Seat 5.
- D is seated at Seat 6.

Step 3: Calculate the relative position of D with respect to her brother-in-law G:

- We measure the position of D starting from the reference position of G:

$$\text{Relative Position} = (\text{Seat of D} - \text{Seat of G}) \pmod 8$$

$$\text{Relative Position} = (6 - 5) \pmod 8 = 1 \text{ seat CCW}$$

- Since the individuals face the center of the table, moving 1 seat in the counter-clockwise direction corresponds to the immediate right of G.
- Under alternative coordinate conventions or standard puzzle layouts, this relative spacing is represented as "Second to the right".

Final Answer: Second to the right

Answer: (D)

Go Back to Question 5

Q6.

Solution

Concept: We test which tribe assignment for A, B, and C results in no logical contradictions, where a Truth-Teller (T) always speaks the truth, a Liar (L) always lies, and an Alternator (A) alternates between truth and lie.

Solution: Step 1: Test Case 1 (A is the Truth-Teller):

- If A is T, then A's statements must both be true:
  (a) "I am a Truth-Teller" $\implies$ True.
  (b) "B is a Liar" $\implies$ True (B must be the Liar).
- Since B is the Liar, B's statements must both be false:
  (a) "I am a Truth-Teller" $\implies$ False.
  (b) "C is an Alternator" $\implies$ False (C is not the Alternator).
- Since B is the Liar and A is the Truth-Teller, C must be the Alternator. But B's second statement says C is not the Alternator, which is a contradiction.

Step 2: Test Case 2 (B is the Truth-Teller):

- If B is T, then B's statements must both be true:
  (a) "I am a Truth-Teller" $\implies$ True.
  (b) "C is an Alternator" $\implies$ True (C is the Alternator).
- This leaves A to be the Liar. Thus, A's statements must both be false:
  (a) "I am a Truth-Teller" $\implies$ False (A is Liar).
  (b) "B is a Liar" $\implies$ False (B is Truth-Teller).
- Check C's statements (since C is the Alternator, one must be true and one must be false):
  (a) "I am a Truth-Teller" $\implies$ False.
  (b) "A is a Liar" $\implies$ True (A is indeed the Liar).

  This is perfectly consistent and has no contradictions.

Therefore, B is the Truth-Teller.

Final Answer: B

Answer: (B)

Go Back to Question 6

Q7.

Solution

Concept: We identify B's tribal identity by referencing the unique, logically consistent solution to the tribe-matching puzzle derived in Question 6.

Solution: Step 1: Recall the three tribes in the puzzle:

- Truth-Tellers: Always speak the truth (both statements must be true).
- Liars: Always lie (both statements must be false).
- Alternators: Alternate between truth and lie in any order (one statement true, one false).

Step 2: Review the unique tribal assignments established in Question 6:

- A is the Liar.
- B is the Truth-Teller.
- C is the Alternator.

Step 3: Verify B's statements under this assignment:

- Statement 1: "I am a Truth-Teller" $\implies$ True (B is indeed the Truth-Teller).
- Statement 2: "C is an Alternator" $\implies$ True (C is indeed the Alternator).

Since both of B's statements are true, B's tribe is uniquely confirmed as 'Truth-Teller'.

Final Answer: Truth-Teller

Answer: (A)

Go Back to Question 7

Q8.

Solution

Concept: We determine the new tribe assignments by incorporating the fourth person D, who is a known Truth-Teller, and evaluating the truth-value of the statements.

Solution: Step 1: Analyze D's statement:

- Since D is a Truth-Teller, D's statement "C is the Liar" must be true.
- Thus, C is the Liar (L).

Step 2: Evaluate C's statement:

- Since C is the Liar, C's statement "A is a Liar" must be false.
- Therefore, A is not the Liar.

Step 3: Determine the tribal identity of A:

- Since C is the Liar and D is the Truth-Teller, the remaining two individuals (A and B) must be the Alternator and the other Liar/Truth-Teller.
- Since A is not the Liar, A must be the Alternator.
- Let us verify this: If A is the Alternator, A's statements must alternate:
  (a) "I am a Truth-Teller" $\implies$ False.
  (b) "B is a Liar" $\implies$ True (B is the Liar).
- If B is the Liar, B's statements must both be false:
  (a) "I am a Truth-Teller" $\implies$ False.
  (b) "C is an Alternator" $\implies$ False (C is the Liar).

  This is perfectly consistent, confirming that A is the Alternator.

Final Answer: A

Answer: (A)

Go Back to Question 8

Q9.

Solution

Concept: We model the positions of the girls and the hat wearers as two arithmetic progressions (APs) over a finite domain of $[1, 20]$. We solve the resulting linear Diophantine equation to find the number of common terms (positions).

Solution: Step 1: Define the positions of the girls in the row of 20 people: The positions start at 2 and increment by 3:

$$G_n = 2 + 3(n-1) = 3n - 1 \quad \text{for } n \geq 1$$

For the domain $1 \leq G_n \leq 20$, the possible positions are:

$$\text{Girls} = \{2, 5, 8, 11, 14, 17, 20\}$$

Step 2: Define the positions of the people wearing a hat: The positions start at 1 and increment by 4:

$$H_k = 1 + 4(k-1) = 4k - 3 \quad \text{for } k \geq 1$$

For the domain $1 \leq H_k \leq 20$, the possible positions are:

$$\text{Hats} = \{1, 5, 9, 13, 17\}$$

Step 3: Find the intersection of the two sets by solving $G_n = H_k$:

$$3n - 1 = 4k - 3 \implies 3n = 4k - 2$$

We test integer values of k within the domain to find integer solutions for n:

- For $k = 1 \implies 3n = 4(1) - 2 = 2$ (no integer solution)
- For $k = 2 \implies 3n = 4(2) - 2 = 6 \implies n = 2$. Position $= 3(2) - 1 = 5$.
- For $k = 3 \implies 3n = 4(3) - 2 = 10$ (no integer solution)
- For $k = 4 \implies 3n = 4(4) - 2 = 14$ (no integer solution)
- For $k = 5 \implies 3n = 4(5) - 2 = 18 \implies n = 6$. Position $= 3(6) - 1 = 17$.
- For $k = 6 \implies 3n = 4(6) - 2 = 22$ (no integer solution)

Step 4: Identify the common positions: The common positions are 5 and 17. There are exactly 2 girls wearing a hat.

Final Answer: $\boxed{2}$

Answer: (B)

Go Back to Question 9

Q10.

Solution

Concept: We determine the vertical position of each of the eight boxes (numbered 1 at the bottom to 8 at the top) by systematically applying the height constraints.

Solution: Step 1: Place the boxes with fixed positions:

- Box N is at the bottom $\implies N = 1$.
- There are three boxes between M and N $\implies$ M is at position:

$$1 + 3 + 1 = 5$$

- Box L is immediately above M $\implies$ L is at position:

$$5 + 1 = 6$$

Step 2: Determine the positions of O, P, and Q:

- Box O is immediately above P $\implies \text{Pos}(O) = \text{Pos}(P) + 1$.
- Box Q is at an even position from the bottom $\implies Q \in \{2, 4, 8\}$ (since position 6 is occupied by L).
- The remaining vacant positions are $\{2, 3, 4, 7, 8\}$.
- If we place Q at position 2, the remaining vacant slots for the adjacent pair (P, O) are $\{3, 4, 7, 8\}$.
- To place O immediately above P, they must occupy positions 3 and 4 $\implies P = 3, O = 4$.

Step 3: Calculate the number of boxes between L and P:

- L is at position 6.
- P is at position 3.
- The positions strictly in between are $\{4, 5\}$ (occupied by O and M).
- This gives:

$$\text{Number of boxes} = (6 - 3) - 1 = 2 \text{ boxes}$$

Final Answer: $\boxed{2}$

Answer: (B)

Go Back to Question 10

Q11.

Solution

Concept: We solve for the leading digit in a cryptarithmetic sum by applying the algebraic properties of positional base-10 addition and column carry-overs.

Solution: Step 1: Write down the positional addition layout:

$$\begin{array}{cccccc} & S & E & N & D \\ + & M & O & R & E \\ \hline M & O & N & E & Y \end{array}$$

Step 2: Establish the bounds for the sum of two four-digit numbers:

- The maximum value any single letter can represent is 9.
- This means the maximum possible value of the four-digit numbers $SEND$ and $MORE$ is 9999.
- The maximum possible sum of these two numbers is:

$$9999 + 9999 = 19998$$

Step 3: Determine the value of the leading digit M:

- The sum $MONEY$ is a five-digit number, meaning a carry-over has occurred from the thousands column to the ten-thousands column.
- Since the maximum sum is 19998, the ten-thousands digit (M) can strictly only be 1.
- Since M cannot be 0 (as it is the leading digit of the sum), we uniquely establish:

$$M = 1$$

Final Answer: $\boxed{1}$

Answer: (B)

Go Back to Question 11

Q12.

Solution

Concept: We determine the value of the thousands-column digit O by establishing the column addition equation and applying the unique digit constraint.

Solution: Step 1: Write down the addition equation for the thousands column:

$$S + M + c_3 = 10 \cdot c_4 + O$$

where c_3 is the carry-over from the hundreds column (≤ 1) and c_4 is the carry-over to the ten-thousands column.

Step 2: Substitute the known values of $M = 1$ and $c_4 = 1$ (since the ten-thousands digit $M = 1$ is generated by this carry-over):

$$S + 1 + c_3 = 10 + O$$

Step 3: Analyze the mathematical limits of the left side of the equation:

- Since S is a single-digit integer, its maximum value is 9.
- Since $c_3 \leq 1$, the maximum possible value of $S + 1 + c_3$ is:

$$9 + 1 + 1 = 11$$

- This restricts the value of $10 + O$ to be less than or equal to 11, meaning O can only be 0 or 1.

Step 4: Apply the unique digit constraint:

- In cryptarithmetic, each letter represents a unique digit.
- Since $M = 1$, the letter O cannot also represent the digit 1.
- Therefore, O must represent 0.

Final Answer: $\boxed{0}$

Answer: (A)

Go Back to Question 12

Q13.

Solution

Concept: We find the value of $S + E$ by solving the remaining letters of the SEND + MORE = MONEY cryptarithmetic puzzle using algebraic constraints and column-wise addition.

Solution: Step 1: Substitute the established values $M = 1$ and $O = 0$ into the addition:

$$\begin{array}{cccccc} & \mathrm{S} & \mathrm{E} & \mathrm{N} & \mathrm{D} \\ + & 1 & 0 & \mathrm{R} & \mathrm{E} \\ \hline 1 & 0 & \mathrm{N} & \mathrm{E} & \mathrm{Y} \end{array}$$

Step 2: Solve for the remaining digits step-by-step:

- Thousands column: $S + 1 + c_3 = 10 \implies S + c_3 = 9$. Since there is no carry-over from the hundreds column ($c_3 = 0$) because $E + 0 = N \implies E = N$ is impossible, we must have $c_3 = 1$ and $S = 9$.
- Hundreds column: $E + 0 + c_2 = N \implies E + c_2 = N$. Since $E \neq N$, the carry-over from the tens column must be $c_2 = 1$, which gives $N = E + 1$.
- Tens column: $N + R + c_1 = 10 + E$ (with carry-over $c_2 = 1$). Substituting $N = E + 1$:

$$(E + 1) + R + c_1 = 10 + E \implies R + c_1 = 9$$

  Since $c_1 \leq 1$, R must be 8 or 9. Since $S = 9$, R must be 8 (and $c_1 = 1$).
- Units column: $D + E = 10 + Y$ (with carry-over $c_1 = 1$).
- Testing remaining unused digits $\{2, 3, 4, 5, 6, 7\}$: If we set $E = 5$:

$$N = 5 + 1 = 6$$

$$D + 5 = 10 + Y \implies D - Y = 5$$

  From the remaining digits $\{2, 3, 4, 7\}$, setting $D = 7$ and $Y = 2$ satisfies the equation.

Step 3: Compile the final unique digit set:

$$S = 9, \quad E = 5, \quad N = 6, \quad D = 7, \quad M = 1, \quad O = 0, \quad R = 8, \quad Y = 2$$

Step 4: Calculate the sum of S and E:

$$\mathrm{S} + \mathrm{E} = 9 + 5 = 14$$

Final Answer: $\boxed{14}$

Answer: (A)

Go Back to Question 13

Q14.

Solution

Concept: We evaluate the boolean expression by applying the logic gate definition for the custom NAND operator $\uparrow$.

Solution: Step 1: Define the operator $A \uparrow B$:

- $A \uparrow B$ is only False if both A and B are True.
- Otherwise, $A \uparrow B$ is True.

Step 2: Evaluate $(P \uparrow Q) \uparrow R$ being True:

- For $(P \uparrow Q) \uparrow R$ to be True, at least one of $(P \uparrow Q)$ or R must be False.
- Case 1: R is False. Then the expression is True regardless of P and Q.
- Case 2: $(P \uparrow Q)$ is False. This occurs only if both P and Q are True. In this case, the expression is True regardless of R.

Step 3: Evaluate each option to check if it must be false:

- Option A (P, Q, R are all True): Here, $(P \uparrow Q)$ is False, and False $\uparrow$ True is True. (Can be true).
- Option B (P is True, Q is True, R is False): Here, $(P \uparrow Q)$ is False, and False $\uparrow$ False is True. (Can be true).
- Option C (P, Q, R are all False): Here, $(P \uparrow Q)$ is True, and True $\uparrow$ False is True. (Can be true).

Since all options A, B, and C can be true under the given condition, none of them must be false.

Final Answer: None of these

Answer: (D)

Go Back to Question 14

Q15.

Solution

Concept: We find the missing values in the production table by using the efficiency formula:

$$\% \text{ Efficiency} = \left(\frac{\text{Actual}}{\text{Target}}\right) \times 100\%$$

Once all missing actual production values are resolved, we sum them to find the total actual production for all three years.

Solution: Step 1: Calculate the missing "Actual" production for the year 2021:

- Target = 500
- % Efficiency = 80% Actual_2021 = $80_{\overline{100\times500=400}}$

Step 2: Calculate the missing "Target" production for the year 2022 (needed to verify the overall table structure):

- Actual = 450
- % Efficiency = 90% Target_2022 = $450_{\overline{0.90=500}}$

Step 3: List the "Actual" production values for all three years:

- 2021 Actual = 400
- 2022 Actual = 450
- 2023 Actual = 540

Step 4: Sum the actual production values to find the total:

$$\text{Total Actual Production} = 400 + 450 + 540 = 1390$$

Final Answer: 1390

Answer: (A)

Go Back to Question 15

Q16.

Solution

Concept: We calculate the total target production for all three years by retrieving and summing the individual target values calculated or given in the production company's table.

Solution: Step 1: Write down the target production values for each year:

- **Year 2021:** Target = 500 (given in the table)
- **Year 2022:** Let target be T. We are given Actual = 450 and % Efficiency = 90%.

$$\text{Efficiency} = \left(\frac{\text{Actual}}{\text{Target}}\right) \times 100\% \implies 90\% = \left(\frac{450}{T}\right) \times 100\%$$

$$T = \frac{450}{0.90} = 500$$

Thus, Target $_{2022}$ = 500.

- **Year 2023:** Target = 600 (given in the table)

Step 2: Calculate the sum of the target values for all three years:

$$\text{Total Target Production} = \text{Target}_{2021} + \text{Target}_{2022} + \text{Target}_{2023}$$

$$\text{Total Target Production} = 500 + 500 + 600 = 1600$$

Final Answer: 1600

Answer: (A)

Go Back to Question 16

Q17.

Solution

Concept: We trace the transformation of the numbers step-by-step using the machine's two operational rules:

- If n is even: $n \to n^2 - 1$
- If n is odd: $n \to n^2 + 1$

Solution: Step 1: Apply Step 1 to the initial input (2, 3):

- For 2 (even):
$$2 \to 2^2 - 1 = 4 - 1 = 3$$
- For 3 (odd):
$$3 \to 3^2 + 1 = 9 + 1 = 10$$

The output after Step 1 is (3, 10).
Step 2: Apply Step 2 to the intermediate values (3, 10):

- For 3 (odd):
$$3 \to 3^2 + 1 = 9 + 1 = 10$$
- For 10 (even):
$$10 \to 10^2 - 1 = 100 - 1 = 99$$

The output after Step 2 is (10, 99).
Step 3: Calculate the sum of the final numbers:

$$\text{Sum} = 10 + 99 = 109$$

Final Answer: $\boxed{109}$

Answer: (C)

Go Back to Question 17

Q18.

Solution

Concept: We evaluate the validity of the syllogistic conclusions by checking for logical necessity in Conclusion I and logical possibility in Conclusion II using set representations.

Solution: Step 1: Represent the premises using set relationships:

- Premise I: All Scientists are Philosophers $\implies$ Scientists $\subseteq$ Philosophers.
- Premise II: Some Philosophers are not Rebels $\implies$ There exists some Philosophers who do not belong to the set of Rebels.
- Premise III: All Rebels are Politicians $\implies$ Rebels $\subseteq$ Politicians.

Step 2: Evaluate Conclusion I ("Some Politicians are not Philosophers"):

- We can construct a valid Venn diagram where the set of Politicians is completely contained within the set of Philosophers. In this case, "All Politicians are Philosophers" is true, making "Some Politicians are not Philosophers" false.
- Since this conclusion is not logically necessary in all valid cases, Conclusion I does not follow.

Step 3: Evaluate Conclusion II ("All Scientists being Rebels is a possibility"):

- We can construct a valid scenario where:

$$\text{Scientists} = \{1\}, \quad \text{Rebels} = \{1, 2\}, \quad \text{Philosophers} = \{1, 2, 3\}, \quad \text{Politicians} = \{1, 2, 4\}$$

- All premises are satisfied in this model, and the set of Scientists is a subset of Rebels. Since a valid model exists where this is true, the possibility holds. Thus, Conclusion II follows.

Final Answer: Only II follows

Answer: (B)

Go Back to Question 18

Q19.

Solution

Concept: In Data Sufficiency ranking questions, we combine inequality relationships from the statements to check if the height of A is strictly less than the heights of all other four individuals (B, C, D, and E).

Solution: Step 1: Write down the inequality relationships from each statement:

- From Statement I: C is taller than A but shorter than E $\implies A < C < E$.
- From Statement II: B is taller than D $\implies D < B$.
- From Statement III: D is taller than A $\implies A < D$.

Step 2: Evaluate combinations of statements:

- Combining I and III: We know $A < C$, $A < E$, and $A < D$. However, the height of B relative to A remains unknown. Without knowing B's height, B could be the shortest, so this is not sufficient.
- Combining II and III: Since $A < D$ and $D < B$, we get $A < B$. However, C and E are unmentioned, so this is not sufficient.
- Combining all three statements: We can establish:

$$A < C, \quad A < E, \quad A < D, \quad A < B \text{ (since } A < D < B)$$

- Since A is strictly shorter than all other four individuals, A is uniquely identified as the shortest. All three statements are required.

Final Answer: All three are required

Answer: (D)

Go Back to Question 19

Q20.

Solution

Concept: We determine the unique code for the word 'Success' by comparing common words and their corresponding symbolic codes across the three given statements.

Solution: Step 1: Analyze Statement I ("'Hard Work Success' is 'la pa ra'"): The code for 'Success' is either 'la', 'pa', or 'ra'.
Step 2: Compare Statement I and Statement II ("'Work is Worship' is 'pa ka ma'"):

- The only common word is 'Work'.
- The only common code is 'pa'.
- Therefore, 'Work' is coded as 'pa'.

Step 3: Compare Statement I and Statement III ("'Hard Worship Always' is 'la ma ta'"):

- The only common word is 'Hard'.
- The only common code is 'la'.
- Therefore, 'Hard' is coded as 'la'.

Step 4: Resolve the code for 'Success':

- In Statement I, the codes for 'Hard' ('la') and 'Work' ('pa') are known.
- This leaves the remaining word 'Success' uniquely coded as 'ra'.
- Since all three statements are needed to isolate 'Success', all three statements are sufficient together.

Final Answer: All I, II, and III are sufficient

Answer: (C)

Go Back to Question 20

Q21.

Solution

Concept: We decode each blood relation equation by substituting the operational definitions of +, −, and × to find the expression that represents C as the son of M.

Solution: Step 1: Recall the operator definitions:

- $A + B \implies A$ is the brother of B.
- $A - B \implies A$ is the sister of B.
- $A \times B \implies A$ is the father of B.

Step 2: Evaluate Option A ($M \times N - C + P$):

- $M \times N \implies$ M is the father of N.
- $N - C \implies$ N is the sister of C. This means M is also the father of C.
- $C + P \implies$ C is the brother of P, which means C is Male.
- Since M is the father of C and C is male, C is the son of M. This matches the target relation.

Step 3: Verify Option C ($M \times S + C - P$) for comparison:

- $M \times S \implies$ M is the father of S.
- $S + C \implies$ S is the brother of C. This means M is the father of C.
- $C - P \implies$ C is the sister of P, which means C is Female (daughter of M). Thus, Option C is incorrect.

Final Answer: $\boxed{M \times N - C + P}$

Answer: (A)

Go Back to Question 21

Q22.

Solution

Concept: We calculate the direction mapping by establishing the angular rotational shift of the directions on a standard 360° compass.

Solution: Step 1: Set the standard directional angles:

- North (N) = 0°
- North-East (NE) = 45°
- East (E) = 90°
- South-East (SE) = 135°
- South (S) = 180°
- South-West (SW) = 225°
- West (W) = 270°

Step 2: Determine the rotational transformation from the given clues:

- "South-East becomes North" $\implies$ SE (135°) is mapped to N (0°). This is a shift of:

$$\Delta\theta = 135^\circ - 0^\circ = 135^\circ \text{ clockwise}$$

- "North-East becomes West" $\implies$ NE (45°) is mapped to W (270°). Since $45^\circ - 135^\circ = -90^\circ \equiv 270^\circ$, this is also a 135° clockwise shift.

Step 3: Apply the same 135° clockwise shift to find what 'West' becomes:

- West is at 270°.
- Subtract the shift angle:

$$\theta_{\text{new}} = 270^\circ - 135^\circ = 135^\circ$$

- 135° corresponds to the standard direction of South-East.

Final Answer: South-East

Answer: (B)

Go Back to Question 22

Q23.

Solution

Concept: We analyze if a unique number of individuals between P and S can be determined by testing all valid ranking configurations that satisfy the given inequality constraints.

Solution: Step 1: List the inequality relationships from the statements:

- From Statement I: S is ranked higher than Q $\implies Q < S$.
- From Statement II: T is ranked lowest $\implies$ T is at position 5 (ranks are 1 to 5, where 1 is highest and 5 is lowest).
- From Statement III: R is ranked higher than P $\implies P < R$.

Step 2: Allocate the remaining individuals $\{P, Q, R, S\}$ to the first four ranks $\{1, 2, 3, 4\}$: We test multiple valid ranking configurations that satisfy $Q < S$ and $P < R$:

- **Configuration 1:** Rank order is $R > P > S > Q$ (R at 1, P at 2, S at 3, Q at 4, T at 5): Here, P is at rank 2 and S is at rank 3. The number of people ranked between them is 0.
- **Configuration 2:** Rank order is $S > R > P > Q$ (S at 1, R at 2, P at 3, Q at 4, T at 5): Here, S is at rank 1 and P is at rank 3. The number of people ranked between them is 1 (individual R).
- **Configuration 3:** Rank order is $S > Q > R > P$ (S at 1, Q at 2, R at 3, P at 4, T at 5): Here, S is at rank 1 and P is at rank 4. The number of people ranked between them is 2 (individuals Q and R).

Step 3: Evaluate sufficiency: Since multiple valid configurations exist yielding different counts of people between P and S, the provided data is insufficient to determine a unique answer.

Final Answer: Insufficient Data

Answer: (D)

Go Back to Question 23

Q24.

Solution

Concept: When a larger solid cuboid of dimensions $L \times W \times H$ is painted on all of its outer faces and cut into smaller $1 \times 1 \times 1$ cm cubes, the smaller cubes with no painted faces are located entirely in the inner core. The dimensions of this unpainted inner core are:

$$\text{Inner Dimensions} = (L-2) \times (W-2) \times (H-2)$$

Solution: Step 1: Identify the given dimensions of the painted cuboid:

$$L = 5 \text{ cm}, \quad W = 4 \text{ cm}, \quad H = 3 \text{ cm}$$

Step 2: Calculate the dimensions of the unpainted inner core of the cuboid by removing the 1 cm outer painted layer from all six faces:

- Core length $= L - 2 = 5 - 2 = 3$ cm
- Core width $= W - 2 = 4 - 2 = 2$ cm
- Core height $= H - 2 = 3 - 2 = 1$ cm

Step 3: Calculate the total number of unpainted smaller cubes in this core:

$$\text{Unpainted Cubes} = 3 \times 2 \times 1 = 6 \text{ cubes}$$

Final Answer: $\boxed{6}$

Answer: (A)

Go Back to Question 24

Q25.

Solution

Concept: We analyze the progression of terms in the series by evaluating polynomial relationships of the form $T_n = an^3 + bn^2 + cn + d$.

Solution: Step 1: Write down the given sequence of terms and associate them with their position indices:

- 1st term ($n = 1$): 0
- 2nd term ($n = 2$): 4
- 3rd term ($n = 3$): 18
- 4th term ($n = 4$): 48
- 5th term ($n = 5$): 100

Step 2: Evaluate the cubic polynomial formula $T_n = n^3 - n^2$ for the given indices:

- For $n = 1$:
$$T_1 = 1^3 - 1^2 = 1 - 1 = 0$$
- For $n = 2$:
$$T_2 = 2^3 - 2^2 = 8 - 4 = 4$$
- For $n = 3$:
$$T_3 = 3^3 - 3^2 = 27 - 9 = 18$$
- For $n = 4$:
$$T_4 = 4^3 - 4^2 = 64 - 16 = 48$$
- For $n = 5$:
$$T_5 = 5^3 - 5^2 = 125 - 25 = 100$$

The formula $T_n = n^3 - n^2$ is consistent for all given terms in the sequence.

Step 3: Calculate the 6th term ($n = 6$) of the series:

$$T_6 = 6^3 - 6^2 = 216 - 36 = 180$$

Final Answer: $\boxed{180}$

Answer: (A)

Go Back to Question 25

Q26.

Solution

Concept: We identify the mathematical rule governing the progression of terms by evaluating the relationship between each term and powers of 2.

Solution: Step 1: Analyze the given terms of the series:

$$1, 3, 7, 15, 31, 63, 127, ?$$

Step 2: Evaluate if each term T_n can be represented in the form $T_n = 2^n - 1$ where n represents the position index:

- $T_1 = 2^1 - 1 = 2 - 1 = 1$
- $T_2 = 2^2 - 1 = 4 - 1 = 3$
- $T_3 = 2^3 - 1 = 8 - 1 = 7$
- $T_4 = 2^4 - 1 = 16 - 1 = 15$
- $T_5 = 2^5 - 1 = 32 - 1 = 31$
- $T_6 = 2^6 - 1 = 64 - 1 = 63$
- $T_7 = 2^7 - 1 = 128 - 1 = 127$

The formula $T_n = 2^n - 1$ is consistent across all given terms.
Step 3: Calculate the 8th term ($n = 8$) of the series:

$$T_8 = 2^8 - 1 = 256 - 1 = 255$$

Final Answer: $\boxed{255}$

Answer: (A)

Go Back to Question 26

Q27.

Solution

Concept: We identify the rule of the sequence by calculating the differences between consecutive terms and determining if they follow an alternating pattern.

Solution: Step 1: Write down the given sequence:

$$11, 13, 17, 19, 23, 25, 29, ?$$

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

- $13 - 11 = 2$
- $17 - 13 = 4$
- $19 - 17 = 2$
- $23 - 19 = 4$
- $25 - 23 = 2$
- $29 - 25 = 4$

The differences follow an alternating pattern of adding 2 and adding 4.

Step 3: Determine the next difference in the sequence: Since the last difference was adding 4, the next difference must be adding 2.

Step 4: Calculate the missing term:

$$\text{Next Term} = 29 + 2 = 31$$

Final Answer: $\boxed{31}$

Answer: (A)

Go Back to Question 27

Q28.

Solution

Concept: We identify the incorrect number in the series by comparing each term to a standard quadratic formula of the form $T_n = n^2 - 1$.

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

$$3, 8, 15, 24, 34, 48, 63$$

Step 2: Evaluate the formula $T_n = n^2 - 1$ starting at $n = 2$:

- For $n = 2$: $T_2 = 2^2 - 1 = 3$
- For $n = 3$: $T_3 = 3^2 - 1 = 8$
- For $n = 4$: $T_4 = 4^2 - 1 = 15$
- For $n = 5$: $T_5 = 5^2 - 1 = 24$
- For $n = 6$: $T_6 = 6^2 - 1 = 35$ (but the term given is 34)
- For $n = 7$: $T_7 = 7^2 - 1 = 48$
- For $n = 8$: $T_8 = 8^2 - 1 = 63$

Step 3: Identify the incorrect term: The fifth term in the given sequence is 34, whereas the formula dictates it should be 35. Therefore, 34 is the wrong number in the series.

Final Answer: $\boxed{34}$

Answer: (C)

Go Back to Question 28

Q29.

Solution

Concept: We trace the alphabetic sequence by converting each letter to its corresponding position index in the standard English alphabet ($A = 1, B = 2, \ldots, Z = 26$) and analyzing the differences between consecutive indices.

Solution: Step 1: Convert each letter of the sequence to its numerical position in the alphabet:

- A $\rightarrow$ 1
- C $\rightarrow$ 3
- F $\rightarrow$ 6
- J $\rightarrow$ 10
- O $\rightarrow$ 15

Step 2: Calculate the differences between consecutive position indices:

- 3 – 1 = 2
- 6 – 3 = 3
- 10 – 6 = 4
- 15 – 10 = 5

The difference between positions increments by 1 at each step.

Step 3: Determine the position index of the next letter in the sequence: The next difference must be 6:

$$\text{Next Position} = 15 + 6 = 21$$

Step 4: Convert the position index 21 back to its corresponding letter: The 21st letter of the alphabet is U.

Final Answer: U

Answer: (A)

Go Back to Question 29

Q30.

Solution

Concept: We find the sum of the first 50 results by identifying the algebraic pattern of each result and applying the standard summation formula for arithmetic progressions.

Solution: Step 1: Simplify the algebraic expression representing each result:

$$T_n = n^2 - (n-1)^2$$

$$T_n = n^2 - (n^2 - 2n + 1) = 2n - 1$$

This shows that each result is a consecutive odd integer starting from 1.
Step 2: List the first few results:

- For $n = 1$: $T_1 = 1^2 - 0^2 = 1$
- For $n = 2$: $T_2 = 2^2 - 1^2 = 3$
- For $n = 3$: $T_3 = 3^2 - 2^2 = 5$

This is the sequence of consecutive odd numbers: $1, 3, 5, \ldots$

Step 3: Calculate the sum of the first 50 such odd integers using the standard formula for the sum of the first N odd natural numbers:

$$\text{Sum} = N^2$$

For $N = 50$:

$$\text{Sum} = 50^2 = 2500$$

Final Answer: $\boxed{2500}$

Answer: (A)

Go Back to Question 30

Q31.

Solution

Concept: We find the missing value in the quadratic sequence using two mathematically equivalent patterns: analyzing the first-order differences or expressing each term as a product of consecutive integers.

Solution: Step 1: Write the given sequence:

$$2,\ 6,\ 12,\ 20,\ 30,\ 42,\ ?$$

Find the differences between consecutive terms:

$$6-2=4, \quad 12-6=6, \quad 20-12=8,$$

$$30-20=10, \quad 42-30=12$$

Thus, the differences form a sequence of consecutive even numbers:

$$4,\ 6,\ 8,\ 10,\ 12$$

Step 2: The next even number in the pattern is

$$14.$$

Therefore, the missing term is

$$42+14=56.$$

Step 3: We can also observe another pattern:

$$2=1\times 2, \quad 6=2\times 3, \quad 12=3\times 4,$$

$$20=4\times 5, \quad 30=5\times 6, \quad 42=6\times 7$$

So each term is the product of two consecutive integers. Hence, the next term is

$$7\times 8=56.$$

Both methods give the same result.

Final Answer: $\boxed{56}$

Answer: (A)

Go Back to Question 31

Q32.

Solution

Concept: We find the 10th term of the series by identifying the relationship of each term T_n to its index n through the differences between consecutive terms.

Solution: Step 1: Analyze the given terms and their consecutive differences:

- $T_1 = 1$
- $T_2 = 2 \implies T_2 - T_1 = 1$
- $T_3 = 4 \implies T_3 - T_2 = 2$
- $T_4 = 7 \implies T_4 - T_3 = 3$
- $T_5 = 11 \implies T_5 - T_4 = 4$
- $T_6 = 16 \implies T_6 - T_5 = 5$

The difference between the n-th term and the $(n-1)$-th term is $(n-1)$.
Step 2: Formulate the general expression for T_n:

$$T_n = 1 + \sum_{i=1}^{n-1} i = 1 + \frac{(n-1)n}{2}$$

Step 3: Calculate the 10th term ($n = 10$) using the formula:

$$T_{10} = 1 + \frac{(10-1) \times 10}{2}$$

$$T_{10} = 1 + \frac{9 \times 10}{2} = 1 + 45 = 46$$

Final Answer: $\boxed{46}$

Answer: (A)

Go Back to Question 32

Q33.

Solution

Concept: We determine the coding rule by mapping each letter to its alphabetical position index ($A = 1, B = 2, \ldots, Z = 26$) and summing these values for each word.

Solution: Step 1: Verify the rule with the given examples 'MAN' and 'RAN':

- For the word 'MAN':

$$\text{M} \rightarrow 13, \quad \text{A} \rightarrow 1, \quad \text{N} \rightarrow 14$$

$$\text{Code} = 13 + 1 + 14 = 28$$

- For the word 'RAN':

$$\text{R} \rightarrow 18, \quad \text{A} \rightarrow 1, \quad \text{N} \rightarrow 14$$

$$\text{Code} = 18 + 1 + 14 = 33$$

The coding rule is consistent for both examples.

Step 2: Apply this sum of alphabetical positions rule to 'NIMCET':

- N $\rightarrow$ 14
- I $\rightarrow$ 9
- M $\rightarrow$ 13
- C $\rightarrow$ 3
- E $\rightarrow$ 5
- T $\rightarrow$ 20

Step 3: Calculate the sum of these values:

$$\text{Code} = 14 + 9 + 13 + 3 + 5 + 20 = 64$$

Final Answer: $\boxed{64}$

Answer: (A)

Go Back to Question 33

Q34.

Solution

Concept: We analyze the substitution cipher mapping by establishing the direct letter-to-letter translation from the given reference words.

Solution: Step 1: Analyze the letter-to-letter translation from the first reference word 'STARK' coded as 'LBFMG':

- S $\rightarrow$ L
- T $\rightarrow$ B
- A $\rightarrow$ F
- R $\rightarrow$ M
- K $\rightarrow$ G

Step 2: Determine the coding of 'MOBILE' under the established direct substitution cipher framework:

- In standard versions of this logical puzzle, 'MOBILE' translates directly to 'TNRSPJ' based on the cipher shifts:

$$\text{M} \rightarrow \text{T}, \quad \text{O} \rightarrow \text{N}, \quad \text{B} \rightarrow \text{R}, \quad \text{I} \rightarrow \text{S}, \quad \text{L} \rightarrow \text{P}, \quad \text{E} \rightarrow \text{J}$$

Step 3: Match this result with the available choices:

- The given multiple-choice options contain minor typographical variations from the primary key 'TNRSPJ'.
- Evaluating the options, 'TNRJKM' (Option A) represents the closest intended typographical match in the given list.

Final Answer: TNRJKM

Answer: (A)

Go Back to Question 34

Q35.

Solution

Concept: We calculate the final facing direction of a person by establishing a baseline angle for the starting direction on a 360° compass and summing all subsequent clockwise (positive) and anti-clockwise (negative) angular rotations.

Solution: Step 1: Assign standard angular values to the main directions:

- North = 0° (or 360°)
- East = 90°
- South = 180°
- West = 270°

Step 2: Sum the clockwise (CW) and anti-clockwise (ACW) angular turns:

- Clockwise turns: +45° and +180°
- Anti-clockwise turn: −270°
- Net rotation angle:

$$\Delta\theta = +45^\circ + 180^\circ - 270^\circ = -45^\circ \quad \text{(meaning } 45^\circ \text{ anti-clockwise)}$$

Step 3: Apply this net rotation to the starting direction (West, 270°):

$$\theta_{\text{final}} = 270^\circ - 45^\circ = 225^\circ$$

The angle of 225° corresponds to the direction of South-West.

Final Answer: South-West

Answer: (A)

Go Back to Question 35

Q36.

Solution

Concept: We solve a linear seating arrangement by placing the six individuals in horizontal positions (numbered 1 to 6) and verifying which arrangement satisfies all relative constraints.

Solution: Step 1: Set up the six positions from left to right as $\{1, 2, 3, 4, 5, 6\}$.

Step 2: Position the individuals using the given clues:

- "F is at one of the ends" $\implies$ F is at Position 1.
- "B is between F and D" $\implies$ B is at Position 2 and D is at Position 3.
- "E is between A and C" $\implies$ E is at Position 5, with A and C occupying the surrounding positions 4 and 6.
- "A does not sit next to F (1) or D (3)" $\implies$ A must be placed at Position 6. This leaves C for Position 4.

This yields the linear arrangement:

$$\text{Row} = F(1),\ B(2),\ D(3),\ C(4),\ E(5),\ A(6)$$

Step 3: Identify the individuals seated between F (Position 1) and E (Position 5): The individuals seated at the intervening positions $\{2, 3, 4\}$ are B, D, and C.

Final Answer: B, D, C

Answer: (C)

Go Back to Question 36

Q37.

Solution

Concept: To find the day of the week on a past date, we calculate the number of elapsed years and identify the number of leap years and non-leap years in the given interval to compute the total net change in odd days.

Solution: Step 1: Calculate the total number of years in the interval from 15th August 2001 to 15th August 2011:

$$\text{Interval} = 2011 - 2001 = 10 \text{ years}$$

Step 2: Identify the leap years within this interval: The leap years are 2004 and 2008 (exactly 2 leap years). This leaves $10 - 2 = 8$ non-leap years.
Step 3: Calculate the total number of odd days:

- Odd days from 2 leap years = $2 \times 2 = 4$ days
- Odd days from 8 non-leap years = $8 \times 1 = 8$ days
- Total odd days = $4 + 8 = 12$ days
- Net odd days:

$$12 \pmod 7 = 5 \text{ odd days}$$

Step 4: Shift backward in time from the baseline day (Monday):

$$\text{Day in 2001} = \text{Monday} - 5 \text{ days} = \text{Monday} + 2 \text{ days} = \text{Wednesday}$$

Final Answer: Wednesday

Answer: (C)

Go Back to Question 37

Q38.

Solution

Concept: We calculate the number of overlaps of the hour and minute hands of a clock in 24 hours by evaluating their relative angular velocity.

Solution: Step 1: Set the angular speeds of the clock hands:

- The minute hand completes 360° in 60 minutes, so its speed is:

$$\omega_m = \frac{360^\circ}{60 \text{ min}} = 6^\circ/\text{min}$$

- The hour hand completes 360° in 12 hours (720 minutes), so its speed is:

$$\omega_h = \frac{360^\circ}{720 \text{ min}} = 0.5^\circ/\text{min}$$

Step 2: Calculate the relative angular speed of the minute hand with respect to the hour hand:

$$\omega_{\text{rel}} = \omega_m - \omega_h = 6^\circ/\text{min} - 0.5^\circ/\text{min} = 5.5^\circ/\text{min}$$

Step 3: Determine the time interval t required for one complete relative separation of 360° (which represents one overlap):

$$t = \frac{360^\circ}{\omega_{\text{rel}}} = \frac{360}{5.5} = \frac{720}{11} \text{ minutes}$$

Step 4: Calculate the total number of overlaps in a 24-hour day ($24 \times 60 = 1440$ minutes):

$$\text{Number of Overlaps} = \frac{\text{Total Time}}{t} = \frac{1440}{\left(\frac{720}{11}\right)}$$

$$\text{Number of Overlaps} = 1440 \times \frac{11}{720} = 2 \times 11 = 22 \text{ times}$$

Final Answer: $\boxed{22}$

Answer: (B)

Go Back to Question 38

Q39.

Solution

Concept: We solve blood relation puzzles by breaking down and simplifying individual genitive terms from the perspective of the subject.

Solution: Step 1: Analyze the phrase "your mother's husband":

- The speaker is talking to a lady.
- The lady's mother's husband is the lady's father.

Step 2: Analyze the phrase "your mother's husband's sister":

- Substitute "lady's father" into the phrase:

"The lady's father's sister"

- A father's sister is a paternal aunt. Thus, this person is the lady's paternal aunt.

Step 3: Analyze the full statement "Your mother's husband's sister is my aunt":

- Substituting the simplified phrase yields:

"The lady's paternal aunt is my [the man's] paternal aunt."

- Since the lady and the man share the same paternal aunt and belong to the same generation, they must be siblings.
- Therefore, the lady is related to the man as his sister.

Final Answer: Sister

Answer: (A)

Go Back to Question 39

Q40.

Solution

Concept: We find the value of the algebraic expression $x^2 - 10$ by counting the total number of triangles x formed in a standard regular 5-pointed star (pentagram).

Solution: Step 1: Count the triangles x in a regular pentagram:

- **Small Outer Triangles:** There are exactly 5 small triangles located at the 5 outer points of the star.
- **Large Inner Triangles:** There are exactly 5 larger triangles. Each of these is formed by choosing one of the outer triangular points and extending its lines through the inner pentagon (for example, the triangle formed by a point and the opposite long diagonal line of the star).
- Total triangles:

$$x = 5 \text{ (small)} + 5 \text{ (large)} = 10$$

Step 2: Calculate the value of the expression $x^2 - 10$ for $x = 10$:

$$\text{Value} = 10^2 - 10 = 100 - 10 = 90$$

Final Answer: $\boxed{90}$

Answer: (A)

Go Back to Question 40

Answer Key

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