LRO · Original Practice Content

Class 6 | Logical Reasoning Olympiad

40 Questions · With Answer Key
Syllabax Olympiad Series
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Instructions: Each question has one correct answer. Choose the best option (A/B/C/D). Answer key is provided at the end. This paper is for practice only — not an official exam paper. Recommended time: **45 minutes**.

Q1. All premises: P → Q, Q → R, ¬R. Which conclusion follows by modus tollens?

A. P
B. R
C. ¬P
D. Q

Q2. In a group of 50 students: 30 like Maths, 25 like Science, and 10 like both. How many like neither?

A. 10
B. 7
C. 5
D. 15

Q3. Which of these is a circular argument (begging the question)?

A. God exists because the Bible says so, and the Bible is true because God inspired it.
B. If it rains, the ground gets wet.
C. All philosophers are thinkers; Plato is a philosopher; therefore Plato is a thinker.
D. Most scientists believe in evolution; therefore evolution is true.

Q4. A cube has edges painted alternately red/blue (3 red, 3 blue edges). If a vertex is shared by 3 edges all red, how many such vertices exist?

A. 0
B. 4
C. 2
D. 8

Q5. The truth table for P ↔ Q (biconditional) is true when:

A. at least one is true
B. P is true
C. both have the same truth value
D. exactly one is true

Q6. How many 4-digit numbers are there where the digit sum is 9 and no digit is zero?

A. 72
B. 56
C. 84
D. 96

Q7. Which argument form is VALID: All A are B; Some C are A; Therefore:

A. All C are B

B. No C is B

C. Some C are B

D. Some B are not C

Q8. In a 4×4 Latin square, each row and column contains the digits 1–4 each once. How many 4×4 Latin squares exist?

A. 24

B. 8

C. 576

D. 16

Q9. What is the fallacy in: 'You should listen to my argument about health because I am a doctor'?

A. False dilemma

B. Ad hominem

C. Appeal to authority (potentially — it depends on relevance)

D. Straw man

Q10. The sum of n odd numbers starting from 1: 1 + 3 + 5 + ... + (2n–1) = ?

A. $n(n+1)/2$

B. $n(n-1)$

C. n^2

D. $2n$

Q11. Which of these is necessarily TRUE if 'Some A are B' is true?

A. All A are B

B. No A is B

C. Some B are A

D. All B are A

Q12. Two numbers have HCF = 6 and LCM = 72. One number is 18. The other is:

A. 12

B. 36

C. 24

D. 48

Q13. What is the 50th term of the series 3, 7, 11, 15, ... (AP with first term 3, common difference 4)?

A. 196

B. 198

C. 199

D. 203

Q14. If $\neg(P \wedge Q)$ is true, which of the following must be true?

A. P is false and Q is false

B. P is true

C. $\neg P \vee \neg Q$

D. P is false

Q15. In propositional logic, which is logically equivalent to ¬(P → Q)?

A. ¬P ∧ Q

B. P ∨ ¬Q

C. P ∧ ¬Q

D. ¬P ∨ Q

Q16. A cube painted on all 6 faces is cut into 64 equal smaller cubes (4×4×4). How many small cubes have exactly 3 faces painted?

A. 4

B. 12

C. 8

D. 16

Q17. Complete the analogy: 27 : 3 :: 125 : ___

A. 7

B. 4

C. 5

D. 25

Q18. Which of these sequences is NOT an AP? A) 2,5,8,11 B) 1,4,9,16 C) 7,7,7,7 D) –3,–1,1,3

A. A

B. C

C. B

D. D

Q19. What is the TOTAL number of diagonals in a decagon (10-sided polygon)?

A. 35

B. 50

C. 45

D. 40

Q20. In a valid syllogism, 'Some dogs are brown. Max is brown.' The conclusion 'Max is a dog':

A. follows necessarily

B. is impossible

C. is an invalid conclusion — fallacy of the undistributed middle

D. is a valid abductive inference

Q21. How many integers from 1 to 200 are divisible by neither 2 nor 3?

A. 56

B. 63

C. 67

D. 72

Q22. Find x: $\log_2(x) + \log_2(x-2) = 3$. x = ?

A. 2

B. 3

C. 4

D. 8

Q23. If the universal set U has 100 elements, A has 60, B has 50, and A ∩ B has 20, then (A ∪ B)' has:

A. 0 **B.** 20

C. 10 **D.** 30

Q24. Which of the following shows the FALLACY of affirming the consequent?

A. P → Q; ¬P; therefore ¬Q **B.** P → Q; P; therefore Q

C. P → Q; Q; therefore P **D.** P → Q; ¬Q; therefore ¬P

Q25. Premises: (1) If it rains, the match is cancelled. (2) The match was not cancelled. Conclusion: It did not rain. This argument form is:

A. modus ponens **B.** hypothetical syllogism

C. modus tollens **D.** disjunctive syllogism

Q26. What is the sum of all 2-digit numbers that are divisible by 3?

A. 1548 **B.** 1600

C. 1665 **D.** 1584

Q27. A, B, C, D, E each write one number on a card. A writes 5, B writes the average of A and C, C writes 10, D writes the average of B and E, E writes 20. What does D write?

A. 12 **B.** 13.5

C. 12.5 **D.** 15

Q28. Which of the following is a NECESSARY condition but NOT sufficient for a number to be divisible by 12?

A. Divisible by 12 **B.** Divisible by both 3 and 4

C. Divisible by 2 **D.** Divisible by 6

Q29. In a truth table, how many rows are needed for a formula with 4 variables?

A. 4 **B.** 8

C. 16 **D.** 32

Q30. The number of ways to distribute 5 identical balls into 3 distinct boxes (some boxes may be empty) is:

A. 15 **B.** 18

C. 21 **D.** 25

Q31. What type of reasoning is: 'I have seen 1000 white swans; therefore all swans are white'?

A. deductive
B. abductive
C. inductive
D. analogical

Q32. Two pipes A and B fill a tank in 20 and 30 minutes respectively. Pipe C empties it in 15 minutes. All three are open. The tank is filled in:

A. 60 min
B. 180 min
C. 120 min
D. 90 min

Q33. Which of the following is the CORRECT negation of 'All students passed'?

A. No students passed
B. Some students did not pass
C. All students did not pass
D. Most students passed

Q34. A and B can complete a job in 12 days together. A alone can do it in 20 days. How long does B alone take?

A. 24 days
B. 15 days
C. 30 days
D. 40 days

Q35. In Euler's formula for polyhedra: V – E + F = 2. A polyhedron has 10 vertices and 7 faces. How many edges?

A. 12
B. 17
C. 15
D. 19

Q36. In how many ways can the word BALLOON be arranged?

A. 840
B. 5040
C. 1260
D. 2520

Q37. Premise: No lizards have fur. Premise: All lizards are reptiles. Valid conclusion:

A. No reptiles have fur
B. Some reptiles have fur
C. Some reptiles do not have fur
D. All animals with fur are not reptiles

Q38. The minimum number of colours needed to colour the faces of a cube so no two adjacent faces share a colour is:

A. 2
B. 4
C. 3
D. 6

Q39. Find the value of n: C(n,2) = 45. n = ?

A. 8

B. 12

C. 10

D. 9

Q40. If the sum of the first n terms of a GP is S_n = 3(2^n – 1), the common ratio is:

A. 1

B. 3

C. 2

D. 6

Answer Key

Q1: C Q2: C Q3: A Q4: C Q5: C Q6: C Q7: C Q8: C Q9: C Q10: C

Q11: C Q12: C Q13: C Q14: C Q15: C Q16: C Q17: C Q18: C Q19: A

Q20: C Q21: C Q22: C Q23: C Q24: C Q25: C Q26: C Q27: C Q28: C

Q29: C Q30: C Q31: C Q32: C Q33: B Q34: C Q35: C Q36: C Q37: C

Q38: C Q39: C Q40: C