Logic: If–Then, AND, OR, NOT

Standard difficulty · 20 questions · 40 marks · Time: 36 minutes

Name: _____ Date: _____ Score: ____ / 40

Show your working for Sections B and C. Answers are on the last page — try every question first!

Section A — Choose the correct answer — 8 × 1 = 8 marks

1. "P AND Q" is true only when:

(a) both are false **(b)** P is false

(c) at least one is true **(d)** both P and Q are true

2. Is this statement true or false? "NOT (20 is a multiple of 5) AND 20 ends in 9"

(a) True **(b)** Sometimes true

(c) False **(d)** Cannot be decided

3. For how many numbers in the list is "x < 31 OR x is a multiple of 10" true? 8, 19, 7, 29, 1, 44, 32

(a) 5 **(b)** 4 **(c)** 2 **(d)** 6

4. In a group of 44 children, 22 like singing, 19 like football and 8 like both. How many like neither?

(a) 36 **(b)** 3 **(c)** 19 **(d)** 11

5. Rule: if it is a Saturday or a Sunday, the library opens at 10 a.m.; on other days it opens before 10 a.m.
Monday: opens at 9 a.m.
Friday: opens at 8 a.m.
Saturday: opens at 9 a.m.
Wednesday: opens at 9 a.m.
Tuesday: opens at 8 a.m.
Which day breaks the rule?

(a) Friday **(b)** Saturday **(c)** Monday **(d)** Wednesday

6. P is True and Q is True. Is "NOT P AND Q" True or False?

(a) False **(b)** True

(c) Both True and False **(d)** Cannot be decided

7. Count from 1 to 36. For each number:
If it is a multiple of both 5 and 6, say "Clap-Jump"
Else if it is a multiple of 5, say "Clap"
Else if it is a multiple of 6, say "Jump"
Otherwise say the number.
How many times do you say "Jump" (only)?

(a) 6 **(b)** 5 **(c)** 1 **(d)** 7

8. A model learned from these labelled examples: 10 → Yes, 5 → Yes, 35 → Yes, 8 → No, 41 → No, 29 → No. Which rule fits ALL of them?

(a) the number is more than 20 **(b)** the number is a multiple of 4

(c) the number ends in 5 or 0 **(d)** the number is less than 15

Section B — Short answer — 8 × 2 = 16 marks

9. When is "P AND Q" true, and when is "P OR Q" true?

10. Write True or False for each: (a) NOT (49 is greater than 40); (b) 41 ends in 7 OR 41 is a multiple of 5

11. For how many numbers in the list is "x > 21 AND x is odd" true? 18, 1, 3, 10, 42, 39, 30, 34, 32

12. In a group of 38 children, 19 like drawing, 20 like singing and 9 like both. How many like neither?

13. Rule: if it is a Saturday or a Sunday, the library opens at 10 a.m.; on other days it opens before 10 a.m.
Sunday: opens at 10 a.m.
Thursday: opens at 9 a.m.
Friday: opens at 9 a.m.
Monday: opens at 8 a.m.
Tuesday: opens at 10 a.m.
Which day breaks the rule?

14. P is True and Q is True. Is "P OR (NOT P AND Q)" True or False?

15. Count from 1 to 24. For each number:
If it is a multiple of both 5 and 7, say "Clap-Jump"
Else if it is a multiple of 5, say "Clap"
Else if it is a multiple of 7, say "Jump"
Otherwise say the number.
How many times do you say "Clap-Jump"?

16. How many numbers from 1 to 140 are multiples of 4 OR of 5 (or both)?

Section C — Word problems — 4 × 4 = 16 marks

17. Make a truth table for "P AND Q" and "P OR Q" (four rows: TT, TF, FT, FF).

18. (a) In a group of 24 children, 13 like milk, 18 like dancing and 8 like both. How many like neither?
(b) For how many numbers in the list is "x > 17 AND x is odd" true? 1, 29, 38, 35, 6, 40, 13

19. Write True or False for each: (a) 45 is greater than 12 OR 45 is a multiple of 5; (b) 6 is a multiple of 5 OR 6 ends in 9; (c) NOT (40 is a multiple of 5); (d) NOT (11 is a multiple of 3) AND 11 is greater than 36

20. (a) Rule: if it is a Saturday or a Sunday, the library opens at 10 a.m.; on other days it opens before 10 a.m.
Thursday: opens at 10 a.m.
Tuesday: opens at 8 a.m.
Friday: opens at 9 a.m.
Saturday: opens at 10 a.m.
Sunday: opens at 10 a.m.
Which day breaks the rule?
(b) P is False and Q is True. Is "NOT P OR NOT Q" True or False?

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Answer key

Logic: If–Then, AND, OR, NOT · AW-7CT-LOG-2026-V1 · For parents — fold back or tear off before handing the sheet to your child.

Q	Answer	Working
1	**(d) both P and Q are true**	—
2	**(c) False**	NOT true AND false
3	**(a) 5**	true for: 8, 19, 7, 29, 1
4	**(d) 11**	22 + 19 − 8 = 33 like at least one; 44 − 33
5	**(b) Saturday**	Saturday is a weekend day but opens earlier
6	**(a) False**	put P = True, Q = True and work out the brackets first
7	**(b) 5**	multiples of 30 (both): 1; of 5: 7; of 6: 6
8	**(c) the number ends in 5 or 0**	"the number ends in 5 or 0" gives every label; each other rule gets at least one example wrong
9	**"P AND Q" is true only if both are true; "P OR Q" is true if at least one is true.**	—
10	**(a) False; (b) False**	(a) NOT true; (b) false OR false
11	**1**	true for: 39
12	**8**	19 + 20 − 9 = 30 like at least one; 38 − 30
13	**Tuesday**	Tuesday is a weekday but opens at 10
14	**True**	put P = True, Q = True and work out the brackets first
15	**0**	multiples of 35 (both): 0; of 5: 4; of 7: 3
16	**56**	35 + 28 − 7 (multiples of 20 counted twice)
17	**P AND Q: T, F, F, F. P OR Q: T, T, T, F.**	—
18	**(a) 1; (b) 2**	(a) 13 + 18 − 8 = 23 like at least one; 24 − 23; (b) true for: 29, 35
19	**(a) True; (b) False; (c) False; (d) False**	(a) true OR true; (b) false OR false; (c) NOT true; (d) NOT false AND false
20	**(a) Thursday; (b) True**	(a) Thursday is a weekday but opens at 10; (b) put P = False, Q = True and work out the brackets first