

GAC Mathematics

Name: _____ Score: _____

1. In a class of 30, 18 study French, 15 study German and 7 study both. How many study neither?

2. Convert binary 1101 to decimal.

3. In binary, what is $1 + 1$?

4. Which are required for a sequence of steps to be an algorithm? Choose all that apply.

- ☐ It is finite
- ☐ Each step is unambiguous
- ☐ It terminates
- ☐ It is written in a programming language

Tick every correct option.

5. A vertex has four edges meeting it. What is its degree?

6. In the same class, how many study French only?

7. Write decimal 10 in binary.

8. How many rows does a truth table with three inputs have?

9. What makes a relation a function?

- ☐ Every output has exactly one input
- ☐ Every input has exactly one output
- ☐ The sets are the same size
- ☐ It can be drawn as a graph

10. In logic, when is "A OR B" false?

- ☐ When both are true

- ☐ When exactly one is true
- ☐ Only when neither is true
- ☐ Never

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1. **4**

$18 + 15 - 7 = 26$ study at least one, so $30 - 26 = 4$ study neither.

2. **13**

Places 8, 4, 2, 1 with digits 1, 1, 0, 1 gives $8 + 4 + 0 + 1 = 13$.

3. **10**

There is no digit for two, so it carries — the same rule as $9 + 1$ in decimal.

4. **It is finite; Each step is unambiguous; It terminates**

Pseudocode and flowcharts are algorithms too. The language is not part of the definition.

5. **4**

Degree counts the edges at a vertex, nothing else.

6. **11**

$18 - 7 = 11$. Filling the Venn diagram from the middle outwards never double-counts.

7. **1010**

8 and 2 are used, 4 and 1 are not. Writing the place values first makes this immediate.

8. **8**

$2^3 = 8$. Every input doubles the number of combinations.

9. **Every input has exactly one output**

One input, one output. Two outputs for one input is a relation but not a function.

10. **Only when neither is true**

Logical OR is inclusive, so both being true still makes it true. Everyday "or" usually is not.