

3.5 Boolean Expressions

Name: _____ Class: _____ Date: _____ **Total: 9 marks**

KEY WORDS boolean expression 布尔表达式 • logical operators 逻辑运算符
• relational operators 关系运算符 • list 列表 • string 字符串

Objective

Build the skills to answer exam questions on **Boolean expressions**.

You must be able to:

- explain how a **Boolean expression** 布尔表达式 evaluates to true or false
- build one with **relational operators** 关系运算符 (equal to, greater than, less than)
- combine conditions with the **logical operators** 逻辑运算符 AND, OR, NOT
- predict the result of a compound Boolean expression

1 Worked examples

Study these first. Each one shows the method for a question type used later.

■ Boolean expression

Always evaluates to **true** or **false**.

■ Operators

- **Relational:** =, >, < (and ≥, ≤).
- **Logical:** **AND** (both true), **OR** (either true), **NOT** (the opposite).

■ Compound expressions

Evaluate each part, then combine: $(5 > 3) \text{ AND } (2 > 4) = \text{true AND false} = \text{false}$.

2 Practice

2.1 State what a Boolean expression evaluates to. [1]

2.2 Evaluate $(7 > 2) \text{ AND } (4 > 9)$. [2]

2.3 State what the NOT operator does. [1]

3 Exam-style questions

3.1 A Boolean expression evaluates to [1]

- | | |
|---|---|
| A | B |
| C | D |
- A** a number
B a string
C true or false
D a list

3.2 The expression $(3 > 1) \text{ OR } (5 < 2)$ is [1]

- | | |
|---|---|
| A | B |
| C | D |
- A** true
B false
C undefined
D 3

3.3 Given $a = 5$ and $b = 8$:

- (a) evaluate $a < b$. [1]
(b) evaluate $(a < b) \text{ AND } (b < 10)$. [1]
(c) evaluate NOT $(a < b)$. [1]