

2.5 Compound Boolean Expressions

Name: _____ Class: _____ Date: _____ Total: 8 marks

KEY WORDS short-circuit evaluation 短路求值 • logical operators 逻辑运算符
• boolean expression 布尔表达式

Objective

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

You must be able to:

- combine conditions with **AND** (**&&**) and **OR** (**||**)
- use **NOT** (**!**) to reverse a Boolean value
- understand **short-circuit evaluation** 短路求值

1 Worked examples

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

■ Logical operators

- **&&** (**AND**) is **true** only when **both** sides are true.
- **||** (**OR**) is **true** when **either** side is true.
- **!** (**NOT**) reverses the value: **!true** is **false**.

■ Short-circuit evaluation

&& stops as soon as the left side is **false**; **||** stops as soon as the left side is **true** — the right side is not even checked.

2 Practice

2.1 State what the **&&** operator requires in order to be **true**. [1]

2.2 Evaluate $(5 > 3) \ || \ (2 > 8)$. [1]

2.3 State what short-circuit evaluation means. [1]

3 Exam-style questions

3.1 The logical AND operator in Java is [1]

- | | |
|---|---|
| A | B |
| C | D |
- A **&**
 - B **&&**
 - C **AND**
 - D **+**

3.2 **!(true)** evaluates to [1]

- | | |
|---|---|
| A | B |
| C | D |
- A **true**
 - B **false**
 - C **1**
 - D an error

3.3 Given **int a = 4, b = 0**;

(a) evaluate $(a > 0) \ \&\& \ (b > 0)$. [1]

(b) evaluate $(a > 0) \ || \ (b > 0)$. [1]

(c) State what the **!** operator does. [1]