AP COMPUTER SCIENCE A • EXERCISE SHEET

2.5 Compound Boolean Expressions

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

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** `AND`
- **D** `+`

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

- **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]

4 Go further

- work through the **2.5 Compound Boolean Expressions** lesson on the **Learn** page;
- read the **Boolean Expressions and if Statements** section of the AP Computer Science A handout on the **Know** page.

Solutions

2.1 both of its sides must be `true`.

2.2 `true` (the left side is true).

2.3 `&&` and `||` stop evaluating as soon as the result is known.

3.1 B.

3.2 B.

3.3 (a) `false`. (b) `true`. (c) it reverses the Boolean value.