

Exercise walk-through

Boolean Expressions ■ 3.5

eXercise

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

Method — Boolean expression

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

Method — Operators

- **Relational:** $=$, $>$, $<$ (and $\geq$, $\leq$).
- **Logical:** **AND** (both true), **OR** (either true), **NOT** (the opposite).

Method — Compound expressions

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

Practice 2.1 ■ 1 mark

State what a Boolean expression evaluates to.

Solution 2.1

Method: Boolean expression

Worked steps

either true or false **B1**.

Practice 2.2 ■ 2 marks

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

Solution 2.2

Worked steps

$7 > 2$ is true; $4 > 9$ is false; true AND false = **false** M1 A1.

Practice 2.3 ■ 1 mark

State what the NOT operator does.

Solution 2.3

Worked steps

it reverses a Boolean value (true becomes false and vice versa) **B1**.

Exam-style 3.1 ■ 1 mark

A Boolean expression evaluates to

A a number

B a string

C true or false

D a list

Solution 3.1

Method: Boolean expression

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



Worked steps

C.

Exam-style 3.2 ■ 1 mark

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

A true

B false

C undefined

D 3

Solution 3.2

A true



B false

C undefined

D 3

Worked steps

A — the first part is true, so OR is true.

Exam-style 3.3 ■ 1 mark

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

- (a) evaluate $a < b$.
- (b) evaluate $(a < b)$ AND $(b < 10)$.
- (c) evaluate NOT $(a < b)$.

Solution 3.3

Worked steps

(a) true **B1**. (b) true (both parts true) **B1**. (c) false **B1**.