

3.9 Developing Algorithms

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

KEY WORDS algorithm 算法 • pseudocode 伪代码 • sequencing 顺序 • efficient 高效 • list 列表

Objective

Build the skills to answer exam questions on **developing algorithms**.

You must be able to:

- explain how an **algorithm** 算法 is a finite, step-by-step set of instructions
- express an algorithm using **sequencing** 顺序, selection, and iteration
- represent an algorithm as **pseudocode** 伪代码, a flowchart, or natural language
- refine an algorithm to be correct, clear, and **efficient** 高效

1 Worked examples

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

■ What an algorithm is

A **finite**, step-by-step set of instructions to complete a task, built from three building blocks: **sequencing**, **selection**, and **iteration**.

■ Representations

The same algorithm can be written as **pseudocode**, drawn as a **flowchart**, or described in **natural language**.

■ Different algorithms, same result

Two different algorithms can solve the same problem correctly; we compare them by clarity and **efficiency**.

2 Practice

2.1 Define an algorithm. [1]

2.2 Name the three building blocks of an algorithm. [2]

2.3 Name two ways to represent an algorithm. [1]

3 Exam-style questions

3.1 An algorithm must be [1]

- | | |
|---|---|
| A | B |
| C | D |
- A** infinite
B finite and step-by-step
C random
D written without any words

3.2 Which of these is **not** a way to represent an algorithm? [1]

- | | |
|---|---|
| A | B |
| C | D |
- A** pseudocode
B a flowchart
C natural language
D an overflow

3.3 Two students write different programs that both correctly sort a list.

- (a) State whether both can be valid algorithms. [1]
(b) Name one quality by which to compare them. [1]
(c) Name the three building blocks of algorithms. [1]