AP COMPUTER SCIENCE PRINCIPLES • EXERCISE SHEET

3.2 Data Abstraction

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

Objective

Build the skills to answer exam questions on **data abstraction**.

You must be able to:

- explain how **data abstraction** 数据抽象 hides detail to manage complexity
- describe how a **list** 列表 groups many values under one name
- explain how using a list makes a program more **general** 通用
- relate data abstraction to real-world **modeling** 建模

1 Worked examples

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

■ Data abstraction

Data abstraction hides detail so the programmer can manage complexity. A **list** is an abstract data type that groups many values under **one name**.

■ More general

Storing scores as one list —`scores = [85, 90, 78]` —instead of three separate variables lets a single loop handle **any** number of values.

■ Modeling

Like real-world modeling, abstraction simplifies detail to focus on the essentials.

2 Practice

2.1 State what data abstraction does. [1]

2.2 State how a list makes a program more general. [1]

2.3 State one benefit of using a list instead of many separate variables. [1]

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3 Exam-style questions

3.1 A list is an example of [1]

- **A** a data abstraction
- **B** a syntax error
- **C** a Boolean
- **D** a byte

3.2 Grouping many values under a single name is [1]

- **A** iteration
- **B** data abstraction
- **C** an event
- **D** compression

3.3 A program must store 100 test scores.

(a) State whether to use 100 separate variables or one list. [1]

(b) State one benefit of the choice in (a). [1]

(c) Name the general idea of hiding detail to manage complexity. [1]

4 Go further

- work through the **3.2 Data Abstraction** lesson on the **Learn** page;
- read the **Algorithms and Programming** section of the AP Computer Science Principles handout on the **Know** page.

Solutions

2.1 it hides detail to manage complexity in a program.

2.2 one list and one loop can handle any number of values.

2.3 it is easier to store, name, and process many values together.

3.1 A.

3.2 B.

3.3 (a) one list. (b) all scores can be processed with a single loop. (c) (data) abstraction.