AP COMPUTER SCIENCE PRINCIPLES • EXERCISE SHEET

3.8 Iteration

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

Objective

Build the skills to answer exam questions on **iteration**.

You must be able to:

- explain how **iteration** 迭代 repeats a block of code using a loop
- use a **repeat** loop to run a block a fixed number of times
- use a condition-controlled loop that continues **until** a condition is true
- identify and avoid an **infinite loop** 无限循环

1 Worked examples

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

■ Iteration

A **loop** repeats a block of code. A **repeat** loop runs a fixed number of times; an **until** loop runs until a Boolean condition becomes true.

■ Infinite loops

A loop that never meets its stopping condition is an **infinite loop** —it never ends, so avoid it.

■ Tracing

Follow the variables across iterations: start `total` at 0, repeat ”add 2” three times, and `total` becomes 6.

2 Practice

2.1 State what iteration does. [1]

2.2 A loop starts `total` at 0 and adds 5 each time, repeating 4 times. State the final total. [2]

2.3 State what an infinite loop is. [1]

3 Exam-style questions

3.1 A loop that repeats a block a fixed number of times is a [1]

- **A** conditional
- **B** repeat loop
- **C** variable
- **D** list

3.2 A loop that never meets its stopping condition is [1]

- **A** efficient
- **B** an infinite loop
- **C** a filter
- **D** a substring

3.3 A counter starts at 1 and doubles each time, repeated 3 times ($1 \to 2 \to 4 \to 8$).

(a) State the final value. [1]

(b) State how many times the block ran. [1]

(c) Name the general idea of repeating code. [1]

4 Go further

- work through the **3.8 Iteration** 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 repeats a block of code (using a loop).

2.2 $0 + 5 + 5 + 5 + 5 = 20$.

2.3 a loop that never meets its stopping condition, so it runs forever.

3.1 B.

3.2 B.

3.3 (a) 8. (b) 3 times. (c) iteration.