2.7 while Loops

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

KEY WORDS while loop • loop control variable • infinite loop

Objective

Build the skills to answer exam questions on **while loops**.

You must be able to:

- write a **while loop** that repeats while its condition is `true`
- understand that the condition is tested **before** each pass
- update a **loop control variable** so the loop makes progress

1 Key knowledge and worked examples

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

■ while loop

```
int i = 0, sum = 0;
while (i < 3) {   // tested before each pass
    sum += i;
    i++;          // update, or the loop never ends
}
```

■ Progress toward stopping

The **loop control variable** must change so the condition eventually becomes `false`; otherwise the loop runs forever (an infinite loop).

2 Practice

2.1 State when a while loop tests its condition. [1]

2.2 State what happens if the loop control variable is never updated. [1]

2.3 Trace: `int i = 0, sum = 0; while (i < 3) { sum += i; i++; }`. State the final `sum`. [2]

3 Exam-style questions

3.1 A while loop tests its condition [1]

- **A** after each pass
- **B** before each pass
- **C** never
- **D** only once at the end

3.2 A loop whose control variable never changes may become [1]

- **A** a for loop
- **B** an infinite loop
- **C** a method
- **D** a cast

3.3 `int n = 1; while (n <= 4) { System.out.print(n); n++; }`.

(a) State the output. [1]

(b) State the final value of `n`. [1]

(c) State when the condition is checked. [1]

Solutions

Each answer shows the steps, then the **result**.

2.1

- before each pass through the loop

2.2

- the loop never stops (an infinite loop)

2.3

- $0 + 1 + 2 = 3$

3.1 B

- before each pass.

3.2 B

- an infinite loop.

3.3

(a)

- `1234`

(b)

- `5`

(c)

- before each pass