

Exercise walk-through

Implementing Selection and Iteration Algorithms ■ 2.9

eXercise

You must be able to

- combine **selection** and **iteration** to build a complete algorithm
- use a loop with an `if` inside to **count** or **filter** values
- accumulate a **running total** 累加 or track a **maximum**/minimum

Method — Loop with an if inside

To **count** values meeting a condition, loop over them and increment a counter inside an if:

```
k+ktint+w ncount+w o+=w l+m+mi0p;
kfor+w p(k+ktint+w nx+w p:+w nnumsp)+w p
+w    kif+w p(nx+w o+w l+m+mi2+w o=o+=w l+m+mi0p)+w ncounto+o+p;+w    c+c1/
p
```

Method — Accumulate and track

A **running total** adds each value as the loop runs. To find a **maximum**, keep a “best so far” variable and update it whenever a larger value appears.

Practice 2.1 ■ 1 mark

State how to count values meeting a condition inside a loop.

Solution 2.1

Method: Loop with an if inside

Worked steps

loop over the values and increment a counter inside an `if` that tests the condition

B1.

Practice 2.2 ■ 2 marks

Describe how to find the maximum of a list of numbers.

Solution 2.2

Worked steps

keep a “maximum so far” variable, and update it whenever the current value is larger **B1** **B1**.

Practice 2.3 ■ 1 mark

State what a “running total” is.

Solution 2.3

Method: Accumulate and track

Worked steps

a variable that accumulates the sum of values as the loop runs **B1**.

Exam-style 3.1 ■ 1 mark

To count how many scores are above 50, you use a loop with

A no condition

B an if inside it

C a cast

D a constructor

Solution 3.1

Method: Loop with an if inside

A no condition

B an if inside it



C a cast

D a constructor

Worked steps

B.

Exam-style 3.2 ■ 1 mark

A variable that adds each value as a loop runs is a

- A** counter of items
- B** running total
- C** loop control variable
- D** parameter

Solution 3.2

Method: Accumulate and track

A counter of items

B running total 

C loop control variable

D parameter

Worked steps

B.

Exam-style 3.3 ■ 1 mark

A loop goes through $\{4, 9, 2, 7\}$ tracking the largest so far (starting with the first value).

- (a) State the maximum so far after seeing 4 and 9.
- (b) State the final maximum.
- (c) Name the technique of adding all the values together.

Solution 3.3

Worked steps

(a) 9 **B1**. (b) 9 **B1**. (c) accumulating a running total **B1**.