

AQA Computer Science A-Level

4.3.4 Searching algorithms

Past Paper Questions

June 2011 Comp 3

- 1** The binary search method can be used to search for an item in an ordered list.
- 1 (a)** Show how the binary search method works by writing numbers on **Figure 1** below to indicate which values would be examined to determine if the name "Richard" appears in the list.

Write the number "1" by the first value to be examined, "2" by the second value to be examined and so on.

Figure 1

Position	Value	Order Examined In
1	Adam	
2	Alex	
3	Anna	
4	Hon	
5	Mohammed	
6	Moonis	
7	Niraj	
8	Philip	
9	Punit	
10	Ravi	
11	Richard	
12	Timothy	
13	Tushara	
14	Uzair	
15	Zara	

(3 marks)

- 1 (b)** A different list contains 137 names.

What is the maximum number of names that would need to be accessed to determine if the name "Rachel" appears in the list? Write your answer in the box below.

(1 mark)

Specimen Paper 1

0 4

Figure 5 shows an incomplete algorithm for a binary search.

Figure 5

```
PROCEDURE BSearch(List, F, L,
ItemToFind)
  Found ← False
  Failed ← (1).....
  WHILE NOT Failed AND NOT Found
    M ← (F + L) DIV 2
    IF List[M] = ItemToFind
      THEN Found ← True
    ELSE
      IF F >= L
        (2).....
      ELSE
        IF List[M] > ItemToFind
          THEN (3).....
          ELSE F ← M + 1
        ENDIF
      ENDIF
    ENDIF
  ENDWHILE
  IF Found = True
    THEN OUTPUT "Item is in list"
  ELSE OUTPUT "Item is not in list"
  ENDIF
ENDPROCEDURE
```

The DIV operator calculates the whole number result of integer division. For example, $15 \text{ DIV } 4 = 3$, $17 \text{ DIV } 4 = 4$.

0 4 . 1

What code should be added at position (1) in Figure 5?

[1 mark]

0 4 . 2

What code should be added at position (2) in Figure 5?

[1 mark]

0 4 . 3

What code should be added at position (3) in Figure 5?

[2 marks]