

0	1
---	---

 .

1

State the comparisons that would be made if the binary search algorithm was used to search for the value 30 in the following array (array indices have been included above the array).

0	1	2	3	4	5	6
1	6	14	21	27	31	35

[3 marks]

0	1
---	---

 .

2

For a binary search algorithm to work correctly on an array of integers, what property must be true about the array?

[1 mark]

Turn over for the next question

0	2
---	---

Describe how the linear search algorithm works.

[3 marks]

0	3	.	1
---	---	---	---

Figure 11 shows a binary search algorithm that has been programmed in C#.

The `CompareTo` method is used to compare two strings. It returns:

- -1 if the first string is less than the second
- 0 if the first string is equal to the second
- 1 if the first string is greater than the second.

Figure 11

```
string[] animals = {"cat", "dog", "hippo", "llama",  
"ox", "rat", "tiger", "wolf"};  
Console.Write("What animal would you like to find? ");  
string animalToFind = Console.ReadLine();  
bool validAnimal = false;  
int start = 0;  
int finish = animals.Length - 1;  
while (validAnimal == false && start <= finish) {  
    int mid = (start + finish) / 2;  
    if (animals[mid] == animalToFind) {  
        validAnimal = true; }  
    else if (animalToFind.CompareTo(animals[mid]) == 1)  
    {  
        start = mid + 1;  
    } else {  
        finish = mid - 1;  
    }  
}  
Console.WriteLine(validAnimal);
```

Complete the trace table for the program in **Figure 11** if the user input is `wol`f

Part of the table has already been filled in.

You may not need to use all the rows in the table.

[4 marks]

[illegible]

0 3 . 3 State why a binary search cannot be used on the array fruits

[1 mark]

0	3	4
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Figure 13 shows an algorithm, represented using pseudo-code, that should display currency names in reverse alphabetical order, starting with yen.

There are errors in the logic of the algorithm.

- Line numbers are included but are not part of the algorithm.

Figure 13

```
1  SUBROUTINE diffCurrencies(currencies)
    currencies ← ['baht', 'dollar', 'euro',
2      'koruna', 'lira', 'rand',
      'rupee', 'yen']
3      RETURN currencies[x]
4  ENDSUBROUTINE
5
6  FOR i ← 8 TO 0 STEP 1
7      OUTPUT(diffCurrencies(i))
8  ENDFOR
```

Rewrite **line 1** and **line 6** from **Figure 13** to make the algorithm work as intended.

[3 marks]

Line 1 _____

Line 6 _____

0	4
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Explain how the linear search algorithm works.

[3 marks]
