"3-a-day" A-Level Exam Practice Unit 2 (005)

Question 1

2 Consider the following algorithm in Fig.2, expressed in pseudocode, as a function S:

```
function S(A[0..N-1], value, low, high)

    if (high < low)then
        return error_message
    endif

    mid = (low + high) / 2

    if (A[mid] > value)then
        return S(A, value, low, mid-1)
    elseif (A[mid] < value)then
        return S(A, value, mid+1, high)
    else
        return mid
    endif

endfunction
```

Fig.2

(a) State the name of the algorithm implemented in Fig.2.

.....**[1]**

Question 2

Describe how this algorithm works *(5 marks)*

Question3

5 **(a)** Give the stages of a binary search for the word Hull in the list

Belfast, Chester, Epsom, Hull, Kendal, Luton, Neath, Oban, Staines

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..... **[3]**

Answer 1

2	**(a)**		• Binary search (1).	**1 AO1.1 (1)**	For 1 mark.

Answer 2

- Finds the length of the given array and calculates the midpoint (1)
- Compares search item with item in mid-point (1)
- If it is smaller, it halves the size of the array from the start to the mid-point and recalls the function passing the new smaller array into it (1)
- If it is larger, it halves the size of the array from the mid-point to the end and recalls the function passing the new smaller array into it (1)
- This recursion continues until the item is found, at which point it returns the mid-point which will be the location of the search item (1)

Answer 3

5	(a)		• start at mid point 'Kendal' • 'Hull' is less than Kendal so take first half of list & discard the rest • repeated halving… • …until 'Hull' is found	3