GCSE Computer Science
Topic 2.1 Algorithms

To find middle item:
(amount of data items +1) / 2

MERGE SORT example (ascending)

13	3	50	7

COMPUTATIONAL THINKING: **t**ackling a problem through abstraction, decomposition and algorithmic thinking.

ABSTRACTION: picking out important bits of information

DECOMPOSITION: breaking down a problem into smaller parts.

ALGORITHMIC THINKING: coming up with an algorithm to solve a problem.

ALGORITHM: a step by step set of instructions to solve a problem

BINARY SEARCH example:

1	3	5	7	9

Find 7:

INSERTION SORT example (ascending)

13	3	50	7

LINEAR SEARCH example

1	3	5	7	9

Find 7:

BUBBLE SORT example (ascending)

13	3	50	7

FLOWCHART: a visual way of representing algorithms.

TERMINATOR

INPUT/ OUTPUT

Subprogram

PROCESS

DECISION
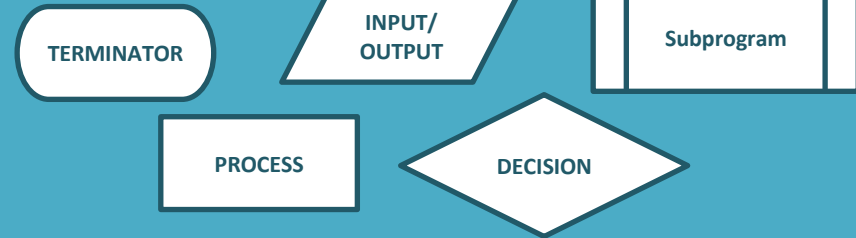
Fake

Pseudocode

A set of instructions in the style of programming language, written in plain English.

INPUT , OUPUT, IF, THEN, ELSE

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What I need to know:

Define computational thinking.
Define abstraction.
Define decomposition.
Define algorithmic thinking.
Define algorithm.
Name the two most common ways of displaying algorithms.
Define flowchart.
Define pseudocode.
Outline the steps of a binary search.
Write an ordered list of numbers or words and perform a binary search to find an item.
Outline the steps of a linear search.
Write a list of numbers or words and perform a binary search to find an item.
Outline the steps of a bubble sort.
Perform a bubble sort on a list of unordered numbers / words to put them into ascending/descending order.
Outline the steps of a insertion sort.
Perform a insertion sort on a list of unordered numbers / words to put them into ascending/descending order.
Outline the steps of a merge sort.
Perform a merge sort on a list of unordered numbers / words to put them into ascending/descending order.
Draw and label the shapes used in flowcharts.
List the keywords used in pseudocode.

Warm-Up Cross out the commands that don't go with the flow diagram symbol.

Input / Process   Subprogram / Stop   Decision / Start   Process / Output

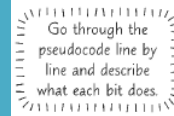Bernard has written the algorithm on the right using pseudocode.

```
VAR height, width, area as INT
height = INPUT("Enter the height.")
width = INPUT("Enter the width.")
area = height * width
print(area)
```

a) Define what is meant by an 'algorithm'.

....

.... [1]

b) Describe what Bernard's algorithm does.

Go through the pseudocode line by line and describe what each bit does.

....

....

.... [3]

Nicola has a list of numbers: 2, 3, 7, 5, 13, 11.

a) She says, "I can't use a binary search to find 13." Why is this the case?

.... [1]

b) Show the steps of a linear search to find 13 in the list above.

[2]

[Total 3 marks]

Sonia has a sorted list of ice cream flavours that she sells in her shop.

a) Show the stages of a binary search to find the word 'butterscotch' in the list below.

| butterscotch | chocolate | mint | strawberry | vanilla |