Your notes

GCSE Computer Science: revision notes

Searching and sorting algorithms

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Linear search

- Check each item in turn, starting at the beginning, until you find the target or reach the end of the list.
- It works on unsorted lists. It is simple, but slow for large lists: a list of n items may need n comparisons.

Binary search

- It only works on a sorted list. Look at the middle item. If it is the target, stop. If the target is smaller, discard the upper half; if it is larger, discard the lower half. Repeat on the half that is left.
- It is much faster for large lists: 1000 items need at most 10 comparisons, because each comparison halves the list.
- When there are two middle items, pick one of them consistently (for example the lower one).

Bubble sort

- Go through the list comparing each pair of neighbouring items, and swap them if they are in the wrong order. Each **pass** moves the largest remaining item to its correct place at the end.
- Keep making **passes** until a whole **pass** makes no swaps.
- It is simple to code, but slow for large lists.

Merge sort and insertion sort

- **Merge sort**: split the list in half again and again until every list has one item, then merge the lists back together in order. It is much faster than **bubble sort** for large lists, but uses more memory.

- (OCR) **Insertion sort**: take each item in turn and insert it into the correct place in the sorted part at the start of the list.

Key terms

Linear search	Checking each item in turn until the target is found.
Binary search	Repeatedly checking the middle item of a sorted list and discarding half.
Bubble sort	Repeatedly comparing and swapping neighbouring items until no swaps are needed.
Merge sort	Splitting a list into single items, then merging them back together in order.
Insertion sort	Inserting each item into its correct place in a growing sorted part.
Pass	One complete trip through the list in a sort.

Quick questions

Cover the answers and test yourself: remembering is what makes it stick.

1. Which search only works on a sorted list?
2. How does a linear search work?
3. In a binary search, the target is smaller than the middle item. What happens next?
4. What is the maximum number of comparisons a binary search needs for 1000 sorted items?
5. What does a bubble sort compare?
6. After one pass of a bubble sort into ascending order, where is the largest item?
7. When does a bubble sort stop?
8. What is the first stage of a merge sort?

Answers

1. Binary search
2. It checks each item in turn from the start
3. The upper half is discarded
4. 10
5. Pairs of neighbouring items
6. At the end of the list
7. When a pass makes no swaps
8. Split the list in half repeatedly until each list has one item

What to do next

Practise 16 questions on this topic

Try 5 exam questions, with mark schemes

Your notes

Read the lesson, one step at a time

Free revision for GCSE and KS3 at lycolearn.co.uk. Some notes are for one exam board only, and say so in brackets.

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