Your notes

KS3 Computing: revision notes

Algorithms

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Computational thinking

- An **algorithm** is a set of step-by-step instructions to solve a problem.
- **Decomposition** means breaking a problem into smaller parts. **Abstraction** means removing unnecessary detail to focus on what matters. Pattern recognition means spotting similarities.

Building blocks

- **Sequence**: steps run in order. **Selection**: a decision chooses which steps run (IF... THEN... ELSE). **Iteration**: steps are repeated (loops such as FOR and WHILE).
- **Algorithms** can be written as **flowcharts** or **pseudocode** (structured English that looks like simple code).
- **Flowchart** symbols: an oval for start and end, a rectangle for a process, a diamond for a decision, and a parallelogram for input or output.

Searching

- A **linear search** checks each item in turn from the start. It works on any list, but is slow for long lists.
- A **binary search** only works on a sorted list. It checks the middle item, then throws away the half that can't contain the target, and repeats. It is much faster for long lists.

Sorting

- A **bubble sort** compares each pair of neighbouring items and swaps them if they are in the wrong order. It repeats passes until no swaps are needed. After the first pass, the largest item is at the end.
- A **merge sort** splits the list into single items, then merges them back together in order. It is faster for long lists.

Key terms

Algorithm	A set of step-by-step instructions to solve a problem.
Decomposition	Breaking a problem into smaller parts.
Abstraction	Removing unnecessary detail to focus on what matters.
Sequence	Steps carried out in order.
Selection	Choosing which steps to run, using a decision.
Iteration	Repeating steps, using a loop.
Flowchart	A diagram that shows an algorithm using symbols.
Pseudocode	An algorithm written in structured English, like simple code.
Linear search	Checking each item in a list in turn.
Binary search	Searching a sorted list by repeatedly checking the middle item.
Bubble sort	Sorting by comparing and swapping neighbouring items.
Merge sort	Sorting by splitting a list up and merging it back in order.

Quick questions

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

1. What is an algorithm?
2. What is decomposition?
3. What is abstraction?
4. Which flowchart symbol shows a decision?
5. What are the three basic building blocks of algorithms?
6. What is iteration?
7. What does a binary search need?
8. How does a linear search work?

Answers

1. A set of step-by-step instructions to solve a problem
2. Breaking a problem into smaller parts
3. Removing unnecessary detail to focus on what matters
4. A diamond
5. Sequence, selection and iteration
6. Repeating steps, using a loop
7. The list must be sorted
8. It checks each item in turn from the start

What to do next

Practise 13 questions on this topic

Your notes

Try 4 exam questions, with mark schemes

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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