

7.3 Computational Thinking

COMPUTATIONAL THINKING: tackling a problem through abstraction, decomposition and algorithmic thinking.

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

FLOWCHART: a visual way of representing algorithms.

DECOMPOSITION: breaking down a problem into smaller parts.

ABSTRACTION: picking out important bits of information

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

Sequence: the order in which the instructions are run.

Selection: Selection is the process of making a decision.

Iteration: when a program needs to repeat or loop

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

Simple Algorithm

LINEAR SEARCH

1. Look at the first item of data.
2. If this is the item you are looking for, stop searching, you found it. 🤔
3. *If not* then look at the next item.
4. Repeat steps 2-3 until you have found the item or you've checked every item.

To find middle item:
 $(\text{amount of data items} + 1) / 2$

BINARY SEARCH:

1. Find the middle item of data
2. If this is the item of data you are looking for, stop as you've found it. 🤔
3. *If not*, compare the item you are looking for to the middle item. If it comes before the middle item, get rid of the second half of the data. If it comes after the middle item, get rid of the first half.
4. You'll be left with half the amount of data to search. Repeat steps 1-3 until you find the data you are looking for.

Efficient algorithm

Start/End

Subroutine

INPUT/
OUTPUT

PROCESS

Fake

DECISION

Pseudocode

INPUT, OUTPUT, 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 linear search.

Write an ordered list of numbers or words and perform a linear search to find an item.

Outline the steps of a binary search.

Write a list of numbers or words and perform a binary search to find an item.

Draw and label the shapes used in flowcharts.

Define the term sequence

Define the term selection

Define the term iteration