Computational Thinking

Knowledge Organiser

Topic Summary: Create flowcharts with correct shapes and clear flow.
Show use of decomposition and abstraction.
Create complex solutions using algorithms which can also be from pattern matching.

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SCAN ME

Abstraction

Breaking the problem down, removing unnecessary details, leaving only the essential information

Benefits of Abstraction

- Makes the problem easier to understand, allowing for a greater chance of success
- The unnecessary details that have been removed don't need to be thought about, reducing the amount to solve
- A simplified environment is easier to compute, requiring less computational power

Over-Abstraction

- If a problem is abstracted too much, the solution can be poor

Decomposition

Breaking down a complex problem or system into smaller, more manageable parts

Examples

Recipes, breaking down the steps to make a meal into smaller more manageable parts

Solving a crime, taking the big problem of the crime and splitting it up into investigating different pieces of evidence

Mathematical equations, these can be broken down into different smaller steps that allow you to solve the whole problem when completed.

Algorithms

An algorithm is simply a set of steps/instructions needed to complete a task.

We can use different methods of representing an algorithm, such as a flowchart or using pseudocode.

Symbol	Name	Function
	Start/end	An oval represents a start or end point
	Arrows	A line is a connector that shows relationships between the representative shapes
	Input/Output	A parallelogram represents input or output
	Process	A rectagle represents a process
	Decision	A diamond indicates a decision

Pattern matching

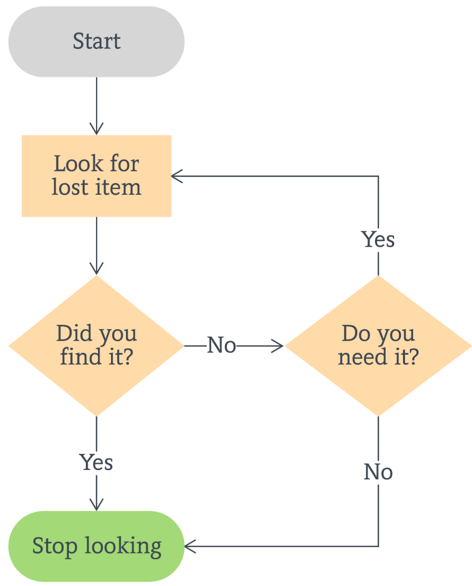
Similarities or characteristics that some problems may share

Problems are easier to solve when they share patterns, because we can use the same problem-solving solution wherever the pattern exists.

The more patterns we can find, the easier and quicker our overall task of problem solving will be

Topic Links:

This topic helps throughout the programming modules taken later in Year 8 and all the way through GCSE. It can also help in day-to-day life as a system for solving problems.



Key Words:

Abstraction
Decomposition
Pattern matching
Algorithms
Flowcharts
Computational
Logic