Key computing ideas

To program computers properly there are some key ideas that you need to know about

Key computing ideas

1. Algorithm

An **algorithm** is a set of instructions to complete a task

When we program, we turn the **algorithm** into programming code

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Etymology of algorithm:

From the name of the Persian scientist and mathematician Al-Khwarizmi who wrote in about CE 825

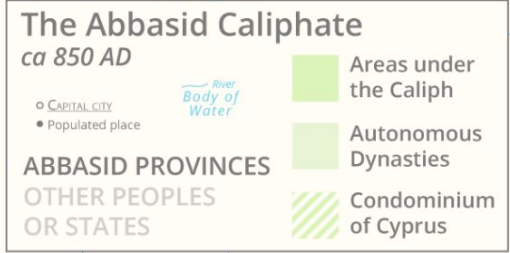Later the Greek word arithmos was added to get **algorithm**

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Etymology of algorithm:
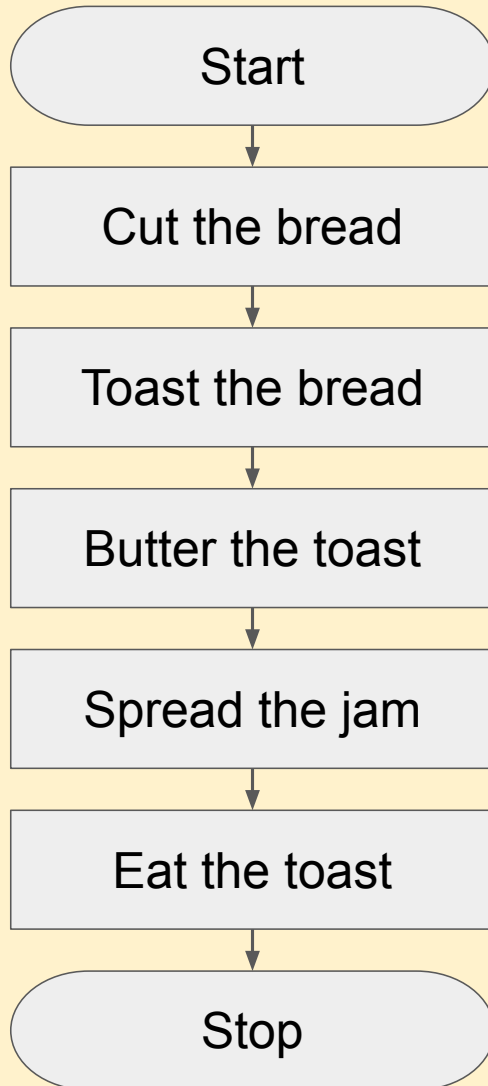
Al-Khwarizmi worked in Baghdad in modern day Iraq

He wrote some of the earliest books about algebra and equations

The area of Persia when Al-Khwarizmi was writing in about CE 825

Key computing ideas

Start

↓

Cut the bread

↓

Toast the bread

↓

Butter the toast

↓

Spread the jam

↓

Eat the toast

↓

Stop

An algorithm is:
- step by step instructions
- in the right order
- break the problem down
- clear and unambiguous
- get the same result each time

This algorithm is written using a **flowchart**

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Algorithms can be used for any task

Computerised algorithms are used in lots of ways:

- to recommend things when online shopping
- to recommend YouTube videos or on spotify
- to plan GPS routes or in sat nav systems
- to give doctors ideas about how to diagnose
- to sort items in a list or search for an item
- to guess what stocks and shares might go up

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2. Sequence

Sequence means putting things in the right order

If lines of computer code or instructions in an algorithm aren't in the right order the program or algorithm might not work as intended
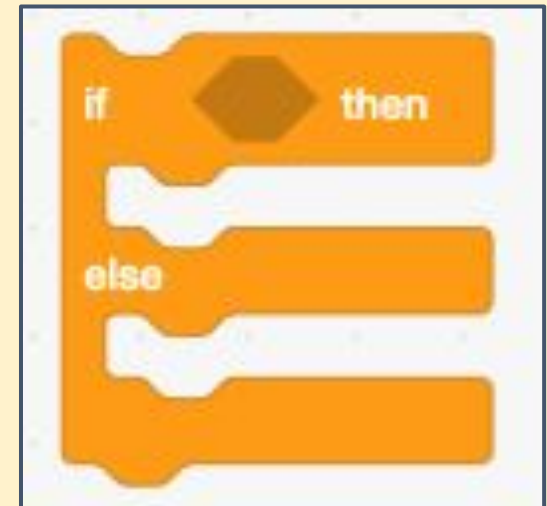
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3. Selection

Selection is choosing what to do next in a computer program or an algorithm

To do this we often use the idea of:

IF – THEN – ELSE

- IF something is true
- THEN do this
- ELSE (otherwise) do something else

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4a. Repetition

Repetition means repeating a block of code or a set of instructions more than once

This can be really helpful – computers are excellent at doing simple things really quickly and using repetition makes this much easier to code

We often do **repetition** by using a **loop**

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4b. Iteration

Iteration is basically just a different way of saying **repetition**

There are different ways to do repetition

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5. Variable

Computers need to be able to store **values** so we can use them again in a program

They do this using **variables**

A **variable** is a named area of computer memory where a value can be stored

The variable can be changed. It can hold numbers, words or other values

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Summary:

- An **algorithm** is a set of instructions to complete a task

- A **computer program** is an algorithm that has been coded so that it runs on a computer

- **Sequence** means getting instructions in the right order

- **Selection** means making a decision in an algorithm

- **Repetition** means doing things more than once
Iteration is another word for repetition

- A **variable** is an area of computer memory where a value can be stored