COMPUTING & ICT—Year 08 Knowledge Organiser: Python Programming (Spring 1)

Summary

Programming is writing computer code to create a program, in order to solve a problem. This consists of a series of instructions to tell a computer exactly what to do and how to do it.

An **algorithm** is a set of instructions that describes how to get something done. It is crucial that the steps in an algorithm are sequenced and performed in the right order - otherwise the algorithm will not work correctly. Algorithms can be designed using **pseudocode** and **flow charts**. They are written using **statements** and **expressions**. There are three basic building blocks (constructs) to use when designing algorithms: **sequencing**, **selection** and **iteration**. We create programs to **implement** algorithms. Algorithms consist of steps, where programs consist of statements.

In programming, iteration is often referred to as '**looping**', because when a program iterates it 'loops' to an earlier step. It is implemented using **FOR** and **WHILE** statements. Selection is implemented in programming using **IF** statements.

Key Vocabulary

Algorithm	A sequence of logical instructions for carrying out a task. In computing, algorithms are needed to design computer programs.
Flowchart	A diagram that shows a process, made up of boxes representing steps, decision, inputs and outputs.
Instruction	A single action that can be performed by a computer processor.
Programming	The process of writing computer software.
Programming language	A language used by a programmer to write a piece of software. There are many programming languages.
Pseudocode	A method of writing up a set of instructions for a computer program using plain English. This is a good way of planning a program before coding.
Variable	In a computer program, this is a memory location where values are stored.

Variable

Computer programs use variables to store information.

Variables could be used to store the score in a game, the number of cars in a car park or the cost of items on a till. They work in a similar way to algebra, where a letter in your code can stand for a number.

Sequencing

Sequencing is the specific order in which instructions are performed in an algorithm.

Algorithms consist of instructions that are carried out (performed) one after another.

Selection

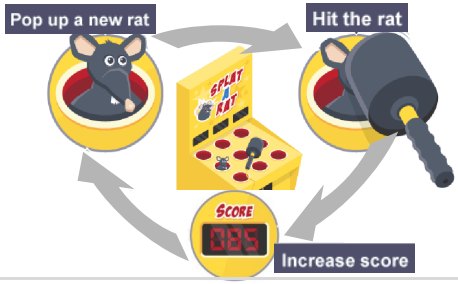
Selection is a decision or question.

At some point, a program may need to ask a question because it has reached a step where one or more options are available. Depending on the answer given, the program will follow a certain step and ignore the others.

Iteration

Iteration is the process of repeating steps.

Iteration allows us to simplify our algorithm by stating that we will repeat certain steps until told otherwise. This makes designing algorithms quicker and simpler because they don't have to include lots of unnecessary steps.



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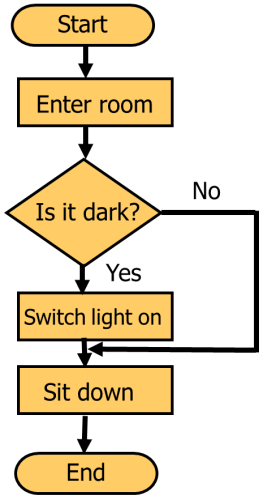
Algorithms

Algorithms can be represented as **pseudocode** or a **flowchart**, and programming is the translation of these into a computer program.

Pseudocode

How to make a cup of tea

1. Put teabag in cup
2. Fill kettle
3. Boil kettle
4. Pour water into cup
5. Add milk
6. Stir
7. Give cup of tea to person

Flowchart

Entering a room