Designing Algorithms

When designing a solution to a problem, it is necessary to design what the computer program will actually do with the data that has been inputted in order to produce the output. This is called an **algorithm**, and is defined as a sequence of steps designed to perform a particular task.

A well designed algorithm:

- List every instruction the computer needs to execute to solve the problem.
- Show the order in which these instructions should be executed.

A successful design should:

- Allow other programmers to understand and implement, the description of the steps needed to solve the problem.
- Should be more structured than pose, and less rigid than code.

Pseudo-code

Pseudo-code is a method of describing an algorithm that uses text rather than a diagram. It is like a simplified programming code, which doesn't follow strict rules, but does use similar keywords to programming languages.

Pseudo-code guidelines:

- Describe each step briefly as possible.
- Use upper case for keywords, and words closer to a real programming language.
- Lowercase for words closer to English.
- Code within a block should be correctly indented.

Program Flow Charts

Uses Diagrams to show the operation of the algorithm. It uses a small number of conventional symbols to stand for different types of operations.
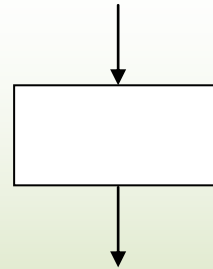
Start/ Stop symbol
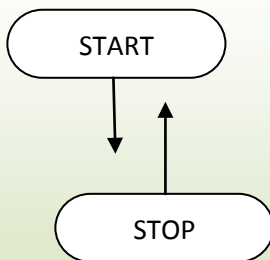
Used at the beginning and end of a flow chart, to show where the program begins and ends.

There can be several stop places, although it is simpler to only have one.
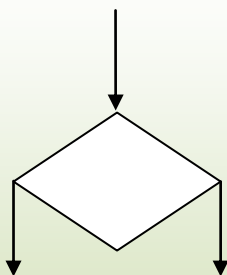
Process Symbol

Shows and operation or instruction that the computer should execute.

It does not involve making a decision or an input or output.

Decision Symbol

Shows a point in the program where a decision needs to be made, it will follow different paths depending on the outcome. There should only be one entry point, and at least two exit points. Text inside should be a question.
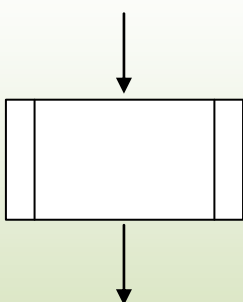
Input/ Output Symbol
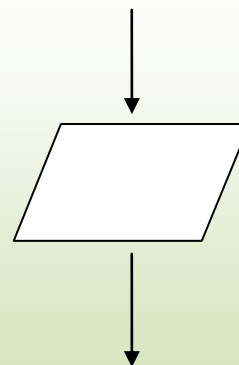
Used to show that an input or output operation should be carried out.

The text should clearly say whether it's an input or output, and which values and the devices used for inputting or outputting this.
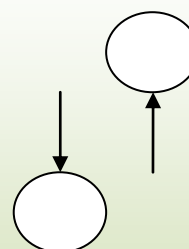
Subroutine Symbol

Shows where a subroutine will be called.

Complex operations can be represented by a subroutine and then another flowchart drawn to show in detail the subroutine being carried out.

Decision Symbol

Shows points of a flow chart that should be connected to each other, when it is not continent to draw flow lines.

The text is a label, usually a single letter, which matches the connectors to each other.