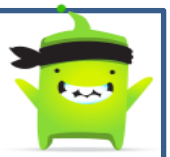
NPA Knowledge Organiser: Year 5 Computing – Summer 1



LED Algorithm-a precise step by step set of instructions used to solve a problem or achieve an objective

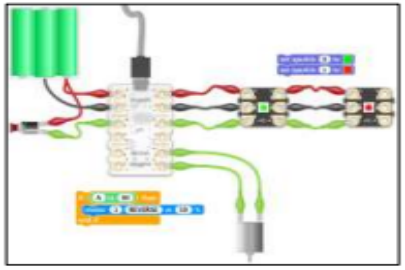
Variable – a named area in computer memory. A variable has a name and a value. The program can change this variable value.

Debugging-- looking for any problems in the code, fixing and testing them

Programming- Physical Computing

Overview

Selection in Physical Computing



- Programming is when we make and input a set of instructions for computers to follow.

-Microcontrollers are devices that can be programmed to control output devices that are connected to them.

-We use algorithms which we can plan, model, trial and debug, in order to create accurate command sequences, involving multiple output devices (e.g. LEDs and motors).

Sequencing and Algorithms

-A **sequence** is a pattern or process in which one thing follows another.

-We design **algorithms** (sets of instructions for performing a task) to help us program sequences involving multiple output devices (e.g. LEDs and motors).

-**Programming** is the process of keying in the code recognized by the computer into the software (using your algorithm).

Trialling and Debugging

-Programmers do not put their computer programs straight to work. They **trial** them first to find any errors:

-Sequence errors: An instruction in the sequence is wrong or in the wrong place.
-Keying errors: Typing in the wrong code.
-Logical errors: Mistakes in plan/thinking.

-If your algorithm does not work correctly the first time, remember to **debug** it.

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Programming Commands

-For programming, we should use the microcontroller software.

-Crumble uses command blocks (like Scratch).

-**Adding/Removing Commands**: To add a command block, drag it from the menu towards the program. When the grey arrow appears, the command will snap into the program. To remove a command block, drag it away from the program and back to the menu.

-**Modifying Commands:** Clicking on the colour square in the command block allows us to change the Sparkle's colour. To change the time of commands, click on the value. Delete the current value and type in the new value. Press enter after completed.

-**Count Controlled Loops:** These allow us to put programs on a loop. Count Controlled Loops are found in the 'Control' options. Drag the desired program into the Count Controlled Loop command block. 'Do until' loops allow commands to happen until a condition is met.

Microcontrollers, LEDs and Motors

-**Microcontrollers:** A microcontroller is a small device that can be programmed to control devices that are connected to it.

-One brand of widely used microcontroller is called a Crumble controller, which can be used to control many things, e.g. LEDs and motors.

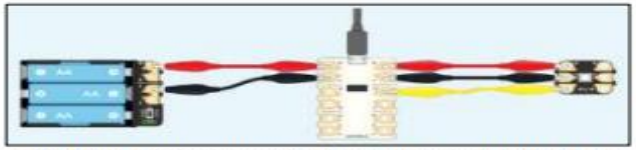
LEDs:

-LEDs are output devices that are emit light. When electricity is passed through an LED it produces light. One type of LED light, controlled by a Crumble controller, is called a Sparkle.

Motors:

-Motors are another output device. A motor can start, stop, spin forwards, spin backwards, and go at different speeds.

Creating Circuits:



-The USB port connects the microcontroller to a computer. Crocodile clips pass electricity and data through to the LED/motor.

-The + and - power pads on the Crumble should be connected with the + and - power pads on the Sparkle and battery box. The D pads on the Crumble and Sparkle should also be connected.

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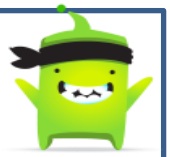


Commands-a single instruction in a computer program
Algorithm - a precise step by step set of instructions used to solve a problem or achieve an objective
Selection – this is a conditional /decision command. When selection is used, a program will choose a different outcome depending on a condition set
Control – these commands determine whether parts of the program will run, how often and sometimes, when
Debugging-- looking for any problems in the code, fixing and testing them

Programming- Quizzes

Overview

Quizzes in Scratch

- Programming is when we make a set of instructions for computers to follow.

-Scratch is a program that we can use in order to code our own quizzes, stories, animations and games. We can input questions using the 'ask' command blocks. We can use selections and conditions in order to ensure that there are different outcomes depending upon a user's response.

-We use algorithms (a set of instructions to perform a task) to sequence movements, actions and sounds in order to program effective animations.

The Basics of Scratch

-What is Scratch? Scratch is a website/ app that lets us code our own quizzes, stories, games and animations.

-Scratch helps us to learn how to use programming language, whilst also being creative and using problem-solving skills.

There are three main areas in Scratch:

-The Blocks Palette (on the left) contain all of the different blocks: puzzle piece commands which control the animation.

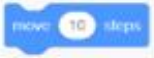
-Code Area (in the middle) is where the blocks are placed to create a program.

-Stage with Sprite (right) is where the output of the program is presented. The sprite is the character.

Attributes: There are three attributes of the sprite which we can change to make our animation: Code, Costumes, Sounds.

-Event Blocks: Event blocks are coloured yellow and are used to sense different events that happen e.g., the green flag being clicked.

-Action Blocks: Action blocks include 'Motion' blocks, 'Sound' blocks and 'Looks' blocks. They make the sprite move, make sounds and change appearance.



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Asking Questions

-Questions can be included by using the 'ask' command blocks.

-If specific answers are needed (e.g. yes or no), these can be typed in when using the 'answer' sensing block within the = 'Operators' block - drag it into the first white space. In the second white space, we can then type in the desired answer.

-The 'say' command block (in looks) is used to inform the user if the response was correct.

Algorithms, Trialling, Debugging

-Designing an **algorithm** (set of instructions for performing a task) will help you to program the sequence that you require.

-Programmers do not put their computer programs straight to work. They **trial** them first to find any errors:

-Sequence errors: An instruction in the sequence is wrong or in the wrong place.

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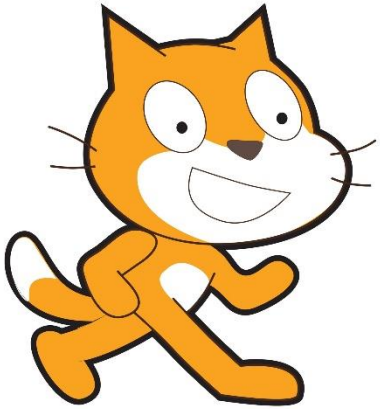
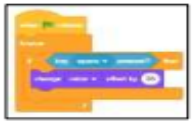
-Logical errors: Mistakes in plan/thinking.

-If your algorithm does not work correctly the first time, remember to **debug** it.



Selections and Conditions

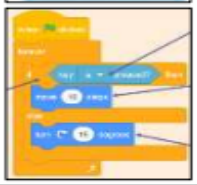
-Creating Conditions: The 'If-then' command block helps us to create conditions. It is one of the darker orange control blocks. Other blocks are placed inside the 'If-then' blocks to create conditions.



The 'senses' blocks (light blue) create the 'trigger' (e.g. when a certain key is pressed). We can change the trigger by pressing the downward arrow and selecting from the range of keys/ actions. The 'actions' blocks (e.g. motions, sounds, etc). are then used to program what will happen when the 'senses' command is triggered.

-Different Outcomes: The 'If-then-else' command block helps us to write programs that have selections with two outcomes.

-Actions to be carried out if the condition is 'true' (if the conditions of the 'sense' command are met) are placed below 'then.' Actions to be carried out if the condition is 'false' (e.g. if any other key is pressed) go below 'else.'



-The 'forever' block means that the command will happen continually.

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