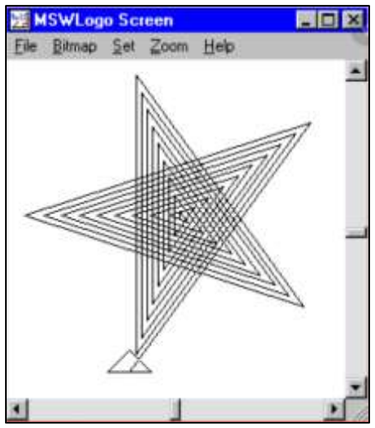
COMPUTING: Programming – Selection in Physical Computing

Year 5

KNOWLEDGE ORGANISER

Overview



Selection in Physical Computing

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

-Logo is a text-based program that we can use in order to create shapes and patterns.

-We use algorithms (a set of instructions to perform a task) which we can plan, model and test, in order to create accurate and imaginative shapes and patterns.

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.

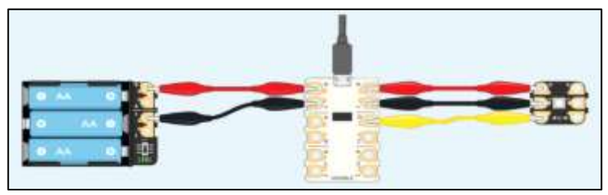
LEDs:

-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:

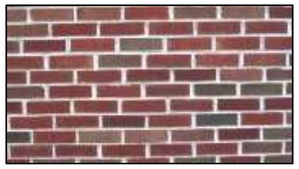


-The USB port connects the microcontroller to a computer. Crocodile clips pass electricity and data through to the LED/motor.

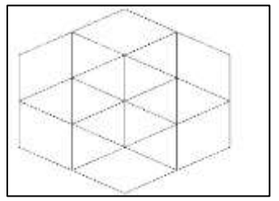
-The + and - power pads on the Crumble should be connected with the + and - power pads on the Sparkle and battery box. The D pads on the Crumble and Sparkle should also be connected.

Programming Commands

-Patterns: Patterns are things that repeat in a logical way. In everyday life, patterns are everywhere!



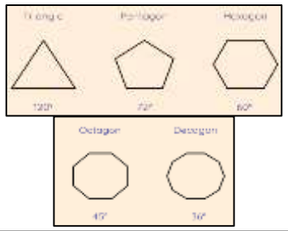
-Patterns in Logo: Instead of typing in the code to create each individual shape, we can save time by repeating a sequence of instructions. We use the 'repeat' function.



-Repeat: Type the command 'repeat' — this repeats commands a set number of times. The number following repeat is the number of times to repeat the code, and the code to be repeated is in square brackets, e.g. repeat 4 [FD 100 LT 90]

The above code will repeat FD 100 LT 90 four times.

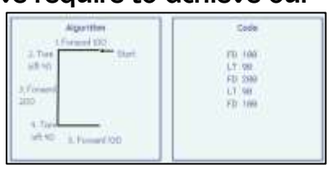
-Creating Shapes and Loops: To make shapes, we need to know the angles of corners of different shapes (see right). Using the repeat function with shapes can help us to make spirals.



Sequencing and Algorithms

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

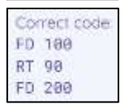
-We design **algorithms** (sets of instructions for performing a task) to help us program the sequence that we require to achieve our desired outcomes.



-**Programming** is the process of keying in the code recognized by the computer (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.

Important Vocabulary

Programming	Circuit	Electricity	Microcontroller	Code	LED	Algorithm	Motor	Sequence	Debugging