



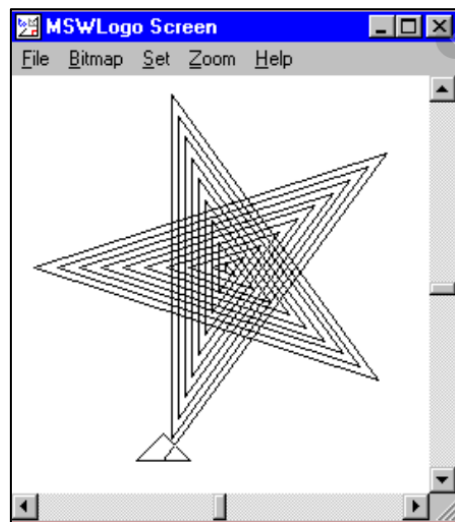
COMPUTING: PROGRAMMING

KNOWLEDGE ORGANISER

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Overview

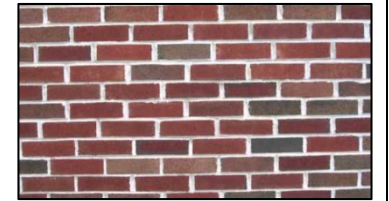


Selection in Physical Computing

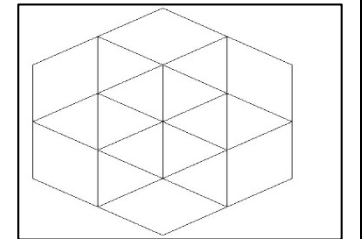
- Programming is when we make and input a set of instructions for computers to follow.
- Logo is a text-based program that we can use in order to create shapes and patterns.
- We use algorithms (a set of instructions to perform a task) which we can plan, model and test, in order to create accurate and imaginative shapes and patterns.

Programming Commands

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



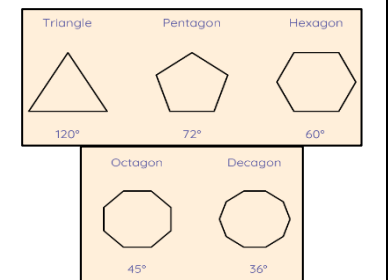
- **Patterns in Logo:** Instead of typing in the code to create each individual shape, we can save time by repeating a sequence of instructions. We use the 'repeat' function.



- **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.



Microcontrollers, LEDs and Motors

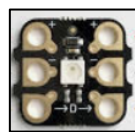
- **Microcontrollers:** A microcontroller is a small device that can be programmed to control devices that are connected to it.

- 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 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.

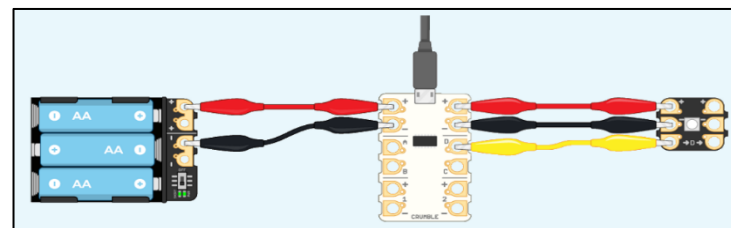


Motors:

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



Creating Circuits:



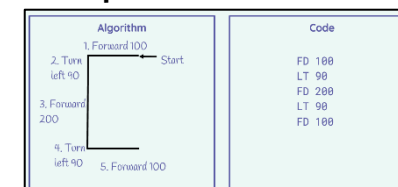
- The USB port connects the microcontroller to a computer. Crocodile clips pass electricity and data through to the LED/motor.
- The + and - power pads on the Crumble should be connected with the + and - power pads on the Sparkle and battery box. The D pads on the Crumble and Sparkle should also be connected.

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

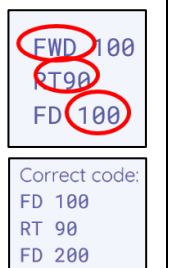
- Programmers do not put their computer programs straight to work. They **trial** them first to find any errors:

- **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