	Computing	Year 5
	Term 3	Programming & Control: physical computing

Key Question: How is programming used to control a real life object?

National Curriculum Objectives:

- Design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts
- Use sequence, selection, and repetition in programs; work with variables and various forms of input and output
- Use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs
- Select, use and combine a variety of software (including internet services) on a range of digital devices to design and create a range of programs, systems and content that accomplish given goals, including collecting, analysing, evaluating and presenting data and information

Vocabulary

Microcontroller, components, connection, infinite loop, input, output component, motor, repetition, count-controlled loop, crumble controller, switch, motor, LED, Sparkle, crocodile clips, battery box, program, selection, condition, action, repetition, debug

Prior Learning:

- From all previous years the children have experience of programming using a block-based language (Scratch) and understand the concepts of sequence and repetition.
- In Year 4 programming and control units the children learnt about repetition through count-controlled an infinite loops.
- The children have an undertsnading of inputs and outputs from the Key Stage 2 Systems and Networks units.

End Point:

The children will work in small groups to design a working carousel that can be controlled using physical computing components.

Use assessment rubric

Safe and Responsible Use:

use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact.

Digital Literacy Skills:

- Use a range of software and hardware.

Knowledge:

I know:

- that a condition can only be true or false
- that a count-controlled loop contains a condition
- hat a condition-controlled loop will stop when a condition is met
- that when a condition is met, a loop will complete a cycle before it stops
- that selection can be used to branch the flow of a program
- that a loop can be used to repeatedly check whether a condition has been met
- he importance of instruction order in 'if...then...else...' statements

Skills:

I can:

- create one or more simple circuits and connect them to a microcontroller
- program a microcontroller
- use a count-controlled loop to control outputs
- compare a count-controlled loop with a condition-controlled loop
- create a condition-controlled loop
- use a condition in an 'if...then...' statement to start an action
- use selection to switch the program flow in one of two ways
- use a condition in an 'if...then...else...' statement to produce given outcomes
- design a physical project that includes selection
- create a program that controls a physical computing project
- test and debug my project

Cross Curricular Links:

Science – Electricity (Year 4)

- Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches, and buzzers

Design and Technology (Key stage 2)

Design

- Generate, develop, model, and communicate their ideas through discussion, annotated sketches, cross-sectional and exploded diagrams, prototypes, pattern pieces, and computer-aided design

Make

- Select from and use a wider range of tools and equipment to perform practical tasks [for example, cutting, shaping, joining, and finishing], accurately
- Select from and use a wider range of materials and components, including construction materials, textiles, and ingredients, according to their functional properties and aesthetic qualities

Evaluate

- Evaluate their ideas and products against their own design criteria and consider the views of others to improve their work

Technical knowledge

- Understand and use electrical systems in their products [for example, series circuits incorporating switches, bulbs, buzzers, and motors]
- Apply their understanding of computing to program, monitor, and control their products

Oracy:

The children will work in small groups in lessons 5 and 6. It may be useful to assign roles for these tasks and provide job descriptions and sentence stems.

Key Questions:

How can circuits be controlled?
How can more than one circuit be controlled?
What are conditions and how they can be used in algorithms and programs?
What is selection and how are they used in algorithms?
How might selection in programming be used in the 'real world'?
How can I use programming to control a real life object?