



### What should I already know?

- I know how to carry out simple block-based programming (scratch).
- I know how to sequence commands
- I know how to debug and make predictions

### Unit Overview – What I will be able to do

- I will write the programming for a model of a fairground carousel that will incorporate my understanding of how the microcontroller and its components are connected, and how selection can be used to control the operation of the model.

### Overview

- We will write programs that control real-world objects, like LEDs and motors, using a computer – this is physical computing.

### Levels of abstraction

- When programming, there are four levels that can help describe a project (known as 'levels of abstraction').
- This structure can support us in understanding how to create a program and how it works:
  - Task — this is what is needed
  - Design — this is what it should do
  - Code — this is how it is done
  - Running the code — this is what it does

### Conditions

Conditions are statements that need to be met for a set of actions to be carried out. They can be used in algorithms and programs to control the flow of actions. When a condition is met, it is referred to as 'true' and when it is not met, it is referred to as 'false'. You will need to be able to identify and use conditions in algorithms in the form of statements to both start and stop sets of action.

### Values

Computerscientists have a 'can do' attitude towards solving problems and are reflective when trying out different possibilities.

### Repetition

Repetition is used in programming to give the same instruction or set of instructions several times.

- Repetition uses loops as the means to give these instructions.
- We will use of two types of loops: infinite and count-controlled.

#### Infinite loop

• An infinite loop is a loop that commands the instruction/set of instructions to repeat forever. When an infinite loop is used in a program, there is no way of ending the program, as the command(s) within the loop will be repeated endlessly.

#### Count-controlled loop

• A count-controlled loop is a form of repetition in which a set of commands are carried out a specific number of times.

#### Condition-controlled loop

• A condition-controlled loop is a form of repetition in which a set of commands stop being carried out when a condition is met. The condition could be anything from when 'score' in a game reaches a certain value to when a key on a keyboard has been pressed.

### Technical vocabulary

Circuit	a complete and closed path around which a circulating electric current can flow.
Microcontroller	a control device which incorporates a microprocessor
Infinite	Limitless or endless
Output	a place where power or information leaves a system.
Input	A place where power or information enters a system
Program	a series of coded software instructions to control the operation of a computer or other machine
Component	a part or element of a larger whole, especially a part of a machine or vehicle.
Algorithms	a process or set of rules to be followed in calculations or other problem-solving operations, especially by a computer



### Selection

- When designing programs, there are often points where a decision must be made
- These decisions are known as selections and are implemented in programming using if statements. Selection is used to control the flow of actions in algorithms and programs by checking if a condition has been met. If it has been met, the identified actions will be carried out.
- When selection is used in programs, loops have to be used to instruct the device to check the condition repeatedly. Without using loops, the condition would only be checked once.



## National Curriculum Objectives

### Computing

- 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

### • Science link

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

## Computing: Data and Information

### Follows on from:

- KS1: Floor robots
- KS1: Scratch