

<p><b>Subject:</b> Computing</p> <p><b>Year:</b> 4 – Summer 2 – <b>Programming B – Repetition in Games</b></p> <p><b>National Curriculum objectives</b></p> <ul style="list-style-type: none"> <li>• Design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts;</li> <li>• Use sequence, selection, and repetition in programs; work with variables and various forms of input and output;</li> <li>• Use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs;</li> <li>• 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.</li> </ul> <p><b>To begin this unit, the children should have already learnt:</b></p> <p><u>Year 1 – Moving a Robot (Spring 1)</u> Floor robots have buttons which help us to direct them. We can use algorithms (a set of guidelines to perform a task) to program floor robots along routes.</p> <p><u>Year 1 – Introduction to Animation (Summer 2)</u> Programming is when we make a set of instructions for computers to follow. <i>ScratchJr</i> is a program that we can use in order to code our own stories and animations.</p> <p><u>Year 2</u> We can create simple quizzes in <i>ScratchJr</i> where the user can select an answer by clicking on a sprite. An outcome occurs when the sprite is clicked.</p> <p><u>Year 3</u> We can use event and action command blocks in order to make sprites carry out actions when certain prompts take place. Algorithms (a set of instructions to perform a task) allow us to sequence movements, actions and sounds in order to program effective animations.</p> <p><b><u>Key Enquiry Question</u></b> When is repetition useful in instructions? What outcome do you predict from ___ code? How do count-controlled and infinite loops differ? What action are you expecting to repeat for each object? Which parts of the loop could be changed and what effect will this have? Why is repetition used in ___ project? How can you modify your project to produce a different outcome? How successfully have you and your partner followed the steps to build your project?</p>	<p><b>The learning in this unit will prepare the children to learn these things in the future:</b></p> <p><u>Year 5</u> 'Conditions' can be used in programming: the 'if... then... else...' structure can be used to select different outcomes depending on whether a condition is 'true' or 'false'. Issues with programs can arise when answers similar to those in the condition are given as inputs. We must predict such issues and identify ways to avoid such problems.</p> <p><u>Year 6</u> Micro:bits are small computers that perform different actions based on programs written on computer software. Programs are then downloaded to the micro:bit. Micro:bits have a range of input sensors that can be used as input triggers for different codes to run. Output devices on Micro:bits (e.g. LED displays) can be programmed to display words, pictures and numbers.</p> <p><b><u>The Big Idea:</u></b> Count-controlled and infinite loops can be used to create different examples of repetition in games: using <u>repeat and loop operator</u> blocks in <i>ScratchJr</i> can make our programs more logical and efficient by running code continuously or for a set number of times.</p>
--	---

**To achieve ARE, pupils will need to be secure in the following knowledge:**

**By the end of this unit, children will know:**

- What repeat means;
- Everyday tasks that include repetition as part of a sequence, eg brushing teeth, dance moves;
- We can use a loop command in a program to repeat instructions;
- How to identify a loop within a program;
- How to identify patterns in a sequence;
- In programming, there are indefinite loops and count-controlled loops;
- An indefinite loop will run until the program is stopped;
- You can program a loop to stop after a specific number of times;
- Justify when to use a loop and when not to;
- The importance of instruction order in a loop;
- Recognise that all tools enable more than one process to run at once.

**Vocabulary:**

Programming; *Scratch Jr.*; command; algorithm; sprite; home; block; stage; background; app (introduced in Y1).

Sequence; quiz; debugging (introduced in Y2).

Code; events; motion; trialling (introduced in Y3).

**By the end of this unit, children will be able to do:**

- List an everyday task as a set of instructions including repetition;
- Use an indefinite loop to produce a given outcome;
- Use a count-controlled loop to produce a given outcome;
- Plan a program using appropriate loops to produce a given outcome;
- Recognise tools that enable more than one process to be run at the same time (concurrency);
- Create two or more sequences that run at the same time.

**Useful Resources:**

**Online training courses**

[Raspberry Pi online training courses](#)

*ScratchJr* for iPads and/or computers.



# COMPUTING: PROGRAMMING

## KNOWLEDGE ORGANISER

Y4



### Overview

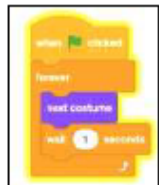
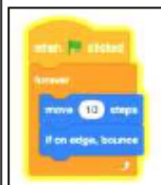
#### Repetition in Scratch



- 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 stories, animations and games. We can use repeat and loop operator blocks in order to make our programs more logical and efficient. These help to run code continuously or for a set number of times.

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



### Loops and Repetition

- **Pen Drawing in Scratch:** Select the 'add extension' icon in the bottom left corner. Then select 'pen.' This allows you to draw with your sprites.



- **The Repeat Block:** Select 'code' and then the 'control' blocks (orange). Here you will find the repeat block. It should be placed around the command blocks that you want to repeat. The number of times something is repeated can be typed into the white area.



- **Creating Shapes:** Selecting 'pen down' (in the 'operators' blocks) can be followed by use of the motion blocks to determine the line that will be drawn (e.g. 'move 10 steps'). Turning a number of degrees changes the direction of the pen. Placing the repeat block around this motion code can allow more complex shapes to be drawn.



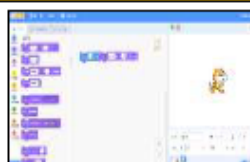
- **Count-Controlled/Infinite Loops:** We can control the number of 'loops' of a command with the number typed into the 'repeat' block. The 'forever' block makes a command continue infinitely (forever).



### The Basics of Scratch

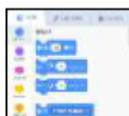
- **What is Scratch?** Scratch is a website/ app that lets us code our own stories, games and animations.

- 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.



### Event Managing and Efficiency

- We should ensure that programs are coded and labelled in easy-to-understand, user-friendly ways.

- Using the 'events' blocks logically can help to make your programming easy to use. E.g. when 's' key pressed a square is drawn, when 'h' key is pressed a hexagon is drawn.



- Efficiency is about getting the right result in the easiest way possible, wasting little time or effort. Our use of the repeat and loop tools should help to create efficient programs.

### 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.

- **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

Scratch

Blocks

Commands

Code

Events

Motion

Sequence

Trialling

Debugging