Computing and ICT Curriculum @ St Johns

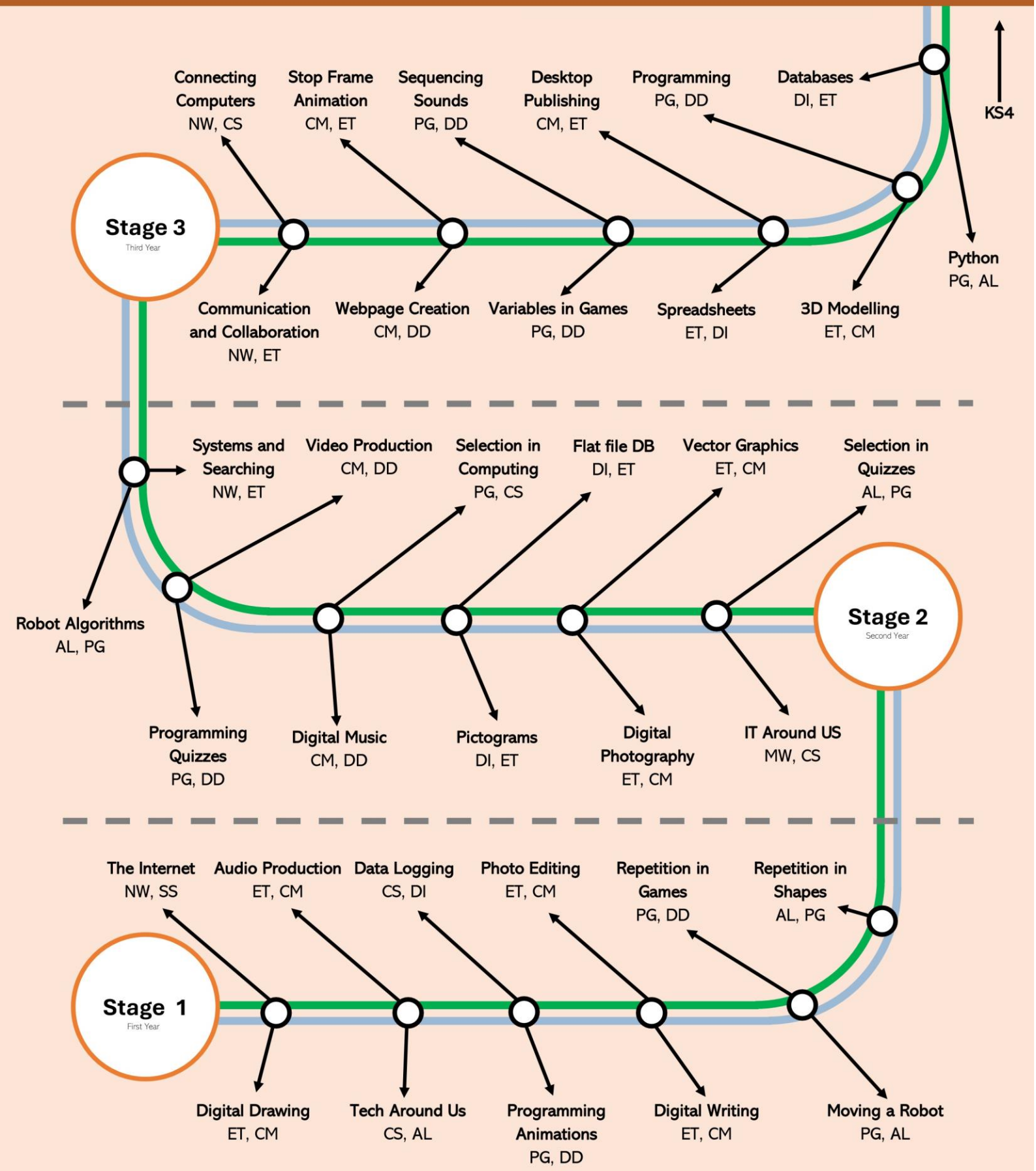
Development map

Formal curriculum

Informal curriculum

Skills Key (Taken from NCCE)

AL Algorithms
CS Computing Systems
CM Creating Media
DI Data & Information
DD Design and Development
ET Effective use of tools
IT Impact of Technology
NW Networks
PG Programming
SS Safety and Security



Semi-Formal Overview

Stage 1 – First year of study at KS3 level

Topic 1 – Digital Drawing	Topic 2 – Tech Around Us	Topic 3 – Programming Animations	Topic 4 – Digital Writing	Topic 5 – Moving a Robot
Students will develop their understanding of a range of tools used for digital painting. They then use these tools to create their own digital paintings, while gaining inspiration from a range of artists' work. The unit concludes with learners considering their preferences when painting with and without the use of digital devices.	Learners will develop their understanding of technology and how it can help them in their everyday lives. They will start to become familiar with the different components of a computer by developing their keyboard and mouse skills. Learners will also consider how to use technology responsibly and who to ask for help if they see any content or comments online that make them feel uncomfortable.	Learners will be introduced to on-screen programming through ScratchJr. Learners will explore the way a project looks by investigating sprites and backgrounds. They will use programming blocks to use, modify, and create programs. Learners will also be introduced to the early stages of program design through the introduction of algorithms.	Learners will develop their understanding of the various aspects of using a computer to create and manipulate text. They will become more familiar with using a keyboard and mouse to enter and remove text. Learners will also consider how to change the look of their text and will be able to justify their reasoning in making these changes. Finally, learners will consider the differences between using a computer to create text and writing text on paper. They will be able to explain which method they prefer and explain their reasoning for choosing this.	Learners will be introduced to early programming concepts. Learners will explore using individual commands, both with other learners and as part of a computer program. They will identify what each command for the floor robot does and use that knowledge to start predicting the outcome of programs. The unit is paced to ensure time is spent on all aspects of programming and builds knowledge in a structured manner. Learners are also introduced to the early stages of program design through the introduction of algorithms.
Key skills (Non-negotiable learning)	**Key skills (Non-negotiable learning)**	**Key skills (Non-negotiable learning)**	**Key skills (Non-negotiable learning)**	**Key skills (Non-negotiable learning)**
Digital Tool Proficiency: Learning to use a variety of digital painting tools, including brushes, shapes, and colors, to create and modify art on a computer. **Creative Application:** Applying digital tools to create original art and to replicate the style of famous artists like **Wassily Kandinsky**. **Critical Evaluation:** Comparing the process of creating art digitally versus on paper and explaining the reasons for personal tool and color choices.	**Understanding technology and its uses** – Recognising what technology is, identifying examples in everyday life, and explaining how it helps us. **Developing basic computer skills** – Learning to use key parts of a computer (mouse, keyboard, screen), practising typing, editing, saving, and opening files. **Using technology safely and responsibly** – Knowing rules for online and offline safety, understanding how	**Exploring programming tools** – Becoming familiar with ScratchJr, using commands to control sprites, and comparing it with other programming tools. **Building and adapting programs** – Joining blocks, changing values, adding sprites, and giving each sprite its own set of instructions. **Designing and creating projects** – Planning algorithms, selecting appropriate sprites and backgrounds,	**Using a keyboard to write** – Recognising keys, entering and removing text, and beginning to type sentences. **Editing and formatting text** – Selecting text, changing its appearance (font, bold, italic, underline), and making thoughtful choices about how writing looks. **Reflecting on writing methods** – Explaining tool choices, comparing typing to handwriting, and deciding	**Understanding commands and sequences** – Linking button presses to outcomes, giving clear directions, and combining movement commands to control a robot. **Developing programming skills** – Creating, testing, and debugging simple sequences to move robots, while predicting what programs will do. **Planning and problem-solving** – Designing routes, exploring more than one solution, and recognising that

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	to stay healthy when using technology, and where to go for help.	programming based on designs, and testing programs to see if they work.	which method is most effective in different situations.	different programs can achieve the same outcome.

Stage 2 – Second year of study at KS3 level

Topic 1 – IT Around Us	Topic 2 – Digital Photography	Topic 3 - Pictograms	Topic 4 – Digital Music	Topic 5 – Programming Quizzes	Topic 6 – Robot Algorithms
Learners will develop their understanding of what information technology (IT) is and will begin to identify examples. They will discuss where they have seen IT in school and beyond, in settings such as shops, hospitals, and libraries. Learners will then investigate how IT improves our world, and they will learn about the importance of using IT responsibly.	Learners will learn to recognise that different devices can be used to capture photographs and will gain experience capturing, editing, and improving photos. Finally, they will use this knowledge to recognise that images they see may not be real.	Learners will begin to understand what the term data means and how data can be collected in the form of a tally chart. They will learn the term 'attribute' and use this to help them organise data. They will then progress onto presenting data visually using software. Learners will use the data presented to answer questions.	In this unit, learners will listen to a variety of pieces of music and consider how music can make them think and feel. Learners will compare creating music digitally and non-digitally. Learners will look at patterns and purposefully create music.	This unit initially recaps on learning from the Year 1 ScratchJr unit 'Programming B – Programming animations'. Learners begin to understand that sequences of commands have an outcome, and make predictions based on their learning. They use and modify designs to create their own quiz questions in ScratchJr, and realise these designs in ScratchJr using blocks of code. Finally, learners evaluate their work and make improvements to their programming projects.	This unit develops learners' understanding of instructions in sequences and the use of logical reasoning to predict outcomes. Learners will use given commands in different orders to investigate how the order affects the outcome. They will also learn about design in programming. They will develop artwork and test it for use in a program. They will design algorithms and then test those algorithms as programs and debug them.
Key skills (Non-negotiable learning)	**Key skills (Non-negotiable learning)**	**Key skills (Non-negotiable learning)**	**Key skills (Non-negotiable learning)**	**Key skills (Non-negotiable learning)**	**Key skills (Non-negotiable learning)**
Recognising IT in everyday life – Identifying computers and IT devices, and exploring how they are used at school, at home, and in the wider world. **Understanding the benefits of IT** – Explaining how IT helps us, how devices can work together, and why it is useful in different contexts.	**Capturing photographs effectively** – Using digital devices to take photos, experimenting with portrait and landscape formats, and applying composition skills such as framing and focus. **Improving photo quality** – Considering lighting, retaking photos to improve them, and	**Collecting and organising data** – Using tally charts to record information, grouping objects and people by attributes, and representing data clearly. **Representing data digitally** – Creating pictograms and block diagrams on a computer to present information in different formats.	**Exploring how music affects us** – Listening to and describing music, recognising rhythms and patterns, and linking sounds to emotions or ideas. **Creating music with technology** – Using computers and instruments to experiment with pitch, tempo, rhythm, and sequences of notes to compose original pieces.	**Understanding sequences and outcomes** – Recognising that programs need a clear start, predicting outcomes of sequences, and creating different results by changing commands. **Designing and building programs** – Using given designs, adapting them, and creating original projects with chosen	**Understanding and following sequences** – Giving clear instructions, recognising the importance of order, and predicting outcomes using logical reasoning. **Designing algorithms and projects** – Planning routes, creating mats and artefacts, and designing algorithms to achieve specific goals.

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Using IT safely and responsibly – Knowing rules for safe use, recognising choices when using IT, and understanding how to use technology in different ways.	using camera tools like flash and autofocus. **Editing and evaluating images** – Using editing tools to apply effects, recognising when images have been altered, and developing awareness that not all photos are real.	**Interpreting and sharing information** – Answering questions and drawing conclusions from data, while understanding when it is or isn't appropriate to share information.	**Refining and reflecting on music** – Reviewing and improving digital compositions, explaining creative choices, and sharing how music makes us feel.	characters, backgrounds, and algorithms. **Improving and debugging** – Comparing projects to designs, making enhancements, and finding and fixing errors to refine programs.	**Decomposing and debugging programs** – Breaking larger tasks into manageable parts, creating algorithms for each part, and testing and correcting errors in programs.

Stage 3 – Third year of study at KS3 level

Topic 1 – Connecting Computers	Topic 2 – Stop Frame Animation	Topic 3 – Sequencing Sounds	Topic 4 – Desktop Publishing	Topic 5 – Branching Database	Topic 6 - Programming
Learners will develop their understanding of digital devices, with an initial focus on inputs, processes, and outputs. They will also compare digital and non-digital devices. Next, learners will be introduced to computer networks, including devices that make up a network's infrastructure, such as wireless access points and switches. Finally, learners will discover the benefits of connecting devices in a network.	Learners will use a range of techniques to create a stop-frame animation. Next, they will apply those skills to create a story-based animation. This unit will conclude with learners adding other types of media to their animation, such as music and text. This unit uses the context of Romans, but this can be adapted to suit your curriculum topics.	This unit explores the concept of sequencing in programming through Scratch. It begins with an introduction to the programming environment, which will be new to most learners. They will be introduced to a selection of motion, sound, and event blocks which they will use to create their own programs, featuring sequences. The final project is to make a representation of a piano. The unit is paced to focus on all aspects of sequences, and make sure that knowledge is built in a structured manner. Learners also apply stages of program design through this unit.	Learners will become familiar with the terms 'text' and 'images' and emojis and understand that they can be used to communicate messages offline and online. They will use desktop publishing software and consider careful choices of font size, colour and type to edit and improve premade documents. Learners will be introduced to the terms 'templates', 'orientation', and 'placeholders' and begin to understand how these can support them in making their own template for a magazine front cover. They will start to add text and images to create their own pieces of work using desktop publishing software. Learners will look at a range of page layouts thinking carefully	Learners will develop their understanding of what a branching database is and how to create one. They will use yes/no questions to gain an understanding of what attributes are and how to use them to sort groups of objects. Learners will create physical and on-screen branching databases. To conclude the unit, they will create an identification tool using a branching database, which they will test by using it. They will also consider real-world applications for branching databases.	This unit explores the links between events and actions, while consolidating prior learning relating to sequencing. Learners begin by moving a sprite in four directions (up, down, left, and right). They then explore movement within the context of a maze, using design to choose an appropriately sized sprite. This unit also introduces programming extensions, through the use of **Pen** blocks. Learners are given the opportunity to draw lines with sprites and change the size and colour of lines. The unit concludes with learners designing and coding their own maze-tracing program.

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			about the purpose of these and evaluate how and why desktop publishing is used in the real world.		
Key skills (Non-negotiable learning)	**Key skills (Non-negotiable learning)**	**Key skills (Non-negotiable learning)**	**Key skills (Non-negotiable learning)**	**Key skills (Non-negotiable learning)**	**Key skills (Non-negotiable learning)**
How digital devices work – Understanding inputs, processes, and outputs, and recognising how digital devices function and can be protected with secure passwords. **Using devices to support work** – Comparing digital and non-digital tools and understanding how devices help us complete tasks more efficiently. **Connecting and networking devices** – Exploring how devices are linked in networks, identifying key components, and understanding the benefits of sharing information across connected devices.	**Understanding and creating animations** – Recognising that animation is a sequence of images, creating flip-book and stop-frame animations, and understanding frame-by-frame movement. **Planning and producing animations** – Using storyboards, planning characters, settings, and events, and applying careful, consistent techniques when creating animations. **Evaluating and enhancing animations** – Reviewing and improving animations, adding media like music and text, and reflecting on creative choices and feedback.	**Exploring the Scratch environment** – Recognising sprites, backdrops, and coding blocks, and understanding that objects have attributes and commands produce outcomes. **Creating sequences and controlling sprites** – Designing and joining blocks into sequences, using events to start programs, combining motion, sounds, and costumes, and understanding the importance of command order. **Designing and implementing projects** – Applying design to create projects, copying code between sprites, testing programs, and producing outcomes such as musical instruments or interactive animations.	**Using text and images to communicate** – Understanding how text, images, and emojis convey messages clearly and appropriately, and recognising the advantages and disadvantages of different formats. **Creating and editing digital content** – Applying skills in font, colour, layout, and templates to add, rearrange, and refine content in a desktop publishing project. **Designing for purpose** – Choosing suitable layouts, understanding editorial roles, and recognising the benefits of desktop publishing compared to creating work by hand.	**Understanding yes/no questions and attributes** – Using yes/no questions to classify objects, selecting attributes, and arranging objects into groups. **Creating and structuring databases** – Planning and building branching databases, ordering questions effectively, and testing to ensure they work. **Applying databases independently** – Designing identification tools, testing with partners, and considering real-world uses of branching databases.	**Moving and controlling sprites** – Using events to move sprites, programming movement in multiple directions, and controlling multiple sprites in a project. **Enhancing programs with features** – Applying extension blocks like Pen, drawing lines, and adding new features to improve and personalise projects. **Debugging and project creation** – Identifying and fixing errors, testing against designs, and designing and implementing a maze-based project independently.

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Digital Drawing

Unit introduction

Students will develop their understanding of a range of tools used for digital painting. They then use these tools to create their own digital paintings, while gaining inspiration from a range of artists' work. The unit concludes with learners considering their preferences when painting with and without the use of digital devices.

Overview of lessons

Lesson	**Brief overview**	**Learning objectives**
1 How can we paint using computers?	This lesson introduces learners to the freehand tools available for digital painting.	To describe what different freehand tools do • I can make marks on a screen and explain which tools I used • I can draw lines on a screen and explain which tools I used • I can use the paint tools to draw a picture
2 Using shape and lines	This lesson introduces learners to the line and shape tools and revisits the fill and undo tools used for digital painting. Learners create their own digital painting in the style of an artist.	To use the shape tool and the line tools • I can make marks with the square and line tools • I can use the shape and line tools effectively • I can use the shape and line tools to recreate the work of an artist
3 Making careful choices	This lesson introduces learners to a range of shape tools, allowing them to create a painting in the style of an artist.	To make careful choices when painting a digital picture • I can choose appropriate shapes • I can make appropriate colour choices

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		• I can create a picture in the style of an artist
4 Why did I choose that?	This lesson increases learners' understanding of the available paint tools and encourages them to select the best tools to create a digital painting in the style of Wassily Kandinsky.	To explain why I chose the tools I used • I can explain that different paint tools do different jobs • I can choose appropriate paint tools and colours to recreate the work of an artist • I can say which tools were helpful and why
5 Painting all by myself	Learners select appropriate colours, brush sizes, and brush tools to independently create their own image in the style of an artist.	To use a computer on my own to paint a picture • I can make dots of colour on the page • I can change the colour and brush sizes • I can use dots of colour to create a picture in the style of an artist on my own
6 Comparing computer art and painting	Learners compare their preferences when creating paintings on computers and on paper.	To compare painting a picture on a computer and on paper • I can explain that pictures can be made in lots of different ways • I can spot the differences between painting on a computer and on paper • I can say whether I prefer painting using a computer or using paper

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Subject knowledge

Before teaching this unit, you should ensure you are familiar with the following:

- Lesson 1: The freehand painting tools in Microsoft Paint or the online app Paintz (paintz.app), or another appropriate digital painting program
- Lesson 2: The style of Piet Mondrian (or another appropriate artist); primary colours; and the line, shape, fill, and undo tools in the digital painting program you've chosen
- Lesson 3: The style of Henri Matisse (or another appropriate artist); the shape, fill, and undo tools in the digital painting program you've chosen
- Lesson 4: The following painting tools in the digital painting program: paintbrush, pencil, fill, erase, undo, shape, and brush styles (eg spray can) if available
- Lesson 5: The following painting tools in the digital painting program: paintbrush, undo, brush sizes, and brush styles if available
- Lesson 6: The following painting tools in the digital painting program: paintbrush, pencil, fill tool, eraser, undo, shape tool, and brush styles if available

Curriculum links

Computing

- Use technology purposefully to create, organise, store, manipulate, and retrieve digital content

Art and Design

- To develop a wide range of art and design techniques in using colour, pattern, texture, line, shape, form, and space
- About the work of a range of artists, craft makers, and designers, describing the differences and similarities between different practices and disciplines and making links to their own work

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Technology Around Us

Unit introduction

Learners will develop their understanding of technology and how it can help them in their everyday lives. They will start to become familiar with the different components of a computer by developing their keyboard and mouse skills. Learners will also consider how to use technology responsibly and who to ask for help if they see any content or comments online that make them feel uncomfortable.

Overview of lessons

Lesson	**Brief overview**	**Learning objectives**
1 Technology around us	Learners will become familiar with the term 'technology'. They will classify what is and what is not technology in their school and/or classroom. Learners will demonstrate their understanding of how technology helps us in different ways. They will be able to explain how to keep themselves safe online and where to go for support when they see content that makes them feel uncomfortable.	To identify technology • I can explain technology as something that helps us • I can locate examples of technology in the classroom • I can explain how these technology examples help us
2 Using technology	Learners will get to know the main parts of a desktop or laptop computer. They will practise turning on and logging in to a computer. The learners will apply their knowledge of the different parts of a computer, to complete a mouse-based task.	To identify a computer and its main parts • I can name the main parts of a computer • I can switch on and log into a computer • I can use a mouse to click and drag

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3 Developing mouse skills	Learners will be building on the mouse skills they were introduced to in Lesson 2. Learners will review images of a computer to explain what each part does. They will develop an understanding that different computers use different mice, but they perform the same function. They will use the mouse to open a program and create a simple picture.	To use a mouse in different ways • I can use a mouse to open a program • I can click and drag to make objects on a screen • I can use a mouse to create a picture
4 Using a computer keyboard	Learners will begin to use the computer keyboard for a purpose. They should understand that writing on a keyboard is called typing and will begin to demonstrate their ability to write their name. Learners will then save their work using the save icon and understand that this icon is used in lots of different programs.	To use a keyboard to type on a computer • I can say what a keyboard is for • I can type my name on a computer • I can save my work to a file
5 Developing keyboard skills	Learners will begin by opening a file they have previously created. They will demonstrate their ability to use a keyboard to edit text, by writing a sentence and then deleting letters. They will also use the keyboard arrow keys to move the text cursor in their textbox.	To use the keyboard to edit text • I can open my work from a file • I can use the arrow keys to move the cursor • I can delete letters
6 Using a computer responsibly	Learners will be introduced to the concept of using computers safely, within the context of a school setting. They will explore why we have rules in school and how those rules help us, and then apply this understanding to rules needed for using computer technology safely.	To create rules for using technology responsibly • I can identify rules to keep us safe and healthy when we are using technology in and beyond the home • I can give examples of some of these rules • I can discuss how we benefit from these rules

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Curriculum links

Computing

- Recognise common uses of information technology beyond school
- Use technology purposefully to create, organise, store, manipulate, and retrieve digital content
- Use technology safely and respectfully, keeping personal information private; identify where to go for help and support when they have concerns about content or contact on the internet or other online technologies.

Education for a Connected World links

Managing Online Information

- I know how to get help from a trusted adult if we see content that makes us feel sad, uncomfortable, worried or frightened.

Self-image and Identity

- If something happens that makes me feel sad, worried, uncomfortable or frightened I can give examples of when and how to speak to an adult I can trust and how they can help.

Health, well-being and lifestyle

- I can explain rules to keep myself safe when using technology both in and beyond the home.

Copyright and ownership

- I can save my work under a suitable title or name so that others know it belongs to me (e.g. filename, name on content).

Art

- to use drawing, painting and sculpture to develop and share their ideas, experiences and imagination

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Programming Animations

Unit introduction

Learners will be introduced to on-screen programming through ScratchJr. Learners will explore the way a project looks by investigating sprites and backgrounds. They will use programming blocks to use, modify, and create programs. Learners will also be introduced to the early stages of program design through the introduction of algorithms.

Overview of lessons

Lesson	**Brief overview**	**Learning objectives**
1 Comparing tools	During this lesson learners will become accustomed to the ScratchJr programming environment. They will discover that they can move characters on-screen using commands, and compare ScratchJr to the Bee-Bots used in the previous unit.	To choose a command for a given purpose • I can find the commands to move a sprite • I can use commands to move a sprite • I can compare different programming tools
2 Joining blocks	During this lesson learners will discover that blocks can be joined together in ScratchJr. They will use a **Start** block to run their programs. They will also learn additional skills such as adding backgrounds and deleting sprites. Learners will follow given algorithms to create simple programs and begin to talk about efficiency.	To show that a series of commands can be joined together • I can use more than one block by joining them together • I can use a **Start** block in a program • I can run my program
3 Make a change	During this lesson learners will discover that some blocks in ScratchJr have numbers underneath them. They will learn how to change these values and identify the effect on a block of changing a value.	To identify the effect of changing a value • I can find blocks that have numbers • I can change the value • I can say what happens when I change a value

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4 Adding sprites	During this lesson learners will be taught how to add and delete sprites in ScratchJr. They will discover that each sprite has its own programming area, and learn how to add programming blocks to give instructions to each of the sprites.	To explain that each sprite has its own instructions • I can show that a project can include more than one sprite • I can delete a sprite • I can add blocks to each of my sprites
5 Project design	During this lesson learners will choose appropriate backgrounds and sprites for a 'Space race' project. They will decide how each sprite will move, and create an algorithm based on the blocks available in ScratchJr that reflects this.	To design the parts of a project • I can choose appropriate artwork for my project • I can decide how each sprite will move • I can create an algorithm for each sprite
6 Following my design	During this lesson learners will use their project designs from the previous lesson to create their projects on-screen in ScratchJr. They will use their project design, including algorithms created in the previous lesson, to make programs for each of their rocket sprites. They will test whether their algorithms are effective when their programs are run.	To use my algorithm to create a program • I can use sprites that match my design • I can add programming blocks based on my algorithm • I can test the programs I have created

Curriculum links

Computing

- Understand what algorithms are, how they are implemented as programs on digital devices, and that programs execute by following precise and unambiguous instructions

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- Create and debug simple programs
- Use logical reasoning to predict the behaviour of simple programs

Maths

Measure

- Sequence events in chronological order using language [for example, before and after, next, first, today, yesterday, tomorrow, morning, afternoon and evening]

Geometry - position and direction

- describe position, direction and movement, including whole, half, quarter and three-quarter turns

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Digital Writing

Unit introduction

Learners will develop their understanding of the various aspects of using a computer to create and manipulate text. They will become more familiar with using a keyboard and mouse to enter and remove text. Learners will also consider how to change the look of their text, and will be able to justify their reasoning in making these changes. Finally, learners will consider the differences between using a computer to create text, and writing text on paper. They will be able to explain which method they prefer and explain their reasoning for choosing this.

Overview of lessons

Lesson	Brief overview	Learning objectives
1 Exploring the keyboard	Learners will familiarise themselves with a word processor and think about how they might use this application in the future. The learners will also identify and find keys, before adding text to their page by pressing keys on a keyboard.	To use a computer to write • I can open a word processor • I can recognise keys on a keyboard • I can identify and find keys on a keyboard
2 Adding and removing text	Learners will continue to familiarise themselves with word processors and how they can interact with the computer using a keyboard. The learners will focus on adding text and will explore more of the keys found on a keyboard. Finally, they will begin to use the Backspace key to remove text from the computer.	To add and remove text on a computer • I can enter text into a computer • I can use letter, number, and Space keys • I can use Backspace to remove text

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3 Exploring the toolbar	Learners will begin to explore the different tools that can be used in word processors to change the look of the text. Learners will use the Caps Lock key to add capital letters to their writing and will begin thinking about how to use this successfully. Learners will match simple descriptions to the related keys. Finally, learners will begin exploring the different buttons available on the toolbar in more detail, and use these to change their own text.	To identify that the look of text can be changed on a computer • I can type capital letters • I can explain what the keys that I have already learnt about do • I can identify the toolbar and use bold, italic, and underline
4 Making changes to text	Learners will begin to understand when it is best to change the look of their text and which tool will achieve the most appropriate outcome. The learners will begin to use their mouse cursor to select text to enable them to make more efficient changes. They will explore the different fonts available to them and change the font for their lost toy poster.	To make careful choices when changing text • I can select a word by double-clicking • I can select all of the text by clicking and dragging • I can change the font
5 Explaining my choices	Learners will begin to justify their use of certain tools when changing text. The learners will decide whether the changes that they have made have improved their writing and will begin to use 'Undo' to remove changes. They will begin to consolidate their ability to select text using the cursor, through double-clicking and clicking and dragging. The learners will be able to explain what tool from the toolbar they have used to change their writing.	To explain why I used the tools that I chose • I can say what tool I used to change the text • I can decide if my changes have improved my writing • I can use 'Undo' to remove changes
6 Pencil or keyboard?	Learners will make comparisons between using a computer for writing and writing on paper. The learners will discuss how the two methods are the same and different and think of examples to explain this. They will demonstrate making changes to writing using a computer to compare the two methods. Finally, the learners will begin to explain which they like best and think about which method would be the best method to use in different situations.	To compare typing on a computer to writing on paper • I can make changes to text on a computer • I can explain the differences between typing and writing • I can say why I prefer typing or writing

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Curriculum links

Computing

- Use technology purposefully to create, organise, store, manipulate, and retrieve digital content
- Use technology safely and respectfully, keeping personal information private; identify where to go for help and support when they have concerns about content or contact on the internet or other online technologies.

English – writing (Y1)

Write sentences by:

- saying out loud what they are going to write about
- composing a sentence orally before writing it
- sequencing sentences to form short narratives
- e-reading what they have written to check that it makes sense

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Moving A Robot

Unit introduction

Learners will be introduced to early programming concepts. Learners will explore using individual commands, both with other learners and as part of a computer program. They will identify what each command for the floor robot does and use that knowledge to start predicting the outcome of programs. The unit is paced to ensure time is spent on all aspects of programming and builds knowledge in a structured manner. Learners are also introduced to the early stages of program design through the introduction of algorithms.

Overview of lessons

Lesson	**Brief overview**	**Learning objectives**
1 Buttons	Learners will be introduced to floor robots. They will talk about what the buttons on a floor robot might do and then try the buttons out. They will spend time linking an outcome to a button press. Learners will consider the direction command buttons, as well as the 'clear memory' and 'run program' buttons.	To explain what a given command will do • I can predict the outcome of a command on a device • I can match a command to an outcome • I can run a command on a device
2 Directions	Learners will think about the language used to give directions and how precise it needs to be. They will also work with a partner to give and follow instructions. These real-world activities should, at suitable points during this lesson, be related to the floor robot introduced in Lesson 1.	To act out a given word • I can follow an instruction • I can recall words that can be acted out • I can give directions
3 Forwards and backwards	Learners will focus on programming the floor robot to move forwards and backwards. They will see that the robot moves forwards and backwards a fixed	To combine 'forwards' and 'backwards' commands to make a sequence

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	distance. This highlights the idea that robots follow a clear, fixed command in a precise and repeatable way. Learners will think about starting the robot from the same place each time. Using the same starting position with fixed commands will allow learners to predict what a program will do. **Note:** This lesson focuses specifically on forward and backward movement only. This is to ensure that learners are developing a depth of knowledge in the concepts surrounding programming, as well as developing their ability to make the robot move. The success criteria for this lesson highlight this and ensure that the learners' knowledge is built in a suitably paced way.	• I can compare forward and backward movements • I can start a sequence from the same place • I can predict the outcome of a sequence involving 'forwards' and 'backwards' commands
4 Four directions	Learners will use 'left turn' and 'right turn' commands along with 'forwards' and 'backwards' commands. Doing this will allow learners to develop slightly more complex programs. Learners will create their programs in this lesson through trial and error, before moving on to planning out their programs in Lesson 5. In Activity 3, learners will predict where given programs will move the robot to. Learners will make their predictions by looking at the commands and matching the program steps to movements.	To combine four direction commands to make sequences • I can compare left and right turns • I can experiment with 'turn' and 'move' commands to move a robot • I can predict the outcome of a sequence involving up to four commands
5 Getting there	Learners will decide what their program will do. They will then create their program and test it on the robot. Where needed, learners will also debug their program.	To plan a simple program • I can explain what my program should do • I can choose the order of commands in a sequence • I can debug my program
6 Routes	Learners will be encouraged to plan routes around a mat before they start to write programs for those routes. The activities in this lesson also introduce the concept of there being more than one way to solve a problem. This concept is	To find more than one solution to a problem • I can identify several possible solutions

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	valid for a lot of programming activities: the same outcome can be achieved through a number of different approaches, and there is not necessarily a 'right' approach. The lesson also introduces the idea of program design, where learners need to plan what they want their program to achieve before they start programming.	• I can plan two programs • I can use two different programs to get to the same place

Curriculum links

Computing

- understand what algorithms are; how they are implemented as programs on digital devices; and that programs execute by following precise and unambiguous instructions
- create and debug simple programs
- use logical reasoning to predict the behaviour of simple programs
- recognise common uses of information technology beyond school

Maths

Measure

- sequence events in chronological order using language [for example, before and after, next, first, today, yesterday, tomorrow, morning, afternoon and evening]

Geometry - position and direction describe position, direction and movement, including whole, half, quarter and three-quarter turns

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IT Around Us

Unit introduction

Learners will develop their understanding of what information technology (IT) is and will begin to identify examples. They will discuss where they have seen IT in school and beyond, in settings such as shops, hospitals, and libraries. Learners will then investigate how IT improves our world, and they will learn about the importance of using IT responsibly.

Overview of lessons

Lesson	**Brief overview**	**Learning objectives**
1 What is IT?	Learners will develop their understanding of what information technology (IT) is. They will identify devices that are computers and consider how IT can help them both at school and beyond.	To recognise the uses and features of information technology • I can identify examples of computers • I can describe some uses of computers • I can identify that a computer is a part of IT
2 IT in school	Learners will consider common uses of information technology in a context that they are familiar with. They will identify examples of IT and be able to explain the purpose of different examples of IT in the school setting.	To identify the uses of information technology in the school • I can identify examples of IT • I can sort school IT by what it's used for • I can identify that some IT can be used in more than one way

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3 IT in the world	Learners will begin to explore IT in environments beyond school, including home and familiar places such as shops. They will talk about the uses of IT in these environments and be able to explain that IT is used in many workplaces.	To identify information technology beyond school • I can find examples of information technology • I can sort IT by where it is found • I can talk about uses of information technology
4 The benefits of IT	Learners will explore the benefits of using IT in the wider world. They will focus on the use of IT in a shop and how devices can work together. Learners will sort activities based on whether they use IT or not and will be able to say why we use IT.	To explain how information technology helps us • I can recognise common types of technology • I can demonstrate how IT devices work together • I can say why we use IT
5 Using IT safely	Learners will consider how they use different forms of information technology safely, in a range of different environments. They will list different uses of IT and	To explain how to use information technology safely

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	talk about the different rules that might be associated with using them. Learners will then say how rules can help keep them safe when using IT.	• I can list different uses of information technology • I can talk about different rules for using IT • I can say how rules can help keep me safe
6 Using IT in different ways	Learners will think about the choices that are made when using information technology, and the responsibility associated with those choices. They will use IT in different types of activities and explain that sometimes they will need to use IT in different ways.	To recognise that choices are made when using information technology • I can identify the choices that I make when using IT • I can use IT for different types of activities • I can explain the need to use IT in different ways

Curriculum links

Computing

- Use technology purposefully to create, organise, store, manipulate, and retrieve digital content
- Recognise common uses of information technology beyond school
- Use technology safely and respectfully, keeping personal information private; identify where to go for help and support when they have concerns about content or contact on the internet or other online technologies

Education for a Connected World links

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Health, well-being, and lifestyle

- I can say how those rules / guides can help anyone accessing online technologies

Maths

- add and subtract numbers using concrete objects, pictorial representations, and mentally (Lesson 4)

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Digital Photography

Unit introduction

Learners will learn to recognise that different devices can be used to capture photographs and will gain experience capturing, editing, and improving photos. Finally, they will use this knowledge to recognise that images they see may not be real.

Overview of lessons

Lesson	Brief overview	Learning objectives
1 Taking photographs	This lesson introduces the concept that many devices can be used to take photographs. In the lesson, learners begin to capture their own photographs.	To use a digital device to take a photograph • I can recognise what devices can be used to take photographs • I can talk about how to take a photograph • I can explain what I did to capture a digital photo
2 Landscape or portrait?	A photograph can be taken in either portrait or landscape format. In this lesson, learners explore taking photographs in both portrait and landscape formats and explore the reasons why a photographer may favour one over the other.	To make choices when taking a photograph • I can explain the process of taking a good photograph • I can take photos in both landscape and portrait format • I can explain why a photo looks better in portrait or landscape format

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3 What makes a good photograph?	A photograph is composed by a photographer. In this lesson, learners discover what constitutes good photography composition and put this into practice by composing and capturing photos of their own.	To describe what makes a good photograph • I can identify what is wrong with a photograph • I can discuss how to take a good photograph • I can improve a photograph by retaking it
4 Lighting	This lesson introduces the concepts of light and focus as further important aspects of good photography composition. In this lesson, learners investigate the effect that good lighting has on the quality of the photos they take, and explore what effect using the camera flash and adding an artificial light source have on their photos. They also learn how the camera autofocus tool can be used to make an object in an image stand out.	To decide how photographs can be improved • I can explore the effect that light has on a photo • I can experiment with different light sources • I can explain why a picture may be unclear
5 Effects	This lesson introduces the concept of simple image editing. Learners are introduced to the image editing software and use the 'Adjust' tools to change the colour effect of an image.	To use tools to change an image • I can recognise that images can be changed • I can use a tool to achieve a desired effect • I can explain my choices
6 Is it real?	This lesson introduces the concept that images can be changed for a purpose. Learners are introduced to a range of images that have been changed in different ways and through this, develop an awareness that not all images they see are real. To start the lesson, learners are first challenged to take their best photograph by applying the photography composition skills that they have developed during the unit.	To recognise that photos can be changed • I can apply a range of photography skills to capture a photo • I can recognise which photos have been changed • I can identify which photos are real and which have been changed

Curriculum links

Computing

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- Use technology purposefully to create, organise, store, manipulate, and retrieve digital content
- Recognise common uses of information technology beyond school
- Use technology safely and respectfully, keeping personal information private; identify where to go for help and support when they have concerns about content or contact on the internet or other online technologies

Art and design

- To develop a wide range of art and design techniques in using colour, pattern, texture, line, shape, form, and space (Lessons 4 and 5)

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Pictograms

Unit introduction

Learners will begin to understand what the term data means and how data can be collected in the form of a tally chart. They will learn the term ‘attribute’ and use this to help them organise data. They will then progress onto presenting data visually using software. Learners will use the data presented to answer questions.

Overview of lessons

Lesson	**Brief overview**	**Learning objectives**
1 Counting and comparing	During this lesson learners will begin to understand the importance of organising data effectively for counting and comparing. They will create their own tally charts to organise data, and represent the tally count as a total. Finally, they will answer questions comparing totals in tally charts using vocabulary such as ‘more than’ and ‘less than’.	To recognise that we can count and compare objects using tally charts • I can record data in a tally chart • I can represent a tally count as a total • I can compare totals in a tally chart
2 Enter the data	During this lesson learners will become familiar with the term ‘pictogram’. They will create pictograms manually and then progress to creating them using a computer. Learners will begin to understand the advantages of using computers rather than manual methods to create pictograms, and use this to answer simple questions.	To recognise that objects can be represented as pictures • I can enter data onto a computer • I can use a computer to view data in a different format • I can use pictograms to answer simple questions about objects

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3 Creating pictograms	During this lesson learners will think about the importance of effective data collection and will consider the benefits of different data collection methods: why, for example, we would use a pictogram to display the data collected. They will collect data to create a tally chart and use this to make a pictogram on a computer. Learners will explain what their finished pictogram shows by writing a range of statements to describe this.	To create a pictogram • I can organise data in a tally chart • I can use a tally chart to create a pictogram • I can explain what the pictogram shows
4 What is an attribute?	During this lesson learners will think about ways in which objects can be grouped by attribute. They will then tally objects using a common attribute and present the data in the form of a pictogram. Learners will answer questions based on their pictograms using mathematical vocabulary such as 'more than'/'less than' and 'most'/'least'.	To select objects by attribute and make comparisons • I can tally objects using a common attribute • I can create a pictogram to arrange objects by an attribute • I can answer 'more than'/'less than' and 'most/least' questions about an attribute
5 Comparing people	During this lesson learners will understand that people can be described by attributes. They will practise using attributes to describe images of people and the other learners in the class. The learners will collect data needed to organise people using attributes and create a pictogram to show this pictorially. Finally, learners will draw conclusions from their pictograms and share their findings.	To recognise that people can be described by attributes • I can choose a suitable attribute to compare people • I can collect the data I need • I can create a pictogram and draw conclusions from it
6 Presenting information	During this lesson learners will understand that there are other ways to present data than using tally charts and pictograms. They will use a pre-made tally chart to create a block diagram on their device. Learners will then share their data with a partner and discuss their findings. They will consider whether it is always OK to share data and when it is not OK. They will know that it is alright to say no if someone asks for their data, and how to report their concerns.	To explain that we can present information using a computer • I can use a computer program to present information in different ways • I can share what I have found out using a

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		computer • I can give simple examples of why information should not be shared

Curriculum links

Computing

- use technology purposefully to create, organise, store, manipulate and retrieve digital content
- use technology safely and respectfully, keeping personal information private; identify where to go for help and support when they have concerns about content or contact on the internet or other online technologies

Maths

Building on Year 1 number and place value:

- Identify and represent numbers using objects and pictorial representations including the number line, and use the language of: 'equal to', 'more than', 'less than' ('fewer'), 'most', 'least'

Year 2

- interpret and construct simple pictograms, tally charts, block diagrams and simple tables
- ask and answer simple questions by counting the number of objects in each category and sorting the categories by quantity
- ask and answer questions about totalling and comparing categorical data

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Digital Music

Unit introduction

In this unit, learners will listen to a variety of pieces of music and consider how music can make them think and feel. Learners will compare creating music digitally and non-digitally. Learners will look at patterns and purposefully create music.

Overview of lessons

Lesson	**Brief overview**	**Learning objectives**
1 How music makes us feel	In this lesson learners will listen to and compare two pieces of music from *The Planets* by Gustav Holst. They will then use a musical description word bank to describe how this music generates emotions, i.e. how it makes them feel.	To say how music can make us feel • I can identify simple differences in pieces of music • I can describe music using adjectives • I can say what I do and don't like about a piece of music
2 Rhythms and patterns	In this lesson, learners will explore **rhythm**. They will create patterns and use those patterns as rhythms. They will use untuned percussion instruments and computers to hear the different rhythm patterns that they create.	To identify that there are patterns in music • I can create a rhythm pattern • I can play an instrument following a rhythm pattern • I can explain that music is created and played by humans
3 How music can be used	During this lesson, learners will explore how music can be used in different ways to express emotions and to trigger their imaginations. They will experiment with	To experiment with sound using a computer • I can connect images with sounds • I can use a computer to experiment with pitch

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	the pitch of notes to create their own piece of music, which they will then associate with a physical object — in this case, an animal.	• I can relate an idea to a piece of music
4 Notes and tempo	In this lesson, learners will develop their understanding of music. They will use a computer to create and refine musical patterns.	To use a computer to create a musical pattern • I can identify that music is a sequence of notes • I can explain how my music can be played in different ways • I can refine my musical pattern on a computer
5 Creating digital music	In this lesson, learners will choose an animal and create a piece of music using the animal as inspiration. They will think about their animal moving and create a rhythm pattern from that. Once they have defined a rhythm, they will create a musical pattern (melody) to go with it.	To create music for a purpose • I can create a rhythm which represents an animal I've chosen • I can create my animal's rhythm on a computer • I can add a sequence of notes to my rhythm
6 Reviewing and editing music	In this lesson, learners will retrieve and review their work. They will spend time making improvements and then share their work with the class.	To review and refine our computer work • I can review my work • I can explain how I changed my work • I can listen to music and describe how it makes me feel

Curriculum links

Computing national curriculum links

- Use technology purposefully to create, organise, store, manipulate, and retrieve digital content
- Use technology safely and respectfully, keeping personal information private; identify where to go for help and support when they have concerns about content or contact on the internet or other online technologies

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Music national curriculum links

- Play tuned and untuned instruments musically
- Listen with concentration and understanding to a range of high-quality live and recorded music
- Experiment with, create, select, and combine sounds using the interrelated dimensions of music

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Programming Quizzes

Unit introduction

This unit initially recaps on learning from the Year 1 ScratchJr unit 'Programming B – Programming animations'. Learners begin to understand that sequences of commands have an outcome, and make predictions based on their learning. They use and modify designs to create their own quiz questions in ScratchJr, and realise these designs in ScratchJr using blocks of code. Finally, learners evaluate their work and make improvements to their programming projects.

Overview of lessons

Lesson	**Brief overview**	**Learning objectives**
ScratchJr recap	During this lesson, learners will recap what they know already about the ScratchJr app. They will begin to identify the start of sequences in real-world scenarios, and learn that sequences need to be started in ScratchJr. Learners will create programs and run them in full-screen mode using the **Green flag**.	To explain that a sequence of commands has a start • I can identify the start of a sequence • I can identify that a program needs to be started • I can show how to run my program
Outcomes	During this lesson, learners will discover that a sequence of commands has an 'outcome'. They will predict the outcomes of real-life scenarios and a range of small programs in ScratchJr. Learners will then match programs that produce the same outcome when run, and use a set of blocks to create programs that produce different outcomes when run.	To explain that a sequence of commands has an outcome • I can predict the outcome of a sequence of commands • I can match two sequences with the same outcome • I can change the outcome of a sequence of commands

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Using a design	During this lesson, learners will be taught how to use the **Start on tap** and **Go to page** (**Change background**) blocks. They will use a predefined design to create an animation based on the seasons. Learners will then be introduced to the task for the next lesson. They will predict what a given algorithm might mean.	To create a program using a given design • I can work out the actions of a sprite in an algorithm • I can decide which blocks to use to meet the design • I can build the sequences of blocks I need
Changing a design	During this lesson, learners will look at an existing quiz design and think about how this can be realised within the ScratchJr app. They will choose backgrounds and characters for their own quiz projects. Learners will modify a given design sheet and create their own quiz questions in ScratchJr.	To change a given design • I can choose backgrounds for the design • I can choose characters for the design • I can create a program based on the new design
Designing and creating a program	During this lesson, learners will create their own quiz question designs including their own choices of question, artwork, and algorithms. They will increase the number of blocks used within their sequences to create more complex programs.	To create a program using my own design • I can choose the images for my own design • I can create an algorithm • I can build sequences of blocks to match my design
Evaluating	During this lesson, learners will compare their projects to their designs. They will think about how they could improve their designs by adding additional features. They will modify their designs and implement the changes on their devices.	To decide how my project can be improved • I can compare my project to my design • I can improve my project by adding features

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	Learners will find and correct errors in programs (debug) and discuss whether they debugged errors in their own projects.	• I can debug my program

Curriculum links

Computing

- Understand what algorithms are, how they are implemented as programs on digital devices, and that programs execute by following precise and unambiguous instructions
- Create and debug simple programs
- Use logical reasoning to predict the behaviour of simple programs
- Use technology purposefully to create, organise, store, manipulate and retrieve digital content
- Use logical reasoning to predict the behaviour of simple programs

Maths

Measure

- sequence events in chronological order using language [for example, before and after, next, first, today, yesterday, tomorrow, morning, afternoon and evening]

Geometry - position and direction

- describe position, direction and movement, including whole, half, quarter and three-quarter turns

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Programming Robots

Unit introduction

This unit develops learners' understanding of instructions in sequences and the use of logical reasoning to predict outcomes. Learners will use given commands in different orders to investigate how the order affects the outcome. They will also learn about design in programming. They will develop artwork and test it for use in a program. They will design algorithms and then test those algorithms as programs and debug them.

Overview of lessons

Lesson	**Brief overview**	**Learning objectives**
1 Giving instructions	Learners will follow instructions given to them and give instructions to others. They will consider the language used to give instructions, and how that language needs to be clear and precise. Learners will combine several instructions into a sequence that can then be issued to another learner to complete. They will then consider a clear and precise set of instructions in relation to an algorithm, and will think about how computers can only follow clear and unambiguous instructions.	To describe a series of instructions as a sequence • I can follow instructions given by someone else • I can choose a series of words that can be acted out as a sequence • I can give clear instructions
2 Same but different	Learners will focus on sequences, and consider the importance of the order of instructions within a sequence. They will create sequences using the same instructions in different orders. They will then test these sequences to see how the different orders affect the outcome.	To explain what happens when we change the order of instructions • I can use the same instructions to create different algorithms • I can use an algorithm to program a sequence on a floor robot

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		• I can show the difference in outcomes between two sequences that consist of the same instructions
3 Making predictions	Learners will use logical reasoning to make predictions. They will follow a program step by step and identify what the outcome will be. **Note:** Learners may need to be encouraged to think through their predictions and understand that they are reasoned decisions rather than guesses.	To use logical reasoning to predict the outcome of a program • I can follow a sequence • I can predict the outcome of a sequence • I can compare my prediction to the program outcome
4 Mats and routes	Learners will design, create, and test a mat for a floor robot. This will introduce the idea that design in programming not only includes code and algorithms, but also artefacts related to the project, such as artwork. **Note:** The designs in this lesson can be changed to suit a topic or theme that the class is learning about. The ideas included in the slides are examples.	To explain that programming projects can have code and artwork • I can explain the choices that I made for my mat design • I can identify different routes around my mat • I can test my mat to make sure that it is usable
5 Algorithm design	Learners will design an algorithm to move their robot around the mat that they designed in Lesson 4. As part of the design process, learners will outline what their task is by identifying the starting and finishing points of a route. This outlining will ensure that learners clearly understand what they want their program to achieve.	To design an algorithm • I can explain what my algorithm should achieve • I can create an algorithm to meet my goal • I can use my algorithm to create a program
6 Break it down	Learners will take on a larger programming task. They will break the task into chunks and create algorithms for each chunk. This process is known	To create and debug a program that I have written • I can test and debug each part of the program

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	as ‘decomposition’ and is covered further in key stage 2. Learners will also find and fix errors in their algorithms and programs. They will understand this process to be ‘debugging’.	• I can plan algorithms for different parts of a task • I can put together the different parts of my program

Curriculum links

Computing

- Understand what algorithms are, how they are implemented as programs on digital devices, and that programs execute by following precise and unambiguous instructions
- Create and debug simple programs
- Use logical reasoning to predict the behaviour of simple programs

Maths

Measure

- sequence events in chronological order using language [for example, before and after, next, first, today, yesterday, tomorrow, morning, afternoon and evening]

Geometry - position and direction

- describe position, direction and movement, including whole, half, quarter and three-quarter turns

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Connecting Computers

Unit introduction

Learners will develop their understanding of digital devices, with an initial focus on inputs, processes, and outputs. They will also compare digital and non-digital devices. Next, learners will be introduced to computer networks, including devices that make up a network's infrastructure, such as wireless access points and switches. Finally, learners will discover the benefits of connecting devices in a network.

Overview of lessons

Lesson	**Brief overview**	**Learning objectives**
1 How does a digital device work?	This lesson introduces the concepts of input, process, and output and how to protect devices using secure passwords. These concepts are fundamental to all digital devices.	To explain how digital devices function • I can explain that digital devices accept inputs • I can explain that digital devices produce outputs • I can follow a process • I can explain what makes a secure password
2 What parts make up a digital device?	Learners will develop their knowledge of the relationship between inputs, processes, and outputs and apply it to devices and parts of devices that they will be familiar with from their everyday surroundings.	To identify input and output devices • I can classify input and output devices • I can describe a simple process • I can design a digital device
3 How do digital devices help us?	Learners will apply their learning from Lessons 1 and 2 by using programs in conjunction with inputs and outputs on a digital device. They will create two pieces of work with the same focus, using digital devices to create one piece of	To recognise how digital devices can change the way that we work

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	work, and non-digital tools to create the other. Learners will then compare and contrast the two approaches.	• I can explain how I use digital devices for different activities • I can recognise similarities between using digital devices and using non-digital tools • I can suggest differences between using digital devices and using non-digital tools
4 How am I connected?	Many digital devices are now connected to other digital devices, e.g. computers through wires, tablets through Wi-Fi, and smartphones through mobile phone networks. The benefit of connecting digital devices is that it allows information to be shared between users and systems. This lesson introduces the concept of connections and moving information between connected devices. Learners will learn to explain how and why computers are joined together to form networks.	To explain how a computer network can be used to share information • I can recognise different connections • I can explain how messages are passed through multiple connections • I can discuss why we need a network switch
5 How are computers connected?	This lesson introduces key network components, including a server and wireless access points. Learners will examine each device's functionality and look at the benefits of networking computers.	To explore how digital devices can be connected • I can recognise that a computer network is made up of a number of devices • I can demonstrate how information can be passed between devices • I can explain the role of a switch, server, and wireless access point in a network
6 What does our school network look like?	Learners will further develop their understanding of computer networks. They will see examples of network infrastructure in a real-world setting and relate them to the activities in Lesson 5.	To recognise the physical components of a network • I can identify how devices in a network are connected together

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		• I can identify networked devices around me • I can identify the benefits of computer networks

Curriculum links

Education for a Connected World links

Privacy and Security

- I can describe simple strategies for creating and keeping passwords private.

Maths

- **Number and place value:** solve number problems and practical problems involving these ideas.

Art

- to improve their mastery of art and design techniques, including drawing, painting and sculpture with a range of materials [for example, pencil, charcoal, paint, clay

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Stop Frame Animation

Unit introduction

Learners will use a range of techniques to create a stop-frame animation. Next, they will apply those skills to create a story-based animation. This unit will conclude with learners adding other types of media to their animation, such as music and text. This unit uses the context of Romans, but this can be adapted to suit your curriculum topics.

Overview of lessons

Lesson	**Brief overview**	**Learning objectives**
1 Can a picture move?	Learners will discuss whether they think a picture can move. They will learn about simple animation techniques and create their own animations in the style of flip books (flick books) using sticky notes.	To explain that animation is a sequence of drawings or photographs • I can draw a sequence of pictures • I can create an effective flip book—style animation • I can explain how an animation/flip book works
2 Frame by frame	In the previous lesson, learners created their own flip book–style animations. In this lesson, they will develop this knowledge and apply it to make a stop-frame animation using a tablet.	To relate animated movement with a sequence of images • I can predict what an animation will look like • I can explain why little changes are needed for each frame • I can create an effective stop-frame animation

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3 What's the story?	In this lesson, learners will be introduced to the job of an animator and will start to think like one in planning their creations. Remind the learners of the animations that we created last week and tell them that next week we will use tablets to animate some of our own stories. Tell the learners that during this lesson they will create a storyboard showing the characters, settings and events that they would like to include in their own stop-frame animation next week.	To plan an animation • I can break down a story into settings, characters and events • I can describe an animation that is achievable on screen • I can create a storyboard
4 Picture perfect	In the previous lesson, learners planned out their own stop-frame animations in a storyboard. This lesson, they will use tablets to carefully create stop-frame animations, paying attention to consistency.	To identify the need to work consistently and carefully • I can use onion skinning to help me make small changes between frames • I can review a sequence of frames to check my work • I can evaluate the quality of my animation
5 Evaluate and make it great!	Last lesson, learners created their own stop-frame animations. This lesson, they will evaluate their animations and try to improve them by creating a brand-new animation based on their feedback.	To review and improve an animation • I can explain ways to make my animation better • I can evaluate another learner's animation • I can improve my animation based on feedback

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6 Lights, camera, action!	Last lesson, learners perfected their stop-frame animations. This lesson, they will add other media and effects into their animations, such as music and text.	To evaluate the impact of adding other media to an animation • I can add other media to my animation • I can explain why I added other media to my animation • I can evaluate my final film

Curriculum links

English

- Pupils should be taught to: draft and write by: in narratives, creating settings, characters and plot
- Pupils should be taught to: proof-read for spelling and punctuation errors

History

- The Roman Empire and its impact on Britain

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Sequencing Sounds

Unit introduction

This unit explores the concept of sequencing in programming through Scratch. It begins with an introduction to the programming environment, which will be new to most learners. They will be introduced to a selection of motion, sound, and event blocks which they will use to create their own programs, featuring sequences. The final project is to make a representation of a piano. The unit is paced to focus on all aspects of sequences, and make sure that knowledge is built in a structured manner. Learners also apply stages of program design through this unit.

Overview of lessons

Lesson	**Brief overview**	**Learning objectives**
1. Introduction to Scratch	This lesson introduces learners to a new programming environment: Scratch. Learners will begin by comparing Scratch to other programming environments they may have experienced, before familiarising themselves with the basic layout of the screen.	To explore a new programming environment • I can identify the objects in a Scratch project (sprites, backdrops) • I can explain that objects in Scratch have attributes (linked to) • I can recognise that commands in Scratch are represented as blocks

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2. Programming sprites	In this lesson, learners will create movement for more than one sprite. In doing this, they will design and implement their code, and then will create code to replicate a given outcome. Finally, they will experiment with new motion blocks.	To identify that commands have an outcome • I can create a program following a design and understand that each sprite is controlled by the commands I choose • I can predict the coding blocks used to move a sprite • I can match coding blocks to their actions
3. Sequences	In this lesson, learners will be introduced to the concept of sequences by joining blocks of code together. They will also learn how event blocks can be used to start a project in a variety of different ways. In doing this, they will apply principles of design to plan and create a project.	To explain that a program has a start • I can start a program in different ways • I can create a sequence of connected commands • I can explain that the objects in my project will respond exactly to the code
4. Ordering commands	This lesson explores sequences, and how they are implemented in a simple program. Learners have the opportunity to experiment with sequences where order is and is not important. They will create their own sequences from given designs.	To recognise that a sequence of commands can have an order • I can explain what a sequence is • I can combine sound commands • I can order notes into a sequence
5. Looking good	This lesson develops learners' understanding of sequences by giving them the opportunity to combine motion and sounds in one sequence. They will also learn how to use costumes to change the appearance of a sprite, and backdrops to change the appearance of the stage. They will apply the skills in Activity 1 and 2 to design and create their own project, including sequences, sprites with costumes, and multiple backdrops.	To change the appearance of my project • I can build a sequence of commands • I can decide the actions for each sprite in a program • I can make design choices for my artwork

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6. Making an instrument	In this lesson, learners will create a musical instrument in Scratch. They will apply the concept of design to help develop programs and use programming blocks — which they have been introduced to throughout the unit. They will learn that code can be copied from one sprite to another, and that projects should be tested to see if they perform as expected.	To create a project from a task description • I can identify and name the objects I will need for a project • I can relate a task description to a design • I can implement my algorithm as code

Curriculum links

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

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Desktop publishing

Unit introduction

Learners will become familiar with the terms ‘text’ and ‘images’ and emojis and understand that they can be used to communicate messages offline and online. They will use desktop publishing software and consider careful choices of font size, colour and type to edit and improve premade documents. Learners will be introduced to the terms ‘templates’, ‘orientation’, and ‘placeholders’ and begin to understand how these can support them in making their own template for a magazine front cover. They will start to add text and images to create their own pieces of work using desktop publishing software. Learners will look at a range of page layouts thinking carefully about the purpose of these and evaluate how and why desktop publishing is used in the real world.

The suggested application for this unit is Canva https://www.canva.com/ . Canva is web based and can be used on tablets, desktops and laptops. Mac, Windows and Android apps are available: https://www.canva.com/download/windows/ .

Students below the age of 13 require parental consent to use Canva for Education. For further details and to download a sample consent template visit: https://www.canva.com/help/invite-teachers-and-students/

To use Canva as a teacher, you will require a Canva for Education account. To learn more and sign up for a FREE Canva teacher account visit: https://www.canva.com/help/about-canva-for-education/.

Overview of lessons

Lesson	**Brief overview**	**Learning objectives**
1. Words and pictures	In this lesson, learners will become familiar with the terms ‘text’ and ‘images’ and understand that text and images need to be used carefully to communicate messages clearly. Learners will be able to give advantages and disadvantages of using text, images, emojis or both text. Images and emojis to communicate messages effectively online.	To recognise how text and images convey information • I can explain the difference between text and images • I can recognise that text and images can communicate messages clearly

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		• I can identify the advantages and disadvantages of using text and images • I understand how to use emojis respectfully online
2. Can you edit it?	This lesson will build on last week's lesson, in which we looked at using images and text to communicate a message effectively. In this lesson we will look at desktop publishing. Learners will think about how to make careful choices regarding font size, colour, and type in an invitation. The use of the Return, Backspace, and Shift keys will be explored and learners will be taught how to type age-appropriate punctuation marks. This will build on the typing skills learned in the Year 1 'Digital writing' unit. Learners will understand that once content has been added, it can be rearranged on the page.	To recognise that text and layout can be edited • I can change font style, size, and colours for a given purpose • I can edit text • I can explain that text can be changed to communicate more clearly
3. Great template!	In this lesson, pupils will look at the role of an editorial designer, being the person who is responsible for putting content together. Learners will be introduced to the terms 'templates', 'orientation', and 'placeholders' within desktop publishing software. The learners will create their own magazine template, which they will add content to during the next lesson.	To choose appropriate page settings • I can explain what 'page orientation' means • I can recognise placeholders and say why they are important • I can create a template for a particular purpose

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	This lesson has been designed on a laptop using Canva and this is reflected in the slides. Teachers may decide to use Canva, or other software such as Microsoft Publisher.	
4. Becoming a designer	In this lesson, learners will add their own content (text and images) to the magazine templates they created in lesson 3. They will copy the information for the front of their magazine from a prewritten document and paste it into the chosen place on their magazine cover. Images will be added from within the search facility in Canva. Learners will recap the role of an editorial designer (introduced to them in lesson three) exploring elements of the job role in more detail.	To add content to a desktop publishing publication • I can choose the best locations for my content • I can paste text and images to create a magazine cover • I can make changes to content after I've added it
5. Lay it out	In this lesson, learners will think about the different ways information can be laid out on a page. They will look at a range of page layouts such as letters and newspapers, and begin to think about the purpose of each of these.	To consider how different layouts can suit different purposes • I can identify different layouts • I can match a layout to a purpose • I can choose a suitable layout for a given purpose
6. Why desktop publishing?	In this lesson, learners will explain what desktop publishing means in their own words. They will think about how desktop publishing is used in the wider world and consider the benefits of using desktop publishing applications.	To consider the benefits of desktop publishing • I can identify the uses of desktop publishing in the real world • I can say why desktop publishing might be helpful

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		• I can compare work made on desktop publishing to work created by hand

Common Misconceptions

Learners may have misconceptions around typing skills. They should be aware that caps lock should only be used if they are typing a full sentence in capital letters. Shift should be used for single letters, as this is more efficient and uses fewer key presses. There may also be misconceptions around the delete and backspace keys. The backspace key deletes to the left of the cursor, and the delete key deletes to the right. When considering their design, learners may think the more colours and effects used, the better their document, however, encourage them to consider the audience and accessibility.

Curriculum links

English programmes of study links

- Pupils should be taught to draft and write by: in non-narrative material, using simple organisational devices [for example, headings and subheadings]
- Evaluate and edit by assessing the effectiveness of their own and others' writing and suggesting improvements
- Proofread for spelling and punctuation errors

Education for a Connected World links

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Branching databases

Unit introduction

Learners will develop their understanding of what a branching database is and how to create one. They will use yes/no questions to gain an understanding of what attributes are and how to use them to sort groups of objects. Learners will create physical and on-screen branching databases. To conclude the unit, they will create an identification tool using a branching database, which they will test by using it. They will also consider real-world applications for branching databases.

Overview of lessons

Lesson	**Brief overview**	**Learning objectives**
1 Yes or no questions	Learners will start to explore questions with yes/no answers, and how these can be used to identify and compare objects. They will create their own yes/no questions, before using these to split a collection of objects into groups.	To create questions with yes/no answers • I can investigate questions with yes/no answers • I can make up a yes/no question about a collection of objects • I can create two groups of objects separated by one attribute
2 Making groups	Learners will develop their understanding of using questions with yes/no answers to group objects more than once. They will learn how to arrange objects into a tree structure and will continue to think about which attributes the questions are related to.	To identify the attributes needed to collect data about an object • I can select an attribute to separate objects into groups • I can create a group of objects within an existing group

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		• I can arrange objects into a tree structure
3 Creating a branching database	Learners will continue to develop their understanding of ordering objects/images in a branching database structure. They will learn how to use an online database tool to arrange objects into a branching database, and will create their own questions with yes/no answers. Learners will show that their branching database works through testing.	To create a branching database • I can select objects to arrange in a branching database • I can group objects using my own yes/no questions • I can test my branching database to see if it works
4 Structuring a branching database	Learners will continue to develop their understanding of how to create a well-structured database. They will use attributes to create questions with yes/no answers, and will apply these to given objects. Learners will compare the efficiency of different branching databases, and will be able to explain why questions need to be in a specific order.	To explain why it is helpful for a database to be well structured • I can create yes/no questions using given attributes • I can compare two branching database structures • I can explain that questions need to be ordered carefully to split objects into similarly sized groups
5 Planning a branching database	Learners will independently plan a branching database by creating a physical representation of one that will identify different types of dinosaur. They will continue to think about the attributes of objects to write questions with yes/no answers, which will enable them to separate a group of objects effectively. Learners will then arrange the questions and objects into a tree structure, before testing the structure.	To plan the structure of a branching database • I can independently create questions to use in a branching database • I can create questions that will enable objects to be uniquely identified • I can create a physical version of a branching database
6 Making a dinosaur identifier	Learners will independently create a branching database to identify different types of dinosaur, based on the paper-based version that they created in Lesson	To independently create an identification tool • I can create a branching database that reflects my plan

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	5. They will then work with a partner to test that their database works, before considering real-world applications for branching databases.	• I can work with a partner to test my identification tool • I can suggest real-world uses for branching databases

Curriculum links

Science (Lower Key Stage 2)

- gathering, recording, classifying and presenting data in a variety of ways to help in answering questions

Maths

- Statistics: interpret and present data using bar charts, pictograms and tables

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Programming B – Events and actions in programs

Unit introduction

This unit explores the links between events and actions, while consolidating prior learning relating to sequencing. Learners begin by moving a sprite in four directions (up, down, left, and right). They then explore movement within the context of a maze, using design to choose an appropriately sized sprite. This unit also introduces programming extensions, through the use of **Pen** blocks. Learners are given the opportunity to draw lines with sprites and change the size and colour of lines. The unit concludes with learners designing and coding their own maze-tracing program.

Overview of lessons

Lesson	**Brief overview**	**Learning objectives**
1 Moving a sprite	In this lesson, learners will investigate how characters can be moved using 'events'. They will analyse and improve an existing project, and then apply what they have learned to their own projects. They will then extend their learning to control multiple sprites in the same project.	To explain how a sprite moves in an existing project • I can explain the relationship between an event and an action • I can choose which keys to use for actions and explain my choices • I can identify a way to improve a program
2 Maze movement	In this lesson, learners will program a sprite to move in four directions: up, down, left, and right. They will begin by choosing a sprite and sizing it to fit in with a given background. Learners will then create the code to move the sprite in one direction before duplicating and modifying it to move in all four directions. Finally,	To create a program to move a sprite in four directions • I can choose a character for my project • I can choose a suitable size for a character in a maze

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	they will consider how their project could be extended to prove that their sprite has successfully navigated a maze.	• I can program movement
3 Drawing lines	This lesson will introduce learners to extension blocks in Scratch using the **Pen** extension. Learners will use the pen down block to draw lines, building on the movement they created for their sprite in Lesson 2. Learners will then decide how to set up their project every time it is run.	To adapt a program to a new context • I can use a programming extension • I can consider the real world when making design choices • I can choose blocks to set up my program
4 Adding features	In this lesson, learners will be given the opportunity to use additional **Pen** blocks. They will predict the functions of new blocks and experiment with them, before designing features to add to their own projects. Finally, they will add these features to their projects and test their effectiveness.	To develop my program by adding features • I can identify additional features (from a given set of blocks) • I can choose suitable keys to turn on additional features • I can build more sequences of commands to make my design work
5 Debugging movement	This lesson explores the process of debugging, specifically looking at how to identify and fix errors in a program. Learners will review an existing project against a given design and identify bugs within it. They will then correct the errors, gaining independence as they do so. Learners will also develop their projects by considering which new setup blocks to use.	To identify and fix bugs in a program • I can test a program against a given design • I can match a piece of code to an outcome • I can modify a program using a design

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6 Making a project	In this lesson, learners will design and create their own projects. Using a template (which can be blank or partially completed), learners will complete projects to move a sprite around a maze, with the option to leave a pen trail showing where the sprite has moved. Ideally, projects will include setup blocks to position the sprite at the start of the maze and clear any lines already on the screen.	To design and create a maze-based challenge • I can make design choices and justify them • I can implement my design • I can evaluate my project

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Formal Overview

Stage 1 – First year of study at KS3 level

Topic 1 – The Internet	Topic 2 – Audio Production	Topic 3 – Data Logging	Topic 4 – Photo Editing	Topic 5 – Repetition in Games	Topic 6 – Repetition in Shapes
Learners will apply their knowledge and understanding of networks, to appreciate the internet as a network of networks which need to be kept secure. They will learn that the World Wide Web is part of the internet, and will be given opportunities to explore the World Wide Web for themselves in order to learn about who owns content and what they can access, add, and create. Finally, they will evaluate online content to decide how honest, accurate, or reliable it is, and understand the consequences of false information.	Learners will identify the input device (microphone) and output devices (speaker or headphones) required to work with sound digitally. Learners will discuss the ownership of digital audio and the copyright implications of duplicating the work of others. In order to record audio themselves, learners will use Audacity to produce a podcast, which will include editing their work, adding multiple tracks, and opening and saving the audio files. Finally, learners will evaluate their work and give feedback to their peers. This unit uses 'school news' as a context for the podcasts, but this can be changed to suit your curriculum.	In this unit, learners will consider how and why data is collected over time. Learners will consider the senses that humans use to experience the environment and how computers can use special input devices called sensors to monitor the environment. Learners will collect data as well as access data captured over long periods of time. They will look at data points, data sets, and logging intervals. Learners will spend time using a computer to review and analyse data. Towards the end of the unit, learners will pose questions and then use data loggers to automatically collect the data needed to answer those questions.	Learners will develop their understanding of how digital images can be changed and edited, and how they can then be resaved and reused. They will consider the impact that editing images can have and evaluate the effectiveness of their choices.	Learners will explore the concept of repetition in programming using the Scratch environment. The unit begins with a Scratch activity like that carried out in Logo in Programming unit A, where learners can discover similarities between two environments. Learners look at the difference between count-controlled and infinite loops and use their knowledge to modify existing animations and games using repetition. Their final project is to design and create a game which uses repetition, applying stages of programming design throughout.	Learners will create programs by planning, modifying, and testing commands to create shapes and patterns. They will use Logo, a text-based programming language. This unit is the first of the two programming units in Year 4 and looks at repetition and loops within programming.
Key skills (Non-negotiable learning)	**Key skills (Non-negotiable learning)**	**Key skills (Non-negotiable learning)**	**Key skills (Non-negotiable learning)**	**Key skills (Non-negotiable learning)**	**Key skills (Non-negotiable learning)**
Understanding how the internet works - Learners will develop an understanding of how devices and networks connect together to form the	**Recording and editing digital audio -** Learners will develop practical skills in recording, editing, and improving audio using software such as Audacity.	**Collecting and recording data -** Learners will develop the ability to collect data using sensors and data loggers. They will learn how computers can	**Using photo editing tools effectively -** Learners will develop practical skills in using photo editing software to rotate, crop, recolour, clone,	**Understanding and using repetition in programming -** Learners will develop programming skills by using loops in Scratch to repeat	**Writing and understanding code in a text-based language -** Learners will develop programming skills by using Logo commands to control a

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internet. They will learn about networks, routers, websites, and the World Wide Web, helping them understand how information travels between devices and how online services work in everyday life. **Creating and sharing content online safely -** Learners will build skills in accessing, creating, and sharing content on the World Wide Web. They will explore websites, recognise different types of media, and understand that online content is created by people and protected by rules such as copyright and ownership. **Evaluating online information critically -** Learners will develop the ability to think carefully about the information they find online. They will learn how to identify unreliable or misleading content, understand the risks of fake news, and consider the consequences of sharing information without checking whether it is accurate or trustworthy.	They will learn how to use microphones and headphones, trim recordings, remove mistakes, adjust sound levels, and combine multiple audio tracks to create a polished final product. **Planning and creating media content -** Learners will build creative and organisational skills by planning and producing their own podcast. They will learn how to structure ideas, create engaging content, use sound effects and music effectively, and follow a production process from initial planning through to the final exported audio file. **Evaluating digital media and understanding copyright -** Learners will develop critical thinking skills by reviewing and evaluating their own work and the work of others. They will also learn about ownership and copyright, understanding that digital audio belongs to its creator and that permission is needed before using other people's recordings, music, or media content.	automatically gather information from the environment over time and understand how data points are recorded at regular intervals to help answer questions. **Analysing and interpreting data -** Learners will build skills in reviewing and analysing data using computer software. They will learn how to sort, view, and interpret data in different ways, identify patterns and trends, and use evidence from data to draw conclusions and answer questions. **Planning investigations using technology -** Learners will develop problem-solving and enquiry skills by planning investigations that use data logging equipment. They will learn how to decide what data needs to be collected, choose appropriate sensors, and evaluate how effective data loggers are for collecting accurate information over time.	and combine images. They will learn how different tools can change the composition and appearance of a digital image to achieve a specific purpose or effect. **Creative design and digital media production -** Learners will build creative skills by planning and creating their own edited images. They will learn how to select suitable images, apply effects appropriately, combine multiple images, and add text to produce a final digital publication. **Evaluating images and understanding ethics -** Learners will develop critical thinking skills by evaluating how image editing can influence what people see and believe. They will consider the ethical issues around altering photographs, understand that online images may not always represent reality, and use feedback to improve their own work.	instructions efficiently. They will learn the difference between count-controlled loops and infinite loops, and understand when each type is appropriate within animations and games. **Designing and creating computer programs -** Learners will build problem-solving and computational thinking skills by designing algorithms, modifying existing code, and creating their own games. They will learn how to plan projects, break problems into smaller steps, and use repetition to create interactive programs. **Testing, debugging, and evaluating programs -** Learners will develop the ability to test and improve their programs by predicting outcomes, identifying mistakes, debugging code, and evaluating how effectively repetition has been used. They will reflect on their designs and refine their projects to improve functionality and user experience.	screen turtle. They will learn how typed commands affect movement and drawing, understand the importance of accuracy in coding, and create algorithms that can be translated into working programs. **Using repetition and procedures in programming -** Learners will build computational thinking skills by identifying repeated patterns and using count-controlled loops to simplify code. They will also learn how procedures can break programs into smaller reusable sections, making programs easier to create and manage. **Debugging and problem-solving -** Learners will develop resilience and logical thinking by testing and debugging their programs. They will learn how to spot and correct errors, predict the outcome of code, and refine their programs so they successfully achieve the intended result.

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Stage 2 – Second year of study at KS3 level

Topic 1 – Selection in Quizzes	Topic 2 – Vector Graphics	Topic 3 – Flat-file Databases	Topic 4 – Selection in Computing	Topic 5 – Video Production	Topic 6 – Systems and Searching
Learners will develop their knowledge of 'selection' by revisiting how 'conditions' can be used in programming and then learning how the 'if… then… else...' structure can be used to select different outcomes depending on whether a condition is 'true' or 'false'. They represent this understanding in algorithms, and then by constructing programs in the Scratch programming environment. They learn how to write programs that ask questions and use selection to control the outcomes based on the answers given. They use this knowledge to design a quiz in response to a given task and implement it as a program. To conclude the unit, learners evaluate their program by identifying how it meets the requirements of the task, the ways they have improved it, and further ways it could be improved.	In this unit, learners start to create vector drawings. They learn how to use different drawing tools to help them create images. Learners recognise that images in vector drawings are created using shapes and lines, and each individual element in the drawing is called an object. Learners layer their objects and begin grouping and duplicating them to support the creation of more complex pieces of work.	This unit looks at how a flat-file database can be used to organise data in records. Learners will use tools within a database to order and answer questions about data. They will create graphs and charts from their data to help solve problems. They will also use a real-life database to answer a question and present their work to others.	In this unit, learners will use physical computing to explore the concept of selection in programming through the use of the Crumble programming environment. Learners will be introduced to a microcontroller (Crumble controller) and learn how to connect and program it to control components (including output devices — LEDs and motors). Learners will be introduced to conditions as a means of controlling the flow of actions in a program. Learners will make use of their knowledge of repetition and conditions when introduced to the concept of selection (through the 'if...then...' structure) and write algorithms and programs that utilise this concept. To conclude the unit, learners will design and make a working model of a fairground carousel that will demonstrate their understanding of how the microcontroller and its components are connected, and how selection can be used to control the operation of the model. Throughout this unit, learners will apply the stages of programming design.	Learners will learn how to create short videos by working in pairs or groups. As they progress through this unit, they will be exposed to topic-based language and develop the skills of capturing, editing, and manipulating video. Learners are guided with step-by-step support to take their idea from conception to completion. At the conclusion of the unit, learners have the opportunity to reflect on and assess their progress in creating a video.	Learners develop their understanding of computer systems and how information is transferred between systems and devices. Learners consider small-scale systems as well as large-scale systems. They explain the input, output, and process aspects of a variety of different real-world systems. Learners discover how information is found on the World Wide Web, through learning how search engines work (including how they select and rank results) and what influences searching, and through comparing different search engines.

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Key skills (Non-negotiable learning)	Key skills (Non-negotiable learning)	Key skills (Non-negotiable learning)	Key skills (Non-negotiable learning)	Key skills (Non-negotiable learning)	Key skills (Non-negotiable learning)
Using selection and conditions in programming - Learners will develop programming skills by using conditions and selection in Scratch. They will learn how programs make decisions using 'if… then… else…' statements and understand how different outcomes can occur depending on user input or specific conditions. **Designing and creating interactive programs -** Learners will build computational thinking and design skills by planning and creating their own interactive quiz programs. They will use algorithms and design templates to organise program flow, predict outcomes, and create engaging user experiences. **Testing, debugging, and improving programs -** Learners will develop problem-solving skills by testing their programs, identifying errors, and refining their work. They will learn how feedback can improve a program, how setup code creates a consistent experience for users, and how programs can be extended and improved over time.	**Creating and editing vector graphics -** Learners will develop practical skills in using vector drawing software to create images using shapes, lines, and objects. They will learn how to move, resize, rotate, duplicate, and modify objects to produce detailed digital artwork and logo designs. **Using design tools and techniques effectively -** Learners will build digital design skills by using layers, grouping, alignment grids, zoom tools, and object manipulation techniques. They will understand how these tools improve accuracy, consistency, and efficiency when creating professional-looking vector drawings. **Evaluating and designing for a purpose -** Learners will develop creative and reflective skills by designing vector graphics for a specific purpose and evaluating the choices they make. They will learn how graphic designers use visual elements to communicate ideas and compare vector drawings with other forms of digital art such as freehand paint drawings.	**Organising and managing data -** Learners will develop the ability to organise information using flat-file databases. They will learn how data is stored in records and fields, and how databases can be used to sort, group, and manage information efficiently compared to paper-based systems. **Searching and analysing information -** Learners will build problem-solving and analytical skills by using database tools to answer questions. They will learn how to search using criteria such as 'AND' and 'OR', refine searches, and use grouping and sorting techniques to find specific information quickly and accurately. **Presenting and interpreting data visually -** Learners will develop skills in creating and interpreting charts and graphs to compare data visually. They will learn how to choose appropriate chart types, filter information effectively, and present findings clearly in real-world contexts such as travel planning and data analysis.	**Programming with selection and conditions -** Learners will develop programming skills by using conditions and selection within the Crumble programming environment. They will learn how 'if…then…' statements allow programs to make decisions and control actions based on inputs such as switches and sensors. **Building and controlling physical computing systems -** Learners will gain practical skills in creating circuits and connecting components such as LEDs, motors, and switches to a microcontroller. They will learn how software and hardware work together to control physical devices and create interactive models. **Designing, testing, and debugging projects -** Learners will develop computational thinking and problem-solving skills by designing algorithms, creating physical computing projects, and testing and debugging their programs. They will evaluate how effectively their projects meet a design brief and refine their work to improve outcomes.	**Planning and creating digital video content -** Learners will develop creative media production skills by planning, storyboarding, filming, and producing their own videos. They will learn how to organise scenes, write scripts, and choose suitable filming techniques to communicate ideas effectively. **Using filming and editing techniques -** Learners will build practical skills in using digital recording devices and video editing software. They will experiment with camera angles, sound recording, clip editing, reshooting, and reordering footage to improve the quality and impact of their videos. **Evaluating media and sharing content responsibly -** Learners will develop critical thinking skills by reviewing the effectiveness of their videos and reflecting on how creative choices affect the final product. They will also learn about safe and responsible online behaviour, including how to respond to inappropriate online content and share media appropriately.	**Understanding computer systems and networks -** Learners will develop an understanding of how computer systems are made up of connected parts that work together. They will learn about inputs, processes, outputs, and how digital systems communicate with other devices to provide useful services in everyday life. **Using search engines effectively -** Learners will build digital literacy skills by learning how to search for information online efficiently. They will practise refining searches, comparing search engine results, recognising trustworthy websites, and understanding how search engines index and rank information. **Evaluating online information and staying safe online -** Learners will develop critical thinking and online safety skills by exploring how search results can be influenced and why some information appears before others. They will also learn how to protect personal information online and become more discerning consumers of digital content.

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Stage 3 – Third year of study at KS3 level

Topic 1 – Webpage Creation	Topic 2 – Communication and Collaboration	Topic 3 – Variables in Games	Topic 4 – Spreadsheets	Topic 5 – 3D Modelling	Topic 6 – micro:bits
Learners will be introduced to creating websites for a chosen purpose. Learners identify what makes a good web page and use this information to design and evaluate their own website using Google Sites. Throughout the process, learners pay specific attention to copyright and fair use of media, the aesthetics of the site, and navigation paths.	In this unit learners explore how data is transferred over the internet. Learners initially focus on addressing, before they move on to the makeup and structure of data packets. Learners then look at how the internet facilitates online communication and collaboration; they complete shared projects online and evaluate different methods of communication. Finally, they learn how to communicate responsibly by considering what should and should not be shared on the internet.	This unit explores the concept of variables in programming through games in Scratch. First, learners find out what variables are and relate them to real-world examples of values that can be set and changed. Then they use variables to create a simulation of a scoreboard. In Lessons 2, 3, and 5, which follow the Use-Modify-Create model, learners experiment with variables in an existing project, then modify them, before they create their own project. In Lesson 4, learners focus on design. Finally, in Lesson 6, learners apply their knowledge of variables and design to improve their games in Scratch.	This unit introduces the learners to spreadsheets. They will be supported in organising data into columns and rows to create their own data set. Learners will be taught the importance of formatting data to support calculations, while also being introduced to formulas and will begin to understand how they can be used to produce calculated data. Learners will be taught how to apply formulas that include a range of cells, and apply formulas to multiple cells by duplicating them. Learners will use spreadsheets to plan an event and answer questions. Finally, learners will create charts, and evaluate their results in comparison to questions asked.	Learners will develop their knowledge and understanding of using a computer to produce 3D models. Learners will initially familiarise themselves with working in a 3D space, moving, resizing, and duplicating objects. They will then create hollow objects using placeholders and combine multiple objects to create a model of a desk tidy. Finally, learners will examine the benefits of grouping and ungrouping 3D objects, then go on to plan, develop, and evaluate their own 3D model of a building.	This unit is the final KS3 programming unit and brings together elements of all the four programming constructs: sequence from Year 7, repetition from Year 8, selection from Year 9, and variables It offers pupils the opportunity to use all of these constructs in a different, but still familiar environment, while also utilising a physical device — the micro:bit. The unit begins with a simple program for pupils to build in and test within the new programming environment, before transferring it to their micro:bit. Pupils then take on three new projects in Lessons 2, 3, and 4, with each lesson adding more depth. Design features prominently in this unit. A design template is introduced in Lesson 3, initially scaffolded to give pupils the opportunity to create code from a given design. In Lesson 4 that scaffolding is gradually reduced, then in Lesson 5, pupils create their own design, using the same template. In the final lesson, pupils will apply their knowledge of the programming constructs and use their design

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					to create their own micro:bit-based step counter.
Key skills (Non-negotiable learning)	**Key skills (Non-negotiable learning)**	**Key skills (Non-negotiable learning)**	**Key skills (Non-negotiable learning)**	**Key skills (Non-negotiable learning)**	**Key skills (Non-negotiable learning)**
Designing and creating web pages - Learners will develop web design skills by planning and creating websites using Google Sites. They will learn how to structure web pages, add different types of media, create navigation paths, and use hyperlinks to connect pages together effectively. **Evaluating user experience and website layout -** Learners will build critical thinking and design skills by reviewing how websites look and function on different devices. They will learn how layout, navigation, and presentation affect the user experience and make improvements to their own websites based on evaluation and feedback. **Using online content responsibly and safely -** Learners will develop digital citizenship skills by learning about copyright, fair use, and the responsible use of online media. They will understand why copyright-free resources are important, how to reference content appropriately, and the implications of linking to work created by others.	**Understanding how information is transferred online -** Learners will develop an understanding of how devices communicate over the internet using IP addresses, protocols, and data packets. They will learn how information such as text, images, audio, and video is broken into packets and transferred between devices across networks. **Collaborating and communicating using digital technologies -** Learners will build skills in working together online through shared files, collaborative projects, and internet-based communication tools. They will explore different ways people communicate and collaborate remotely, and evaluate which methods are most suitable for different purposes. **Using online communication safely and responsibly -** Learners will develop digital citizenship skills by considering privacy, security, and responsible communication online. They will learn what information is appropriate to share, understand that online	**Understanding and using variables in programming -** Learners will develop programming skills by learning how variables store and change information within a program. They will understand that variables can hold numbers or text, and that their values can change during gameplay to control scores, timers, and other game features. **Designing and creating interactive games -** Learners will build creative and computational thinking skills by designing artwork, planning algorithms, and developing their own games in Scratch. They will learn how to apply variables effectively within game design to create interactive and engaging experiences. **Testing, improving, and evaluating programs -** Learners will develop problem-solving and evaluation skills by testing their games, identifying areas for improvement, and refining their projects. They will also learn how to share their work, give constructive feedback, and	**Organising and formatting data in spreadsheets -** Learners will develop skills in collecting, organising, and presenting data within spreadsheets. They will learn how to structure information using rows, columns, and cell references, and apply appropriate formatting to make data easier to read and use. **Using formulas and calculations -** Learners will build mathematical and computational skills by creating formulas to calculate data automatically. They will learn how to use operations such as addition, subtraction, multiplication, and division, apply formulas across ranges of cells, and understand how changing inputs affects outputs. **Presenting and analysing data visually -** Learners will develop analytical skills by creating charts and tables to present data clearly. They will learn how to choose appropriate ways to display information, interpret chart results, and use spreadsheet tools to answer questions and support decision-making.	**Creating and manipulating 3D models -** Learners will develop practical skills in using 3D modelling software to create and edit digital objects. They will learn how to move, resize, rotate, duplicate, recolour, and combine shapes within a three-dimensional workspace. **Designing models for a specific purpose -** Learners will build creative and design skills by planning and constructing 3D models such as name badges, desk tidies, and buildings. They will learn how to select suitable shapes, use placeholders to create hollow objects, and apply CAD techniques used in real-world design and architecture. **Evaluating and improving digital designs -** Learners will develop analytical and reflective skills by reviewing their own 3D models and those created by others. They will learn how to identify improvements, modify their designs, and understand how computer-aided design supports planning, communication, and problem-solving in professional contexts.	**Programming physical devices using Python and micro:bits -** Learners will develop programming skills by creating and testing programs for the micro:bit. They will learn how software can control physical devices using inputs, processes, and outputs, and apply programming concepts such as sequence, selection, repetition, and variables in a real-world context. **Using variables, conditions, and sensors -** Learners will build computational thinking skills by using variables and conditional statements to control program flow. They will learn how sensors such as buttons and accelerometers can provide input to programs, allowing the micro:bit to respond to movement and user interaction. **Designing, testing, and debugging programs -** Learners will develop problem-solving and design skills by planning algorithms, creating program flow diagrams, and building projects such as a micro:bit step counter. They will test and debug their code using both emulators and physical devices,

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	communication may not always be private, and know how to report inappropriate or unsafe content.	use variables to extend and improve gameplay features.			refining their programs to achieve the intended outcome

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The Internet

Unit introduction

Learners will apply their knowledge and understanding of networks, to appreciate the internet as a network of networks which need to be kept secure. They will learn that the World Wide Web is part of the internet, and will be given opportunities to explore the World Wide Web for themselves in order to learn about who owns content and what they can access, add, and create. Finally, they will evaluate online content to decide how honest, accurate, or reliable it is, and understand the consequences of false information.

Overview of lessons

Lesson	**Brief overview**	**Learning objectives**
1 Connecting networks	Learners will explore how a network can share messages with another network to form the internet. They will consider some of the network devices involved in this, such as routers, and will also discuss what should be kept in and out of a network to keep safe.	To describe how networks physically connect to other networks • I can describe the internet as a network of networks • I can demonstrate how information is shared across the internet • I can discuss why a network needs protecting
2 What is the internet made of?	Learners will describe the parts of a network and how they connect to each other to form the internet. They will use this understanding to help explain how the internet lets us view the World Wide Web and recognise that the World Wide Web is part of the internet which contains websites and web pages.	To recognise how networked devices make up the internet • I can describe networked devices and how they connect • I can explain that the internet is used to provide many services

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		• I can recognise that the World Wide Web contains websites and web pages
3 Sharing information	Learners will explore what can be shared on the World Wide Web and where websites are stored. They will also explore how the World Wide Web can be accessed on a variety of devices.	To outline how websites can be shared via the World Wide Web (WWW) • I can explain the types of media that can be shared on the WWW • I can describe where websites are stored when uploaded to the WWW • I can describe how to access websites on the WWW
4 What is a website?	Learners will analyse a website and identify the key parts. They will then consider what content can be added to websites and what factors they should consider before adding content to a website. Finally, they will use a website which enables them to create their own content online.	To describe how content can be added and accessed on the World Wide Web (WWW) • I can explain what media can be found on websites • I can recognise that I can add content to the WWW • I can explain that internet services can be used to create content online
5 Who owns the web?	Learners will explore who owns the content on the World Wide Web (or 'web' for short). They will explore a variety of websites and will investigate what they can and cannot do with the content on them. They will also relate this to principles of ownership and sharing in the real world.	To recognise how the content of the WWW is created by people • I can explain that websites and their content are created by people • I can suggest who owns the content on websites • I can explain that there are rules to protect

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		content
6 Can I believe what I read?	Learners will gain an appreciation of the fact that not everything they see on the internet is true, honest, or accurate. They will review images and decide whether or not they are real, before looking at why web searches can return ambiguous (and sometimes misleading) results. Finally, learners will complete a practical activity, demonstrating how quickly information can spread beyond their control.	To evaluate the consequences of unreliable content • I can explain that not everything on the World Wide Web is true • I can explain why some information I find online may not be honest, accurate, or legal • I can explain why I need to think carefully before I share or reshare content

Common Misconceptions

A key misconception pupils face within this unit is that the internet and the World Wide Web are the same thing, which they are not. They internet is a global system of computer networks, whereas the World Wide Web is an application that runs on the internet, which can be accessed through websites. When looking at the World Wide Web, leaners may confuse search engines and browsers. Some learners may confuse Google as a browser, that 'Google' is needed to access to internet. However, a browser is a piece of software that retrieves and displays web pages, such as Chrome, Firefox, etc. In contrast, Google is a search engine that use crawlers to find specific information on the web.

You may also need to address the many misconceptions around trusting what learners see on the internet, and the issues of fake news. There is a high volume of inaccurate, misleading, or false content on the internet, which learners need to be aware of, alongside the fact search results can be influenced by adverts and sponsored content.

Curriculum links

Education for a Connected World links

Managing online information

- I can analyse information to make a judgement about probable accuracy, and I understand why it is important to make my own decisions regarding content and that my decisions are respected by others.
- I can explain what is meant by fake news, e.g. why some people will create stories or alter photographs and put them online to pretend something is true when it

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isn’t.

Relationships Education, Relationships and Sex Education (RSE) and Health Education

Online relationships

- Pupils should know how information and data is shared and used online

Internet safety and Harms

- Pupils should know how to be a discerning consumer of information online
- Pupils should know that for most people the internet is an integral part of life and has many benefits

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Creating media – Audio production

Unit introduction

Learners will identify the input device (microphone) and output devices (speaker or headphones) required to work with sound digitally. Learners will discuss the ownership of digital audio and the copyright implications of duplicating the work of others. In order to record audio themselves, learners will use Audacity to produce a podcast, which will include editing their work, adding multiple tracks, and opening and saving the audio files. Finally, learners will evaluate their work and give feedback to their peers. This unit uses 'school news' as a context for the podcasts, but this can be changed to suit your curriculum.

Overview of lessons

Lesson	**Brief overview**	**Learning objectives**
1. Recording sound	In this lesson, learners will identify the input devices used to record sound and output devices needed to listen to it. They will then record their voices using a computer, and reflect on what makes a good audio recording. Lastly, learners will consider ownership and copyright issues related to recordings.	To identify that sound can be recorded • I can identify the input and output devices used to record and play sound • I can use a computer to record audio • I can explain that the person who records the sound can say who is allowed to use it
2. Editing audio	In this lesson, learners will record and re-record their voices to improve their recordings. They will edit the recordings, removing long pauses and mistakes. Learners will also listen to a range of podcasts and identify the features of a podcast. They will be introduced to the job of a recording engineer.	To explain that audio recordings can be edited • I can re-record my voice to improve my recording • I can inspect the soundwave view to know where to trim my recording • I can discuss what sounds can be added to a podcast
3. Planning a podcast	In this lesson, learners will record their voices and then import and align sound effects to create layers in their recordings. Learners will learn how to save their work	To recognise the different parts of creating a podcast project • I can explain how sounds can be combined to make a podcast more engaging

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	so it remains editable. They will then plan their own podcast which they will work on in future lessons.	• I can save my project so the different parts remain editable • I can plan appropriate content for a podcast
4. Creating a podcast	In this lesson, learners will record the voice tracks for their podcast. They will review their recordings and re-record if necessary. Learners will edit, trim, and align their voice recordings, and then save their project so they can continue working on it in the next lesson.	To apply audio editing skills independently • I can record content following my plan • I can review the quality of my recordings • I can improve my voice recordings
5. Behind the scenes	In this lesson, learners will develop their podcast further by adding content such as sound effects and background music. The audio will be layered with their existing voice recordings and exported as an audio file.	To combine audio to enhance my podcast project • I can open my project to continue working on it • I can arrange multiple sounds to create the effect I want • I can explain the difference between saving a project and exporting an audio file
6. Evaluating podcasts	In this lesson, learners will evaluate their own podcasts and that of others. After looking at the evaluation, learners will decide if they can improve their podcast and then make any changes they have chosen.	To evaluate the effective use of audio • I can listen to an audio recording to identify its strengths • I can suggest improvements to an audio recording • I can choose appropriate edits to improve my podcast

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Common Misconceptions

Learners may have the misconception that recording and editing audio is as simple as pressing a button and speaking, however there are many skills that are required. They may believe that the software alone ensures high-quality recording, however the quality is dependent on the microphone, the environment and the techniques used. Learners might expect perfect results from their recordings, but good audio often requires careful editing. They may think that saving their project and exporting audio are the same thing, however saving a project keeps the ability to edit, whereas exporting creates a final audio file that cannot be re-edited in the same way.

Curriculum links

Education for a Connected World links

Copyright and ownership

- When searching on the internet for content to use, I can explain why I need to consider who owns it and whether I have the right to reuse it
- I can give some simple examples of content which I must not use without permission from the owner, e.g. videos, music, images.

Science

- **Sound:** Find patterns between the volume of a sound and the strength of the vibrations that produced it
- **Sound:** Recognise that sounds get fainter as the distance from the sound source increases

English

- **Writing – composition:** Plan their writing by discussing and recording ideas
- **Writing – draft and write by:** In non-narrative material, using simple organisational devices [for example, headings and subheadings]
- **Writing:** Read aloud their own writing, to a group or the whole class, using appropriate intonation and controlling the tone and volume so that the meaning is clear

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Data logging

Unit introduction

In this unit, learners will consider how and why data is collected over time. Learners will consider the senses that humans use to experience the environment and how computers can use special input devices called sensors to monitor the environment. Learners will collect data as well as access data captured over long periods of time. They will look at data points, data sets, and logging intervals. Learners will spend time using a computer to review and analyse data. Towards the end of the unit, learners will pose questions and then use data loggers to automatically collect the data needed to answer those questions.

Overview of lessons

Lesson	**Brief overview**	**Learning objectives**
1 Answering questions	Learners will consider what data can be collected and how it is collected. They will think about data being collected over time. Learners will also think about questions that can and can't be answered using available data, and reflect on the importance of collecting the right data to answer questions.	To explain that data gathered over time can be used to answer questions • I can choose a data set to answer a given question • I can suggest questions that can be answered using a given data set • I can identify data that can be gathered over time
2 Data collection	Learners will build on the idea of collecting data over time, and be introduced to the idea of collecting data automatically using computers such as data loggers. They will also be introduced to the concept that computers can capture data from the physical world using input devices called 'sensors'. Learners will establish that sensors can be connected to data loggers, which can automatically collect data while not attached to a computer.	To use a digital device to collect data automatically • I can explain what data can be collected using sensors • I can use data from a sensor to answer a given question • I can identify that data from sensors can be recorded

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3 Logging	Learners will explore how data loggers work. They will record data at set moments in time and draw parallels with the data points that a data logger captures at regular intervals. Learners will use data loggers away from a computer, then they will connect the loggers to a computer and download the data.	To explain that a data logger collects 'data points' from sensors over time • I can recognise that a data logger collects data at given points • I can identify the intervals used to collect data • I can talk about the data that I have captured
4 Analysing data	Learners will open an existing data file and use software to find out key information. They will analyse a data file which shows hot water cooling over time.	To recognise how a computer can help us analyse data • I can view data at different levels of detail • I can sort data to find information • I can explain that there are different ways to view data
5 Data for answers	Learners will think about questions that can be answered using collected data. They will choose a question to focus on and then plan the data logging process that they need to complete. After learners have completed their plan, they will set up the data loggers to check that their plan will work. This setting up is designed to ensure that the data collection will work, and that learners will have data to use in the next lesson.	To identify the data needed to answer questions • I can propose a question that can be answered using logged data • I can plan how to collect data using a data logger • I can use a data logger to collect data
6 Answering my question	Learners will access and review the data that they have collected using a data logger. They will then use the data collected to answer the question that they selected in the previous lesson. Learners will also reflect on the benefits of using a data logger.	To use data from sensors to answer questions • I can interpret data that has been collected using a data logger • I can draw conclusions from the data that I have collected • I can explain the benefits of using a data logger

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Common Misconceptions

Learners may have the misconception that data logging is just about recording random information, however it involves systematically collecting data over time to analyse patterns. When using data loggers, they may believe that all data collected by their data logger is accurate, although this misconception should be challenged, as the accuracy can be influenced by difference factors, such as sensor quality, environmental conditions and user errors.

Curriculum links

Science

- Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers.
- They should learn how to use new equipment, such as data loggers, appropriately. They should collect data from their own observations and measurements, using notes, simple tables and standard units, and help to make decisions about how to record and analyse this data.

Maths

- interpret and present discrete and continuous data using appropriate graphical methods, including bar charts and time graphs.
- solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables and other graphs.

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Photo editing

Unit introduction

Learners will develop their understanding of how digital images can be changed and edited, and how they can then be resaved and reused. They will consider the impact that editing images can have and evaluate the effectiveness of their choices.

Overview of lessons

Lesson	**Brief overview**	**Learning objectives**
1 Changing digital images	In this lesson, you will introduce learners to the concept of editing images and discuss whether or not editing is ethical. They will go on to explore when we need to rotate and crop an image as well as how to use an image editor to make these changes. Learners will then discuss image composition. Learners will relate this to the role of a photographer, appreciating how this knowledge and skill helps them to effectively edit their photos in this way.	To explain that the composition of digital images can be changed • I can improve an image by rotating it • I can explain why I might crop an image • I can use photo editing software to crop an image • I understand that editing images can be unethical
2 Recolouring	In this lesson, learners will look at the effect that different colours and filters can have on an image. They will choose appropriate effects to fit a scenario, and explain how they made their choices. They will then edit the images using different effects to suit two different scenarios. Learners will relate this to the role of a photographer, appreciating how this knowledge and skill helps them to effectively edit their photos in this way.	To explain that colours can be changed in digital images • I can explain that different colour effects make you think and feel different things • I can experiment with different colour effects • I can explain why I chose certain colour effects

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3 Cloning	In this lesson, learners will be introduced to the cloning tool and its use in both changing the composition of a photo and photo retouching. They will see how parts of a photo can be removed or duplicated using cloning. Learners will consider what parts of an image can be retouched and learn techniques to make this as unnoticeable as possible. Finally, they will consider when it is necessary to edit photographs in this way. Learners will relate this to the role of a photographer, appreciating how this knowledge and skill helps them to effectively edit their photos in this way.	To explain how cloning can be used in photo editing • I can add to the composition of an image by cloning • I can identify how a photo edit can be improved • I can remove parts of an image using cloning
4 Combining	In this lesson, students learn how to use different tools to select areas of an image. Learners then use copy and paste within one image and between two images to produce a combined image. Finally, learners will consider when it's appropriate to edit an image and discuss some of the ethics around retouching photos.	To explain that images can be combined • I can experiment with tools to select and copy part of an image • I can use a range of tools to copy between images • I can explain why photos might be edited
5 Creating	In this lesson, learners will apply all the skills they have learnt in the unit so far. They will start by reviewing some images and considering what makes an image look real or made up. Learners will then plan their own image. They will choose from a selection of images, open them and edit them to create their own project.	To combine images for a purpose • I can describe the image I want to create • I can choose suitable images for my project • I can create a project that is a combination of other images

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6 Evaluating	This lesson is the final lesson in the unit on photo editing. Learners will review the image that they created in Lesson 5. After they have reviewed their image, they will have the opportunity to make changes to their image based on their review. Learners will then add text to their image to complete it as a publication.	To evaluate how changes can improve an image • I can review images against a given criteria • I can use feedback to guide making changes • I can combine text and my image to complete the project

Common Misconceptions

When looking at digital photos, misconceptions may arise about what has or has not been edited. In the same way that they need understand 'fake news', they need to understand that images are not static and that what they see online may have, and can be, manipulated using photo editing software. The ethical implications should be questioned, as editing can alter reality or give a misrepresentation of things. Learners may see photo editing as just a way to make photos look 'prettier', however this unit will show how editing can be used for various purposes, including correcting errors, enhancing details, adding creative effects, and conveying messages.

When looking at editing skills, learners may have the misconception that cropping and resizing are the same process. Cropping changes the image composition by removing parts of it, while resizing changes the image dimensions. They may also assume that more filters and effects always improve an image, however overuse can lead to unnatural results. When working on their projects, they may think that saving and exporting are the same actions, however saving refers to keeping the project in a format that can be re-edited, while exporting creates a final image file that is often not easily editable.

Curriculum links

Education for a Connected World links

Self-image and identity

- I can explain how my online identity can be different to my offline identity

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Repetition in games

Unit introduction

Learners will explore the concept of repetition in programming using the Scratch environment. The unit begins with a Scratch activity similar to that carried out in Logo in Programming unit A, where learners can discover similarities between two environments. Learners look at the difference between count-controlled and infinite loops and use their knowledge to modify existing animations and games using repetition. Their final project is to design and create a game which uses repetition, applying stages of programming design throughout.

Overview of lessons

Lesson	**Brief overview**	**Learning objectives**
1 Using loops to create shapes	In the first lesson, learners look at real-life examples of repetition, and identify which parts of instructions are repeated. Learners then use Scratch, a block-based programming environment, to create shapes using count-controlled loops. They consider what the different values in each loop signify, then use existing code to modify and create new code, and work on reading code and predicting what the output will be once the code is run.	To develop the use of count-controlled loops in a different programming environment • I can list an everyday task as a set of instructions including repetition • I can predict the outcome of a snippet of code • I can modify a snippet of code to create a given outcome
2 Different loops	In this lesson, learners look at different types of loops: infinite loops and count-controlled loops. They practise using these within Scratch and think about which might be more suitable for different purposes.	To explain that in programming there are infinite loops and count-controlled loops • I can modify loops to produce a given outcome • I can choose when to use a count-controlled and an infinite loop • I can recognise that some programming languages enable more than one process to be run at once

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3 Animate your name	In this lesson, learners create designs for an animation of the letters in their names. The animation uses repetition to change the costume (appearance) of the sprite. The letter sprites will all animate together when the **event** block (**green flag**) is clicked. When they have designed their animations, the learners will program them in Scratch. After programming, learners then evaluate their work, considering how effectively they used repetition in their code.	To develop a design that includes two or more loops which run at the same time • I can choose which action will be repeated for each object • I can explain what the outcome of the repeated action should be • I can evaluate the effectiveness of the repeated sequences used in my program
4 Modifying a game	In this lesson, learners look at an existing game and match parts of the game with the design. They make changes to a sprite in the existing game to match the design. They then look at a completed design, and implement the remaining changes in the Scratch game. They add a sprite, re-use and modify code blocks within loops, and explain the changes made.	To modify an infinite loop in a given program • I can identify which parts of a loop can be changed • I can explain the effect of my changes • I can re-use existing code snippets on new sprites
5 Designing a game	In this lesson, learners look at a model project that uses repetition. They then design their own games based on the model project, producing designs and algorithms for sprites in the game. They share these designs with a partner and have time to make any changes to their design as required.	To design a project that includes repetition • I can evaluate the use of repetition in a project • I can select key parts of a given project to use in my own design • I can develop my own design explaining what my project will do
6 Creating your games	In this lesson, learners build their games, using the designs they created in Lesson 5. They follow their algorithms, fix mistakes, and refine designs in their work as they build. They evaluate their work once it is completed, and showcase their games at the end.	To create a project that includes repetition • I can refine the algorithm in my design • I can build a program that follows my design • I can evaluate the steps I followed when building my project

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Common Misconceptions

Learners may have misconceptions around the language used within this unit. They may believe that ‘repetition’ and ‘loop’ are different entities, but repeating commands can also be referred to as a ‘loop’. They may also get confused between infinite loops and count-controlled loops, as both have different outcomes. Infinite loops can be repeated without an end (forever loop), whereas count-controlled loops will run for a set number of times (repeat _ times). Learners may believe that infinite loops are the easiest to use, however you may want to share that programmers do not actually use infinite loops very often as they can get stuck, and the only way to stop them is to close the program and start again.

Curriculum links

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

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Programming A – Repetition in shapes

Unit introduction

Learners will create programs by planning, modifying, and testing commands to create shapes and patterns. They will use Logo, a text-based programming language. This unit is the first of the two programming units in Year 4 and looks at repetition and loops within programming.

Overview of lessons

Lesson	Brief overview	Learning objectives
1 Programming a screen turtle	This lesson will introduce pupils to programming in Logo. Logo is a text-based programming language where pupils type commands that are then drawn on screen. Pupils will learn the basic Logo commands, and will use their knowledge of them to read and write code.	To identify that accuracy in programming is important • I can program a computer by typing commands • I can explain the effect of changing a value of a command • I can create a code snippet for a given purpose
2 Programming letters	In this lesson, pupils will create algorithms (a precise set of ordered instructions, which can be turned into code) for their initials. They will then implement these algorithms by writing them in Logo commands to draw the letter. They will debug their code by finding and fixing any errors that they spot.	To create a program in a text-based language • I can use a template to draw what I want my program to do • I can write an algorithm to produce a given outcome • I can test my algorithm in a text-based language
3 Patterns and repeats	In this lesson, pupils will first look at examples of patterns in everyday life. They will recognise where numbers, shapes, and symbols are repeated, and how many times repeats occur. They will create algorithms for drawing a square, using the same annotated diagram as in Lesson 2. They will use this algorithm to program a square the 'long' way, and recognise the repeated pattern within a square. Once they	To explain what 'repeat' means • I can identify repetition in everyday tasks • I can identify patterns in a sequence

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	know the repeated pattern, they will use the `repeat` command within Logo to program squares the 'short' way.	• I can use a count-controlled loop to produce a given outcome
4 Using loops to create shapes	In this lesson, pupils will work with count-controlled loops in a range of contexts. First, they will think about a real-life example, then they will move on to using count-controlled loops in regular 2D shapes. They will trace code to predict which shapes will be drawn, and they will modify existing code by changing values within the code snippet.	To modify a count-controlled loop to produce a given outcome • I can identify the effect of changing the number of times a task is repeated • I can predict the outcome of a program containing a count-controlled loop • I can choose which values to change in a loop
5 Breaking things down	In this lesson, pupils will focus on decomposition. They will break down everyday tasks into smaller parts and think about how code snippets can be broken down to make them easier to plan and work with. They will learn to create, name, and call procedures in Logo, which are code snippets that can be reused in their programming.	To decompose a task into small steps • I can identify 'chunks' of actions in the real world • I can use a procedure in a program • I can explain that a computer can repeatedly call a procedure
6 Creating a program	In the final lesson, pupils will apply the skills that they have learnt in this unit to create a program containing a count-controlled loop. Over the course of the lesson, they will design wrapping paper using more than one shape, which they will create with a program that uses count-controlled loops. They will begin by creating the algorithm, either as an annotated sketch, or as a sketch and algorithm, and then implement it as code. They will debug their work throughout, and evaluate their programs against the original brief.	To create a program that uses count-controlled loops to produce a given outcome • I can design a program that includes count-controlled loops • I can make use of my design to write a program • I can develop my program by debugging it

Common Misconceptions

Learners may have the misconception that repetition is just about making things faster or easier, however it is a fundamental programming concept that allows for efficient and scalable code.

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When using FMS Logo, learners may believe that slight variations in syntax or structure do not matter, and that the computer will understand what is meant. Even small errors such as misspelling (FWD instead of FD) or omitting a space (FD50 instead of FD 50), can cause a program to fail. They should learn that precision is important in coding. Learners may also not realise that the turtle's position and orientations are relative to its current state. They may believe that the right and left code moves the turtle in that direction, however in reality it just turns the turtle on the spot the number of degrees stated.

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Programming B – Selection in quizzes

Unit introduction

Learners will develop their knowledge of 'selection' by revisiting how 'conditions' can be used in programming, and then learning how the 'if… then… else...' structure can be used to select different outcomes depending on whether a condition is 'true' or 'false'. They represent this understanding in algorithms, and then by constructing programs in the Scratch programming environment. They learn how to write programs that ask questions and use selection to control the outcomes based on the answers given. They use this knowledge to design a quiz in response to a given task and implement it as a program. To conclude the unit, learners evaluate their program by identifying how it meets the requirements of the task, the ways they have improved it, and further ways it could be improved.

Overview of lessons

Lesson	**Brief overview**	**Learning objectives**
Exploring conditions	In this lesson, learners revisit previous learning on 'selection' and identify how 'conditions' are used to control the flow of actions in a program. They are introduced to the blocks for using conditions in programs using the Scratch programming environment. They modify the conditions in an existing program and identify the impact this has.	To explain how selection is used in computer programs • I can recall how conditions are used in selection • I can identify conditions in a program • I can modify a condition in a program
Selecting outcomes	In this lesson, learners will develop their understanding of selection by using the 'if… then… else...' structure in algorithms and programs. They will revisit the need to use repetition in selection to ensure that conditions are repeatedly checked. They identify the two outcomes in given programs and how the condition informs which outcome will be selected. Learners use this knowledge to write their own programs that use selection with two outcomes.	To relate that a conditional statement connects a condition to an outcome • I can use selection in an infinite loop to check a condition • I can identify the condition and outcomes in an 'if… then… else…' statement

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		• I can create a program that uses selection to produce different outcomes
Asking questions	In this lesson, learners consider how the 'if… then... else…' structure can be used to identify two responses to a binary question (one with a 'yes or no' answer). They identify that the answer to the question is the 'condition', and use algorithms with a branching structure to represent the actions that will be carried out if the condition is true or false. They learn how questions can be asked in Scratch, and how the answer, supplied by the user, is used in the condition to control the outcomes. They use an algorithm to design a program that uses selection to direct the flow of the program based on the answer provided. They implement their algorithm as a program and test whether both outcomes can be achieved.	To explain how selection directs the flow of a program • I can explain that program flow can branch according to a condition • I can design the flow of a program that contains 'if… then… else…' • I can show that a condition can direct program flow in one of two ways
Designing a quiz	In this lesson, learners will be provided with a task: to use selection to control the outcomes in an interactive quiz. They will outline the requirements of the task and use an algorithm to show how they will use selection in the quiz to control the outcomes based on the answer given. Learners will complete their designs by using design templates to identify the questions that will be asked, and the outcomes for both correct and incorrect answers. To demonstrate their understanding of how they are using selection to control the flow of the program, learners will identify which outcomes will be selected based on given responses.	To design a program that uses selection • I can outline a given task • I can use a design format to outline my project • I can identify the outcome of user input in an algorithm
Testing a quiz	In this lesson, learners will use the Scratch programming environment to implement the first section of their algorithm as a program. They will run the first section of their program to test whether they have correctly used selection to control the outcomes, and debug their program if required. They will then continue implementing their algorithm as a program. Once completed, they will consider the value of sharing their program with others so that they can receive	To create a program that uses selection • I can implement my algorithm to create the first section of my program • I can test my program • I can share my program with others

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	feedback. Learners conclude the lesson by using another learner's quiz and providing feedback on it.	
Evaluating a quiz	In this lesson, learners will return to their completed programs and identify ways in which the program can be improved. They will focus on issues where answers similar to those in the condition are given as inputs, and identify ways to avoid such problems. Learners will also consider how the outcomes may change the program for subsequent users, and identify how they can make use of 'setup' to provide all users with the same experience. They will implement their identified improvements by returning to the Scratch programming environment and adding to their programs. They conclude the unit by identifying how they met the requirements of the given task, and identifying the aspects of the program that worked well, those they improved, and areas that could improve further.	To evaluate my program • I can identify ways the program could be improved • I can identify the setup code I need in my program • I can extend my program further

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Vector drawing

Unit introduction

In this unit, learners start to create vector drawings. They learn how to use different drawing tools to help them create images. Learners recognise that images in vector drawings are created using shapes and lines, and each individual element in the drawing is called an object. Learners layer their objects and begin grouping and duplicating them to support the creation of more complex pieces of work.

Overview of lessons

Lesson	**Brief overview**	**Learning objectives**
1 The drawing tools	Learners are introduced to vector drawings and begin to understand that they are made up of simple shapes and lines. They use the shape tools in the chosen software to create their own vector drawings. Learners discuss how vector drawings differ from paper-based drawings.	To identify that drawing tools can be used to produce different outcomes • I can recognise that vector drawings are made using shapes • I can experiment with the shape and line tools • I can discuss how vector drawings are different from paper-based drawings
2 Creating images	Learners begin to identify the shapes that are used to make vector drawings. They are able to explain that each element of a vector drawing is called an object. Learners create their own vector drawing by moving, resizing, rotating, and changing the colours of a selection of objects. They also learn how to duplicate the objects to save time.	To create a vector drawing by combining shapes • I can identify the shapes used to make a vector drawing • I can explain that each element added to a vector drawing is an object • I can move, resize, and rotate objects I have duplicated

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3 Making effective drawings	Learners increase the complexity of their vector drawings and use the zoom tool to add detail to their work. They are shown how grids and resize handles can improve the consistency of their drawings. Learners also use tools to modify objects to create a new image.	To use tools to achieve a desired effect • I can use the zoom tool to help me add detail to my drawings • I can explain how alignment grids and resize handles can be used to improve consistency • I can modify objects to create a new image
4 Layers and objects	Learners gain an understanding of layers and how they are used in vector drawings. They discover that each object is built on a new layer and that these layers can be moved forwards and backwards to create effective vector drawings.	To recognise that vector drawings consist of layers • I can identify that each added object creates a new layer in the drawing • I can change the order of layers in a vector drawing • I can use layering to create an image
5 Manipulating objects	Learners find out how to select and duplicate multiple objects at a single time. They develop this skill further by learning how to group multiple objects to make them easier to work with. Learners then use this knowledge to group and ungroup objects, in order to make changes to and develop their vector drawings.	To group objects to make them easier to work with • I can copy part of a drawing by duplicating several objects • I can recognise when I need to group and ungroup objects • I can reuse a group of objects to further develop my vector drawing
6 Becoming a graphic designer	Learners use the skills they have gained in this unit to create a vector drawing for a specific purpose. They reflect on the skills they have used to create the vector drawing and think about why they used the skills they did. Pupils will learn about the role of a graphic designer and take this on to create logo	To apply what I have learned about vector drawings • I can create a vector drawing for a specific purpose • I can reflect on the skills I have used and why I have used them

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	designs of their own. Learners then begin to compare vector drawings to freehand paint program drawings.	• I can compare vector drawings to freehand paint drawings

Curriculum links

Art and Design

- to improve their mastery of art and design techniques, including drawing, painting and sculpture with a range of materials [for example, pencil, charcoal, paint, clay]

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Data and information – Flat-file databases

Unit introduction

This unit looks at how a flat-file database can be used to organise data in records. Learners will use tools within a database to order and answer questions about data. They will create graphs and charts from their data to help solve problems. They will also use a real-life database to answer a question and present their work to others.

Overview of lessons

Lesson	**Brief overview**	**Learning objectives**
1. Creating a paper-based database	In this lesson, learners will create a paper version of a record card database. Using a card template, they will create a data set, with each learner creating eight to ten cards linked to a theme, e.g. animals. They will complete records for each of the animals in their database and then they will physically sort the cards to answer questions about the data.	To use a form to record information • I can create a database using cards • I can explain how information can be recorded • I can order, sort, and group my data cards
2. Computer databases	In this lesson, learners will use a computer-based database to examine how data can be recorded and viewed. They will learn that a database consists of 'records', and that each record contains 'fields'. In addition, they will order records in different ways and compare this database to the paper database they created in Lesson 1.	To compare paper and computer-based databases • I can explain what a field and a record is in a database • I can navigate a flat-file database to compare different views of information • I can choose which field to sort data by to answer a given question

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3. Using a database	In this lesson, learners will investigate how records can be grouped, using both the paper record cards created in Lesson 1 and a computer-based database from J2E. They will use 'grouping' and 'sorting' to answer questions about the data.	To outline how you can answer questions by grouping and then sorting data • I can explain that data can be grouped using chosen values • I can group information using a database • I can combine grouping and sorting to answer specific questions
4. Using search tools	In this lesson, learners will develop their search techniques to answer questions about the data. They will use advanced techniques to search for more than one field, and will practise doing this through both unplugged methods (without using computers), and using a computer database.	To explain that tools can be used to select specific data • I can choose which field and value are required to answer a given question • I can outline how 'AND' and 'OR' can be used to refine data selection • I can choose multiple criteria to answer a given question
5. Comparing data visually	In this lesson, learners will consider what makes a useful chart, and how charts can be used to compare data. They will create charts from their data in order to answer questions about it.	To explain that computer programs can be used to compare data visually • I can select an appropriate chart to visually compare data • I can refine a chart by selecting a particular filter • I can explain the benefits of using a computer to create charts
6. Databases in real life	The final lesson requires learners to use a real-life database to ask questions and find answers in the context of a flight search based on set parameters. They will take on the role of a travel agent and present their findings, showing how they arrived at their chosen options. Presentations may be given between groups of learners, or by each group to the whole class, depending on the time available.	To use a real-world database to answer questions • I can ask questions that will need more than one field to answer • I can refine a search in a real-world context • I can present my findings to a group

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Common Misconceptions

Learners may assume that data and information are the same thing. Data is raw unprocessed facts and figures without any context, typically a collection of letters, words, numbers, dates, images, etc. Information is data that has been processed, organised or structured to provide context and meaning- it helps to make sense of the data. For example, '1' is data, but '1' in a list of race positions is information as it tells us the person came first.

Learners may have the misconception of thinking that a flat-file database is just a simple list or table of data. In fact, a flat-file database is a single table that stores data in a structured format, allowing for efficient data organisation, retrieval or management. When looking at databases, learners may mistake records for fields, or vice versa. They should understand that fields are the specific categories of information (the columns in a table with headings for each category) and records are the complete set of information for each entry in the database (the row in a table, each representing a complete set of related information).

When searching a flat-file database, they may think that searching is the same as searching through a text file, however it can be far more efficient than manual searches using different search functions ('AND' and 'OR'). Again, learners may confuse these two search functions; simply, 'AND' will search for records that meet **all** the criteria, whereas 'OR' will search for records that meet **any** of the criteria.

Curriculum links

Maths – Statistics

- complete, read and interpret information in tables, including timetables.

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Selection in Computing

Unit introduction

In this unit, learners will use physical computing to explore the concept of selection in programming through the use of the Crumble programming environment. Learners will be introduced to a microcontroller (Crumble controller) and learn how to connect and program it to control components (including output devices — LEDs and motors). Learners will be introduced to conditions as a means of controlling the flow of actions in a program. Learners will make use of their knowledge of repetition and conditions when introduced to the concept of selection (through the 'if...then...' structure) and write algorithms and programs that utilise this concept. To conclude the unit, learners will design and make a working model of a fairground carousel that will demonstrate their understanding of how the microcontroller and its components are connected, and how selection can be used to control the operation of the model. Throughout this unit, learners will apply the stages of programming design.

Overview of lessons

Lesson	**Brief overview**	**Learning objectives**
1 Connecting Crumbles	In this lesson, your learners will become familiar with the Crumble controller and the programming environment used to control it. Learners will connect a Sparkle to a Crumble and then program the Crumble to make the Sparkle flash different colour patterns. Learners will also use infinite loops, which were introduced to the learners in the previous school year.	To control a simple circuit connected to a computer • I can create a simple circuit and connect it to a microcontroller • I can program a microcontroller to make an LED switch on • I can explain what an infinite loop does
2 Combining output components	In this lesson, learners will connect a Sparkle and a motor to the Crumble controller. Learners will design sequences of actions for these components. They will then apply their understanding of repetition by using count-controlled loops when implementing their design as a program.	To write a program that includes count-controlled loops • I can connect more than one output component to a microcontroller • I can use a count-controlled loop to control outputs • I can design sequences that use count-controlled loops

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3 Controlling with conditions	In this lesson, learners will be introduced to conditions, and how they can be used in programs to control their flow. They will identify conditions in statements, stating if they are true or false. Learners will be introduced to a Crumble switch, and learn how it can provide the Crumble controller with an input that can be used as a condition. They will explore how to write programs that use an input as a condition.	To explain that a loop can stop when a condition is met • I can explain that a condition is either true or false • I can design a conditional loop • I can program a microcontroller to respond to an input
4 Starting with selection	In this lesson, learners will develop their understanding of how the flow of actions in algorithms and programs can be controlled by conditions. They will be introduced to selection and then represent conditions and actions using the 'if…then…' structure. Learners will create algorithms that include selection. They will use their algorithms to guide their program writing. Learners will see that infinite repetition is required to repeatedly check if a condition has been met.	To explain that a loop can be used to repeatedly check whether a condition has been met • I can explain that a condition being met can start an action • I can identify a condition and an action in my project • I can use selection (an 'if…then…' statement) to direct the flow of a program
5 Drawing designs	In this lesson, learners will apply their understanding of microcontrollers and selection when designing a project to meet the requirements of a given task. To support their understanding, learners will identify how selection might be used in real-world situations, then they will consider how they can apply this knowledge to design their project. Learners will produce design sketches to show how their model will be made and how they will connect the microcontroller to its components.	To design a physical project that includes selection • I can identify a real-world example of a condition starting an action • I can describe what my project will do • I can create a detailed drawing of my project
6 Writing and testing algorithms	In this final lesson of the unit, learners will develop Crumble programs to control the model of a fairground ride they built in Lesson 5. First, learners will identify how they are going to use selection before writing an algorithm to meet the requirements of the given task. They will then implement their algorithms as code. Learners will run their programs to identify any bugs, and	To create a program that controls a physical computing project • I can write an algorithm that describes what my model will do

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	then return to the code or algorithm to debug it where necessary. Finally, to conclude the unit, learners will evaluate their designs.	• I can use selection to produce an intended outcome • I can test and debug my project

Subject knowledge

This unit focuses on physical computing, which allows learners to control real-life projects through the construction of programs. When learners undertake physical computing, they write programs that control real-world objects, like LEDs and motors, using a computer. The tangible effect of seeing the commands that they entered into a computer being carried out on a physical item, rather than on screen, can be highly motivational for learners. Physical computing also offers the opportunity to take a more project-based approach to learning, and allows learners to make choices about the purpose, design, and program of their product.

Repetition

You will need to know that 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. This unit makes use of two types of loops: infinite and count-controlled, which have been defined below:

- 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. For this reason, infinite loops should only be used when writing a program that is intended to run forever. The exception to this is when using selection in physical computing, as you will see throughout this unit.
- 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. Count-controlled loops should only be used when it is known how many times a set of commands needs to be repeated.
- 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 the ‘score’ in a game reaches a certain value to when a key on a keyboard has been pressed.

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. Additionally, you will need to understand that conditions can be used in loops, and when they are, that the set of actions in the loop will be carried out repeatedly until the condition is true, for example, ‘until button A is pressed’.

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Selection

Selection is “part of a program where, if a condition is met, then a set of commands are run”. Selection is implemented in programming using `if...then...` statements. Selection is used to control the flow of actions in algorithms and programs by checking if a condition (see above) has been met. If it has been met, the identified actions will be carried out. When selection is used in programs, loops (see above) often have to be used to instruct the device to check the condition repeatedly. Without using loops, the condition would only be checked once. It’s important to understand that each loop cycle will complete before the condition is checked again. In the Crumble programming software, selection is implemented through the `if...then...` command block.

Curriculum links

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 – 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

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- 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

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Video Production

Unit introduction

Learners will learn how to create short videos by working in pairs or groups. As they progress through this unit, they will be exposed to topic-based language and develop the skills of capturing, editing, and manipulating video. Learners are guided with step-by-step support to take their idea from conception to completion. At the conclusion of the unit, learners have the opportunity to reflect on and assess their progress in creating a video.

Overview of lessons

Lesson	**Brief overview**	**Learning objectives**
1 What is video?	Learners will be introduced to video as a media format. They will see examples of videos featuring production and editing techniques that they will work towards using their own videos. Learners will begin by explaining what the medium of video is before analysing and comparing examples of videos.	To explain what makes a video effective • I can explain that video is a visual media format • I can identify features of videos • I can compare features in different videos • I know what to do if I see any content online that makes me feel uncomfortable
2 Filming techniques	Learners will explore the capabilities of a digital device that can be used to record video. Once they are familiar with their device, learners will experiment with different camera angles, considering how different camera angles can be used for different purposes.	To use a digital device to record video • I can identify and find features on a digital video recording device • I can experiment with different camera angles • I can make use of a microphone
3 Using a storyboard	Learners will use a storyboard to explore a variety of filming techniques, some of which they will use in their own video project later in the unit. They will evaluate the effectiveness of these techniques before offering feedback on others' work.	To capture video using a range of techniques • I can suggest filming techniques for a given purpose

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		• I can capture video using a range of filming techniques • I can review how effective my video is
4 Planning a video	Learners will plan a video by creating a storyboard. Their storyboard will describe each scene, and will include a script, camera angles, and filming techniques. Learners will use their storyboards to film the first scene of their videos.	To create a storyboard • I can outline the scenes of my video • I can decide which filming techniques I will use • I can create and save video content
5 Importing and editing video	Learners will film the remaining scenes of their video, and then import their content to video editing software. Learners will be introduced to the job role of a video producer and will take on the role of a video producer to edit their creations. They will then explore key editing techniques and decide whether sections of their video can be edited or need to be shot again.	To identify that video can be improved through reshooting and editing • I can store, retrieve, and export my recording to a computer • I can explain how to improve a video by reshooting and editing • I can select the correct tools to make edits to my video
6 Video evaluation	Learners will complete their video by removing unwanted content and reordering their clips. They will then export their finished video and evaluate the effectiveness of their edits. Finally, they will consider how they could share their video with others.	To consider the impact of the choices made when making and sharing a video • I can make edits to my video and improve the final outcome • I can recognise that my choices when making a video will impact the quality of the final outcome • I can evaluate my video and share my opinions

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Curriculum links

Computing

- Use search technologies effectively, appreciate how results are selected and ranked, and be discerning in evaluating digital content
- 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
- Use technology safely, respectfully, and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact

Education for a Connected World links

Online relationships

- I can explain how someone can get help if they are having problems and identify when to tell a trusted adult.

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Systems and Searching

Unit introduction

Learners develop their understanding of computer systems and how information is transferred between systems and devices. Learners consider small-scale systems as well as large-scale systems. They explain the input, output, and process aspects of a variety of different real-world systems. Learners discover how information is found on the World Wide Web, through learning how search engines work (including how they select and rank results) and what influences searching, and through comparing different search engines.

Overview of lessons

Lesson	**Brief overview**	**Learning objectives**
1 Systems	Learners are introduced to the concept of a system. They begin to understand that components can work together to perform a task. Finally, learners explore how digital systems can work and learn about physical and electronic connections.	To explain that computers can be connected together to form systems • I can explain that systems are built using a number of parts • I can describe the input, process, and output of a digital system • I can explain that computer systems communicate with other devices
2 Computer systems and us	Learners consider how larger computer systems work. They see how devices and processes are connected, and reflect on how computer systems can help them.	To recognise the role of computer systems in our lives • I can identify tasks that are managed by computer systems • I can identify the human elements of a computer system • I can explain the benefits of a given computer system • I can explain how to keep my personal information safe online
3 Searching the web	Learners are introduced to a range of search engines. They are given the opportunity to explain how to search, before they write and test	To identify how to use a search engine

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	instructions. Next, they learn that searches do not always return the results that someone is looking for, and refine their searches accordingly. Finally, learners are introduced to the two most common methods of searching: using a search engine and using the address bar.	• I can make use of a web search to find specific information • I can refine my web search • I can compare results from different search engines • I can recognise trustworthy websites
4 Selecting search results	Learners gain an understanding of why search engines are necessary to help them find things on the World Wide Web. They conduct their own searches and break down, in detail, the steps needed to find things on the web. Learners then emulate web crawlers to create an index of their own classroom. Finally, they consider why some searches return more results than others.	To describe how search engines select results • I can explain why we need tools to find things online • I can recognise the role of web crawlers in creating an index • I can relate a search term to the search engine's index
5 How search results are ranked	Learners take part in an unplugged activity to find out about how a webpage's content can influence where it is ranked in search results. In groups, learners create paper-based webpages on a topic that they are familiar with. They then discover how their webpages would rank when searching for keywords relating to their content.	To explain how search results are ranked • I can order a list by rank • I can explain that a search engine follows rules to rank results • I can give examples of criteria used by search engines to rank results
6 How are searches influenced?	Learners explore how someone performing a web search can influence the results that are returned, and how content creators can optimise their sites for searching. They also explore some of the limitations of searching and discuss what cannot be searched.	To recognise why the order of results is important, and to whom • I can describe some of the ways that search results can be influenced • I can recognise some of the limitations of search engines • I can explain how search engines make money

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Curriculum links

Computing

- Understand computer networks, including the internet; how they can provide multiple services, such as the World Wide Web, and the opportunities they offer for communication and collaboration

Education for a Connected World links

Managing Online Information

- I can explain the benefits and limitations of using different types of search technologies e.g. voice-activation search engine. I can explain how some technology can limit the information I am presented with.

Privacy and Security

- I can explain what a strong password is and demonstrate how to create one

Relationships Education, Relationships and Sex Education (RSE) and Health Education

Internet safety and Harms

- Pupils should know how to be a discerning consumer of information online, including that from search engines, is ranked, selected and targeted

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Webpage Creation

Unit introduction

Learners will be introduced to creating websites for a chosen purpose. Learners identify what makes a good web page and use this information to design and evaluate their own website using Google Sites. Throughout the process, learners pay specific attention to copyright and fair use of media, the aesthetics of the site, and navigation paths.

Overview of lessons

Lesson	**Brief overview**	**Learning objectives**
1 What makes a good website?	In this lesson, learners will explore and review existing websites and evaluate their content. They will have some understanding that websites are created by using HTML code.	To review an existing website and consider its structure • I can explore a website • I can discuss the different types of media used on websites • I know that websites are written in HTML
2 Becoming a web designer	In this lesson, learners will take on the role of a web designer, focussing on the initial design stage of creating a website. Learners will look at the different layout features available in Google Sites and plan their own web page on paper. **Homework:** Learners will look at two of their favourite websites and sketch them on the worksheet provided, detailing the similarities and differences.	To plan the features of a web page • I can recognise the common features of a web page • I can suggest media to include on my page • I can draw a web page layout that suits my purpose

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	Note: For the homework activity, teachers could provide printed 'home page' images for anyone who doesn't have internet access at home.	
3 Copyright or copyWRONG?	During this lesson learners will become familiar with the terms 'fair use' and 'copyright'. They will gain an understanding of why they should only use copyright-free images and will find appropriate images to use in their work from suggested sources. They will understand how to search, reuse and reference images under creative commons to enable them to be respectful and responsible online users. **Homework:** Learners answer a series of questions based on copyright and fair use.	To consider the ownership and use of images (copyright) • I can say why I should use copyright-free images • I can find copyright-free images • I can describe what is meant by the term 'fair use' • I know how to use technology respectfully and responsibly when online
4 How does it look?	Learners will revise how to create their own web page in Google Sites. Using their plan from previous lessons, learners will create their own web page/home page. They will preview their web page as it will appear on different devices and suggest or make edits to improve the user experience on each device.	To recognise the need to preview pages • I can add content to my own web page • I can preview what my web page looks like • I can evaluate what my web page looks like on different devices and suggest/make edits.
5 Follow the breadcrumbs	During this lesson, learners will begin to appreciate the need to plan the structure of a website carefully. They will plan their website, paying attention to the navigation paths (the way that pages are linked together). They will then create multiple web pages for their site and use hyperlinks to link them together as detailed in their planning.	To outline the need for a navigation path • I can explain what a navigation path is • I can describe why navigation paths are useful • I can make multiple web pages and link them using hyperlinks

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6 Think before you link!	Learners will consider the implications of linking to content owned by other people and create hyperlinks on their own websites that link to other people's work. They will then evaluate the user experience when using their own website and that of another learner.	To recognise the implications of linking to content owned by other people • I can explain the implication of linking to content owned by others • I can create hyperlinks to link to other people's work • I can evaluate the user experience of a website

Curriculum links

Computing

- Use search technologies effectively, appreciate how results are selected and ranked, and be discerning in evaluating digital content
- 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.
- use technology safely, respectfully, and responsibly; recognise acceptable/unacceptable behaviour.

Education for a Connected World links

Copyright and ownership

- I can demonstrate the use of search tools to find and access online content which can be reused by others.

English

- Writing composition: Identifying the audience for and purpose of the writing, selecting the appropriate form, and using other similar writing as models for their own.

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Communication and Collaboration

Unit introduction

In this unit learners explore how data is transferred over the internet. Learners initially focus on addressing, before they move on to the makeup and structure of data packets. Learners then look at how the internet facilitates online communication and collaboration; they complete shared projects online and evaluate different methods of communication. Finally, they learn how to communicate responsibly by considering what should and should not be shared on the internet.

Overview of lessons

Lesson	**Brief overview**	**Learning objectives**
L1 Internet addresses	Learners explore what is necessary for effective communication and the importance of agreed protocols. They apply this understanding to IP addresses and the rules (protocols) that computers have for communicating with one another. Learners also use a Domain Name Server (DNS) to translate web addresses into IP addresses.	To explain the importance of internet addresses • I can recognise that data is transferred using agreed methods • I can explain that internet devices have addresses • I can describe how computers use addresses to access websites
L2 Data packets	Learners are introduced to the concept of packets. They complete an activity based on transferring an image across the internet, to see that as well as messages (text), other types of data (images, video, and audio) are also transferred over the internet. They gain an understanding of the key parts of a packet: the header and the data payload.	To recognise how data is transferred across the internet • I can identify and explain the main parts of a data packet • I can explain that data is transferred over networks in packets • I can explain that all data transferred over the internet is in packets

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L3 Working together	Learners consider how people can work together when they are not in the same location. They discuss ways of working and complete a collaborative online project. The online activity assumes that learners can make simple slides, including text and images. If your learners are unsure how to do this, you may wish to spend some time on the Year 3 – 'Desktop publishing' unit before this lesson.	To explain how sharing information online can help people to work together • I can recognise how to access shared files stored online • I can send information over the internet in different ways • I can explain that the internet allows different media to be shared
L4 Shared working	Learners are introduced to another approach to online working: reusing and modifying work done by someone else. (**Note:** Using someone else's work needs to be within the bounds of copyright and with the relevant permissions.) This lesson involves the Scratch programming tool, which allows learners to use other people's work.	To evaluate different ways of working together online • I can identify different ways of working together online • I can recognise that working together on the internet can be public or private • I can explain how the internet enables effective collaboration
L5 How we communicate	Learners deepen their understanding of the term 'communication'. They explore different methods of communication, before they consider internet-based communication in more detail. Finally, learners evaluate which methods of communication suit particular purposes.	To recognise how we communicate using technology • I can explain the different ways in which people communicate • I can identify that there are a variety of ways to communicate over the internet • I can choose methods of communication to suit particular purposes
L6 Communicating responsibly	Learners use information provided in the lesson and their own prior knowledge to categorise different forms of internet communication. They then choose which method(s) they would use for the scenarios discussed in the previous lesson. Through these activities, learners explore issues around privacy, information security and how to report concerns about inappropriate content online.	To evaluate different methods of online communication • I can compare different methods of communicating on the internet • I can decide when I should and should not share information online

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		• I can explain that communication on the internet may not be private • I can explain how to report inappropriate content online

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Variables in Games

Unit introduction

This unit explores the concept of variables in programming through games in Scratch. First, learners find out what variables are and relate them to real-world examples of values that can be set and changed. Then they use variables to create a simulation of a scoreboard. In Lessons 2, 3, and 5, which follow the Use-Modify-Create model, learners experiment with variables in an existing project, then modify them, before they create their own project. In Lesson 4, learners focus on design. Finally, in Lesson 6, learners apply their knowledge of variables and design to improve their games in Scratch.

Overview of lessons

Lesson	**Brief overview**	**Learning objectives**
1 Introducing variables	Learners are introduced to variables. They see examples of real-world variables (score and time in a football match) before they explore them in a Scratch project. Learners then design and make their own project that includes variables. Finally, learners identify that variables are named and that they can be letters (strings) as well as numbers.	To define a 'variable' as something that is changeable • I can identify examples of information that is variable • I can explain that the way a variable changes can be defined • I can identify that variables can hold numbers or letters
2 Variables in programming	Learners understand that variables are used in programs, and that they can only hold a single value at a time. They complete an unplugged task that demonstrates the process of changing variables. Then, learners explore why it is important to name variables and apply their learning in a Scratch project in which they make, name, and update variables.	To explain why a variable is used in a program • I can identify a program variable as a placeholder in memory for a single value • I can explain that a variable has a name and a value

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		• I can recognise that the value of a variable can be changed
3 Improving a game	Learners apply the concept of variables to enhance an existing game in Scratch. They predict the outcome of changing the same `change score` block in different parts of a program, then they test their predictions in Scratch. Learners also experiment with using different values in variables, and with using a variable elsewhere in a program. Finally, they add comments to their project to explain how they have met the objectives of the lesson.	To choose how to improve a game by using variables • I can decide where in a program to change a variable • I can make use of an event in a program to set a variable • I can recognise that the value of a variable can be used by a program
4 Becoming a games designer	Learners will take on the role of a games designer. They will work at the 'design' level of abstraction, where they create artwork and plan algorithms. Learners first design the sprites and backgrounds for their project, then they design their algorithms to create their program flow.	To design a project that builds on a given example • I can choose the artwork for my project • I can create algorithms for my project • I can explain my design choices
5 Design to code	Continuing to use the work of games designers as a model, learners implement the algorithms that they created in Lesson 4. In doing this, they identify variables in an unfamiliar project and learn the importance of naming variables. They also have the opportunity to add another variable to enhance their project.	To use my design to create a project • I can create the artwork for my project • I can choose a name that identifies the role of a variable • I can test the code that I have written
6 Improving and sharing	Learners build on the project that they created in Lesson 5. They consider how they could improve their own projects and make small changes to achieve this. Learners then have the opportunity to add a variable independently. Finally, learners evaluate each other's projects; they identify features that they liked and	To evaluate my project • I can identify ways that my game could be improved • I can use variables to extend my game • I can share my game with others

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	features that could be improved. they identify features that they liked and features that could be improved.	

Curriculum links

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

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Spreadsheets

Unit introduction

This unit introduces the learners to spreadsheets. They will be supported in organising data into columns and rows to create their own data set. Learners will be taught the importance of formatting data to support calculations, while also being introduced to formulas and will begin to understand how they can be used to produce calculated data. Learners will be taught how to apply formulas that include a range of cells, and apply formulas to multiple cells by duplicating them. Learners will use spreadsheets to plan an event and answer questions. Finally, learners will create charts, and evaluate their results in comparison to questions asked.

Overview of lessons

Lesson	**Brief overview**	**Learning objectives**
1 Collecting data	Learners will collect and organise data in a format of their choice. They will then explore how data can be structured in a table. Finally they will input data into a spreadsheet.	To create a data set in a spreadsheet • I can collect data • I can suggest how to structure my data • I can enter data into a spreadsheet
2 Formatting a spreadsheet	Learners will develop their understanding of the structure of a spreadsheet. They will be introduced to cell references, data items and the concept of formatting cells. Learners will see data items formatted in different ways, they will then choose formats for data items before applying formats in their own spreadsheet.	To build a data set in a spreadsheet • I can explain what an item of data is • I can choose an appropriate format for a cell • I can apply an appropriate format to a cell
3 What's the formula?	Learners will begin to use formulas to produce calculated data. They will understand that the type of data in a cell is important (e.g. numbers can be used	To explain that formulas can be used to produce calculated data

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	in calculations whereas words cannot). Learners will create formulas to use in a spreadsheet using cell references and identify that changing inputs will change the output of the calculation.	• I can explain which data types can be used in calculations • I can construct a formula in a spreadsheet • I can identify that changing inputs changes outputs
4 Calculate and duplicate	Learners will calculate data using the operations of multiplication, subtraction, division, and addition. They will use these operations to create formulas in a spreadsheet. Learners will then begin to understand the importance of creating formulas that include a range of cells and the advantage of duplicating in order to apply formulas to multiple cells.	To apply formulas to data • I can calculate data using different operations • I can create a formula which includes a range of cells • I can apply a formula to multiple cells by duplicating it
5 Event planning	Learners will plan and calculate the cost of an event using a spreadsheet. They will use a predefined list to choose what they would like to include in their event, and use their spreadsheet to answer questions on the data they have selected. Learners will be reminded of the importance of organising data and will then create a spreadsheet using formulas to work out costs for their event.	To create a spreadsheet to plan an event • I can use a spreadsheet to answer questions • I can explain why data should be organised • I can apply a formula to calculate the data I need to answer questions

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6 Presenting data	Learners will gain skills to create charts in Google Sheets. They will evaluate the results from their charts to answer questions. Finally, learners will show they understand that there are different software tools available within spreadsheet applications to present data.	To choose suitable ways to present data • I can produce a chart • I can use a chart to show the answer to a question • I can suggest when to use a table or chart

Curriculum links

Computing

- 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

Maths

Number

- Solve problems involving addition, subtraction, multiplication, and division

Statistics:

- Interpret and construct pie charts and line graphs, and use these to solve problems
- Calculate and interpret the mean as an average

Education for a Connected World links

Managing information online

- I can describe how I can search for information within a wide group of technologies (e.g. social media, image sites, video sites)
- I can use different search technologies

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3D Modelling

Unit introduction

Learners will develop their knowledge and understanding of using a computer to produce 3D models. Learners will initially familiarise themselves with working in a 3D space, moving, resizing, and duplicating objects. They will then create hollow objects using placeholders and combine multiple objects to create a model of a desk tidy. Finally, learners will examine the benefits of grouping and ungrouping 3D objects, then go on to plan, develop, and evaluate their own 3D model of a building.

Overview of lessons

Lesson	Brief overview	Learning objectives
1 Introduction to 3D modelling	Learners will be introduced to the concept of 3D modelling by creating a range of 3D shapes that they select and move. Learners also examine shapes from a variety of views within the 3D space.	To recognise that you can work in three dimensions on a computer • I can add 3D shapes to a project • I can view 3D shapes from different perspectives • I can move 3D shapes relative to one another
2 Modifying 3D objects	Learners will manipulate 3D objects digitally. They will resize objects in one, two, and three dimensions. They will also lift and lower 3D objects relative to the workplane, and combine two 3D objects to make a new shape. Finally learners will recolour 3D objects.	To identify that digital 3D objects can be modified • I can resize an object in three dimensions • I can lift/lower 3D objects • I can recolour a 3D object
3 Make your own name badge	Learners will develop their understanding of manipulating digital 3D objects. They will rotate objects in three dimensions, duplicate objects, and then use grouping and ungrouping to manipulate many objects at once. They will combine these	To recognise that objects can be combined in a 3D model • I can rotate objects in three dimensions • I can duplicate 3D objects • I can group 3D objects

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	skills to create their own 3D name badge. Finally, learners will consider the practicality of 3D printing the objects they have made.	
4 Making a desk tidy	Learners will be introduced to the dimensions of shapes in Tinkercad which will enable them to accurately resize and move shapes. Learners will then be introduced to placeholders which can be used to create holes in objects. Finally learners will duplicate, then resize multiple objects to create a meaningful 3D object.	To create a 3D model for a given purpose • I can accurately size 3D objects • I can show that placeholders can create holes in 3D objects • I can combine a number of 3D objects
5 Planning a 3D model	Learners will see how architects use 3D design to visualise and plan buildings and communicate with clients. They will explode 3D models of buildings to see what shapes they comprise of. Learners will then look at real world structures and identify the shapes that they include. They will then plan their own 3D building design, thinking about some of the ways in which real-world architects use these tools.	To plan my own 3D model • I can analyse a 3D model • I can choose objects to use in a 3D model • I can combine objects in a design
6 Make your own 3D model	Learners will create a computer 3D model based on their design. They will explore why architects might use CAD software alongside traditional skills. They will then evaluate their model and that of another learner, before modifying their own model to improve it.	To create my own digital 3D model • I can construct a 3D model based on a design • I can explain how my 3D model could be improved • I can modify my 3D model to improve it

Curriculum links

Computing

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

Education for a Connected World links

Privacy and Security

- I can describe strategies for keeping my personal information private, depending on context

Art and Design

- To improve their mastery of art and design techniques, including drawing, painting, and sculpture with a range of materials

Design and Technology

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

Maths

- Recognise, describe, and build simple 3D shapes, including making nets

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Python and micro:bits

Unit introduction

This unit is the final KS2 programming unit and brings together elements of all the four programming constructs: sequence from Year 3, repetition from Year 4, selection from Year 5, and variables (introduced in Year 6 – 'Programming A'. It offers pupils the opportunity to use all of these constructs in a different, but still familiar environment, while also utilising a physical device — the micro:bit. The unit begins with a simple program for pupils to build in and test within the new programming environment, before transferring it to their micro:bit. Pupils then take on three new projects in Lessons 2, 3, and 4, with each lesson adding more depth.

Design features prominently in this unit. A design template is introduced in Lesson 3, initially scaffolded to give pupils the opportunity to create code from a given design. In Lesson 4 that scaffolding is gradually reduced, then in Lesson 5, pupils create their own design, using the same template. In the final lesson, pupils will apply their knowledge of the programming constructs and use their design to create their own micro:bit-based step counter.

Overview of lessons

Lesson	**Brief overview**	**Learning objectives**
1 The micro:bit	Pupils will be introduced to the micro:bit as an input, process, output device that can be programmed. Pupils will familiarise themselves with the device itself and the programming environment, before creating their own programs. They will then run their programs on the device. **Note:** This unit is written assuming that you will be using a desktop or laptop computer (not a tablet) to connect micro:bits.	To create a program to run on a controllable device • I can apply my knowledge of programming to a new environment • I can test my program on an emulator • I can transfer my program to a controllable device

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2 Go with the flow	Pupils will explore how if, then, else statements are used to direct the flow of a program. They will initially relate if, then, else statements to real-world situations, before creating programs in MakeCode. They will apply their knowledge of if, then, else statements to create a program that features selection influenced by a random number to create a micro:bit fortune teller project.	To explain that selection can control the flow of a program • I can identify examples of conditions in the real world • I can use a variable in an if, then, else statement to select the flow of a program • I can determine the flow of a program using selection
3 Sensing inputs	Pupils will initially use the buttons to change the value of a variable using selection. They will then develop their programs to update the variable by moving their micro:bit using the accelerometer to sense motion. Finally, they will learn that a variable's value remains the same after it has been checked by the program.	To update a variable with a user input • I can use a condition to change a variable • I can experiment with different physical inputs • I can explain that checking a variable doesn't change its value
4 Finding your way	Pupils will apply their understanding of the importance of order in programs. They will then use operands in selection to determine the flow of a program. Pupils will then modify a program which will enable the micro:bit to be used as a navigational device. To code this, they will adapt the code they completed to make a basic compass.	To use an conditional statement to compare a variable to a value • I can use an operand (e.g. <>=) in an if, then statement • I can explain the importance of the order of conditions in else, if statements • I can modify a program to achieve a different outcome
5 Designing a step counter	Pupils will be working at the design level. They will pick out features of a step counter, a piece of technology with which they are likely to be familiar. They will then relate those features to the sensors on a micro:bit. In the main activity, pupils will design the algorithm and program flow for their step counter project.	To design a project that uses inputs and outputs on a controllable device • I can decide what variables to include in a project • I can design the algorithm for my project

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		• I can design the program flow for my project
6 Making a step counter	Pupils will use the design that they have created in Lesson 5 to make a micro:bit-based step counter. First they will review their plans, followed by creating their code. Pupils will test and debug their code, using the emulator and then the physical device. To successfully complete this project, Pupils will need to demonstrate their understanding of all the programming lessons they've had so far.	To develop a program to use inputs and outputs on a controllable device • I can create a program based on my design • I can test my program against my design • I can use a range of approaches to find and fix bugs

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