



Newbald Primary School

Computing

Framework
Year 5&6





Key Concepts



Within Computing, pupils will develop a deep understanding of key concepts and second order concepts. These key concepts have been carefully considered and identified as the core knowledge, skills and confidence to engage with technology required to successfully achieve in a digital world. The Key concepts are revisited and developed as the pupils move through the school to ensure the knowledge, skills and confidence to engage with technology are firmly embed within the long-term memory. All concepts encompass the three strands of computing: Computer Science, Digital literacy and Information technology.

Key Concepts:

- **Programming:** (interpreting, creating and evaluating algorithms, programming to accomplish specific goals, detecting and correcting errors)
- **Computing systems and networks:** (systems, networks and how they are used, the internet, hardware and software)
- **Data and information:** (collecting, analysing, evaluating, presenting data and information)
- **Creating media:** (design and development, communicating and collaborating online, evaluating online content, respectful and responsible communication, presenting, creating content)

As part of the work on each key concept, children also explore and learn about:

- The effective use of tools
- The impact of technology
- Safety, E-Safety and security



Cycle A	Class 2	Class 3	Class 4
Autumn 1	Florence Nightingale & Mary Seacole Creating Media - Digital Painting (Year 1) https://teachcomputing.org/curriculum/key-stage-1/creating-media-digital-painting 	Prehistoric Britain Programming B - Events and Actions (Year 3) https://teachcomputing.org/curriculum/key-stage-2/programming-b-events-and-actions 	Ancient Egypt Programming B - Selection in Quizzes (Year 5) https://teachcomputing.org/curriculum/key-stage-2/programming-b-selection-in-quizzes 
Autumn 2	Australia & Oceania Creating Media - Making Music (Year 2) https://teachcomputing.org/curriculum/key-stage-1/creating-media-making-music 	The Victorians Data and Information - Branching Databases (Year 3) https://teachcomputing.org/curriculum/key-stage-2/data-and-information-branching-databases 	Europe Creating Media - Vector Drawing (Year 5) https://teachcomputing.org/curriculum/key-stage-2/creating-media-vector-drawing 
Spring 1	Weather & Climate Programming B - An Introduction to Quizzes (Year 2) https://teachcomputing.org/curriculum/key-stage-1/programming-b-an-introduction-to-quizzes 	India & Asia Programming B - Repetition in Games (Year 4) https://teachcomputing.org/curriculum/key-stage-2/programming-b-repetition-in-games 	The Tudors Creating Media - Webpage (Year 6) https://teachcomputing.org/curriculum/key-stage-2/creating-media-web-page-creation 
Spring 2	Explorers Programming B - Introduction to Animation (Year 1) https://teachcomputing.org/curriculum/key-stage-1/programming-b-introduction-to-animation 	England & The UK Computer Systems and Networks - The Internet (Year 4) https://teachcomputing.org/curriculum/key-stage-2/computing-systems-and-networks-the-internet 	Mountains Data and Information - Flat File Data (Year 5) https://teachcomputing.org/curriculum/key-stage-2/data-and-information-flat-file-databases 
Summer 1	Local Area - Yorkshire Data and Information - Grouping Data (Year 1) https://teachcomputing.org/curriculum/key-stage-1/data-and-information-grouping-data 	Coasts Creating Media - Animation (Year 3) https://teachcomputing.org/curriculum/key-stage-2/creating-media-animation 	Britain Since 1945 Computer Systems and Networks - Sharing Information (Year 5) https://teachcomputing.org/curriculum/key-stage-2/computing-systems-and-networks-sharing-information 
Summer 2	Inventors & Inventions Computer Systems and Networks - IT Around Us (Year 2) https://teachcomputing.org/curriculum/key-stage-1/computing-systems-and-networks-it-around-us 	The Anglo Saxons & Vikings Creating Media - Photo Editing (Year 4) https://teachcomputing.org/curriculum/key-stage-2/creating-media-photo-editing 	Britain Since 1945 Programming B - Sensing (Year 6) https://teachcomputing.org/curriculum/key-stage-2/programming-b-sensing 



Cycle B	Class 2	Class 3	Class 4
Autumn 1	Transport Through Time Data and Information - Pictograms (Year 2) https://teachcomputing.org/curriculum/key-stage-1/data-and-information-pictograms 	World War 2 Creating Media - Audio Editing (Year 4) https://teachcomputing.org/curriculum/key-stage-2/creating-media-audio-editing 	World War 1 Data and Information - Spreadsheets (Year 6) https://teachcomputing.org/curriculum/key-stage-2/data-and-information-spreadsheets 
Autumn 2	Polar Regions Creating Media - Digital Writing (Year 1) https://teachcomputing.org/curriculum/key-stage-1/creating-media-digital-writing 	USA & North America Computer Systems and Networks - Connecting Computers (Year 3) https://teachcomputing.org/curriculum/key-stage-2/computing-systems-and-networks-connecting-computers 	Brazil & South America Programming A - Selection in Physical Computing (Year 5) https://teachcomputing.org/curriculum/key-stage-2/programming-a-selection-in-physical-computing 
Spring 1	Great Fire of London Computer Systems and Networks - Technology around us (Year 1) https://teachcomputing.org/curriculum/key-stage-1/computing-systems-and-networks-technology-around-us 	The Romans Programming A - Repetition in Shapes (Year 4) https://teachcomputing.org/curriculum/key-stage-2/programming-a-repetition-in-shapes 	Ancient Greece Programming A - Variables in Games (Year 6) https://teachcomputing.org/curriculum/key-stage-2/programming-a-variables-in-games 
Spring 2	Pirates & The Ocean Programming A - Moving a Robot (Year 1) https://teachcomputing.org/curriculum/key-stage-1/programming-a-moving-a-robot 	Volcanoes, Earthquakes & Natural Disasters Programming A - Sequence in Music (Year 3) https://teachcomputing.org/curriculum/key-stage-2/programming-a-sequence-in-music 	Human Rights Activists Creating Media - Video Editing (Year 5) https://teachcomputing.org/curriculum/key-stage-2/creating-media-video-editing 
Summer 1	An Island Home(Scotland) Programming A - Robot Algorithms (Year 2) https://teachcomputing.org/curriculum/key-stage-1/programming-a-robot-algorithms 	Forests Data and Information - Data Logging (Year 4) https://teachcomputing.org/curriculum/key-stage-2/data-and-information-data-logging 	The Mayan Civilisation Creating Media - 3D Modelling (Year 6) https://teachcomputing.org/curriculum/key-stage-2/creating-media-3d-modelling 
Summer 2	Creating Media - Digital Photography (Year 2) https://teachcomputing.org/curriculum/key-stage-1/creating-media-digital-photography 	The Middle Ages Creating Media - Desktop Publishing (Year 3) https://teachcomputing.org/curriculum/key-stage-2/creating-media-desktop-publishing 	Maps & Rivers Computer Systems and Networks - Communication (Year 6) https://teachcomputing.org/curriculum/key-stage-2/computing-systems-and-networks-communication 



Class 4 - Year 5 & 6 Vocabulary



Year 3 & 4 Vocabulary Cycle A

Ancient Egypt Programming B - Selection in Quizzes	Europe Creating Media - Vector Drawing	The Tudors Creating Media - Webpage
Selection, condition, true, false, count-controlled loop, outcomes, conditional statement, algorithm, program, debug, question, answer, task, design, input, implement, test, run, setup, operator	vector, drawing tools, object, toolbar, vector drawing, move, resize, colour, rotate, duplicate/copy, zoom, select, align, modify, layers, order, copy, paste, group, ungroup, reuse, reflection	website, web page, browser, media, Hypertext Markup Language (HTML), logo, layout, header, media, purpose, copyright, fair use, home page, preview, evaluate, device, Google Sites, breadcrumb trail, navigation, hyperlink, subpage, evaluate, implication, external link, embed.
Mountains Data and Information - Flat File Data	Britain Since 1945 Computer Systems and Networks - Sharing Information	Britain Since 1945 Programming B - Sensing
database, data, information, record, field, sort, order, group, search, value, criteria, graph, chart, axis, compare, filter, presentation.	system, connection, digital, input, process, storage, output, search, search engine, refine, index, bot, ordering, links, algorithm, search engine optimisation (SEO), web crawler, content creator, selection, ranking.	Micro:bit, MakeCode, input, process, output, flashing, USB, trace, selection, condition, if then else, variable, random, sensing, accelerometer, value, compass, direction, navigation, design, task, algorithm, step counter, plan, create, code, test, debug.

Year 3 & 4 Vocabulary Cycle B

World War 1 Data and Information - Spreadsheets	Brazil & South America Programming A - Selection in Physical Computing	Ancient Greece Programming A - Variables in Games
data, collecting, table, structure, spreadsheet, cell, cell reference, data item, format, formula, calculation, spreadsheet, input, output, operation, range, duplicate, sigma, propose, question, data set, organised, chart, evaluate, results, sum, comparison, software, tools.	microcontroller, USB, components, connection, infinite loop, output component, motor, repetition, count-controlled loop, Crumble controller, switch, LED, Sparkle, crocodile clips, connect, battery box, program, condition, Input, output, selection, action, debug, circuit, power, cell, buzzer	variable, change, name, value, set, design, event, algorithm, code, task, artwork, program, project, code, test, debug, improve, evaluate, share, assign, declare
Human Rights Activists Creating Media - Video Editing	The Mayan Civilisation Creating Media - 3D Modelling	Maps & Rivers Computer Systems and Networks - Communication
video, audio, camera, talking head, panning, close up, video camera, microphone, lens, mid-range, long shot, moving subject, side by side, angle (high, low, normal), static, zoom, pan, tilt, storyboard, filming, review, import, split, trim, clip, edit, reshoot, delete, reorder, export, evaluate, share.	TinkerCAD, 2D, 3D, shapes, select, move, perspective, view, handles, resize, lift, lower, recolour, rotate, duplicate, group, cylinder, cube, cuboid, sphere, cone, prism, pyramid, placeholder, hollow, choose, combine, construct, evaluate, modify.	communication, protocol, data, address, Internet Protocol (IP), Domain Name Server (DNS), packet, header, data payload, chat, explore, slide deck, reuse, remix, collaboration, internet, public, private, oneway, two-way, one-to-one, one-to-many.

Class 4 Cycle A

	Class 4	
Autumn 1	Ancient Egypt	Programming B - selection in quizzes
Autumn 2	Europe	Creating media - Vector drawings
Spring 1	Tudors	Creating media - webpage
Spring 2	Mountains	Data and information - Flat file data
Summer 1	Britain since 1945	Computing systems and networks - Systems and searching
Summer 2	Britain since 1945 (Continued)	Programming B - sensing

Ancient Egypt

Programming B - selection in quizzes

<https://teachcomputing.org/curriculum/key-stage-2/programming-b-selection-in-quizzes>



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.

Learners will need to have access to Scratch for this unit. The online version of Scratch runs via a web browser and can be accessed on desktops, laptops and tablets. You may want to consider setting up a teacher account, to create logins for learners to save and access their projects. If internet connectivity is an issue in school, Scratch can be accessed offline via the Scratch app.

Lesson	Brief overview	Learning objectives
1 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
2 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 - I can create a program that uses selection to produce different outcomes
3. 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

4 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
5 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 feedback. Learners conclude the lesson by using another learner's quiz and providing feedback on it.	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
6 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

Vocabulary:

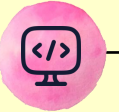
Ancient Egypt Programming B - Selection in Quizzes

Selection, condition, true, false, count-controlled loop, outcomes, conditional statement, algorithm, program, debug, question, answer, task, design, input, implement, test, run, setup, operator



Ancient Egypt

Unit: Programming B - selection in quizzes



Assessment Criteria:

	Emerging [1]	Expected [2]	Exceeding [3]
Task	Describe the model that will be made in the task	Describe the requirements of the task, including the use of selection	Explain how selection could be used to meet the requirements of the task
Design	- Identify components to be used in their electrical circuit - Build a model that reflects the task - Write an algorithm to control output devices	- Construct a wiring diagram to show how components will be connected - Build a model that supports the hardware that will be used in the task - Write an algorithm that uses selection to control a sequence using output devices	- Construct a wiring diagram detailing the pads to be used on each component - Build a model informed by the limitations of the hardware (for example, not placing LEDs on the rotating disc) - Explain how conditions and loops have been used in the algorithm to create a selection statement
Code	- Choose from a scaffolded set of blocks - Identify where the program goes wrong	- Combine appropriate blocks to implement their algorithm - Suggest a strategy to fix the code when it is not working	- Explain why they have chosen to implement their algorithm in that way - Explain to others any bugs found and how they were fixed
Running the code	Run their code with their model connected	Test their code with their model	Discuss the limitations of reviewing the code while running it
Evaluation	Identify elements of the task that have been achieved	Evaluate how successful they were in meeting the task requirements	Identify how and why their project could be enhanced

Europe

Creating media - Vector drawings

<https://teachcomputing.org/curriculum/key-stage-2/creating-media-vector-drawing>



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 uses the Google Drawings application. All Google Drawings files are provided in the lesson plans (the links create a copy of the drawing that can be edited). If you wish to use a different program, the resources are included as Google Slides presentations. The contents of these files can be copied across to your preferred program.

Note: pupils are creating vector-style drawings in this unit, not true vector drawings, as these require specialised software.

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 main drawing tools within the Google Drawings application 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
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 Create a vector drawing	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. Learners then begin to compare vector drawings to freehand paint program drawings.	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 - I can compare vector drawings to freehand paint drawings

Vocabulary:

Europe

Creating Media - Vector Drawing

vector, drawing tools, object, toolbar, vector drawing, move, resize, colour, rotate, duplicate/copy, zoom, select, align, modify, layers, order, copy, paste, group, ungroup, reuse, reflection



Europe

Unit: Creating media - Vector drawings



Assessment Criteria:

	Emerging [1]	Expected [2]	Exceeding [3]
Task	Outline the broad requirements of the task	Explain the key requirements of the task	Outline an approach to planning the task
Design decisions	Choose an item to base their work on	Choose an item in the classroom and consider how it's relevant to the task	Choose an item in the classroom and consider how it can be represented as a drawn object
Implementation	- Add and remove objects to create a drawing - Manipulate the objects to create a drawing - Move objects on the screen - Position an object on top of another - Select and group objects to move them	- Add and remove objects to create a drawing of a chosen artefact - Use copy and paste to maintain consistency within the drawing - Manipulate an object's size, colour, and proportion to represent a chosen artefact - Purposefully position and rotate objects - Move objects to different layers to create a specific aspect of a drawing - Manipulate multiple objects concurrently - Group objects to make them easier to work with	- Enhance the drawing by adding additional objects, for example to represent light and shade - Manipulate objects to achieve desired effects to create a drawing with consistent proportions - Trial placing objects in different places to see what suits the overall image - Position objects to make more complex shapes - Combine grouped objects together to form bigger groups - Ungroup objects to make a change and then regroup as necessary
Evaluation	Identify which elements of the task have been achieved	Evaluate how successful they were in meeting the task requirements	Identify how and why their project could be improved

Tudors

Creating media - webpage

<https://teachcomputing.org/curriculum/key-stage-2/creating-media-web-page-creation>



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, fair use of media and creative commons, the aesthetics of the site, and navigation paths. This will enable the learners to understand how to be a respectful and responsible user of technology online.

It is recommended that learners use laptop or desktop computers for this unit of work. The unit has been based on the use of Google Sites,

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 How would you lay out your web page?	Learners will look at the different layout features available in Google Sites and plan their own web page on paper.	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
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.	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?	Today 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
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

Vocabulary:

The Tudors

Creating Media - Webpage

website, web page, browser, media, Hypertext Markup Language (HTML), logo, layout, header, media, purpose, copyright, fair use, home page, preview, evaluate, device, Google Sites, breadcrumb trail, navigation, hyperlink, subpage, evaluate, implication, external link, embed.



Tudors

Unit: Creating media - webpage



Assessment Criteria:

	Emerging [1]	Expected [2]	Exceeding [3]
Task	Outline the broad requirements of the task	Explain the key requirements of the task	Outline an approach to planning the task
Design decisions	- Use pictures and writing related to chosen topic - Aware of the importance of checking ownership of multimedia - Aware that planning helps create a better outcome - Some parts of the layout have been planned	- Layout contains multiple sections - Layout relates to a relevant purpose/audience - Use copyright-free images - Design is clear and organised	- Use additional features (editing, image carousels, maps) - Layout contains original work - Make references or acknowledgements (fair use) - Design takes into consideration the limitations of the software
Implementation	- Recognise that multiple webpages can be added - Recognise that multiple webpages can be linked - Aware of differences when viewing how the webpage will look on different devices	- Add subpages - Add internal and external hyperlinks - Suggest some improvements - Design considers how the page will look on different devices	- Add, organise, and link multiple pages - Enhance website with embedded content - Justify and make improvements
Evaluation	Identify which elements of the task have been achieved	Evaluate how successful they were in meeting the task requirements	Identify how and why their project could be improved

Mountains

Data and information - Flat file data

<https://teachcomputing.org/curriculum/key-stage-2/data-and-information-flat-file-databases>



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.

You will need digital devices for learners to interact with during this unit, to access the free J2e data platform: <https://www.j2e.com/database/>. The website can be accessed via any device; laptop, Chromebook, desktop or tablet, and the example databases from the unit can be found here: <https://www.j2e.com/data/examples/>

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
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

Vocabulary:

Mountains

Data and Information - Flat File Data

database, data, information, record, field, sort, order, group, search, value, criteria, graph, chart, axis, compare, filter, presentation.



Mountains

Unit: Data and information - Flat file data



Assessment Criteria:

	Emerging [1]	Expected [2]	Exceeding [3]
Asking questions	• Suggests what topic they want to ask a question about • Chooses a relevant question that can be answered using a data logger	• Suggests questions that require data from at least one sensor to answer them • Suggests questions that require data to be collected over time to answer them	• Suggests questions that require data from more than one sensor and/or time frame to answer them
Collecting data	• Use a simple form to record information • Begin to compare paper and computer-based databases • Begin to explain that tools can be used to select specific data	• Use a form to record information • Compare paper and computer-based databases • Outline how grouping and then sorting data allows us to answer questions • explain that tools can be used to select specific data	• Create and use a detailed form to record information • Compare paper and computer-based databases expressing insight into pros and cons of each • Outline and demonstrate how grouping and then sorting data allows us to answer questions • Explain and demonstrate how multiple tools can be used to select and be used to analyze specific data
Viewing data	• Uses software to view collected data • Recognises some data points in their data	• Uses software to view relevant data • Recognises how some data points are different	• Uses multiple features to analyse and look at sections of data more closely • Describes the differences in data points
Findings	• Makes statements about what their data shows • Uses their collected data to answer their question	• Explain that computer programs can be used to compare data visually Uses their collected data to answer their question • Compare data visually • Apply my knowledge of a database to ask and answer real-world questions	• Explain in detail that computer programs can be used to compare data visually Uses their collected data to answer their question • Compare increasingly complex data visually • Apply my knowledge of a database to ask and answer increasingly complex real-world questions

Britain since 1945

Computing systems and networks - Systems and searching

<https://teachcomputing.org/curriculum/key-stage-2/computing-systems-and-networks-sharing-information>



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.

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 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.	To identify how to use a search engine - 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 explain why I should search trustworthy websites and not share any personal information online.

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

Vocabulary:

Britain Since 1945

Computer Systems and Networks - Sharing Information

system, connection, digital, input, process, storage, output, search, search engine, refine, index, bot, ordering, links, algorithm, search engine optimisation (SEO), web crawler, content creator, selection, ranking.



Assessment Criteria:

	Emerging [1]	Expected [2]	Exceeding [3]
Task	• Explain the key requirements of the task	• Outline an approach to planning the task	• Outline a highly effective approach to planning the task
Knowledge	• Begin to understand that computers can be connected together to form systems • Begin to recognise the role of computer systems in our lives • Begin to recognise how information is transferred over the internet • Begin to explain how sharing information online lets people in different places work together	• Explain that computers can be connected together to form systems • Recognise the role of computer systems in our lives • Recognise how information is transferred over the internet • Explain how sharing information online lets people in different places work together	• Explain how computers can be connected together to form systems • Recognise and explain the role of computer systems in our lives and how they are used in specific examples • Recognise and explain how information is transferred over the internet • Explain how sharing information online lets people in different places work together demonstrating this practically
Implementation	• Contribute to a shared project online • Identify input and output devices • Use sensors to create a system such as a virtual pedestrian crossing or virtual automatic doors • Use increasingly advanced features of search engines	• Contribute to a shared project online • Identify input and output devices • Use sensors to create a system such as a virtual pedestrian crossing or virtual automatic doors • Use increasingly advanced features of search engines	• Contribute to a shared project online, taking a leading role and ensuring high expectations • Identify, use and control input and output devices • Use multiple sensors to create an increasingly complex system such as a virtual traffic light or pedestrian crossing • Demonstrate and explain increasingly advanced features of search engines
Evaluation	• Evaluate how successful they were in meeting the task requirements	• Identify how and why their project could be improved • Evaluate different ways of working together online	• Identify and explain which elements were successful and why and how and why their project could be improved • Evaluate different ways of working together online

Britain Since 1945 (Continued)

Programming B - sensing

<https://teachcomputing.org/curriculum/key-stage-2/programming-b-sensing>



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.

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
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

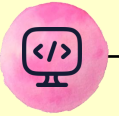
4 Finding your way	Pupils will apply their understanding of the importance of order in programs. They will then use operands in selection to determine the flow of a program. Pupils will then modify a program which will enable the micro:bit to be used as a navigational device. To code this, they will 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 - 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

Vocabulary:

Britain Since 1945

Programming B - Sensing

Micro:bit, MakeCode, input, process, output, flashing, USB, trace, selection, condition, if then else, variable, random, sensing, accelerometer, value, compass, direction, navigation, design, task, algorithm, step counter, plan, create, code, test, debug.



Assessment Criteria:

	Emerging [1]	Expected [2]	Exceeding [3]
Task	Describe the purpose of the project, for example, to create a project that shows how many steps someone has walked	Describe what will be shown if someone has walked more than a set number of steps	Describe a variety of responses based on the number of steps walked
Design	- Identify how a user will be shown how many steps they've walked - Create an algorithm to describe how the program will record a step	- Identify what will be displayed and how the user will see it - Choose an appropriate name for a variable - Choose when and where to set a variable - Create an algorithm to describe how the program will process each input	Relate the use of selection within the algorithm to other real-world systems
Code	Choose from a scaffolded set of blocks to implement their algorithm	Combine appropriate blocks to implement their algorithm	Explain why they have chosen to implement their algorithm in that way
Running the code	- Run their code on the device - Identify if the program doesn't work as they expected it to	- Run their code on the emulator to test their program - Propose a strategy to fix the code if it is not working	- Discuss the limitations of the emulator when testing code - Explain to others about any bugs that were found and how they were fixed
Evaluation	Identify elements of the task that have been achieved	Evaluate how successful they were in meeting the task requirements	Identify how and why their project could be enhanced

Class 4 Cycle B

Autumn 1	World War 1	Data and information - Spreadsheets
Autumn 2	Brazil and South America	Programming A - Selection in physical computing
Spring 1	Ancient Greece	Programming A - Variables in games
Spring 2	Human Rights	Creating media - Video editing
Summer 1	The Mayans	Creating Media - 3D Modelling
Summer 2	Maps and Rivers	Computer systems and networks - Sharing information

World War 1

Data and information - Spreadsheets

<https://teachcomputing.org/curriculum/key-stage-2/data-and-information-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.

It is recommended that you use laptop or desktop computers which have access to a spreadsheet application. The screenshots and videos in this unit are based on Google Slides.

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 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.	To explain that formulas can be used to produce calculated data - 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
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

Vocabulary:

World War 1

Data and Information - Spreadsheets

data, collecting, table, structure, spreadsheet, cell, cell reference, data item, format, formula, calculation, spreadsheet, input, output, operation, range, duplicate, sigma, propose, question, data set, organised, chart, evaluate, results, sum, comparison, software, tools.



Assessment Criteria:

	Emerging [1]	Expected [2]	Exceeding [3]
Asking questions	• Suggests what topic they want to ask a question about • Chooses a relevant question that can be answered using data	• To identify questions which can be answered using data and suggest ways of using a spreadsheet to do so	• To identify questions which can be answered using data and suggest ways of using a spreadsheet to do so • Suggests questions that require data from more than one sensor or source and/or time frame to answer them
Collecting data	• Begin to explain that objects can be described using data • Begin to explain that formula can be used to produce calculated data • Begin to apply simple formulas to data	• Explain that objects can be described using data • Explain that formula can be used to produce calculated data • Apply formulas to data, including duplicating	• Explain in detail that objects can be described using data • Explain and use multiple formulas accurately to produce calculated data • Apply multiple formulas accurately to data, including duplicating, copying and pasting • Create graphs and visual representations from data collected • Format cells applicable to the relevant task e.g.: money, one decimal place etc.
Viewing data	• Create a simple spreadsheet to plan an event • Choose one way to present data eg line graph / bar chart.	• Create a spreadsheet to plan an event • Choose suitable ways to present data	• Create a detailed and highly effective spreadsheet to plan an event • Choose highly effective ways to present data • Describes the differences in data points
Findings	• Recognises changes in a graph • Identifies the part of the graph that could help them answer their question	• Makes statements about what their data shows • Uses their collected data to answer their question	• Identifies the parts of their data most relevant to answering their question • Suggests other questions that their data could answer

Brazil and South America

Programming A - Selection in physical computing

<https://teachcomputing.org/curriculum/key-stage-2/programming-a-selection-in-physical-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.

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
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

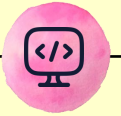
4 Starting with selection	In this lesson, learners will develop their understanding of how the flow of actions in algorithms and programs can be controlled by conditions. They will be introduced to selection and then represent conditions and actions using the 'if...then...' structure. Learners will create 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 then return to the code or algorithm to debug it where necessary. Finally, to conclude the unit, learners will evaluate their designs.	To create a program that controls a physical computing project - I can write an algorithm that describes what my model will do - I can use selection to produce an intended outcome - I can test and debug my project

Vocabulary:

Brazil & South America

Programming A - Selection in Physical Computing

microcontroller, USB, components, connection, infinite loop, output component, motor, repetition, count-controlled loop, Crumble controller, switch, LED, Sparkle, crocodile clips, connect, battery box, program, condition, Input, output, selection, action, debug, circuit, power, cell, buzzer



Assessment Criteria:

	Emerging [1]	Expected [2]	Exceeding [3]
Task	Describe the model that will be made in the task	Describe the requirements of the task, including the use of selection	Explain how selection could be used to meet the requirements of the task
Design	- Identify components to be used in their electrical circuit - Build a model that reflects the task - Write an algorithm to control output devices	- Construct a wiring diagram to show how components will be connected - Build a model that supports the hardware that will be used in the task - Write an algorithm that uses selection to control a sequence using output devices	- Construct a wiring diagram detailing the pads to be used on each component - Build a model informed by the limitations of the hardware (for example, not placing LEDs on the rotating disc) - Explain how conditions and loops have been used in the algorithm to create a selection statement
Code	- Choose from a scaffolded set of blocks - Identify where the program goes wrong	- Combine appropriate blocks to implement their algorithm - Suggest a strategy to fix the code when it is not working	- Explain why they have chosen to implement their algorithm in that way - Explain to others any bugs found and how they were fixed
Running the code	Run their code with their model connected	Test their code with their model	Discuss the limitations of reviewing the code while running it
Evaluation	Identify elements of the task that have been achieved	Evaluate how successful they were in meeting the task requirements	Identify how and why their project could be enhanced

Ancient Greece

Programming A - Variables in games

<https://teachcomputing.org/curriculum/key-stage-2/programming-a-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.

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 - 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 Designing a game	Learners work at the 'design' level of abstraction, where they create their artwork and 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	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 features that could be improved.	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

Vocabulary:

Ancient Greece

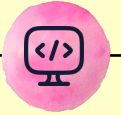
Programming A - Variables in Games

variable, change, name, value, set, design, event, algorithm, code, task, artwork, program, project, code, test, debug, improve, evaluate, share, assign, declare



Ancient Greece

Unit: Programming A - Variables in games



Assessment Criteria:

	Emerging [1]	Expected [2]	Exceeding [3]
Task	Describe the model that will be made in the task	Describe the requirements of the task, including the use of selection	Explain how selection could be used to meet the requirements of the task
Design	- Begin to understand the term 'variable' as something that is changeable - Begin to explain why a variable is used in a program - Experiment with how to improve a game by using variables - Begin to design a project that builds on a given example - Use parts of my design to create a project	- Define a 'variable' as something that is changeable - Explain why a variable is used in a program - Choose how to improve a game by using variables - Design a project that builds on a given example - Use my design to create a project	- Define a 'variable' as something that is changeable giving examples - Explain with insight why a variable is used in a program - Choose how to improve a game effectively by using a variety of variables - Design an effective project that builds on a given example - Use my design to create a highly effective project
Code	- Choose from a scaffolded set of blocks - Identify where the program goes wrong	- Combine appropriate blocks to implement their algorithm - Suggest a strategy to fix the code when it is not working	- Explain why they have chosen to implement their algorithm in that way - Explain to others any bugs found and how they were fixed
Running the code	Run their code with their model connected	Test their code with their model	Discuss the limitations of reviewing the code while running it
Evaluation	Identify elements of the task that have been achieved	- Evaluate my project - Evaluate how successful they were in meeting the task requirements	Identify how and why their project could be enhanced

Human Rights Activists

Creating media - Video editing

<https://teachcomputing.org/curriculum/key-stage-2/creating-media-video-editing>



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.

To teach this unit, you will need video recording equipment such as video cameras or tablets with video capabilities.

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
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 - 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. 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

Vocabulary:

Human Rights Activists

Creating Media - Video Editing

video, audio, camera, talking head, panning, close up, video camera, microphone, lens, mid-range, long shot, moving subject, side by side, angle (high, low, normal), static, zoom, pan, tilt, storyboard, filming, review, import, split, trim, clip, edit, reshoot, delete, reorder, export, evaluate, share.



Human Rights Activists

Unit: Creating media - Video editing



Assessment Criteria:

	Emerging [1]	Expected [2]	Exceeding [3]
Task	Outline the broad requirements of the task	Explain the key requirements of the task	Outline an approach to planning the task
Design decisions	- Show ideas to support the making of a video - Show the ideas of the story and the scenes to be filmed - Show a story with progression and some notes on how the film will be made	Show sequence and progression with a clear beginning, middle, and end	Show pictures and notes for all elements and aid the production of the video, with additional, unprompted notes
Implementation	- Capture a video that relates to the storyboard - Include spoken audio - Review video in an editing program	- Use appropriate filming techniques and capture the scenes from the storyboard - Captured audio is clear - Edit the video to join scenes, matching the storyboard	- Purposefully use filming techniques - Combine audio with the video to enhance the visuals on screen - Purposefully use edits to produce an effective video
Evaluation	Identify which elements of the task have been achieved	Evaluate how successful they were in meeting the task requirements	Identify how and why their project could be improved

The Mayan Civilisation

Creating Media - 3D Modelling

<https://teachcomputing.org/curriculum/key-stage-2/creating-media-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.

For this sequence of lessons, learners will be using Tinkercad (<https://www.tinkercad.com>), a web-based 3D modelling application. Learners will need accounts to save their work and access the resources. We recommend signing up for a teacher account at <https://www.tinkercad.com/join>, which enables learner accounts to be created and the website accessed with a class code. For guidance on setting up your class, please visit <https://www.tinkercad.com/teach>. Please ensure your school's online safety policy is considered when creating accounts.

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 skills to create their own 3D name badge. Finally, learners will consider the practicality of 3D printing the objects they have made.	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

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 computer-based 3D design is used in architecture to plan buildings. 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.	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 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

Vocabulary:

The Mayan Civilisation

Creating Media - 3D Modelling

TinkerCAD, 2D, 3D, shapes, select, move, perspective, view, handles, resize, lift, lower, recolour, rotate, duplicate, group, cylinder, cube, cuboid, sphere, cone, prism, pyramid, placeholder, hollow, choose, combine, construct, evaluate, modify.



Assessment Criteria:

	Emerging [1]	Expected [2]	Exceeding [3]
Task	Explain that 3D models can be created using a computer	Describe the purpose of their project: to create a 3D model of a building	List the steps needed to complete the task
Design decisions	- Select from a variety of 3D shapes - Recognise that 3D objects can be viewed from different perspectives	- Explain shapes that are representative of a real-world object to make a model - Recognise that changing perspective does not change the position of objects	- Choose 3D shapes that can be combined to create more complex shapes - View objects from different perspectives to evaluate their size and position
Implementation	- Place and move 3D objects in three dimensions (including lift and lower) - Resize objects in three dimensions using handles - Group multiple objects and manipulate them as one object	- Position 3D objects to create a chosen artefact - Accurately resize objects - Create holes in objects - Use and combine variations of one 3D shape	- Use guidelines to accurately position 3D objects - Use size guides to accurately resize 3D objects relative to each other - Duplicate and ungroup objects to create variations of models
Evaluation	Identify which elements of the task have been achieved	Evaluate how successful they were in meeting the task requirements	Identify how and why their project could be improved

Maps and Rivers

Computing systems and networks - Communication and collaboration

<https://teachcomputing.org/curriculum/key-stage-2/computing-systems-and-networks-communication>



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.

Lesson	Brief overview	Learning objectives
1 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
2 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
3 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

4 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
5 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
6 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 and information security.	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 - I can explain that communication on the internet may not be private

Vocabulary:

Maps & Rivers

Computer Systems and Networks - Communication

communication, protocol, data, address, Internet Protocol (IP), Domain Name Server (DNS), packet, header, data payload, chat, explore, slide deck, reuse, remix, collaboration, internet, public, private, oneway, two-way, one-to-one, one-to-many.



Assessment Criteria:



	Emerging [1]	Expected [2]	Exceeding [3]
Task	Explain the key requirements of the task	Outline an approach to planning the task	Outline a highly effective approach to planning the task
Knowledge	- Begin to explain that computers can be connected together to form systems - Begin to recognise that data is transferred using agreed methods - Explain that internet devices have addresses - Begin to explain that data on the internet is broken down into packets	- Explain that computers can be connected together to form systems - Recognise that data is transferred using agreed methods - Explain that internet devices have addresses - Describe how computers use addresses to access websites - Explain that data is transferred over networks in packets - Explain how the internet enables effective collaboration	- Explain with insight that computers can be connected together to form systems - Recognise that data is transferred using agreed methods giving examples - Explain that internet devices have addresses and explain what an IP address is - Describe with insight how computers use addresses to access websites - Explain that data is transferred over networks in packets - Explain how the internet enables effective collaboration giving examples
Implementation	- Access shared and saved files stored online - Send information over the internet in at least one way - Begin to understand that the internet allows different media to be shared - Identify at least one way of working together online - Begin to recognise that working together on the internet can be public or private - Begin to understand when I should and should not share information online - Explain how to report inappropriate content online	- Recognise how to access shared files stored online - Send information over the internet in different ways - Explain that the internet allows different media to be shared - Identify different ways of working together online - Recognise that working together on the internet can be public or private - Choose methods of communication to suit particular purposes - Decide when I should and should not share information online - Explain how to report inappropriate content online	- Effectively access shared files stored online - Send information over the internet in multiple ways - Store and access and share different media using the internet - Identify multiple ways of working together online - Recognise that working together on the internet can be public or private - Choose methods of communication to suit particular purposes - Decide when I should and should not share information online - Explain how to report inappropriate content online
Evaluation	Evaluate how successful they were in meeting the task requirements	- Identify how and why their project could be improved - Evaluate different ways of working together online	- Identify and explain which elements were successful and why and how and why their project could be improved - Evaluate different ways of working together online