



Computing Curriculum
Year 5 and 6 – Cycle B

Purpose of study

A high-quality computing education equips pupils to use computational thinking and creativity to understand and change the world. Computing has deep links with mathematics, science, and design and technology, and provides insights into both natural and artificial systems. The core of computing is computer science, in which pupils are taught the principles of information and computation, how digital systems work, and how to put this knowledge to use through programming. Building on this knowledge and understanding, pupils are equipped to use information technology to create programs, systems and a range of content. Computing also ensures that pupils become digitally literate – able to use, and express themselves and develop their ideas through, information and communication technology – at a level suitable for the future workplace and as active participants in a digital world.

Aims

The national curriculum for computing aims to ensure that all pupils:

- ♣ can understand and apply the fundamental principles and concepts of computer science, including abstraction, logic, algorithms and data representation
- ♣ can analyse problems in computational terms, and have repeated practical experience of writing computer programs in order to solve such problems
- ♣ can evaluate and apply information technology, including new or unfamiliar technologies, analytically to solve problems
- ♣ are responsible, competent, confident and creative users of information and communication technology.

Attainment targets

By the end of each key stage, pupils are expected to know, apply and understand the matters, skills and processes specified in the relevant programme of study. Schools are not required by law to teach the example content in [square brackets].

Key stage 1 Pupils should be taught to:

- ♣ 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
- ♣ 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.

Key stage 2 Pupils should be taught to:

- ♣ 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
- ♣ 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
- ♣ 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.

Autumn		Spring		Summer	
Non- Negotiables C13: Collaborate with others online on sites approved and moderated by teachers. C15: Understand and demonstrate knowledge that it is illegal to download copyrighted material, including music or games, without express written permission, from the copyright holder. C16: Understand the effect of online comments and show responsibility and sensitivity when online. C18: Choose the most suitable applications and devices for the purposes of communication. C19: Use many of the advanced features in order to create high quality, professional or efficient communications.					
C17: Understand how simple networks are set up and used	C2: Change the position of objects between screen layers (send to back, bring to front) .C15: Understand and demonstrate knowledge that it is illegal to download copyrighted material, including music or games, without express written permission, from the copyright holder. C4: Combine the use of pens with movement to create interesting effects.	. C15: Understand and demonstrate knowledge that it is illegal to download copyrighted material, including music or games, without express written permission, from the copyright holder. C16: Understand the effect of online comments and show responsibility and sensitivity when online. C14: Give examples of the risks of online communities and demonstrate knowledge of how to minimise risk and report problems.	C20: Select appropriate applications to devise, construct and manipulate data and present it in an effective and professional manner.	C1: Set IF conditions for movements. Specify types of rotation giving the number of degrees. C5: Set events to control other events by ‘broadcasting’ information as a trigger. C6: Use IF THEN ELSE conditions to control events or objects. C8: Use lists to create a set of variables.	C3: Upload sounds from a file and edit them. Add effects such as fade in and out and control their implementation. C7: Use a range of sensing tools (including proximity, user inputs, loudness and mouse position) to control events or actions. C9: Use the Boolean operators () < (), () = (), () > (), ()and(), ()or(), Not() to define conditions. C10: Use the Reporter operators () + (), () - (), () * (), () / () to perform calculations. C11: Pick Random () to (), Join () (), Letter () of (), Length of (), () Mod () C12: This reports the remainder after a division calculation Round () () of ().

Resources	Computing Systems and Networks - Communicating Laptops, access to internet, iPads, search engines	Creating Media – 3D Modelling Laptops, access to internet, iPads, (https://www.tinkercad.com). 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 , enables learner accounts to be created and the website accessed with a Class Code: https://tinkercad.zendesk.com/hc/en-us/articles/360026236693-Tinkercad-Classrooms . Please ensure your school's online safety policy (or similar) is closely adhered to and avoid using learners' full names when creating accounts.	Creating Media- Web Page Creating Laptops, access to internet, iPads,	Data and Information - Spreadsheets Laptops, access to internet, iPads, Googlesheets, excel,	Programming A – Variables in Games Laptops, access to internet, iPads, Scratch,	Programming B - Sensing Laptops, access to internet, iPads, makecode.microbit.org , micro:bit will need the following peripherals: A micro USB to USB lead A battery pack 2 x AAA batteries per micro:bit (if you are using your own micro:bits, rather than those provided in the NCCE hub kits, check the battery size — some are AA)
	Vocabulary Search engine, world wide web, select, rank, address bar, web crawlers,	2D and 3D graphics, resize, rotate,	HTML, code, hyperlinks,	cells, formulae, data, column, row, organise, analyse, operations: multiplication, subtraction, division, and addition,	Use-Modify-Create model, variables, blocks, algorithm, sprites, input, output,	Microbit, input, output, variables, >, <, =, operand, if, then, else, algorithm,
	Lesson 1 Year 5/6: To identify how to use a search engine Activities: In this lesson, learners will be introduced to a range of search engines. They will be given the opportunity to explain how we search, then they will write and test instructions. Next, they will learn that searches do not always return the results that we are looking for, and will refine their searches accordingly. Finally, they will be introduced to the two most common methods of searching: using a search engine and the address bar. Outcomes: Year 5/6: I can complete a web search to find specific information I can refine my search I can compare results from different search engines	Year 5/6: To use a computer to create and manipulate three-dimensional (3D) digital objects Activities: This lesson introduces learners to the concept of 3D modelling by creating a range of 3D shapes that they select and move. They also examine the shapes from a variety of views within the 3D space. Outcomes: Year 5/6 I can discuss the similarities and differences between 2D and 3D shapes. I can explain why we might represent 3D objects on a computer. I can select, move, and delete a digital 3D shape.	Year 5/6: To review an existing website and consider its structure Activities: In this lesson learners will explore and review existing websites and evaluate their content. They will have some understanding that websites are created using HTML code. Outcomes: Year 5/6: I can explore a website I can discuss the different types of media used on websites I know that websites are written in HTML	Year 5/6: To identify questions which can be answered using data Activities: During this lesson learners will understand that a spreadsheet is a computer application which allows users to organise, analyse, and store data in a table. They will begin to realise the importance of data headings. Learners will answer questions about a spreadsheet, and then create their own questions that can be answered using a given set of data. Outcomes: Year 5/6: I can explain the relevance of data headings I can answer questions from an existing data set I can ask simple relevant questions which can be answered using data	Year 5/6: To define a 'variable' as something that is changeable Activities: In this lesson, pupils will be introduced to variables. Pupils will see examples of real-world variables (score and time in a football match), then they will explore them in a Scratch project. Pupils will then design and make their own project including variables. Finally, pupils will identify that variables are named and can be letters (strings) as well as numbers. Outcomes: Year 5/6: I can identify examples of information that is variable I can explain that the way that a variable changes can be defined I can identify that variables can hold numbers or letters	Year 5/6: To create a program to run on a controllable device Activities: In this lesson, learners will be introduced to the microbit as an input, process, output device that can be programmed. Learners will familiarise themselves with the device itself and the programming environment, before creating their own programs. They will then flash their programs to the device. Outcomes: Year 5/ 6: 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
Lesson 2	Year 5/6: To describe how search engines select results Activities: In this lesson, learners will gain an understanding of why search engines are necessary to help us find things on the World Wide Web. They will conduct their	Year 5/6: To compare working digitally with 2D and 3D graphics Activities: This lesson examines the similarities and differences between working digitally with 2D and 3D graphics. Learners initially discuss the similarities and differences they have	Year 5/6: To plan the features of a web page Activities: 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	Year 5/6: To explain that objects can be described using data Activities: During this lesson learners will be taught that objects can be described using data. They will build a data set (a collection of related data that can be manipulated using a	Year 5/6: To explain why a variable is used in a program Activities: In this lesson, pupils will understand that variables are used in programs, and that they can hold a single value at a time. Pupils will complete an unplugged task	Year 5: To understand that selection can control the flow of a program Year 6: To explain that selection can control the flow of a program Activities: In this lesson, learners will explore how if, then, else statements are used to direct the flow of a program. They

Lesson 3	<p>own searches and break down, in detail, the steps needed to find things on the web. They will then emulate web crawlers to create an index of their own classroom. Finally, they will consider why some searches return more results than others.</p> <p>Outcomes: Year 5/6: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</p>	<p>identified so far, then move on to combine 3D shapes, including lifting the 3D object, to produce a house. Learners then colour their 3D shapes, followed by adding further shapes and undertaking further reflection on the similarities and differences between working digitally with 2D and 3D graphics.</p> <p>Outcomes: Year 5/6: I can identify how graphical objects can be modified I can resize a 3D object I can change the colour of a 3D object</p>	<p>them on the worksheet provided, detailing the similarities and differences.</p> <p>Note: For the homework activity, teachers could provide printed 'home page' images for anyone who doesn't have internet access at home.</p> <p>Outcomes: Year 5/6: 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</p>	<p>computer) within a spreadsheet application, and apply appropriate number formats to cells.</p> <p>Outcomes: Year 5/6: I can explain what an item of data is I can apply an appropriate number format to a cell I can build a data set in a spreadsheet application</p>	<p>that will demonstrate the process of changing variables. Next, they will explore why it is important to name variables, then they will apply their learning in a Scratch project in which they will make, name, and update variables.</p> <p>Outcomes: Year 5/6: 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</p>	<p>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.</p> <p>Outcomes: Year 5/6: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</p>
	<p>Year 5/6: To explain how search results are ranked</p> <p>Activities: This lesson includes an unplugged activity in which the class will learn about some of the main factors that influence how a search engine ranks a web page. Learners will create paper-based 'web pages' in groups, on a topic that they are currently studying. They will then discover how their web pages would rank when searching for keywords relating to their content.</p> <p>Outcomes: Year 5/6:I can explain that search results are ordered I can explain that a search engine follows rules to rank relevant pages I can suggest some of the criteria that a search engine checks to decide on the order of results</p>	<p>Year 5/6: To construct a digital 3D model of a physical object</p> <p>Activities: During this lesson, learners will produce a 3D model of a physical object, which will contain a number of different 3D objects. 3D objects will need to be rotated and placed into position in relation to other 3D objects.</p> <p>Outcomes: Year 5/ 6:I can rotate a 3D object I can position 3D objects in relation to each other I can select and duplicate multiple 3D objects</p>	<p>Year 5/6: To consider the ownership and use of images (copyright)</p> <p>Activities: 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.</p> <p>Homework: Learners answer a series of questions based on copyright and fair use.</p> <p>Outcomes: Year 5/6: 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'</p>	<p>Year 5/6: To explain that formulas can be used to produce calculated data</p> <p>Activities: During this lesson 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 their spreadsheet using cell references and identify that changing inputs will change the output of the calculation.</p> <p>Outcomes: Year 5/6: I can explain the relevance of a cell's data type I can construct a formula in a spreadsheet I can identify that changing inputs changes outputs</p>	<p>Year 5/6: To choose how to improve a game by using variables</p> <p>Activities: In this lesson, pupils will apply the concept of variables to enhance an existing game in Scratch. They will predict the outcome of changing the same change score block in different parts of a program, then they will test their predictions in Scratch. They will also experiment with using different values in variables, and with using a variable elsewhere in a program. Finally, they will add comments to their project, explaining how they have met the objectives of the lesson.</p> <p>Outcomes: Year 5/6: 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</p>	<p>Year 5/6: To update a variable with a user input</p> <p>Activities: In this lesson, learners 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 can be displayed after it is updated or in response to an input.</p> <p>Outcomes: Year 5/ 6: I can use a condition to change a variable I can experiment with different physical inputs I can explain that if you read a variable, the value remains</p>
	<p>Year 5/6: To recognise why the order of results is important, and to whom</p> <p>Activities: In this lesson, learners will explore how the person performing a web search can</p>	<p>Year 5/6: To identify that physical objects can be broken down into a collection of 3D shapes</p> <p>Activities: During this lesson, learners will produce a 3D model of a pencil holder desk tidy. The 3D model will</p>	<p>Year 5/6: To recognise the need to preview pages</p> <p>Activities: 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</p>	<p>Year 5/6: To apply formulas to data, including duplicating</p> <p>Activities: During this lesson learners will recognise that data can be calculated using different operations: multiplication,</p>	<p>Year 5/6: To design a project that builds on a given example</p> <p>Activities: This lesson focuses on the design elements of programming. For the majority of the tasks, pupils will be working at</p>	<p>Year 5/ 6: To use an conditional statement to compare a variable to a value</p> <p>Activities: In this lesson, learners will initially work at code level by applying their knowledge from the previous lesson to make their micro:bit perform the function</p>

	<p>influence the results that are returned, and how content creators can optimise their sites for searching. Learners will also explore some of the limitations of searching, then discuss what cannot be searched.</p> <p>Outcomes:</p> <p>Year 5/6: I can describe some of the ways that search results can be influenced</p> <p>I can recognise some of the limitations of search engines</p> <p>I can explain how search engines make money</p>	<p>contain a number of 3D objects that are of specific dimensions and use other 3D objects as placeholders to create holes with them.</p> <p>Outcomes:</p> <p>Year 5/6: I can identify the 3D shapes needed to create a model of a real-world object</p> <p>I can create digital 3D objects of an appropriate size</p> <p>I can group a digital 3D shape and a placeholder to create a hole in an object</p>	<p>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.</p> <p>Outcomes:</p> <p>Year 5/6: I can add content to my own web page</p> <p>I can preview what my web page looks like</p> <p>I can evaluate what my web page looks like on different devices and suggest/make edits.</p>	<p>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.</p> <p>Outcomes:</p> <p>Year 5/6: I can recognise that data can be calculated using different operations</p> <p>I can create a formula which includes a range of cells</p> <p>I can apply a formula to multiple cells by duplicating it</p>	<p>the algorithmic level of abstraction. Pupils will first design the sprites and backgrounds for their project, then they will design their algorithms to create their program flow.</p> <p>Outcomes:</p> <p>Year 5/6: I can choose the artwork for my project</p> <p>I can explain my design choices</p> <p>I can create algorithms for my project</p>	<p>of a compass. They will then design 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 the compass.</p> <p>Outcomes:</p> <p>Year 5/6:I can explain the importance of the order of conditions in else, if statements</p> <p>I can use an operand (e.g. <=>) in an if, then statement</p> <p>I can modify a program to achieve a different outcome</p>
Lesson 5	<p>Year 5/6: To recognise how we communicate using technology</p> <p>Activities: In this lesson, learners will deepen their understanding of the term ‘communication’. They will explore different methods of communication, then they will consider internet-based communication in more detail. Finally, they will evaluate which methods of communication suit particular purposes.</p> <p>Outcomes:</p> <p>Year 5/6:I can explain the different ways in which people communicate</p> <p>I can identify that there are a variety of ways of communicating over the internet</p> <p>I can choose methods of communication to suit particular purposes</p>	<p>Year 5/6: To design a digital model by combining 3D objects</p> <p>Activities: During this lesson, learners will resize and enhance their 3D model of a pencil holder desk tidy. Learners will also plan their own 3D model of a photo frame, which will be developed during the next lesson.</p> <p>Outcomes:</p> <p>Year 5/6: I can plan my 3D model</p> <p>I can choose which 3D objects I need to construct my model</p> <p>I can modify multiple 3D objects</p>	<p>Year 5/6: To outline the need for a navigation path</p> <p>Activities: 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.</p> <p>Outcomes:</p> <p>Year 5/6: I can explain what a navigation path is</p> <p>I can describe why navigation paths are useful</p> <p>I can make multiple web pages and link them using hyperlinks</p>	<p>Year 5/6: To create a spreadsheet to plan an event</p> <p>Activities: During this lesson 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.</p> <p>Outcomes:</p> <p>Year 5/6: I can use a spreadsheet to answer questions</p> <p>I can explain why data should be organised</p> <p>I can apply a formula to calculate the data I need to answer questions</p>	<p>Year 5/6: To use my design to create a project</p> <p>Activities: In this lesson, pupils will implement the algorithms that they created in Lesson 4 as code. In doing this, they will identify variables in an unfamiliar project and learn the importance of naming variables. They will also have the opportunity to add another variable to enhance their project.</p> <p>Outcomes:</p> <p>Year 5/6: I can create the artwork for my project</p> <p>I can choose a name that identifies the role of a variable</p> <p>I can test the code that I have written</p>	<p>Year 5/6: To design a project that uses inputs and outputs on a controllable device</p> <p>Activities: In this lesson, learners 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. Having seen a simulated example of a micro:bit step counter, learners will pick out features which they will be able to include in their design. In the main activity, learners will design the algorithm for their step counter project. Finally, they will connect the battery pack to their micro:bit to set it up as a portable device.</p> <p>Outcomes:</p> <p>Year 5/ 6: I can decide what variables to include in a project</p> <p>I can design the algorithm for my project</p> <p>I can design the program flow for my project</p>
Lesson 6	<p>Year 5/6: To evaluate different methods of online communication</p> <p>Activities: In this lesson, learners will use information provided and their own prior knowledge to</p>	<p>Year 5/6: To develop and improve a digital 3D model</p> <p>Activities: This unit progresses students’ knowledge and understanding of creating 3D graphics</p>	<p>Year 5/6: To recognise the implications of linking to content owned by other people</p> <p>Activities: Learners will consider the implications of linking to content owned</p>	<p>Year 5/6: To choose suitable ways to present data</p> <p>Activities: During this lesson learners will acquire the skills to create charts in Google Sheets. They will evaluate</p>	<p>Year 5/6: To evaluate my project</p> <p>Activities: This lesson gives pupils the opportunity to build on the project that they created in Lesson 5. As the lesson develops, the</p>	<p>Year 5/6: To develop a program to use inputs and outputs on a controllable device</p> <p>Activities: In this lesson, learners will use the design that they have created in Lesson 5 to make a micro:bit-based step counter.</p>

	<p>categorise different forms of internet communication. They will then choose which method they would use for the scenarios discussed in the previous lesson. During these activities, they will explore issues around privacy and information security.</p> <p>Outcomes: Year 5/6:I can compare different methods of communicating on the internet I can decide when I should and should not share I can explain that communication on the internet may not be private</p>	<p>using a computer. Prior to undertaking this unit, learners should have worked with 2D graphics applications.</p> <p>Outcomes: Year 5/6: I can decide how my model can be improved I can modify my model to improve it I can evaluate my model against a given criterion</p>	<p>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.</p> <p>Outcomes: Year 5/6: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</p>	<p>results based on questions asked using the chart that they have created. Finally, learners will outline their understanding that there are different software tools available within spreadsheet applications to present data.</p> <p>Outcomes: Year 5/6: I can produce a graph I can use a graph to show the answer to questions I can suggest when to use a table or graph</p>	<p>scaffolding is gradually removed, so that the last main activity is without constraints. Finally, pupils will evaluate each other’s projects, identifying features that they like, and features that could be improved further.</p> <p>Outcomes: Year 5/ 6: I can identify ways that my game could be improved I can extend my game further using more variables I can share my game with others</p>	<p>First they will review their plans, followed by creating their code. Depending on their level of confidence, they can use a scaffolded or part-complete project, otherwise they can start a new project. Learners will test and debug their code, using the emulator and then the physical device. To successfully complete this project, learners will need to use all four programming constructs: sequence, repetition, selection, and variables.</p> <p>Outcomes: Year 5/6: 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</p>
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	Computing Systems and Networks - Communicating	Creating Media – 3D Modelling	Creating Media – Web Page Creating	Data Information – Speadsheets	Programming A – Variables in Games	Programming B - Sensing
Progression	This unit progresses students’ knowledge and understanding of computing systems and online collaborative working.	This unit progresses students’ knowledge and understanding of creating 3D graphics using a computer. Prior to undertaking this unit, learners should have worked with 2D graphics applications.	This unit progresses students’ knowledge and understanding of the following: digital writing, digital painting, desktop publishing, digital photography, photo editing, and vector drawing. (Be aware in Y5 beginning on cycle B)	This unit progresses students’ knowledge and understanding of data, and teaches them how to organise and modify data within spreadsheets.	This unit assumes that pupils will have some prior experience of programming in Scratch. Specifically, they should be familiar with the programming constructs of sequence, repetition, and selection. These constructs are covered in the Year 3, 4, and 5 National Centre for Computing Education programming units respectively. Each year group includes at least one unit that focuses on Scratch.	This unit presumes that learners are already confident in their understanding of sequence, repetition and selection independently within programming. If learners are not yet ready for this, you may wish to revisit earlier programming units where these constructs are introduced.

Curricular Links	<p>National curriculum links</p> <p>Design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts.</p> <p>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.</p> <p>Use search technologies effectively, appreciate how results are selected and ranked, and be discerning in evaluating digital content.</p> <p>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.</p> <p>Use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact.</p> <p>Education for a Connected World links</p> <p>I can describe and assess the benefits and the potential risks of sharing information online.</p> <p>I can use various additional tools to refine my searches (e.g. search filters: size, type, usage rights etc.).</p> <p>I can explain how to use search effectively and use examples from my own practice to illustrate this.</p> <p>I can explain how search engine rankings are returned and can explain how they can be influenced (e.g. commerce, sponsored results</p>	<p>Computing – KS2</p> <p>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.</p> <p>Use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact.</p> <p>Art and design – KS2</p> <p>To improve their mastery of art and design techniques, including drawing, painting and sculpture with a range of materials</p> <p>Design and technology – KS2</p> <p>Generate, develop, model and communicate their ideas through discussion, annotated sketches, cross-sectional and exploded diagrams, prototypes, pattern pieces and computer-aided design</p> <p>Mathematics – KS2 (Y6)</p> <p>Recognise, describe and build simple 3D shapes, including making nets</p> <p>Education for a Connected World links</p> <p>Strand - Lesson 1 and Lesson 3 – Privacy and Security (Y4) – I can describe strategies for keeping my personal information private, depending on context.</p>	<p>National curriculum links</p> <p>Use search technologies effectively, appreciate how results are selected and ranked, and be discerning in evaluating digital content.</p> <p>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.</p> <p>Use technology safely, respectfully, and responsibly; recognise acceptable/unacceptable behaviour.</p> <p>English links</p> <p>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.</p> <p>Education for a Connected World links</p> <p>Online relationships - I can use the internet with adult support to communicate with people I know. (EY-7)</p> <p>Managing information online - I can navigate online content, websites, or social media feeds using more sophisticated tools to get to the information I want (e.g. menus, sitemaps, breadcrumb-trails, site search functions). (11-14)</p> <p>Copyright and ownership - I can explain why copying someone else’s work from the internet without permission can cause problems.</p> <p>I can give examples of what those problems might be.</p> <p>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.</p> <p>I can give some simple examples.</p> <p>I can assess and justify when it is acceptable to use the work of others.</p> <p>I can give examples of content that is permitted to be reused.</p> <p>I can demonstrate the use of search tools to find and access online content which can be reused by others.</p> <p>I can demonstrate how to make references to and acknowledge sources I have used from the internet.</p> <p>I can explain the principles of fair use and apply this to case studies. (11-14)</p>	<p>National curriculum links</p> <p>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.</p> <p>National curriculum maths links</p> <p>Number – addition, subtraction, multiplication, and division:</p> <p>Solve problems involving addition, subtraction, multiplication, and division.</p> <p>Statistics: Interpret and construct pie charts and line graphs, and use these to solve problems</p> <p>Calculate and interpret the mean as an average.</p> <p>Education for a Connected World links</p> <p>Managing information online</p> <p>I can describe how I can search for information within a wide group of technologies (e.g. social media, image sites, video sites).</p> <p>I can use different search technologies</p> <p>I can evaluate digital content and can explain how I make choices from search results.</p>	<p>National curriculum links</p> <p>Design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts.</p> <p>Use sequence, selection, and repetition in programs; work with variables and various forms of input and output.</p> <p>Use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs.</p> <p>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.</p>	<p>National curriculum links</p> <p>Design, write, and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts.</p> <p>Use sequence, selection, and repetition in programs; work with variables and various forms of input and output.</p> <p>Use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs.</p> <p>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.</p>
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Assessment	<p>Summative assessment</p> <p>Please see the assessment question and answer documents for this unit.</p>	<p>Formative assessment</p> <p>Assessment opportunities are detailed in each lesson plan. The learning objectives and success criteria are introduced in the slide deck at the beginning of each lesson and then reviewed at the end. Learners are invited to assess how well they feel they have met the learning objective using thumbs up, thumbs sideways, or thumbs down.</p> <p>Summative assessment</p> <p>Within this unit, a rubric is used to assess learners’ work after Lesson 6. Please see the assessment rubric document for this unit.</p>	<p>Summative assessment</p> <p>Please see the assessment rubric document for this unit.</p>	<p>Summative assessment</p> <p>Please see the assessment question and answer documents for this unit.</p>	<p>Formative assessment</p> <p>Assessment opportunities are detailed in each lesson plan. The learning objectives and success criteria are introduced in the slide deck at the beginning of each lesson, and then reviewed at the end. Pupils are invited to assess how well they feel they have met the learning objective using thumbs up, thumbs sideways, or thumbs down.</p> <p>We recommend the use of teacher accounts in Scratch to help with assessment throughout this unit. For guidance on setting up teacher accounts, please visit the Scratch website (scratch.mit.edu/educators/faq).</p> <p>Summative assessment</p> <p>Please see the assessment question and answer documents for this unit.</p>	<p>Formative assessment</p> <p>Assessment opportunities are detailed in each lesson plan. The learning objectives and success criteria are introduced in the slide deck at the beginning of each lesson, and then reviewed at the end. Pupils are invited to assess how well they feel they have met the learning objective using thumbs up, thumbs sideways, or thumbs down.</p> <p>We recommend that teachers collect the programming work which the learners complete either by learner’s sharing the URLs with their teacher when they select ‘Share’ and ‘Publish Project’ or by downloading the code file and saving it on the school’s computer system. This will aid assessment throughout this unit.</p> <p>To open a downloaded code project (.hex file), create a blank project on the MakeCode editor and then drag the code project into the code area. If any changes are made to the project, the project will be needed to be saved and downloaded again. For more information on saving micro:bit projects in MakeCode, visit the micro:bit help and support web page.</p> <p>Summative assessment</p> <p>Please see the ‘Assessment rubric’ document for this unit.</p>
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Subject Knowledge	<p>Enhance your subject knowledge to teach this unit through the following training opportunities:</p> <p>Online training courses</p> <ul style="list-style-type: none">Raspberry Pi Foundation online training courses <p>Face-to-face courses</p> <ul style="list-style-type: none">National Centre for Computing Education face-to-face training courses	<p>Lesson 1: You will need to be familiar with creating, selecting, and moving 3D objects in Tinkercad, including how to view them from different angles. Tinkercad’s Start Learning 3D tutorials provide a good starting point (https://www.tinkercad.com/learn/designs).</p> <p>Lesson 2: You will need to be familiar with resizing, lifting, and altering the colour of 3D objects in Tinkercad. Tinkercad’s Start Learning 3D tutorials provide a good starting point (https://www.tinkercad.com/learn/designs).</p> <p>Lesson 3: You will need to be familiar with rotating and positioning 3D objects in Tinkercad.. Tinkercad’s Rotate it tutorial provides a good starting point (https://www.tinkercad.com/learn/designs) along with the Promo Ambition’s Tinkercad Tutorial 2 (https://promoambitions.com/tinkercad). In order to deliver the extension task in Activity 3, the Changing workplanes teacher guidance provides further information, along with Promo Ambition’s Tinkercad Tutorial 4 (https://promoambitions.com/tinkercad).</p> <p>Lesson 4: You will need to be familiar with resizing 3D objects to specific dimensions in Tinkercad. Tinkercad’s Size it up! tutorial provides a good starting point (https://www.tinkercad.com/learn/designs). In order to use other objects as placeholders to create holes within 3D objects, 3D shapes need to be grouped. The Group it! tutorial provides further information (https://www.tinkercad.com/learn/designs).</p> <p>Lesson 5: You may wish to revisit resizing and grouping 3D objects from Lesson 4.</p> <p>Lesson 6: You may wish to revisit the skills developed during the previous lessons. Enhance your subject knowledge to teach this unit through the following training opportunities:</p>	<p>This unit focuses on the design and creation of web pages and websites using Google Sites.</p>	<p>It would be beneficial for teachers to have an understanding of a spreadsheet application e.g. ‘Google Sheets’ or alternative software such as ‘Microsoft Excel’ or ‘Purple Mash – 2Calculate’.</p> <p>An understanding that data can be words, numbers, dates, images, sounds, etc. without context is important. Just as words need to be in a sentence to give them meaning, data items need to be part of a structure. For example, the number 6 isn’t data unless it’s part of a larger structure, such as included in a spreadsheet with data headings. Understanding that a data set is a collection of related data that can be modified using a computer is helpful, as learners will be creating their own data sets throughout the unit.</p> <p>Knowledge of why data headings are important and an understanding of how data is organised in columns and rows would be beneficial. Organising data is an important aspect of data and information. It supports the use of calculations and provides the opportunity to use sorting and filtering, which enables ease of use and reduces human error.</p> <p>This unit focuses on the learners applying number formats to alter cells. It is important to understand that this type of formatting changes how a spreadsheet interacts with the data and is different to applying style formatting (bold, italics, etc.), which only changes the appearance of data.</p> <p>In Lesson 5 of this unit, learners have been provided with the mathematical calculations they need to complete the activities in the unit, the calculations can be found in the ‘Data calculations’ handout. It is important that learners are given the opportunity to demonstrate their ability to use the computational skills required, regardless of their mathematical ability.</p>	<p>This unit focuses on developing pupils’ understanding of variables in a new programming language. It highlights where variables can be used and how they can be set and changed through the running of a program. This unit also develops pupils’ understanding of design in programming, using the approach outlined below.</p> <p>When programming, there are four levels that can help describe a project (known as ‘levels of abstraction’). Research suggests that this structure can support pupils in understanding how to create a program and how it works:</p> <ul style="list-style-type: none">Task — what is neededDesign — what it should doCode — how it is doneRunning the code — what it does <p>Spending time at the ‘task’ and ‘design’ levels before engaging in writing code can aid pupils in assessing the ‘do-ability’ of their programs. It also reduces the cognitive load for pupils during programming.</p> <p>Pupils will move between the different levels throughout the unit, and this is highlighted within each lesson plan.</p> <p>During this unit, pupils are required to save their work in Scratch. We recommend the use of teacher and pupil accounts to manage this process. You can find detailed guidance on setting up and managing accounts in Scratch on the Scratch website (scratch.mit.edu/educators/faq).</p>	<p>This unit focuses on developing pupils’ understanding of variables in a different programming environment and using a physical device. It also enables pupils to combine their knowledge and understanding of programming constructs introduced in previous years. This unit continues to advance pupils’ understanding of design in programming, using the approach outlined below.</p> <p>When programming, there are four levels that can help describe a project (known as ‘levels of abstraction’). Research suggests that this structure can support pupils in understanding how to create a program and how it works:</p> <ul style="list-style-type: none">Task — what is neededDesign — what it should doCode — how it is doneRunning the code — what it does <p>Spending time at the ‘task’ and ‘design’ levels before engaging in writing code can aid pupils in assessing the ‘do-ability’ of their programs. It also reduces the cognitive load for pupils during programming.</p> <p>Pupils will move between the different levels throughout the unit, and this is highlighted within each lesson plan: Lesson 3 - pupils work at the ‘code’ and ‘running the code’ levels from a given design. Lesson 4 - pupils move from ‘design’ to ‘code’, to ‘running the code’ with some scaffolding. Lesson 5 - pupils work at the ‘design’ level with increasing independence. Lesson 6 - pupils work at the ‘code’ and ‘running the code’ levels, using their own design</p>
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