



# Computing Curriculum

2021-22

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# Computing Curriculum

*'Everything that's already in the world when you are born is just normal'* – Douglas Adams

## 1. The aims of our Computing curriculum

In line with the National Curriculum, at Northbourne we believe “a high-quality computing education equips pupils to use computational thinking and creativity to understand and change the world”. Computing, and the wider context of Information Technology that it sits within, is an increasingly sprawling curriculum area, with natural links into maths, science and design-technology. To ensure that children become digitally literate – that is, can use, express themselves, and develop their ideas through information and communication technology – we aim to provide opportunities for pupils to develop and apply clearly defined, crucial computer and keyboard skills across a range of subjects and contexts. This strand of the curriculum interweaves with computer science, which is the core of this subject, and teaches children the principles of information and computation, how digital systems work and how to use this knowledge through programming.

The aims of the National Curriculum for Computing are 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 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.

Our curriculum is carefully designed and sequenced to fully address all of these aims, building skills, knowledge and enjoyment of Computing from the time children start in Early Years.

## 2. Learning Outcomes

Much of the planned curriculum draws on the Teach Computing Curriculum. This organizes learning outcomes around ten strands, which are woven throughout the planned units of work:

- **Algorithms:** Be able to comprehend, design, create and evaluate algorithms
- **Computer networks:** Understand how networks can be used to retrieve and share information and how they come with associated risks
- **Computer systems:** Understand what a computer is, and how its constituent parts function together as a whole
- **Creating media:** Select and create a range of media including text, images, sounds and video
- **Data and information:** Understand how data is stored, organized and used to represent real-world artefacts and scenarios
- **Design and development:** Understand the activities involved in planning, creating and evaluating computer artefacts
- **Effective use of tools:** Use software tools to support computing work
- **Impact of technology:** Understand how individuals, systems and society as a whole interact with computer systems
- **Programming:** Create software to allow computers to solve problems
- **Safety and security:** Understand risks when using technology and how to protect individuals and systems.

### 3. Curriculum Map

The curriculum is covered in 3 strands: Creating Media, Programming, Data and Information, with one unit from each being taught each year as shown below.

	Unit 1 <i>Creating Media</i>	Unit 2 <i>Data and Information</i>	Unit 3 <i>Programming</i>
<b>Key Stage One</b>	Digital Painting 1.2	Grouping Data / Pictograms 1.4/2.4	Programming Animation 1.6/2/6
	Digital Writing 1.5	Grouping Data / Pictograms 1.4/2.4	Programming Animation / Quizzes 1.6/2.6
<b>Lower KS2</b>	Digital Photography 2.2 / Photo Editing 4.5	Branching Databases 3.4	Sequencing Sounds 3.3
	Stop Frame Animation 3.2	Desk-top Publishing 3.5	Repetition in Shapes 4.3
<b>Upper KS2</b>	Video Editing 5.2	Flat-File Databases 5.4	Selection in Quizzes 5.6
	Webpage Creation 6.2	Spreadsheets 6.4	Variables in Games 6.3

- **Online Safety** is taught within each unit, and is also covered in PSHE.
- **Physical Computing** is taught within the Design Technology curriculum for Key Stage Two, using Crumble controllers. Teachers ensure these links are made clear for pupils during sequences of lessons.

## 4. Progression in knowledge and skills

	Unit 1 <i>Creating Media</i>	Unit 2 <i>Data and Information</i>	Unit 3 <i>Programming</i>
<b>Key Stage One</b>	<p style="text-align: center;"><b>Digital Painting: paintz.app</b></p> <p>Choosing appropriate tools in a program to create art, and making comparisons with working non-digitally</p> <ul style="list-style-type: none"> <li>• I can make marks and lines on a screen and explain which tools I have used</li> <li>• I can use the paint tools to draw a picture</li> <li>• I can use the shape (incl square) and line tools effectively</li> <li>• When using paint programs, I can choose appropriate shapes, colours and tools for a picture, including one imitating an artist</li> <li>• I can use the brush tool, changing colour and size</li> <li>• I can use dots of colour to create a picture</li> <li>• I can explain differences between painting using a computer and on paper.</li> </ul>	<p style="text-align: center;"><b>Grouping Data / Pictograms: j2e Pictogram</b></p> <p>Exploring object labels, then using them to sort and group objects by properties</p> <ul style="list-style-type: none"> <li>• I can describe objects using labels; match objects to groups; and identify the label for a group of objects</li> <li>• I can count and group objects</li> <li>• I can describe an object and a property of an object</li> <li>• I can find objects with similar properties</li> <li>• I can group similar objects</li> <li>• I can group objects in more than one way</li> <li>• I can choose how to group objects</li> <li>• I can describe groups of objects</li> <li>• I can record how many objects are in a group</li> <li>• I can describe how to group objects to answer a question</li> </ul>	<p style="text-align: center;"><b>Programming Animation: Scratch Junior</b></p> <p>Designing and programming the movement of a character on screen to tell stories</p> <ul style="list-style-type: none"> <li>• Choose a command for a given purpose</li> <li>• Find and use the commands to move a sprite</li> <li>• Compare different programming tools</li> <li>• Use more than one block by joining them together</li> <li>• Use a <b>start</b> block in a program</li> <li>• I can run my program</li> <li>• I can find blocks that have numbers</li> <li>• I can change the value</li> <li>• I can say what happens when I change a value</li> <li>• I can show that a project can include more than one sprite</li> <li>• I can delete a sprite</li> <li>• I can add blocks to each of my sprites</li> <li>• I can choose appropriate artwork for my project</li> <li>• I can decide how sprites should move, creating an algorithm for each one</li> <li>• I can add programming blocks based on my algorithm</li> <li>• I can test the programs I have created</li> </ul>
	<p style="text-align: center;"><b>Digital Writing: Google Docs</b></p> <p>Using a computer to create and format text, before comparing to writing non-digitally</p> <ul style="list-style-type: none"> <li>• I can open a word processor</li> <li>• I can identify and find keys on a keyboard</li> <li>• I can enter text and use the letter, number and space keys</li> <li>• I can use backspace to remove text</li> <li>• I can type capital letters</li> <li>• I can use bold, italic and underline from the toolbar</li> <li>• I can select a word by double-clicking, and select all of the text by clicking and dragging</li> <li>• I can change font</li> <li>• I can explain what tools I have used to change text, and decide if these changes have improved my writing</li> <li>• I can use <i>undo</i> to remove changes</li> <li>• I can compare, and explain the differences between, typing and writing</li> </ul>	<p style="text-align: center;"><b>Grouping Data / Pictograms: j2e Pictogram</b></p> <p>Collecting data in tally charts and using attributes to organize and present data on a computer</p> <ul style="list-style-type: none"> <li>• I can record data in a tally chart, representing a tally count as a total and comparing totals</li> <li>• I can enter data into a program</li> <li>• I can use a computer to view data in a different format</li> <li>• I can use pictograms to answer simple questions about objects</li> <li>• I can organize data in a tally chart</li> <li>• I can turn a tally chart into a pictogram</li> <li>• I can tally objects using a common attribute</li> <li>• I can create a pictogram to arrange objects by an attribute</li> <li>• I can answer <i>more than / less than</i> and <i>most / least</i> questions about an attribute</li> <li>• I can choose a suitable attribute to compare people</li> <li>• I can give examples of why information should not be shared</li> </ul>	<p style="text-align: center;"><b>Programming Animation / Quizzes: Scratch Junior</b></p> <p>Designing algorithms and programs to use events to trigger sequences of code to make an interactive quiz</p> <ul style="list-style-type: none"> <li>• I can identify the start of a sequence</li> <li>• I know that a program needs to be started</li> <li>• I can show how to run by program</li> <li>• I can predict the outcome of a sequence of commands</li> <li>• I can match two sequences with the same outcome</li> <li>• I can change the outcome of a sequence of commands</li> <li>• I can work out the actions of a sprite in an algorithm</li> <li>• I can decide which blocks to use to meet a design</li> <li>• I can build the sequences of blocks I need</li> <li>• I can choose backgrounds, characters and images for a design, and create a new program based on this</li> <li>• I can create an algorithm</li> <li>• I can build sequences of blocks to match my design</li> <li>• I can compare my project to my design</li> <li>• I can evaluate my project, adding features and debugging</li> </ul>

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<p><b>Lower KS2</b></p>	<p><b>Digital Photography / Photo Editing: pixlr.com, paint.net</b> Capturing and changing digital photographs for different purposes, and manipulating images in a range of ways</p> <ul style="list-style-type: none"> <li>I can take a digital photo</li> <li>I can take photos in landscape and portrait format, and explain which is most appropriate</li> <li>I can discuss what makes a good photograph, identify what is wrong with a photo, and retake it to improve it</li> <li>I can explore the effect light has on a photo</li> <li>I can experiment with different light sources</li> <li>I can use a tool to change an image, including retouching, and explain my choices</li> <li>I can recognize where photos have been changed, including where they have been retouched, and identify images which are real and which have been altered</li> <li>I can change the composition of an image by selecting parts of it</li> <li>I can choose effects to make my image fit a purpose, and explain my choices</li> <li>I can combine parts of images to create new images</li> <li>I can consider the effect of adding other elements to my work</li> </ul>	<p><b>Branching Databases: j2data</b> Building and using branching databases to group objects using yes/no questions</p> <ul style="list-style-type: none"> <li>I can investigate questions with yes/no answers, and make up yes/no questions about a collection of objects</li> <li>I can create two groups of objects separated by one attribute</li> <li>I can select an attribute to separate objects into groups</li> <li>I can create a group of objects within an existing group</li> <li>I can arrange objects into a tree structure</li> <li>I can select objects to arrange in a branching database</li> <li>I can group objects using my own yes/no questions</li> <li>I can prove my branching database works</li> <li>I can create yes/no questions using given attributes</li> <li>I can explain that questions need to be ordered carefully to split groups into similarly sized groups</li> <li>I can compare two branching database structures</li> <li>I can select a theme and choose a variety of objects</li> <li>I can create questions and apply them to a tree structure</li> <li>I can use my branching database to answer questions</li> <li>I can explain what a pictogram tells me</li> <li>I can explain what a branching database tells me</li> <li>I can compare two ways of presenting information</li> </ul>	<p><b>Sequencing Sounds: Scratch</b> Creating sequences in a block-based programming language to make music</p> <ul style="list-style-type: none"> <li>I can identify the objects in a Scratch project (sprites, backdrops)</li> <li>I can explain that objects in Scratch have attributes</li> <li>I can explain that commands in Scratch are represented as block</li> <li>I can identify that each sprite is controlled by the commands I choose</li> <li>I can choose a word which describes an on-screen action for my plan</li> <li>I can create a program following a design</li> <li>I can start a program in different ways</li> <li>I can create a sequence of connecting commands</li> <li>I can explain that the objects in my project will respond exactly to the code</li> <li>I can explain what a sequence is</li> <li>I can combine sound commands</li> <li>I can order notes into a sequence</li> <li>I can build a sequence of commands</li> <li>I can decide the actions for each sprite in a program</li> <li>I can make design choices for my artwork</li> <li>I can identify and name the objects I will need for a project</li> <li>I can relate a task description to a design</li> <li>I can implement my algorithm as code</li> </ul>
	<p><b>Stop Frame Animation: Stop Motion Animator / iMotion</b> Capturing and editing digital still images to produce a stop-frame animation that tells a story</p> <ul style="list-style-type: none"> <li>I can create an effective flip-book style animation and explain how this works</li> <li>I can predict what an animation will look like</li> <li>I can explain why small changes are needed for each frame</li> <li>I can create an effective stop-frame animation</li> <li>I can storyboard an animation, taking into account what is achievable on screen</li> <li>I can use onion-skinning to help me make small changes between frames</li> <li>I can review a sequence of frames to check my work</li> <li>I can evaluate the quality of my animation and that of another and explain how to improve it</li> <li>I can add other media to my animation and explain why</li> </ul>	<p><b>Desk-top Publishing: Google Docs</b> Creating documents by modifying text, images and page layouts for a specific purpose</p> <ul style="list-style-type: none"> <li>I can explain the differences between text and images, and recognize that each communicates messages clearly</li> <li>I can identify the advantages and disadvantages of using text and images</li> <li>I can change font style, size and colour for a given purpose</li> <li>I can edit text</li> <li>I can explain that text can be changed to communicate more clearly</li> <li>I can explain what page orientation is</li> <li>I can recognize placeholders and say why they are important</li> <li>I can create a template for a particular purpose</li> <li>I can choose the best locations for my content</li> <li>I can paste text and images to create a given document</li> <li>I can make changes to edit and improve content</li> <li>I can identify different layouts, matching these to purpose and selecting the most suitable</li> <li>I can identify the uses of desktop publishing in the real world</li> <li>I can say when desktop publishing might be helpful</li> <li>I can compare desktop published work to that created by hand</li> </ul>	<p><b>Repetition in Shapes: Logo (Turtle Academy / FMSLogo)</b> Using a text-based programming language to explore count-controlled loops when drawing shapes</p> <ul style="list-style-type: none"> <li>I can program a computer by typing commands</li> <li>I can explain the effect of changing a value of a command</li> <li>I can create a code snippet for a given purpose</li> <li>I can use a template to draw what I want my program to do</li> <li>I can write an algorithm to produce a given outcome</li> <li>I can test my algorithm in a text-based language</li> <li>I can use a count-controlled loop to produce a given outcome</li> <li>I can identify the effect of changing the number of times a task is repeated</li> <li>I can predict the outcome of a program containing a count-controlled loop and then design this program</li> <li>I can choose which values to change in a loop</li> <li>I can use a procedure in a program</li> <li>I can explain that a computer can repeatedly call a procedure</li> <li>I can evaluate and develop a program by de-bugging it</li> </ul>

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<b>Upper KS2</b>	<b>Video Editing: Video Recorder</b> Planning, capturing and editing video to produce a short film	<b>Flat-File Databases: j2data</b> Using a database to order data and create charts to answer questions	<b>Selection in Quizzes: Scratch</b> Exploring selection in programming to design and code an interactive quiz
	<ul style="list-style-type: none"> <li>• I can explain that video is a visual media format</li> <li>• I can identify and compare features of video</li> <li>• I can identify and find features on a digital video recording device</li> <li>• I can experiment with different camera angles</li> <li>• I can make use of a microphone</li> <li>• I can suggest filming techniques for a given purpose</li> <li>• I can capture video using a range of filming techniques</li> <li>• I can plan the scenes of a video, identifying which filming techniques to use</li> <li>• I can create and save video content</li> <li>• I can store, retrieve and export my recording to a computer</li> <li>• I can explain how to improve a video by reshooting and editing</li> <li>• I can select the correct tools to make edits to my video</li> <li>• I can make edits to my video and improve the final outcome</li> <li>• I can evaluate my video and share my opinions</li> </ul>	<ul style="list-style-type: none"> <li>• I can create multiple questions about the same field</li> <li>• I can explain how information can be recorded</li> <li>• I can order, sort and group my data cards</li> <li>• I can navigate a flat-file database to compare different views of information</li> <li>• I can explain what a field and a record is in a database</li> <li>• I can choose which field to sort data by to answer a given question</li> <li>• I can explain how information can be grouped</li> <li>• I can group information to answer questions</li> <li>• I can combine grouping and sorting to answer more specific questions</li> <li>• I can choose which field and value are required to answer a given question</li> <li>• I can outline how AND and OR can be used to refine data selection</li> <li>• I can choose multiple criteria to answer a given question</li> <li>• I can select an appropriate chart to visually compare data</li> <li>• I can refine a chart by selecting a particular filter</li> <li>• I can explain the benefits of using a computer to create graphs</li> <li>• I can ask questions that need more than one field to answer</li> <li>• I can refine a search in a real-world context</li> </ul>	<ul style="list-style-type: none"> <li>• I can explain how conditions are used in selection</li> <li>• I can identify and modify a condition in a program</li> <li>• I can use selection in an infinite loop to check a condition</li> <li>• I can identify the condition and outcomes in an 'if...then...else' statement</li> <li>• I can create a program with different outcomes using selection</li> <li>• I can explain that program flow can branch according to a condition</li> <li>• I can design the flow of a program which contains 'if...then...else'</li> <li>• I can show that a condition can direct program flow in one of two ways</li> <li>• I can outline a given task</li> <li>• I can use a design format to outline my project</li> <li>• I can identify the outcome of user input in an algorithm</li> <li>• I can implement an algorithm</li> <li>• I can test my program</li> <li>• I can share my program with others</li> <li>• I can identify ways the program could be improved</li> <li>• I can identify the setup code I need in my program</li> <li>• I can extend my program further</li> </ul>
	<b>Webpage Creation: Google Sites</b> Designing and creating webpages, giving considerations to copyright, aesthetics and navigation	<b>Spreadsheets: Google Sheets</b> Answering questions by using spreadsheets to organize and calculate data	<b>Variables in Games: Scratch</b> Exploring variables when designing and coding a game
	<ul style="list-style-type: none"> <li>• I can explore and evaluate a website, discussing the types of media used on these</li> <li>• I know that websites are written in HTML</li> <li>• I can suggest media to include on a webpage and draw a webpage layout that suits my purpose</li> <li>• I can say why I should use copyright-free images</li> <li>• I can describe what is meant by 'fair use'</li> <li>• I can add content to my own webpage</li> <li>• I can preview what my webpage looks like</li> <li>• I can evaluate what my webpage looks like on different devices and suggest / make edits</li> <li>• I can explain what a navigation path is and explain why these are useful</li> <li>• I can make multiple webpages and link them using hyperlinks</li> <li>• I can explain the implications of linking to content owned by others</li> <li>• I can create hyperlinks to link to other people's work</li> <li>• I can evaluate the user experience of a website</li> </ul>	<ul style="list-style-type: none"> <li>• I can explain the relevance of data headings</li> <li>• I can answer questions from an existing data set</li> <li>• I can ask simple relevant questions which can be answered using data</li> <li>• I can explain what an item of data is</li> <li>• I can apply an appropriate number format to a cell</li> <li>• I can build a data set in a spreadsheet application</li> <li>• I can explain the relevance of a cell's data type</li> <li>• I can construct a formula in a spreadsheet</li> <li>• I can identify that changing inputs changes outputs</li> <li>• I can recognize that data can be calculate using different operations</li> <li>• I can create a formula which includes a range of cells</li> <li>• I can apply a formula to multiple cells by duplicating it</li> <li>• I can use a spreadsheet to answer questions</li> <li>• I can explain why data should be organized</li> <li>• I can apply a formula to calculate the data I need to answer questions</li> <li>• I can produce a graph and use this to answer questions</li> <li>• I can identify when to use a table or graph</li> </ul>	<ul style="list-style-type: none"> <li>• I can identify example of information that is variable</li> <li>• I can explain that the way that a variable changes can be defined</li> <li>• I can identify that variables can hold numbers or letters</li> <li>• I can identify a program variable as a placeholder in memory for a single value</li> <li>• I can explain that a variable has a name and a value</li> <li>• I can recognize that the value of a variable can be changed</li> <li>• I can decide where in a program to change a variable</li> <li>• I can make use of an event in a program to set a variable</li> <li>• I can recognize that the value of a variable can be used be a program</li> <li>• I can choose and create artwork for my project</li> <li>• I can explain my design choices</li> <li>• I can create algorithms for my project</li> <li>• I can choose a name that identifies the role of a variable</li> <li>• I can test code I have written</li> <li>• I can identify ways in which my game can be improved</li> <li>• I can extend my game using more variables</li> <li>• I can share my game with others</li> </ul>

## 5. Progression in IT Skills

Reception	<ul style="list-style-type: none"> <li>• Collect, open, log into and out of a Chromebook</li> <li>• Type letters with increasing confidence using a keyboard</li> </ul>
Y1	<ul style="list-style-type: none"> <li>• Confidently type words on a keyboard with increasing speed</li> <li>• Use the space bar and delete key</li> <li>• Use enter to start a new line</li> </ul>
Y2	<ul style="list-style-type: none"> <li>• Copy and paste text and images</li> <li>• Use Caps Lock for capital letters</li> <li>• Add images to text in a word-processed document</li> <li>• Navigate to a webpage</li> </ul>
Y3	<ul style="list-style-type: none"> <li>• Change text and images to make a document more engaging and eye-catching – borders and shadow</li> <li>• Save, find and open a file</li> </ul>
Y4	<ul style="list-style-type: none"> <li>• Combine digital images and text from different sources to make a range of final products – poster, document, leaflet</li> <li>• Use font sizes and styles appropriate to audience and purpose</li> <li>• Use spell check and thesaurus</li> </ul>
Y5	<ul style="list-style-type: none"> <li>• Include hyperlinks in documents</li> <li>• Import sounds into a document</li> <li>• Organise and reorganise text to suit a purpose</li> </ul>
Y6	<ul style="list-style-type: none"> <li>• Format text to suit a purpose</li> <li>• Organise documents into files and folders</li> <li>• Create and name folders to support organisation of work</li> </ul>

