Computing Curriculum

Intent

At The Duston School, we use the Barefoot Computing at School for the planning of computing in EYFS and the National Centre for Computing Education (NCCE) curriculum to teach computing in Years 1-6, to ensure that our children are offered a progressive curriculum, where skills are revisited, developed and extended year on year. Units are carefully scaffolded to develop technical programming skills, an understanding of computer systems and networks as well as the ability to present information or create media. Teacher's subject knowledge and confidence is supported through the teaching resources and guides which run alongside each unit plan. Lessons are adapted to tailor learning to children's needs; ensuring that all children are supported to keep up with learning within all units.

Our curriculum provides our children with the skills to apply across a range of devices such as laptops, tablets, beebots, data loggers, crumble kits and micro:bits. Our plugged in and unplugged approach provides problem solving opportunities and practical skills which inspire children to develop a love of and confidence with technology.

Whilst recognising the benefits that technology brings, children are taught about the risks that the technological world can present. They learn strategies to ensure safe and positive experiences, whilst using technology, at an age appropriate level. We follow the Project Evolve – Education for a Connected World' framework to ensure the progressive, up to date teaching of Online Safety throughout all year groups.

Implementation

At The Duston School, Computing is taught in discreet computing lessons. Lessons are blocked into three half terms in Key Stage 1 and weekly lessons are taught in Key Stage 2. Lessons take a structured approach with all lessons starting with a prior learning review, where children are supported to retrieve prior knowledge and make connections.

Detailed unit plans are provided, which support teachers with their subject knowledge and sequences learning progressively. We have an emphasis on explicitly teaching vocabulary, and each lesson includes introducing, orally rehearsing, and engaging with key vocabulary. Key vocabulary is contextualised throughout the lesson and children are given opportunities to apply new language.

Information is presented in small steps, clearly explained and modelled, and children have opportunities to talk, answer questions, explain their learning and work independently. Throughout lessons, teachers assess/monitor pupil responses and provide effective feedback.

The safety of our children is of paramount importance and each computing unit begins with an explicit online safety lesson. Online safety is also taught as part of our PSHE curriculum, Protective Behaviours programme and when specific issues are brought to our attention. National Online Safety parent guides are regularly shared with parents. We take part in Safer Internet Day each February to raise awareness within school and the local community about the possible dangers of using the internet and mobile technologies, and to advise on ways in which to reduce risk.

Curriculum Map and Key Knowledge Goals

Computer systems and Networks	
Media	
Programming	
Data and Information	

	Curriculum Map and Key Knowledge Goals					
	EYFS					
	Autumn 1	**Autumn 2**	**Spring 1**	**Spring 2**	**Summer 1**	**Summer 2**
		Awesome Autumn To continue, copy and create repeating patterns. To predict what comes next in the pattern. To spot mistakes in the pattern and fix it. To give directions from a starting point. To order instructions.	**Amazing Aliens** To design and make an alien. To talk about similarities and differences. To use logical reasoning to predict which methods of joining will work. To check and fix problems as they arise. To give directions to reach an end point.			**Summer Fun** To group and organise items. To represent groupings as a pictogram. To talk about the position of objects on a map. To use the language of position. To turn and rotate shapes to create a picture.
		Key Vocabulary *Colour autumn season pattern repeated first next fix mistake maze starting point forward backwards left right turn algorithm sequence direction*	*Key Vocabulary* *Similar different size colour compare group design predict reason joining problems fix algorithm forward right backward left position direction*			*Key Vocabulary* *Group organise pictogram colour size position next to front back left right turn place shape 2D place rotate flip debug error fix*
	Key Stage 1					
Year 1	**Computing systems and networks – Technology around us** Identify technology. To identify a computer and its main parts. Use a mouse in different ways. Use a keyboard to type on a computer. To use a keyboard to edit text. Create rules for using technology responsibly.	**Creating media – Digital painting** Describe what different freehand tools do. Use the shape and line tools. Make careful choices when painting a digital picture. Explain I chose the tools I used. Compare painting a picture on a computer and on paper.	**Programming A – Moving a robot** Explain what a given command will do. Combine forwards and backwards commands to make a sequence. Plan a simple program. Find more than one solution to a problem	**Data and information – Grouping data** Label objects. To identify that objects can be counted. Describe objects in different ways. Count objects with the same properties. Compare groups of objects. To answer questions about groups of objects.	**Creating media – Digital writing** Use a computer to write. Add and remove text on a computer. Identify that the look of text can be changed on a computer. Make careful choices when changing text. Explain why I used the tools that I chose. Compare typing on a computer to writing on paper.	**Programming B - Programming animations** Show that a series of commands can be joined together. Identify the effect of changing a value. Explain that each sprite has its own instructions. Design the parts of a project. Use an algorithm to create a program.
	Key Vocabulary *Technology, mouse/trackpad, keyboard, screen, click, drag, double-click, Input device, Shift, space bar, computer, technology*	*Key Vocabulary* *paint program, tool, paintbrush, erase, fill, undo, shape tools, line tool, fill tool*	*Key Vocabulary* *Forwards, backwards, turn, clear, go, commands Instructions, algorithm, program*	*Key Vocabulary* *Data, groups, criteria, criterion, label, order, input*	*Key Vocabulary* *Word processor, backspace, toolbar, bold, italic, underline,*	*Key Vocabulary* *ScratchJr, Bee-Bot, command, sprite, compare programming, , Block, block, background, delete, reset, algorithm, predict, effect, program.*

Year 2	**Computing systems and networks – IT around us** Recognise the uses and features of information technology. Identify the uses of information technology in the school and beyond. Explain how to use information technology safely.	**Creating media – Digital photography** Use a digital device to take a photograph. Make choices when taking a photograph. Describe what makes a good photograph. Decide how photographs can be improved. Use tools to change an image.	**Programming A – Robot algorithms** Describe a series of instructions as a sequence. Explain what happens when we change the order of instructions. Use logical reasoning to predict the outcome of a program. Create and debug a program that I have written.	**Data and information – Pictograms** Recognise that we can count and compare objects using tally charts. Create a pictogram. Select objects by attribute and make comparisons. Recognise that people can be described by attributes. Explain that we can present information using a computer.	**Creating media - Digital music** Say how music can make us feel. Identify that there are patterns in music. Experiment with sound using a computer. Use a computer to create a musical pattern. Create music for a purpose. Review and refine our computer work.	**Programming B - Programming quizzes** Explain that a sequence of commands has a start and an outcome. Create a program using a given design. Change a given design. Change a given design. Create a program using my own design. Decide how my project can be improved.
	Key Vocabulary *Information technology (IT), computer, barcode, scanner/scan*	*Key Vocabulary* *Device, camera, photograph, capture, image, digital Framing, focal point, subject matter, field of view, format, compose*	*Key Vocabulary* *Instruction, sequence, clear, unambiguous, algorithm, program*	*Key Vocabulary* *organise, data, object, tally chart, votes, Pictogram, Attribute, group*	*Key Vocabulary* *Digital, purpose, pattern, review, experiment*	*Key Vocabulary* *Debugging, command, program, run, program, start Sprite, design, modify, change*
	Lower Key Stage 2					
Year 3	**Computing systems and networks – Connecting computers** Explain how digital devices function, Identify input and output devices. Recognise how digital devices can change the way we work. Explain how a computer network can share information. Explore how digital devices are connected.	**Creating media - Stop-frame animation** Explain that animation is a sequence of drawings or photographs. Plan an animation. Identify the need to work consistently and carefully. Evaluate the impact of adding other media to an animation.	**Programming A - Sequencing sounds** Explore a new programming environment. Identify that commands have an outcome. Explain that a program has a start. Recognise that a sequence of commands can have an order. Change the appearance of my project. Create a project from a task description.	**Data and information – Branching databases** Create questions with yes/no answers. Identify the attributes needed to collect data about an object. Create a branching database. Plan the structure of a branching database. Create an identification tool.	**Creating media – Desktop publishing** Recognise how text and images convey information. Choose appropriate page settings. Add content to a desktop publishing publication. Consider how different layouts can suit different purposes. Consider the benefits of desktop publishing.	**Programming B - Events and actions in programs** Explain how a sprite moves in an existing project. Create a program to move a sprite in four directions. Develop my program by adding features. Identify and fix bugs in a program. Design and create a maze-based challenge.
	Key Vocabulary *Digital device, input, output, process Program Connection, network, network switch, server, wireless access point (WAP)*	*Key Vocabulary* *Motion, event, sprite, algorithm, logic Move, resize, extension block,*	*Key Vocabulary* *Scratch, code programming, blocks, stage commands, sprite, costume, backdrop Sequence, event, code, Design, debug algorithm, bug,*	*Key Vocabulary* *Branching database, database, attribute, value, questions, objects, equal, even, separate*	*Key Vocabulary* *Text, images Landscape, portrait, orientation, placeholder, template*	*Key Vocabulary* *Scratch, code programming, blocks, stage, commands, sprite, costume, backdrop Sequence, code, Design, algorithm, bug, debug*

Year 4	**Computing systems and networks – The Internet** Describe how networks physically connect to other networks. Recognise how networked devices make up the internet. Describe how content can be added and accessed on the World Wide Web (WWW). Evaluate the consequences of unreliable content.	**Creating media - Audio production** Identify that sound can be recorded. Explain that audio recordings can be edited. Recognise the different parts of creating a podcast project. Combine audio to enhance my podcast project. Evaluate the effective use of audio.	**Programming A – Repetition in shapes** Identify that accuracy in programming is important. Create a program in a text-based language. Decompose a task into small steps. Create a program that uses count-controlled loops to produce a given outcome.	**Data and information – Data logging** Explain that data gathered over time can be used to answer questions. Use a digital device to collect data automatically. Recognise how a computer can help us analyse data. Identify the data needed to answer questions.	**Creating media – Photo editing** Explain that the composition of digital images can be changed. Explain that colours can be changed in digital images. Explain how cloning can be used in photo editing. Explain that images can be combined. Evaluate how changes can improve an image.	**Programming B – Repetition in games** Develop the use of count-controlled loops in a different programming environment. Explain that in programming there are infinite loops and count controlled loops. Develop a design that includes two or more loops which run at the same time.
	Key Vocabulary *Internet, network, router, security switch, server, wireless access point (WAP), router, route tracing, browser content ownership, permission*	*Key Vocabulary* *Program, turtle, commands, code snippet Algorithm, design, debug, Logo Pattern, repeat, repetition, controlled loop, algorithm*	*Key Vocabulary* *Scratch, loop, programming, sprite, blocks, code, repeat, forever, infinite loop, controlled loop, costume algorithm, duplicate, debug, refine,*	*Key Vocabulary* *Data, table (layout) Input device, sensor, data logger, data point, interval, analyse, data set, import, export*	*Key Vocabulary* *monument Byzantine Empire mosaic Constantinople, Ravenna ornate Justinian Theodora*	*Key Vocabulary* *Scratch, loop, programming, sprite, blocks, code, repeat, infinite, count-controlled loop, algorithm, duplicate, debug, refine, evaluate*
	Upper Key Stage 2					
Year 5	**Computing systems and networks - Systems and searching** Explain that computers can be connected together to form systems. Recognise the role of computer systems in our lives. Describe how search engines select results. Recognise why the order of results is important, and to whom.	**Creating media - Video production** Explain what makes a video effective. Identify digital devices that can record video. Capture video using a range of techniques. Identify that video can be improved through reshooting and editing. Consider the impact of the choices made when sharing.	**Programming A – Selection in physical computing** Control a simple circuit connected to a computer. Write a program that includes count-controlled loops. Explain that a loop can be used to repeatedly check whether a condition has been met	**Data and information – Flat-file databases** Use a form to record information. Outline how you can answer questions by grouping and then sorting data. Explain that computer programs can be used to compare data visually. Use a real-world database to answer questions.	**Creating media – Introduction to vector graphics** Identify that drawing tools can be used to produce different outcomes. Create a vector drawing by combining shapes. To recognise that vector drawings consist of layers. Group objects to make them easier to work with.	**Programming B – Selection in quizzes** Explain how selection is used in computer programs. Relate that a conditional statement connects a condition to an outcome. Explain how selection directs the flow of a program. Design a program which uses selection. Create a program which uses selection.

	Key Vocabulary *System, connection, digital, input, process, output Protocol, address, packet*	Key Vocabulary *Microcontroller, Crumble loop , controller, components, LED, Sparkle, program, action repetition, infinite selection, controlled loop, microcontroller, algorithm,*	Key Vocabulary *Microcontroller, controller, components, LED, program, infinite switch, loop,count-controlled loop, condition, input, algorithm, debug, evaluate*	Key Vocabulary *Database, data, information, record, field, sort, order, group graph, chart, axis, compare, filter*	Key Vocabulary *Vector, drawing tools, shapes, object, icons, toolbar organise, zoom, select, rotate, object, alignment grid, resize, handles, consistency,*	Key Vocabulary *Selection, condition, = count-controlled loop, conditional statement = algorithm, debug, implement, task, input, evaluate, constructive*
Year 6	**Computing systems and networks - Communication and collaboration** Explain the importance of internet addresses. Recognise how data is transferred across the internet. Evaluate different ways of working together online.	**Creating media – Web page creation** Review an existing website and consider its structure. Consider the ownership and use of images (copyright). Outline the need for a navigation path. Recognise the implications of linking to content owned by other people.	**Programming A – Variables in games** 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.	**Data and information – Spreadsheets** Create a data set in a spreadsheet. Build a data set in a spreadsheet. Explain that formulas can be used to produce calculated data. Apply formulas to data. Create a spreadsheet to plan an event.	**Creating media – 3D Modelling** Recognise that you can work in three dimensions on a computer. Identify that digital 3D objects can be modified. Recognise that objects can be combined in a 3D model. Create a 3D model for a given purpose. Plan my own 3D model.	**Programming B - Sensing movement** Create a program to run on a controllable device. Use a conditional statement to compare a variable to a value. Design a project that uses inputs and outputs on a controllable device.
	Key Vocabulary *crawler, bot, search engine, Website, page, browser, , Hypertext Web page, website, logo, header, media, purpose Copyright, , hyperlink,*	Key Vocabulary *Website, web browser, media, Hypertext Markup embed header, media, copyright, , evaluate, breadcrumb, trail, navigation, hyperlink,*	Key Vocabulary *Variable, name, value, set, change Task, algorithm, design, artwork, program, project, code, test, debug*	Key Vocabulary *Spreadsheet, data, data heading, data set, cells, columns and rows, Formula, calculation, input, output. cells, cell reference*	Key Vocabulary *2D, 3D, Rotate, position, select, duplicate Dimensions, placeholder,*	Key Vocabulary *Micro:bit, MakeCode, input, process, output, flashing, USB Selection, condition, if… then… else, variable, random accelerometer*

e-Safety success criteria (& Project Evolve resources)

	Autumn 1	Spring 1	Summer 1
EYFS	**Self-Image and Identity** Recognise, online or offline, that anyone can say 'no', **Online Relationships** Give examples of how I (might) use technology to communicate with people I know.	**Online Reputation** Identify ways that I can put information on the internet. **Online Bullying** Describe ways that some people can be unkind online. Offer examples of how this can make others feel.	**Managing Online Information** Talk about how to use the internet as a way of finding information online. Identify devices I could use to access information on the internet.
Year 1	**Self-Image and Identity** Recognise that there may be people online who could make someone feel sad, embarrassed or upset. **Online Relationships** Give examples of when I should ask permission to do something online and explain why this is important. Explain why things one person finds funny or sad online may not always be seen in the same way by others.	**Online Reputation** Recognise that information can stay online and could be copied. Describe what information I should not put online without asking a trusted adult first. **Online Bullying** Describe to behave online in ways that do not upset others and can give examples.	**Managing Online Information** Know that we can encounter a range of things online including things we like and don't like as well as things which are real or make believe/a joke. Know how to get help from a trusted adult if we see content that makes us feel sad, uncomfortable, worried or frightened.

Year 2	**Self-Image and Identity** I can give examples of issues online that might make someone feel sad, worried, uncomfortable or frightened; I can give examples of how they might get help. **Online Relationships** Managing Online Information Talk about how to use the internet as a way of finding information online. Identify devices I could use to access information on the internet.		**Online Reputation** Explain how information put online about someone can last for a long time. Describe how anyone's online information could be seen by others. Know who to talk to if something has been put online without consent or if it is incorrect. **Online Bullying** Explain what bullying is, how people may bully others and how bullying can make someone feel. Explain why anyone who experiences bullying is not to blame. Talk about how anyone experiencing bullying can get help.		**Managing Online Information** Explain the difference between things that are imaginary, 'made up' or, 'make believe' and things that are 'true' or 'real'. Explain why some information I find online may be real or true. **Privacy and Security** Explain and give examples of what is meant by 'private' and 'keeping things private'.	
Year 3	**Self-Image and Identity** Explain what is meant by the term 'identity'. Explain how people can represent themselves in different ways online. Explain ways in which someone might change their identity depending on what they are doing online (e.g. gaming; using an avatar; social media) and why.	**Online Relationships 1** Describe ways people who have similar likes and interests can get together online. Explain what it means to 'know someone' online and why this might be different from knowing someone offline. Explain what is meant by 'trusting' someone online' why it is important to be careful about who to trust online	**Online Relationships 2** Explain why someone may change their mind about trusting anyone with something if they worried. Explain how someone's feelings can be hurt by what is said or written online. Explain the importance of having permission before sharing things online	**Online Bullying** Describe appropriate ways to behave towards other people online and why this is important. Give examples of how bullying behaviour could appear online and how someone can get support.	**Health and Wellbeing** Explain why spending too much time using technology can sometimes have a negative impact. Explain why some online activities have age restrictions, why it is important to follow them and know who I can talk to if others pressure me to watch or do something	
Year 4	**Self-Image and Identity** Describe positive ways for someone to interact with others online and understand how this will positively impact on how others perceive them. Explain that others online can pretend to be someone else, including my friends, and can suggest reasons why they might do this.	**Online Relationships** Describe strategies for safe and fun experiences in a range of online social environments (e.g. livestreaming, gaming platforms). Give examples of how to be respectful to others online and describe how to recognise healthy and unhealthy online behaviours.	**Online Reputation** Describe how to find information about others by searching online. Explain ways that some of the information about anyone online could have been created, copied or shared by others.	**Online Bullying** Recognise when someone if upset, hurt or angry online. Describe ways people can be bullied through a range of media (e.g. image, video, text, chat). Explain why people need to think carefully about how content they post might affect others, their feelings and how it may affect how others feel about them	**Health and Wellbeing** Explain how using technology can be a distraction from other things, in both a positive and negative way. Identify times or situations when someone may need to limit the amount of time they use technology e.g. I can suggest strategies to help them with limiting this time.	**Privacy and Security** Describe strategies for keeping personal information private, depending on context. Describe how some online services may seek consent to store information about me; I know how to respond appropriately and who I can ask if I am not sure.

Year 5	**Self-Image and Identity** Explain how identity online can be copied, modified or altered. Demonstrate how to make responsible choices about having an online identity, depending on context.	**Online Bullying** Describe how what one person perceives as playful joking and teasing (including 'banter') might be experiences by others as bullying. Identify a range of ways to report concerns and access support both in school and at home about online bullying. Explain how to block abusive users. Describe the helpline services which can help people experiencing bullying and how to access then	**Managing Online Information** Evaluate digital content and can explain how to make choices about what is trustworthy. Explain what is meant by the term 'stereotype', how 'stereotypes' are amplified and reinforced online, and why accepting 'stereotypes' may influence how people think about others. Explain what is meant by a 'hoax.	**Health and Wellbeing** Describe ways technology can affect health and well-being both positively and negatively. Explain how and why some apps and games may request or take payment for additional content (e.g. in-app purchases, loot boxes) and explain the importance of seeking permission from a trusted adult before purchasing.	**Privacy and Security** Explain what app permissions are and give some examples.	**Copyright and Ownership** Assess and justify when is it acceptable to use the work of others. Give examples of content that is permitted to be reused and know how this content can be found online.
Year 6	**Self-Image and Identity** Identify and critically evaluate online content relating to gender, race, religion, disability, culture and other groups, and explain why it is important to challenge and reject inappropriate representations online. Describe issues online that could make anyone feel sad, worried, uncomfortable or frightened. I know and can give examples of how to get help, both on and offline.	**Online Relationships** Explain how sharing something online may have an impact either positively or negatively. Describe how things shared privately online can have unintended consequence for others Explain that asking or sharing inappropriate images of someone, even if they say it is okay, may have an impact for the sharer and others, and who can help if someone is worried about this.	**Online Bullying** Describe how to capture bullying content as evidence (e.g. scree-grab, URL, profile) to share with others who can help me. Explain how someone would report online bullying in different contexts.	**Health and Wellbeing** Describe common systems that regulate age-related content (e.g. PEGI, BBFC, parental warnings) and describe their purpose. Recognise features of persuasive design and how that are used to keep users engaged (current and future use) Assess and action different strategies to limit the impact of technology on health	**Privacy and Security 1** Describe effective ways people can manage passwords (e.g. storing them securely or saving them in the browser). Explain what to do if a password is shared, lost or stolen. Describe how and why people should keep their software and apps up to date, e.g. auto updates.	**Privacy and Security 2** Describe simple ways to increase privacy on apps and services that provide privacy settings. Describe ways in which some online content targets people to gain money or information illegally; I can describe strategies to help me identity such content (e.g. scams, phishing). Know that online services have terms and conditions that govern their use.

Impact
At the end of each phase, children can confidently use the technical programming skills, have an understanding of computer systems and networks as well as the ability to present information or create media. They can apply these on a range of devices and software which ensures that they have the knowledge and skills for the next stage of their education and beyond. Expected progress is shown through children's ability to participate fully and accept challenge in Computing lessons.

Children know how to stay safe on all devices and know what to do then issues arise. Children talk enthusiastically about their learning using taught subject specific vocabulary correctly and can articulate about the potential risks of being online.

Children are challenged to succeed throughout the Computing curriculum and learn about significant people who have, themselves, faced challenge and overcome these to bring advances in the technological world e.g. Tim Berners-Lee, Ada Lovelace and Margaret Hamilton.

Values
Children demonstrate the Primary Phase values of Care, Challenge and Succeed through their Computing learning.

 Care:
Care is threaded throughout the Computing curriculum. Children show care by respecting the school computing equipment and supporting each other in their learning. Appreciation is shown of the work that children produce by their peers and staff. Online and computer safety is taught explicitly and children follow these strategies to keep themselves and others safe when in lessons and using devices at home. Regular online safety advice is sent to parents and can be found on our website.

 Challenge:
Children are challenged to learn new knowledge throughout the Computing curriculum. Ambitious vocabulary is taught explicitly and children are encouraged to use this in the correct context. Learning is never capped and children are able to take their knowledge and run with it, especially when using coding programs.

 Succeed:
Children have opportunities to succeed in all their Computing learning. Scaffolding and assessment for learning is used effectively so that all children can succeed in their Computing lessons. Throughout the Computing curriculum, children have opportunities to apply their knowledge and to succeed in practical work and through explaining their learning.