Ladygrove Primary School and Nursery

Progression of Knowledge and Skills for Computing

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.

National Curriculum Aims for Primary Computing

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.

Progression across key stages

At Ladygrove Primary we follow the National Centre for Computing Education (NCCE) Scheme of Learning and Natterhub ESafety Scheme of Learning. All learning objectives have been mapped to the National Centre for Computing Education's taxonomy of ten strands, which ensures that units build on each other from one key stage to the next.

Every year group learns through units within the same four themes, which combine ten strands of the NCCE's taxonomy (See below).

This approach allows us to use the spiral curriculum approach to progress skills and concepts from one year group to the next.

<table>
<tr><th>Primary Themes</th><th>Computing Systems and Networks</th><th>Programming</th><th>Data and Information</th><th>Creating Media</th></tr>
<tr><td rowspan="4">Taxonomy Strands</td><td>Computer Systems

Computer Networks</td><td>Programming

Algorithms

Design and Development</td><td>Data and Information</td><td>Creating Media

Design and Development</td></tr>
<tr><td colspan="4">Effective use of tools</td></tr>
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End of EYFS Expectations (Non-statutory Computing)

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Knowledge-

- Shows an interest in technological toys. (Au1/2)
- Knows how to operate simple equipment (Sp1/2)
- To know how to use different technological toys. (Su1/2)

Skills

- Shows skill in making toys work by pressing parts or lifting flaps to achieve effects such as sound, movement or a new image (Au1)
- Use IT hardware to interact with age-appropriate computer software. (Au2)
- To use the interactive whiteboard to complete a simple task. (Sp1 - Su2)

Vocabulary

Interactive White Board (IWB), iPad, laptop, computer, mouse, pad, click, press, gentle, screen, monitor, BeeBot, control, buttons, batteries, charger, lead, socket, plug, switches, safety, log in, log off, standby, username, password, stranger danger, virus.

End of KS1 Expectations	End of KS2 expectations
Pupils should be able 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	**Pupils should be able 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

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

`	EYFS		KS1		KS2			
	Nursery	**Reception**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
Computer Science – Substantive Knowledge	To know how to operate simple equipment.		I know how to combine 'forwards' and 'backwards' commands to make a sequence. I know how to plan a simple program. I know how to find more than one solution to a problem.	I know what happens when we change the order of instructions. I know that programming projects can have code and artwork.	I know that commands have an outcome. I know that a program has a start. I know that a sequence of commands can have an order.	I know that accuracy in programming is important. I know what 'repeat' means. I know how to decompose a task into small steps.	I know that a loop can stop when a condition is met. I know that a loop can be used to repeatedly check whether a condition has been met.	I know that a 'variable' as something that is changeable. I know why a variable is used in a program. I know how to improve a game by using variables.

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Computer Science - Disciplinary Knowledge and Skills	I can show an interest in real objects that involve technology. I can show skill in making toys work by pressing parts to achieve effects such as sound, light, movement or the showing of images.	I can explain what a given command will do. I can act out a given word. I can combine four direction commands to make sequences.	I can describe a series of instructions as a sequence. I can use logical reasoning to predict the outcome of a program. I can design an algorithm. I can create and debug a program that I have written.	I can explore a new programming environment. I can change the appearance of my project. I can create a project from a task description.	I can create a program in a text-based language. I can modify a count-controlled loop to produce a given outcome. I can create a program that uses count-controlled loops to produce a given outcome.	I can control a simple circuit connected to a computer. I can write a program that includes count-controlled loops. I can design a physical project that includes selection. I can create a program that controls a physical computing project.	I can design a project that builds on a given example. I can use my design to create a project. I can evaluate my project.
Information Technology – Substantive Knowledge		I know how to use the shape tool and the line tools. I know how to use a computer on my own to paint a picture. I know how to use a mouse in different ways. I know how to use a keyboard to type on a computer.	I know how to explain how information technology helps us. I know how to use information technology safely. I know that we can count and compare objects using tally charts. I know that objects can be	I know how to identify input and output devices. I know how digital devices can change the way that we work. I know how digital devices can be connected. I know how text and images convey information.	I know how to use a digital device to collect data automatically. I know that a data logger collects 'data points' from sensors over time. I know how a computer can help us analyse data. I know how to use data from sensors to answer questions. I know how networked devices	I know how you can answer questions by grouping and then sorting data. I know that tools can be used to select specific data. I know that computer programs can be used to compare data visually. I know that computers can be connected together to form systems.	I know how data is transferred across the internet. I know how sharing information online can help people to work together. I know how we communicate using technology. I know how to plan the features of a web page. I know the need for a navigation path.

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			represented as pictures. I know that people can be described by attributes. I know that we can present information using a computer.	I know that text and layout can be edited. I know how different layouts can suit different purposes.	make up the internet. I know how content can be added and accessed on the World Wide Web (WWW). I know how the content of the WWW is created by people.	I know the role of computer systems in our lives. I know how to use a search engine.	
Information Technology – Disciplinary Knowledge and Skills	I can interact with a computer or tablet to make something happen successfully. I can interact with age-appropriate computer software.	I can describe what different freehand tools do. I can make careful choices when painting a digital picture. I can explain why I chose the tools I used. I can compare painting a picture on a computer and on paper. I can identify technology.	I can recognise the uses and features of information technology. I can identify the uses of information technology in the school. I can identify information technology beyond school. I can recognise that choices are made when using information technology.	I can explain how digital devices function. I can explain how a computer network can be used to share information. I can recognise the physical components of a network. I can choose appropriate page settings. I can add content to a desktop publishing publication.	I can explain that data gathered over time can be used to answer questions. I can identify the data needed to answer questions. I can describe how networks physically connect to other networks. I can outline how websites can be shared via the World Wide Web (WWW). I can evaluate the consequences of unreliable content.	I can use a form to record information. I can compare paper and computer-based databases. I can use a real-world database to answer questions. I can describe how search engines select results. I can explain how search results are ranked.	I can explain the importance of internet addresses. I can evaluate different ways of working together online. I can evaluate different methods of online communication. I can an existing website and consider its structure. I can consider the ownership and use of images (copyright). I can recognise the need to preview pages. I can recognise the implications of linking to

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		I can identify a computer and its main parts. I can use the keyboard to edit text. I can create rules for using technology responsibly.	I can create a pictogram. I can select objects by attribute and make comparisons.	I can consider the benefits of desktop publishing.			content owned by other people.
Digital Literacy (Includes E-Safety) – Substantive Knowledge		I know that the work I create belongs to me.	I know the people I can trust and can share my personal information; I can explain why I can trust them.	When searching on the internet for content to use, I know why I need to consider who owns it and whether I have the right to reuse it.			I know why copying someone else's work from the internet without permission can cause problems.
Digital Literacy (Includes E-Safety – Education for a Connected World Links through Natterhub and Barefoot)	I can talk to an adult about what I have done on a computer and start to know that I have to be careful with devices so that they do not break. [some students will know that they need to log on to some devices to make them work] I can recognise that a range of technology is	I can identify rules that help keep us safe and healthy in and beyond the home when using technology. I can name my work so that others know it belongs to me.	I can identify rules that help keep us safe and healthy in and beyond the home when using technology and I can give some simple examples. I can identify some simple	I can use key phrases in search engines. I can use search technologies effectively. I can demonstrate the use of search tools to find and access online content which	I can analyse information to make a judgement about probable accuracy, and I understand why it is important to make my own decisions regarding content and that my decisions are respected by others. I can explain what is meant by fake	I am aware that a person's online activity, history or profile (their 'digital personality') will affect the type of information returned to them in a search or on a social media feed, and how this may be intended to influence their	I can describe and assess the benefits and the potential risks of sharing information online. I can assess and justify when it is acceptable to use the work of others. I can give examples of content that is permitted to be reused.

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– Disciplinary Knowledge and Skills	used in places such as homes and schools. I can recognise that there may be people online who could make someone feel sad, embarrassed or upset. I can begin to follow the school's safer internet rules.		examples of my personal information (e.g. name, address, birthday, age, location) I can recognise more detailed examples of information that is personal to me (e.g. where I live, my family's names, where I go to school)	can be reused by others.	news, e.g. why some people will create stories or alter photographs and put them online to pretend something is true when it isn't. I can describe ways of identifying when online content has been commercially sponsored or boosted, (e.g. by commercial companies or by vloggers, content creators, or influencers). I can describe how fake news may affect someone's emotions and behaviour, and explain why this may be harmful.	beliefs, actions and choices. I can explain how search engine rankings are returned and can explain how they can be influenced (e.g. commerce, sponsored results)	I can use the internet with adult support to communicate with people I know.
KEY Vocabulary Progression	Instruction, move, touch, press, start, stop, turn, careful, safe.	forwards, backwards, command, sequence, mouse,	sequence, algorithm, outcome, debug, attribute, personal	outcomes, input, output, program, device, command, sequence	repeat, modify, count- controlled loop, data, analyse, content, sensor, fake news	condition, selection, circuit, connected, system, search engine, digital personality	variable, design, communicate, navigation path, permission, ownership, copyright, website

		keyboard, freehand tools					
Visits and Visitors	Year 5 and 6 Workshops with Paul Gerrie www.amazingict.co.uk Year 5 Robotics Workshop with Anthony Hyett https://www.hyetteducation.com/						

Ladygrove Computing Journey Map

"Every day counts, every minute matters!"

