PRIMARY COMPUTING CURRICULUM PROGRESSION

Aligned with the National Curriculum for England (2013) and the Statutory Framework for the Early Years Foundation Stage (2021)

Kneesall C of E Primary School
Key Knowledge and Skills Progression

National Curriculum Purpose	National Curriculum Aims
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.	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.
Links to other subjects/curriculum areas	**Experiences every child should have**
Presenting their work from across the curriculum in a variety of ways such as photograph, presentation, word document or publisher. Using online simulations to explore ideas in Science or Geography Using the internet as a search tool to support learning across the curriculum Using apps to support learning (such as Times Tables Rockstars or Padlet) E-Safety aspects have strong links with RSHE curriculum.	Seeing something move in response to their commands Taking photos and creating videos and sharing them with their friends and families. Produce something of their own that makes them go 'wow!' Chances to try things out and discover what happens if things go wrong

EYFS

Areas of Learning – Understanding the World (broader): Technology*

Children recognise that a range of technology is used in places such as homes and schools. They select and use technology for particular purposes.

- Knows how to operate simple equipment
- Shows an interest in technological toys with knobs or pulleys, or real objects such as cameras or mobile phones
- Shows skill in making toys work by pressing parts or lofting flaps to achieve effects such as sound, movements or new images
- Knows information can be retrieved from computers
- Completes a simple program on a computer
- Uses ICT hardware to interact with age-appropriate computer software

Digital Literacy

Declarative Knowledge	Procedural Knowledge
Care is needed when we use technology	• Know when to ask a grown up for help • Don't give out information about themselves online

Vocabulary	Prior Learning	Future Learning
Online Technology	3 to 4 year olds will be familiar with technology in their home and it's uses.	In Years One and Two children will: • know what to do if something worries or frightens them. • know not everything they see online is true. • Know how to keep personal information safe and use technology safely.

Computer Science

Declarative Knowledge	Procedural Knowledge

Cause and effect: Buttons (physical or touch screen) make things happen	• Turn on an iPad and open a desired app • Operate a Beebot (or other programmable toy) • Use a keyboard to type on a laptop or iPad screen	
Vocabulary	Prior Learning	Future Learning
Computer iPad Beebot Button Instruction	3 and 4 years old will explore how things work (such as mechanical equipment with cogs and pulleys or wind-up toys).	In Years One and Two children will: • Know what algorithms are and understand how to program a floor robot • Understand that algorithms must be sequential and unambiguous or may need debugging

Information Technology

Declarative Knowledge	Procedural Knowledge	
Devices can record information and can be interacted with in different ways	• Use an iPad or camera to take photos • Interact with a device to watch a video or listen to sound • Mark make on digital devices	
Vocabulary	Prior Learning	Future Learning
iPad Camera Video Photo[graph]	3 and 4 year olds may mark make on tablets or iPads.	In Years One and Two children will: • Learn how to take photographs using devices • Learn how to paint, write and make music digitally • Learn how to use a variety of 'tools' to edit their digital work.

*Although 'Technology' is no longer statutory as part of the EYFS framework, at Kneesall we are ambitious about our children's life experiences and feel it is necessary to ensure exposure to technology within their Foundation learning, to prepare them well for the rest of their Primary curriculum.

Key Stage One National Curriculum Content

Pupils should be taught to:

Computer Science

- 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

Information Technology

- use technology purposefully to create, organise, store, manipulate and retrieve digital content

Digital Literacy

- 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 One

Digital Literacy

National Curriculum Objectives	Declarative Knowledge	Procedural Knowledge
Digital Wellbeing (RSHE) – To 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.	Digital Wellbeing – Children know what to do if something worries or frightens them. They will know not everything they see online is true.	Digital Wellbeing – How to keep personal information safe and use technology safely.
Y1 KRP 'Who does this belong to?' (CS/B) – To identify where to go for help and support when	Y1 KRP' - When someone has ownership of something, you need their permission to use it.	/

they have concerns about content or contact on the internet or other online technologies. Y2 KRP 'Do the right thing.' (CS/B) - To 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.	Y2 KRP' – You need permission to use someone else's digital things.	/
Vocabulary	Prior Learning	Future Learning
e-safety/internet safety communicate risk online private/personal information digital wellbeing	In EYFS children should: • understand what technology is and that care is needed when we use it • know when to ask an adult for help • know not to give out personal information online	In Years Three and Four children will: • Children will know which information should be kept private • Understand the consequences of using technology disrespectfully and irresponsibly so will communicate appropriately online • Be aware of cyber-criminals
Computer Science		
National Curriculum Objectives	Declarative Knowledge	Procedural Knowledge
Moving a Robot (TC) – To understand what algorithms are To being to create and debug simple programs To use logical reasoning to predict the behaviour of simple programs Y1 KRP Algorithms/Scratch Jr/Programming and debugging (CS/B) - To understand what algorithms are; how they are implemented as programs on digital devices; and that programs execute by following precise and unambiguous instructions. To create and debug simple programs	Moving a Robot - A command is an instruction we can program into a device. Know how to move a floor robot (Beebot) Y1 KRP' – An algorithm is a precise sequence of instructions or a set or rules that perform a specific task. The instructions have to be accurate and followed sequentially.	Moving a Robot - How to plan a simple program, predict the outcome of a command on a device (up to four commands) and identify one or more solutions to a problem when programming Y1 KRP' – How to program a sequence of precise instructions successfully and how to debug it when it goes wrong using logical reasoning.

To use logical reasoning to predict the behaviour of simple programs Y2 KRP Algorithms/Scratch Jr/Programming and Debugging (CS/B) To know how algorithms are implemented as programs on digital devices; and that programs execute by following precise and unambiguous instructions. To create and debug simple programs	Y2 KRP' - An algorithm is a precise sequence of instructions or a set or rules that perform a specific task. The instructions have to be unambiguous and followed sequentially.	Y2 KRP' – Use a storyboard to write a code, debug and evaluate it, creating a sequence of codes and know how to program a toy to perform a specific task.
Vocabulary	Prior Learning	Future Learning
command program floor robot (Beebot) debug logic logical reasoning algorithm precise and unambiguous sequence/sequential	In EYFS children should • Have experienced using buttons on a programmable toy and/or Beebot to operate it and make it move.	In Years Three and Four children will: • Learn about variables • Implement algorithms as code • Understand how to debug algorithms
Information Technology		
National Curriculum Objectives	Declarative Knowledge	Procedural Knowledge
Digital Painting (TC) – To use technology purposefully to create content. Digital Writing (TC) – To use technology purposefully to create and manipulate content.	Digital Painting – You can create pictures on Computers. Digital Writing – Understand the differences between writing digitally and on paper.	Digital Painting – How to use shape tools, brush sizes, brush tools on painting/drawing software. Digital Writing – How to use a word processor, select words and texts, use keyboard keys, use bold, italic and underline tools, change fonts

Digital Photography (TC) - To use technology purposefully to store and manipulate digital content Digital Music (TC) – To use technology purposefully to create, organise, store, manipulate and retrieve digital content	Digital Photography – Know which devices can be used to take photographs and that software can be used to edit them. Digital Music – Know that humans create and play music and that this can be done digitally. Rhythm, tempo and pitch can be altered using software.	Digital Photography – How to take a good photograph using light. Digital Music – How to create digital music by experimenting with a musical pattern and sequence of notes.
Vocabulary	Prior Learning	Future Learning
tools – brush, size, shape, underline, bold, italic keys – space bar, enter, backspace, letter keys, capital letters font word processor photograph editing software tempo, pitch, rhythm, sequence of notes, musical patterns	In EYFS children should: Mark making on an iPad or Computer Listen to and interact with devices that play music, sounds or video	In Years Three and Four children will: • How to use data loggers to collect data over time • How to use desktop publishing for a purpose • How to produce digital audio • How to edit digital photographs using software • How to create branching databases

Key Stage Two National Curriculum Content

Pupils should be taught to:

Computer Science

- 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

Information Technology

- 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

Digital Literacy

- use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact.

Lower Key Stage Two

Digital Literacy

National Curriculum Objectives	Declarative Knowledge	Procedural Knowledge
Digital Wellbeing (RSHE) - To use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify ways to report concerns about content and contact. Y3 KRP 'You're the jury' & Evaluating digital content (CS/B) – To recognise acceptable/unacceptable behaviour. Y4 KRP 'You're the cyber security expert' & Evaluating digital content (CS/B) – To use technology safely, respectfully and responsibly. To 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	Digital wellbeing – Children will know why we shouldn't share passwords and private information online. They will be able to explain why we have rules and restrictions around the technology they use. They will know how to communicate respectfully online. Y3 KRP' – Understand how the victims of cyber crimes such as online abuse, trolling, bullying and harassment can be negatively affected. Y4 KRP – Know that cyber criminals may try to use computers to discover secret numbers such as pins or passwords. Recognise uses of computer networks within school.	Digital wellbeing – Children will know how to respond to noticing bullying online and how to get support if they don't feel safe. Y3 KRP' – *Also links to Computer Science using prior knowledge of algorithms, and IT using videography skills.* *Y4 KRP – Also links to Computer Science using knowledge of variables and loops to create algorithms that build stronger passwords.*

Vocabulary	Prior Learning	Future Learning
e-safety/internet safety communicate risk	By the end of Year Two Children should: • know what to do if something worries or frightens them.	In Year Five & Six children will: • Understand how to look after their digital wellbeing.

online private/personal information password digital wellbeing cyberbullying restrictions cyber-criminal/crime abuse trolling harassment	• know not everything they see online is true. • Know how to keep personal information safe and use technology safely.	• Know how to make online bullying stop • Identify risks and benefits of social media • Recognise the signs of harmful online relationships
Computer Science		
National Curriculum Objectives	Declarative Knowledge	Procedural Knowledge
Y3 KRP Scratch, Algorithms & debugging (CS/B) To design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts. To use sequence, selection, and repetition in programs; work with variables and various forms of input and output. Y4 KRP Scratch, Algorithms & debugging (CS/B) To design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts To use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs Y4 KRP Programming – Kodu (CS/B) To design, write and debug programs that accomplish specific goals, including controlling or simulating physical	Y3 KRP' – Variables in algorithms contain information that can have different values. A sequence of instruction can be repeated multiple times in a loop. Y4 KRP' – To debug an algorithm you must decompose it into smaller parts.	Y3 KRP' – How to use logical reasoning to debug algorithms using decomposition and then apply this to repetition and different variables. Y4 KRP' - Understand how to debug algorithms by decomposing them into smaller parts.

systems; solve problems by decomposing them into smaller parts To use sequence, selection, and repetition in programs; work with variables and various forms of input and output	Y4 KRP' – Algorithms can be implemented as code.	Y4 KRP' – Make a simple game using algorithms and code.
Vocabulary	Prior Learning	Future Learning
decomposition loop repetition variable debug tinkering code algorithm logical reasoning	By the end of Year Two Children should: • Understand that algorithms are a sequence of instructions • Understand that algorithms need to be sequential and unambiguous or will need debugging	In Year Five & Six children will: • Expand their knowledge of how variables work • Debug algorithm codes and know some uses of this in the real world.
Information Technology		
National Curriculum Objectives	Declarative Knowledge	Procedural Knowledge
Desktop Publishing (TC) To 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	Desktop Publishing – Know how desktop publishing can be useful and helpful in the real world and compare it to work made by hand.	Desktop Publishing – How to convey information through text and image digitally using a desktop publisher, and how to change the font style, size and colour for a given purpose, to communicate clearly with the audience.
Data Logging (TC) “	Data Logging – Data loggers can gather data over time using their sensors.	Data Logging – Collect data with a data logger and interpret the data.
Stop Frame Animation (TC) “	Stop Frame Animation – Animations can be made more accurate using ‘onion skinning’.	Stop Frame Animation – Create and evaluate a digital animation using ‘onion skinning’
Photo editing (TC)	Photo editing – Digital photos can be edited using software.	

“ Branching databases (TC) “ Audio production (TC) “	Branching databases – A branching database classifies groups of objects structured by yes/no answers. Audio production- Audio can be recorded and edited and saved to create an audio file.	Photo editing – Use tools to change colours, clone parts of an image and remove them, copy parts of an image, then evaluate my digital images. Branching databases – Create an identification tool by arranging objects by ‘yes/no’ questions after classifying objects by their attributes Audio production – Create a podcast by recording, re-recording and playing sound using input and output devices, then edit the content by arranging sounds. This can then be saved as an audio recording.
Vocabulary	Prior Learning	Future Learning
data loggers page orientation text edit image content layout desktop publishing font style font size font colour animation onion skinning audio podcast input output save software	By the end of Year Two Children should: • Know which devices take photographs and how to take a good photo using good sources of light • Know how to type and using a keyboard • Music can be made digitally using software.	In Year Five & Six children will: • Learn about copyright rules • Create vector graphics using a variety of tools and skills • Create web pages and content for this • Create 3D images • Create spreadsheets • Understand skills relating to video production

Upper Key Stage Two

Digital Literacy

National Curriculum Objectives	Declarative Knowledge	Procedural Knowledge
Digital Wellbeing (RSHE) - To use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact. Y5 KRP 'Stop think. Do I consent?' (CS/B) - To use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact. Y6 KRP 'The Phisherman Game' & Ranking Search Activity (CS/B) - To use technology safely, respectfully and responsibly	Digital Wellbeing - Children will understand why it is important to look after their digital wellbeing. They will understand why bullying is wrong and know how to make it stop. They will be able to explain not all information is true online. Y5 KRP' – When signing up to social media platforms you are consenting to giving away personal information. Y6 KRP' – Phishing is where someone tries to trick people into giving information out online by pretending to be someone trustworthy.	Digital Wellbeing - Identify benefits and risks of social media; know how to use technology safely and responsibly; and how to recognise signs of inappropriate and harmful online relationships. Y5 KRP' – Evaluate the personal data given away by family at home on social media and share the risks in doing so. Y6 KRP' – Identify a phishing email, text or social media message.
Vocabulary	**Prior Learning**	**Future Learning**
e-safety/internet safety communicate risk online private/personal information password digital wellbeing cyberbullying restrictions online relationships social media fake news	By the end of Year Four Children should: • know why we shouldn't share passwords and private information online, explain why we have rules and restrictions around the technology they use and will know how to communicate respectfully online. • know how to respond to noticing bullying online and how to get support if they don't feel safe.	In secondary school children will • understand a range of ways to use technology safely, respectfully, responsibly and securely, including protecting their online identity and privacy; recognise inappropriate content, contact and conduct, and know how to report concerns

Computer Science		
National Curriculum Objectives	Declarative Knowledge	Procedural Knowledge
Y5 KRP Scratch, Algorithms & debugging (CS/B) To design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems Y6 KRP Scratch, Algorithms & debugging (CS/B) To design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems Sensing Movement (TC) – To use sequence, selection, and repetition in programs; work with variables and various forms of input and output	Y5 KRP' – Variables are needed to store data within a computer program and they may be used as it runs. Abstraction means removing unnecessary detail. Y6 KRP' – Computers can 'crack codes' and were used to do so in WW2. Sensing Movement – Micro:bits sense motion and can tell you which direction you are moving.	Y5 KRP' – Use variables to create a program that runs successfully. Create a simulation that reaches an intended audience, and in doing so abstract unnecessary parts of it. Y6 KRP' – *Has links to Information Technology as children will plan and create their own films about WW2 Code Crackers!* Sensing Movement – Modify, then design a program that uses inputs and outputs on a controllable device, which also uses variables.
Vocabulary	Prior Learning	Future Learning
variables abstraction simulation input output code	By the end of Year Four Children should: • Know how to implement algorithms containing variables and debug code	In secondary school children will • design, use and evaluate computational abstractions that model the state and behaviour of real-world problems and physical systems • understand several key algorithms that reflect computational thinking [for example, ones for sorting and searching]; use logical reasoning to compare the utility of alternative algorithms for the same problem • use 2 or more programming languages, at least one of which is textual, to solve a variety of computational problems; make appropriate use of data structures [for example, lists, tables

		or arrays]; design and develop modular programs that use procedures or functions • understand simple Boolean logic [for example, AND, OR and NOT] and some of its uses in circuits and programming; understand how numbers can be represented in binary, and be able to carry out simple operations on binary numbers [for example, binary addition, and conversion between binary and decimal] • understand the hardware and software components that make up computer systems, and how they communicate with one another and with other systems
Information Technology		
National Curriculum Objectives	Declarative Knowledge	Procedural Knowledge
Video Production (TC) – To 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. 3D modelling (TC) “ Vector Graphics (TC) – “	Video Production – Different filming techniques and video editing can improve the quality of the outcome of the final video. 3D modelling – Computers can create 3D images, not just 2D images. Vector Graphics – Vectors are digital drawings made using shapes.	Video Production – After creating a storyboard, record a video on a digital device experimenting with different angles and then review how effective the video is. Then store, retrieve and export the video from the device to a computer ready for editing. 3D modelling – Add, view from different angles, resize, lift, lower, recolour, rotate, duplicate, group 3D models, then combine the models to make a design to analyse and evaluate Vector Graphics – How to move, resize, rotate, copy and paste shapes (using ctrl buttons), zoom to add detail, add layers and group objects to make a vector.

Web Page Creation (TC) “ To use search technologies effectively, appreciate how results are selected and ranked, and be discerning in evaluating digital content. Y5 KRP Using data (CS/B) - To select, use and combine a variety of software to present data and information. To use search technologies effectively, appreciate how results are selected and ranked, and be discerning in evaluating digital content.	Web Page Creation – Websites are made by HTML Y5 KRP' – Spreadsheets can help up solve problems.	Web Page Creation – Find copyright-free images and use them when adding content to your own websites. Create a navigation path and use hyperlinks. Y5 KRP – Create a spreadsheet that represents collected data found by online research. Evaluate my own work and the work of others. *Also links to Computer Science – Following algorithms as recipes.*
<u>Vocabulary</u>	<u>Prior Learning</u>	<u>Future Learning</u>
micro:bits editing save retrieve store export resize recolour duplicate group combine model vector graphics rotate zoom copy and paste website HTML	By the end of Year Four Children should: • Know how to use data loggers to collect data over time • Know how to use desktop publishing for a purpose • Know how to produce digital audio • Know how to edit digital photographs using software • Know how to create branching databases	In secondary school children will • understand the hardware and software components that make up computer systems, and how they communicate with one another and with other systems • understand how instructions are stored and executed within a computer system; understand how data of various types (including text, sounds and pictures) can be represented and manipulated digitally, in the form of binary digits • undertake creative projects that involve selecting, using, and combining multiple applications, preferably across a range of devices, to achieve challenging goals, including collecting and analysing data and meeting the needs of known users • create, reuse, revise and repurpose digital artefacts for a given audience, with

copyright hyperlinks navigation path spreadsheets		attention to trustworthiness, design and usability

Key

TC = Teach Computing

CS/B = Cornerstones/Barefoot KRP (search Cornerstones Maestro for 'Y1 Computing' or 'Y2 Computing')

KRP = Cornerstones Knowledge Rich Project

RSHE = Our RSHE programme of study via Twinkl

Terminology (as defined by Ofsted 2022)

Declarative Knowledge = 'Knowing That'

Procedural Knowledge = 'Knowing how'

Computer Science = Computer science covers knowledge of computers and computation, including concepts such as data, system architecture, algorithms and programming. Computer science is seen as the core of computing and underpins the whole of the subject.

Digital Literacy = The National Centre for Computing Education defines digital literacy as the 'skills and knowledge required to be an effective, safe and discerning user of a range of computer systems'

Information Technology = Information technology provides a context for the use of computers in society. It focuses on how computers are used in different sectors and describes the methods used to create digital artefacts such as presentations, spreadsheets and videos.

Computational thinking = Logic and logical thinking, algorithms and algorithmic thinking, patterns and pattern recognition, abstraction and generalisation, evaluation, automation