HOLY CROSS & ALL SAINTS RC PRIMARY

Computing Curriculum

Progression of Skills Overview

Computing

EYFS Framework Links:

To listen to a broad selection of stories, non-fiction, rhymes and poems will foster their understanding of our culturally, socially, technologically and ecologically diverse world. As well as building important knowledge, this extends their familiarity with words that support understanding across domains.

Children in EYFS with take part in sessions & activities based around computational thinking concepts and approaches. Pupils will develop the necessary problem-solving skills needed for everyday life and to develop their computational thinking skills such as:

- Creating and following algorithms
- Collaborating
- Decomposition
- Debugging
- Persevereing
- Creating patterns
- Logical reasoning
- Abstraction

National Curriculum Links:

Key stage 1

Pupils should be taught to:

- understand what algorithms are, how they are implemented as programs on digital devices, and that programs execute by following precise and unambiguous instructions
- create and debug simple programs
- use logical reasoning to predict the behaviour of simple programs
- use technology purposefully to create, organise, store, manipulate and retrieve digital content
- recognise common uses of information technology beyond school
- use technology safely and respectfully, keeping personal information private; identify where to go for help and support when they have concerns about content or contact on the internet or other online technologies

Key stage 2

Pupils should be taught to:

- design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts
- use sequence, selection, and repetition in programs; work with variables and various forms of input and output
- use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs
- understand computer networks, including the internet; how they can provide multiple services, such as the World Wide Web, and the opportunities they offer for communication and collaboration
- use search technologies effectively, appreciate how results are selected and ranked, and be discerning in evaluating digital content
- select, use and combine a variety of software (including internet services) on a range of digital devices to design and create a range of programs, systems and content that accomplish given goals, including collecting, analysing, evaluating and presenting data and information
- use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact

Computer Science	EYFS		KS1		LKS2		UKS2	
	Nursery	Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
	• Talk about the patterns they can see in a sequence and continue a given pattern. They spot mistakes in patterns and fix them. • use logical reasoning to predict which route through a maze will be quickest / best and explain their reasons • Put a set of instructions in order. The algorithm is broken down (decomposed) into steps which are in a particular sequence. • Debug a design by following instructions they have made. • Spot patterns they can see around them, and talking about what makes a pattern.		**C12** • Learn that code is a language used to give computers instructions. • Understand the terms 'code', 'command', 'algorithm' and 'program'. • Create a multi-step algorithm to complete a real-world task. • Use commands to create algorithms for a computer program. • Learn about 'for loops', 'start and end functions', 'events', and 'delays'. • Find a bug in code. • Follow a debugging strategy. • Create a multi-step program which follows a brief. • Offer constructive feedback on a classmate's project. • Develop a project in response to a classmate's feedback. • Understand the importance of precise instructions. • Relate algorithms to real life situations. • Recognise the consequences of ignoring bugs. • Be able to predict computer behaviour based on code. **C21** • Learn that code is a language used to give computers instructions. • Understand the terms 'code', 'command', 'algorithm' and 'program'. • Create a multi-step algorithm to complete a real-world task. • Use commands to create algorithms for a computer program. • Learn about 'for loops', 'start and end functions', 'events', and 'delays'. • Find a bug in code. • Follow a debugging strategy. • Create a multi-step program which follows a brief. • Offer constructive feedback on a classmate's project. • Develop a project in response to a classmate's feedback. Secondary • Understand the importance of precise instructions. • Relate algorithms to real life situations. • Recognise the consequences of ignoring bugs. • Be able to predict computer behaviour based on code.		**C31** • Recognise different types of computers and what they can be used for. • Program a simple algorithm. • create a multi-step alogorithm with a specific audience in mind. • Use one event to control more than one object. • Convert human stories into code and vice versa. • Identify the 'Three Ws' at the heart of coding. • Recognise that objects are not always personified characters. • Work to a creative brief independently. • Offer constructive feedback on a classmate's project. • Develop my project in response to a classmate's feedback. **C41** • Recognise real-world examples of repetition and how computers can be used to automate solutions. • Recognise the benefits and the potential drawbacks of autonomation upon society. • Program an algorithm that caters to repitition efficiently. • Correctly identify the most suitable loop for a given task. • Incorporate functions into my algorithm to accommodate for unpredictable repetition. • Accurately predict the outcome of an algorithm without running it. • Identify smaller patterns within larger trends. •Explain the benefits of loops over coding each individual line manually. • write computer algorithms to improve the effiency of human tasks. • Recognise the limitations of loops in code.		**C51** • Create a simple algorithm. • Create multiple algorithms of moderate complexity that are triggered by separate events. • Correctly identify the X and Y axis. • Use coordinates to code multi-directional movement into my algorithm. • Efficiently code instructions that repeat in my algorithm. • Identify the correct loop to use for my specific purpose. • Create a cohesive theme for a game. • Analyse a pre-existing game to establish standard game-play features. • Identify and code various states of play in a game. • Code placeholder objects that appear or disappear based on the state of play. **C61** • Analyse a pre-existing game to establish standard game play features. • Learn about the history of video games. • Create a simple algorithm. • Write a program that contains multiple algorithms pf moderate complexity which are triggered by separate events. • Realise that they will need to write different programs to create different styles of game. • Correctly identify variables. • Create logic trees to help map logical progression. • Consolidate coding skills taught throughout Key Stage 2. • Create a cohesive theme for the game. • Use variables to create a functioning score counter. • Respond productively to feedback and work to develop and improve a game.	

		C22 • Program a multi-step algorithm using 'for loops', 'start and end functions', 'delays', 'events', 'messages', and 'sequences'. • Use sequencing within an algorithm. • Find bugs in code and come up with strategies for debugging. • Explain how events enable us to solve more complex problems with code. • Offer constructive feedback on a classmate's project. • Develop my project in response to a classmate's feedback. • Explain the meaning of the terms 'sequence' and 'event' in Computing. •Create algorithms that solve specific problems • Predict how a code will run before seeing it in action.		
Computer Science (Robotics)		• Control a robot using a variety of drive modes: joystick, slingshot, kick, and tilt. • Create an algorithm for a robot to follow using simple blocks. • Find bugs in code and debug simple algorithms. • Create a simple algorithm consisting of movement and light commands, based on a brief. • Be able to predict a robot's behaviour based on code. • Understand differences between computers and robots. • Recognise uses for robots in real life. • Discuss ways in which robots can assist humans in everyday tasks.	**C32** • Recognise differences between computers and robots. • Program inputs using a draw canvas to control a robot's movement. • Program inputs using block code to control a robot's movement. • Demonstrate use of sequencing by combining lights, movements and sounds to create a multistep algorithm. • Follow a specific brief and create an algorithm capable of guiding a robot through a course. • Accurately translate real-life physical distance into code. • Recognise that there are several forms of input humans can use to control robots. • Use movement, sound, and light blocks creatively. • Offer constructive feedback on a classmate's project. • Develop my project in response to a classmate's feedback. **C42** • Successfully name, call, and define a function within my a program. • Incorporate functions into my algorithm to accommodate unpredictable repetition. • Recognise the benefits and the potential drawbacks of automation upon society. • Program an algorithm that caters to repition efficiently. • Correctly identify the need for a function over a loop. • Accurately predict the outcome of an algorithm without running it. • Nest functions within other functions to increase effciency. • Write computer algorithms to improve the effiency of human tasks. • Recognise the limitations of loops in code. • Name examples of loops and functions in the real world.	**C52** • Correctly identify the most suitable event (or conditional) to deal with a potential encounter. • Name multiple types of sensors available to my robot. • Program an algorithm that caters to changing circumstances. • Accurately predict the outcome of a multi-branch algorithm without running it. • Discuss examples of pros and cons of autonomous vehicles in today's society. • Break a problem down into smaller parts (decomposition). • Explain how an infrared sensor works. **C62** • Define the word 'variable' and give exaples for its use in programming. • Create and name a variable. • Implement a system using variables which will replicate the process of counting upwards using integers. • Use conditionals in my program to trigger code when specific physical movements are made. • Identify the correct loop to use for my specific purpose. • Analyse a pre-existing game to establish standard game-play features. • Identify and code various states of play in a game. • Code my algorithm to randomise an outcome. • Use movements, animations, and sound effects to mimic emotion during the win and lose states of my game.

Information and Communicatins Technology				
	• Shows skill in making toys work by pressing parts or lifting flaps to achieve effects such as sound, movements or new images. • Children find out about and use a range of everyday technology. They select appropriate applications that support an identified need - for example in deciding how best to make a record of a special event in their lives, such as a journey on a steam train. • Uses ICT hardware to interact with age-appropriate computer software.	C15, C25 • Give examples of how technology is used in the home i.e. Smart TV's, car entertainment systems, iPads, Chromebooks, voice activated systems, and other devices for entertainment and productivity. • Understand that computers are embedded in society: lifts, traffic lights, automatic doors. • Take and save photographs, videos, and audio to capture learning. • Consider ways in which computers are used to capture and store information. • Investigate different types of digital data e.g. online encyclopaedias, search engines. • Recognise that computers consist of a number of inputs and outputs, and give examples of these.	C35, C45 Our programme of study interprets the following extract of the national curriculum as relating to both ICT and Digital Literacy: *Create a range of programs, systems, and content by selecting, using, and combining a variety of software on a range of digital devices…* The following statements relate to the traditional ICT elements of the curriculum. Computer Networks • Recognise that networks are formed when data is exchanged between two (or more) independent computers. Examples of networks include the internet, bluetooth speakers, multiple computers in cars, co-processors in modern computers. • Understand that computer networks are physical entities. • Understand that wireless networks are separate entities to the internet; that they are merely wireless data transfer. • Appreciate that data transfer is rarely device to device (with exceptions of local networks like bluetooth). Reject the common misconception that emails are transmitted directly between devices. • Recognise ever-expanding opportunites for communication and collaboration e.g Zoom, Facetime, Microsoft Teams. Search Technologies • Appreciate that search, local or remote, catalogues data, and uses complex algorithms to surface relevant data to users. • Recognise examples of local and remote search providers i.e. 'Spotlight' on Apple devices, Google. • Identify key words and other structural strategies to search for information on the internet. • Use search engines as part of an effective research strategy. • Recognise that data has ownership and rights associated with it and check who the owner is before copying. ICT Software & Data Handling • Record & present data in a variety of ways. • Plan & create a database designed to answer specific questions. • Recognise the uses and potential drawbacks of various software packages, as well as	C55, C65 Our programme of study interprets the following extract of the national curriculum as relating to both ICT and Digital Literacy: *Create a range of programs, systems, and content by selecting, using, and combining a variety of software on a range of digital devices…* The following statements relate to the traditional ICT elements of the curriculum. Computer Networks • Understand that the internet is simply remote computing; that servers are effectively non-local computers. • Understand that although the internet is the biggest and most well-known example of a network, others exist: private networks, home networks, work networks, and government networks. • Evaluate and discuss reasons why some state governments operate closed-off alternatives to the internet i.e Russia and China. • Illustrate examples of data exchange routes e.g. email exchange: Device > router > modem > local internet exchange > national internet exchange > international internet exchange > company server > return route. Search Technologies • Understand that rankings are influenced by: relevence, interactivity (i.e the number of people who have linked to the page), the modernity and compliance of the website, human choices behind the algorithm, mobile friendliness, business information, page load speed, optimized content, and countless other factors. • Understand the business models behind various search providers i.e 'Privacy Focus' with Apple. • Explain that 'the user' is the end product with free search online, reject the common misconception that their data is not extremely valuable. • Appreciate the impact that the free model has on the reliability and the ethics of search results; might a provider highlight or promote results for pay, supress results, or leave socially harming results available in the name of political freedom? • Address the ecological impact of search; what's the environmental impact of cloud computing? • Understand that search technologies are powered by algorithms that are not inherently good or bad; they are informed by human choices. Transparency, regulation, and

			indenfiying the appropriate time to use them. • Manage files in an organised way, displaying use of exporting, saving, and sharing.	responsibility: how do we want to integrate algorithms into our society? • Make informed choices about the reliability of links and the pages they lead to; evaluate factors such as sponsorship, reputation of information provider, and emotive language. ICT Software & Data Handling • Collect and record information using spreadsheets and databases. • Analyse information and question data. • Critically evaluate a database, refining searches to provide answers to questions. • Use various forms of software, such as Word, Excel, and Powerpoint (or their equivalents) to present data in a logical format. • Transform file formats from 'editable' documents (such as word), to 'presentation' format (such as PDF).

Digital Literacy	• Knows how to operate simple equipment, e.g. turns on CD player and uses remote control. • Shows an interest in technological toys with knobs or pulleys, or real objects such as cameras or mobile phones. • Knows that information can be retrieved from computers • Children recognise that a range of technology is used in places such as homes and schools. They select and use technology for particular purposes.	**C11** • Learn that an iPad/Chromebook can be used to do lots of different things. • Navigate an iPad/Chromebook using simple functions. • Use a variety of apps to create different content. • Start learning basic keyboard and typing skills. • Use the skills taught in this module to create a poster. • Realise that IT skills can be used together to create more interesting products. • Work together with a partner. • Offer constructive feedback to a partner. • Respond appropriately to feedback from a partner.	Our programme of study interprets the following extract of the national curriculum as relating to both ICT and Digital Literacy: *Create a range of programs, systems, and content by selecting, using, and combining a variety of software on a range of digital devices…* The following statements relate to the contemporary media (Digital Literacy) elements of the curriculum. C34 • Use creative expression to interpret a story or setting, recreating the scene in a three-dimensional block project. • Use multiple iPad gestures, such as: swipe, pinch, tap, and two-finger gestures to navigate a project. • Offer constructive feedback to a classmate's project. • Develop my project in response to a classmate's feedback. C44 • Operate a simple video camera and record useable footage. • Import and edit footage. • Understand permissions involved with recording footage of other people, acting respectfully and responsibly. • Discuss why schools and other organisations have strict policies over filming. *Project management: working with digital media requires complex management of media assets, project files, and formats. As students progress through KS2, each module is designed to require more demanding workflows:* C34 • Single app: media inputted, and exported from a single program. C44 • Dual app: media recorded in one app, whilst robotics are controlled by another. Video is edited, with text and graphics added, before being exported as a video file format.	Our programme of study interprets the following extract of the national curriculum as relating to both ICT and Digital Literacy: *Create a range of programs, systems, and content by selecting, using, and combining a variety of software on a range of digital devices…* The following statements relate to the contemporary media (Digital Literacy) elements of the curriculum. C54 • Use photo editing software to crop photographs and add effects. • Review images on a camera and delete unwanted images. • Source media assets from various sources; download stock images from the internet, paying close attention to copywright laws and ownership rights. • Use creative expression to make informed choices with regards to page layout, font, and theming. C64 • Understand the history and functionality of stop motion animation. • Describe 'frames' and 'frames per second' in the context of animation. • Use creative expression to plan and storyboard an effective animation to represent a story or setting. • Use appropriate theming, soundtrack, sound effects, text, and visual effects to produce a short animation to a brief. *Project management: working with digital media requires complex management of media assets, project files, and formats. As students progress through KS2, each module is designed to require more demanding workflows:* C54 • Multi app: media in the form of photographs, text, and graphics from various apps imported into an arrangement app, manipulated, edited, and exported as various file formats. C64 • Multi app: media produced in one app, exported into sharable format, imported into an arrangement app, edited and manipulated, exported, shared.

E-Safety	• how to stay safe when using internet services such as online games or websites • how to use internet services respectfully and responsibly • which kinds of information should be kept private • how to keep personal information or private data safe • why we use passwords or passcodes to keep our things safe	Our E-Safety modules are designed in compliance with the UK Council for Internet Safety's (UKCIS) 'Education for a Connected World' framework. We brand this module as Safe Surfin'. **C13, C23** • Recognise, online or offline, that anyone can say 'no' / 'please stop' / 'I'll tell' / 'I'll ask' to somebody who makes them feel sad, uncomfortable, embarrassed, or upset. • Recognise that there may be people online who could make someone feel sad, embarrassed, or upset. • Identify ways that I can put information on the internet. • Describe how to behave online in ways that do not upset others and can give examples. • Talk about how to use the internet as a way of finding information online. • Explain rules to keep myself safe when using technology both in and beyond the home. • Explain and give examples of what is meant by 'private' and 'keeping things private'. • Recognise that content on the internet may belong to other people.	Our E-Safety modules are designed in compliance with the UK Council for Internet Safety's (UKCIS) 'Education for a Connected World' framework. We brand this module as MYLO: My Life Online. Pupils consider different aspects of their online life: mySelf, myFriends, myReputation, myBehaviour, myHealth, myPrivacy. Pupils engage with these topics whilst designing and developing a school campaign to raise awareness about a healthy and flourishing online community. As pupils create multi-media content for their projects, including websites, social posts, and print assets, this module also addresses Digital Literacy. **C33** • Explain how people can represent themselves in different ways online. • Explain how someone's feelings can be hurt by what is said or written online. • Explain how to search for information about others online. • Give examples of how bullying behaviour could appear online and how someone can get support. • Demonstrate how to use key phrases in search engines to gather accurate information online. • Explain why some online activities have age restrictions. • Describe simple strategies for creating and keeping passwords private. **C43** • Explain how my online identity can be different to my offline identity. • Describe strategies for safe and fun experiences in a range of online social environments (e.g. livestreaming, gaming platforms). • Explain ways that some of the information about anyone online could have been created, copied, or shared by others. • Recognise when someone is upset, hurt or angry online. • Explain why lots of people sharing the same opinions or beliefs online do not make those opinions or beliefs true. • Explain how using technology can be a distraction from other things, in both a positive and negative way. • Explain that internet use is never fully private and is monitored, e.g. adult supervision. • When searching on the internet for content to use, I can explain why I need to consider who owns it and whether I have the right to reuse it.	Our E-Safety modules are designed in compliance with the UK Council for Internet Safety's (UKCIS) 'Education for a Connected World' framework. We brand this module as MYLO: My Life Online. Pupils consider different aspects of their online life: mySelf, myFriends, myReputation, myBehaviour, myHealth, myPrivacy. Pupils engage with these topics whilst designing and developing a school campaign to raise awareness about a healthy and flourishing online community. As pupils create multi-media content for their projects, including websites, social posts, and print assets, this module also addresses Digital Literacy. **C53** • Explain how identity online can be copied, modified, or altered. • Explain that there are some people I communicate with online who may want to do me or my friend's harm. • Search for information about an individual online and summarise the information found. • Recognise online bullying can be different to bullying in the physical world and can describe some of those differences. • Explain what is meant by 'being sceptical'; give examples of when and why it is important to be 'sceptical'. • Describe some strategies, tips, or advice to promote health and well- being with regards to technology. • Explain what app permissions are and can give some examples. **C63** • 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 how things shared privately online can have unintended consequences for others. • Explain strategies anyone can use to protect their 'digital personality' and online reputation, including degrees of anonymity. • Describe how to capture bullying content as evidence (e.g. screengrab, URL, profile) to share with others who can help me. • Explain how to use search technologies effectively. • Recognise features of persuasive design and how they are used to keep users engaged (current and future use). • Describe simple ways to increase privacy on apps and services that provide privacy settings. • Demonstrate how to make references to and acknowledge sources used from the internet.

Progression in Vocabulary

	EYFS		KS1		LKS2		UKS2	
	Nursery	Reception	Year 1	Year 2	Nursery	Reception	Year 1	Year 2
Computer Science	Pattern, repeat, predict, forwards, backwards, sideways, left, right, turn, first next, then, finally, last, instruction		Command, Instruction, Algorithm, Code, Bug, Debug, Program, Programming, Repeat, Start, End, Delay, Sequence, Message		Program, Event, Object, Sequence, Concurrency (Side-by-Side), Values, For Loop, Loop Forever, Loop Until/While, Functions, Automation, Efficiency		State, Transparency, Random, Range, Value, Obstacle, Loops (for, forever, until), Pixel, Positive/Negative, Coordinate, Axis, Conditional, Variable, Controller	
Computer Science (Robotics)	Robot, Instruction, Movement, Start, End, Control		Lights, Sensor, Motor, Input, Output, Aim, Joystick mode, Slingshot mode, Tilt mode		For Loop, Loop Forever, Robot, Angles/Degrees, Aim, Wait, Continue, Draw Canvas, Block Canvas, LED, Functions, Function (name), Function (define), Function (call), Delay, Sensor		Autonomous, Controls, Logic, Conditionals, Decomposition, Sensor	
ICT	Button, record, video, photo, save, delete		Video, Camera, Portrait mode/ landscape mode, Sounds, Space bar, Index finger typing, Enter, Return, Caps lock, Documents, Templates, Animation		Devices, Networks, Bluetooth, Internet, WiFi, Search tools, Information collection, Reliability, Owners, Collaboration, Database, Recording/presenting data, Database searches		Email, Router, Modem, Server, IP address Types of network (private, home, work, government), Search provider, Search result ranking, Responsibility, Acknowledgement, Plausibility, Spreadsheets, Complex searches	
Digital Literacy	Camera, phone, tablet, laptop, information, google, search		Chromebook, iPad, Swipe, Zoom, Lock, Unlock, Volume, Save, Format, File, Photo, App, Typing, QWERTY, Home Button		Audio, Footage, Zooming, Shooting, Close up, Editing, Software, Font, Alignment, Shading, Background, Share, Export		Photography, Typography, Page layout, Animation, Stop motion, Frame, Frames per second (FPS), Splicing, Target audience, Import, File shifting, Editable	
E-Safety	Online, private, lock, password, passcode, safe, secure, protect own / owner, technology, permission, allowed		Rules, Online, Private information, Email, Appropriate/inappropriate sites, Cyber-bullying, Digital footprint, Keyword searching		Online/offline identity, Gaming, Social media, Bullying, Support, Trust, Consent, Opinions/beliefs, Age restrictions, Password, Monitoring, Content ownership		Altered/copied identity, Anonymity, Critical evaluation, Capturing content, Persuasive design, Privacy settings, Intention, Interpretation, Reporting	