HOLY TRINITY
C.E. PRIMARY ACADEMY
(HANDSWORTH)

Progression of Skills in Computing

National Curriculum

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.

Aims

- 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.

KS1	**KS2**
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.	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

Year	Topic	Key Learning	National Curriculum	Skills Progression
1	Computer Hardware	To become familiar with the different components of a computer by developing their keyboard and mouse skills.	• Recognise common uses of information technology beyond school.	Learning where keys are located on the keyboard. Learning how to operate a camera. Understanding that computers and devices around us use inputs and outputs, identifying some of these.
2	Computer Hardware	To develop the basic skills needed to effectively use a computer keyboard and mouse. Understanding what a computer is and the role of individual components.	• Recognising that a range of technology is used in places such as homes and schools.	Understanding what a computer is and that it has made up of different components. Recognising that buttons cause effects, and that technology follows instructions. Using greater control when taking photos with tablets or computers.
3	Computer Hardware	Understanding what different components of a computer do.	• 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.	Understanding what the different components of a computer do and how they work together. Drawing comparisons across different types of computers Learning what a server does.
4	Computer Hardware	To learn about the World Wide Web To learn about the internet as a network of networks which need to be kept secure.	• 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.	Learning about the purpose of routers.
5	Computer Hardware	To understand that computers can be connected together to form systems. Understand how external devices can be programmed by a separate computer.	• 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.	Learning that external devices can be programmed by a separate computer. Understanding the fetch, decode, execute cycle.

6	**Computer Hardware**	To investigate different methods of communication, before focusing on internet-based communication. Learning about the history of computers and how they evolved over time.	• 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	Learning about the history of computers and how they have evolved over time. Using the understanding of historic computers to design a computer of the future.

Computer Science

Year	Topic	Key Learning	National Curriculum	Skills Progression
1	Networks and Data Representation	To understand the uses of the internet and how it is formed.	• recognise common uses of information technology	To understand what the Internet is
2	Networks and Data Representation	*Waiting for unit to be released at the end of the month*	• Understand computer networks, including the internet; how they can provide multiple services, such as the World wide Web	
3	Networks and Data Representation	Learn how a network is built together using different components. The relationship between the internet and networks.	• understand computer networks including the internet	Learning what a network is and its purpose. Identifying the key components within a network, including whether they are wired or wireless. Recognising links between networks and the internet.

4	**Networks and Data Representation**	Identifying how to use the world wide web to search collaboratively across the world. Understanding that websites can be altered by exploring the code beneath the site	• 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	Consolidating understanding of the key components of a network Understanding that websites & videos are files that are shared from one computer to another. Learning about the role of packets Understanding that computer networks provide multiple services, such as the World Wide Web, and opportunities for communication and collaboration.
5	**Networks and Data Representation**	To learn how data or information is stored in binary. Learn how to trim digital images down by reducing the picture. Recognising that computers transfer data in binary and understand simple binary addition.	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	Learning the vocabulary associated with data: data and transmit. Learning how the data for digital images can be compressed. Recognising that computers transfer data in binary and understanding simple binary addition.
6	**Networks and Data Representation**	Understanding how search engines work and knowing how to use them safely and effectively.	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	Understanding that computer networks provide multiple services.

Computer Science

Year	Topic	Key Learning	National Curriculum	Skills Progression
1	Computational thinking	Learning how to explore and tinker with hardware to find out how it works. Constructing a series of instructions into a simple algorithm. Applying computing concepts to real world situation in an unplugged activity.	• To design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts	Using decomposition to solve unplugged challenges. Using logical reasoning to predict the behavior of simple programs. Developing the skills associated with sequencing in unplugged activities.
2	Computational thinking	Creating and debugging simple programs. Using logical reasoning to predict the behaviour of simple programs. Understanding what algorithms are; how they are implemented as programs on digital devices; and that programs execute by following precise and unambiguous instructions.	• 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 logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs	Using decomposition to decompose a story into smaller parts. Learning what abstraction is Learning that there are different levels of abstraction. Explaining what an algorithm is
3	Computational thinking	Using logical reasoning to explain how simple algorithms work. Designing, writing, and debugging programs that accomplish specific goals, including controlling or simulating physical systems. Solving problems by decomposing them into smaller parts.	• use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs.	Understanding that computers follow instructions. Using an algorithm to explain the roles of different parts of a computer. Using logical reasoning to explain how simple algorithms work.
4	Computational thinking	Designing, writing and debugging programs that accomplish specific goals, including controlling or simulating physical systems. Solving problems by decomposing them into smaller parts. Using sequence, selection and repetition in programs. Working with variables and various forms of input and output.	• 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	• Using decomposition to understand the purpose of a script of code. • Using decomposition to help solve problems. • Identifying patterns through unplugged activities

5	Computational thinking	Using block coding to program a device. To explore variables and different forms of input.	• 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.	Decomposing animations into a series of images Decomposing a program without support Decomposing a story to be able to plan a program to tell a story. Predicting how software will work based on previous experience.
6	Computational thinking	Understanding that websites can be altered by exploring the code beneath the site. Designing, writing, and debugging programs that accomplish specific goals. Solving problems by decomposing them into smaller parts.	• 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.	• Decomposing a program into an algorithm • Using past experiences to help solve new problems. • Writing increasingly complex algorithms for a purpose

Computer Science

Year	Topic	Key Learning	National Curriculum	Skills Progression
1	Programming	Applying computing concepts to real world situation in an unplugged activity.	• design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems	Programming a Bee-bot/Virtual Bee-bot to follow a planned route. Learning to debug instructions when things go wrong. Developing a how-to video to explain how the Bee-bot works.
2	Programming	Consider inputs and outputs to understand how sensors work	• use sequence, selection, and repetition in programs; work with variables and various forms of input and output	Using logical thinking to explore software, predicting, testing. and explaining what it does Using an algorithm to write a basic computer program. Learning what loops are
3	Programming	Solving problems by decomposing them into smaller parts. Using sequence, selection, and repetition in programs. Working with variables and various forms of input and output	• 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	Using logical thinking to explore more complex software, predicting, testing, and explaining what it does. Incorporating loops to make code more efficient. Remixing existing code
4	Programming	Designing, writing and debugging programs that accomplish specific goals, including controlling or simulating physical systems.	• design, write and debug programs that accomplish specific goals, • use sequence, selection, and repetition in programs; work with variables and various forms of input and output	Understanding that websites can be altered by exploring the code beneath the site. Coding a simple game Using abstraction and pattern recognition to modify code. Incorporating variables to make code more efficient.
5	Programming	Using programming language to create music, including use of loops.	• design, write and debug programs that accomplish specific goals, • use sequence, selection, and repetition in programs; work with variables and various forms of input and output	Programming an animation Iterating and developing their programming as they work Beginning to use nested loops (loops within loops) Debugging their own code

				Writing code to create a desired effect
6	Programming	Using programming software to understand hacking, relating this to computer cracking codes in WWII.	• design, write and debug programs that accomplish specific goals, • use sequence, selection, and repetition in programs; work with variables and various forms of input and output	Debugging quickly and effectively to make a program more efficient. Remixing existing code to explore a problem. Using and adapting nested loops Programming using the language Python. Changing a program to personalize it.

Information Technology

Year	Topic	Key Learning	National Curriculum	Skills Progression
1	Using Software	Taking and manipulating digital photographs, including adding images found via a search engine	• use technology purposefully to create, organise, store, manipulate and retrieve digital content	Using a basic range of tools within graphic editing software Taking and editing photographs Understanding how to create digital. art using an online paint tool.
2	Using Software	Using their developing word processing skills, pupils write simple messages to friends	• use technology purposefully to create, organise, store, manipulate and retrieve digital content	Developing word processing skills, including altering text, copying, and pasting and using keyboard shortcuts Using word processing software to type and reformat text. Using software to create story animations.
3	Using Software	Developing their understanding of data and databases, children play with and create their own Top Trumps cards, learning how to interpret information by ordering and filtering	• 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,	Taking photographs and recording video to tell a story. Using software to edit and enhance their video adding music, sounds and text on screen with transitions.
4	Using Software	Pupil's design and create their own websites, considering content and style, as well as understanding the importance of working collaboratively	• 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	Building a web page and creating content for it Designing and creating a webpage for a given purpose Use Google online software for documents, presentations, forms, and spreadsheets.
5	Using Software	Composing music using code through Sonic Pi or Scratch pupils can compose simple tunes culminating in a 'battle of the bands' using loops of music	• 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,	Using logical thinking to explore software more independently, making predictions based on their previous experience. Using a software programmer (Sonic Pi or Scratch) to create music. Using video editing software or animation software to animate.
6	Using Software	Reflecting on and showcasing their computing skills, pupils create an entire project around a specific theme	• 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.	Using logical thinking to explore software independently, iterating ideas and testing continuously Using search and word processing skills to create a presentation Planning, recording, and editing a radio play

Information Technology

Year	Topic	Key Learning	National Curriculum	Skills Progression
1	Using email and the internet	Taking and manipulating digital photographs, including adding images found via a search engine.	• use technology safely and respectfully, keeping personal information private;	Searching and downloading images from the internet safely Understanding that we are connected to others when using the internet.
2	Using email and the internet	Pupils learn about how to keep personal information safe online, including their right to give or deny permission for information to be shared online.	• use technology safely and respectfully, keeping personal information private;	Understanding that personal information should not be shared on the internet. Learning how to be respectful to others when sharing content online.
3	Using email and the internet	Pupils learn how to send emails, including attachments and how to be responsible digital citizens	• 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	Learning to log in and out of an email account. Writing an email including a subject, 'to' and 'from' Sending an email with an attachment Replying to an email
4	Using email and the internet	Recognising that information on the internet might not be true or correct. Using technology safely, by recognising acceptable/ unacceptable behaviour	• use search technologies effectively, appreciate how results are selected and ranked, and be discerning in evaluating digital content.	Understanding why some results come before others when searching. Understanding that information on the internet is not all grounded in fact.
5	Using email and the internet	Considering online communication and the effects on mental health and wellbeing.	• 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	Developing searching skills to help find relevant information on the internet. Understanding how apps can access our personal information and how to alter the permissions.
6	Using email and the internet	Understanding how search engines work and knowing how to use them safely and effectively.	• use search technologies effectively, appreciate how results are selected and ranked, and be discerning in evaluating digital content	Understanding how search engines work

Information Technology				
Year	**Topic**	**Key Learning**	**National Curriculum**	**Skills Progression**
1	Using data	Learning about what data is and how it can be represented and using these skills to show the findings of a mini beast hunt	• use technology purposefully to create, organise, store, manipulate and retrieve digital content	Introduction to spreadsheets Representing data in tables, charts, and pictograms Sorting data and creating branching databases
2	Using data	Building on their understanding of how computers sense the world around us, pupils learn how data is collected and used to keep astronauts safe on the I.S.S.	• use technology purposefully to create, organise, store, manipulate and retrieve digital content	Collecting and inputting data into a spreadsheet Interpreting data
3	Using data	Developing their understanding of data and databases, children play with and create their own Top Trumps cards, learning how to interpret information by ordering and filtering.	• 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	Understanding the vocabulary associated with databases: field, record, data. Learning about the pros and cons of digital versus paper databases Sorting and filtering databases to easily retrieve information.
4	Using data	Children investigate the role of computers in forecasting and recording weather as well as how technology is used to present forecasts.	• 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	Designing a weather station which gathers and records sensor data.
5	Using data	Using search technologies effectively, appreciating how results are selected and ranked, and be discerning in evaluating digital content. Recognising that computers transfer data in binary and understand simple binary addition.	• 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	Understanding how data is collected.
6	Using data	Understanding how learning can be applied to a real-world context. Selecting, using and combining a variety of software to design and create a range of programs, systems and content to collect, analyse, evaluate and present data.	• 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	Understanding how barcodes, QR codes and RFID work Gathering and analyzing data in real time Creating formulas and sorting data within spreadsheets

Information Technology

Year	Topic	Key Learning	National Curriculum	Skills Progression
1	Wider use of technolog	Recognising uses of technology beyond school.	• recognise common uses of information technology beyond school	Recognising common uses of information technology, including beyond school Understanding some of the ways we can use the internet.
2	Wider use of technology	Using their developing word processing skills, pupils write simple messages to friends and learn why we must be careful about who we talk to online	• recognise common uses of information technology beyond school	Learning how computers are used in the wider world.
3	Wider use of technology	Learn about cyberbullying and fake emails. Understanding the purpose of emails.	• 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	Understanding the purpose of emails. Learning what a search engine is Recognising how social media platforms are used to interact.
4	Wider use of technolog	Understanding opportunities offered by the World Wide Web for communication and collaboration.	• 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	Understanding that software can be used collaboratively online to work as a team.
5	Wider use of technology	Understanding 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.	• 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	Learn about different forms of communication that have developed with the use of technology.
6	Wider use of technology	Children learn how data is collected and stored by exploring barcodes, QR codes and RFID chips, and investigate how collecting big data can be used to help people in a variety of different scenarios.	• 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	Learning about the Internet of Things and how it has led to 'big data'. Learning how 'big data' can be used to solve a problem or improve efficiency.

Digital literacy				
Year	**Topic**	**Key Learning**	**National Curriculum**	**Skills Progression**
1	Staying Safe	Children learn what it means to be 'online' and how to stay safe whilst treating others with respect.	• use technology safely and respectfully, keeping personal information private.	Logging in and out and saving work on their own account. Understand the importance of a password. Learning some top tips for staying safe online
2	Staying Safe	Pupils learn about how to keep personal information safe online, including their right to give or deny permission for information to be shared online.	• use technology safely and respectfully, keeping personal information private; identify where to go for help and support when they have concerns about content.	Understanding that personal information should not be shared on the internet. Learning how to be respectful to others when sharing content online.
3	Staying Safe	Understanding that you cannot trust everything you read on the internet. Learning about social media platforms including their age-restrictions and privacy settings.	• use technology safely, respectfully, and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact.	Learning to be a responsible digital citizen; understanding their responsibilities to treat others respectfully and recognizing when digital behavior is unkind. Learning about cyberbullying
4	Staying Safe	Pupils develop their understanding of how to identify trustworthy information online and consider the implications of technology.	• use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact.	Recognising what appropriate behavior is when collaborating with others online. Recognising that information on the Internet might not be true or correct and that some sources are more trustworthy than others.
5	Staying Safe	Considering online communication and the effects on mental health and wellbeing.	• use technology safely, respectfully, and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact.	Learning about how permissions work and how to change them. Identifying possible issues with online communication Considering the effects of screen-time on physical and mental wellbeing
6	Staying Safe	Learning about the impact and consequences of sharing information online; exploring how to develop a positive online reputation that will benefit the children in the long term; capturing evidence techniques and methods to combat online bullying.	• use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact.	Understanding the importance of secure passwords and how to create them, along with two-step authentication. Using search engines safely and effectively Recognising that updated software can help to prevent data corruption and hacking.