Computing Curriculum

West London Primary Schools

Computing Curriculum

- Our curriculum develops computational thinking, teaches children how to use technology and supports children in becoming digitally literate.
- Our curriculum is aligned with the TEACH Computing curriculum.
- Our curriculum ensures complete coverage of the National Curriculum.
- We value the importance of E-Safety, and it is taught each term through materials from Project Evole.

National Curriculum

Macro Concepts

Computer Science (CS)

Information Technology (IT)

Digital Literacy (DL)

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.

Area	Key Stage 1	Key Stage 2
Computer Science (CS)	1. Understand what algorithms are; how they are implemented as programs on digital devices; and that programs execute by following precise and unambiguous instructions 2. Create and debug simple programs 3. Use logical reasoning to predict the behaviour of simple programs	4. Design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts 5. Use sequence, selection, and repetition in programs; work with variables and various forms of input and output 6. Use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs 7. Understand computer networks including the internet; how they can provide multiple services, such as the World Wide Web 8. Appreciate how [search] results are selected and ranked
Information Technology (IT)	1. Use technology purposefully to create, organise, store, manipulate and retrieve digital content	2. Use search technologies effectively 3. 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 (DL)	1. Recognise common uses of information technology beyond school 2. 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	3. Understand the opportunities [networks] offer for communication and collaboration 4. Be discerning in evaluating digital content 5. Use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact

National curriculum

Aims

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.

National curriculum

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.

National curriculum

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.

EYFS Computing Objectives

The Early Years Foundation Stage (EYFS) 'promotes teaching and learning to ensure children's 'school readiness' and gives children the broad range of knowledge and skills that provide the right foundation for good future progress through school and life.' We consider it important to provide our children with as wide and varied experience as possible to prepare them for Key Stage 1 and beyond.

As part of this we develop learner understanding of computing and computational thinking.

In Nursery, we….

In Reception, we…

On entering KS1 children should have had the following experiences:

Nursery - I can statements	**Reception - I can statements**
I can use pretend technology in my role play. I can take turns with digital devices. I can talk about different digital devices that I see and use. I can ask an adult for help when I use technology I can follow the rules when I use digital devices. I can talk to an adult if something on a screen upsets me. I can take photos. I can use a touchscreen to make things happen (e.g. play a game on an iPad / interactive whiteboard) I can put pictorial instructions in order I can follow a sequence of instructions. I can make a toy do something using buttons and switches.	I can talk about what I am doing on the an iPad I can use technology/digital devices to help me learn things about the world. I can answer questions about what I am doing with a range of technology I can ask questions about digital devices. I can talk about how I can be safe when using a digital device. I can make choices on a digital device about what I would like to do. (E.g. choose a game to play, activity to complete.) I can 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. I can recognise some ways in which the internet can be used to communicate. I can give examples of how I (might) use technology to communicate with people I know I can identify ways that I can put information on the internet. I can describe ways that some people can be unkind online. I can offer examples of how this can make others feel I can talk about how to use the internet as a way of finding information online I can identify devices I could use to access information on the internet. I can identify some simple examples of my personal information (e.g. name, address, birthday, age, location). I can describe who would be trustworthy to share this information with; I can explain why they are trusted. I can use a digital device to make a picture, video, or music. (using busythings .) I can plan out a route for a friend or robot. I can program a robot to perform a task. I can debug an algorithm.

Year	Autumn	Spring Safer Internet Day (February 7th)	Summer
Nursery	**Technology in my role play**	Programming **Sequencing**	Online Safety **Following rules when using technology**
Reception	**Talking about technology**	Programming **Planning a route**	Online Safety **Being safe when using technology**
1	Computing systems and networks **Technology around us**	Programming **Moving a robot**	Programming **Introduction to animation**
2	Computing systems and networks **IT around us**	Programming **Robot algorithms**	Programming **Introduction to quizzes**
3	Computing systems and networks **Connecting computers**	Programming **Sequence in music**	Programming **Events and actions**
4	Computing systems and networks **The internet**	Programming **Repetition in shapes**	Programming **Repetition in games**
5	Computing systems and networks **Sharing information**	Programming **Selection in physical computing**	Programming **Selection in quizzes**
6	Computing systems and networks **Communication**	Programming **Variables in games**	Programming **Sensing**

Progression of vocabulary

Year	Autumn	Spring	Summer
N	Phone, ipad, touch	First, second, next, after	No, turns, wait, tell
R	Technology, ipad, computer, laptop, touch screen	Bee-bot, forwards, backwards, route, plan	Safety, online, information, personal
1	technology, computer, mouse, trackpad, keyboard, screen, double-click, typing.	Bee-Bot, forwards, backwards, turn, clear, go, commands, instructions, directions, left, right, route, plan, algorithm, program.	ScratchJr, command, sprite, compare, programming, area, block, joining, start, run, program, background, delete, reset, algorithm, predict, effect, change, value, instructions, design.
2	Information technology (IT), computer, barcode, scanner/scan	instruction, sequence, clear, unambiguous, algorithm, program, order, prediction, artwork, design, route, mat, debugging, decomposition	sequence, command, program, run, start, outcome, predict, blocks, design, actions, sprite, project, modify, change, algorithm, build, match, compare, debug, features, evaluate, decomposition, code.
3	digital device, input, process, output, program, digital, non-digital, connection, network, switch, server, wireless access point, cables, sockets	Scratch, programming, blocks, commands, code, sprite, costume, stage, backdrop, motion, turn, point in direction, go to, glide, sequence, event, task, design, run the code, order, note, chord, algorithm, bug, debug, code.	motion, event, sprite, algorithm, logic, move, resize, extension block, pen up, set up, pen, design, action, debugging, errors, setup, code, test, debug, actions.
4	internet, network, router, security, switch, server, wireless access point (WAP), website, web page, web address, routing, web browser, World Wide Web, content, links, files, use, download, sharing, ownership, permission, information, accurate, honest, content, adverts	Logo (programming environment), program, turtle, commands, code snippet, algorithm, design, debug, pattern, repeat, repetition, count-controlled loop, value, trace, decompose, procedure	Scratch, programming, sprite, blocks, code, loop, repeat, value, infinite loop, count-controlled loop, costume, repetition, forever, animate, event block, duplicate, modify, design, algorithm, debug, refine, evaluate.
5	system, connection, digital, input, process, storage, output, search, search engine, refine, index, bot, ordering, links, algorithm, search engine optimisation (SEO), web crawler, content creator, selection, ranking.	microcontroller, USB, components, connection, infinite loop, output component, motor, repetition, count-controlled loop, Crumble controller, switch, LED, Sparkle, crocodile clips, connect, battery box, program, condition, Input, output, selection, action, debug, circuit, power, cell, buzzer	Selection, condition, true, false, count-controlled loop, outcomes, conditional statement, algorithm, program, debug, question, answer, task, design, input, implement, test, run, setup, operator
6	communication, protocol, data, address, Internet Protocol (IP), Domain Name Server (DNS), packet, header, data payload, chat, explore, slide deck, reuse, remix, collaboration, internet, public, private, oneway, two-way, one-to-one, one-to-many.	variable, change, name, value, set, design, event, algorithm, code, task, artwork, program, project, code, test, debug, improve, evaluate, share, assign, declare	Micro:bit, MakeCode, input, process, output, flashing, USB, trace, selection, condition, if then else, variable, random, sensing, accelerometer, value, compass, direction, navigation, design, task, algorithm, step counter, plan, create, code, test, debug.

Year	E-Safety Units					
Nursery	Self-image and Identity	Online relationships	Online reputation	Online bullying	Managing online information	Privacy and security
Reception	Self-image and Identity	Online relationships	Online reputation	Online bullying	Managing online information	Privacy and security
1	Self-image and identity	Online relationships	Online reputation	Online bullying	Privacy and security	Copyright and ownership
2	Self image and identity	Online relationships	Online reputation	Online bullying	Managing online information	Privacy and security
3	Self image and identity	Online relationships 1	Online relationships 2	Online bullying	Health and wellbeing	Copyright and ownership
4	Self image and identity	Online relationships	Online reputation	Online bullying	Health and wellbeing	Privacy and Security
5	Self image and identity	Online bullying	Managing online information	Health and wellbeing	Privacy and security	Copyright and ownership
6	Self image and identity	Online relationships	Online bullying	Health and wellbeing	Privacy and security 1	Privacy and security 2

Nursery

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
Autumn Technology in my role play	I can use pretend technology in my role play. I can take turns with digital devices. I can take photos.					
Spring Sequencing	I can use a touchscreen to make things happen (e.g. play a game on an iPad / interactive whiteboard) I can put pictorial instructions in order I can follow a sequence of instructions. I can make a toy do something using buttons and switches.					
Summer Following rules when using technology	I can talk about different digital devices that I see and use. I can ask an adult for help when I use technology I can follow the rules when I use digital devices. I can talk to an adult if something on a screen upsets me.					

Reception

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
Autumn Talking about technology	I can talk about what I am doing on the an iPad. I can use technology/digital devices to help me learn things about the world. I can answer questions about what I am doing with a range of technology. I can ask questions about digital devices.					
Spring	I can make choices on a digital device about what I would like to do. (e.g. choose a game to play, activity to complete.) I can use a digital device to make a picture, video, or music. (using busythings) I can plan out a route for a friend or robot. I can program a robot to perform a task. I can debug an algorithm.					
Summer	I can 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.	I can recognise some ways in which the internet can be used to communicate. I can give examples of how I (might) use technology to communicate with people I know	I can identify ways that I can put information on the internet.	I can describe ways that some people can be unkind online. I can offer examples of how this can make others feel	I can talk about how to use the internet as a way of finding information online I can identify devices I could use to access information on the internet..	I can identify some simple examples of my personal information (e.g. name, address, birthday, age, location). I can describe who would be trustworthy to share this information with; I can explain why they are trusted.

Team 1

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
Autumn Computer Systems and Networks **Technology around us**	E-Safety **Self-image and identity**	• Technology around us • Using technology • Developing mouse skills • Using a computer keyboard • Developing keyboard skills • Using a computer responsibly				E-Safety **Online relationships**
Spring Programming **Moving a robot**	E-Safety **Online reputation**	• Buttons • Directions • Forwards and backwards • Four directions • Getting there • Routes				E-Safety **Online bullying**
Summer Programming **Introduction to animation**	E-Safety **Privacy and security**	• Comparing tools • Joining blocks • Make a change • Adding sprites • Project design • Following my design				E-Safety **Copyright and ownership**

Team 2

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
Autumn Computer Systems and Networks Information technology around us	E-Safety **Self-image and identity**	• What is IT? • IT in school • IT in the world • The benefits of IT • Using IT safely Using IT in different ways				E-Safety **Online relationships**
Spring Programming **Robot algorithms**	E-Safety **Online reputation**	• Giving instructions • Same but different • Making predictions • Mats and routes • Algorithm design • Break it down				E-Safety **Online bullying**
Summer Programming **Introduction to quizzes**	E-Safety **Managing online information**	• ScratchJr recap • Outcomes • Using a design • Changing a design • Designing and creating a program • Evaluating				E-Safety **Privacy and security**

Team 3

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
Autumn Computing systems and networks **Connecting computers**	E-Safety **Self-image and identity**	• How does a digital device work? • What parts make up a digital device? • How do digital devices help us? • How am I connected? How are computers connected? • What does our school network look like?				E-Safety **Online relationships 1**
Spring Programming **Sequence in music**	E-Safety **Online relationships 2**	• Introduction to Scratch • Programming sprites • Sequences • Ordering commands • Looking good • Making an instrument				E-Safety **Online bullying**
Summer Programming **Events and actions**	E-Safety **Health and wellbeing**	• Moving a sprite • Maze movement • Drawing lines • Adding features • Debugging movement • Making a project				E-Safety **Copyright and ownership**

Team 4

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
Autumn Computing systems and networks **The internet**	E-Safety **Self-image and identity**	• Connecting networks • What is the internet made of? • Sharing information • What is a website? • Who owns the web? • Can I believe what I read?				E-Safety **Online relationships**
Spring Programming **Repetition in shapes**	E-Safety **Online reputation**	• Programming a screen turtle • Programming letters • Patterns and repeats • Using loops to create shapes • Breaking things down • Creating a program				E-Safety **Online bullying**
Summer Programming **Repetition in games**	E-Safety **Health and wellbeing**	• Using loops to create shapes • Different loops • Animate your name • Modifying a game • Designing a game • Creating your games				E-Safety **Privacy and Security**

Team 5

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
Autumn Computing systems and networks **Sharing information** Systems and Sharing	E-Safety **Self-image and identity**	• Systems • Computer systems and us • Searching the web • Selecting search results • How search results are ranked • How are searches influenced?				E-Safety **Online bullying**
Spring Programming **Selection in physical computing**	E-Safety **Managing online information**	• Connecting Crumbles • Combining output components Controlling with conditions • Starting with selection Drawing designs • Writing and testing algorithms				E-Safety **Health and wellbeing**
Summer Programming **Selection in quizzes**	E-Safety **Privacy and security**	• Exploring conditions Selecting outcomes • Asking questions • Designing a quiz • Testing a quiz Evaluating a quiz				E-Safety **Copyright and ownership**

Team 6

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
Autumn Computing systems and networks **Communication**	E-Safety **Self-image and identity**	• Internet addresses • Data packets • Working together • Shared working • How we communicate • Communicating responsibly				E-Safety **Online relationships**
Spring Programming **Variables in games**	E-Safety **Online bullying**	• Introducing variables • Variables in programming • Improving a game • Designing a game Design to code • Improving and sharing				E-Safety **Health and wellbeing**
Summer Programming **Sensing**	E-Safety **Privacy and security 1**	• The micro: bit • Go with the flow • Sensing inputs Finding your way • Designing a step counter • Making a step counter				E-Safety **Privacy and security 2**

Beyond KS2:

Pupils should be taught to:

- 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 two 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 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, re-use, revise and re-purpose digital artefacts for a given audience, with attention to trustworthiness, design and usability
- 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.

KS3 National Curriculum Programme of Study