KS1-KS2 Computing Objective Overview

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

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.

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Strand	Year 1 and 2	Year 3 and 4	Year 5 and 6
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** • Know that an algorithm is a set of steps cre- ated to solve a problem of make something happen • Enter a set of instructions into a program or device • Choose and enter instructions for a purpose • Choose and enter different sets of instruc- tions which achieve the same outcome, and suggest which is better **Create and debug simple programs** • Input a set of clear and precise instructions that a computer can understand and achieve an outcome • Understand that a bug is a mistake in a set of instructions given to a program or device • Test programs and identify where mistakes occur • Identify a mistake and how it was corrected • Identify different ways to amend mistakes **Use logical reasoning to predict the behaviour of simple programs.** • Recognise familiar programs and devices • Say what familiar programs and devices can and can't do • Choose an appropriate program or device to achieve an outcome • Reason why programs and devices are chosen to achieve an outcome	**Design, write and debug programs that control or simulate virtual events; decompose programs into smaller parts.** • Design, input and test a simple precise set of instructions to a program or device • Identify mistakes in a set of instructions that stop a given outcome from being achieved • Break instructions into small sections in or- der to test and correct mistakes • **Work with various forms of input and output.** • Understand that input is when data is put into a computer in some form • Understand that output is the result of running instructions • Use a keyboard, mouse and touch screen efficiently • Print a document to a particular specifica- tion • Know how to adjust basic features of out- put equipment such as a monitor and speakers • Use sensors, midi instruments, cameras and spreadsheets **Use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs.** • Know how a simple algorithm has been de- signed to solve a problem • Know how to break down a simple algorithm • Explain why an algorithm has been de- signed in a specific way • Think logically to plan and design algorithms, debugging in the planning stage	**Design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts.** • Design, input and test an increasingly complex set of instructions to a pro- gram or device • Break instruction sets into small re- lated sections in order to test and cor- rect mistakes • Begin to use hardware including Motors, sensors, lights and switches to explore real world systems • Use sequences and repetition with hardware to explore real world systems **Use sequence, selection, and repetition in programs; work with variables and various forms of input and output** • Design, write and test simple programs that follow a sequence of instructions or allow a set of instructions to be repeated • Design, write and test simple programs with opportunities for selection, where a particular result will happen based on actions or situations controlled by the user • Create programs with variables (data that is changed or updated as a pro- gram is running, such as a keeping score) **Use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs.** • Discuss why a simple algorithm has been designed to solve a problem or make something happen • Know how a simple algorithm has been designed to solve a problem • Think logically to plan and design algorithms, debugging in the planning stage
Digital Literacy	**Use technology purposefully to create, organise, store, manipulate and retrieve digital content.** • Use familiar programs and devices to word process, create artwork, and edit digital pho tos and videos • Contribute to a forum or add entries to a blog • Save a piece of work on the school network • Open a piece of saved work and improve it • Recognise options for digital storage such as a school network, USB stick, memory stick or online storage • Choose the most appropriate method of storage for a piece of work • Understand the benefits to specific storage	**Select, use and combine a variety of software (including internet services), with support, on a range of digital devices to design and create programs, systems and content that accomplish given goals.** • Use software as directed and supported by the teacher • Use more than one piece of software or device to achieve a given outcome • Capture a video or photograph, import and edit in a package, then upload to a suitable blog or network	**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.** • Choose which is the most appropriate range of software and devices needed to reach a desired outcome • Choose which is the most appropriate range of software and devices needed to collect and analyse data • Analyse, evaluate and present data and information from larger public data sets, as well as data they have collected themselves to solve a problem (design an app with a defined user in mind)

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Information Technology	**Recognise common uses of information technology beyond school.** • Name some familiar digital devices • Discuss types of devices and programs used at home • Explain how devices found at home are used • Recognise that devices and programs are used by other people • Recognise how devices and programs might be used differently by other people • Discuss benefits and problems that other users might find in using the same devices and programs. **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.** • Know that different devices may be used to communicate with others • Know the school e-safety rules • Follow school e-safety rules and know how to report any incidents in school	**Understand and differentiate between computer networks including the internet; how they can provide multiple services, such as the world wide web; and identify computer network systems in use in the world around him/ her.** • Recognise that networks are a set of computers connected together • Networks transfer and share data • Know that the internet is a type of network • Recognise the role of different computers in school • Recognise the different types of networks that schools have • Use the school network to transfer and share information • Understand that the internet is a collection of web page which are viewed through a browser **Use simple search technologies, appreciate how results are selected and ranked, and discern some issues of reliability when evaluating digital content.** • Be familiar with a variety of common search engines and complete a basic key- word and phrase search • Scan and skim results to find the most Relevant • Understand that anyone can publish on the web and that not all information is true or accurate • Distinguish between main search results and adverts that match search terms **Use technology safely and responsibly; recognise acceptable/ unacceptable behaviour; report concerns about content and contact using school policies and procedures.** • Know to keep passwords and personal data secure • Understand that there are certain rules and laws, beyond the school, that apply when using the internet • Understand that when posting information on some websites it is possible for it to be copied, captured and stored by others	**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.** • Understand that networks use an agreed set of rules (protocol) to break data into small packets to be sent across a network and be reassembled • Begin to use networks outside of school networks, such as internet, to securely share and transfer data for a group project • With support, use HTML code to create a simple website to communicate with a wider community **Use search technologies effectively, appreciate how results are selected and ranked, and be discerning in evaluating digital content.** • Use more advanced search options available on a variety of search technologies • Independently choose which search technology is the best for a given purpose • Critically evaluate information which is published on the web • Assess the reliability of information found based on things such as author, website, organisation and purpose • Assess the reliability of information when researching for a purpose **Use technology safely, respectfully and responsibly; recognise acceptable/ unacceptable behaviour; identify a range of ways to report concerns about content and contact.** • Understand and follow terms and conditions for use of web services and social media, including minimum age restrictions • Understand and follow the copyright laws on intellectual property including music, video and images • Be aware of leaving a digital footprint and how the data generated from internet use can be used