

Computer Science Schemes of Learning

Students will be following the National Curriculum for Computing which 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.

Overview for Year 7 and Year 8

Topic	Summary
<p>E-safety, Security and Ethics and Computing in the wider context</p> <ul style="list-style-type: none"> • 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. 	<p>During this module, students will learn that they have a digital footprint and that information from it can be searched; copied and passed on; seen by a large, invisible audience, and can be persistent.</p> <p>They will be able to recognize that people’s online information can be helpful or harmful to their reputation and image.</p> <p>They will have to consider their own digital footprints and what they want those footprints to be like in the future, and to also consider the possible benefits and risks of sharing information online.</p> <p>Students will need to be able to recognize the importance of context in posting or viewing online images, and to be able to understand what choices they need to make to protect the privacy of others online. They will also learn which information they should avoid sharing online because it is private.</p> <p>Students will be taught to understand which kinds of websites have privacy policies, and why and practice checking websites they visit for privacy policies and privacy seals of approvals.</p> <p>Students Identify the legal and ethical considerations involved in using the creative work of others.</p> <p>Understand an individual’s rights and responsibilities as a creator and consumer of content.</p> <p>Practice critical thinking and ethical decision making about the use of creative works.</p> <p>Identify the key points required for a creative work to fall under fair use and judge whether or not the two case studies can be called fair use. They will also be taught to understand the value of fair use by reworking and remixing copyrighted material in a collage or video</p>

Topic	Summary
<p>Programming</p> <ul style="list-style-type: none"> • 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 	<p>Students will undertake a series of programming tasks in both Scratch, Blockly and one other language, such as Python or Visual Basic.</p> <p>Students will be taught to:</p> <p>Explain what computer programming is. Evaluate what blocks to put together to create a working script. Explain program design and development Understand key elements of the scratch interface Understand Scratch commands Understand animation Understand the ways in which a sprite can be programmed to animate Create programs that accept input from the computer. Understand what an algorithm is To be able to express algorithms in words To be able to express algorithms and a set of Scratch instructions Understand/develop block based programming Understand Cartesian coordinates Understand broadcast and receive Understand variables and how they are used. Create and use at least one variable. Apply programming techniques to the creation of simple projects. Build an animated presentation using sound and graphics Create if/then statements to create a working script. Create scripts that include and, or and not for simple use. Create simultaneous execution of more than one script. Coordinate multiple sprites and their actions that tell a story</p> <p>Students will also be developing their programming and computational thinking skills through activities that form part of the Hour of Code environment from Code.Org. These will include:</p> <p>Identifying bugs and debugging programs. Learning about loops, nested loops and conditionals and learning how to build mobile apps.</p> <p>Opportunities will also be provided to develop event-based programming techniques to develop Android and IOS apps using App Inventor from MIT.</p>

Topic	Summary
<p>Understanding Computers</p> <ul style="list-style-type: none"> Understand the hardware and software components that make up computer systems, and how they communicate with one another and with other systems 	<p>Students will be taught to:</p> <ul style="list-style-type: none"> To understand the function and purpose of a computer To understand that not every computer looks like a PC and that many everyday devices contain computers To be able to identify the main component parts of a computer system To be able to explain the role of the main components within a computer To be able to define the term 'software' To understand that software provides instructions for the computer To be able to identify different types of software To be able to distinguish between system software and application software To understand the role of the central processing unit (CPU) and be able to describe the phases in the Fetch-Decode-Execute cycle <p>In addition, students will undertake a study of the history of computers, including learning about the key characters, computers and events that have shaped the environment we have today.</p>
<p>How data is represented in computers</p> <ul style="list-style-type: none"> 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 	<p>Students will learn definitions for a variety of data representation terms such as ASCII, nibble, byte etc.</p> <p>They will be able to understand that computers use binary numbers to represent data and that data needs to be converted into binary for computers to understand it.</p> <p>They will learn how to manipulate binary to represent values and characters and be able to convert between decimal and binary.</p> <p>They will understand how storage size is measured and know the difference between kilobytes, megabytes and terabytes.</p>
<p>Digital Creativity</p> <ul style="list-style-type: none"> Create, re-use, revise and re-purpose digital artefacts for a given audience, with attention to trustworthiness, design and usability 	<p>Use computer software to develop and manipulate websites, documents, images and presentations that meet the requirements of different audiences.</p> <p>Evaluate and provide feedback on the work that has been done and identify areas for improvement.</p>

Topic	Summary
<p>Collaborative Project</p> <ul style="list-style-type: none"> <li>• 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 	<p>Students will be undertaking a collaborative project based around a theme. They will need to:</p> <p>Plan a project as part of a group or as an individual Carry out and document their research for the project</p> <p>Define and allocate key tasks</p> <p>Make decisions about the information and resource requirements</p> <p>Gather information from a range of sources</p> <p>Design and create the project</p> <p>Evaluate and provide feedback on the work they have done.</p>

Overview for year 9

For those that opt to do a GCSE course in Computer Science, students will be following the Edexcel GCSE (9-1) Computer Science course, based around the revised Computer Science specification.

The subject content is divided into six broad and inter-related topics

Topic	Summary
Problem Solving	<p>Students are expected to develop a set of computational thinking skills that enable them to understand how computer systems work, and design, implement and analyse algorithms for solving problems.</p> <p>They will develop computational thinking techniques through –for example -the use of flowcharting and the creation of pseudo-code.</p>
Programming	<p>Focuses on the programming knowledge and skills students need to learn and practise.</p> <p>As a consequence of the work they undertake throughout this topic they should become competent at designing, reading, writing, debugging and creating computer programs in one or more computer languages.</p> <p>As part of the course students will be expected to design and develop a computer program to carry out a complex task.</p>
Data	<p>This is a wide-ranging topic during which students develop an understanding of the binary representation of data, data compression, encryption and relational databases. It also provides a useful context for developing computing-related maths skills including binary, HEX and decimal conversions as well as logic functions and truth tables.</p>

<p>Computers</p>	<p>is concerned with the hardware and software components of a computer system. Students will develop an understanding of the hardware and software components of a computer system and how they inter-relate with each other.</p> <p>They are expected to recognise that computers take many forms from embedded microprocessors to distributed clouds.</p> <p>They will understand the key aspects of the Von Neumann computer architecture and in particular the key elements of the CPU and purpose and functions of the Fetch-Decode-Execute cycle</p>
<p>Communication and the Internet</p>	<p>This element of the course focuses on the key principles behind the organisation of computer networks. Students will develop an understanding of different network topologies and protocols.</p> <p>Students will also develop an understanding of network and cyber security and methods for protecting networks and network users from cyber-attacks.</p>
<p>The bigger picture</p>	<p>This element of the course focuses on developing in students an awareness of the influence of computing technology on emerging trends, as well as the issues and the impact of computers and communication technologies on today's world.</p> <p>It also encourages students to consider the ethical impact, honing in on privacy as well as raising awareness among students of legal and ownership issues associated with computing technology.</p>