IT & Computer Science Department Delivery Grid

Intent

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.

The 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

Pupils are 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 2 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, reuse, revise and repurpose 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

Impact

Pupils are taught using a range of learning resources which help them to develop a broad range of skills in a variety of software packages. Modelling and application of these skills makes up a large proportion of lesson time, in which pupils are given the skills and knowledge to make choices as to how IT can be best used to present their ideas. Once pupils are confident in using a piece of software they will be required to work more independently to complete practical projects in which application of these skills are assessed to ensure progress is being made. Pupils will explore Computing through practical project work, research and

independent work using a variety of resources, such as desktop PC's, laptops, interactive presentations, whiteboards, online learning experiences, Microbits and visualisers to model key concepts and examples. There are regular opportunities for pupils to explore how IT is developing and changing the world we live in, as we discuss news articles, job opportunities and the importance of digital citizenship. Pupils have the opportunity to attend coding clubs and support IT in the school by becoming IT ambassadors. Pupil progress is facilitated through detailed planning of lessons and practical activities, revision classes and scaffolded concepts across the Key Stages.

Implementation

Progression in Computing is measured through both formative and summative assessments, including practice papers, teacher questioning, regular feedback, classroom observation and individual discussions. Due to the nature of the subject formal assessments are often based around practical project work in which pupils will demonstrate the skills they have developed and describe their understanding of what they have done. It is the aim of the department to enable students to develop skills and knowledge in computer science and digital technologies to prepare them for a future in a world where the use of this technology is fully embodied. We wish to enthuse students to have an understanding far deeper than the interface that they currently operate. We aim to enable students to develop a love of learning for the subject and an understanding that there are no limits to their own development in programming and IT. An important life skill for anyone is to problem solve. Using the strands of computational thinking will aid learners with their Computer Science studies and, as it is embedded within everyday life activities, they will understand that they cannot run before they can walk. Students will be given guidance on how to work safely on-line so that it will be second nature to carry out all the necessary steps for their own safety as well as those around them.

At KS3 students will be given the opportunity to develop their computer coding and digital technology skills. Learning the language of code is an important added bonus as students who develop their coding skills will be able to grasp the magic behind the computers. This will allow them to take their studies onto KS4 and to Further and Higher education if they desire and ultimately secure a career within a large range of industries.

KS3 IT Topics

		Autumn A *7weeks*	**Autumn B** *7 weeks*	**Spring A** *7weeks*	**Spring B** *6 weeks*	**Summer A** *6 weeks*	**Summer B** *7weeks*
Year 7	TOPIC	Intro to Computing & Programming	Introduction to Programming	Office Skills and File Management Project	Web Design - Introduction to HTML	Computer Hardware	Arcade Game Maker
	ASSESSMENT	Formative – All About Me Formative – E-Safety Diagnostic - Base Line Assessment	Formative – Chat Bot Formative – Calculator Diagnostic – Unit Scratch Assessment	Formative – Spreadsheet Task Formative - Festival Group Presentations Diagnostic – Office Assessment	Formative - Page design (visualisation diagram) Formative – Final Website Diagnostic – HTML Quiz	Formative – Hardware Presentation Formative - Computer Components Advice Diagnostic - Computer Hardware Assessment	Formative – Project planning Formative - Evaluation Diagnostic – Final Game
	SKILL FOCUS	Skill Focus - Using school systems effectively. Basic IT skills - presenting information	Skill Focus - Programming fundamental	Skill Focus - IT Skills for life, Audience and Purpose. Planning	Skill Focus - Web design, page layout/graphics	Presenting information – Office skills, Research skills	Skill Focus - Planning skills
Year 8	TOPIC	Introduction to Python	Binary, Bits and Bobs inc hardware and software	Back to the Future	HTML & CSS	Experience AI	Platform Game Maker (Scratch Game Design using Pre-production techniques)
	ASSESSMENT	Formative – Python Code 1 Formative – Python Code 2 Diagnostic -	Formative – Binary Formative – Representing Images Diagnostic - Binary	Formative - History Timeline Formative - Multimedia Product Diagnostic -	Formative - Page design (visualisation diagram) Formative - Evaluation	Formative - AI in the real world Formative - Using AI to solve a problem Diagnostic – AI	Formative – Visualisation Diagram Formative - Evaluation

		Assessed - Practical programming project	Bits and Bobs end of unit assessment	Back to the Future Quiz	Diagnostic - Website / code	Quiz	Diagnostic - Final Game: Design, Game play, Complexity, Testing
	SKILL FOCUS	Skill Focus - Programming	Skill Focus - Application of maths	Skill Focus - Research and presentation of information	Skill Focus - Web design. Graphics.	Skill Focus - Programming & Evaluation	Skill Focus - IT Skills, multimedia, research

Year 9	TOPIC	Programming and Algorithms	Web Design	IT for Business	Networks and Cyber Security	Media – Animation Creation	Graphics
	ASSESSMENT	Formative – Flow Chart Formative – Python Code Project Diagnostic - Unit Quiz	Formative – Planning tools Formative - Website Diagnostic - Unit Quiz	Formative – Marketing Poster Formative – Finances Diagnostic - Unit Quiz	Formative – Network Topology Formative – Security Leaflet Diagnostic - Unit Quiz	Formative - Storyboard Animation Formative - Diagnostic – Final Animation	Formative – Graphic Design Formative - Graphic creation Diagnostic - End of unit Quiz
	SKILL FOCUS	Problem solving, programming with Python	Interpretation of client brief, audience and purpose. Web Design	Planning, Presenting information, IT skills for business. Working as part of a team.	Drawing tools to create topology diagrams. Problem solving.	Application of maths. Drawing and understanding logic gates.	Photoshop skills: analysing graphics, layers, tools, filters, removing backgrounds

IT (IMedia - Cambridge Nationals)

IT	Autumn A *7 weeks*	Autumn B *7 weeks*	Spring A *7 weeks*	Spring B *6 weeks*	Summer A *6 weeks*	Summer B *7 weeks*
Year 10	R093: Media industry (TA1) R093: How style, content and layout are linked to purpose. Client requirements and how they are defined (TA2) R093 Audience demographics and segmentation (TA2) R093: Media codes used to convey meaning, create impact and/or engage audiences (TA2)	R093: Work planning and documents used to support ideas generation (TA3) R093: Documents used to design/plan media products (TA3) R094: Purpose features, elements and design of visual identity	R094: Techniques to plan visual identity and digital graphics R094: Tools and techniques to create visual identity and digital graphics R094: Technical skills to source, create and prepare assets for use within digital graphics	R094: Techniques to save and export visual identity and digital graphics (with integrated R093 TA4 distribution considerations and file formats) R094: NEA Assessment (working on)	R094: NEA Assessment (Working on and submit for moderation) R097: TA1 Introduction (with R093 key content embedded)	R097: Features and conventions of interactive digital media R097: Resources required to create interactive digital media products
Year 11	R097: Pre-production and planning documentation and techniques for interactive digital media	R097: Technical skills to create and/or edit and manage assets for use within interactive digital media products R097: Technical skills to create interactive digital media	R097: Techniques to save and export/publish interactive digital media R097: Techniques to test/check and review interactive digital media R097: Improvements and further developments	R097: NEA Assessment (Working on) R093: Distribution platforms and media to reach audiences (TA4) R093: Properties and formats of media files (TA4)	R097: (submit1 for moderation) R093: Sources of research and types of research data (TA2) R093: The legal issues that affect media (TA3) R093: Job roles in the media industry (TA1)	R093: Revision and mock papers/tests R093: Examination (Terminal unit)

Curriculum enrichment at KS4

Topic to be extended/ enriched	Knowledge development	Skill development	Attitude development

	Including possible interdisciplinary links		
Enrichment week: Research (once a term, a week will be used for pupils to investigate IT in their world)	Looking at the future - Artificial Intelligence. News - e.g Hacking stories, new developments in 5G, Digital democracy, Law related to IT use, Social divide, Ethics	Planned time for research and class presentation	Independence. Digital citizenship. Group/paired work.
IDEA - Digital Badges that are gained and awarded with Bronze, Silver and Gold certificates.	Broadening the depth of pupils knowledge in relation to citizenship, Working with IT, Making Digital Products, Gaming and Entrepreneurship.	Note making and independent learning. Building skills for the workplace.	Independence. Digital citizenship.

GCSE COMPUTER SCIENCE (TAUGHT AFTER SCHOOL Extra)

Computer Science	**Autumn A** *7 weeks*	**Autumn B** *7 weeks*	**Spring A** *7 weeks*	**Spring B** *6 weeks*	**Summer A** *6 weeks*	**Summer B** *7 weeks*
Year 10	2.4.1 Boolean Logic 1.2.3 Units 1.2.4 Data Storage – Numbers 2.1.2 Designing, creating and refining algorithms	2.1.2 Designing, creating and refining algorithms 2.2.1 Programming fundamentals 2.2.2 Data Types Practical Programming Skills	2.2.3 Additional programming techniques Practical Programming Skills	1.2.4 Data Storage – Characters, Images, Sound 1.2.5 Compression 1.1.1 Architecture of the CPU 1.1.2 CPU Performance	1.1.3 Embedded systems 1.2.1 Primary Storage 1.2.2 Secondary Storage 1.3.1 Networks and Topologies	1.3.1 Wired and Wireless networks, protocols and layers Practical Programming Skills
Year 11	1.4.1 Threats to computer systems and networks 1.4.2 Identifying and preventing vulnerabilities 1.5.1 Operating Systems 1.5.2 Utility Software 1.6.1 Ethical, legal, cultural and environmental impact	2.3.1 Defensive design 2.3.2 Testing 2.5.1 Languages 2.5.2 The Integrated Development Environment (IDE)	Practical Programming Skills 2.1.3 Searching and Sorting Algorithms Searching and sorting practical programming skills	Paper 1 Revision 1.1 Systems Architecture 1.2 Memory and Storage 1.3 Networks 1.4 Network Security 1.5 Systems Software 1.6 Ethical, legal, cultural and environmental impacts	Paper 2 Revision 2.1 Algorithms 2.2 Programming fundamentals 2.3 Producing Robust Programs 2.4 Boolean Logic 2.5 Programming Languages & IDE	

Curriculum enrichment at KS4

Topic to be extended/ enriched	**Knowledge development** *Including possible interdisciplinary links*	**Skill development**	**Attitude development**
Enrichment week: Research (once a term, a week will be used for pupils to investigate IT in their world)	Looking at the future - Artificial Intelligence. News - e.g Hacking stories, new developments in 5G, Digital democracy, Law related to IT use, Social divide, Ethics	Planned time for research and class presentation	Independence. Digital citizenship. Group/paired work.
IDEA - Digital Badges that are gained and awarded with Bronze, Silver and	Broadening the depth of pupils	Note making and independent learning. Building skills for the	Independence. Digital citizenship.

Gold certificates.	knowledge in relation to citizenship, Working with IT, Making Digital Products, Gaming and Entrepreneurship.	workplace.	
MicroBits - Java (Extra language)	Broadening understanding of coding by applying their knowledge in multiple languages. Introducing Java with the Micro:bits.	Coding with Java	Apply to real world projects. Team work. Creativity.