Computing and ICT

How we use computers and computer programs has defined the world we live in today. Computer scientists connect the abstract with the concrete, creating the products we use every day. A fundamental understanding of computing enables students to be not just educated users of technology, but the innovators capable of designing new computers and programs to improve the quality of life for everyone. Needless to say computer scientists are always in high demand. Computer science is a practical subject where students can apply the academic principles learned in the classroom to real-world systems. It's an intensely creative subject that combines invention and excitement, and can look at the natural world through a digital prism.

Skill

Each child will develop:

- An understanding and ability to apply the fundamental principles and concepts of computer science, including: abstraction, decomposition, logic, algorithms and data representation
- The ability to analyse problems in computational terms through practical experience of solving such problems, including writing programs to do so, and error correction
- The capacity to think creatively, innovatively, analytically, logically and critically
- The capacity to see relationships between different aspects of computer science, in particular the relationship between hardware and software components, and how they communicate with each other, and with other systems
- Mathematical skills
- Digital literacy
- An understanding of the fundamentals of e-Safety

Character

Generally, students much prefer to collaborate than to work alone, and computing can give them the disciplines and methods they need to work successfully on large uncertain projects, and in collaborative teams.

Computational thinking also helps to build resilience through problem solving and encourages students to take risks; computers are forgiving in the sense that it is easy to rectify a mistake simply by clicking undo. Although students need to be aware that virtual mistakes - such as those found in bad programming – bugs – can have just as much impact as physical ones, Computer Science by its nature can teach students how to "fail well".

It is essential that students learn how to become responsible "digital practitioners". This involves, for example, good e-safety and file management practice, commonly termed as "acceptable use"; and being conversant in the moral, ethical, legal and social issues behind technology.

Experience

Computing teaching nurtures students' interests, passions, and sense of engagement with the world around them. Programming is both the expression and implementation and of computational thinking, and a role in which millions of people across the planet are employed; and Computer Science students simulate this job role every week in their lessons. In order to embed some of the "digital practitioner" elements identified in the previous section, and gain an understanding of the significant current emphasis in the technology sector, these simulated experiences will involve some focus on cybersecurity.

Criticality

Computing students learn logical reasoning, algorithmic thinking, design and structured problem solving—all concepts and skills that are valuable well beyond the computing classroom. Students gain awareness of the resources required to implement and deploy a solution and how to deal with real-world and business constraints. These skills are applicable in many contexts, from science and engineering to the humanities and business, and have already led to deeper understanding in many areas.

Computational thinking teaches you how to tackle large problems by breaking them down into a sequence of smaller, more manageable problems. It allows you to tackle complex problems in efficient ways that operate at huge scale. It involves designing, using and evaluating computational abstractions that model the state and behaviour of real-world problems and physical systems. It which enable students to focus on the most pertinent aspects of a problem, and move from specific solutions to general ones.

Computational thinking involves a clear focus on tangible problems; a large collection of proven techniques such as abstraction, decomposition, iteration, and recursion; an understanding of the capabilities of humans and machines alike; and a keen awareness of the cost of it all.

Students also develop a “healthy scepticism” when searching for and evaluating digital information prior to its use: in particular, critically evaluating the reliability, accuracy and quality of that information.

Students also need to develop efficiency when working with technology, which necessarily involves working with computers in an organised manner.

Creative iMedia Programme of Study

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Year 9	RO87 skills Mind maps Mod boards	RO87 skills Visualisation diagrams	RO87 skills Ro82 skills	Legislation Ro82 skills	Reviewing Ro82 skills	Consolidation of skills through practise assignment
Year 10	R087 Assignment	R087 Assignment	R082 Assignment	R082 Assignment	R081 Exam Skills	Mop up R082 and R087 assignments for submissions
Year 11	Third assignment (TBC)	Third assignment (TBC)	Third assignment (TBC)	R081 skills for resubmissions	R081 skills for resubmissions	

GCSE specification: OCR

Year 9, 10 and 11 fundamentals

Term and topic:	Fundamental knowledge	Entitlement vocabulary
Year 9 autumn term: Research and investigation	• develop their capability, creativity and knowledge in computer science, digital media and information technology • develop and apply their analytic, problem-solving, design, and computational thinking skills • understand how changes in technology affect safety, including new ways to protect their online privacy and identity, and how to identify and report a range of concerns. • Investigation and research into types of digital media product • Graphics: how to plan the creation of a digital media product	Design principles Hardware Software Peripherals Purpose Connections Bandwidth Data transfer speeds File formats
Year 9 spring term: Digital media	• develop their capability, creativity and knowledge in computer science, digital media and information technology • develop and apply their analytic, problem-solving, design, and computational thinking skills • understand how changes in technology affect safety, including new ways to protect their online privacy and identity, and how to identify and report a range of concerns. • Graphics: Creating a digital media product – tools and techniques •	Client requirements Target audience Work plan Mind map Mood board
Year 9 summer term: Digital media	• develop their capability, creativity and knowledge in computer science, digital media and information technology • develop and apply their analytic, problem-solving, design, and computational thinking skills • understand how changes in technology affect safety, including new ways to protect their online privacy and identity, and how to identify and report a range of concerns. • Graphics: Creating a digital media product – tools and techniques • Graphics: Reviewing digital media products	Design principles Visualisation diagrams Test plan Legislation Assets Structure Exporting File names File structures Reviewing Improvements Development

Term and topic:	Fundamental knowledge	Entitlement vocabulary
Year 10 autumn term: Purpose and properties of digital graphics Planning digital graphics	• develop their capability, creativity and knowledge in computer science, digital media and information technology • develop and apply their analytic, problem-solving, design, and computational thinking skills • understand how changes in technology affect safety, including new ways to protect their online privacy and identity, and how to identify and report a range of concerns.	Digital graphics File types File formats Properties Design Layout Client requirements Target audience Mind map Mood board Work plan Visualization diagram Assets Legislation
Year 10 spring term: Creating digital graphics Reviewing digital graphics	• develop their capability, creativity and knowledge in computer science, digital media and information technology • develop and apply their analytic, problem-solving, design, and computational thinking skills • understand how changes in technology affect safety, including new ways to protect their online privacy and identity, and how to identify and report a range of concerns.	Assets Tools and techniques Exports Electronic files Reviewing Improvements Development
Year 10 summer term: Use and planning of multimedia products Creating and reviewing multimedia products	• develop their capability, creativity and knowledge in computer science, digital media and information technology • develop and apply their analytic, problem-solving, design, and computational thinking skills • understand how changes in technology affect safety, including new ways to protect their online privacy and identity, and how to identify and report a range of concerns.	Design principles Hardware Software Peripherals Purpose Connections Bandwidth Data transfer speeds File formats Client requirements Target audience Work plan Mind map Mood board Design principles Visualisation diagrams Test plan Legislation Assets Structure Exporting File names File structures Reviewing Improvements Development

Term and topic:	Fundamental knowledge	Entitlement vocabulary
Year 11 autumn term: Marketing Game design	• develop their capability, creativity and knowledge in computer science, digital media and information technology • develop and apply their analytic, problem-solving, design, and computational thinking skills • understand how changes in technology affect safety, including new ways to protect their online privacy and identity, and how to identify and report a range of concerns.	Hardware Generations Capabilities Limitations Digital game Genre Objectives
Year 11 spring term: Game design	• develop their capability, creativity and knowledge in computer science, digital media and information technology • develop and apply their analytic, problem-solving, design, and computational thinking skills • understand how changes in technology affect safety, including new ways to protect their online privacy and identity, and how to identify and report a range of concerns.	Client requirements Target audience Outlines Criteria Mind map Mood board Constraints Opportunities Visualisations Legislation Electronic files Review Improvements Development
Year 11 summer term: Exam revision	• develop their capability, creativity and knowledge in computer science, digital media and information technology • develop and apply their analytic, problem-solving, design, and computational thinking skills • understand how changes in technology affect safety, including new ways to protect their online privacy and identity, and how to identify and report a range of concerns.	