Long term plan: Vision and Core Concepts

Purpose of study

Technology is becoming ever more important in our student's day to day lives and this trend is likely to continue and even accelerate in the future.

We are preparing students for jobs that do not yet exist and to use technology that has not yet been invented.

We will do this by ensuring that every student has the opportunity to study and use a wide range of technology, building the resilience to both learn to use new technology and solve new problems in a logical algorithmic way.

The OCL Computing curriculum will ensure that every student is able to navigate the digital world confidently in a safe and socially responsible manner.

Core Concepts

We have structured our curriculum around the most significant Core Concepts in computing and mapped students' development of these concepts through lesson sequences and topics.

1	Use a wide range of software and technology safely
2	Embed fundamental ICT skills of word processing
3	Modify and create computer programs
4	Create and edit a variety of media
5	Be aware of the risks of technology and how they can be minimised
6	Use computational thinking skills to solve real world problems
7	Embed fundamental ICT skills
8	Understand what networks are and how they are used
9	Understand simple Boolean logic
10	Recognise and predict technology trends
11	Maximising the use of Horizons

We value character, competence and community in our curriculum:

•**Character:** Enabling students to develop and build solutions to both digital and real-world problems by applying computational thinking. Students will be able to take complex problems and break them down into manageable chunks and build solutions using skills such as pattern recognition, abstraction and algorithmic thinking.

•**Competence**: Developing students' digital literacy allowing them to adapt and be active users of the ever-changing technology used in their future careers and personal lives. Students will be able to confidently learn and use new technology and software as it is made available to them during their education and beyond.

•**Community:** Inspiring students to become active creators of and innovators instead of passive users of technology. Online safety and a solid understanding of the moral, legal and ethical considerations of technology are embedded at every level of our curriculum to ensure that students know how to use technology responsibly.

Long term plan: Principles of Progression

Core concepts and principles of progression

Our curriculum will ensure that students develop and sustain theoretical knowledge alongside practical computing skills. Students will learn the foundational knowledge and, from this foundation, will have the opportunity to practice and apply that knowledge to innovate, build and create. E-safety will be embedded at every level of the curriculum ensuring that where appropriate each unit takes exposes and ratifies the legal, moral and ethical ramifications of using technology. After studying the OCL Computing curriculum students will be able to:

1. **Use a wide range of software and technology** - we know that students will need to use a multitude of different software packages in their personal, academic and professional lives. So that students can build the resilience to adapt to new software, the curriculum will utilise a multitude of selected software packages on both Windows PC and iPad.
2. **Display fundamental ICT skills** – embedded in each unit will be opportunities to practice the fundamentals of ICT use. Students will be able to use software and computing devices confidently (keyboard, mouse and touch devices), file management, communicating online (email, in app messaging and collaborative documents) and how to choose the right device / software for a given task.
3. **Modify and create computer programs** – Students will be able to create computer programs in Scratch and Python. They will understand good programming practices and the foundations of writing code in any language that will enable them to take their next steps in further education or in industry.
4. **Create and edit a variety of media** – in addition to the creation of computer programs, students will be able to create documents, spreadsheets presentations, images, animations and Websites. Students will understand how media is consumed by the public, how intellectual property is protected as well as how different forms of media created.
5. **Be aware of the risks of technology and how they can be minimised** – Students will be able to navigate the online world with confidence. students will have a strong understanding of cyber security and e-safety fundamentals. This will help to ensure that they when they are working with technology and online, they are doing so in a safe and responsible way.
6. **Use computational thinking skills to solve real world problems** – decomposition, pattern recognition, abstraction and algorithmic thinking are some of the most important transferable skills from computing. Students will take problems such as converting values, measuring space or managing data and use these skills alongside their programming knowledge to design and build solutions for them.
7. **Recognise computer hardware and understand how each component works** – students will understand the purpose of each part of a given computer system and how performance is affected be changing components. Students will be able to apply this knowledge to design computers that are effective for a given task as well as how to improve existing systems.
8. **Understand what networks are and how they are used** – this includes understanding how computers are connected to a network; how common network hardware works and the benefits of using networks. Students will also understand how different networks connect and how messages are broken into packets before being sent across networks such as the internet.
9. **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. Students will be able to convert between binary, denary and hexadecimal.
10. **Recognise and predict technology trends** – computing is a young and ever-changing field. By studying the history of computing, how it is used in society today and key areas of research (Artificial Intelligence, robotics and augmented reality to name a few) students will be better prepared for the change technology is likely to bring to everyday life.
11. **Maximising the use of Horizons** – lessons will make use of the iPads that all students have due to the Horizons project. Students will use several apps to complete tasks alongside traditional PCs where appropriate. Students will work on some tasks by using both devices simultaneously by utilising live office files and online resources such as Formative. This will help students become more adaptable with using different types of technology to complete tasks.

Long term plan: Aims/Outcomes

Through a carefully sequences and ambitious curriculum we will develop student knowledge and understanding across the 3 areas of computing:

Digital literacy – students will:

- Be able to use a wide variety of popular software packages.
- Build the resilience to quickly adapt to changes in software and to new packages entirely.
- Understand how technology is used in a variety of careers both within and outside of the technology industry.
- Be able to protect their online identity and use technology safely.
- Be able to create and edit different forms of media (text, images, sound and video).
- Be able to find accurate information on the internet and recognise misleading information.

Information technology – students will:

- Be able to sort and manipulate data using database and spreadsheet software.
- Create and present information for a variety of contexts while ensuring it is fit for purpose and appropriate to the target audience.
- Understand the legal, moral and ethical issues caused by the increase of technology in our daily lives.
- Evaluate whether a given software package is fit for purpose for a given task.
- Design a basic network for a given scenario taking into account the number of users and advantages of different hardware.

Computer Science – students will:

- Modify and build a variety of programs using visual and text-based programming languages.
- Understand how each component of a computer works and contributes to the overall system
- Compare and evaluate different storage types for a given task
- Use computational thinking to break down problems, and algorithmic thinking to build logical solutions to real world problems.
- Generalise algorithms so that they can be reused again to solve similar but different problems.
- Be able to apply established algorithms to solve common problems such as searching and sorting data.
- Be able to recognise and use data types appropriately.
- Understand the functions of an operating system.
- Recognise different cybersecurity threats, why they happen and how to prevent them.

Year 7 Long term plan

Brief overview
• The Autumn Term begins by ensuring students can access the suite of software and devices made available to them alongside a focus on safeguarding students, by highlighting the dangers they face online, using web-browsers, social media, and emails. Alongside the delivery of the declarative and procedural knowledge, students are then made aware of the forms cyberbullying can take, and our expectations of them as part of our nine habits. The unit progresses from the use of word-processing software to spreadsheets, and then presentation software, laying a foundation of their fundamental ICT skills and interaction with a variety of media. When students receive their iPads, they will explore their effective use. • Fundamental to all aspects of computer science, the Spring Term introduces students to computational thinking, developing their abilities to solve problems by then learning about algorithms and finally representing them with flowcharts and pseudocode. • In the Summer Term, students will start programming with Scratch, exploring sequence, selection, and iteration, and understanding subroutines. This will set a foundation for their programming knowledge which they will progress each year within KS3 and into KS4, should they choose Computer Science as an option. • Software packages: Throughout the year, students will use a web browser, Formative.com, MS Teams, MS OneNote, MS Office (PowerPoint, Excel, Word), and Scratch.mit.edu. • The following topics are delivered during Cultural Capital and Personal Development lessons: *Recognising online dangers – Personal Development; Respectful Communication Online - Cultural Capital; Cyberbullying - Personal Development; Getting started with Horizons – Cultural Capital*

Unit	Autumn	Spring	Spring/Summer
Unit title	**Using IT Safely and Effectively**	**Computational Thinking and Algorithms**	**Scratch Programming**
Core Principles	• Use a wide range of software and technology safely. • Embed fundamental ICT skills. • Create and edit a variety of media. • Be aware of the risks of technology and how they can be minimised. • Maximising the use of Horizons	• Use a wide range of software and technology • Embed fundamental ICT skills • Use computational thinking skills to solve real world problems • Understand simple Boolean logic • Maximising the use of Horizons	• Use a wide range of software and technology safely • Modify and create computer programs • Use computational thinking skills to solve real world problems • Understand simple Boolean logic • Maximising the use of Horizons
Declarative Knowledge	• How to use social media safely • Identify different programs for different tasks • What constitutes a secure password • Private and Public information • Structuring a good presentation • Cell references • Formulas • Types of charts available • Spreadsheets and their uses • Knowledge of SUM and AVERAGE	• Knowledge of abstraction, algorithmic thinking, decomposition, pattern recognition • Knowledge of what each symbol in a flowchart is for • Knowledge of pseudocode structures • Knowledge of Linear and binary search • Knowledge of basic sorting algorithms • Knowledge of uses for sorting algorithms	• Knowledge of Sequence • Knowledge of Inputs and Outputs • Knowledge of Selection structure (IF ELIF ELSE) • Knowledge of Variables • Knowledge of forever loops and iteration
Procedural Knowledge	• Use input devices effectively • Use word processors effectively • Use presentation processors effectively • Use web browsers effectively • Use email effectively • Determine which information in an extract is personal • How to use spreadsheet software • How to lay data out in a spreadsheet so that it can be analysed	• How to represent an algorithm in a flowchart or pseudocode. • How to follow through an algorithm in one's head, tracking variables • How to approach problems efficiently by using abstraction, algorithmic thinking, decomposition, and pattern recognition.	• How to use scratch to make simple programs • How to break down a problem into smaller tasks and plan a program • How to track the changing value of a variable through a program • How to trace the control flow through a simple program (run the program in their heads)
Lesson Breakdown	1) What are Computers (including logging on) 2) Types of Software + OS 3) Word processing 4) Spreadsheets 5) Presentations 6) Assessment	7. The Input Process Output Model 8. Decomposition, Abstraction, and Pattern Recognition 9. Algorithms (Jam) 10. Flowcharts 11. Sequence, selection, Iteration 12. Algorithms for Searching and Sorting	13. Sequence and Variables 14. Selection 15. Operators 16. Iteration 17. Broadcast 18. Game Development

Year 8 Long term plan

Brief Overview
• The Autumn Term expands upon the year 7 exploration of computational thinking and their first experience of programming, Scratch, to prepare them for their second programming experience in the Spring Term, Python, which places greater requirements on their understanding of how computers handle information. The unit begins with how data stored and converted, before moving on to how it is handled. • The Spring Term builds on year 7 and the Autumn term to introduce them to Python and arguable a programmer's most useful tool, debugging, now they are using a text-based language. Students then return to the core programming concepts of Sequence, Selection and Iteration as they develop as programmers. • In the Summer Term seeks to bridge students' understanding of the use and design of software, beginning with the history of computing, before exploring hardware and architecture underpinning the interaction between hardware and software, and how and why computers communicate within organisations and the wider world. • Software Packages: Students will use a combination of a web browser, Formative.com, MS Teams and MS OneNote throughout each unit. In addition, they will use, logic.ly, Python, MU IDE, photopea.com, wickeditor.com, Notepad ++

Unit	Autumn	Spring	Summer
Unit title	**Binary logic and Booleans**	**Programming with Python 1**	**Hardware and Networks**
Core Principles	• Understand simple Boolean logic • Maximising the use of Horizons	• Use a wide range of software and technology • Modify and create computer programs • Use computational thinking skills to solve real world problems • Understand simple Boolean logic • Maximising the use of Horizons	• Embed fundamental ICT skills • Understand what networks are and how they are used • Recognise and predict technology trends • Maximising the use of horizons
Declarative Knowledge	• Knowledge of AND, OR, and NOT • Know difference between operands and operators • Know 1 and 0 are bits • Know the purpose of logic gates • Know the layout of truth tables	• Knowledge of syntax requirements • Knowledge of types of error • Knowledge of basic data types • Knowledge of Selection Structures • Knowledge of while loops • Knowledge of variables in a python • Knowledge of how embedded systems are programmed	• When and who invented the first computers • How the CPU, RAM, and FDE cycle allow all general-purpose computers to complete any task • How inputs and output peripherals allow us to use and apply computers in a variety of ways • The purpose of motherboards, storage, memory, GPUs, ROM, and cooling inside a computer • What is an embedded system • What is a network and why is it useful? • The difference between LANs and WANs • The pros and cons of Wireless and Wired networks • What is the Internet and how does it work? (including packets, routers, IP addresses,
Procedural Knowledge	• How to construct logic diagrams from a Boolean expression • How to construct truth tables • How to convert between 8 bit binary and <256 denary numbers	• How to convert a simple pseudocode algorithm to python • How to debug code containing simple syntax errors • How to use arithmetic operators in code including Modulus and integer division • How to write programs with inputs and outputs • How to write programs using the micro bit library	• How to draw a network from a description and requirements • How to recognise an IP or MAC addresses • How to label a diagram of a computer • How to recognise a hardware-part from a picture, common features, port type. • How to sort peripherals into inputs and outputs • How to list some features/purposes of an operating system • How to choose the best storage technology and justify decision based on a brief • How to compare the processing speeds of 2 CPUs
Lesson Breakdown	1. Thinking in 1s and 0s 2. Logic Gates 3. Storing Numbers 4. Storing Text 5. Storing Pictures 6. Storing Sound 7. Assessment	1. Sequence, Variables, and Outputs 2. Inputs and Operators 3. Selection 4. Selection 2 5. Condition-Controlled Iteration 6. Count-Controlled iteration	1. History of Computing 2. Von Neuman Architecture 3. Peripherals 4. Internal Hardware 5. Wired + Wireless Networks 6. The Internet

Year 9 Long term plan

Brief overview
• The Autumn Term provides students with essential skills in software and technology, focusing on creating and modifying programs. Students will use computational thinking to solve real-world problems, understand Boolean logic, and utilize various tech tools. Key programming concepts covered include selection, iteration, subroutines, and pseudo-randomness. Students will study Python's random library syntax, code evaluation, and testing, tracing variables with truth tables, following control flow in complex programs, designing programs for tasks, and identifying code issues. • In the Spring Term, students study to safely use software and technology to create and edit various media. Students learn to recognize technology trends, understand plagiarism and copyright law, and evaluate information sources. The curriculum covers bitmaps and vectors, colour depth, resolution, and CAD/CAM applications, using PowerPoint, Word, and Photopea for media creation, making keyframe animations, designing projects, and constructing 3D models. • The Summer term prepares students for the digital world ahead, mindful that most of them will not have chosen Computer Science GCSE as an option. Students begin by exploring the reasons behind cybercrime and relevant legislation, before exploring the types of malware and social exploitation which threaten us. Then, students' awareness of the current and future applications and impacts of technology are broadened, for future study and later life. • Software Packages: Students will use a combination of a web browser, Formative.com, MS Teams and MS OneNote throughout each unit. In addition, they will use Python, Mu IDE, App Lab (code.org), MS Excel, MS Access

Unit	Autumn	Spring	Summer
Unit title	**Programming With Python 2**	**Multimedia**	**Cybersecurity and Impacts of Future Tech**
Core Principles	• Use a wide range of software and technology • Modify and create computer programs • Use computational thinking skills to solve real world problems • Understand simple Boolean logic • Maximising the use of Horizons	• Use a wide range of software and technology safely • Create and edit a variety of media • Recognise and predict technology trends • Maximising the use of Horizons	• Use a wide range of software and technology safely. • Be aware of the risks of technology and how they can be minimised. • Recognise and predict technology trends. • Maximising the use of Horizons.
Declarative Knowledge	• Knowledge of how computers generate "pseudo randomness" • Knowledge of selection, iteration, subroutine structures in code • Know the syntax of python's random library. • Knowledge of how to evaluate code in terms of maintainability • Knowledge of how to test programs	• Knowledge of plagiarism • Knowledge of copyright law • Knowledge of information sources and fake news • Knowledge of formatting tools and programs • Know the difference between bitmaps and vectors • Know how frames and images relate to videos and animations • Know how colour depth and resolution affect bitmaps • Know some of the uses and limitations of vectors • Know the meaning and applications of CAD and CAM	• Know why cybersecurity is necessary and important. • Know why hackers hack (hacktivists, penetration testers, black-hat) • Know what malware, viruses, worms, trojans, ransomware, spyware are. • Know how firewalls, anti-malware software, encryption, and Acceptable Use Policies keep a network/device safe • Know what social engineering attacks are and how to spot them • Know what AI, robotics, green tech, and Big Data are and how they could be applied this century • Know the ethical issues introduced by technology (e-waste, privacy, digital divide, mass automation)
Procedural Knowledge	• How to trace the value of parameters and variables through a program using truth tables • How to follow the control flow of a medium complex program (one that uses nested structures) • How to design and write a program to fulfil a simple task • How to link errors in testing to problems with the code	• How to use PowerPoint, Word, and Photopea to make text and image media and the latter to create bitmaps and vector graphics • How to evaluate the credibility of a source • How to make simple keyframe animations • How to design a project to match a given brief • How to construct 3D models subject and recipient	• How to spot an email/text is a social engineering attack • How to tell when a download site is untrustworthy • How to access security settings and anti-malware options on devices • How to control your digital footprint and exercise your Data Protection act rights
Lesson Breakdown	1. Recap 2. Nesting 3. Procedures 4. Functions 5. Data Structures 6. Game Dev 7. Assessment	1. Licensing + Planning 2. Digital Graphics 1 3. Digital Graphics 2 4. Animation (purpose + Types) 5. Making Animations 6. 3D Modelling	1. Cybercrime, Why? Computer Misuse act 2. Malware 3. Social Engineering 4. Defences 5. Future Tech: Robotics + AI + Big Data 6. Impacts of Technology: E-Waste + Privacy + Digital Divide