

# Curriculum Overview – Computing and ICT

## Introduction

This document outlines the curriculum and key considerations including:

- Aims and purpose
- Alignment with the whole school provision and curriculum intent
- A summary programme of study which includes sequencing of taught content

**We use the National Curriculum as our statutory foundation and broadly share its principles and aims including:**

- ‘To provide students with an introduction to the essential knowledge that they need to be educated citizens. To introduce students to the best that has been thought and said; and help engender an appreciation of human creativity and achievement’.
- To prepare students to be confident in themselves, to have a fulfilled and successful life beyond our school – one where they contribute positively to society.
- Our statutory curriculum is just one element in the education of every child. There is time and space in the school day and in each week, term and year to range beyond statutory specifications.
- Provision of a framework of core knowledge around which teachers can develop exciting and stimulating lessons to promote the development of students’ knowledge, understanding and skills as part of the wider school curriculum.
- The wider school curriculum includes an extensive range of opportunities and activities that are routinely available to students, are inclusive and reflect our diverse community.

## Numeracy and literacy

Teachers should take opportunities to develop students’ mathematical fluency, spoken language, reading, writing and vocabulary within their specific discipline and in line with the expectations laid out in our school curriculum statement.

## Purpose of study

‘A high-quality computing education equips students 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 students 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, students are equipped to use information technology to create programs, systems and a range of content. Computing also ensures that students 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.’ *(Adapted from National Curriculum, DfE, 2014).*

## Wolfreton Curriculum Intent

Our computing curriculum is underpinned by our Intent statement, or strapline:

Understanding the digital world through creativity and coding – a ‘bit’ at a time!

## Curriculum Aims

The Wolfreton curriculum for computing and ICT aims to ensure that all students:

- promote the safe use of computers and develop lifelong computer skills.
- can understand and apply the fundamental principles and concepts of computer science, including 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.

## Building on prior learning

By the end of Key Stage 2, students should have been taught to:

- design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts
- use sequence, selection, and repetition in programs, work with variables and various forms of input and output
- use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs
- 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
- use search technologies effectively, appreciate how results are selected and ranked, and be discerning in evaluating digital content
- 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
- use technology safely, respectfully, and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact

## What are the skills gaps?

Generally, students from feeder primary schools are familiar with using some programmes from Microsoft Office, particularly Word and PowerPoint. Typically keyboard skills increasingly becoming a weakness due to use smart devices with touchscreens – this leads to some students lacking facility with keyboards and basic computer skills.

Although the primary curriculum covers coding, this is not always taught consistently across all schools due to limitations on resources in some feeder primary schools, so some students do not have an awareness or knowledge of basic coding concepts and skills.

## Curriculum Threads

Disciplinary Knowledge Strands	Year 7	Year 8	Year 9	Year 10	Year 11
Online Safety	<ul style="list-style-type: none"> <li>Digital footprints</li> <li>Online behaviours</li> <li>Signs of danger</li> <li>Reporting abuse</li> <li>Gaming addiction</li> </ul>	<ul style="list-style-type: none"> <li>Personal data security - phishing</li> <li>Inappropriate behaviours</li> <li>SMART rules</li> <li>Overuse of technology</li> <li>Password security</li> </ul>	<ul style="list-style-type: none"> <li>Social Engineering</li> <li>Sensitive information</li> <li>Permanency</li> <li>Social media</li> <li>Legislation</li> <li>Dangers of sexting</li> <li>Networks HTML and Cyber Security</li> </ul>	<ul style="list-style-type: none"> <li>Malware and Antimalware</li> <li>Hackers / Tools to Stop and Best Defence</li> <li>Social Engineering (Phishing, baiting, pretexting)</li> <li>Encryption and keeping data safe</li> </ul>	<ul style="list-style-type: none"> <li></li> </ul>
Creation and Programming	<ul style="list-style-type: none"> <li>Multimedia Unit</li> <li>Python EduBlocks</li> </ul>	<ul style="list-style-type: none"> <li>Python Programming in EduBlocks</li> <li>Mobile App Development</li> </ul>	<ul style="list-style-type: none"> <li>EasyGUI Programming</li> <li>Networks HTML and Cyber Security</li> </ul>	<ul style="list-style-type: none"> <li>Intro to Programming - Hello World and Print</li> <li>Assigning values to variables and Data Types</li> <li>Input integers and debugging</li> <li>Input Processing Output Selection</li> <li>For Loops</li> <li>Selection IF THEN ELIF</li> <li>Procedures</li> <li>Functions</li> </ul>	<ul style="list-style-type: none"> <li>Turtle – Introduction Pens and Lines</li> <li>Turtle – Movement and Coordinates</li> <li>Turtle – Pen colour and filling shapes</li> <li>File Reading</li> <li>File Writing</li> <li>CSV Files</li> <li>Two Dimensional Arrays</li> </ul>

Disciplinary Knowledge Strands	Year 7	Year 8	Year 9	Year 10	Year 11
				<ul style="list-style-type: none"> <li>• Arrays</li> </ul>	
Algorithmic Thinking	<ul style="list-style-type: none"> <li>• Multimedia Unit</li> <li>• Python EduBlocks</li> </ul>	<ul style="list-style-type: none"> <li>• Mobile App Development</li> </ul>	<ul style="list-style-type: none"> <li>• EasyGUI Programming</li> </ul>	<ul style="list-style-type: none"> <li>• Flowcharts</li> </ul>	<ul style="list-style-type: none"> <li>• Flowcharts</li> </ul>
Problem Solving	<ul style="list-style-type: none"> <li>• Python EduBlocks</li> </ul>	<ul style="list-style-type: none"> <li>• Mobile App Development</li> </ul>	<ul style="list-style-type: none"> <li>• EasyGUI Programming</li> </ul>	<ul style="list-style-type: none"> <li>• Flowcharts</li> </ul>	<ul style="list-style-type: none"> <li>• Flowcharts</li> </ul>
Computing Fundamentals	<ul style="list-style-type: none"> <li>• Introduction to Computing</li> </ul>	<ul style="list-style-type: none"> <li>• Binary Logic</li> <li>• Understanding Computers</li> </ul>	<ul style="list-style-type: none"> <li>• Data and Algorithms</li> <li>• Networks HTML and Cyber Security</li> </ul>	<ul style="list-style-type: none"> <li>• Binary / Addition</li> <li>• Two's Complement</li> <li>• Logical and Arithmetic Shifts</li> <li>• Hexadecimal</li> <li>• ASCII</li> <li>• Stored Program concept</li> <li>• FDE</li> <li>• Secondary Storage</li> <li>• Sizes</li> <li>• Operating Systems</li> <li>• File Management</li> <li>• Process Management</li> <li>• Peripherals</li> <li>• Utility Software</li> <li>• Encryption</li> <li>• Robust Software</li> <li>• Networking (LANS WANS)</li> <li>• Wired v Wireless</li> <li>• Connectivity</li> <li>• Topologies</li> </ul>	<ul style="list-style-type: none"> <li>• Embedded Systems</li> <li>• The Internet of Things</li> <li>• Packet Switching</li> <li>• OSI Layer Model</li> <li>• Network Protocols</li> <li>• Environmental Issues</li> <li>• Translators / Compilers</li> <li>• High- and Low-Level Languages</li> <li>• Intellectual Property</li> <li>• Representation of data (Images, sound, etc..)</li> <li>• Linear Search</li> <li>• Bubble Sort</li> <li>• Binary Search</li> <li>• Merge Sort</li> <li>• Two Dimensional Arrays</li> </ul>

## Curriculum Sequencing

### Key Stage 3: Year 7 – Long Term Planning

	Autumn term	Spring term	Summer term
Knowledge	<p><a href="#">Online Safety (E-Safety)</a></p> <ul style="list-style-type: none"> <li>Learn about issues surrounding internet safety and online dangers. They will learn the common issues and how to avoid them. They will learn how to use the internet safely and give advice.</li> <li>Know how to communicate in a respectful manner as not to cause harm to others.</li> <li>Know the steps that need to be taken in order to stay safe.</li> <li>Know the SMART rules.</li> <li>Know how to report abuse.</li> <li>Be able to recall a range of tools in order to assist them in staying safe such as thinkuknow.co.uk. 0800 1111 (Childline) and the SMART Rules.</li> </ul> <p><a href="#">Introduction to Computing</a></p> <ul style="list-style-type: none"> <li>Be able to recall the office address.</li> <li>Know what office online is and how to access it.</li> <li>Know what Microsoft Teams is and what it is used for.</li> <li>Know what Outlook and Word and what they are used for.</li> <li>Know what and e-mail is and its properties such as subject, cc, bcc etc..</li> <li>Know what an internet browser is and be able to identify one.</li> </ul>	<p><a href="#">Multimedia Product</a></p> <ul style="list-style-type: none"> <li>Understand the good and bad principles when designing a digital product.</li> <li>Know how to break a problem down- Understand the terms purpose and audience and how they impact on a design.</li> <li>Be able to recognise the flowchart symbols - Know that a program / algorithm is a list of instructions.</li> <li>Know how to use a digital Presentation editor and the different functions thereof.</li> <li>Know the key skills to evaluate.</li> </ul> <p><a href="#">Python Edublocks</a></p> <ul style="list-style-type: none"> <li>Learn to use the range of available tools to create simple to more complex shapes.</li> <li>Synthesise mathematical problems with procedural instructions to create shapes. I.e. square, rectangle, triangle, hexagon and so on.</li> <li>Be able to use the programming language to create them independently.</li> <li>Use of additional tools to make programs more efficient will be introduced e.g. FOR looping.</li> <li>Students can effectively use the IDE tools, e.g. debug information, to make informed decisions about how to bug fix their programs.</li> </ul>	<p><a href="#">Graphics Editing</a></p> <ul style="list-style-type: none"> <li>Gain an understanding of how industry uses graphics to: <ul style="list-style-type: none"> <li>a. Advertise b. Promote c. Persuade</li> </ul> </li> <li>Become aware of how to effectively use a range of tools to create a new digital product, calling on creative skills.</li> <li>Learn about the purpose and audience of a graphic. They will learn about the IT tools used to develop a digital artefact.</li> </ul>
Skills	<a href="#">Online Safety (E-Safety)</a>	<a href="#">Multimedia Product</a>	<a href="#">Graphics Editing</a>

	Autumn term	Spring term	Summer term
	<ul style="list-style-type: none"> <li>● Be able to recognise danger and when they are being manipulated for the benefit of others.</li> <li>● Be able to state what is the best recourse of action for a dangerous situation and how internet safety relates in this situation.</li> <li>● Understand a range of ways to use technology safely, respectfully, responsibly and securely, including protecting their online identity and privacy.</li> <li>● Recognise inappropriate content, contact and conduct</li> <li>● Be able to report concerns</li> <li>● Be able to use tools to set privacy levels to an appropriate level in order to protect their data online.</li> <li>● Be able to reflect on a situation and give advice to others on how to stay safe.</li> </ul> <p><a href="#">Introduction to Computing</a></p> <ul style="list-style-type: none"> <li>● How to log onto Wolfreton School Systems</li> <li>● How to use Microsoft Teams in the browser</li> <li>● How to use Microsoft OneDrive in the browser</li> <li>● How to use Microsoft Outlook in the browser</li> <li>● How to use Microsoft Word in the browser</li> <li>● Basic understanding of how to navigate the GUI and load some apps.</li> <li>● Construct a simple e-mail including an attachment.</li> <li>● Perform simple file management in OneDrive such as creating folders and moving files from Teams into OneDrive</li> <li>● Upload documents to OneDrive.</li> <li>● Use the Application Launcher to load applications in the cloud.</li> </ul>	<ul style="list-style-type: none"> <li>● Place in practice good design techniques such as house style and positioning of objects</li> <li>● Recognise the purpose and audience of a given brief and be able to describe how it impacts a design.</li> <li>● Be able to decompose a problem with regards to a given brief</li> <li>● Be able to create / use Flowchart.</li> <li>● Be able to create / use a Presentation Editor to create a multimedia product.</li> <li>● Use online tools via Office.com / PowerPoint including multimedia elements such as video, sound and automation.</li> <li>● Evaluate their own work</li> </ul> <p><a href="#">Python Edublocks</a></p> <ul style="list-style-type: none"> <li>● Students can use a Textual Programming language and program flow to draw shapes. They will learn about structure and using correct code for a given purpose.</li> <li>● Use programming objects and the Turtle – using appropriate turtle commands to create shapes. They will apply basic mathematical knowledge to the computer models.</li> <li>● They can use ‘blocks’ correctly to speed up coding and the correct use of error codes to debug their programs.</li> <li>● They recognise that the Python code generated is that which is being executed.</li> </ul>	<ul style="list-style-type: none"> <li>● Learn how to edit images using a graphics editing package and how to save them in the correct file format.</li> <li>● They will learn how to create composite images and manipulate graphics using various tools.</li> <li>● They will learn how to plan a poster layout and collect relevant images for the poster.</li> <li>● To understand how to use the tools in to create the poster for a given purpose / audience in practice.</li> <li>● Students are able to evaluate performance.</li> </ul>

	Autumn term	Spring term	Summer term
<b>Subject specific vocabulary</b>	<ul style="list-style-type: none"> <li>Digital Footprint</li> <li>Viruses</li> <li>Malware</li> <li>Ransomware</li> <li>WannaCry</li> <li>Addiction</li> <li>Safeguard</li> <li>Username</li> <li>Icon</li> <li>Taskbar</li> </ul>	<ul style="list-style-type: none"> <li>Psychographics</li> <li>Algorithm</li> <li>Process</li> <li>Selection</li> <li>Terminator</li> <li>Hyperlink</li> <li>Sequence</li> <li>Iteration</li> <li>Loops</li> <li>Flow</li> </ul>	<ul style="list-style-type: none"> <li>Manipulate</li> <li>Asset</li> <li>Transparency</li> <li>Opacity</li> <li>Canvas</li> <li>Scale</li> <li>Rasterize</li> <li>Resolution (PPI [Pixels Per Inch] and DPI [Dots Per Inch])</li> </ul>
<b>Assessment</b>	<ul style="list-style-type: none"> <li>Teachers check worksheet produced in class.</li> <li>Students to undertake an online assessment</li> <li>On screen assessment including multiple choice</li> </ul>	<ul style="list-style-type: none"> <li>Undertake an interim assessment. Have the final product graded.</li> <li>Undertake an interim assessment. complete a practical programming assessment</li> </ul>	<ul style="list-style-type: none"> <li>Students are assessed on their final product.</li> </ul>

### Key Stage 3: Year 8 – Long Term Planning

	Autumn term	Spring term	Summer term
<b>Knowledge</b>	<p><a href="#">Online Safety (E-Safety)</a></p> <ul style="list-style-type: none"> <li>Student will learn about posting the correct amount of information online</li> <li>Learn about what information should be posted online and which information should not</li> <li>Learn about grooming and meeting strangers online</li> <li>Learn about sharing nude images and its consequences</li> <li>Learn about how to report concerns about adults online</li> <li>Learn about distribution of inappropriate material</li> <li>Learn about a digital footprint and how it is linked to security</li> <li>Learn about some social engineering techniques</li> </ul> <p><a href="#">Binary Logic</a></p> <ul style="list-style-type: none"> <li>Know how a simple circuit will work</li> <li>Know why computers use binary</li> </ul>	<p><a href="#">Python Programming in EduBlocks</a></p> <ul style="list-style-type: none"> <li>Learn how to output data to the screen and what a variable is</li> <li>Learn why order is important and how to input numbers into Python</li> <li>Learn about different data types in Python such as bool, integer, string etc..</li> <li>Learn the input function</li> <li>Learn how to convert an integer into a string and the other way round</li> <li>Learn what is selection and how it works in Python</li> <li>Learn what is indentation and how it relates to if statements</li> <li>Learn about iteration or looping and how it works in Python</li> <li>Learn about the three different loops</li> <li>Learn about operators</li> </ul>	<p><a href="#">Understanding Computers</a></p> <ul style="list-style-type: none"> <li>Learn about the hardware that makes up a computer</li> <li>Know what is meant by the terms hardware and software</li> <li>Learn what is an input, output and storage device are</li> <li>Learn how a CPU works</li> <li>Understand the difference between RAM and ROM</li> <li>Learn the purpose of the CPU and things that impact on performance</li> <li>Learn about the components of the CPU such as ALU, CU and so on</li> <li>Learn about the FDE cycle</li> <li>Learn about operating systems, application and utility software</li> <li>Learn about binary</li> <li>Learn about ASCII</li> <li>Learn about data sizes</li> <li>Learn the rules of binary addition</li> </ul>

	Autumn term	Spring term	Summer term
	<ul style="list-style-type: none"> <li>• Know the rules for the three logic gates: AND OR NOT</li> <li>• Know the truth tables for the three logic gates AND OR NOT</li> <li>• Know what the binary value of true and false is</li> <li>• Know what a logic circuit expression or equation is</li> <li>• Know the output from one logic gate can feed into another as input</li> </ul>		<ul style="list-style-type: none"> <li>• Learn what an overflow error is</li> <li>• Learn how data is stored on a computer</li> <li>• Learn about optical storage</li> <li>• Learn about how computers store images and represent them</li> <li>• Learn about resolution, colour depth, vector and bitmap images</li> </ul> <p><u>Mobile App Development</u></p> <ul style="list-style-type: none"> <li>• Learn how to use an app to solve a problem</li> <li>• Learn how to make an app react to user input</li> <li>• Learn how to add images to a GUI</li> <li>• Learn about variables and how to manipulate them</li> </ul>
Skills	<p><u>Online Safety (E-Safety)</u></p> <ul style="list-style-type: none"> <li>• Be able to recognise when they are posting too much information</li> <li>• Be able to identify what is appropriate and inappropriate information to post online</li> <li>• Be able to report concerns</li> <li>• Be able to recognise if they are being groomed or manipulated</li> <li>• Recognise social engineering tactics.</li> <li>• Be able to safeguard themselves from social engineering techniques</li> </ul> <p><u>Binary Logic</u></p> <ul style="list-style-type: none"> <li>• Be able to recognise the three logic gate symbols</li> <li>• Be able to create the three truth tables for AND OR NOT logic circuits</li> <li>• Be able to create truth tables based on real life situations</li> <li>• Be able to work out the output of a simple circuit</li> </ul>	<p><u>Python Programming in EduBlocks</u></p> <ul style="list-style-type: none"> <li>• Be able to create a simple program in Python that uses the terminal or command window</li> <li>• Be able to assign a value to a variable</li> <li>• Be able to output information to the screen</li> <li>• Be able to order a simple program in Python</li> <li>• Be able to input numbers into Python</li> <li>• Be able to use that input in calculations</li> <li>• Be able to describe data types in Python</li> <li>• Be able to describe what is meant by selection</li> <li>• Be able to use an IF statement in Python</li> <li>• Be able to use indentation</li> <li>• Be able to use selection in Python programs</li> </ul>	<p><u>Understanding Computers</u></p> <ul style="list-style-type: none"> <li>• Be able to explain the different parts of the CPU</li> <li>• Be able to explain the FDE cycle</li> <li>• Be able to define Hz, MHz and GHz and state how these relate to the speed of the processor</li> <li>• Be able to explain different aspects of utilities, operating systems and applications software</li> <li>• Be able to convert denary values into 8-bit binary</li> <li>• Be able to convert 8-bit binary values into denary numbers</li> <li>• Be able to perform binary addition using rules</li> <li>• Be able to evaluate overflow errors</li> <li>• Be able to explain how 1s and 0s are represented by lands and pits</li> <li>• Be able to evaluate the strengths and weaknesses of different storage devices</li> </ul>



	Autumn term	Spring term	Summer term
	<ul style="list-style-type: none"> <li>• Be able to work out the output and a more advanced circuit</li> <li>• Be able to create truth tables from logic circuits</li> <li>• Be able to create a logic circuit given an expression</li> </ul>		<ul style="list-style-type: none"> <li>• Be able to explain what a pixel is and how images can become pixelated</li> <li>• Be able to decode a binary string into an image</li> <li>• Be able to explain the terms resolution, bitmap, vector and colour depth.</li> <li>• Be able to encode a binary image</li> </ul> <p><u>Mobile App Development</u></p> <ul style="list-style-type: none"> <li>• Be able to break down a problem</li> <li>• Be able to implement a GUI to meet the needs of a user</li> <li>• Be able to link screens together</li> <li>• Recognise that events can control the flow of a program</li> <li>• Use a block-based programming language to create a sequence</li> <li>• Use user input in an event-driven programming environment</li> <li>• Be able to add an image from an existing file</li> <li>• Be able to resize the image in the properties and in code</li> <li>• Be able to code the image to respond to the tap &amp; move</li> <li>• Understand the role of a variable</li> <li>• Add or subtract from a variable in an event</li> <li>• Show the result of a variable on screen</li> </ul>
<b>Subject specific vocabulary</b>	<ul style="list-style-type: none"> <li>• Uniqueness</li> <li>• Randomness</li> <li>• Phishing</li> <li>• Shouldering</li> <li>• Exploitation</li> </ul>	<ul style="list-style-type: none"> <li>• Fraudulent</li> <li>• Boolean</li> <li>• Operators</li> <li>• Binary</li> <li>• Denary</li> </ul>	<ul style="list-style-type: none"> <li>• Operators</li> <li>• Variable</li> <li>• Sequence</li> <li>• Encapsulation</li> </ul>
<b>Assessment</b>	<ul style="list-style-type: none"> <li>• Online Safety (E-Safety)</li> <li>• Teachers will check the worksheet produced in class.</li> </ul>	<ul style="list-style-type: none"> <li>• Python Programming in EduBlocks</li> <li>• Teachers will check the worksheet produced in class.</li> </ul>	<ul style="list-style-type: none"> <li>• Peripheral</li> <li>• Components</li> <li>• Volatile</li> <li>• Scalable</li> <li>• Pixilation</li> <li>• Decomposition</li> <li>• Hexadecimal</li> <li>• Simulator</li> <li>• Developer</li> </ul>

	Autumn term	Spring term	Summer term
	<ul style="list-style-type: none"> <li>Students to undertake an online assessment</li> <li>On screen assessment including multiple choice</li> <li>Binary Logic</li> <li>Teachers will check the worksheet produced in class.</li> <li>Students to undertake an online assessment</li> <li>On screen assessment to create truth tables etc by typing in the answers</li> </ul>	<ul style="list-style-type: none"> <li>Interim Assessment – Multiple Choice</li> <li>End of Unit – Students produce 3 python programs.</li> </ul>	<ul style="list-style-type: none"> <li>Binary Review</li> <li>Binary Addition Review</li> <li>Mobile App Development</li> <li>Produce a mobile app (Tappy Tap)</li> </ul>

### Key Stage 3: Year 9 – Long Term Planning

	Autumn term	Spring term	Summer term
Knowledge	<p><a href="#">Online Safety (E-Safety)</a></p> <ul style="list-style-type: none"> <li>Learn about oversharing information</li> <li>Learn that your digital footprint is also based upon what others also share about you</li> <li>Learn that your digital footprint can be pieced together</li> <li>Learn about private information that should not be shared</li> <li>Learn about online risks such as cat fishing, identity fraud and so on</li> <li>Learn about nudes and pornography and the legality of under 18s sharing such material</li> <li>Learn about how bad decisions can have an effect on their future</li> </ul> <p><a href="#">EasyGUI Programming</a></p> <ul style="list-style-type: none"> <li>Learn about sequencing and event handling</li> <li>Learn about procedures in Python</li> <li>Learn about GUI output techniques</li> <li>Learn what a GUI is</li> <li>Learn about variables in Python</li> </ul>	<p><a href="#">Data and Algorithms</a></p> <ul style="list-style-type: none"> <li>Learn how computers store numbers</li> <li>Learn about sizes of data</li> <li>Learn how computers store images</li> <li>Learn about abstraction</li> <li>Learn what a digital image is</li> <li>Learn how can binary be used to store image data</li> <li>Learn the process to encode and decode a digital image</li> <li>Learn about how computers store sound</li> <li>Learn what sound is</li> <li>Learn how computers transmit sound</li> <li>Learn about the link between file size and fidelity</li> <li>Learn about file size calculation in relation to sound</li> <li>Learn about the properties of sound files ie: stereo, mono etc..</li> <li>Learn how the bit depth and sample rate can affect the quality of the audio file</li> <li>Learn how computers search for data</li> </ul>	<p><a href="#">Networks HTML and Cyber Security</a></p> <ul style="list-style-type: none"> <li>Learn about the WWW and the Internet</li> <li>Understand the breakdown of a URL</li> <li>Learn about the most common form of cyber attacks</li> <li>Be able to define hacking in the context of cybersecurity</li> <li>Explain what ethical hacking is?</li> <li>Identifying different types of cyberattack</li> <li>Explain how a DDoS attack can impact users of online services</li> <li>Identify strategies to reduce the chance of a brute force attack being successful</li> <li>Explain the need for the Computer Misuse Act</li> <li>Learn programming aspects of HTML</li> </ul>

	Autumn term	Spring term	Summer term
	<ul style="list-style-type: none"> <li>Learn about input methods using GUI techniques</li> <li>Learn about selection in Python</li> <li>Learn about ButtonBoxes in Python</li> <li>Learn to code an app using a range of different terminal and GUI based techniques</li> </ul>	<ul style="list-style-type: none"> <li>Learn how computers sort data</li> </ul>	
Skills	<ul style="list-style-type: none"> <li>Recognise the fact that they are over sharing</li> <li>Recognise online risks such as cat fishing and identity fraud</li> <li>Report concerns and know the mechanisms of such</li> </ul> <p><a href="#">EasyGUI Programming</a></p> <ul style="list-style-type: none"> <li>Understand the role of a flow diagram</li> <li>Use a flow diagram to show stages of an algorithm</li> <li>Create an algorithm using Flowol</li> <li>Import a GUI library</li> <li>Use a GUI to output to the screen</li> <li>Use a simple procedure</li> <li>Use variables in Python</li> <li>Use input functions from GUI libraries</li> <li>Write programs that use selection in Python</li> <li>Write programs that allow the user to selection options from a GUI based menu</li> <li>Use procedures</li> <li>Use global variables</li> <li>Use msgbox to output to the screen</li> <li>Use enterbox to enter data</li> <li>Use buttonboxes to create a simple menu system</li> <li>Create a sequence of instructions in the appropriate order</li> </ul>	<p><a href="#">Data and Algorithms</a></p> <ul style="list-style-type: none"> <li>Convert a binary number into a denary number</li> <li>Convert a denary number up to 255 into a binary value</li> <li>Decode and encode a digital image</li> <li>Calculate the file sizes of computer-based images</li> <li>Explain how a computer converts analogue sound into digital and vice versa</li> <li>Explain why digital media is likely to be lower quality than analogue media</li> <li>Explain the reasons that may affect the quality of sound when digitizing it</li> <li>Calculate the file sizes and digitized sounds / music</li> <li>Define algorithm</li> <li>Understand and explain how binary and linear search algorithms work</li> <li>Compare and contrast linear and binary search algorithms</li> <li>Perform a linear search</li> <li>Perform a binary search</li> <li>Explain why we need to sort data</li> <li>Describe and implement at least one sorting algorithms</li> </ul>	<p><a href="#">Networks HTML and Cyber Security</a></p> <ul style="list-style-type: none"> <li>Explain the differences between the WWW and internet</li> <li>Evaluate a website</li> <li>Recognise how to spot a fake URL</li> <li>Understand the basic role and structure of HTML</li> <li>Understand how tags work</li> <li>Create a web page</li> <li>Add links to a website</li> <li>Add images to a website</li> </ul>

	Autumn term	Spring term	Summer term
<b>Subject specific vocabulary</b>	<ul style="list-style-type: none"> <li>• Permanency</li> <li>• Pseudonym</li> <li>• Allegations</li> <li>• Precautions</li> <li>• Char</li> <li>• Terminator</li> <li>• Procedures</li> <li>• Buttonbox</li> <li>• Array</li> <li>• Looping</li> <li>• Iteration</li> <li>• Concatenation</li> </ul>	<ul style="list-style-type: none"> <li>• Binary</li> <li>• Denary</li> <li>• Transistors</li> <li>• States</li> <li>• Represent</li> <li>• Register</li> <li>• Encode</li> <li>• Abstraction</li> <li>• Digitize</li> <li>• Fidelity</li> <li>• Transmit</li> <li>• Efficiency</li> </ul>	<ul style="list-style-type: none"> <li>• Network</li> <li>• Espionage</li> <li>• Botnet</li> <li>• Malware</li> <li>• Phishing</li> <li>• Pharming</li> <li>• Shouldering</li> <li>• Trojan</li> <li>• Ransomware</li> <li>• Keyframing</li> <li>• Storyboarding</li> </ul>
<b>Assessment</b>	<p><a href="#">Online Safety (E-Safety)</a></p> <ul style="list-style-type: none"> <li>• Teachers will check the worksheet produced in class.</li> <li>• On screen assessment including multiple choice</li> </ul> <p><a href="#">EasyGUI Python Programming</a></p> <ul style="list-style-type: none"> <li>• Interim Assessment – Multiple Choice</li> <li>• End of Unit Test – Project based assessment where the student creates a GUI based program for a bank</li> </ul>	<p><a href="#">Data and Algorithms</a></p> <ul style="list-style-type: none"> <li>• Teachers will check the worksheet produced in class.</li> <li>• On screen assessment including multiple choice</li> <li>• End of Unit Test</li> <li>• Interim Test</li> </ul>	<p><a href="#">Networks HTML and Cyber Security</a></p> <ul style="list-style-type: none"> <li>• Students to produce a simple website on cyber security (Project Based Assessment)</li> </ul>

#### Key Stage 4 Year 10 – Long Term Planning – Edexcel GCSE

	Autumn term	Spring term	Summer term
<b>Knowledge</b>	<p><a href="#">01P – Representation of Numbers in Binary</a></p> <ul style="list-style-type: none"> <li>• Binary to Denary Conversion using 8-bit unsigned binary numbers</li> <li>• Rules of binary addition</li> <li>• Overflow errors</li> </ul> <p><a href="#">02P – Binary division/multiplication, representation of letters and hexadecimal</a></p> <ul style="list-style-type: none"> <li>• Representation of negative numbers in binary using sign and magnitude and two's compliment</li> <li>• Logical Binary Shifts</li> <li>• Arithmetic Binary Shifts</li> <li>• Hexadecimal</li> <li>• ASCII</li> </ul>	<p><a href="#">02CT – Programming Fundamentals</a></p> <ul style="list-style-type: none"> <li>• Input Processing Output Selection</li> <li>• For Loops</li> <li>• Selection IF THEN ELIF</li> </ul> <p><a href="#">04P - Operating Systems, their components and functionality</a></p> <ul style="list-style-type: none"> <li>• Operating Systems</li> <li>• File Management</li> <li>• Process Management (Round Robin etc)</li> <li>• Peripherals and User Management</li> <li>• Utility Software</li> </ul>	<p><a href="#">05P – Viruses, security and social engineering</a></p> <ul style="list-style-type: none"> <li>• Malware and AntiMalware</li> <li>• Hackers / Tools to Stop and Best Defence</li> <li>• Social Engineering (Phishing, baiting, pretexting etc..)</li> <li>• Encryption and keeping data safe</li> <li>• Robust software, vulnerabilities, bad practice and code reviews</li> </ul> <p><a href="#">03CT – Making computer programs modular and arrays</a></p> <ul style="list-style-type: none"> <li>• Procedures</li> <li>• Functions</li> <li>• Arrays</li> </ul> <p><a href="#">06P Networks</a></p>

	<p><u>01CT – Introduction to Computer Programming</u></p> <ul style="list-style-type: none"> <li>• Intro to Programming - Hello World and Print</li> <li>• Decomposition and Sequencing</li> <li>• Assigning values to variables and Data</li> <li>• Types</li> <li>• Input integers and debugging</li> <li>• Flowcharts</li> </ul> <p><u>03P – Stored program concept (Von Neumann) and how computers work</u></p> <ul style="list-style-type: none"> <li>• Stored Program Concept (Von Neumann)</li> <li>• Fetch Decode Execute Von Neumann</li> <li>• CPU Terminology</li> <li>• Secondary Storage Sizes</li> </ul>		<ul style="list-style-type: none"> <li>• LANS and WANS</li> <li>• Network Speed</li> <li>• Connectivity / Cables (UTP, Fibre, Ethernet etc...)</li> <li>• Wired V Wireless</li> <li>• Network Topologies (Ring, Star, Mesh)</li> </ul>
<p><b>Skills</b></p>	<p><u>01P - Representation of Numbers in Binary</u></p> <ul style="list-style-type: none"> <li>• Convert from denary to binary numbers and vice versa</li> <li>• Add 8-bit binary numbers</li> <li>• Be able to handle overflow errors</li> </ul> <p><u>02P - Binary division / multiplication, representation of letters and hexadecimal</u></p> <ul style="list-style-type: none"> <li>• Convert signed and unsigned 8-bit binary numbers</li> <li>• Perform logical binary shifts to show multiplication and division</li> <li>• Perform arithmetic binary shifts to show multiplication and division</li> <li>• Convert binary and denary values into hexadecimal notation and vice versa</li> <li>• Convert ASCII codes into letters and vice versa</li> </ul> <p><u>03P – Stored program concept (Von Neumann) and how computers work</u></p>	<p><u>02CT – Programming Fundamentals</u></p> <ul style="list-style-type: none"> <li>• Use print and input functions</li> <li>• Recognise selection and use simple if statements to get the computer to make decisions</li> <li>• Expand the capability of the if statements to include if then else complexity</li> <li>• Recognise loops and iteration</li> <li>• Use ‘for loops’</li> <li>• Use ‘while loops’</li> </ul> <p><u>04P – Operating Systems</u></p> <ul style="list-style-type: none"> <li>• Describe and explain what an operating system is</li> <li>• Explain file management and its related functions such as directories, files, moving copying etc.</li> <li>• Explain file permissions read, write and execute</li> <li>• Explain the term process management</li> </ul>	<p><u>05P – Viruses, security and social engineering</u></p> <ul style="list-style-type: none"> <li>• Describe and explain the different types of Malware Antimalware</li> <li>• Describe and explain the different types of Hack Tools and Best Defence against them</li> <li>• Explain Social Engineering (Phishing, baiting, pretexting etc..)</li> <li>• Explain what encryption is and how to keep data safe</li> <li>• Discuss robust software, vulnerabilities, bad practice and code reviews</li> </ul> <p>06P - Networks</p> <ul style="list-style-type: none"> <li>• Describe the different types of network topology and be able to discuss the different network transmission media and be able to perform calculations</li> <li>• Explain the different type of network connectivity media such as UTP and fibre optic</li> <li>• Be able to talk about wired and wireless networks and evaluate them</li> </ul>

	<ul style="list-style-type: none"> <li>Describe the Von Neumann architecture and how computers work</li> <li>Explain the FDE cycle, how this relates to Von Neumann and the stages of fetch data and instructions stored in RAM</li> <li>Identify and explain the components of a computer system</li> <li>Describe the roles of computer parts in a computer system</li> <li>Explain the components of the CPU and their roles</li> <li>Describe and explain secondary storage devices and their roles</li> <li>Calculate and or state various sizes of secondary storage</li> </ul>	<ul style="list-style-type: none"> <li>Explain the main scheduling algorithms round robin etc..</li> <li>Explain what virtual memory is and how it works</li> <li>Explain about peripherals, device drivers and evaluate why they are needed</li> <li>Explain the different types of interfaces such as GUI, WIMMP, CLI</li> <li>Describe and explain the different types of utilities software and their roles in the system</li> <li>Explain what is meant by robust software, code vulnerabilities and hackers</li> <li>Identify and explain aspects of a code review.</li> </ul>	<ul style="list-style-type: none"> <li>Explain different networking protocols and their role with in a network</li> <li>Discuss how data is broken up</li> <li>Discuss the TCP/IP stack / OSI model</li> </ul>
<b>Vocabulary</b>	Please see KS4 Computing vocabulary and definitions	Please see KS4 Computing vocabulary and definitions	Please see KS4 Computing vocabulary and definitions
<b>Assessment</b>	<p>01P Representation of Numbers in Binary Type in answers KMP</p> <p>02P - Binary division / multiplication, representation of letters and hexadecimal Type in answers</p> <p>01CT – Introduction to Computer Programming</p> <p>03P – Stored program concept (Von Neumann) and how computers work Onscreen based KMP</p>	<p>02CT – Programming Fundamentals On Screen Assessment / KMP</p> <p>04P - Operating Systems, their components and functionality On Screen Assessment / KMP</p>	<p>05P – Viruses, security and social engineering On Screen Assessment / KMP</p> <p>03CT – Making computer programs modular and arrays On Screen Assessment / KMP Coding</p> <p>06P Networks On Screen Assessment / KMP</p>

#### Key Stage 4: Year 11 – Long Term Planning – Edexcel GCSE

	Autumn term	Spring term	Summer term
<b>Knowledge</b>	<p>01CT – Using the turtle to control and create computer graphics</p> <ul style="list-style-type: none"> <li>Turtle Introduction Pens and Lines</li> </ul>	02CT – Using coding techniques to handle files in Python	03CT – Searching and sorting techniques in Python

	<ul style="list-style-type: none"> <li>• Turtle Movement and Coordinates</li> <li>• Turtle pen colour and filling</li> </ul> <p>01P – Embedded Systems. IoT and Networking</p> <ul style="list-style-type: none"> <li>• Embedded Systems</li> <li>• The Internet of Things</li> <li>• Packet Switching (Networks)</li> <li>• TCP IP and the OSI 4 Layer Model</li> <li>• Protocols (HTTP, FTP, Ethernet, POP etc...)</li> </ul> <p>02P – Environmental Issues, Low and High</p> <ul style="list-style-type: none"> <li>• Level Programming and intellectual Property</li> <li>• Environmental Issues and the Wee Directive</li> <li>• High Level and Low-Level Languages</li> <li>• Translators</li> <li>• Intellectual Property</li> </ul>	<ul style="list-style-type: none"> <li>• File Reading including the three different operating modes (read, readline and readlines)</li> <li>• File Writing</li> <li>• CSV Files</li> </ul> <p>03P – Representation of Data and Compression</p> <p>Learn how the computer represents different kinds of data and stores it.</p> <ul style="list-style-type: none"> <li>• Bitmaps</li> <li>• Sound</li> <li>• Compression</li> <li>• Lossy Compression</li> <li>• Lossless Compression</li> </ul>	<p>Learn how a computer sorts and searches for data. learn:</p> <ul style="list-style-type: none"> <li>• Linear Search</li> <li>• Bubble Sort</li> <li>• Binary Search</li> <li>• Merge Sort</li> <li>• Two Dimensional Arrays</li> </ul>
<b>Skills</b>	<p>01CT – Using the turtle to control and create computer graphics</p> <ul style="list-style-type: none"> <li>• Manipulate the turtle to draw polygons and basic shapes</li> <li>• Functions and built-in libraries to control movement and use coordinates</li> <li>• Format the turtle to change attributes such as width, colour, size and filling options</li> </ul> <p>01P – Embedded Systems. IoT and Networking</p> <ul style="list-style-type: none"> <li>• Describe and explain the properties of an embedded system and IoT</li> <li>• Give examples of embedded systems and IoT</li> <li>• Explain what is meant by a packet switching network and how it works</li> </ul>	<p>02CT – Using coding techniques to handle files in Python</p> <ul style="list-style-type: none"> <li>• Open a text file for reading</li> <li>• use three different modes for opening a text file</li> <li>• Create a program to read a text file and display the output on screen</li> <li>• Open a text file for writing</li> <li>• Use three different modes for opening a text file for writing</li> <li>• Create a program to write data to a text file and display the output on screen</li> <li>• Read data from a CSV file and display the data on screen</li> <li>• Write data to a CSV file</li> </ul>	<p>03CT – Searching and sorting techniques in Python</p> <ul style="list-style-type: none"> <li>• Implement a linear search in Python</li> <li>• Implement a two-dimensional array</li> <li>• Explain how a bubble sort works</li> <li>• Explain how a binary search works</li> <li>• Explain how a merge search works</li> </ul>

	<ul style="list-style-type: none"> <li>• Explain the 4 stages of the OSI layer model and what happens in each layer</li> <li>• List all of the layers in order</li> <li>• List networking protocols</li> <li>• Explain how those networking protocols work</li> </ul> <p>O2P – Environmental Issues, Low and High Level Programming and intellectual Property</p> <ul style="list-style-type: none"> <li>• Describe and explain environmental issues and their associated impact. EG: raw materials impact on the environment and water usage</li> <li>• Explain elements of the WEEE directive</li> <li>• Explain high- and low-level languages and evaluate their suitability for a given task</li> <li>• Explain what is meant by an interpreter, compiler and assembler when translating languages</li> <li>• Evaluate an interpreter, compiler and assembler and state the disadvantages and advantages</li> <li>• Describe and explain aspects of IPO and copyright</li> <li>• Contextualise the use of IPO and copyright</li> </ul>	<ul style="list-style-type: none"> <li>• Explain how the CSV parameters work in Python</li> </ul> <p>O3P – Representation of Data and Compression</p> <ul style="list-style-type: none"> <li>• Describe and explain how a computer represents images</li> <li>• Encode a digital image</li> <li>• Decode a digital image</li> <li>• Describe and explain how a computer represents sound</li> <li>• Evaluate the effect of altering the resolution, amplitude, channels, frequency, sample rate and bit depth</li> </ul>	
<b>Vocabulary</b>	<ul style="list-style-type: none"> <li>• Please see KS4 Computing vocabulary and definitions</li> </ul>	<ul style="list-style-type: none"> <li>• Please see KS4 Computing vocabulary and definitions</li> </ul>	<ul style="list-style-type: none"> <li>• Please see KS4 Computing vocabulary and definitions</li> </ul>
<b>Assessment</b>	<p>O1CT – Using the turtle to control and create computer graphics Coding KMP on screen assessment</p> <p>O1P – Embedded Systems. IoT and Networking On screen KMP assessment</p>	<p>O2CT – Using coding techniques to handle files in Python On screen KMP assessment</p>	<p>O3CT – Searching and sorting techniques in Python Coding on Screen On screen KMP assessment</p>



	02P – Environmental Issues, Low and High Level Programming and intellectual Property On screen KMP assessment		
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