



# Curriculum map – Computer Science

YEAR 10	AUTUMN 1	AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1	SUMMER 2
TOPIC(s)	<p><b>Introduction to OCR J277 GCSE Computer Science.</b></p> <ul style="list-style-type: none"> <li>The course</li> <li>Computer Systems</li> <li>The CPU</li> <li>Main Memory</li> <li>Secondary Storage</li> <li>Units and Conversion</li> <li>Software</li> <li>Networks</li> <li>Security</li> <li>Legislation</li> </ul> <p><b>Programming (Advanced)</b></p> <ul style="list-style-type: none"> <li>Variables and constants</li> <li>Datatypes</li> <li>Iteration</li> <li>Condition and Count Controlled</li> <li>Debugging</li> </ul> <p><b>Integrated Development Environments</b></p>	<p><b>Systems Architecture</b></p> <ul style="list-style-type: none"> <li>Computer Systems</li> <li>Performance</li> <li>Von Neumann</li> <li>The F-D-E cycle</li> </ul> <p><b>Memory</b></p> <ul style="list-style-type: none"> <li>The Purpose of RAM and ROM</li> <li>Virtual Memory</li> </ul> <p><b>Environmental issues</b></p> <ul style="list-style-type: none"> <li>The dark side of technology</li> </ul> <p><b>Programming (Advanced)</b></p> <ul style="list-style-type: none"> <li>Arrays</li> </ul> <p>Algorithms</p> <ul style="list-style-type: none"> <li>Design, test and refine computational problems</li> <li>Flowcharts and Structure Diagrams</li> </ul> <p><b>Robust Programs</b></p> <ul style="list-style-type: none"> <li>Testing</li> </ul>	<p><b>Storage</b></p> <ul style="list-style-type: none"> <li>Types of storage</li> <li>Characteristics of storage</li> </ul> <p><b>Units</b></p> <ul style="list-style-type: none"> <li>Units of storage</li> <li>Calculating storage</li> <li>Binary addition</li> <li>Binary Shift</li> <li>Hexadecimal Conversion</li> <li>Binary Conversion</li> </ul> <p><b>Ethical issues</b></p> <ul style="list-style-type: none"> <li>Privacy and technology (Face recognition)</li> </ul> <p><b>Programming (Advanced)</b></p> <ul style="list-style-type: none"> <li>Procedures</li> <li>Local/Global Variables</li> <li>Arithmetic operators</li> <li>Mod &amp; DIV</li> </ul>	<p><b>Data representation</b></p> <ul style="list-style-type: none"> <li>ASCII</li> <li>Images</li> <li>Sound</li> <li>Compression</li> </ul> <p><b>Cultural issues</b></p> <ul style="list-style-type: none"> <li>The impact of technology on culture.</li> </ul> <p><b>Programming (Advanced)</b></p> <ul style="list-style-type: none"> <li>Boolean Operators</li> <li>2D arrays</li> <li>Functions</li> <li>String methods</li> <li>Battleship project ( this is dependent on teachers AFL)</li> </ul>	<p><b>Networks</b></p> <ul style="list-style-type: none"> <li>Types of networks</li> <li>Performance of networks</li> <li>Client server vs Peer to Peer</li> <li>Hardware</li> <li>The internet</li> <li>Topologies</li> <li>Modes of connection</li> <li>Ethernet</li> <li>Encryption</li> <li>Protocols</li> <li>Layers</li> </ul> <p><b>Legal, environmental, ethical and cultural issues</b></p> <ul style="list-style-type: none"> <li>How technology impacts society</li> </ul> <p><b>Programming (Advanced)</b></p> <ul style="list-style-type: none"> <li>File handling</li> <li>Practicing programming</li> </ul>	<p><b>Algorithms</b></p> <ul style="list-style-type: none"> <li>Abstraction and Decomposition (Advanced)</li> <li>Algorithms</li> <li>Types of Testing</li> <li>Bubble Sort (Advanced)</li> <li>Flow Charts (Advanced)</li> </ul> <p><b>Robust Programs</b></p> <ul style="list-style-type: none"> <li>Defensive Design</li> <li>Validation</li> <li>Authentication</li> </ul> <p><b>Boolean Logic</b></p> <ul style="list-style-type: none"> <li>Logic Gates – 2 levels</li> <li>Boolean programming</li> </ul> <p><b>Programming (Advanced)</b></p> <ul style="list-style-type: none"> <li>Practising programming</li> </ul>

What students will know

<ul style="list-style-type: none"> <li>• The definition of an embedded system.</li> <li>• The CPU carries out the F-D-E cycle</li> <li>• The name of the registers of the CPU</li> <li>• The names of the components of the CPU</li> <li>• The basic differences between RAM and ROM</li> <li>• The three types of storage devices</li> <li>• The purpose of secondary storage.</li> <li>• Brief overview of data units, conversion and representation</li> <li>• Types of networks</li> <li>• Topologies</li> <li>• Name the network hardware (NIC introduced)</li> <li>• Definition of bandwidth</li> <li>• Basics of threats to a network – the names and the basic wordings and the preventions.</li> <li>• Legislation related to computing.             <ul style="list-style-type: none"> <li>• The data protection Act</li> <li>• The Computer Misuse Act</li> <li>• Copyright Designs and Patents act</li> <li>• Software licenses</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• The purpose of the CPU</li> <li>• The role of each register in the F-D-E</li> <li>• The Von Neumann Architecture</li> <li>• The common characteristics of the CPU and how they affect performance.</li> <li>• The purpose of embedded systems</li> <li>• Examples of embedded systems</li> <li>• The need for primary storage</li> <li>• The difference between RAM and ROM</li> <li>• The purpose of ROM &amp; RAM</li> <li>• Virtual Memory</li> <li>• Impact of technology on the environment and related laws.</li> </ul> <p>Programming: Commenting</p> <p>The purpose of testing Types of testing (Iterative and Final Test data</p> <p>Normal, Boundary Invalid, Erroneous</p>	<ul style="list-style-type: none"> <li>• The need for secondary storage</li> <li>• Common types of storage</li> <li>• Suitable storage devices and storage media for a given application</li> <li>• The advantages and disadvantages of storage devices and storage media.</li> <li>• The units of data storage</li> <li>• How data has to be converted to binary to be processed by a computer.</li> <li>• Impact of technology on ethical and privacy and related laws.</li> </ul>	<ul style="list-style-type: none"> <li>• Describe an overflow error</li> <li>• Binary numbers are created by transistors, measuring voltage.</li> <li>• What a hexadecimal number is and what it will be used or.</li> <li>• What the most significant bit and least significant bit is.</li> <li>• Understand the effect of a binary shift – left or right.</li> <li>• How binary codes are used to represent characters</li> <li>• Define a character set</li> <li>• The relationship between the number of bits per character in a character set and the number of characters that can be represented (ASCII, Unicode)</li> <li>• How an image is represented as a series of pixels, represented in binary.</li> <li>• What Metadata is</li> <li>• The effect of colour depth and resolution on:</li> <li>• The quality of the image</li> <li>• The size of the file</li> <li>• How sound can be sampled and stored in digital form</li> </ul>	<ul style="list-style-type: none"> <li>• Types of Networks:</li> <li>• LAN and WAN</li> <li>• Factors that affect the performance of networks</li> <li>• Different roles of computers in a client server and peer to peer network</li> <li>• The hardware used to connect networks in to LAN:             <ul style="list-style-type: none"> <li>○ Wireless access points</li> <li>○ Routers</li> <li>○ Switches</li> <li>○ NIC</li> <li>○ Transmission media</li> </ul> </li> <li>• The internet as a worldwide collection of computer networks             <ul style="list-style-type: none"> <li>○ DNS</li> <li>○ Hosting</li> <li>○ The cloud</li> <li>○ Web servers and clients.</li> </ul> </li> <li>• Star and Mesh Topologies.</li> <li>• Modes of connection: Wired (Ethernet)</li> <li>• Wireless (Wi-Fi / Bluetooth</li> <li>• Encryption</li> <li>• IP Addressing and MAC addressing</li> <li>• Standards</li> </ul>	<ul style="list-style-type: none"> <li>• Abstraction</li> <li>• Decomposition</li> <li>• Algorithmic thinking</li> <li>• Pseudocode</li> <li>• Flowcharts</li> <li>• Levels of Language</li> <li>• Trace Tables</li> <li>• Bubble Sort the main steps The pre-requisites of the algorithms, Apply the algorithms, Identify the algorithms if given the code,</li> <li>• Defensive Design</li> <li>• Anticipating Misuse</li> <li>• Authentication</li> <li>• Maintainability</li> <li>• Using subprograms</li> <li>• Naming conversions</li> <li>• Indention</li> <li>• commenting</li> <li>• Input validation</li> </ul>
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YEAR 10	AUTUMN 1	AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1	SUMMER 2
	Programming: <ul style="list-style-type: none"> <li>• The features of integrated Development Environments</li> <li>• Common tools: Editors, Error Diagnostics, Run-time environments</li> <li>• Trace Tables</li> </ul>			<ul style="list-style-type: none"> <li>• The effect of sample rate, duration and bit depth on:               <ul style="list-style-type: none"> <li>○ The quality</li> <li>○ The size of the sound.</li> </ul> </li> <li>• The need for compression</li> <li>• Types of compression: Lossless and Lossy</li> <li>• Impact of technology on culture and related laws.</li> </ul>	<ul style="list-style-type: none"> <li>• Common protocols (TCP/IP, HTTP, HTTPS, FTP, POP, IMAP, SMTP)</li> <li>• The concept of layers.</li> <li>• 1.6 Ethical impact of technology (AI) and related laws.</li> </ul>	

YEAR 10	AUTUMN 1	AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1	SUMMER 2
What students will be able to do	<p>Programming:</p> <ul style="list-style-type: none"> <li>• Use a variable, and constant, input output and assignments</li> <li>• Use sequence, selection and iteration.</li> <li>• Name and program with the correct data types</li> <li>• Debug syntax and logic errors</li> <li>• solve programming problems using selection (if, elif, else)</li> <li>• Iteration – solve programming problems using iteration</li> <li>• Complete a simple trace table</li> </ul>	<p>Being to develop the skills to write coherently about the impacts of technology. (Balanced, planned answers)</p> <p>Programming</p> <p>2.1 Use abstraction and decomposition to solve a problem</p> <p>2.2 Identify the inputs, processes and outputs for a problem</p> <p>Create pseudocode and flowcharts for an algorithm</p> <p>Identify common errors</p> <p>Use simple arithmetic operators</p> <p>Program with Boolean operators (AND, OR, NOT)</p> <p>Program using the correct data types.</p> <p>Cast between Data types, choose the appropriate data type.</p> <p>Random number and strong generation from an Array</p> <p>The creation and use of sub-programs (procedures)</p> <p>Creation and use of local/global variables</p>	<p>Build on the skills to write coherently about the impacts of technology.</p> <p>Order the units of storage.</p> <p>Convert between the units of storage.</p> <p>Calculations relate to: Data Capacity and calculations of data capacity</p> <p>Convert binary to denary and visa-versa</p> <p>Convert hex to denary and binary and visa-versa</p> <p>Program a hex to denary calculator.</p> <p>Programming:</p> <p>Use of complex arithmetic operators (MOD and DIV)</p> <p>Application of the skills learnt the previous two half terms within a programming project.</p>	<p>Continue to build the skills to write coherently about the impacts of technology.</p> <p>Convert positive denary whole numbers to binary numbers (up to 8 bits) a vice versa</p> <p>Adding two binary integers together</p> <p>Convert positive denary whole numbers into 2-digit hexadecimal numbers and vice versa</p> <p>Convert binary integers to their hexadecimal equivalents and vice versa</p> <p>Carry out binary shifts</p> <p>Programming:</p> <p>The creation and use of functions.</p> <p>2D arrays</p> <p>String manipulation – slicing</p> <p>Boolean operators revisit</p> <p>Application of the skills learnt the previous two half terms with in a programming project.</p>	<p>Continue to build the skills to write coherently about the impacts of technology.</p> <p>Programming:</p> <p>File handling Text files</p> <p>Application of the skills learnt the previous two half terms with in a programming project.</p>	<p>Begin to build the skills to write written algorithms on paper using python and pseudocode.</p> <p>Create and interpret flow charts</p> <p>Create maintainable code using sub-programs, indentation commenting and naming conventions consistently.</p> <p>Application of the skills learnt the previous two half terms with in a programming project.</p>