

## Shoreham Academy Computing Department: 7-year curriculum map

	Autumn		Spring		Summer	
<p><b>Year 7</b></p> <p>Computing</p>	<p><b>Topic:</b> E-Literacy and E-Safety</p> <p><b>Knowledge/skills taught:</b> How to use the school network. Electronic file and folder management. Searching the web using Boolean Operators. Cyberbullying - inappropriate content, contact and conduct.</p> <p><b>Has links to:</b> Using the school network safely and respectfully. Online relationships covered in year 8 and 9. Databases in year 9. Boolean Algebra KS4/KS5 Computer Science.</p>	<p><b>Topic:</b> Computer Systems /software</p> <p><b>Knowledge/skills taught:</b> Identifying/describing the functions of computer hardware components, storage devices, input, and output devices. Binary Conversion. Identifying software applications and their uses, selecting the most appropriate software application for a given context.</p> <p><b>Has links to:</b> Computing theory studied in KS4/KS5 Computer Science and IT.</p>	<p><b>Topic:</b> Data Manipulation and Processing - Spreadsheets</p> <p><b>Knowledge/skills taught</b> Create, edit, and process data using appropriate software tools and techniques – Data entry/formatting, formulae, functions, Charts/Graphs, Modelling.</p> <p><b>Has links to:</b> Spreadsheets studied in year 9 and KS4/KS5 IT.</p>	<p><b>Topic:</b> Computer Crime and Legislation</p> <p><b>Knowledge/skills taught</b> Identify and explain legislation relating to securing and protecting personal data – GDPR. Crimes linked to data theft - explain the need for data protection.</p> <p><b>Has links to:</b> Legislation/Data studied in KS4/KS5 Computer Science and IT.</p>	<p><b>Topic:</b> Programming techniques (Scratch Block Based)</p> <p><b>Knowledge/skills taught:</b> Programming using block based visual programming. Understand and use programming techniques – sequence, selection, and iteration.</p> <p><b>Has links to:</b> Programming studied in year 8 (Small Basic), 9 (Python) and KS4/5 Programming - Computer Science.</p>	<p><b>Topic:</b> Creative Project – Game Development</p> <p><b>Knowledge/skills taught:</b> Design, develop, test, and evaluate a digital game – based on client requirement.</p> <p><b>Has links to:</b> Programming studied in year 8 (Small Basic), 9 (Python) and KS4/5 Programming - Computer Science.</p>
<p><b>Year 8</b></p> <p>Computing</p>	<p><b>Topic:</b> Data Manipulation and Processing - Spreadsheets</p> <p><b>Knowledge/skills taught</b> Using techniques to create, edit and process data. Using formulae, conditional formatting, What If Scenarios (goal seek), advanced functions and cell referencing.</p> <p><b>Has links to:</b> Spreadsheets/Data Manipulation studied in year 9 and KS4/KS5 IT.</p>	<p><b>Topic:</b> Computer Crime and Legislation</p> <p><b>Knowledge/skills taught -</b> legislation relating to intellectual property - Copyright, Designs and Patents Act. Legislation relating to Computer Crimes – Hacking and Malware – Computer Misuse Act.</p> <p><b>Has links to:</b> Legislation - studied in KS4/KS5 Computer Science and IT.</p>	<p><b>Topic:</b> Designing algorithms using Flowcharts</p> <p><b>Knowledge/skills taught:</b> Create flowcharts to solve and model of real-world problems. Use flowcharts symbols to construct flowcharts and show the step-by-step solution to the problem.</p> <p><b>Has links to:</b> Algorithms studied in year 7/8/9 programming Topic and KS4/KS5 Computer Science.</p>	<p><b>Topic:</b> Programming Techniques (Small Basic – Text Based))</p> <p><b>Knowledge/skills taught:</b> Code instructions to a graphics and text window. Understand and use programming constructs - sequence, selection, and iteration.</p> <p><b>Has links to:</b> Programming studied in 9 (Python) and KS4/5 Computer Science.</p>	<p><b>Topic:</b> Networks</p> <p><b>Knowledge/skills taught.</b> Types of networks (LAN/WAN), network hardware, factors affecting network performance. Network topologies -Star, Ring, Bus, and Mesh.</p> <p><b>Has links to:</b> Networks and topologies studied in KS4/KS5 Computer Science and IT.</p>	<p><b>Topic:</b> E-safety and Cyber Security</p> <p><b>Knowledge/skills taught:</b> Understand online risks and how to stay safe. Understand cyber-crime threats -social engineering and malware. Methods used to prevent cyber-attacks.</p> <p><b>Has links to:</b> Cybercrime and Threats studied in KS4/KS5 Computer Science and IT.</p>
<p><b>Year 9</b></p> <p>Computing</p>	<p><b>Topic:</b> Data Management</p> <p><b>Knowledge/skills taught:</b> Database management – database design, entry, management, data types, creating queries and reports, data protection legislation.</p> <p><b>Has links to:</b> Database Management studied in KS4 IT and KS5 Computer Science and IT.</p>	<p><b>Topic:</b> Programming (Python)</p> <p><b>Knowledge/skills taught:</b> Write and run programs using Sequence (Input and output), Selection (Making decisions), Iteration (Repeating instructions). Write pseudocode algorithms for a given problem.</p> <p><b>Has links to:</b> Programming studied in 9 (Python) and KS4/5 Computer Science.</p>	<p><b>Topic:</b> Web design and development</p> <p><b>Knowledge/skills taught:</b> Analysing and assessing websites, creating a website prototype to meet customer UI design/wireframes. Use HTML to structure static web pages. Modify HTML tags using inline styling to improve the appearance of web pages.</p> <p><b>Has links to:</b> KS4/5 IT coursework units.</p>	<p><b>Topic:</b> App Development</p> <p><b>Knowledge/skills taught:</b> Implement and customise GUI elements to meet the needs of the user. Use user input in an event-driven programming environment. Develop an app prototype to include some functionality. Act on user feedback and evaluate the solution.</p> <p><b>Has links to:</b> KS4/5 IT coursework units. Programming Concepts studied in KS4/5 Computer Science.</p>	<p><b>Topic:</b> Data manipulation and modelling real-world problems - Spreadsheets</p> <p><b>Knowledge/skills taught:</b> Using techniques to create, edit and process data. Using formulae, functions, data validation, formatting, modelling tools, security measures</p> <p><b>Has links to:</b> Spreadsheets/Data Manipulation studied in KS4/KS5 IT.</p>	<p><b>Topic:</b> E-Safety and Project Management</p> <p><b>Knowledge/skills taught:</b> Online privacy/identity/reporting concerns. Use planning tools and software to plan a project and the meet requirements of client, presenting information using tools and techniques. Evaluating projects.</p> <p><b>Has links to:</b> KS4/5 IT units – Project Lifecycle, app design and game design.</p>

<p><b>Year 10</b> IT</p>	<p><b>Topics:</b> Design Tools, HCI (Human Computer Interaction), Data and testing / Augmented Reality Unit</p> <p><b>Key Knowledge/skills taught:</b> Understand how to apply and create design tools for applications.</p> <ul style="list-style-type: none"> <li>Flowcharts, mind maps (library/tunnel timewise/presentation), visualisation diagrams and wireframes</li> </ul> <p>Understand the importance and use of HCI in applications.</p> <ul style="list-style-type: none"> <li>Banking, embedded systems, entertainment, fitness, home appliances and retail</li> <li>Hardware and software considerations</li> <li>User interaction methods</li> </ul> <p>Understand the use of data and testing in different contexts when testing solutions.</p> <ul style="list-style-type: none"> <li>Information and data, data use, data types, data validation and verifications, data collection and storage methods</li> </ul> <p><b>Augmented Reality (AR) unit:</b> Understand the purpose and uses of AR, types of AR and user interaction, devices used with AR, planning and design consideration, creating an AR prototype.</p>	<p><b>Topics:</b> Introduction to Data Manipulation using spreadsheets /</p> <p><b>Key knowledge/skills taught:</b> Manipulate data to develop a solution to meet an identified need using Spreadsheets and Databases</p> <ul style="list-style-type: none"> <li>Functionality: calculations, sorting, filtering, user aids (data entry/validation)</li> <li>Types of outputs: charts, lists, invoices, reports, worksheets</li> <li>HCI: Navigation, accessibility, colour, layout, learnability, user perceptions, messages</li> <li>Data handling and manipulation: Data validation, formatting, formulae, cell referencing, functions,</li> <li>User interface: Buttons, Macros, Hyperlinks, Forms</li> <li>Testing: during and after development, test plan documentation, types of test data</li> <li>Evaluating the spreadsheet solution: client requirements, HCI design principles and conventions</li> </ul>	<p><b>Topics:</b> Cyber Security and legislation Digital Communications / R050 Spreadsheet Unit</p> <p><b>Key Knowledge/skills taught:</b> Understand the use of data and testing in different contexts when testing solutions.</p> <ul style="list-style-type: none"> <li>Purpose and importance of testing, test data, types of testing</li> </ul> <p>Understand cyber security and legislation related to the use IT systems.</p> <ul style="list-style-type: none"> <li>Threats: Malware, social engineering, hacking, DDos, Pharming</li> <li>Vulnerabilities: environmental, physical, system</li> <li>Impacts/consequences of cyber security attacks</li> <li>Prevention measures: physical, logical, safe destruction of data</li> <li>IT Legislation</li> </ul> <p><b>Spreadsheet unit:</b> Be able to plan and design a spreadsheet solution to meet client requirements. Use a range of tools and techniques to create a spreadsheet solution based on the design, which will then be tested and evaluated based on the user requirements.</p>
<p><b>Year 10</b> Computer Science</p>	<p><b>Topic:</b></p> <ol style="list-style-type: none"> <li>Programming fundamentals</li> <li>Practical Programming knowledge/skills</li> </ol> <p><b>Key knowledge/skills taught:</b> <b>Programming fundamentals:</b> The use of variables, constants, operators, inputs, outputs, and assignments, use programming constructs used to control the flow of a program, arithmetic operators, Boolean operators AND, OR and NOT. <b>Data types:</b> The use of data types. Learn Programming fundamentals and techniques with Python.</p> <p><b>Practical Programming knowledge/skills:</b></p> <p><b>Additional programming techniques:</b> basic string manipulation, file handling operations, SQL to search for data, arrays (or equivalent) when solving problem. Sub programs (functions and procedures) to produce structured code. Random number generation.</p>	<p><b>Topic:</b></p> <ol style="list-style-type: none"> <li>Algorithms</li> <li>Producing robust programs</li> </ol> <p><b>Algorithms:</b> Computational thinking – Abstraction, decomposition, algorithmic thinking Designing, creating, and refining algorithms – Identify inputs, processes and outputs for a problem, structure diagrams, create pseudocode and flowchart algorithms. Identify common errors. Trace tables Searching (Binary and Linear Searching), and sorting (bubble, merge, insertion sort) algorithms.</p> <p><b>Producing robust programs:</b> Defensive design, testing, Refining algorithms.</p>	<p><b>Topic:</b></p> <ol style="list-style-type: none"> <li>Boolean logic</li> <li>Memory and storage</li> <li>Systems architecture</li> <li>Practical programming Task</li> </ol> <p><b>Key knowledge/skills taught:</b> <b>Boolean logic:</b> Simple logic diagrams using the operators AND, OR and NOT, Truth tables, combining Boolean operators using AND, OR and NOT, applying logical operators in truth tables to solve problems.</p> <p><b>Systems architecture:</b> Architecture of a CPU, CPU Performance, Embedded systems.</p> <p><b>Memory and storage: Primary storage (RAM/ROM/VIRTUAL memory) Secondary storage.</b> The units of data storage: How data needs to be converted into a binary format to be processed by a computer. Data capacity and calculation of data capacity requirements (Numbers, Characters, Images, Sound) Compression)</p> <p><b>Practical programming Task:</b> All students are given the opportunity to undertake programming tasks to allow students to develop knowledge/skills within the following areas when programming:</p> <ul style="list-style-type: none"> <li>Design</li> <li>Write</li> <li>Test</li> <li>Refine</li> </ul> <p>Python as a programming language, will be used to solve a problem (or problems).</p>

<p><b>Year 11</b> IT</p>	<p><b>Topics:</b> Digital communications / Spreadsheet NEA Assignment</p> <p><b>Key knowledge/skills taught:</b></p> <ul style="list-style-type: none"> <li>• Know the purpose of each digital communication, advantages, disadvantages (e.g., audio, presentation, reports, infographics).</li> <li>• Know the characteristics of the software used to create digital communications.</li> <li>• Know the characteristics of digital devices used to communicate (e.g., Smartphone, PC, Smart TV)</li> <li>• Know the characteristics of each type of distribution channel, advantages, and disadvantages (e.g., cloud, email, VoIP)</li> <li>• Know the characteristics of each connectivity.</li> <li>• Method (e.g., Wi-Fi, 3g/3g)</li> </ul> <p>Assess the suitability for each and justify the use of a digital communication applied to a given context.</p> <p><b>Spreadsheet Coursework Assignment:</b> Students must design, develop, test, and evaluate a spreadsheet solution to meet client requirements (Westwood Swim Centre Scenario). Students will utilise all knowledge/skills learned throughout year 10 and 11 to successfully complete the assignment.</p>	<p><b>Topics:</b> Internet of everything / AR (Augmented Reality) NEA Assignment</p> <p><b>Key knowledge/skills taught:</b></p> <ul style="list-style-type: none"> <li>• Know what is meant by the IoE / the World Wide Web (WWW) and the Internet are used in the use of the IoE.</li> <li>• Know the four pillars and understand the interaction between them.</li> <li>• Advantages and disadvantages of the IoE</li> <li>• Know about digital interactivity /How devices can be tailored to meet the needs of the end users.</li> <li>• Know the purpose of the IoE applied to each application area (energy management, health, manufacturing, military/emergency services/smart devices/ transport)</li> <li>• Assess the suitability of the use of the IoE for each application.</li> <li>• The security issues related to the use of the IoE in each application area.</li> </ul> <p><b>Augmented Reality Coursework Assignment:</b> Students must design, develop, test, and evaluate an augmented reality prototype solution to meet client requirements (Paris City Breaks). Students will utilise all knowledge/skills learned throughout year 10 and 11 to successfully complete the assignment.</p>	<p><b>Topics:</b> AR (Augmented Reality) NEA / Exam preparation</p> <p><b>Augmented Reality Coursework Assignment:</b> Students must design, develop, test, and evaluate an augmented reality prototype application solution to meet client requirements (Paris City Breaks). Students will utilise all knowledge/skills learned throughout year 10 and 11 to successfully complete the assignment.</p> <p>Past assignment examples - Students have been asked to develop products for the following business scenarios:</p> <ul style="list-style-type: none"> <li>• Car manufacturer</li> <li>• Travel Company</li> <li>• Hotels</li> <li>• Bakery</li> <li>• Beauty Salon</li> <li>• Electricity Company</li> </ul> <p>Exam Preparation for Unit R050 Written Exam</p> <ul style="list-style-type: none"> <li>• Knowledge Retrieval</li> <li>• Exam technique</li> </ul>
<p><b>Year 11</b> Computer Science</p>	<p><b>Topic:</b></p> <ol style="list-style-type: none"> <li>1. Systems architecture/ memory/storage</li> <li>2. System software</li> <li>3. Computer networks, connections, and protocols</li> <li>4. Network security</li> <li>5. Ethical, legal, cultural, and environmental impacts of digital technology</li> </ol> <p><b>Knowledge / Knowledge/skills:</b> <b>Systems software:</b> Operating systems, Utility software.</p> <p><b>Networks and topologies:</b> Types of networks, Wired and wireless networks, protocols and layers.</p> <p><b>Network security</b> Threats to computer systems and networks. Identifying and preventing vulnerabilities</p> <p><b>Ethical, legal, cultural, and environmental impacts of digital technology:</b> Impacts of digital technology on wider society including legislation relevant to Computer Science.</p>	<p><b>Topic:</b></p> <ol style="list-style-type: none"> <li>1. Programming fundamentals</li> <li>2. Producing robust programs</li> <li>3. Programming languages and Integrated Development Environments</li> </ol> <p><b>Key knowledge/skills taught:</b> <b>Programming fundamentals:</b> The use of variables, constants, operators, inputs, outputs, and assignments, use programming constructs used to control the flow of a program, arithmetic operators, Boolean operators AND, OR and NOT. <b>Data types:</b> The use of data types.</p> <p><b>Producing robust programs:</b> Defensive design, testing, refining algorithms.</p> <p><b>Programming languages and Integrated Development Environments</b> <b>Languages:</b> Characteristics and purpose of different levels of programming language <b>The Integrated Development Environment (IDE):</b> Common tools and facilities available in an Integrated Development Environment (IDE).</p>	<p><b>Topic:</b></p> <ol style="list-style-type: none"> <li>1. Algorithms</li> <li>2. Additional programming techniques / practice</li> <li>3. Revision / exam preparation</li> </ol> <p><b>Key knowledge/skills taught:</b> <b>Algorithms:</b> Computational thinking, Designing, creating, and refining algorithms, Searching, and sorting algorithms.</p> <p><b>Additional programming techniques:</b> basic string manipulation. file handling operations. SQL to search for data. Arrays (or equivalent) when solving a problem. Sub programs (functions and procedures) to produce structured code. Random number generation.</p>

<p><b>Year 12</b> IT</p>	<p><b>Topic:</b> Fundamentals of IT (Unit 1) <b>Key knowledge/skills taught:</b> Computer hardware and software, business IT systems, employability and communication knowledge/skills, ethical and operational issues.</p>	<p><b>Topic:</b> Application Design (Unit 6) <b>Key knowledge/skills taught:</b> Coursework based unit. Understand how applications are designed, be able to investigate potential solutions, be able to generate and prototype a solution to meet client and user requirements, presenting them to a client.</p>	<p><b>Topic:</b> Game design (Unit 15) <b>Key knowledge/skills/knowledge taught:</b> Coursework based unit. Understand how games are designed, be able to investigate potential solutions, be able to generate and prototype a solution to meet client and user requirements, presenting them to a client. Blender to be used.</p>
<p><b>Year 12</b> Computer Science</p>	<p><b>Topic: <u>Fundamental of programming</u></b> <b>Key Knowledge/skills taught:</b> Programming concepts, Programming paradigms.</p> <p><b>Topic: <u>Fundamentals of data representation</u></b> <b>Key knowledge/skills taught:</b> Number systems, Number bases, Units of information, Binary number system, Information coding systems, Representing images, sound, and other data.</p> <p><b>Topic: <u>Fundamentals of data structures</u></b> <b>Key knowledge/skills taught:</b></p> <ul style="list-style-type: none"> <li>• Data structures and abstract data types</li> <li>• Queues</li> <li>• Stacks</li> <li>• Graphs</li> <li>• Trees</li> <li>• Hash tables</li> <li>• Dictionaries</li> <li>• Vectors</li> </ul>	<p><b>Topic: <u>Fundamentals of algorithms</u></b> <b>Key knowledge/skills taught:</b> Graph-traversal, Tree-traversal, Reverse Polish, searching algorithms, Sorting algorithms, Optimisation algorithms.</p> <p><b>Topic: <u>Theory of computation</u></b> <b>Key knowledge/skills taught:</b> Abstraction and automation, Regular languages, Context-free languages, Classification of algorithms, A model of computation.</p> <p><b>Topic: <u>Fundamentals of computer systems</u></b> <b>Key knowledge/skills taught:</b> Hardware and software, Classification of programming languages, Types of program translator, Logic gates, Boolean algebra.</p>	<p><b>Topic: <u>Fundamentals of computer organisation and architecture</u></b> <b>Key knowledge/skills taught:</b></p> <ul style="list-style-type: none"> <li>• Internal hardware components of a computer</li> <li>• The stored program concepts.</li> <li>• Structure and role of the processor and its components</li> <li>• External hardware devices</li> </ul> <p><b>Topic: <u>Consequences of uses of computing</u></b> <b>Key knowledge/skills taught:</b></p> <ul style="list-style-type: none"> <li>• Individual (moral), social (ethical), legal and cultural issues and opportunities</li> </ul> <p><b>Topic <u>Fundamentals of communication and networking</u></b> <b>Key knowledge/skills taught:</b></p> <ul style="list-style-type: none"> <li>• Communication</li> <li>• Networking</li> <li>• The Internet</li> <li>• The Transmission Control Protocol/Internet Protocol (TCP/IP) protocol</li> </ul>
<p><b>Year 13</b> IT</p>	<p><b>Topic:</b> Global Information (Unit 2) <b>Key knowledge/skills/knowledge taught:</b> Understand where/how information is held globally, its uses by individuals and organisations. Understand legal framework governing storage, the process flow of information and principles of information security – for all types and classification of information.</p>		<p><b>Topic:</b> Internet of Everything (Unit 17) <b>Key knowledge/skills taught:</b> Coursework based unit. Understand what is meant by Internet of Everything (IoE), be able to repurpose technologies to extend scope of IoE, present concept of ideas for repurposed developments.</p>
<p><b>Year 13</b> Computer Science</p>	<p><b>Topic: <u>Fundamentals of data representation</u></b> <b>Key knowledge/skills taught:</b> Number systems, Number bases, Units of information, Binary number system, Information coding systems, Representing images, sound, and other data.</p> <p><b>Topic: <u>Fundamentals of computer systems</u></b> <b>Key knowledge/skills taught:</b> Hardware and software, Classification of programming languages, Types of program translator, Logic gates, Boolean algebra.</p> <p><b>Topic: <u>Fundamentals of communication and networking</u></b> <b>Key knowledge/skills taught:</b></p> <ul style="list-style-type: none"> <li>• Communication</li> <li>• Networking</li> <li>• The Internet</li> <li>• The Transmission Control Protocol/Internet Protocol (TCP/IP) protocol</li> </ul>	<p><b>Topic: <u>Consequences of uses of computing</u></b> <b>Key knowledge/skills taught:</b> Individual (moral), social (ethical), legal and cultural issues and opportunities.</p> <p><b>Topic: <u>Fundamentals of databases</u></b> <b>Key knowledge/skills taught:</b></p> <ul style="list-style-type: none"> <li>• Conceptual data models and entity relationship modelling</li> <li>• Relational databases</li> <li>• Database design and normalisation techniques</li> <li>• Structured Query Language (SQL)</li> <li>• Client server databases</li> </ul> <p><b>Topic: <u>Fundamentals of computer organisation and architecture</u></b> <b>Key knowledge/skills taught:</b></p> <ul style="list-style-type: none"> <li>• Functional programming paradigm</li> <li>• Writing functional programs</li> <li>• Lists in functional programming.</li> </ul> <p><b>Topic: <u>Blg Data</u></b></p>	<p><b>Topic: <u>Fundamentals of functional programming</u></b> <b>Key knowledge/skills taught:</b></p> <ul style="list-style-type: none"> <li>• Functional programming paradigm</li> <li>• Writing functional programs</li> <li>• Lists in functional programming.</li> </ul> <p><b>Topic: <u>Systematic approach to problem solving</u></b> <b>Key knowledge/skills taught:</b> Aspects of software development.</p> <p><b>Non-exam assessment - Computing practical project.</b></p>