



# OCL Computing Long Term Plan

## Year 7

**Overview:** In year 7 students will arrive with varying levels of computing knowledge from the primary school they have attended and the technology they have access to at home. In order to build their confidence students will start to use a variety of different software and web apps to improve their digital literacy starting from logging on in lesson 1.

Autumn 1 will give students opportunity to familiarize themselves with the computing lab and/or iPad. Many students will soon be creating social media accounts if they have not already. Student will be looking at what respectful online communication looks like and how messages online can be seen without context. Students will then look at cyberbullying and create a presentation on the subject using MS PowerPoint. This allows students to cover important e-safety topics while still getting hands on experience with their computer and commonly used software. In Autumn 2 students will use another common software package MS Excel to work with data. The purpose of this unit is for students to understand how data can be collected, analyzed, and used. Spring 1 introduces students to networks and how they aid communication between computers. This unit will first look at the benefits of computer networks, how they are created and how they operate. The second half of the unit will focus on the Internet, smart devices and how this is changing the way we live our lives. Spring 2 will be the first experience of computer programming for many students. They will be using Scratch a web based visual programming language that allows students to create programs by connecting premade code blocks. Student will be able to explore the programming concepts of sequence, selection and iteration without worrying about syntax errors. This unit will set the foundation of students programming knowledge embedding key concepts that they will continue to explore throughout KS3 and KS4. Summer 1 will focus on creating text and image media while also looking at legal issues such as copyright law and plagiarism. This unit will also look at credibility, sourcing information and fake news. Finally in summer 2 students will look at how computers work. Students will first study hardware and the role of different components. Then they will look at software in general terms, instead of focusing on specific packages they will understand the role of different archetypes of software and operating systems.

**Software Packages:** Students will use a combination of a web browser, Formative.com, MS Teams and MS OneNote throughout each unit. In addition throughout year 7 they will use MS Office(PowerPoint, Excel and Word), Scratch.mit.edu, and Photopea.com.

7	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
	<b>7.1 Using Technology Safely</b>	<b>7.2 Data Modelling (Spreadsheets)</b>	<b>7.3 Computer Networks</b>	<b>7.4 Scratch Programming 1</b>	<b>7.5 Multimedia 1</b>	<b>7.6 Computer Systems</b>
SOI Core Concept Links	1, 2, 4, 5, 11	1, 2, 11	8, 10, 11	1, 3, 6, 9, 11	1, 2, 4, 5, 10, 11	1, 2, 7, 11
What will be covered?	<ol style="list-style-type: none"> <li>1. Passwords and logging on</li> <li>2. Getting started with Horizons</li> <li>3. Respectful Communication Online</li> <li>4. What is cyberbullying?</li> <li>5. Presenting to an Audience 1</li> <li>6. Presenting to an Audience 2</li> </ol>	<ol style="list-style-type: none"> <li>1. What is a spreadsheet?</li> <li>2. Quick Calculations</li> <li>3. Collecting Data</li> <li>4. Working with Data</li> <li>5. Working with Data 2</li> <li>6. Bringing it all together</li> </ol>	<ol style="list-style-type: none"> <li>1. Introduction to Networks</li> <li>2. Network Hardware</li> <li>3. Wired and Wireless Networks</li> <li>4. The Internet</li> <li>5. The internet of Things</li> <li>6. The World Wide Web</li> </ol> <p>Safer Internet Day (Optional)</p>	<ol style="list-style-type: none"> <li>1. Sequence and Variables</li> <li>2. Selection</li> <li>3. Operators</li> <li>4. Iteration</li> <li>5. Problem Solving</li> <li>6. Bringing it all together</li> </ol>	<ol style="list-style-type: none"> <li>1. Word Processing</li> <li>2. Licencing and copyright</li> <li>3. Credibility</li> <li>4. Email and online images</li> <li>5. Putting content online</li> <li>6. Assessment</li> </ol>	<ol style="list-style-type: none"> <li>1. Peripherals</li> <li>2. Internal Hardware</li> <li>3. Storage</li> <li>4. Application software</li> <li>5. System software</li> <li>6. Bringing it all together</li> </ol>

## Year 8

**Overview:** In year 8 students will continue to develop their digital literacy with multiple opportunities to have hands of experience with a variety of software packages and web applications. Students will build upon their practical skills from year 7 particularly in programming and media creation. Students will also begin to look at how computers represent data and solve problems.

Autumn 1 will give students the opportunity to look at creating some more complex programs in Scratch. After a recap of selection and iteration student will start to look at how subroutines help us to organize and create one aspect of a program at a time, how instructions can be passed to other parts of a program and pull all this together to create a complex program. Autumn 2 will students will study the binary number system, why it is used by computers and how to convert between this and our denary number system. Once they have an understanding of binary numbers they will look at the logic gates AND, OR and NOT and their respective truth tables. In spring 1 students will look at using computational thinking to model and solve problems. They will also explore different methods of representing algorithms including using flowcharts and written pseudocode. Spring 2 students will move onto their second programming language Python. This first unit will focus again on the core programming concepts of Sequence, Selection and Iteration. As a text based language students will now encounter syntax errors and will need to interpret error messages to help debug their own code. In Summer 1 students will again have the opportunity to create and edit media. In this unit they will look at images in more detail studying both bitmap and vector graphics. Students will then look at using these image files to create keyframe animations. Finally in summer 2 students will have the opportunity to look at how websites are created and create their own website. While creating web pages students will also focus on good web design practiced and the importance of making websites accessible to everybody.

**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 [scratch.mit.edu](http://scratch.mit.edu), [logic.ly](http://logic.ly), Python, MU IDE, [photopea.com](http://photopea.com), [wickeditor.com](http://wickeditor.com), Notepad ++

8	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
	<b>8.1 Scratch Programming 2</b>	<b>8.2 Binary and Boolean Logic</b>	<b>8.3 Computational thinking and algorithms</b>	<b>8.4 Programming with Python 1</b>	<b>8.5 Multimedia 2</b>	<b>8.6 Developing for the Web</b>
SOI Core Concept Links	1, 3, 6, 9, 11	9, 11	1, 2, 6, 9, 11	1, 3, 6, 9, 11	1, 4, 11	1, 4, 5, 8, 10, 11
What will be covered?	<ol style="list-style-type: none"> <li>Selection 2</li> <li>Iteration 2</li> <li>Subroutines</li> <li>Sensing and Broadcasting</li> <li>Building a game</li> <li>Assessment</li> </ol>	<ol style="list-style-type: none"> <li>Thinking in 1s and 0s</li> <li>Thinking with 8 bits</li> <li>Converting from denary</li> <li>Logic gates</li> <li>Truth Tables</li> <li>Assessment</li> </ol>	<ol style="list-style-type: none"> <li>Algorithms</li> <li>Computational thinking</li> <li>Representing Algorithms</li> <li>Searching and sorting 1</li> <li>Searching and sorting 2</li> <li>Assessment</li> </ol>	<ol style="list-style-type: none"> <li>Your first Python program</li> <li>Debugging</li> <li>Working with numbers</li> <li>Selection</li> <li>Iteration (While)</li> <li>Assessment</li> </ol>	<ol style="list-style-type: none"> <li>Bitmap graphics</li> <li>Vector graphics</li> <li>Animation 1</li> <li>Animation 2</li> <li>Project</li> <li>Assessment</li> </ol>	<ol style="list-style-type: none"> <li>Creating a webpage with HTML</li> <li>Styling a webpage with CSS</li> <li>Adding images and other content</li> <li>Making website accessible</li> <li>Navigating to other pages</li> <li>Creating a personal website</li> </ol>

## Year 9

**Overview:** In year 9 students will expand upon all of the skills they have learnt so far with 3 units focused on creating programs. Students will also look at 2 of the most popular career paths in Computer Science Cybersecurity and Data Science. These units will expand upon previous security and data units with a focus on real world examples of cyber threats and handling data.

Autumn 1 starts with students looking at binary again this time with a focus on how it is used to represent data. Students will gain insight into how computers actually store the files on the computer and how binary can be interpreted to display images or play audio. Autumn 2 delves deeper into the Python programming language focusing again on the core programming concepts alongside data types (integer, float, string and Boolean) and using the Random library to generate random numbers. Spring 1 gives students the opportunity to put everything they have learned in the previous programming units to plan, create and test a complex program. The unit will start at looking how subroutines are used in Python then students will be given a scenario that they will plan, create and evaluate a program for. Spring 2 will introduce students to cybersecurity, students will look at different cyber attacks and system vulnerabilities before looking at how software and networks can be designed to protect against these attacks. In summer 1 students will be looking at mobile app design, this requires a different approach to programming than they have used previously. Students will create a Graphical User Interface and add functionality driven by user interaction. Finally students will finish KS3 by looking at data science and big data. This unit focuses on different ways to present data using visualizations before looking at how and why large data sets need to be investigated and cleaned before they can be used.

**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

9	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
	<b>9.1 Binary and Data Representation</b>	<b>9.2 Programming With Python 2</b>	<b>9.6 Computer Systems 2</b>	<b>9.4 Cybersecurity</b>	<b>9.5 Mobile App Development</b>	<b>9.6 Data Science</b>
SOI Core Concept Links	9, 11	1, 3, 6, 9, 11	1, 7, 11	2, 5, 8, 10, 11	1, 3, 4, 6, 10, 11	1, 2, 5, 6, 10, 11
What will be covered?	<ol style="list-style-type: none"> <li>1. Converting binary</li> <li>2. Binary addition</li> <li>3. Data Representation ASCII</li> <li>4. Data Representation Images</li> <li>5. Data Representation Sound</li> <li>6. Assessment</li> </ol>	<ol style="list-style-type: none"> <li>1. Data types</li> <li>2. Selection 3</li> <li>3. Iteration 2</li> <li>4. Iteration 3</li> <li>5. Randomness in programs</li> <li>6. Assessment</li> </ol>	<ol style="list-style-type: none"> <li>1. The CPU</li> <li>2. Memory and Storage</li> <li>3. Comparing storage devices</li> <li>4. The Operating System</li> <li>5. Connecting Systems</li> <li>6. Assessment</li> </ol>	<ol style="list-style-type: none"> <li>1. Data protection</li> <li>2. Human Error</li> <li>3. Ethical and unethical hacking</li> <li>4. Malware</li> <li>5. Designing for security</li> <li>6. Assessment</li> </ol>	<ol style="list-style-type: none"> <li>7. GUI</li> <li>8. Event driven programming</li> <li>9. Fixing errors</li> <li>10. User Input</li> <li>11. Project 1</li> <li>12. Project 2</li> </ol>	<ol style="list-style-type: none"> <li>1. Data and visualisations</li> <li>2. Big data</li> <li>3. Data trends</li> <li>4. Interrogating data</li> <li>5. Cleaning data</li> <li>6. Assessment</li> </ol>

## Year 10: GCSE Computer Science (Pearson Edexcel (9-1) 1CP2)

**Overview:** In year 10 assuming 3 lessons per week students will start with 2 programming lessons using Python (topic 6) and 1 theory lesson focusing on topics 1, 2 and 3 primarily. From summer 1 when most programming topics have been covered this will swap to 1 programming lesson and 2 theory lessons. The programming lessons although focusing mainly on problem solving with programming and paper 2 topics will also cover and allow application of algorithms (topic 1) and characteristics of programming languages (Topic 3).

Students will start learning how programming languages work and how to create computer programs right from the start of Autumn1 and continue this throughout the year. They will use the Python programming language to complete the practical aspects of their lessons. The introduction to the language will assume that students have not used Python or had very limited experience with it. Autumn 1 will mainly focus input, output and using variables, students will not use selection or iteration techniques until Autumn 2. Due to the amount of different programming techniques that students need to master throughout the GCSE the complexity of the programs they create will build much quicker than KS3. By the end of year 10 students should have encountered and have a good familiarity with every programming technique required for GCSE Computer Science and have applied them to a complex programming project.

The more theory based lessons will focus on Computer Systems, Boolean Logic, Algorithms, Cybersecurity and Data Representation.

**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

10	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
SOI Core Concept Links	1, 2, 3, 6, 7, 10, 11	1, 2, 3, 6, 7, 9, 10, 11	1, 3, 6, 9, 11	1, 3, 5, 6, 9, 10, 11	1, 3, 6, 9, 11	1, 2, 3, 4, 6, 9, 11
What will be covered?	<p>Practical</p> <ol style="list-style-type: none"> <li>Introduction to Computer Science</li> <li>Translators</li> <li>Sequence 1</li> <li>Sequence 2</li> <li>Variables</li> <li>Input</li> <li>Casting</li> <li>Debugging</li> <li>Flowcharts 1</li> <li>Flowcharts 2</li> <li>Solving complex problems</li> <li>Assessment</li> </ol> <p>Theory</p> <ol style="list-style-type: none"> <li>Computer Systems</li> <li>The CPU</li> <li>CPU Registers</li> <li>The FDE Cycle</li> <li>Main Memory</li> <li>Secondary Storage</li> </ol>	<p>Practical</p> <ol style="list-style-type: none"> <li>Randomisation</li> <li>Arithmetic Expressions</li> <li>Selection</li> <li>Selection Challenge</li> <li>Logical Expressions</li> <li>Nested Selection</li> <li>While Loops</li> <li>Trace Tables</li> <li>For Loops</li> <li>Data Validation</li> <li>Data Validation 2</li> <li>Assessment</li> </ol> <p>Theory</p> <ol style="list-style-type: none"> <li>Optical and Magnetic Storage</li> <li>Selecting a storage device</li> <li>Computer specifications</li> <li>Boolean Logic</li> <li>Logic Problems</li> <li>Logic Problems 2</li> </ol>	<p>Practical</p> <ol style="list-style-type: none"> <li>Pseudocode</li> <li>Subroutines 1</li> <li>Subroutines 2</li> <li>Functions</li> <li>Functions 2</li> <li>Scope</li> <li>Constants</li> <li>Structured Programming 1</li> <li>Structured Programming 2</li> <li>Creating a larger program 1</li> <li>Creating a larger program 2</li> <li>Assessment</li> </ol> <p>Theory</p> <ol style="list-style-type: none"> <li>Computational thinking</li> <li>Representing Algorithms</li> <li>Tracing Algorithms 1</li> <li>Tracing Algorithms 2</li> <li>Reading algorithms</li> <li>Building algorithms</li> </ol>	<p>Practical</p> <ol style="list-style-type: none"> <li>String Handling 1</li> <li>String handling 2</li> <li>String Handling 3</li> <li>ASCII Conversions</li> <li>Programming challenge (Strings)</li> <li>Arrays and Lists</li> <li>List Methods 1</li> <li>List Methods 2</li> <li>2D Arrays and Lists</li> <li>Programming Challenge (Lists)</li> <li>Programming Challenge (Lists)2</li> <li>Assessment</li> </ol> <p>Theory</p> <ol style="list-style-type: none"> <li>Cybersecurity</li> <li>Non-Automated Cybercrime</li> <li>Automated Cybercrime</li> <li>Software Design as a Defence</li> <li>Network Design as a Defence</li> <li>Where is the Danger</li> </ol>	<p>Practical</p> <ol style="list-style-type: none"> <li>Reading text files</li> <li>Writing to text files</li> <li>Working with CSV files</li> <li>Write to CSV files</li> <li>Good programming practices</li> <li>Good programming practices 2</li> <li>Project planning</li> </ol> <p>Theory</p> <ol style="list-style-type: none"> <li>What is representation</li> <li>Number bases (binary to denary)</li> <li>Number bases (denary to binary)</li> <li>Binary addition</li> <li>Binary subtraction</li> <li>Binary shift</li> <li>Signed binary integers</li> <li>Hexadecimal 1</li> <li>Hexadecimal 2</li> <li>Representing Text</li> <li>Assessment</li> </ol>	<p>Practical</p> <ol style="list-style-type: none"> <li>Project design 1</li> <li>Project design 2</li> <li>Project building 1</li> <li>Project Building 2</li> <li>Project testing</li> <li>Project Evaluation</li> </ol> <p>Theory</p> <ol style="list-style-type: none"> <li>Unicode and file size calculation</li> <li>Representing bitmap images</li> <li>Bitmap file size calculation</li> <li>Representing sound</li> <li>Sound file size calculation</li> <li>Measurements of storage</li> <li>Compression</li> <li>Run length encoding</li> <li>Huffman Coding</li> <li>Operating Systems</li> <li>System Software</li> <li>Assessment</li> </ol>

## Year 11: GCSE Computer Science (Pearson Edexcel (9-1) 1CP2)

**Overview:** In year 11 assuming 3 lessons per week students will be continuing with the model of 1 practical programming lesson and 2 theory based lessons that they moved to towards the end of year 10. It is expected that by the end of Spring 1 students will have finished all or most of the content allowing time for focused revision throughout Spring 1 and Summer 1 in preparation for the exams. As they will have covered all the programming techniques that they need to solve problems with Python (Topic 6) in year 10 programming lessons will be used to recap and build mastery focusing in some of the techniques that students regularly struggle. The final 2 theory topic from Paper 1 (topic 4 and topic 5) will be the main focus of the theory lessons.

Autumn 1 starts with some recapping of the most common programming techniques that are used in almost all Python programs. The first lesson back will cover some of the very basics as many students will not have created a program over the summer. The complexity of programs will build very quickly so that in Spring 1 they can focus on independently building solutions to a variety of problems similar to those they will encounter in the assessment.

Theory lessons will start looking at some specific algorithms for searching and sorting. Students will be able to recognize and compare these algorithms allowing them to choose the best one for a given situation and justify their choice. In Autumn 2 they will look at computer networks and spring 1 will focus on the issues and impact of computing. This unit will cover some of the same material as the cybersecurity unit in year 10, however, now students will be focusing more on the impact of cybercrimes when they occur.

**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

11	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
SOI Core Concept Links	1, 6, 9, 11	1, 6, 8, 9, 11	1, 5, 6, 9, 11			
What will be covered?	<p>Practical</p> <ol style="list-style-type: none"> <li>Sequence</li> <li>Selection</li> <li>Iteration</li> <li>Input and debugging</li> <li>Subroutines</li> <li>String Handling</li> <li>Data Validation</li> </ol> <p>Theory</p> <ol style="list-style-type: none"> <li>Linear Search</li> <li>Binary Search</li> <li>Comparing searching Algorithms</li> <li>Coding searching algorithms</li> <li>Bubble Sort</li> <li>Merge Sort</li> <li>Comparing sort algorithms</li> <li>Coding sorting algorithms</li> <li>Fit for purpose?</li> <li>Improving algorithms</li> <li>Assessment</li> </ol>	<p>Practical</p> <ol style="list-style-type: none"> <li>Arrays and lists</li> <li>2D arrays and lists</li> <li>Structured programming</li> <li>Working with text files</li> <li>Working with CSV files</li> <li>Good programming practice</li> <li>Debugging</li> </ol> <p>Theory</p> <ol style="list-style-type: none"> <li>What is a computer network</li> <li>The client server Model</li> <li>Network Hardware</li> <li>Network topologies</li> <li>Wired and wireless transmission media</li> <li>Network performance</li> <li>What is the internet</li> <li>Hosting services</li> <li>Protocols</li> <li>The TCP/IP Model</li> <li>Assessment</li> </ol>	<p>Practical</p> <ol style="list-style-type: none"> <li>Creating programs to solve problems 1</li> <li>Creating programs to solve problems 2</li> <li>Creating programs to solve problems 3</li> <li>Creating programs to solve problems 4</li> <li>Creating programs to solve problems 5</li> <li>Creating programs to solve problems 6</li> </ol> <p>Theory</p> <ol style="list-style-type: none"> <li>The impact of technology</li> <li>The law, data protection</li> <li>The law, Copyright</li> <li>The Computer Misuse Act</li> <li>Cultural Impacts</li> <li>Privacy and Surveillance</li> <li>Environmental impact</li> <li>Ethical Impact</li> <li>Cybercrimes</li> <li>Defending against cybercrimes</li> <li>Consequences of cybercrimes</li> <li>Assessment</li> </ol>	Revision	Revision	