

## LONG-TERM OVERVIEW

YEAR 10			YEAR 11		
Term	Topics	Assessment	Term	Topics	Assessment
1	<ul style="list-style-type: none"> <li>Introduction to the course</li> <li>SLR 1.1 Systems architecture <ul style="list-style-type: none"> <li>6 lessons</li> </ul> </li> <li>SLR 1.2 Memory and storage – Part 1 <ul style="list-style-type: none"> <li>5 lessons</li> </ul> </li> <li>Plus 5 dedicated programming lessons</li> </ul>	SLR 1.1 Student workbook SLR 1.1 End-of-topic test	1	<ul style="list-style-type: none"> <li>SLR 2.2 Programming fundamentals <ul style="list-style-type: none"> <li>9 lessons</li> </ul> </li> <li>SLR 2.1 Algorithms <ul style="list-style-type: none"> <li>5 lessons</li> </ul> </li> <li>Plus 3 paper 2 exam revision lessons</li> </ul>	SLR 2.2 Student workbook SLR 2.2 End-of-topic test
2	<ul style="list-style-type: none"> <li>SLR 1.2 Memory and storage – Part 1 <ul style="list-style-type: none"> <li>2 lessons</li> </ul> </li> <li>SLR 1.2 Memory and storage (Part 2) <ul style="list-style-type: none"> <li>12 lessons</li> </ul> </li> <li>Plus 6 dedicated programming lessons</li> </ul>	SLR 1.2 Student workbook – Part 1 SLR 1.2 End-of-topic test – Part 1 SLR 1.2 Student workbook (Part 2) SLR 1.2 End-of-topic test (Part 2)	2	<ul style="list-style-type: none"> <li>SLR 2.1 Algorithms <ul style="list-style-type: none"> <li>13 lessons</li> </ul> </li> <li>Plus 7 paper 2 exam revision lessons</li> </ul>	SLR 2.1 Student workbook SLR 2.1 End-of-topic test
3	<ul style="list-style-type: none"> <li>SLR 1.3 Computer networks, connections and protocols <ul style="list-style-type: none"> <li>12 lessons</li> </ul> </li> <li>Plus 3 dedicated programming lessons</li> </ul>	None for this term.	3	<ul style="list-style-type: none"> <li>SLR 2.3 Producing robust programs <ul style="list-style-type: none"> <li>8 lessons</li> </ul> </li> <li>Plus 7 paper 2 exam revision lessons</li> </ul>	SLR 2.3 Student workbook SLR 2.3 End-of-topic test
4	<ul style="list-style-type: none"> <li>SLR 1.3 Computer networks, connections and protocols <ul style="list-style-type: none"> <li>2 lessons</li> </ul> </li> <li>SLR 1.4 Network security <ul style="list-style-type: none"> <li>10 lessons</li> </ul> </li> <li>Plus 3 dedicated programming lessons</li> </ul>	SLR 1.3 Student workbook SLR 1.3 End-of-topic test	4	<ul style="list-style-type: none"> <li>SLR 2.4 Boolean logic <ul style="list-style-type: none"> <li>5 lessons</li> </ul> </li> <li>SLR 2.5 Programming languages and IDEs <ul style="list-style-type: none"> <li>6 lessons</li> </ul> </li> <li>Plus 4 paper 2 exam revision lessons</li> </ul>	SLR 2.4 Student workbook SLR 2.4 End-of-topic test SLR 2.5 Student workbook SLR 2.6 End-of-topic test
5	<ul style="list-style-type: none"> <li>SLR 1.4 Computer networks, connections and protocols <ul style="list-style-type: none"> <li>2 lessons</li> </ul> </li> <li>SLR 1.5 System software <ul style="list-style-type: none"> <li>6 lessons</li> </ul> </li> <li>Plus 5 dedicated programming lessons</li> </ul>	SLR 1.4 Student workbook SLR 1.4 End-of-topic test SLR 1.5 Student workbook SLR 1.5 End-of-topic test	5	<p>This final term before Easter has been set aside for you to use as you see fit for your students.</p> <p>See SoL below for details of suggested activities.</p>	Past papers Smart Revise app
6	<ul style="list-style-type: none"> <li>SLR 1.6 Ethical, legal, cultural and environmental concerns <ul style="list-style-type: none"> <li>9 lessons</li> </ul> </li> <li>8 lesson text-based adventure game</li> </ul>	SLR 1.6 Student workbook SLR 1.6 End-of-topic test	<p>The dedicated programming lessons are for students to engage in self-directed programming. We have hundreds of activities, worksheets and programming challenges for them to complete, available through your premium resources account.</p> <p>See our Excel delivery calendar OCR GCSE J277 - 2-week model (delivery calendar).xlsx</p>		



# SHORT-TERM SCHEME OF LEARNING

1. This lesson-by-lesson breakdown is based on the two-week calendar. You will need to adapt it slightly to fit your school's delivery model.
2. Along with the whole dedicated programming lessons in year 10, many of the theory lessons have allotted the second half to be used for programming. Opportunities for independent programming during lesson time are shown in **green**. This should of course be reinforced by regular practice in the student's own time.
3. Dedicated lesson time for assessment and students responding to feedback/making improvements are shown in **blue**.
4. For a detailed breakdown of which lessons to deliver week by week, see our Excel delivery calendars which accompany this SoL.
5. All the resources you need for the theory lessons are contained within their own topic folders – e.g., “SLR1 Systems architecture.”
6. All the resources you need for the dedicated **programming lessons** in year 10 are downloadable from the “Programming” section of your premium subscription.
7. All resources you need for the **dedicated paper 2 exam revision lesson** are contained in the folder named “Paper 2 exam revision unit.”
8. Along with each lesson's learning outcomes, we also supply a key question that each lesson attempts to address. **These key questions appear in red**.
9. Each topic in this SoL is presented as part of a workbook, each workbook and all of its associated resources can be download from your premium account as a single zip file. When extracted they contain the following folders:



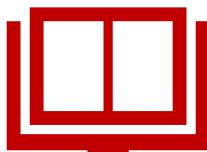
### Lesson overview PowerPoints

One for each lesson to be displayed at the front of the classroom to provide structure to the lesson.



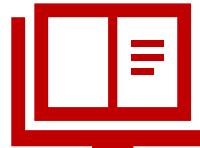
### End of topic test

Written using exam style questions.  
All tests are out of 20 so easy comparisons can be made between different topics.  
Full answers provided.



### Student workbook

This is the main file students complete as they progress through a topic.  
Includes an opportunity for assessment and feedback.  
Includes a RAG rating self-assessment page.



### Student workbook (answers)

A grade 9 model answer version of the blank student workbook.  
Doubles up as an excellent knowledge organiser to hand out to students when needed.

[Assessment with Craig 'n' Dave - \(GCSE\)](#)



# GCSE OCR Computer Science (J277) – Scheme of Learning

YEAR 10 – TERM 1						
	Focus for lesson	Learning outcomes and key question	Starter	Activities	HW for next lesson	Key terms
1	1.1 Introduction lesson – About the course	<ul style="list-style-type: none"> <li>Understand the course structure and appreciate how you will be taught and assessed in this subject.</li> <li>Understand the importance of the flipped classroom approach.</li> </ul>	What is a computer?	Introductory activities (Slides 8-11)	 <a href="#">1.1 The purpose of the CPU: The fetch-execute cycle</a>  <a href="#">1.1 Common CPU components and their function</a>	
<b>SLR 1.1 Systems architecture</b>						
2	SLR 1.1 – Lesson 1, Architecture of the CPU	<ul style="list-style-type: none"> <li>Understand what the CPU of a computer does.</li> <li>Know what the registers in a CPU are.</li> <li>Know the stages of the fetch, execute cycle.</li> <li>Know about other components of the CPU.</li> </ul> <p><b>KEY QUESTION:</b> <b>What is the “architecture” of a CPU?</b></p>	The toy railway	SLR 1.1 Workbook Complete slides 2 and 3   <a href="#">Programming introduction activity slide 8</a>	 <a href="#">1.1 Von Neumann architecture</a>	<b>Slides 1-15</b> CPU, Fetch-execute cycle, ALU, CU, Cache, Register, Von Neumann architecture, MAR, MDR, Program counter, Accumulator, Clock speed, Cache size, Cores, Embedded system
3	SLR 1.1 – Lesson 2, Architecture of the CPU	<ul style="list-style-type: none"> <li>Describe the von Neumann architecture.</li> <li>Know the components of the von Neumann architecture.</li> <li>Understand what a <i>keyword</i> is.</li> </ul> <p><b>KEY QUESTION:</b> <b>What is the “architecture” of a CPU?</b></p>	Who was John von Neumann?  What are the characteristics of the von Neumann computer architecture?	SLR 1.1 Workbook Complete slide 4   <a href="#">Programming keyword word cloud activity slide 6</a>	 <a href="#">1.1 The common characteristics of CPUs</a>	
4	SLR 1.1 – Lesson 3, How common characteristics of CPUs affect their performance	<ul style="list-style-type: none"> <li>Understand three ways in which the speed of a CPU – and therefore, the speed of a computer – can be increased.</li> <li>Begin learning how to program.</li> </ul> <p><b>KEY QUESTION:</b> <b>What factors affect CPU performance?</b></p>	What factors affect the speed of a computer?	SLR 1.1 Workbook Complete slide 5   <a href="#">Begin programming</a>	 <a href="#">1.1 Embedded systems</a>	
5	SLR 1.1 – Lesson 4, Embedded systems	<ul style="list-style-type: none"> <li>Understand what is meant by the term <i>embedded system</i>.</li> </ul>	In what ways is this washing machine a computer?	SLR 1.1 Workbook Complete slide 6	 <a href="#">1.2 The need for primary storage</a>	



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		<ul style="list-style-type: none"> <li>• Know several examples of embedded systems.</li> <li>• Understand how to program.</li> </ul> <p><b>KEY QUESTION:</b> What are embedded systems, and what are their characteristics?</p>		Programming	 <a href="#">1.2 RAM and ROM</a>	
6 to 10	Independent programming	Gain experience in practical programming Use our T.I.M.E workbooks, Programming challenges and Defold games tutorials.	Various	Revise what you have learned in unit 1.1.		
11	SLR 1.1 – End-of-topic test	End-of-topic test	1.1 Test.docx 1.1 Test Answers.docx			
12	SLR 1.1 – Action	Action/response lesson	Chance for students to respond to feedback, improve workbooks, correct misunderstandings			
<b>SLR 1.2 Memory and storage</b>						<b>Slides 16-29</b>
13	SLR 1.2 – Lesson 1, RAM and ROM	<ul style="list-style-type: none"> <li>• Understand the need for primary storage</li> <li>• Know the difference between RAM and ROM.</li> <li>• Know the purpose of ROM in a computer system.</li> <li>• Know the purpose of RAM in a computer system.</li> <li>• Understand how to program.</li> </ul> <p><b>KEY QUESTION:</b> Why do computers have primary storage?</p>	Find out where this old type of memory was used.  What is a core dump?	SLR 1.2 Workbook (Part 1) Complete slides 2-5  Programming	 <a href="#">1.2 Virtual memory</a>	Primary storage, RAM, ROM, Virtual memory, Secondary storage, Optical storage, Magnetic storage, Solid-state storage,
14	SLR 1.2 – Lesson 2, Virtual memory	<ul style="list-style-type: none"> <li>• Understand the need for virtual memory.</li> <li>• Understand how to program.</li> </ul> <p><b>KEY QUESTION:</b> How does virtual memory work?</p>	Why would the RAM be faster than the hard disk?	SLR 1.2 Workbook (Part 1) Complete slides 6-10  Programming	 <a href="#">1.2 The need for secondary storage</a>  <a href="#">1.2 Common types of storage</a>	Storage capacity, Storage speed, Storage portability,



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15	SLR 1.2 – Lesson 3, Common types of storage	<ul style="list-style-type: none"> <li>Understand the need for secondary storage.</li> <li>Know the common types of storage.</li> <li>Know the characteristics of storage devices.</li> <li>Understand how to program.</li> </ul> <p><b>KEY QUESTION:</b> Why do computers have secondary storage?</p>	<p>A digital camera uses an SD card to store images. How much would it cost me to upgrade my memory card from 32GB?</p> <p>A friend has a Nintendo Switch console. They need a memory card to store more games. What card would you recommend and how much would it cost?</p>	<p>SLR 1.2 Workbook (Part 1) Complete slides 11-14  <b>Programming</b></p>	Storage durability, Storage reliability, Storage cost
16	SLR 1.2 – Lesson 4, Common types of storage	<ul style="list-style-type: none"> <li>Know the characteristics of storage devices.</li> <li>Understand how to program.</li> </ul> <p><b>KEY QUESTION:</b> What are the differences between secondary storage devices?</p>	<p>A cloud-based server farm is considering replacing all its hard disks for solid-state storage drives. Why would it want to do this, and what are the implications to consider?</p>	<p>SLR 1.2 Workbook (Part 1) Finish slides 11-14  <b>Programming</b></p>	<p> <a href="#">1.2 Suitable storage devices and storage media</a></p>
17	SLR 1.2 – Lesson 5, Application storage	<ul style="list-style-type: none"> <li>Understand the suitability of storage devices for given applications.</li> <li>Understand the advantages and disadvantages of devices based on their characteristics.</li> <li>Understand how to program.</li> </ul> <p><b>KEY QUESTION:</b> What features of secondary storage make devices suitable for different situations?</p>	<p>What storage media would you choose for:</p>	<p>SLR 1.2 Workbook (Part 1) Complete slides 15-17  <b>Programming</b></p>	<p> <a href="#">1.2 The units of data storage</a>   <a href="#">1.2 How data needs to be converted into binary to be processed by a computer</a>   Revise what you have learned in part 1 of this unit.</p>



# GCSE OCR Computer Science (J277) – Scheme of Learning

YEAR 10 – TERM 2						
	Focus for lesson	Learning outcomes and key question	Starter	Activities	HW for next lesson	Key terms
	<b>SLR 1.2 Memory and storage</b>					
1	SLR 1.2, part 1 – End-of-topic test	End-of-topic tests		1.2 Test 1 - Primary storage.docx 1.2 Test 1 - Primary storage Answers.docx 1.2 Test 2 - Secondary storage.docx 1.2 Test 2 - Secondary storage Answers.docx		
2	SLR 1.2, part 1 – Action	Action/response lessons		Chance for students to respond to feedback, improve workbooks, correct misunderstandings		
3	SLR 1.2 – Lesson 6, Units	<ul style="list-style-type: none"> <li>Understand what is meant by the terms bit, nibble, byte, kilobyte, megabyte, gigabyte, terabyte and petabyte.</li> <li>Understand how to represent the capacity of data storage using these units and convert between them.</li> <li>Understand that data needs to be converted into a binary format to be processed by a computer.</li> </ul> <p><b>KEY QUESTION:</b> <b>Why is data stored in binary?</b></p>	A one-minute clip of a film takes up 540 megabytes of storage. Approximately how many gigabytes of storage would be required to store the entire two-hour film if it was encoded using the same settings?	SLR 1.2 Workbook (Part 2) Complete slides 2-6  <b>Programming</b>	 <a href="#">1.2 Data capacity and calculation of data capacity requirements</a>	Slides 30-60 Bit, Nibble, Byte, Kilobyte, Megabyte, Gigabyte, Terabyte, Petabyte, Denary numbers, Binary numbers, Binary arithmetic, Overflow,



# GCSE OCR Computer Science (J277) – Scheme of Learning

4	SLR 1.2 – Lesson 7, Data capacity and calculation of requirements	<ul style="list-style-type: none"> <li>• Know what data capacity means.</li> <li>• Understand how to calculate data capacity requirements.</li> <li>• Understand how to program.</li> </ul> <p><b>KEY QUESTION:</b> <b>How do you calculate data capacity?</b></p>	Order and continue the number line:	SLR 1.2 Workbook (Part 2) Complete slide 7  <b>Programming</b>	 <a href="#">1.2 Converting between denary and 8-bit binary</a>  <a href="#">1.2 Adding two 8-bit binary integers</a>	Hexadecimal, Binary shifts, Character set, ASCII, Unicode, Pixels, Metadata, Colour depth, Resolution, Image quality, Image file size, Sample rate, Sample duration, Sample bit depth, Playback quality, Sound file size, Compression, Lossy compression, Lossless compression
5	SLR 1.2 – Lesson 8, Binary conversion and addition	<ul style="list-style-type: none"> <li>• Know how to convert positive denary whole numbers (0 – 255) to 8-bit binary and vice versa.</li> <li>• Know how to add two 8-bit binary integers.</li> <li>• Understand the terms most/least significant bit.</li> <li>• Understand how overflow errors occur.</li> </ul> <p><b>KEY QUESTION:</b> <b>What can happen to the most significant bit when you add two binary numbers together?</b></p>	Assuming any overflow bits are lost and not part of the final result, what answer would an arithmetic logic unit (ALU) give to the calculation 167 + 220?	SLR 1.2 Workbook (Part 2) Complete slides 8 and 9  <b>Programming</b>	 <a href="#">1.2 Binary shifts</a>  <a href="#">1.2 Converting between denary and 2-digit hexadecimal</a>	
6	SLR 1.2 – Lesson 9, Binary shift and hexadecimal	<ul style="list-style-type: none"> <li>• Know how to perform a left and right binary shift.</li> <li>• Understand what a binary shift achieves.</li> <li>• Know how to convert positive denary whole numbers (0 – 255) into 2-digit hexadecimal and vice versa.</li> <li>• Know how to convert from binary to hexadecimal equivalents and vice versa.</li> </ul> <p><b>KEY QUESTION:</b> <b>What actions can an ALU perform?</b> <b>What is the relationship between denary, binary and hexadecimal?</b></p>	What are the uses of hexadecimal in computer science? Can you research three?	SLR 1.2 Workbook (Part 2) Complete slides 10-13  <b>Programming</b>		



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7	SLR 1.2 – Lesson 10, Catch-up lesson	<ul style="list-style-type: none"> <li>Complete any outstanding work to this point.</li> </ul> <p><b>KEY QUESTION:</b> How do computers store and use numbers?</p>	Put these examples of memory in order of speed for the processor from fastest to slowest.	SLR 1.2 Workbook (Part 2) Finish slides 10-13  <b>Programming</b>	 <a href="#">1.2 Representing characters and character sets</a>	
8	SLR 1.2 – Lesson 11, Character sets	<ul style="list-style-type: none"> <li>Understand that all data must be represented in binary numbers, including text.</li> <li>Know what is meant by the term “character set”.</li> <li>Understand the relationship between the number of bits in the character set and the number of characters that can be represented.</li> <li>Know two common character sets: ASCII and Unicode.</li> </ul> <p><b>KEY QUESTION:</b> How does a computer store characters and what are the implications for the number of bits used?</p>	How many binary combinations are there with:  2 bits?  4 bits?  8 bits?	SLR 1.2 Workbook (Part 2) Complete slides 14-16  <b>Programming</b>	 <a href="#">1.2 Representing images</a>	
9	SLR 1.2 – Lesson 12, Bitmaps	<ul style="list-style-type: none"> <li>Understand how an image is represented as a series of pixels represented in binary.</li> <li>Know what is meant by the term ‘metadata’ and be able to give examples.</li> <li>Understand the effect of colour depth and resolution on the size of an image file.</li> </ul> <p><b>KEY QUESTION:</b> How does a computer store graphics and what are the implications for image size and resolution?</p>	Find out what colours these hexadecimal numbers represent:  FF0000 00FF00 0000FF  What does that tell you about what all colours on a computer are made up of?	SLR 1.2 Workbook (Part 2) Complete slides 17-19  <b>Programming</b>	 <a href="#">1.2 Representing sound</a>	
10	SLR 1.2 – Lesson 13, Sound	<ul style="list-style-type: none"> <li>Understand how sound can be sampled and stored in digital form.</li> <li>Understand how sampling rates, duration and bit depth affect the size of a sound file and the quality of its playback.</li> </ul>	Describe what is happening in this illustration:	SLR 1.2 Workbook (Part 2) Complete slides 20-22	 <a href="#">1.2 Compression</a>	



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		<b>KEY QUESTION:</b> How do computers store sound and what are the implications for sample rate, duration and bit depth?		Programming		
11	SLR 1.2 – Lesson 14, Compression	<ul style="list-style-type: none"> <li>• Know why data is often compressed for transfer and storage.</li> <li>• Understand the difference between lossy and lossless compression.</li> <li>• Know why some types of data are only suitable for one type of compression.</li> </ul> <b>KEY QUESTION:</b> Where is compression used and why?	Using the metadata and data below, what is the paragraph of text?	SLR 1.2 Workbook (Part 2) Complete slides 23-25  Programming		
12	SLR 1.2 – Lesson 15, Compression	<ul style="list-style-type: none"> <li>• Know why data is often compressed for transfer and storage.</li> <li>• Understand the difference between lossy and lossless compression.</li> <li>• Know why some types of data are only suitable for one type of compression.</li> </ul> <b>KEY QUESTION:</b> What are the effects on a file for each type of compression?	Using the metadata and data below, explain why the compression is ineffective.	SLR 1.2 Workbook (Part 2) Complete slides 26 and 27  Programming	Revise what you have learned in this unit	
13 to 15	Independent programming	Gain experience in practical programming Use our T.I.M.E workbooks, Programming challenges and Defold games tutorials.		Various		
16	SLR 1.2, part 2 – End-of-topic test	End-of-topic test		1.2 Test 3 - Units and number systems 1.2 Test 3 - Units and number systems Answers 1.2 Test 4 - Images, sound and compression		



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			1.2 Test 4 - Images, sound and compression Answers		
17	SLR 1.2, part 2 – Action	Action/response lessons	Chance for students to respond to feedback, improve workbooks, correct misunderstandings		
18 to 20	Independent programming	Gain experience in practical programming Use our T.I.M.E workbooks, Programming challenges and Defold games tutorials.	Various		



# GCSE OCR Computer Science (J277) – Scheme of Learning

YEAR 10 – TERM 3						
	Focus for lesson	Learning outcomes and key question	Starter	Activities	HW for next lesson	Key terms
	<b>SLR 1.3 Computer networks, connections and protocols</b>				 <a href="#">1.3 Types of networks</a>	Slides 61-96 LAN, WAN, Client-server network, Peer-to-peer network, Wireless access point, Router, Switch, NIC, Transmission media, the internet, DNS, Hosting, The cloud, Web server, Client, Network topology, Star topology, Mesh topology, Wired connection, Ethernet, Wireless connection, WiFi, Bluetooth, Encryption, IP address, MAC address, Standards, Protocol, TCP/IP,
1	SLR 1.3 – Lesson 1, Types of networks	<ul style="list-style-type: none"> <li>Know what is meant by ‘stand-alone’ computers.</li> <li>Know the different types of networks: LAN and WAN.</li> <li>Understand the advantages of networking.</li> <li>Understand the implications of networking.</li> <li>Understand how to program.</li> </ul> <p><b>KEY QUESTION:</b> <b>What are the characteristics of LANs and WANs?</b></p>	Wide area networks have enabled email and social networking to become a major part of our society today.  To what extent have these tools changed our society for the better?	SLR 1.3 Workbook Complete slides 2 and 3   <a href="#">Programming</a>	 <a href="#">1.3 Factors that affect the performance of networks.</a>	
2	SLR 1.3 – Lesson 2, Factors that affect the performance of networks	<ul style="list-style-type: none"> <li>Know what factors affect the performance of networks.</li> <li>Understand how to program.</li> </ul> <p><b>KEY QUESTION:</b> <b>What can affect the performance of a network?</b></p>	The school network also includes several CCTV cameras that record video images to the file server. The headteacher wants to add more cameras on the outside of the school building for security.  What should the network manager consider?	SLR 1.3 Workbook Complete slide 4   <a href="#">Programming</a>	 <a href="#">1.3 Client-server and peer-to-peer networks</a>	
3	SLR 1.3 – Lesson 3, Client-server and peer-to-peer	<ul style="list-style-type: none"> <li>Know what a client-server model is.</li> <li>Know what a peer-to-peer model is.</li> <li>Understand the different roles computers have in each model.</li> </ul> <p><b>KEY QUESTION:</b> <b>What are the differences between peer-to-peer and client-server networks?</b></p>	How do bit torrents work? Are they an example of a client-server or a peer-to-peer approach to networking?  Is it a quicker or slower way of downloading video files, and why?	SLR 1.3 Workbook Complete slides 5 and 6   <a href="#">Programming</a>	 <a href="#">1.3 Hardware to connect a LAN</a>	
4	SLR 1.3 – Lesson 4, Hardware for a LAN	<ul style="list-style-type: none"> <li>Know the hardware needed to connect a LAN.</li> <li>Understand the purpose of each piece of hardware.</li> </ul>	How does the internet connect across oceans?  What media would be best to use?	SLR 1.3 Workbook Complete slide 7	 <a href="#">1.3 the internet</a>	



# GCSE OCR Computer Science (J277) – Scheme of Learning

		KEY QUESTION: <i>How do you set up a LAN?</i>		Programming		HTTP, HTTPS, FTP, POP, IMAP, SMTP, Protocol layering
5	SLR 1.3 – Lesson 5, the internet	<ul style="list-style-type: none"> <li>Understand what the internet is.</li> <li>Understand the term DNS (Domain Name Server).</li> <li>Understand what is meant by the term <i>hosting</i>.</li> <li>Understand what is meant by the term <i>cloud</i>.</li> <li>Understand what is meant by the terms <i>web server</i> and <i>client</i>.</li> </ul> <p>KEY QUESTION: <i>How does the internet work?</i></p>	Using Google Docs/Drive or Office 365/OneDrive are examples of working in the cloud. What are the features of these systems, and what is the advantage of working in the cloud instead of installing programs and working on data on a local hard disk?	SLR 1.3 Workbook Complete slides 8-10  <a href="#">Programming</a>		
6	SLR 1.3 – Lesson 6, Catch up lesson	<ul style="list-style-type: none"> <li>Complete any outstanding work to this point.</li> </ul> <p>KEY QUESTION: <i>How does the internet work?</i></p>	What is the difference between a switch and a router?	SLR 1.3 Workbook Finish slides 8 - 10  <a href="#">Programming</a>	 <a href="#">1.3 Star and mesh network topologies</a>	
7	SLR 1.3 – Lesson 7, Star and mesh network topologies	<ul style="list-style-type: none"> <li>Know what a star network is.</li> <li>Know what a mesh network is.</li> <li>Understand the internet is an example of a partial mesh network.</li> <li>Know the advantages and disadvantages of star and mesh networks.</li> <li>Understand how to program.</li> </ul> <p>KEY QUESTION: <i>Why is a mesh network better than a star network?</i></p>	A small business is moving into new premises. They are going to have a small client-server local area network connected to the internet via wired and wireless connections. List six items of hardware they will need.	SLR 1.3 Workbook Complete slides 11-15  <a href="#">Programming</a>	 <a href="#">1.3 Modes of connection, wired and wireless</a>	
8	SLR 1.3 – Lesson 8, Modes of connection	<ul style="list-style-type: none"> <li>Understand that Ethernet is a wired method of connection.</li> <li>Understand that Wi-Fi and Bluetooth are wireless methods of connection.</li> <li>Understand the benefits and drawbacks of wired versus wireless connections.</li> </ul>	Can you name these different types of wired and wireless network methods? List six items of hardware they will need.	SLR 1.3 Workbook Complete slides 16-19  <a href="#">Programming</a>	 <a href="#">1.3 Wireless encryption</a>	



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		<ul style="list-style-type: none"> <li>Be able to command a connection type for a given scenario.</li> </ul> <p><b>KEY QUESTION:</b> Which is better, a wired or wireless network?</p>			
9	SLR 1.3 – Lesson 9, Wi-Fi encryption	<ul style="list-style-type: none"> <li>Know the basics of how cryptography can work with a simple key.</li> <li>Know how wireless devices authenticate with each other before communicating data.</li> <li>Understand the difference between a private key and public keys.</li> <li>Understand why private (master) keys are never shared.</li> <li>Understand how to program.</li> </ul> <p><b>KEY QUESTION:</b> What is the purpose of encryption?</p>	<p>Research:</p> <ul style="list-style-type: none"> <li>- What is ROT13 used for?</li> <li>- How does ROT13 work?</li> <li>- What is the relationship between ROT13 and the Romans?</li> </ul>	<p>SLR 1.3 Workbook Complete slides 20 and 21</p> <p><b>Programming</b></p>	 <a href="#">1.3 The use of IP and MAC addressing</a>
10	SLR 1.3 – Lesson 10, IP and MAC addressing	<ul style="list-style-type: none"> <li>Understand the uses of MAC and IP addressing.</li> <li>Understand the difference between IPv4 and IPv6.</li> <li>Understand the need for IPv6.</li> <li>Understand how to program.</li> </ul> <p><b>KEY QUESTION:</b> What are the differences between the three types of network device address?</p>	Identify the three types of address shown here: 180.17.255.1 2001:0DB8:AC10:FE01: 0000:0000:0000:0000 00-15-E9-2B-99-3C	<p>SLR 1.3 Workbook Complete slide 22</p> <p><b>Programming</b></p>	 <a href="#">1.3 Standards</a>  <a href="#">1.3 Common protocols</a>
11	SLR 1.3 – Lesson 11, Standards and common protocols	<ul style="list-style-type: none"> <li>Understand the need for standards in computing.</li> <li>Understand the 7 common protocols and what they are used for.</li> <li>Understand how to program.</li> </ul> <p><b>KEY QUESTION:</b> What are standards and protocols?</p>	Using the letters below, identify all the networking protocol acronyms.	<p>SLR 1.3 Workbook Complete slide 23</p> <p><b>Programming</b></p>	 <a href="#">1.3 The concept of layers</a>



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12	SLR 1.3 – Lesson 12, The concept of layers	<ul style="list-style-type: none"><li>• Know why protocols are layered.</li><li>• Understand how to program.</li></ul> <p><b>KEY QUESTION:</b> <b>What are the benefits of layering protocols?</b></p>	Create two different burgers using one item from each category:	SLR 1.3 Workbook Complete slide 24  Programming		
13 to 15	Independent programming	Gain experience in practical programming  Use our T.I.M.E workbooks, Programming challenges and Defold games tutorials.	Various	Revise what you have learned in this unit		



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YEAR 10 – TERM 4							
	Focus for lesson	Learning outcomes and key question		Starter	Activities	HW for next lesson	Key terms
<b>SLR 1.3 Computer networks, connections and protocols</b>							
1	SLR 1.3 – End-of-topic test	End-of-topic test		1.3 Test 1.docx 1.3 Test 1 Answers.docx 1.3 Test 2.docx 1.3 Test 2 Answers.docx			
2	SLR 1.3 – Action	Action/response lessons		Chance for students to respond to feedback, improve workbooks, correct misunderstandings			
3 to 5	Independent programming	Gain experience in practical programming Use our T.I.M.E workbooks, Programming challenges and Defold games tutorials.		Various	 <a href="#">1.4 Forms of attack</a>		
<b>SLR 1.4 Network security</b>							Slides 97-109
6	SLR 1.4 – Lesson 1, Forms of attack	<ul style="list-style-type: none"> <li>Understand the different forms of attack carried out on computer systems.</li> </ul> <p><b>KEY QUESTION:</b> <b>What are the threats to devices and computers?</b></p>	What is CryptoLocker? What was Operation Tovar? Who was Evgeniy Bogachev? What was the reward for capturing Bogachev? How much money did CryptoLocker make?	SLR 1.4 Workbook Complete slides 2 Head up and definitions for slides 3-8  <a href="#">Play the system security game for 20 minutes</a>  <a href="#">1.4 System security game.pptm</a>	 <a href="#">1.4 Threats posed to networks</a>		Malware, Social engineering, Phishing, Brute-force attack, Denial of service attack, Data interception and theft, SQL injection, Penetration
7	SLR 1.4 – Lesson 2, Threats posed to networks (malware)	<ul style="list-style-type: none"> <li>Understand the threat of malware.</li> <li>Understand how to identify and protect against malware.</li> </ul> <p><b>KEY QUESTION:</b></p>	ILOVEYOU was the most damaging malware event of all time gaining an entry into the Guinness World Records in 2000.	SLR 1.4 Workbook Complete slide 3			testing, Anti-malware software, Firewall, User



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		What effect do different malware attacks have on your computer?	What was it? What did it do? How are people a 'weak point' in this example?	Play the system security game for 20 minutes  1.4 System security game.pptm		access level, Password, Physical security
8	SLR 1.4 – Lesson 3, Threats posed to networks (phishing) 1	<ul style="list-style-type: none"> <li>Understand phishing.</li> <li>Understand how to identify and protect against phishing.</li> </ul> <p><b>KEY QUESTION:</b> What does a phishing attack set out to achieve?</p>	How can you tell this email is phishing?	SLR 1.4 Workbook Complete slide 4  Play the system security game for 20 minutes  1.4 System security game.pptm		
9	SLR 1.4 – Lesson 4, Threats posed to networks (phishing) 2	<ul style="list-style-type: none"> <li>Understand phishing.</li> <li>Understand how to identify and protect against phishing.</li> </ul> <p><b>KEY QUESTION:</b> What does a phishing attack set out to achieve?</p>	Imagine you bank with TrustedBank. What should you do if you receive this email?	SLR 1.4 Workbook Finish slide 4  Play the system security game for 20 minutes  1.4 System security game.pptm		
10	SLR 1.4 – Lesson 5, Threats posed to networks (brute force attack)	<ul style="list-style-type: none"> <li>Understand brute force attacks.</li> <li>Understand how to identify and protect against brute force attacks.</li> </ul> <p><b>KEY QUESTION:</b> How does a brute force attack work?</p>	How long would it take a computer to brute-force crack your password? Check it at <a href="http://howsecureismypassword.net">howsecureismypassword.net</a> How could you improve your password strength?	SLR 1.4 Workbook Complete slide 5  Play the system security game for 20 minutes  1.4 System security game.pptm		



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11	SLR 1.4 – Lesson 6, Threats posed to networks (denial of service)	<ul style="list-style-type: none"> <li>• Understand denial-of-service attacks.</li> <li>• Understand how to identify and protect against denial of service attacks.</li> </ul> <p><b>KEY QUESTION:</b> <b>What is the effect of a DDoS attack?</b></p>	<p>Much of America's internet was brought down on 21<sup>st</sup> October 2016. This included Netflix, Twitter, Spotify, Reddit, CNN, PayPal, Pinterest, Fox News, The Guardian, The New York Times and the Wall Street Journal.</p> <p>What happened?</p>	<p>SLR 1.4 Workbook Complete slide 6</p> <p>Discuss the following link: <a href="http://digitalattackmap.com">digitalattackmap.com</a></p> <p>Play the system security game for 20 minutes</p> <p><a href="#">1.4 System security game.pptm</a></p>	
12	SLR 1.4 – Lesson 7, Threats posed to networks (data interception and theft)	<ul style="list-style-type: none"> <li>• Understand data interception and theft as a security threat.</li> <li>• Understand how to identify and protect against data interception.</li> </ul> <p><b>KEY QUESTION:</b> <b>What do we mean by "humans are a weak point"?</b></p>	<p>Identify all the potential threats to system security in this image. Consider 'people as a weak point'.</p>	<p>SLR 1.4 Workbook Complete slide 7</p> <p>Play the system security game for 20 minutes</p>	
13	SLR 1.4 – Lesson 8, Threats posed to networks (SQL injection)	<ul style="list-style-type: none"> <li>• Understand the concept of SQL injection.</li> <li>• Understand how to protect against SQL injection.</li> </ul> <p><b>KEY QUESTION:</b> <b>How does a SQL injection hack work?</b></p>	<p>Consider this snippet of code that executes when a user enters their username, password and presses login:</p> <pre>SQL = "SELECT * FROM table_users WHERE uname = '" + username + "'; " db.Open SQL db.MoveFirst return(db("password"))</pre> <p>What do you think it does?</p> <p>In programming when you join a string to a variable like this: <i>uname</i> = "" + <i>username</i> it is known as what?</p>	<p>SLR 1.4 Workbook Complete slide 8</p> <p>Have a go at the SQL injection hack simulation.</p> <p>Try and crack a username and password using SQL injection techniques.</p>	 <a href="#">1.4 Identifying and preventing vulnerabilities</a>



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14	SLR 1.4 – Lesson 9, Identifying and preventing vulnerabilities	<ul style="list-style-type: none"> <li>• Understand how people are a weak point in secure systems.</li> <li>• Known how the following prevention methods help again the various forms of cyberattack:             <ul style="list-style-type: none"> <li>○ Penetration testing</li> <li>○ Anti-malware software</li> <li>○ Firewalls</li> <li>○ User access levels</li> <li>○ Passwords</li> <li>○ Encryption</li> <li>○ Physical security</li> </ul> </li> </ul> <p><b>KEY QUESTION:</b> How can you protect yourself against hackers?</p>	<p>What is being described in each of these statements?</p> <ol style="list-style-type: none"> <li>1. Monitoring and analysis of computer network traffic for the purposes of information gathering, legal evidence, or intrusion detection.</li> <li>2. Evaluating the security of an IT infrastructure by safely trying to exploit vulnerabilities.</li> <li>3. A document stipulating constraints and practices that a user must agree to for access to a corporate network.</li> </ol>	<p>SLR 1.4 Workbook Complete slides 10-11</p> <p><a href="#">Play the system security game for 20 minutes</a></p> <p><a href="#">1.4 System security game.pptm</a></p>	
15	SLR 1.4 – Lesson 10, Identifying and preventing vulnerabilities	<ul style="list-style-type: none"> <li>• Understand how people are a weak point in secure systems.</li> <li>• Know how the following prevention methods help again the various forms of cyberattack:             <ul style="list-style-type: none"> <li>○ Penetration testing</li> <li>○ Anti-malware software</li> <li>○ Firewalls</li> <li>○ User access levels</li> <li>○ Passwords</li> <li>○ Encryption</li> <li>○ Physical security</li> </ul> </li> </ul> <p><b>KEY QUESTION:</b> How can you protect yourself against hackers?</p>	<p>Use the Internet to find out what the difference is between a white-hat, grey-hat and black-hat hacker.</p>	<p>SLR 1.4 Workbook Complete slides 12-13</p> <p><a href="#">Play the system security game for 20 minutes</a></p> <p><a href="#">1.4 System security game.pptm</a></p>	<p>Revise what you have learned in this unit</p>



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YEAR 10 – TERM 5							
	Focus for lesson	Learning outcomes and key question		Starter	Activities	HW for next lesson	Key terms
<b>SLR 1.4 Network security</b>							
1	SLR 1.4 – End-of-topic test	End-of-topic test		1.4 Test.docx 1.4 Test Answers.docx			
2	SLR 1.4 – Action	Action/response lessons		Chance for students to respond to feedback, improve workbooks, correct misunderstandings			
3 to 5	Independent programming	Gain experience in practical programming Use our T.I.M.E workbooks, Programming challenges and Defold games tutorials.		Various	 <a href="#">1.5 The purpose and functionality of operating systems</a>		
<b>SLR 1.5 System software</b>							Slides 110-122
6	SLR 1.5 – Lesson 1, The purpose and functionality of operating systems	<ul style="list-style-type: none"> <li>Know the purpose and functionality of operating systems.</li> <li>Know the different types of user interface and understand the features of each.</li> </ul> <p><b>KEY QUESTION:</b> <b>Why does your computer need an operating system?</b></p>	How many operating systems can you name?	SLR 1.5 Workbook Complete slides 2-3  Programming	 <a href="#">1.5 Operating systems part 1</a>		Systems software, Operating system, User interface, Memory management, Multitasking, Peripheral management, Driver, User management, File management, Utility software,
7	SLR 1.5 – Lesson 2, Operating systems part 1	<ul style="list-style-type: none"> <li>Know what is meant by the term multitasking.</li> <li>Understand how the OS manages the memory.</li> <li>Understand the need for device drivers.</li> </ul> <p><b>KEY QUESTION:</b> <b>How does a computer manage having lots of programs open and running at the same time?</b></p>	<p>Below is an illustration of the RAM of a computer. Each square is a page of memory that can hold a fragment of a program. The memory always fills up left to right, but fragments are never moved.</p> <p>Show the state of the memory after this sequence of processes:</p>	SLR 1.5 Workbook Complete slides 4-6  Programming	 <a href="#">1.5 Operating systems part 2</a>		



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8	SLR 1.5 – Lesson 3, Operating systems part 2	<ul style="list-style-type: none"> <li>Understand what is meant by the term <i>user management</i>.</li> <li>Understand how the operating system manages files</li> </ul> <p><b>KEY QUESTION:</b> What features does an operating system give users?</p>	Find out what is meant by the term, ‘roaming profile’ in the context of an operating system. What are the advantages and disadvantages of roaming profiles?	SLR 1.5 Workbook Complete slides 7-8  Programming	 <a href="#">1.5 Utility system software</a>	Encryption software, Defragmentation software, Data compression software
9	SLR 1.5 – Lesson 4, Utility system software	<ul style="list-style-type: none"> <li>Understand encryption utilities.</li> <li>Understand defragmentation utilities.</li> <li>Understand data compression utilities.</li> </ul> <p><b>KEY QUESTION:</b> What is the purpose of utility software?</p>	Identify the system software terms from these picture clues.	SLR 1.5 Workbook Complete slide 9  Programming	Revise what you have learnt in this unit	
10 & 11	Independent programming	Gain experience in practical programming Use our T.I.M.E workbooks, Programming challenges and Defold games tutorials.		Various		
12	SLR 1.5 – End-of-topic test	End-of-topic test		1.5 Test.docx 1.5 Test Answers.docx		
13	SLR 1.5 – Action	Action/response lessons		Chance for students to respond to feedback, improve workbooks, correct misunderstandings		



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YEAR 10 – TERM 6						
	Focus for lesson	Learning outcomes and key question	Starter	Activities	HW for next lesson	Key terms
	SLR 1.6 Ethical, legal, cultural and environmental concerns				 <a href="#">1.6 How to investigate and discuss Computer Science technologies, considering ethical, legal, cultural, environmental and privacy issues</a>	Slides 123-133 Ethical issues, Legal issues, Cultural issues, Environmental issues, Privacy issues, The Data Protection Act
1	SLR 1.6 – Lesson 1, Ethical issues	<ul style="list-style-type: none"> <li>Know a range of things to consider beyond development when implementing new computer systems.</li> <li>Understand at least one ethical issue of computer technology.</li> </ul> <p><b>KEY QUESTION:</b> <b>What are the ethical issues of computing?</b></p>	<p>To what extent is copying software, music and motion picture files a form of stealing?</p> <p>Make your own mind up, and then look at the comments in this online debate: <a href="http://www.debate.org/opinions/should-piracy-be-legal">http://www.debate.org/opinions/should-piracy-be-legal</a></p> <p>What are the arguments for and against piracy?</p>	<p>SLR 1.6 Workbook Complete slides 2-4</p> <p><b>Programming</b></p>	 <a href="#">1.6 Privacy issues</a>	2018, Computer Misuse Act 1990, Copyright Designs and Patents Act 1998, Software licences, Open source, Proprietary
2	SLR 1.6 – Lesson 2, Privacy issues	<ul style="list-style-type: none"> <li>Understand at least one issue related to privacy and computer technologies.</li> </ul> <p><b>KEY QUESTION:</b> <b>What privacy issues does computing cause?</b></p>	<p>To what extent can you maintain your privacy on social networking?</p> <p>What are the potential problems of public profiles?</p>	<p>SLR 1.6 Workbook Complete slide 5 Take a copy of slide 4 and tackle another ethical issue</p> <p><b>Programming</b></p>	 <a href="#">1.6 Legislation relevant to computer science</a>	



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3	SLR 1.6 – Lesson 3, Legal issues	<ul style="list-style-type: none"> <li>• Know the principles of the Acts of Parliament:           <ul style="list-style-type: none"> <li>◦ Data Protection Act 2018</li> <li>◦ Computer Misuse Act 1990</li> <li>◦ Copyright Designs and Patents Act 1988</li> </ul> </li> </ul> <p><b>KEY QUESTION:</b> <b>What does the legislation for computing prohibit?</b></p>	<ol style="list-style-type: none"> <li>1. I discovered my teacher's username and password. I use it to access the school information system to change the grades on my report – am I breaking the law?</li> <li>2. I copy a picture from the internet to use in my new book that I intend to sell online – am I breaking the law?</li> <li>3. I want to know what the latest traffic improvement scheme in town cost to put in place – can I find out?</li> </ol>	SLR 1.6 Workbook Complete slides 6-7  <span style="color: green;">Programming</span>	 <a href="#">1.6 Cultural implications of computer science</a>	
4	SLR 1.6 – Lesson 4, Cultural issues	<ul style="list-style-type: none"> <li>• Understand some of the key cultural issues of computer science:           <ul style="list-style-type: none"> <li>◦ The impact of technology on our daily lives.</li> <li>◦ The 'digital divide'.</li> <li>◦ Globalisation.</li> </ul> </li> </ul> <p><b>KEY QUESTION:</b> <b>How does computing impact on people?</b></p>	Research: what is the "one laptop per child" initiative? Why was it criticised?	SLR 1.6 Workbook Complete slides 8-9  <span style="color: green;">Programming</span>	 <a href="#">1.6 Environmental impact of computer science</a>	
5	SLR 1.6 – Lesson 5, Environmental issues	<ul style="list-style-type: none"> <li>• Understand the environmental impact of computers in terms of:           <ul style="list-style-type: none"> <li>◦ Manufacturing</li> <li>◦ Use</li> <li>◦ Disposal</li> </ul> </li> </ul> <p><b>KEY QUESTION:</b> <b>What is the environmental impact of computing?</b></p>	Which 20 elements are used in the manufacturing of computers? How many can you guess correctly? For double points, highlight the ones you think are most hazardous to humans.	SLR 1.6 Workbook Complete slide 10  <span style="color: green;">Programming</span>	 <a href="#">1.6 Impacts of digital technology on wider society</a>	
6	SLR 1.6 – Lesson 6, How digital technology impacts society	<ul style="list-style-type: none"> <li>• Know how to identify key stakeholders.</li> <li>• Know how to consider a scenario from the perspective of the stakeholders.</li> <li>• Understand at least one scenario of the impact of computer science.</li> </ul> <p><b>KEY QUESTION:</b></p>	An electricity supplier is changing its practice of reading customer usage meters. Instead of estimating bills and sending someone to read the meter at houses once a year, the company are investing in "smart meters". These meters send the	SLR 1.6 Workbook Complete slides 11-12  <span style="color: green;">Programming</span>	 <a href="#">1.6 Open source vs proprietary software</a>	



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		How can digital technology have an impact on society at a local, national and international level?	usage data via the internet to the electricity supplier automatically. Identify the key stakeholders and state the impact on them.			
7	SLR 1.6 – Lesson 7, Open source vs proprietary software	<ul style="list-style-type: none"> <li>• Know the difference between open source and proprietary software.</li> <li>• Understand the implications of using open source and proprietary software.</li> </ul> <p><b>KEY QUESTION:</b> <b>What recommendations would you give to someone considering software for their PC?</b></p>	Open source or proprietary?	SLR 1.6 Workbook Complete slide 13  Programming	Revise what you have learnt in this unit	
8	<b>Text adventure game</b>  All the resources needed for this section are in the folder “Text-based adventure game (Telium)”					
9						
10	These resources can be used in many ways. If you are following our delivery plan, we have set aside these eight dedicated lessons in the final term of year 10 for your students to attempt an extended text-based space adventure game.					
11						
12	By this point, students should have a fair amount of experience in programming – this is a nice exercise to bring all the concepts together in an extended exercise.					
13	There is a detailed teacher notes file in the folder above named “+ Telium – Teacher notes (README)”.					
14						
15	We have also provided a PDF workbook for students to use throughout this section.  All the coded solutions are also provided for your reference.					
16	SLR 1.6 – End-of-topic test	End-of-topic test		1.6 Test.docx 1.6 Test Answers.docx		
17	SLR 1.6 – Action	Action/response lessons		Chance for students to respond to feedback, improve workbooks, correct misunderstandings		



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YEAR 11 – TERM 1						
	Focus for lesson	Learning outcomes and key question	Starter	Activities	HW for next lesson	Key terms
	SLR 2.2 Programming fundamentals				<a href="#"> 2.2 The use of variables, constants, inputs, outputs and assignments</a> <a href="#"> 2.2 The use of the three basic programming constructs</a>	<u>Slides 152-199</u> Variable, Constant, Operator, Assignment, Programming construct, Sequence, Selection, Count controlled iteration, Condition controlled iteration, Arithmetic operator, AND, OR, NOT, ==, !=, <, <=, >, >=, +, -, *, /, MOD, DIV, ^, Data type, Integer, Real, Boolean, Character, String, Casting, String manipulation, OPEN, READ,
1	SLR 2.2 – Lesson 1, Basic programming constructs	<ul style="list-style-type: none"> <li>• Know what is meant by the following key terms:           <ul style="list-style-type: none"> <li>○ Variables</li> <li>○ Constants</li> <li>○ Input</li> <li>○ Output</li> <li>○ Assignment</li> </ul> </li> <li>• Know the 3 basic programming constructs.</li> </ul> <p><b>KEY QUESTION:</b>  <b>What terms are associated with programming?</b></p>	<p>Constants and variables both store data for a program. The concepts are very similar.</p> <p>Why should a programmer use a constant in their code instead of a variable?</p>	<p>SLR 2.2 Workbook</p> <p>Complete slides 2-4</p> <p><a href="#">Using code snippets from slide 3 and 4 of the 2.2 workbook, write a program that: Suggests 3 usernames for a new user, asks for their choice of username and rejects any username entered that is less than 4 or more than 12 characters long.</a></p>	<a href="#"> 2.2 The common arithmetic and comparison operators</a> <a href="#"> 2.2 The common Boolean operators</a> <a href="#"> 2.2 The use of data types and casting</a> <a href="#"> 2.2 The use of basic string manipulation</a>	<u>Slides 152-199</u> Variable, Constant, Operator, Assignment, Programming construct, Sequence, Selection, Count controlled iteration, Condition controlled iteration, Arithmetic operator, AND, OR, NOT, ==, !=, <, <=, >, >=, +, -, *, /, MOD, DIV, ^, Data type, Integer, Real, Boolean, Character, String, Casting, String manipulation, OPEN, READ,
2	SLR 2.2 – Lesson 2, Data types, operators and string manipulation	<ul style="list-style-type: none"> <li>• Know the different variable data types.</li> <li>• Understand the need for casting.</li> <li>• Know the arithmetic operators.</li> <li>• Know the Boolean operators.</li> <li>• Know the comparison operators.</li> </ul>	<p>Solve the logic puzzle presented to you on paper:</p> <p>University of Greenwich is sending out several expeditions to study different</p>	<p>SLR 2.2 Workbook</p> <p>Complete slide 5-9</p>	<a href="#"> 2.2 The use of basic file handling operations</a>	<u>Slides 152-199</u> Variable, Constant, Operator, Assignment, Programming construct, Sequence, Selection, Count controlled iteration, Condition controlled iteration, Arithmetic operator, AND, OR, NOT, ==, !=, <, <=, >, >=, +, -, *, /, MOD, DIV, ^, Data type, Integer, Real, Boolean, Character, String, Casting, String manipulation, OPEN, READ,



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		<ul style="list-style-type: none"> <li>Understand how to use computer-related mathematic operators.</li> <li>Understand basic string manipulation commands.</li> </ul> <p><b>KEY QUESTION:</b> Why are numbers sometimes stored as strings?</p>	bat species around the world. Each expedition will include a chiroptologist (bat expert) and a speleologist (cave expert), and each will take place in a different country.  Which person is leaving in each month?	Continue working on the programming exercise from the last lesson.		WRITE, CLOSE, Record, SQL, SELECT, FROM, WHERE, Array, Sub program, Procedure, Function, Random number generation
3	SLR 2.2 – Lesson 3, File handling	<ul style="list-style-type: none"> <li>Understand how to use basic file handling operations: <ul style="list-style-type: none"> <li>Open files</li> <li>Read from files</li> <li>Write to files</li> <li>Close files</li> </ul> </li> </ul> <p><b>KEY QUESTION:</b> What are the steps to using data files with programs?</p>	Examine the following program and data file.  The program should output the names of all the countries, but it does not work. Why?	SLR 2.2 Workbook Complete slide 10-11  Using the unscrambled programs from 2.2 workbook sides 10 and 11, enter these into Python as two separate programs and check they work.  The data entry will be case sensitive.	<a href="#"> 2.2 The use of records to store data</a> <a href="#"> 2.2 The use of SQL to search for data</a>	
4	SLR 2.2 – Lesson 4, Records and SQL	<ul style="list-style-type: none"> <li>Understand the term ‘record’.</li> <li>Understand the SQL commands: <ul style="list-style-type: none"> <li>SELECT</li> <li>FROM</li> <li>WHERE (including the Boolean operators)</li> <li>LIKE</li> </ul> </li> <li>Know the purpose of nested SELECTs.</li> </ul> <p><b>KEY QUESTION:</b> How is SQL used to search for data?</p>	How many records would be returned?	SLR 2.2 Workbook Complete slides 12-13  You can use the lesson 4 SQL program as a head start with the code.  The code uses a database file called lesson 4 – world.sqlite3	<a href="#"> 2.2 The use of arrays</a> <a href="#"> 2.2 How to use sub-programs</a>	
5	SLR 2.2 – Lesson 5, Arrays and sub-problems	<ul style="list-style-type: none"> <li>Understand how an array or list can be used to store data.</li> <li>Understand that arrays can be one- or two-dimensional.</li> </ul>	Codebreaker. What is the code to open the safe?	SLR 2.2 Workbook Complete slides 14-17	<a href="#"> 2.2 Random number generation</a>	



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		<ul style="list-style-type: none"><li>Understand that programs can be structured using procedures and functions.</li><li>Understand that parameters can be passed and returned from functions.</li><li>Understand that variables can be global or local.</li></ul> <p><b>KEY QUESTION:</b> What does a two-dimensional array or list mean? Why are sub-programs used?</p>		<p>Write a program to output a random bingo ticket. These objectives get progressively more difficult. See how far you can get. (details in lesson PowerPoint)</p>	
6	SLR 2.2 – Lesson 6, Random number generation	<ul style="list-style-type: none"><li>Understand how to use random number generation.</li></ul> <p><b>KEY QUESTION:</b> In what sort of problems might we need to generate a random number or sequence of random numbers?</p>	"Can computers produce truly random numbers?"  What can you find out about this question in the next few minutes?	<p>SLR 2.2 Workbook Complete slide 18</p> <p>Write the dice roll program that you pseudo-coded on slide 16 of your workbook. If you have time continue with the bingo ticket problems from the last lesson.</p>	
7	SLR 2.2 – Lesson 7, Catch up lesson	<ul style="list-style-type: none"><li>Catch up and complete any outstanding work from this unit.</li></ul> <p><b>KEY QUESTION:</b> What terms are associated with programming?</p>	What is the difference between pseudocode and source code?	<p>SLR 2.2 Workbook Complete any slides not yet completed in this unit.</p> <p>Continue working on the bingo ticket problem or any other unfinished programs from this unit.</p>	Revise what you have learned in this unit.



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8 to 10	Dedicated paper 2 exam revision lesson	Gain experience answering computational thinking, algorithms and programming questions for component J277/02 using our dedicated exam revision unit.		Progress with activities in the “Exam revision unit” folder		
11	SLR 2.2 – End-of-topic test	End-of-topic test		2.2 Test.docx 2.2 Test Answers.docx		
12	SLR 2.2 – Action	Action/response lessons		Chance for students to respond to feedback, improve workbooks, correct misunderstandings		
<b>SLR 2.1 Algorithms</b>						 <u>2.1 Abstraction</u>
13	SLR 2.1 – Lesson 1, Abstraction	<ul style="list-style-type: none"> <li>• Know what is meant by the term ‘abstraction’.</li> <li>• Know some examples of abstraction.</li> </ul> <p><b>KEY QUESTION:</b> <b>What are the principles of computational thinking?</b></p>	<p>The picture below shows the Perrygrove railway. In what ways is this an example of abstraction?</p>	<p>SLR 2.1 Workbook Complete slide 2  Fly the paper aeroplanes. Who made the best one and why? Complete slide 3. Can you extend your icon set to include more animals? What features have you included in your icons so they are recognisable as part of the same icon set?</p>		<b>Slides 134-151</b> Computational Thinking, Abstraction, Decomposition, Algorithmic thinking, Problem inputs, Problem processes, Problem outputs, Structure diagram, Pseudocode, Flowchart, Trace table, Searching algorithms, Binary search, Linear search,
14	SLR 2.1 – Lesson 2, Abstraction	<ul style="list-style-type: none"> <li>• Know what is meant by the term ‘abstraction’.</li> <li>• Know some examples of abstraction</li> </ul>	Consider the interface of a sat-nav device.	SLR 2.1 Workbook Complete slide 3	 <u>2.1 Decomposition</u>	



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		<p><b>KEY QUESTION:</b> What are the principles of computational thinking?</p>	<p>What are the necessary details for the input? What are the necessary details for the output?</p>	<p>Complete slide 4.</p>	 <a href="#">2.1 Structure diagrams</a>	Sorting algorithm, Bubble sort, Merge sort, Insertion sort
15	SLR 2.1 – Lesson 3, Decomposition and structure diagrams	<ul style="list-style-type: none"> <li>• Know what is meant by problem decomposition.</li> <li>• Know the advantages of decomposition when applied to programming.</li> <li>• Know an example of problem decomposition.</li> <li>• Know how to produce a structure diagram to aid in decomposing a problem.</li> </ul> <p><b>KEY QUESTION:</b> What is the purpose of decomposition, and how can producing structure diagrams help?</p>	<p>You and a friend decide to go to the cinema on Saturday. How would you apply problem decomposition to this task?</p>	<p>SLR 2.1 Workbook Complete slides 5-8</p> <p><b>Complete the programming challenge on slide 6.</b></p> <p>To make the challenge easier, you could input N, S, E, W separately to the latitude and longitude.</p> <p>To make the challenge more difficult you could use string manipulation commands to extract the N, S, E, W from the right of the string.</p>	 <a href="#">2.1 Inputs, processes and outputs</a>   <a href="#">2.1 Algorithmic thinking</a>	
16	SLR 2.1 – Lesson 4, Algorithmic thinking	<ul style="list-style-type: none"> <li>• Understand how to solve computational problems by applying algorithmic thinking.</li> </ul> <p><b>KEY QUESTION:</b> What do we mean by “thinking algorithmically”?</p>	<p>A storage unit is in the shape of a hemisphere on top of a cylinder. The surface of the storage unit is to be painted. Calculate the area to be painted.</p>	<p>SLR 2.1 Workbook Complete slide 9 Start slide 10</p> <p><b>Write the programs on slide 10</b></p>		



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17	SLR 2.1 – Lesson 5, Algorithmic thinking	<ul style="list-style-type: none"><li>Understand how to solve computational problems by applying algorithmic thinking.</li></ul> <p><b>KEY QUESTION:</b> <b>What do we mean by “thinking algorithmically”?</b></p>	<p>What does this algorithm output for each of the following values of a and b:</p> <p>a = 3 b = 4</p> <p>What does this algorithm do?</p> <p>a = a * a b = b * b c = sqrt(a + b) return c</p>	<p>SLR 2.1 Workbook Complete slide 11</p> <p><b>Continue working on problems on either slide 10 or slide 11</b></p>		
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# GCSE OCR Computer Science (J277) – Scheme of Learning

YEAR 11 – TERM 2						
	Focus for lesson	Learning outcomes and key question	Starter	Activities	HW for next lesson	Key terms
	SLR 2.1 Algorithms					
1	SLR 2.1 – Lesson 6, Algorithmic thinking	<ul style="list-style-type: none"> <li>Understand how to solve computational problems by applying algorithmic thinking.</li> </ul> <p><b>KEY QUESTION:</b> What do we mean by “thinking algorithmically”?</p>	<p>What does this algorithm output for each of the following values of n:</p> <p>n = 2 n = 3 n = 4</p> <p>What does this algorithm do?</p> <pre>i = 2 while i &lt;= n/2:     if n % i == 0:         return False     i = i + 1 return True</pre>	<p>Continue working on problems from either slide 10 or slide 11</p>	 <a href="#">2.1 Linear search</a>	<b>Slides 134-151</b> Computational Thinking, Abstraction, Decomposition, Algorithmic thinking, Problem inputs, Problem processes, Problem outputs, Structure diagram, Pseudocode,
2	SLR 2.1 – Lesson 7, Linear search	<ul style="list-style-type: none"> <li>Understand the linear search algorithm.</li> <li>Understand it is not an efficient algorithm, but it is easier to program than alternatives and does not require the items to be in any order.</li> </ul> <p><b>KEY QUESTION:</b> How does a linear search work?</p>	<p>Consider this list of mountains. With a linear search, how many conditions will be executed to find each of the mountains below?</p> <ul style="list-style-type: none"> <li>Manaslu</li> <li>Annapurna</li> <li>Broad Peak</li> </ul>	<p>SLR 2.1 Workbook Complete slide 12</p> <p><a href="#">Write a program to perform a linear search to output the latitude and longitude of a given capital city</a></p>	 <a href="#">2.1 Binary search</a>	Flowchart, Trace table, Searching algorithms, Binary search, Linear search, Sorting algorithm, Bubble sort,
3	SLR 2.1 – Lesson 8, Binary search	<ul style="list-style-type: none"> <li>Understand the binary search algorithm.</li> <li>Know the special condition of the list of items for the binary search to work.</li> <li>Understand which searching algorithm is quicker.</li> </ul> <p><b>KEY QUESTION:</b></p>	<p>Given this list of numbers, can you illustrate the binary search as a picture of a tree?</p> <p>2, 4, 6, 8, 10, 12, 14</p>	<p>SLR 2.1 Workbook Complete slides 13-14</p> <p><a href="#">Write a program to perform a binary search on a list of items</a></p>	 <a href="#">2.1 Bubble sort</a>	Merge sort, Insertion sort



# GCSE OCR Computer Science (J277) – Scheme of Learning

		How does a binary search work?			
4	SLR 2.1 – Lesson 9, Bubble sort	<ul style="list-style-type: none"> <li>Understand the bubble sort algorithm.</li> </ul> <p><b>KEY QUESTION:</b> <b>How does a bubble sort work?</b></p>	<p>What is the value of n after running this code?</p> <p>What does this code do?</p> <pre>n = [23,16] i = 1 if n[i-1] &gt; n[i]:     t = n[i-1]     n[i-1] = n[i]     n[i]=t</pre>	<p>SLR 2.1 Workbook Complete slide 15</p> <p>Write a program to perform a bubble sort on a list of items</p>	 <a href="#">2.1 Merge sort</a>  <a href="#">2.1 Insertion sort</a>
5	SLR 2.1 – Lesson 10, Merge sort and insertion sort	<ul style="list-style-type: none"> <li>Understand the merge sort algorithm.</li> <li>Understand the insertion sort algorithm.</li> </ul> <p><b>KEY QUESTION:</b> <b>How does a merge sort work?</b> <b>How does an insertion sort work?</b></p>	<p>Class is divided into two groups. Group 1 are demonstrating a <b>merge</b> sort.</p> <p>Group 2 are demonstrating an <b>insertion</b> sort.</p> <p>To demonstrate this, each person in the team lines up and holds an A4 sheet with a number in front of them.</p> <p>According to the algorithm one student physically moves at a time to show how the sort works.</p>	<p>SLR 2.1 Workbook Complete slides 16-18</p> <p>Continue working on programs you have already started in this unit.</p> <p>There is no need to learn how to program the merge sort as it requires some A Level knowledge.</p> <p>You could have a go at programming an insertion sort on a list if you wanted another super challenge</p>	 <a href="#">2.1 How to produce algorithms using pseudocode and flow diagrams</a>



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6	SLR 2.1 – Lesson 11, How to produce algorithms	<ul style="list-style-type: none"> <li>• Know the flow diagram symbols.</li> <li>• Know that flow diagrams are also called flowcharts.</li> <li>• Know how to make a flow diagram.</li> <li>• Understand how to construct a program from a flow diagram.</li> <li>• Know what is meant by the term pseudocode.</li> <li>• Understand how to write pseudocode.</li> <li>• Understand the OCR reference language.</li> </ul> <p><b>KEY QUESTION:</b> <b>How can algorithms be described without ambiguity?</b></p>	Can you write a program for this algorithm?	SLR 2.1 Workbook Complete slides 19-21  <a href="#">Create the program on slide 21</a>		
7	SLR 2.1 – Lesson 12, How to produce algorithms	<ul style="list-style-type: none"> <li>• Know how to make a flow diagram.</li> <li>• Understand how to write pseudocode.</li> <li>• Understand how to write a program from a flow diagram and pseudocode.</li> <li>• Understand the OCR reference language.</li> </ul> <p><b>KEY QUESTION:</b> <b>How can algorithms be described without ambiguity?</b></p>	<p>A role-playing game (RPG) often requires dice with a different number of sides to be rolled.</p> <p>This Python program should ask the user how many sides the dice has, and how many rolls to perform, before outputting the result of the dice rolls, but it does not work.</p> <p>Where is the bug?</p>	SLR 2.1 Workbook Complete slides 22-23  <a href="#">Write the program described on slide 23</a>		
8	SLR 2.1 – Lesson 13, Interpret, correct or complete algorithms	<ul style="list-style-type: none"> <li>• Understand how to interpret algorithms.</li> <li>• Understand how to correct algorithms.</li> <li>• Understand the OCR reference language.</li> </ul> <p><b>KEY QUESTION:</b> <b>How do you express algorithms using the exam board reference language?</b></p>	<p>A role-playing game (RPG) often requires dice with a different number of sides to be rolled.</p> <p>This Python program should ask the user how many sides the dice has, and how many rolls to perform, before outputting the result of the dice rolls, but it does not work.</p> <p>Where is the bug?</p>	SLR 2.1 Workbook Complete slides 24-25  <a href="#">Write the program described on slide 25</a>		



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9	SLR 2.1 – Lesson 14, How to produce algorithms	<ul style="list-style-type: none"> <li>Know how to make a flow diagram.</li> <li>Understand how to write pseudocode.</li> <li>Understand how to write a program from a flow diagram and pseudocode.</li> <li>Understand the OCR reference language.</li> </ul> <p><b>KEY QUESTION:</b> How can algorithms be described without ambiguity?</p>	<p>A role-playing game (RPG) often requires dice with a different number of sides to be rolled.</p> <p>This Python program should ask the user how many sides the dice has, and how many rolls to perform, before outputting the result of the dice rolls, but it does not work.</p> <p>Where is the bug?</p>	<p>SLR 2.1 Workbook Complete slides 26-27</p> <p><b>Write the program described on slide 27</b></p>	 <a href="#">2.1 Identifying errors and suggesting fixes</a>	
10	SLR 2.1 – Lesson 15, Identifying common errors and suggesting fixes	<ul style="list-style-type: none"> <li>Know what a syntax error is.</li> <li>Know what a logic error is.</li> <li>Know how identify simple syntax and logic errors in high-level code and the OCR reference language.</li> <li>Be able to suggest code fixes by spotting syntax and logic errors.</li> </ul> <p><b>KEY QUESTION:</b> What are the different types of errors that can occur when programming?</p>	<p>When programmers make mistakes or errors in their code, we often call it a “bug”.</p> <p>Can you find out where this term came from?</p>	<p>SLR 2.1 Workbook Complete slides 28-30</p> <p><b>Complete or enhance any programs from this unit</b></p>	 <a href="#">2.1 Trace tables</a>	
11	SLR 2.1 – Lesson 16, Trace tables	<ul style="list-style-type: none"> <li>Know what a trace table is.</li> <li>Understand how and why trace tables can be useful for debugging.</li> <li>Know how to complete a trace table.</li> </ul> <p><b>KEY QUESTION:</b> How and why do programmers use a trace table?</p>	<p>Look at this code:</p> <ol style="list-style-type: none"> <li>Identify the variables.</li> <li>Identify the lines of code that change these variables.</li> <li>Why don't we need to add the constants to a trace table?</li> </ol>	<p>SLR 2.1 Workbook Complete slide 31</p> <p><b>Complete or enhance any programs from this unit</b></p>	Revise what you have learned in this unit	
12 & 13	Dedicated paper 2 exam revision lesson	Gain experience answering computational thinking, algorithms and programming questions for component J277/02 using our dedicated exam revision unit.		Progress with activities in the “Exam revision unit” folder		
14	SLR 2.1 – End-of-topic test	End-of-topic test		2.1 Test.docx 2.1 Test Answers.docx		



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15	SLR 2.1 – Action	Action/response lessons	Chance for students to respond to feedback, improve workbooks, correct misunderstandings		
16 to 20	Dedicated paper 2 exam revision lesson	Gain experience answering computational thinking, algorithms and programming questions for component J277/02 using our dedicated exam revision unit.	Progress with activities in the “Exam revision unit” folder		



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YEAR 11 – TERM 3						
	Focus for lesson	Learning outcomes and key question	Starter	Activities	HW for next lesson	Key terms
		SLR 2.3 Producing robust programs			<a href="#"> 2.3 Defensive design considerations part 1</a>	Slides 200-217 Defensive design, Anticipating misuse, Authentication, Input validation, Maintainability, Naming conventions, Indentation, Commenting, Testing, Iterative testing, Final/terminal testing, Syntax
1	SLR 2.3 – Lesson 1, Input validation	<ul style="list-style-type: none"> <li>Know what is meant by the term “defensive design considerations” when writing programs.</li> <li>Understand why input validation is necessary.</li> <li>Know a range of validation techniques that can be used to write a robust program.</li> </ul> <p><b>KEY QUESTION:</b> What issues should a programmer consider to ensure a program caters for all likely input values?</p>	What validation could be performed on this sign-up form?	SLR 2.3 Workbook Complete slide 2  Write a program that asks the user to enter a date in the format dd/mm/yyyy. The program should validate the data in the following ways, and output which type of check was failed or that the date is valid:	<a href="#"> 2.3 Defensive design considerations part 2</a>	
2	SLR 2.3 – Lesson 2, Defensive design consideration	<ul style="list-style-type: none"> <li>Know what is meant by the term “defensive design considerations” when writing programs.</li> <li>Know a range of potential problems that can occur when a program is running, especially if it requires communication to servers, peripherals, data in files and arithmetic.</li> <li>Understand some authentication techniques a programmer may choose to use to protect their program from misuse.</li> </ul> <p><b>KEY QUESTION:</b> What issues should a programmer consider to ensure a program caters for all likely input values?</p>	Why do online forms often have this prompt?  What else is ReCAPTCHA used for?	SLR 2.3 Workbook Complete slides 3-4  Continue the date validation program. Write a program to validate an email address: must contain a @. Must be sanitised to lower case. Dot cannot be a first or last character. Double dots are not permitted.	<a href="#"> 2.3 Maintainability</a> <a href="#"> 2.3 Refining algorithms to make them more robust</a>	error, Logical error, Test data, Test data: Normal, Test data: Invalid, Test data: Erroneous



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				SUPER CHALLENGE: Research what makes a strong password. Create a program to validate a secure password.	
3	SLR 2.3 – Lesson 3, Maintainability and refining algorithms	<ul style="list-style-type: none"> <li>• Know why creating easy to read code is important with large projects.</li> <li>• Understand what programmers can do to make their code more readable.</li> <li>• Understand how to refine algorithms to make them more robust.</li> </ul> <p><b>KEY QUESTION:</b> <b>What does code maintainability mean?</b></p>	<p>Research on the internet: “best practices for writing super readable code.”</p> <p>What are the seven deadly sins of creating unreadable code?</p>	<p>SLR 2.3 Workbook Complete slides 5-6</p> <p><b>Continue the date validation program.</b> <b>Continue the validate email address program.</b> <b>Add sanitisation and validation to the greatest common factors program on slide 5.</b></p>	 <a href="#">2.3 The purpose and types of testing</a>  <a href="#">2.3 How to identify syntax and logic errors</a>
4	SLR 2.3 – Lesson 4, Types of testing and errors	<ul style="list-style-type: none"> <li>• Know four reasons why a program should be tested.</li> <li>• Know what iterative testing is.</li> <li>• Know what final/terminal testing is.</li> <li>• Know what a syntax error is.</li> <li>• Know what a logic error is.</li> </ul> <p><b>KEY QUESTION:</b> <b>What are the different types of errors that can occur in a program?</b></p>	<p>The following program should output the factorial of a number input – e.g., <math>5! = 5*4*3*2*1 = 120</math>, but it contains syntax and logic errors. Where are they?</p>	<p>SLR 2.3 Workbook Complete slide 7-12</p> <p><b>Continue the date validation program.</b> <b>Continue the validate email address program.</b> <b>Continue the greatest common factors program.</b> <b>Create the program shown in the starter to output the factorial of a number. Include suitable</b></p>	 <a href="#">2.3 Suitable test data</a>



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				input sanitisation and validation for the program.	
5	SLR 2.3 – Lesson 5, Suitable test data	<ul style="list-style-type: none"><li>Understand that because a program works, it doesn't mean it works for all inputs.</li><li>Understand that suitable test data for a program needs to include:<ul style="list-style-type: none"><li>Normal data</li><li>Boundary data</li><li>Invalid data</li><li>Erroneous data</li></ul></li></ul> <p><b>KEY QUESTION:</b> <b>What makes a good testing strategy?</b></p>	<p>The following program outputs the factorial of a number input – e.g., <math>5! = 5*4*3*2*1 = 120</math>.</p> <p>Suggest a range of test data that could be used with this program and why that data should be used.</p>	<p>SLR 2.3 Workbook Complete slides 13-15</p> <p>Complete any outstanding programs. Write a program to simulate an input tweet of up to 280 characters. It should allow the user to enter text and output the number of characters that were remaining after the input. Inputs of more than 280 characters are rejected with the number of characters over shown as a negative number.</p> <p><b>SUPER CHALLENGE:</b> Can you allow the user to enter a multi-line tweet using a list to store each line input, terminating when the line contains no characters?</p>	



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				Extend the program so it only stops when a tweet of 0 characters is entered.		
6	SLR 2.3 – Lesson 6, Complete outstanding programs	<ul style="list-style-type: none"><li>Understand how robust programs are made. <b>KEY QUESTION:</b> <b>What makes a robust program?</b></li></ul>	<p>What does it mean to “produce a robust program”? Create a list of points you would include in an answer to a question worth 12 marks.</p>	<p>SLR 2.3 Workbook Complete any outstanding workbook pages</p> <p>Complete any outstanding programs: Date validation program. Secure password validation program. Greatest common factors program. Factorial numbers program. Twitter validation program. SUPER CHALLENGE: Write a program to convert a decimal into a fraction – e.g., <math>0.5 = \frac{1}{2}</math>, <math>0.75 = \frac{3}{4}</math>. You will need to use your greatest common factors program and research a suitable algorithm.</p>	Revise what you have learned in this unit	



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7 & 8	Dedicated paper 2 exam revision lesson	Gain experience answering computational thinking, algorithms and programming questions for component J277/02 using our dedicated exam revision unit.	Progress with activities in the “Exam revision unit” folder		
9	SLR 2.3 – End-of-topic test	End-of-topic test	2.3 Test.docx 2.3 Test Answers.docx		
10	SLR 2.3 – Action	Action/response lessons	Chance for students to respond to feedback, improve workbooks, correct misunderstandings		
11 to 15	Dedicated paper 2 exam revision lesson	Gain experience answering computational thinking, algorithms and programming questions for component J277/02 using our dedicated exam revision unit.	Progress with activities in the “Exam revision unit” folder		



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YEAR 11 – TERM 4						
	Focus for lesson	Learning outcomes and key question	Starter	Activities	HW for next lesson	Key terms
	SLR 2.4 Boolean logic				 <a href="#">2.4 Simple logic diagrams</a>	Slides 218-223 Logic diagram, Logic gate, AND, OR, NOT, Truth table
1	SLR 2.4 – Lesson 1, Simple logic diagrams	<ul style="list-style-type: none"> <li>Know how to make simple logic diagrams from Boolean expressions using AND, OR, NOT.</li> </ul> <p><b>KEY QUESTION:</b> <b>What are the symbols used in logic diagrams?</b></p>	<p>Use <a href="http://logic.ly/demo/">http://logic.ly/demo/</a> to make this circuit: What internal component do you think it could be part of in a computer system?</p>	<p>SLR 2.4 Workbook Complete slides 2-7</p> <p>Just for fun – this circuit is part of the arithmetic logic unit in the CPU. It adds two binary digits: <math>0+0=0</math>, <math>0+1=1</math>, <math>1+0=1</math>, <math>1+1=0</math> carry 1. Give it a go by making it using <a href="https://logic.ly/demo/">https://logic.ly/demo/</a></p> <p>SUPER CHALLENGE: Can you make the output of the carry the input to another adder circuit?</p>	 <a href="#">2.4 Truth tables</a>  <a href="#">2.4 Combining Boolean operators</a>	
2	SLR 2.4 – Lesson 2, Applying logic operators and truth tables to solve problems	<ul style="list-style-type: none"> <li>Understand how to complete truth tables from one- and two-level logic diagrams.</li> </ul> <p><b>KEY QUESTION:</b> <b>How do you complete a truth table?</b></p>	<p>Study the electric circuit below. Which logic gate is it? Can you create a circuit for an alternative logic gate?</p>	<p>SLR 2.4 Workbook Complete slides 8-14</p> <p>Mark your truth tables by drawing the logic diagrams on slides 8-14 using <a href="http://logic.ly/demo/">http://logic.ly/demo/</a></p> <p>Use toggle switches for inputs and a light bulb for the output.</p>	 <a href="#">2.4 Applying logical operators in truth tables</a>	



# GCSE OCR Computer Science (J277) – Scheme of Learning

				Check that the output matches the inputs given for each of your truth tables.		
3	SLR 2.4 – Lesson 3, Create, complete or edit logic diagrams and truth tables	<ul style="list-style-type: none"> <li>Understand how to create, complete or edit logic diagrams and truth tables for given scenarios. <b>KEY QUESTION:</b> How do you create logic diagrams from truth tables?</li> </ul>	<p>Hard drives are considered old technology today as people replace their HDD with SSD, but could they instead actually be the future technology for mass storage of data?</p> <p>Research: “single atom magnets” What is your conclusion?</p>	<p>SLR 2.4 Workbook</p> <p>Complete slides 15-17</p> <p>Mark your truth tables by drawing the logic diagrams on slides 8-14 using <a href="http://logic.ly/demo/">http://logic.ly/demo/</a></p> <p>Use toggle switches for inputs and a light bulb for the output.</p> <p>Check that the output matches the inputs given for each of your truth tables.</p>	Revise what you have learnt in this unit	
4 & 5	Dedicated paper 2 exam revision lesson	Gain experience answering computational thinking, algorithms and programming questions for component J277/02 using our dedicated exam revision unit.		Progress with activities in the “Exam revision unit” folder		
6	SLR 2.4 – End-of-topic test	End-of-topic test		2.4 Test.docx 2.4 Test Answers.docx		
7	SLR 2.4 – Action	Action/response lessons		Chance for students to respond to feedback, improve workbooks, correct misunderstandings		



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SLR 2.5 Programming languages and IDEs					 <a href="#">2.5</a> <a href="#">Characteristics and purpose of different levels of programming language</a>	<b>Slides 224-231</b> High-level language, Low-level language, Translator, Compiler, Interpreter, IDE, IDE: Error diagnostics, IDE: Run-time environment
8	SLR 2.5 – Lesson 1, Characteristics of languages	<ul style="list-style-type: none"> <li>Know the characteristics of high level and low-level programming languages.</li> <li>Understand the terms: <ul style="list-style-type: none"> <li>Source code</li> <li>Assembly code</li> <li>Machine code</li> </ul> </li> </ul> <p><b>KEY QUESTION:</b> <b>What are the differences between high- and low-level languages?</b></p>	Translate these alphabet hieroglyphics:	SLR 2.5 Workbook Complete slides 2-4  <b>Solve as many Little Man Computer problems as you can</b>		
9	SLR 2.5 – Lesson 2, Low level programming	<ul style="list-style-type: none"> <li>Understand how to write programs in a low-level language using assembly with Little Man Computer.</li> </ul> <p><b>KEY QUESTION:</b> <b>How do you write a program in assembly language?</b></p>	What should this program do? What is the problem with it?	SLR 2.5 Workbook Complete slide 5  Programming circle group activity (slide 7)  <b>Solve as many Little Man Computer problems as you can</b>	 <a href="#">2.5 The purpose of translators</a>   <a href="#">2.5 Characteristics pf compilers and interpreters</a>	
10	SLR 2.5 – Lesson 3, Compilers and interpreters for translation	<ul style="list-style-type: none"> <li>Know what a translator does.</li> <li>Understand the differences between compilers and interpreters.</li> </ul> <p><b>KEY QUESTION:</b></p>	Research the family tree of programming languages and put these languages in historical order.	SLR 2.5 Workbook Complete slides 6-7  <b>Type the two programs to generate the prime numbers</b>	 <a href="#">2.5 IDEs</a>	



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		<p>How does code a programmer writes become binary a computer can execute?</p>		<p>between 1 and 100 into Python and a BBC Micro emulator: <a href="https://bbc.godbolt.org/">https://bbc.godbolt.org/</a></p> <p>Put a syntax error in line 120. Observe how each language handles the syntax errors differently: Python with a compiler and BBC Basic with an interpreter.</p> <p>Continue to solve as many Little Man Computer problems as you can.</p>	
11	SLR 2.5 – Lesson 4, IDEs	<ul style="list-style-type: none"><li>• Know a range of facilities provided by an integrated development environment (IDE) to assist the programmer in writing code.</li></ul> <p><b>KEY QUESTION:</b> Why do programmers use IDEs?</p>	<p>What are the key features of this IDE?</p>	<p>SLR 2.5 Workbook Complete slides 8</p> <p>Brainstorm a list of computer science words from the 2.5 topic.</p> <p>Create a cryptic crossword for someone else to solve from these words using: <a href="http://superteacherworksheets.com/generator-crossword-puzzle.html">superteacherworksheets.com/generator-crossword-puzzle.html</a></p> <p>You will notice that possibly not all your words will fit into the crossword. That is because the output is only as</p>	<p>Revise what you have learnt in this unit</p>



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				good as the algorithm. Can you do a better job and fit all the words in?		
12 & 13	Dedicated paper 2 exam revision lesson	Gain experience answering computational thinking, algorithms and programming questions for component J277/02 using our dedicated exam revision unit.		Progress with activities in the "Exam revision unit" folder		
14	SLR 2.5 – End-of-topic test	End-of-topic test		2.5 Test.docx 2.5 Test Answers.docx		
15	SLR 2.5 – Action	Action/response lessons		Chance for students to respond to feedback, improve workbooks, correct misunderstandings		



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## YEAR 11 – TERM 5

	Focus for lesson	Learning outcomes and key question	Starter	Activities	HW for next lesson	Key terms
1	Exam revision	This final term before Easter has been set aside for you to use as you see fit for your students. We have many resources to help with revision: <ul style="list-style-type: none"><li>• Further programming experience with the exam revision unit.</li><li>• Additional time to complete the many programming challenges and super challenges presented throughout the SLR theory units and from the dedicated programming resources.</li><li>• Our free, dedicated for students with all our videos and other helpful resources: <a href="http://student.craigndave.org">student.craigndave.org</a></li><li>• Our series of videos on exam technique, including how to understand command words and answer extended questions: <a href="http://student.craigndave.org/videos/exam-technique">student.craigndave.org/videos/exam-technique</a></li></ul>				
2	Exam revision					
3	Exam revision					
4	Exam revision					
5	Exam revision					
6	Exam revision					
7	Exam revision					
8	Exam revision					
9	Exam revision					
10	Exam revision					
11	Exam revision					
12	Exam revision					
13	Exam revision					

