

## GCSE 9-1 (J276) Computer Science Summer 2017 PPE Check List

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|-----|--------------|--|--|
| 1.1 | Architecture | <u>What is a computer system?</u>            | <ul style="list-style-type: none"> <li>• Computer system</li> <li>• Input, process, output, storage</li> <li>• Data bus</li> <li>• Embedded computer</li> </ul>                                  |
|     |              | <u>The purpose and components of the CPU</u> | <ul style="list-style-type: none"> <li>• Control unit</li> <li>• ALU</li> <li>• Registers</li> <li>• Cache</li> <li>• Clock</li> </ul>   |
|     |              | <u>Von Neumann architecture</u>              | <ul style="list-style-type: none"> <li>• Von Neumann architecture</li> <li>• MAR &amp; MDR</li> <li>• Program Counter</li> <li>• Accumulator</li> <li>• Harvard architecture</li> </ul>          |
|     |              | <u>Fetch-Decode-Execute cycle</u>            | <ul style="list-style-type: none"> <li>• Registers involved</li> <li>• Fetch, decode, execute cycle</li> </ul>   |
|     |              | <u>CPU performance factors</u>               | <ul style="list-style-type: none"> <li>• Clock speed</li> <li>• Multi-core processors</li> <li>• Cache</li> <li>• RAM</li> <li>• Graphics GPU</li> </ul>   |
| 1.2 | Memory       | <u>Memory types</u>                          | <ul style="list-style-type: none"> <li>• Main memory</li> <li>• Volatile memory - what is it?</li> <li>• RAM</li> <li>• DRAM</li> <li>• SRAM</li> <li>• ROM</li> <li>• Virtual memory</li> </ul> |

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| 1.3 | Storage                 | <u>Secondary storage</u>                             | <ul style="list-style-type: none"> <li>• Storage media &amp; devices</li> <li>• Magnetic storage</li> <li>• Optical storage</li> <li>• Solid state media</li> <li>• Data capacity</li> <li>• Calculating storage</li> </ul> |
| 1.4 | WiFi and Wired networks | <u>Types of networks</u>                             | <ul style="list-style-type: none"> <li>• What is a network?</li> <li>• Home networks</li> <li>• Business networks</li> <li>• LANs</li> <li>• WANs</li> </ul>  |
|     |                         | <u>Performance of networks</u>                       | <ul style="list-style-type: none"> <li>• Bandwidth</li> <li>• Wired performance</li> <li>• Bands and channels</li> <li>• Wi-Fi performance</li> </ul>   |
|     |                         | <u>Client/Server and Peer-to-Peer</u>                | <ul style="list-style-type: none"> <li>• Client server networks</li> <li>• Peer-to-peer networks</li> </ul>   |
|     |                         | <u>Hardware needed</u>                               | <ul style="list-style-type: none"> <li>• NIC</li> <li>• Hub</li> <li>• Switch</li> <li>• Router</li> <li>• Cables</li> <li>• WAP and Wi-Fi</li> </ul>   |
|     |                         | <u>DNS, IP addressing, web hosting and the cloud</u> | <ul style="list-style-type: none"> <li>• ISP</li> <li>• URL</li> <li>• IP address</li> <li>• DNS</li> <li>• Web sites</li> <li>• Local hosting</li> <li>• External hosting</li> </ul>                                       |

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|     |                  |   | <ul style="list-style-type: none"> <li>• The Cloud</li> </ul>  |
|     |                  | <u>Virtual Networks</u>                 | <ul style="list-style-type: none"> <li>• Standard networks</li> <li>• Virtual networks</li> </ul>  |
| 1.5 | Networks         | <u>Network topologies</u>               | <ul style="list-style-type: none"> <li>• Star network</li> <li>• Mesh network</li> </ul>   |
|     |                  | <u>Protocols</u>                        | <ul style="list-style-type: none"> <li>• Protocols</li> <li>• TCP/IP</li> <li>• HTTP / HTTPS</li> <li>• FTP</li> <li>• POP, IMAP, SMTP</li> <li>• Ethernet</li> <li>• The four layer model</li> </ul>  |
|     |                  | <u>Packet Switching</u>                 | <ul style="list-style-type: none"> <li>• Circuit switching</li> <li>• Packet switching</li> </ul>  |
| 1.6 | Network security | <u>Introduction to network security</u> | <ul style="list-style-type: none"> <li>• Network security</li> <li>• Why is it important?</li> </ul>   |
|     |                  | <u>Network threats</u>                  | <ul style="list-style-type: none"> <li>• Malware</li> <li>• Social engineering</li> <li>• Phishing</li> <li>• Brute force</li> <li>• Denial of service</li> <li>• Data interception</li> <li>• SQL injection</li> <li>• Poor network policy</li> </ul> |
|     |                  | <u>Malware</u>                          | <ul style="list-style-type: none"> <li>• Malware</li> <li>• Viruses</li> <li>• Worms</li> </ul>  |

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|     |                   |  | <ul style="list-style-type: none"> <li>• Browser malware</li> </ul>  |
|     |                   | <p><u>Preventing vulnerabilities</u></p> | <ul style="list-style-type: none"> <li>• User access rights</li> <li>• Passwords</li> <li>• Network policy</li> <li>• Acceptable use policy</li> <li>• Backups</li> <li>• Disaster recovery</li> <li>• Network forensics</li> <li>• Anti-malware</li> <li>• Firewall</li> <li>• Penetration testing</li> <li>• Encryption</li> </ul> |
| 1.7 | Systems Software  | <p><u>Operating System</u></p>           | <ul style="list-style-type: none"> <li>• Kernel</li> <li>• User interface</li> <li>• Memory management</li> <li>• Multi-tasking OS</li> <li>• Device drivers</li> <li>• User management</li> </ul>   |
|     |                   | <p><u>Utility software</u></p>           | <ul style="list-style-type: none"> <li>• Encryption utilities</li> <li>• Defragmentation utilities</li> <li>• Compression</li> <li>• Backup</li> <li>• Information &amp; diagnostics</li> </ul>  |
| 1.8 | Ethical and legal | <p><u>Legislation</u></p>                | <ul style="list-style-type: none"> <li>• Data Protection Act</li> <li>• Computer Misuse Act</li> <li>• Copyright, Designs &amp; Patents Act</li> <li>• Freedom of Information Act</li> </ul>   |
|     |                   | <p><u>Environment</u></p>                | <ul style="list-style-type: none"> <li>• Ewaste</li> <li>• Sustainability</li> <li>• Recycling</li> </ul>  |

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|     |            |                                      | <ul style="list-style-type: none"> <li>• Energy</li> <li>• Monitoring</li> <li>• Stakeholders</li> </ul>   |
|     |            | <u>Privacy &amp; technology</u>      | <ul style="list-style-type: none"> <li>• DNA profiling</li> <li>• National Identity cards</li> <li>• CCTV</li> <li>• Electronic tracking</li> <li>• Personal data</li> <li>• Stakeholders</li> </ul> |
|     |            | <u>Ethics &amp; technology</u>       | <ul style="list-style-type: none"> <li>• Digital divide</li> <li>• Genetic screening</li> <li>• Whistleblowers</li> <li>• Self driving cars</li> <li>• Drone warfare</li> </ul>                      |
|     |            | <u>Culture &amp; technology</u>      | <ul style="list-style-type: none"> <li>• Anonymity</li> <li>• Social media</li> <li>• Health</li> <li>• Citizen journalism</li> <li>• Viral videos</li> </ul>  |
|     |            | <u>Open source and closed source</u> | <ul style="list-style-type: none"> <li>• Open source</li> <li>• Closed source</li> <li>• Creative Commons</li> </ul>   |
| 2.1 | Algorithms | <u>Computational thinking</u>        | <ul style="list-style-type: none"> <li>• Decomposition</li> <li>• Top-down diagrams</li> <li>• Pattern recognition</li> <li>• Abstraction</li> <li>• Algorithms</li> </ul>                           |
|     |            | <u>Pseudocode</u>                    | <ul style="list-style-type: none"> <li>• Algorithms</li> <li>• Pseudocode</li> </ul>   |

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|-----|------------------------|---------------------------------------|--|
|     |                        |                                       | <ul style="list-style-type: none"> <li>• Precision</li> <li>• Keywords</li> <li>• Operators &amp; variables</li> <li>• Conditionals</li> <li>• Loops</li> </ul>  |
|     |                        | <u>Flowchart</u>                      | <ul style="list-style-type: none"> <li>• Algorithms</li> <li>• Flowcharts</li> <li>• Flowchart shapes</li> </ul>   |
|     |                        | <u>Sorting algorithms</u>             | <ul style="list-style-type: none"> <li>• Bubble sort</li> <li>• Insertion sort</li> <li>• Merge sort</li> </ul>  |
|     |                        | <u>Searching algorithms</u>           | <ul style="list-style-type: none"> <li>• Searching</li> <li>• Data sets and criteria</li> <li>• Linear search</li> <li>• Binary search</li> </ul>  |
| 2.2 | Programming Techniques | <u>Variables etc</u>                  | <ul style="list-style-type: none"> <li>• Variables</li> <li>• Constants</li> <li>• Arithmetic operators</li> <li>• Boolean operators</li> <li>• Assignment operators</li> <li>• Compound operators</li> </ul>    |
|     |                        | <u>Arrays</u>                         | <ul style="list-style-type: none"> <li>• One dimensional arrays</li> <li>• Static arrays</li> <li>• Dynamic arrays</li> <li>• Iterations</li> <li>• Two dimensional arrays</li> <li>• Array functions</li> </ul> |
|     |                        | <u>Sequence, Selection, Iteration</u> | <ul style="list-style-type: none"> <li>• Sequence</li> <li>• Selection</li> </ul>  |

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|     |   |  | <ul style="list-style-type: none"> <li>• Conditionals -IF</li> <li>• Conditionals - CASE</li> <li>• Iteration</li> <li>• WHILE</li> <li>• DO</li> <li>• FOR</li> </ul>                     |
|     |   | <u>String Manipulation</u>                     | <ul style="list-style-type: none"> <li>• Assignment &amp; storage</li> <li>• Copy &amp; concatenate</li> <li>• Traversal</li> <li>• Search</li> <li>• Casting</li> </ul>                   |
|     |   | <u>File Handling</u>                           | <ul style="list-style-type: none"> <li>• Open</li> <li>• Close</li> <li>• Write</li> <li>• Write loop</li> <li>• Read</li> <li>• Read loop</li> </ul>                                      |
|     |   | <u>Data Types</u>                              | <ul style="list-style-type: none"> <li>• Character &amp; string</li> <li>• Integer</li> <li>• Real</li> <li>• Boolean</li> </ul>   |
|     |   | <u>Sub-procedure and Functions</u>             | <ul style="list-style-type: none"> <li>• Repeating code</li> <li>• Sub-procedures</li> <li>• Functions</li> <li>• Code Library</li> </ul>  |
| 2.5 | Translators and facilities of languages | <u>Levels of language, Translators and IDE</u> | <ul style="list-style-type: none"> <li>• Machine code</li> <li>• Assembly code</li> <li>• High level language</li> <li>• Translators</li> <li>• Assemblers</li> <li>• Compilers</li> </ul> |

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|     |                     |                            | <ul style="list-style-type: none"> <li>• Interpreters</li> <li>• IDE</li> </ul>   |
| 2.6 | Data Representation | <u>Units</u>               | <ul style="list-style-type: none"> <li>• Bit, nibble, byte</li> <li>• Kilobyte, megabyte, gigabyte</li> <li>• Terabyte, petabyte</li> </ul>   |
|     |                     | <u>Binary Numbers</u>      | <ul style="list-style-type: none"> <li>• Number systems</li> <li>• Digit position</li> <li>• Denary to binary</li> <li>• Binary to denary</li> <li>• Adding binary</li> <li>• Binary shift</li> <li>• Binary overflow</li> </ul>    |
|     |                     | <u>Hexadecimal Numbers</u> | <ul style="list-style-type: none"> <li>• Hexadecimal symbols</li> <li>• Denary to Hexadecimal</li> <li>• Hexadecimal to denary</li> <li>• Binary to hexadecimal</li> <li>• Hexadecimal to binary</li> <li>• Check digits</li> </ul> |
|     |                     | <u>Characters</u>          | <ul style="list-style-type: none"> <li>• ASCII</li> <li>• Extended ASCII</li> <li>• Character sets</li> <li>• Unicode</li> </ul>  |
|     |                     | <u>Images</u>              | <ul style="list-style-type: none"> <li>• Input devices</li> <li>• Pixels</li> <li>• Greyscale</li> <li>• Colour</li> <li>• Colour depth</li> <li>• Resolution</li> <li>• Metadata</li> </ul>  |

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|  |  | <u>Sound</u>       | <ul style="list-style-type: none"><li>• Sampling</li><li>• Storing</li><li>• Sampling frequency</li><li>• Sampling bit depth</li><li>• Channels</li><li>• Bit rate</li><li>• Metadata</li></ul> |
|  |  | <u>Compression</u> | <ul style="list-style-type: none"><li>• Lossy compression</li><li>• Lossless compression</li></ul>  |