

Complete the RAG by giving a 1,2 or 3 on your confidence of this gained knowledge.

1 - Red - I am not confident of this knowledge.

2 - Amber - I have some knowledge in this area.

3 - Green - I am very confident in this area, I have this knowledge secured.

OCR GCSE Computer Science J277	
	RAG
1.1 – Systems architecture	1, 2, 3
1.1.1 Architecture of the CPU	
1.1.1 a The purpose of the CPU:	
1.1.1 a i The fetch-execute cycle	
1.1.1 b Common CPU components and their function:	
1.1.1 b i ALU (Arithmetic Logic Unit)	
1.1.1 b ii CU (Control Unit)	
1.1.1 b iii Cache	
1.1.1 b iv Registers	
1.1.1 c Von Neumann architecture:	
1.1.1 c i MAR (Memory Address Register)	
1.1.1 c ii MDR (Memory Data Register)	
1.1.1 c iii Program Counter	
1.1.1 c iv Accumulator	
1.1.2 CPU performance	
1.1.2 a How common characteristics of CPUs affect their performance:	
1.1.2 a i Clock speed	
1.1.2 a ii Cache size	
1.1.2 a iii Number of cores	
1.1.3 Embedded systems	
1.1.3 a The purpose and characteristics of embedded systems	
1.1.3 b Examples of embedded systems	
1.2 – Memory and storage	
1.2.1 Primary storage (Memory)	
1.2.1 a The need for primary storage	
1.2.1 b The difference between RAM and ROM	
1.2.1 c The purpose of ROM in a computer system	
1.2.1 d The purpose of RAM in a computer system	
1.2.1 e i Why virtual memory may be needed in a system	
1.2.1 e ii How virtual memory works	
1.2.2 Secondary storage	
1.2.2 a The need for secondary storage	

1.2.2 b Common types of storage:	
1.2.2 b i Optical	
1.2.2 b ii Magnetic	
1.2.2 b iii Solid state	
1.2.2 c Suitable storage devices and storage media for a given application	
1.2.2 d The advantages and disadvantages of different storage devices and storage media relating to these characteristics:	
1.2.2 d i Capacity	
1.2.2 d ii Speed	
1.2.2 d iii Portability	
1.2.2 d iv Durability	
1.2.2 d v Reliability	
1.2.2 d vi Cost	
1.2.3 Units	
1.2.3 a The units of data storage:	
1.2.3 a i Bit	
1.2.3 a ii Nibble (4 bits)	
1.2.3 a iii Byte (8 bits)	
1.2.3 a iv Kilobyte (1,000 bytes or 1 KB)	
1.2.3 a v Megabyte (1,000 KB)	
1.2.3 a vi Gigabyte (1,000 MB)	
1.2.3 a vii Terabyte (1,000 GB)	
1.2.3 a viii Petabyte (1,000 TB)	
1.2.3 b Familiarity with data units and moving between each	
1.2.3 c Why data must be stored in binary format	
1.2.3 d How data needs to be converted into a binary format to be processed by a computer	
1.2.3 e Data capacity and calculation of data capacity requirements	
1.2.3 f Calculate capacity of devices	
1.2.3 g Calculate required capacity for a given set of files	
1.2.4 Data storage	
Numbers	
1.2.4 a How to convert positive denary whole numbers to binary numbers (up to and including 8 bits) and vice versa	
1.2.4 b How to add two binary integers together (up to and including 8 bits) and explain overflow errors which may occur	
1.2.4 c How to convert positive denary whole numbers into 2-digit hexadecimal numbers and vice versa	
1.2.4 d How to convert binary integers to their hexadecimal equivalents and vice versa	
1.2.4 e Binary shifts	
1.2.4 f Understanding of the terms most significant bit, and least significant bit	
1.2.4 g Characters	
1.2.4 g i The use of binary codes to represent characters	
1.2.4 g ii The term 'character set'	
1.2.4 g iii The relationship between the number of bits per character in a character set, and the number of characters which can be represented, e.g.:	

1.2.4 g iv ASCII (8 bit)	
1.2.4 g v Unicode	
1.2.4 h text file size = bits per character x number of characters	
1.2.4. j Images	
1.2.4 j i How an image is represented as a series of pixels, represented in binary for a specific code	
1.2.4 j ii Metadata	
The effect of colour depth and resolution on:	
1.2.4 j iii The quality of the image	
1.2.4 j iv The size of an image file	
1.2.4 j v colour depth x image height (px) x image width (px)	
1.2.4 k Sound	
1.2.4 k i How sound can be sampled and stored in digital form	
1.2.4 k ii Sample rate – measured in Hertz (Hz)	
1.2.4 k iii Bit depth – number of bits available to store each sample (e.g. 16-bit)	
The effect of sample rate, duration and bit depth on:	
1.2.4 k iv The playback quality	
1.2.4 k v The size of a sound file = sample rate x duration (s) x bit depth	
1.2.5 Compression	
1.2.5 a The need for compression	
1.2.5 b Lossy Compression	
1.2.5 c Lossless Compression	
1.2.5 d Common scenarios where compression may be needed	
1.2.5 e Advantages and disadvantages of each type of compression	
1.2.5 f Effects on the file for each type of compression	
1.3 – Computer networks, connections and protocols	
1.3.1 Networks and topologies	
1.3.1 a Types of network, characteristics and examples:	
1.3.1 a i LAN (Local Area Network)	
1.3.1 a ii WAN (Wide Area Network)	
1.3.1 b Factors that affect the performance of networks (number of devices and bandwidth)	
1.3.1 c The different roles of computers in a client-server and a peer-to-peer network	
1.3.1 d The hardware needed to connect stand-alone computers into a Local Area Network:	
1.3.1 d i Wireless access points	
1.3.1 d ii Routers	
1.3.1 d iii Switches	
1.3.1 d iv NIC (Network Interface Controller/Card)	
1.3.1 d v Transmission media	
1.3.1 d vi File servers	
1.3.1 e The Internet as a worldwide collection of computer networks:	
1.3.1 e i DNS (Domain Name Server)	
1.3.1 e ii Hosting	
1.3.1 f The Cloud (storage, software, processing)	

1.3.1 f i Advantages and disadvantages of the Cloud	
1.3.1 g Web servers and clients	
1.3.1 h Star and Mesh network topologies	
1.3.1 h i Advantages and disadvantages of the Star and Mesh topologies	
1.3.2 Wired and wireless networks, protocols and layers	
1.3.2 a Modes of connection:	
1.3.2 a i Wired Ethernet	
1.3.2 a ii Wireless Wi-Fi	
1.3.2 a iii Wireless Bluetooth	
1.3.2 b Compare benefits and drawbacks of wired versus wireless connection	
1.3.2 c Recommend one or more connections for a given scenario	
1.3.2 d Encryption	
1.3.2 e IP addressing (IPv4 and IPv6)	
1.3.2 f MAC addressing	
1.3.2 g Standards to provide rules for areas of computing	
1.3.2 h Standards allows hardware/software to interact across different manufacturers/producers	
1.3.2 j Common protocols including:	
1.3.2 j i TCP/IP (Transmission Control Protocol/Internet Protocol)	
1.3.2 j ii HTTP (Hyper Text Transfer Protocol)	
1.3.2 j iii HTTPS (Hyper Text Transfer Protocol Secure)	
1.3.2 j iv FTP (File Transfer Protocol)	
1.3.2 j v POP (Post Office Protocol)	
1.3.2 j vi IMAP (Internet Message Access Protocol)	
1.3.2 j vii SMTP (Simple Mail Transfer Protocol)	
1.3.2 k The concept of layers used in protocols, and the benefits of using layers (4-layer TCP/IP model)	
1.4 – Network security	
1.4.1 Threats to computer systems and networks	
1.4.1 a Forms of attack:	
1.4.1 a i Malware	
1.4.1 a ii Social engineering, e.g. phishing, people as the 'weak point'	
1.4.1 a iii Brute-force attacks	
1.4.1 a iv Denial of service attacks	
1.4.1 a v Data interception and theft	
1.4.1 a vi The concept of SQL injection	
1.4.2 Identifying and preventing vulnerabilities	
1.4.2 a Common prevention methods:	
1.4.2 a i Penetration testing	
1.4.2 a ii Anti-malware software	
1.4.2 a iii Firewalls	
1.4.2 a iv User access levels	
1.4.2 a v Passwords	
1.4.2 a vi Encryption	
1.4.2 a vii Physical security	
1.5 – Systems software	

1.5.1 Operating systems	
1.5.1 a The purpose and functionality of operating systems:	
1.5.1 a i User interface	
1.5.1 a ii Memory management and multitasking	
1.5.1 a iii Peripheral management and drivers	
1.5.1 b User management	
1.5.1 b i Allocation of an account	
1.5.1 b ii Access rights	
1.5.1 b iii Security, etc.	
1.5.1 c File management	
1.5.1 c i Naming	
1.5.1 c ii Allocating to folders	
1.5.1 c iii Moving files	
1.5.1 c iv Saving, etc.	
1.5.1 d Processes need to be managed and what this entails (e.g. the use of buffers when transferring data to a printer)	
1.5.2 Utility software	
1.5.2 a The purpose and functionality of utility software	
1.5.2 a i Encryption software	
1.5.2 a ii Defragmentation	
1.5.2 a iii Data compression	
1.6 – Ethical, legal, cultural and environmental impacts of digital technology	
1.6.1 Ethical, legal, cultural and environmental impact	
1.6.1 a Impacts of digital technology on wider society including:	
1.6.1 a i Ethical issues	
1.6.1 a ii Legal issues	
1.6.1 a iii Cultural issues	
1.6.1 a iv Environmental issues	
1.6.1 a v Privacy issues	
1.6.1 b Knowledge of a variety of examples of digital technology and how this impacts on society	
1.6.1 c Legislation relevant to Computer Science:	
1.6.1 c i The Data Protection Act 2018	
1.6.1 c ii Computer Misuse Act 1990	
1.6.1 c iii Copyright Designs and Patents Act 1988	
1.6.1 c iv Software licences (i.e. open source and proprietary)	
1.6.1 d The need to license software and the purpose of a software licence	
1.6.1 e Features of open source (providing access to the source code and the ability to change the software)	
1.6.1 f Features of proprietary (no access to the source code, purchased commonly as off-the-shelf)	
1.6.1 g Recommend a type of licence for a given scenario including benefits and drawbacks	

