

Year 10 Revision List

1.1 – Systems architecture	
Sub topic	Guidance
1.1.1 Architecture of the CPU	
<input type="checkbox"/> The purpose of the CPU: <ul style="list-style-type: none"> ○ The fetch-execute cycle <input type="checkbox"/> Common CPU components and their function: <ul style="list-style-type: none"> ○ ALU (Arithmetic Logic Unit) ○ CU (Control Unit) ○ Cache ○ Registers <input type="checkbox"/> Von Neumann architecture: <ul style="list-style-type: none"> ○ MAR (Memory Address Register) ○ MDR (Memory Data Register) ○ Program Counter ○ Accumulator 	<p>Required</p> <ul style="list-style-type: none"> ✓ What actions occur at each stage of the fetch-execute cycle ✓ The role/purpose of each component and what it manages, stores, or controls during the fetch-execute cycle ✓ The purpose of each register, what it stores (data or address) ✓ The difference between storing data and an address <p>Not required</p> <ul style="list-style-type: none"> ✗ Knowledge of passing of data between registers in each stage
1.1.2 CPU performance	
<input type="checkbox"/> How common characteristics of CPUs affect their performance: <ul style="list-style-type: none"> ○ Clock speed ○ Cache size ○ Number of cores 	<p>Required</p> <ul style="list-style-type: none"> ✓ Understanding of each characteristic as listed ✓ The effects of changing any of the common characteristics on system performance, either individually or in combination
1.1.3 Embedded systems	
<input type="checkbox"/> The purpose and characteristics of embedded systems <input type="checkbox"/> Examples of embedded systems	<p>Required</p> <ul style="list-style-type: none"> ✓ What embedded systems are ✓ Typical characteristics of embedded systems ✓ Familiarity with a range of different embedded systems

1.2 – Memory and storage	
Sub topic	Guidance
1.2.1 Primary storage (Memory)	
<input type="checkbox"/> The need for primary storage <input type="checkbox"/> The difference between RAM and ROM <input type="checkbox"/> The purpose of ROM in a computer system <input type="checkbox"/> The purpose of RAM in a computer system <input type="checkbox"/> Virtual memory	<p>Required</p> <ul style="list-style-type: none"> ✓ Why computers have primary storage <ul style="list-style-type: none"> ▪ How this usually consists of RAM and ROM ✓ Key characteristics of RAM and ROM ✓ Why virtual memory may be needed in a system ✓ How virtual memory works <ul style="list-style-type: none"> ▪ Transfer of data between RAM and HDD when RAM is filled
1.2.2 Secondary storage	
<input type="checkbox"/> The need for secondary storage <input type="checkbox"/> Common types of storage: <ul style="list-style-type: none"> ○ Optical ○ Magnetic ○ Solid state <input type="checkbox"/> Suitable storage devices and storage media for a given application <input type="checkbox"/> The advantages and disadvantages of different storage devices and storage media relating to these characteristics: <ul style="list-style-type: none"> ○ Capacity ○ Speed ○ Portability ○ Durability ○ Reliability ○ Cost 	<p>Required</p> <ul style="list-style-type: none"> ✓ Why computers have secondary storage ✓ Recognise a range of secondary storage devices/media ✓ Differences between each type of storage device/medium ✓ Compare advantages/disadvantages for each storage device ✓ Be able to apply their knowledge in context within scenarios <p>Not required</p> <ul style="list-style-type: none"> ✗ Understanding of the component parts of these types of storage

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1.2.3 Units	
<input type="checkbox"/> The units of data storage: <ul style="list-style-type: none"> ○ Bit ○ Nibble (4 bits) ○ Byte (8 bits) ○ Kilobyte (1,000 bytes or 1 KB) ○ Megabyte (1,000 KB) ○ Gigabyte (1,000 MB) ○ Terabyte (1,000 GB) ○ Petabyte (1,000 TB) <input type="checkbox"/> How data needs to be converted into a binary format to be processed by a computer <input type="checkbox"/> Data capacity and calculation of data capacity requirements	<p>Required</p> <ul style="list-style-type: none"> ✓ Why data must be stored in binary format ✓ Familiarity with data units and moving between each ✓ Data storage devices have different fixed capacities ✓ Calculate required storage capacity for a given set of files ✓ Calculate file sizes of sound, images and text files <ul style="list-style-type: none"> ▪ sound file size = sample rate x duration (s) x bit depth ▪ image file size = colour depth x image height (px) x image width (px) ▪ text file size = bits per character x number of characters <p>Alternatives</p> <ul style="list-style-type: none"> • Use of 1,024 for conversions and calculations would be acceptable • Allowance for metadata in calculations may be used
1.2.4 Data storage	
<p>Numbers</p> <input type="checkbox"/> How to convert positive denary whole numbers to binary numbers (up to and including 8 bits) and vice versa <input type="checkbox"/> How to add two binary integers together (up to and including 8 bits) and explain overflow errors which may occur <input type="checkbox"/> How to convert positive denary whole numbers into 2-digit hexadecimal numbers and vice versa <input type="checkbox"/> How to convert binary integers to their hexadecimal equivalents and vice versa <input type="checkbox"/> Binary shifts	<p>Required</p> <ul style="list-style-type: none"> ✓ Denary number range 0 – 255 ✓ Hexadecimal range 00 – FF ✓ Binary number range 00000000 – 11111111 ✓ Understanding of the terms ‘most significant bit’, and ‘least significant bit’ ✓ Conversion of any number in these ranges to another number base ✓ Ability to deal with binary numbers containing between 1 and 8 bits <ul style="list-style-type: none"> ▪ e.g. 11010 is the same as 00011010 ✓ Understand the effect of a binary shift (both left or right) on a number ✓ Carry out a binary shift (both left and right)
1.2.5 Compression	
<p>Characters</p> <input type="checkbox"/> The use of binary codes to represent characters <input type="checkbox"/> The term ‘character set’ <input type="checkbox"/> The relationship between the number of bits per character in a character set, and the number of characters which can be represented, e.g.: <ul style="list-style-type: none"> ○ ASCII ○ Unicode <p>Images</p> <input type="checkbox"/> How an image is represented as a series of pixels, represented in binary <input type="checkbox"/> Metadata <input type="checkbox"/> The effect of colour depth and resolution on: <ul style="list-style-type: none"> ○ The quality of the image ○ The size of an image file <p>Sound</p> <input type="checkbox"/> How sound can be sampled and stored in digital form <input type="checkbox"/> The effect of sample rate, duration and bit depth on: <ul style="list-style-type: none"> ○ The playback quality ○ The size of a sound file 	<p>Required</p> <ul style="list-style-type: none"> ✓ How characters are represented in binary ✓ How the number of characters stored is limited by the bits available ✓ The differences between and impact of each character set ✓ Understand how character sets are logically ordered, e.g. the code for ‘B’ will be one more than the code for ‘A’ ✓ Binary representation of ASCII in the exam will use 8 bits <p>Not required</p> <ul style="list-style-type: none"> ✗ Memorisation of character set codes <p>Required</p> <ul style="list-style-type: none"> ✓ Each pixel has a specific colour, represented by a specific code ✓ The effect on image size and quality when changing colour depth and resolution ✓ Metadata stores additional image information (e.g. height, width, etc.) <p>Required</p> <ul style="list-style-type: none"> ✓ Analogue sounds must be stored in binary ✓ Sample rate – measured in Hertz (Hz) ✓ Duration – how many seconds of audio the sound file contains ✓ Bit depth – number of bits available to store each sample (e.g. 16-bit)
<input type="checkbox"/> The need for compression <input type="checkbox"/> Types of compression: <ul style="list-style-type: none"> ○ Lossy ○ Lossless 	<p>Required</p> <ul style="list-style-type: none"> ✓ Common scenarios where compression may be needed ✓ Advantages and disadvantages of each type of compression ✓ Effects on the file for each type of compression <p>Not required</p> <ul style="list-style-type: none"> ✗ Ability to carry out specific compression algorithms

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1.3 – Computer networks, connections and protocols	
Sub topic	Guidance
1.3.1 Networks and topologies	
<ul style="list-style-type: none"> <input type="checkbox"/> Types of network: <ul style="list-style-type: none"> o LAN (Local Area Network) o WAN (Wide Area Network) <input type="checkbox"/> Factors that affect the performance of networks <input type="checkbox"/> The different roles of computers in a client-server and a peer-to-peer network <input type="checkbox"/> The hardware needed to connect stand-alone computers into a Local Area Network: <ul style="list-style-type: none"> o Wireless access points o Routers o Switches o NIC (Network Interface Controller/Card) o Transmission media <input type="checkbox"/> The Internet as a worldwide collection of computer networks: <ul style="list-style-type: none"> o DNS (Domain Name Server) o Hosting o The Cloud o Web servers and clients <input type="checkbox"/> Star and Mesh network topologies 	<p>Required</p> <ul style="list-style-type: none"> ✓ The characteristics of LANs and WANs including common examples of each ✓ Understanding of different factors that can affect the performance of a network, e.g.: <ul style="list-style-type: none"> ▪ Number of devices connected ▪ Bandwidth ✓ The tasks performed by each piece of hardware ✓ The concept of the Internet as a network of computer networks ✓ A Domain Name Service (DNS) is made up of multiple Domain Name Servers ✓ A DNS's role in the conversion of a URL to an IP address ✓ Concept of servers providing services (e.g. Web server → Web pages, File server → file storage/retrieval) ✓ Concept of clients requesting/using services from a server ✓ The Cloud: remote service provision (e.g. storage, software, processing) ✓ Advantages and disadvantages of the Cloud ✓ Advantages and disadvantages of the Star and Mesh topologies ✓ Apply understanding of networks to a given scenario

1.3.2 Wired and wireless networks, protocols and layers	
<ul style="list-style-type: none"> <input type="checkbox"/> Modes of connection: <ul style="list-style-type: none"> o Wired <ul style="list-style-type: none"> • Ethernet o Wireless <ul style="list-style-type: none"> • Wi-Fi • Bluetooth <input type="checkbox"/> Encryption <input type="checkbox"/> IP addressing and MAC addressing <input type="checkbox"/> Standards <input type="checkbox"/> Common protocols including: <ul style="list-style-type: none"> o TCP/IP (Transmission Control Protocol/Internet Protocol) o HTTP (Hyper Text Transfer Protocol) o HTTPS (Hyper Text Transfer Protocol Secure) o FTP (File Transfer Protocol) o POP (Post Office Protocol) o IMAP (Internet Message Access Protocol) o SMTP (Simple Mail Transfer Protocol) <input type="checkbox"/> The concept of layers 	<p>Required</p> <ul style="list-style-type: none"> ✓ Compare benefits and drawbacks of wired versus wireless connection ✓ Recommend one or more connections for a given scenario ✓ The principle of encryption to secure data across network connections ✓ IP addressing and the format of an IP address (IPv4 and IPv6) ✓ A MAC address is assigned to devices; its use within a network ✓ The principle of a standard to provide rules for areas of computing ✓ Standards allows hardware/software to interact across different manufacturers/producers ✓ The principle of a (communication) protocol as a set of rules for transferring data ✓ That different types of protocols are used for different purposes ✓ The basic principles of each protocol i.e. its purpose and key features ✓ How layers are used in protocols, and the benefits of using layers; for a teaching example, please refer to the 4-layer TCP/IP model <p>Not required</p> <ul style="list-style-type: none"> ✗ Understand how Ethernet, Wi-Fi and Bluetooth protocols work ✗ Understand differences between static and dynamic, or public and private IP addresses ✗ Knowledge of individual standards ✗ Knowledge of the names and function of each TCP/IP layer

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1.4 – Network security	
Sub topic	Guidance
1.4.1 Threats to computer systems and networks	
<input type="checkbox"/> Forms of attack: <ul style="list-style-type: none">○ Malware○ Social engineering, e.g. phishing, people as the 'weak point'○ Brute-force attacks○ Denial of service attacks○ Data interception and theft○ The concept of SQL injection	Required <ul style="list-style-type: none">✓ Threats posed to devices/systems✓ Knowledge/principles of each form of attack including:<ul style="list-style-type: none">▪ How the attack is used▪ The purpose of the attack

Programming

- Data Types
- The use of variables, constants, operators, inputs, outputs and assignments
- Three basic programming constructs – sequence, selection, iteration
- Be able to write code using IF statements, For Loops, While Loops, Lists

Website to use for revision

- <https://stambrosecollege.sharepoint.com/sites/Computer-Science>
- <https://www.bbc.co.uk/bitesize/examspecs/zmtchbk>
- <https://www.computerscience.gcse.guru/>
- <https://www.youtube.com/@craigndave/playlists>
- <https://app.senecalearning.com/courses>
- <https://www.savemyexams.com/gcse/computer-science/ocr/22/>
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