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1.1 Systems architecture

Specific knowledge required:	Ask for help and research the topic	Deep revision required	Got it! Normal revision
I understand the purpose of the CPU	☐	☐	☐
I can describe the function of the fetch-execute cycle	☐	☐	☐
I can name the common components of the CPU: ALU, CU, cache, registers	☐	☐	☐
I can describe the function of the common components of the CPU	☐	☐	☐
I can name the special-purpose registers in the von Neumann CPU architecture: MAR, MDR, PC, ACC	☐	☐	☐
I describe the function of the special-purpose registers in the von Neumann CPU architecture	☐	☐	☐
I understand how the performance of the CPU can be affected by cache size, clock speed and number of cores	☐	☐	☐
I can describe the purpose and characteristics of embedded systems	☐	☐	☐
I can name examples of embedded systems	☐	☐	☐

1.2 Memory and storage

Specific knowledge required:	Ask for help and research the topic	Deep revision required	Got it! Normal revision
I understand the need for primary storage	☐	☐	☐
I understand the difference between RAM and ROM	☐	☐	☐
I understand the purpose of RAM in a computer system	☐	☐	☐
I understand the purpose of ROM in a computer system	☐	☐	☐
I understand the need for virtual memory	☐	☐	☐
I can describe the function of virtual memory	☐	☐	☐
I understand the need for secondary storage	☐	☐	☐
I can describe common types of storage: optical, magnetic, solid state	☐	☐	☐
I can describe characteristics of common types of storage: capacity, speed, portability, durability, reliability, cost	☐	☐	☐
I can select suitable storage devices and storage media for different scenarios	☐	☐	☐
I can define units of measurement, including: bit, nibble, byte, kilobyte, megabyte, gigabyte, terabyte, petabyte	☐	☐	☐
I understand that data needs to be converted into a binary format to be processed by a computer	☐	☐	☐
I am able to calculate data capacity requirements for different file types	☐	☐	☐
I can convert positive denary whole numbers to binary (up to and including 8 bits) and vice versa	☐	☐	☐
I can add two binary integers together (up to and including 8 bits) and explain overflow errors which may occur	☐	☐	☐

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I can convert positive denary whole numbers into 2-digit hexadecimal and vice versa	☐	☐	☐
I can convert binary integers to their hexadecimal equivalents and vice versa	☐	☐	☐
I can perform binary shifts	☐	☐	☐
I understand the use of binary codes to represent characters	☐	☐	☐
I can define the term “character set”	☐	☐	☐
I understand the relationship between the number of bits per character in a character set and the number of characters that can be represented (e.g. ASCII, Extended ASCII, Unicode)	☐	☐	☐
I understand that an image is represented as a series of pixels represented in binary	☐	☐	☐
I can describe the metadata included in an image file	☐	☐	☐
I understand the effect of colour depth and resolution on the size of an image file	☐	☐	☐
I understand how sound can be sampled and stored in digital form	☐	☐	☐
I understand how the size of a sound file and the quality of its playback are affected by: sampling intervals, sample size, bit rate, sampling frequency	☐	☐	☐
I understand the need for compression	☐	☐	☐
I can describe types of compression: lossy, lossless	☐	☐	☐

1.3 Computer networks, connections and protocols

Specific knowledge required:	**Ask for help and research the topic**	**Deep revision required**	**Got it! Normal revision**
I can describe the characteristics of types of network: LAN, WAN	☐	☐	☐
I can describe the factors that affect network performance	☐	☐	☐
I understand the different roles of computers in a client-server and a peer-to-peer network	☐	☐	☐
I can describe the hardware needed to connect standalone computers into a LAN: wireless access points, routers, switches, NICs, transmission media	☐	☐	☐
I understand that the internet is a worldwide collection of computer networks	☐	☐	☐
I can describe the role of a DNS (Domain Name Server)	☐	☐	☐
I understand the purpose of web hosting	☐	☐	☐
I can describe the Cloud and its purpose	☐	☐	☐
I can describe the roles of web servers and clients	☐	☐	☐
I can describe the characteristics of star and mesh network topologies	☐	☐	☐
I can discuss the benefits and drawbacks of wired and wireless networks	☐	☐	☐
I understand the characteristics of wired Ethernet networks	☐	☐	☐
I understand the characteristics of wireless networks, including Wi-Fi and Bluetooth	☐	☐	☐
I understand what encryption is and why it is required	☐	☐	☐

I can describe the purpose of IP addressing and the format of an IP address (IPv4 and IPv6)	☐	☐	☐
I understand that a MAC address is assigned to a device and can describe its use within a network	☐	☐	☐
I understand the need for standards in networking	☐	☐	☐
I understand the principle of a (communication) protocol as a set of rules for transferring data	☐	☐	☐
I can describe the purpose and key features of common networking protocols, including TCP/IP, HTTP, HTTPS, FTP, POP, IMAP, SMTP	☐	☐	☐
I understand how layers are used in protocols, and the benefits of using layers	☐	☐	☐

1.4 Network security

Specific knowledge required:	**Ask for help and research the topic**	**Deep revision required**	**Got it! Normal revision**
I understand the threat posed to devices/systems by different forms of attack	☐	☐	☐
I can describe how and why malware is used as a form of attack	☐	☐	☐
I can describe how and why social engineering (e.g. phishing) is used as a form of attack	☐	☐	☐
I can describe how and why brute force attacks are used as a form of attack	☐	☐	☐
I can describe how and why denial of services attacks are used as a form of attack	☐	☐	☐
I can describe how and why data interception and theft are used as a form of attack	☐	☐	☐
I understand the concept of SQL injection	☐	☐	☐
I understand the role in identifying and preventing vulnerabilities of penetration testing	☐	☐	☐
I understand the role in identifying and preventing vulnerabilities of anti-malware software	☐	☐	☐
I understand the role in identifying and preventing vulnerabilities of firewalls	☐	☐	☐
I understand the role in identifying and preventing vulnerabilities of user access levels	☐	☐	☐
I understand the role in identifying and preventing vulnerabilities of passwords	☐	☐	☐
I understand the role in identifying and preventing vulnerabilities of encryption	☐	☐	☐
I understand the role in identifying and preventing vulnerabilities of physical security	☐	☐	☐

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1.5 Systems software			
Specific knowledge required:	**Ask for help and research the topic**	**Deep revision required**	**Got it! Normal revision**
I can name the functions of an operating system	☐	☐	☐
I can describe the features of a user interface	☐	☐	☐
I can describe the purpose and function of memory management; e.g. the transfer of data between memory and how this allows for multitasking	☐	☐	☐
I can describe the purpose and function of peripheral management and drivers	☐	☐	☐
I can describe the purpose and function of user management; e.g. allocation of an account, access rights, security	☐	☐	☐
I can describe the purpose and function of file management; e.g naming, moving, saving and allocating to folders	☐	☐	☐
I understand the need for utility software	☐	☐	☐
I can describe the purpose and function of encryption software	☐	☐	☐
I can describe the purpose and function of defragmentation software	☐	☐	☐
I can describe the purpose and function of data compression software	☐	☐	☐

1.6 Ethical, legal, cultural and environmental impacts of digital technology			
Specific knowledge required:	**Ask for help and research the topic**	**Deep revision required**	**Got it! Normal revision**
I understand that digital technology has an impact on wider society	☐	☐	☐
I can discuss some of the ethical issues of digital technology	☐	☐	☐
I can discuss some of the legal issues of digital technology	☐	☐	☐
I can discuss some of the cultural issues of digital technology	☐	☐	☐
I can discuss some of the environmental issues of digital technology	☐	☐	☐
I can discuss some of the privacy issues of digital technology	☐	☐	☐
I understand the purpose of the Data Protection Act, 1998	☐	☐	☐
I understand the purpose of the Computer Misuse Act, 1990	☐	☐	☐
I understand the purpose of the Copyright Designs and Patents Act, 1988	☐	☐	☐
I understand the need to license software and the purpose of a software licence	☐	☐	☐
I can describe the features of open source and proprietary software licences	☐	☐	☐

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2.1 Algorithms

Specific knowledge required:	Ask for help and research the topic	Deep revision required	Got it! Normal revision
I understand the term computational thinking	☐	☐	☐
I understand and can use the skill of abstraction	☐	☐	☐
I understand and can use the skill of decomposition	☐	☐	☐
I understand and can use the skill of algorithmic thinking	☐	☐	☐
I can identify the inputs, processes and outputs for a problem	☐	☐	☐
I can produce structure diagrams to show the structure of a problem	☐	☐	☐
I can create, interpret, correct, complete and refine algorithms using pseudocode	☐	☐	☐
I can create, interpret, correct, complete and refine algorithms using flowcharts	☐	☐	☐
I can create, interpret, correct, complete and refine algorithms using reference language / high-level programming languages	☐	☐	☐
I can identify syntax and logic errors in code and suggest a fix	☐	☐	☐
I can create and use trace tables to follow an algorithm	☐	☐	☐
I can use a linear search to find data	☐	☐	☐
I can use a binary search to find data	☐	☐	☐
I can perform a bubble sort on a set of data	☐	☐	☐
I can perform a merge sort on a set of data	☐	☐	☐
I can perform an insertion sort on a set of data	☐	☐	☐

2.2 Programming fundamentals

Specific knowledge required:	Ask for help and research the topic	Deep revision required	Got it! Normal revision
I know how to use variables, constants, operators, inputs, outputs, assignments	☐	☐	☐
I know how to use the three basic programming constructs for controlling the flow of a program: sequence, selection, iteration (both count- and condition-controlled loops)	☐	☐	☐
I know how to use common arithmetic operators: + - * / MOD DIV ^	☐	☐	☐
I know how to use comparison operators: == != > >= < <=	☐	☐	☐
I know how to use common Boolean operators: AND OR NOT	☐	☐	☐
I understand how and when to use different data types: integer, real, Boolean, character, string	☐	☐	☐
I know how to use casting to convert between different data types	☐	☐	☐
I know how to use basic string manipulation	☐	☐	☐

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I know how to use basic file-handling operations: open, read, write, close	☐	☐	☐
I know how to use records to store data	☐	☐	☐
I can use SQL to search for data	☐	☐	☐
I know how to use 1-dimensional and 2-dimensional arrays when solving problems	☐	☐	☐
I know how to use sub-programs (functions and procedures) to produce structured code	☐	☐	☐
I can create and use random numbers in a program	☐	☐	☐

2.3 Producing robust programs

Specific knowledge required:	**Ask for help and research the topic**	**Deep revision required**	**Got it! Normal revision**
I understand the importance of anticipating misuse when designing programs	☐	☐	☐
I understand the importance of authentication when designing programs	☐	☐	☐
I understand the importance of input validation when designing programs	☐	☐	☐
I understand how maintainability can be supported through: use of sub programs; naming conventions; indentation; commenting	☐	☐	☐
I understand the purpose and importance of testing	☐	☐	☐
I can describe different types of testing: iterative, final/terminal	☐	☐	☐
I know how to identify syntax and logic errors	☐	☐	☐
I know how to select suitable test data, including: normal; boundary; invalid/erroneous	☐	☐	☐
I am able to use results of testing to refine and improve algorithms	☐	☐	☐

2.4 Boolean logic

Specific knowledge required:	**Ask for help and research the topic**	**Deep revision required**	**Got it! Normal revision**
I can draw simple logic diagrams using AND, OR and NOT operators	☐	☐	☐
I can create truth tables for AND, OR and NOT operators	☐	☐	☐
I can combine Boolean operators using AND, OR and NOT operators	☐	☐	☐
I can apply logical operators in truth tables to solve problems	☐	☐	☐

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2.5 Programming languages and Integrated Development Environments			
Specific knowledge required:	**Ask for help and research the topic**	**Deep revision required**	**Got it! Normal revision**
I can describe the characteristics and purpose of different levels of programming language, including high-level and low-level languages	☐	☐	☐
I understand the purpose of translators	☐	☐	☐
I can describe the characteristics of a compiler and an interpreter	☐	☐	☐
I can describe common tools and facilities available in an Integrated Development Environment: editors, error diagnostics, run-time environment, translators	☐	☐	☐