

GCSE Computer Science Revision Guide

All resources can be found in: P:\Computing\Key Stage 4\GCSE Computer Science\GCSE Computer Science Books and Videos\Videos GCSE Computer Science

Main websites

Crash Course	Youtube Videos	Most topics
Craig n Dave	Youtube Videos Resources on Pupilshare	Make sure you refer to AQA GCSE
BBC CS	Text, animation and mini tests on a number of topics.	
Computer Science Tutor		Make sure you refer to AQA GCSE

Quizzes (OCR)
Unit 1.1 System Architecture - https://quizizz.com/admin/quiz/58b2cd230e72331a25658642
Unit 1.2 Memory L1 - https://quizizz.com/admin/quiz/58b2d9870e72331a256586b5
Unit 1.2 Memory L2 - https://quizizz.com/admin/quiz/58b2dbb3b629afe02454bfde
Unit 1.3 Storage - https://quizizz.com/admin/quiz/58b2e3debd1549e624d0a4ff
Unit 1.4 Networks L1 - https://quizizz.com/admin/quiz/5891bcf9d4e77d1f279e9026
Unit 1.4 Networks L2 - https://quizizz.com/admin/quiz/589499f6a10243a72fe4f349
Unit 1.5 Network Topologies L1 - https://quizizz.com/admin/quiz/58b2ec74ba7e5e34252d392d
Unit 1.5 Network Topologies L2 - https://quizizz.com/admin/quiz/58b2efddc0c8734b25d9cb24
Unit 1.7 Systems Software L1 - https://quizizz.com/admin/quiz/58ad777a2d7fbf8659dd232d
Unit 1.7 Systems Software L2 - https://quizizz.com/admin/quiz/58b03fa55d33fff54773a650
Unit 1.8 - Legal, ethical etc - https://quizizz.com/admin/quiz/58b2f23dc0c8734b25d9cb39

1. Fundamentals of algorithms

1.1 Representing algorithms

<input type="checkbox"/> Understand and explain the term algorithm.	Paul Long Book: Chapter 1, Page 2 AQA Book: Page 1 Video: 70 https://student.craigndave.org/videos/aqa-gcse-slr8-whats-an-algorithm
<input type="checkbox"/> Understand and explain the term decomposition.	Paul Long Book: Chapter 1, Page 5 AQA Book: Page 3 https://student.craigndave.org/videos/aqa-gcse-slr8-decomposition
<input type="checkbox"/> Understand and explain the term abstraction.	Paul Long Book: Chapter 1, Page 8 AQA Book: Page 5 https://student.craigndave.org/videos/aqa-gcse-slr8-abstraction
<input type="checkbox"/> Use a systematic approach to problem solving and algorithm creation representing those algorithms using pseudo-code and flowcharts.	Paul Long Book: Chapter 1, Page 15 AQA Book: Page 7, Page 9 Video: 68 and 69 https://student.craigndave.org/videos/aqa-gcse-slr8-systematic-approach-to-problem-solving

<input type="checkbox"/> Explain simple algorithms in terms of their inputs, processing and outputs.	Paul Long Book: Chapter 1, Page 23 https://student.craigndave.org/videos/aqa-gcse-slr8-algorithm-inputs-processing-and-outputs
<input type="checkbox"/> Determine the purpose of simple algorithms	Paul Long Book: Chapter 1, Page 28

1.2 Efficiency of algorithms

<input type="checkbox"/> Understand that more than one algorithm can be used to solve the same problem.	Paul Long Book: Chapter 1, Page 39 https://student.craigndave.org/videos/aqa-gcse-slr8-how-to-produce-algorithms
<input type="checkbox"/> Compare the efficiency of algorithms explaining how some algorithms are more efficient than others in solving the same problem.	Paul Long Book: Chapter 1, Page 40 https://student.craigndave.org/videos/aqa-gcse-slr8-algorithm-efficiency

1.3 Searching algorithms

<input type="checkbox"/> Understand and explain how the linear search algorithm works.	Paul Long Book: Chapter 1, Page 44 AQA Book: Page 13 https://student.craigndave.org/videos/aqa-gcse-slr8-linear-search
<input type="checkbox"/> Understand and explain how the binary search algorithm works.	Paul Long Book: Chapter 1, Page 49 AQA Book: Page 13 https://student.craigndave.org/videos/aqa-gcse-slr8-binary-search
<input type="checkbox"/> Compare and contrast linear and binary search algorithms	Paul Long Book: Chapter 1, Page 62 AQA Book: Page 13

1.4 Sorting algorithms

<input type="checkbox"/> Understand and explain how the merge sort algorithm works.	Paul Long Book: Chapter 1, Page 66 AQA Book: Page 15 https://student.craigndave.org/videos/aqa-gcse-slr8-merge-sort
<input type="checkbox"/> Understand and explain how the bubble sort algorithm works.	Paul Long Book: Chapter 1, Page 78 AQA Book: Page 17 https://student.craigndave.org/videos/aqa-gcse-slr8-bubble-sort
<input type="checkbox"/> Compare and contrast merge sort and bubble sort algorithms.	Paul Long Book: Chapter 1, Page 83

2. Programming

2.1 Data types

<ul style="list-style-type: none">□ Understand the concept of a data type.	<p>Paul Long Book: Chapter 2, Page 1 AQA Book: Page 23 Video: 77 and 86</p>
<ul style="list-style-type: none">□ Understand and use the following appropriately:<ul style="list-style-type: none">○ integer○ real○ Boolean○ character○ string.	<p>https://student.craigndave.org/videos/aqa-gcse-slr9-the-use-of-data-types-and-casting</p>

2.2 Programming concepts

<ul style="list-style-type: none">□ Use, understand and know how the following statement types can be combined in programs:<ul style="list-style-type: none">○ variable declaration○ constant declaration○ assignment○ iteration○ selection○ subroutine (procedure/function).	<p><u>Variable declaration</u> Paul Long Book: Chapter 2, Page 9 AQA Book: Page 21 Video: 75 https://student.craigndave.org/videos/aqa-gcse-slr9-the-use-of-variables-and-constants</p> <p><u>Constant declaration</u> Paul Long Book: Chapter 2, Page 10 AQA Book: Page 21 Video: 76 https://student.craigndave.org/videos/aqa-gcse-slr9-the-use-of-variables-and-constants</p> <p><u>Assignment (Assigning a value to a variable)</u> Paul Long Book: Chapter 2, Page 11 AQA Book: Page 21</p> <p><u>Iteration (Loops)</u> Paul Long Book: Chapter 2, Page 18 AQA Book: Page 31, Page 33, Page 35 Video: 82, 83, and 84 https://student.craigndave.org/videos/aqa-gcse-slr9-the-use-of-the-three-basic-programming-constructs</p> <p><u>Selection (If statements)</u> Paul Long Book: Chapter 2, Page 12 AQA Book: Page 29 Video: 79</p> <p><u>Subroutine</u> Paul Long Book: Chapter 2, Page 28 AQA Book: Page 23 https://student.craigndave.org/videos/aqa-gcse-slr9-introduction-to-subroutines</p>
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<input type="checkbox"/> Use definite and indefinite iteration, including indefinite iteration with the condition(s) at the start or the end of the iterative structure.	Paul Long Book: Chapter 2, Page 18 https://student.craigndave.org/videos/aqa-gcse-slr9-the-use-of-the-three-basic-programming-constructs
<input type="checkbox"/> Use nested selection and nested iteration structures.	Paul Long Book: Chapter 2, Page 26 https://student.craigndave.org/videos/aqa-gcse-slr9-the-use-of-the-three-basic-programming-constructs
<input type="checkbox"/> Use meaningful identifier names and know why it is important to use them.	Paul Long Book: Chapter 2, Page 8 AQA Book: Page 23 Video: 77 and 86 https://student.craigndave.org/videos/aqa-gcse-slr9-using-meaningful-identifier-names

2.3 Arithmetic operations in a programming language

<input type="checkbox"/> Be familiar with and be able to use: <ul style="list-style-type: none"> ○ addition ○ subtraction ○ multiplication ○ real division ○ integer division, including remainders. 	Paul Long Book: Chapter 2, Page 32 AQA Book: Page 27 https://student.craigndave.org/videos/aqa-gcse-slr9-the-common-arithmetic-operators https://student.craigndave.org/videos/aqa-gcse-slr9-the-common-boolean-and-comparison-operators
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2.4 Relational operations in a programming language

<ul style="list-style-type: none"><input type="checkbox"/> Be familiar with and be able to use:<ul style="list-style-type: none">o equal too not equal too less thano greater thano less than or equal too greater than or equal to.	<p>Paul Long Book: Chapter 2, Page 35 AQA Book: Page 29</p>
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2.5 Boolean operations in a programming language

<ul style="list-style-type: none"><input type="checkbox"/> Be familiar with and be able to use:<ul style="list-style-type: none">o NOTo ANDo OR.	<p>Paul Long Book: Chapter 2, Page 38 AQA Book: Page 29 Video: 81 https://student.craigdave.org/videos/aqa-gcse-slr9-the-common-boolean-and-comparison-operators</p>
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2.6 Data structures

<ul style="list-style-type: none"><input type="checkbox"/> Understand the concept of data structures.	<p>Paul Long Book: Chapter 2, Page 40 AQA Book: Page 29 https://student.craigdave.org/videos/aqa-gcse-slr10-the-structured-approach-to-programming</p>
<ul style="list-style-type: none"><input type="checkbox"/> Use arrays (or equivalent) in the design of solutions to simple problems.	<p>Paul Long Book: Chapter 2, Page 40 AQA Book: Page 39, Page 41 Video: 85 https://student.craigdave.org/videos/aqa-gcse-slr10-data-structures-and-the-use-of-arrays</p>
<ul style="list-style-type: none"><input type="checkbox"/> Use records (or equivalent) in the design of solutions to simple problems.	<p>Paul Long Book: Chapter 2, Page 50 AQA Book: Page 43 https://student.craigdave.org/videos/aqa-gcse-slr10-records</p>

2.7 Input/output and file handling

<input type="checkbox"/> Be able to obtain user input from the keyboard.	Paul Long Book: Chapter 2, Page 56 AQA Book: Page 25 https://student.craigdave.org/videos/aqa-gcse-slr10-user-input-and-display-output
<input type="checkbox"/> Be able to output data and information from a program to the computer display.	Paul Long Book: Chapter 2, Page 55 AQA Book: Page 25 https://student.craigdave.org/videos/aqa-gcse-slr10-user-input-and-display-output
<input type="checkbox"/> Be able to read/write from/to a text file.	Paul Long Book: Chapter 2, Page 58, Page 60 https://student.craigdave.org/videos/aqa-gcse-slr10-the-use-of-basic-file-handling-operations

2.8 String handling operations in a programming language

<input type="checkbox"/> Understand and be able to use: <ul style="list-style-type: none"> ○ length ○ position ○ substring ○ concatenation ○ convert character to character code ○ convert character code to character ○ string conversion operations. 	Paul Long Book: Chapter 2, Page 63 AQA Book: Page 47 https://student.craigdave.org/videos/aqa-gcse-slr10-the-use-of-basic-string-manipulation
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2.9 Random number generation in a programming language

<input type="checkbox"/> Be able to use random number generation.	Paul Long Book: Chapter 2, Page 69 AQA Book: Page 49 https://student.craigdave.org/videos/aqa-gcse-slr10-random-number-generation
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2.10 Subroutines (procedures and functions)

<input type="checkbox"/> Understand the concept of subroutines.	Paul Long Book: Chapter 2, Page 71 AQA Book: Page 53, Page 55, Page 57 https://student.craigdave.org/videos/aqa-gcse-slr10-how-to-use-subroutines
<input type="checkbox"/> Explain the advantages of using subroutines in programs.	Paul Long Book: Chapter 2, Page 78 https://student.craigdave.org/videos/aqa-gcse-slr10-how-to-use-subroutines
<input type="checkbox"/> Describe the use of parameters to pass data within programs.	Paul Long Book: Chapter 2, Page 73 https://student.craigdave.org/videos/aqa-gcse-slr10-the-structured-approach-to-programming

<input type="checkbox"/> Use subroutines that return values to the calling routine.	Paul Long Book: Chapter 2, Page 74 https://student.craigndave.org/videos/aqa-gcse-slr10-how-to-use-subroutines
<input type="checkbox"/> Know that subroutines may declare their own variables, called local variables, and that local variables usually: <ul style="list-style-type: none"> ○ only exist while the subroutine is executing ○ are only accessible within the subroutine. 	Paul Long Book: Chapter 2, Page 77 https://student.craigndave.org/videos/aqa-gcse-slr10-the-importance-of-local-variables
<input type="checkbox"/> Use local variables and explain why it is good practice to do so.	Paul Long Book: Chapter 2, Page 77 https://student.craigndave.org/videos/aqa-gcse-slr10-the-importance-of-local-variables

2.11 Structured programming

<input type="checkbox"/> Describe the structured approach to programming.	Paul Long Book: Chapter 2, Page 81 AQA Book: Page 53 https://student.craigndave.org/videos/aqa-gcse-slr10-simple-authentication-routines
<input type="checkbox"/> Explain the advantages of the structured approach.	Paul Long Book: Chapter 2, Page 84 AQA Book: Page 53 https://student.craigndave.org/videos/aqa-gcse-slr8-systematic-approach-to-problem-solving

2.12 Robust and secure programming

<input type="checkbox"/> Be able to write simple data validation routines.	Paul Long Book: Chapter 2, Page 88 AQA Book: Page 59 Video: 47 https://student.craigndave.org/videos/aqa-gcse-slr10-data-validation
<input type="checkbox"/> Be able to write simple authentication routines.	Paul Long Book: Chapter 2, Page 98 AQA Book: Page 59 https://student.craigndave.org/videos/aqa-gcse-slr10-simple-authentication-routines
<input type="checkbox"/> Be able to select suitable test data that covers normal (typical), boundary (extreme) and erroneous data. Be able to justify the choice of test data.	Paul Long Book: Chapter 2, Page 101 AQA Book: Page 63 https://student.craigndave.org/videos/aqa-gcse-slr10-suitable-test-data

2.13 Classification of programming languages

<ul style="list-style-type: none"> □ Know that there are different levels of programming language: <ul style="list-style-type: none"> ○ low-level language ○ high-level language. □ Explain the main differences between low-level and high-level languages. □ Know that machine code and assembly language are considered to be low-level languages and explain the differences between them. 	<p>Paul Long Book: Chapter 2, Page 107 AQA Book: Page 65 Video: 47</p> <p>https://student.craigndave.org/videos/aqa-gcse-slr12-characteristics-and-purpose-of-different-levels-of-programming-language</p>
<ul style="list-style-type: none"> □ Understand that ultimately all programming code written in high-level or assembly languages must be translated into machine code. □ Understand that machine code is expressed in binary and is specific to a processor or family of processors. 	<p>Paul Long Book: Chapter 2, Page 107 AQA Book: Page 65 Video: 47</p> <p>https://student.craigndave.org/videos/aqa-gcse-slr12-characteristics-and-purpose-of-different-levels-of-programming-language</p>
<ul style="list-style-type: none"> □ Understand the advantages and disadvantages of low-level language programming compared with high-level language programming. □ Understand that there are three common types of program translator: <ul style="list-style-type: none"> ○ interpreter ○ compiler ○ assembler. □ Explain the main differences between these three types of translator. □ Understand when it would be appropriate to use each type of translator. 	<p>Paul Long Book: Chapter 2, Page 110</p> <p>https://student.craigndave.org/videos/aqa-gcse-slr12-assemblers-compilers-and-interpreters</p> <p>https://student.craigndave.org/videos/aqa-gcse-slr12-the-purpose-of-translators</p>

3. Fundamentals of data representation

3.1 Number bases

<ul style="list-style-type: none"><input type="checkbox"/> Understand the following number bases:<ul style="list-style-type: none">○ decimal (base 10)○ binary (base 2)○ hexadecimal (base 16).	<p>Paul Long Book: Chapter 3, Page 2 AQA Book: Page 71, page 73, page 75, page 81, page 85 Video: 33, 35, and 36 https://student.craigndave.org/videos/aqa-gcse-slr13-number-bases</p>
<ul style="list-style-type: none"><input type="checkbox"/> Understand that computers use binary to represent all data and instructions.	
<ul style="list-style-type: none"><input type="checkbox"/> Explain why hexadecimal is often used in computer science.	

3.2 Converting between number bases

<ul style="list-style-type: none"><input type="checkbox"/> Understand how binary can be used to represent whole numbers.	<p>Paul Long Book: Chapter 3, Page 7 AQA Book: Page 71, page 73, page 75, page 81, page 85</p>
<ul style="list-style-type: none"><input type="checkbox"/> Understand how hexadecimal can be used to represent whole numbers.	<p>Paul Long Book: Chapter 3, Page 9 AQA Book: Page 71, page 73, page 75, page 81, page 85</p>
<ul style="list-style-type: none"><input type="checkbox"/> Be able to convert in both directions between:<ul style="list-style-type: none">○ binary and decimal○ binary and hexadecimal○ decimal and hexadecimal.	<p>Paul Long Book: Chapter 3, Page 9 AQA Book: Page 71, page 73, page 75, page 81, page 85 Video: 33, 35, and 36 https://student.craigndave.org/videos/aqa-gcse-slr13-converting-between-decimal-and-8-bit-binary https://student.craigndave.org/videos/aqa-gcse-slr13-converting-between-decimal-and-2-digit-hex</p>

3.3 Units of information

<ul style="list-style-type: none"><input type="checkbox"/> Know that:<ul style="list-style-type: none">○ a bit is the fundamental unit of information○ a byte is a group of 8 bits.	<p>Paul Long Book: Chapter 3, Page 19 AQA Book: Page 89 https://student.craigndave.org/videos/aqa-gcse-slr13-bit-patterns</p>
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<ul style="list-style-type: none"> <input type="checkbox"/> Know that quantities of bytes can be described using prefixes. <input type="checkbox"/> Know the names, symbols and corresponding values for the decimal prefixes: <ul style="list-style-type: none"> o kilo, 1 kB is 1,000 bytes o mega, 1 MB is 1,000 kilobytes o giga, 1 GB is 1,000 Megabytes o tera, 1 TB is 1,000 Gigabytes. 	<p>Paul Long Book: Chapter 3, Page 20 AQA Book: Page 89</p> <p>https://student.craigndave.org/videos/aqa-gcse-slr13-units</p>
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3.4 Binary arithmetic

<ul style="list-style-type: none"> <input type="checkbox"/> Be able to add together up to three binary numbers. 	<p>Paul Long Book: Chapter 3, Page 22 AQA Book: Page 77, Page 79 Video: 34</p> <p>https://student.craigndave.org/videos/aqa-gcse-slr13-adding-three-8-bit-binary-integers</p>
<ul style="list-style-type: none"> <input type="checkbox"/> Be able to apply a binary shift to a binary number. 	<p>Paul Long Book: Chapter 3, Page 25 AQA Book: Page 77</p> <p>https://student.craigndave.org/videos/aqa-gcse-slr13-binary-shifts</p>
<ul style="list-style-type: none"> <input type="checkbox"/> Describe situations where binary shifts can be used. 	<p>Paul Long Book: Chapter 3, Page 25 AQA Book: Page 87</p> <p>https://student.craigndave.org/videos/aqa-gcse-slr13-binary-shifts</p>

3.5 Character encoding

<ul style="list-style-type: none"> <input type="checkbox"/> Understand what a character set is and be able to describe the following character encoding methods: <ul style="list-style-type: none"> o 7-bit ASCII o Unicode. 	<p>Paul Long Book: Chapter 3, Page 28 AQA Book: Page 91, Page 93</p> <p>https://student.craigndave.org/videos/aqa-gcse-slr13-characters</p>
<ul style="list-style-type: none"> <input type="checkbox"/> Understand that character codes are commonly grouped and run in sequence within encoding tables. 	
<ul style="list-style-type: none"> <input type="checkbox"/> Describe the purpose of Unicode and the advantages of Unicode over ASCII. 	

<input type="checkbox"/> Know that Unicode uses the same codes as ASCII up to 127.	
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3.6 Representing images

<input type="checkbox"/> Understand what a pixel is and be able to describe how pixels relate to an image and the way images are displayed.	<p>Paul Long Book: Chapter 3, Page 31 AQA Book: Page 93, Page 95 Video: 38 and 39 https://student.craigndave.org/videos/aqa-gcse-slr13-images</p>
<input type="checkbox"/> Describe the following for bitmaps: <ul style="list-style-type: none"> ○ size in pixels ○ colour depth. <input type="checkbox"/> Know that the size of a bitmap image in pixels (width x height) is known as the image resolution.	
<input type="checkbox"/> Describe how a bitmap represents an image using pixels and colour depth.	
<input type="checkbox"/> Describe using examples how the number of pixels and colour depth can affect the file size of a bitmap image.	
<input type="checkbox"/> Calculate bitmap image file sizes based on the number of pixels and colour depth.	
<input type="checkbox"/> Convert binary data into a black and white image.	
<input type="checkbox"/> Convert a black and white image into binary data.	

3.7 Representing sound

<input type="checkbox"/> Understand that sound is analogue and that it must be converted to a digital form for storage and processing in a computer.	<p>Paul Long Book: Chapter 3, Page 43 AQA Book: Page 97 Video: 40 https://student.craigndave.org/videos/aqa-gcse-slr13-sound</p>
<input type="checkbox"/> Understand that sound waves are sampled to create the digital version of sound.	
<input type="checkbox"/> Describe the digital representation of sound in terms of: <ul style="list-style-type: none"> ○ sampling rate ○ sample resolution. 	

<input type="checkbox"/> Calculate sound file sizes based on the sampling rate and the sample resolution.	
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3.8 Data compression

<input type="checkbox"/> Explain what data compression is. <input type="checkbox"/> Understand why data may be compressed and that there are different ways to compress data.	<p>Paul Long Book: Chapter 3, Page 48 AQA Book: Page 101 Video: 66 https://student.craigdave.org/videos/aqa-gcse-sl13-compression-introduction</p>
<input type="checkbox"/> Explain how data can be compressed using Huffman coding. <input type="checkbox"/> Be able to interpret/create Huffman trees.	<p>Paul Long Book: Chapter 3, Page 52 AQA Book: Page 105 https://student.craigdave.org/videos/aqa-gcse-sl13-compression-huffman-coding</p>
<input type="checkbox"/> Be able to calculate the number of bits required to store a piece of data compressed using Huffman coding. <input type="checkbox"/> Be able to calculate the number of bits required to store a piece of uncompressed data in ASCII	
<input type="checkbox"/> Explain how data can be compressed using run length encoding (RLE).	<p>Paul Long Book: Chapter 3, Page 50 AQA Book: Page 103 https://student.craigdave.org/videos/aqa-gcse-sl13-compression-run-length-encoding</p>
<input type="checkbox"/> Represent data in RLE frequency/data pairs.	

4. Computer systems

4.1 Hardware and software

<ul style="list-style-type: none"><input type="checkbox"/> Define the terms hardware and software and understand the relationship between them.	<p>Paul Long Book: Chapter 4, Page 2 https://student.craigndave.org/videos/aqa-gcse-slr6-hardware-and-software-an-introduction</p>
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4.2 Boolean logic

<ul style="list-style-type: none"><input type="checkbox"/> Construct truth tables for the following logic gates:<ul style="list-style-type: none">o NOTo ANDo OR.	<p>Paul Long Book: Chapter 4, Page 7 AQA Book: Page 105 Video: 12</p> <p>https://student.craigndave.org/videos/aqa-gcse-slr11-simple-logic-diagrams</p>
<ul style="list-style-type: none"><input type="checkbox"/> Construct truth tables for simple logic circuits.<input type="checkbox"/> Interpret the results of simple truth tables.	<p>https://student.craigndave.org/videos/aqa-gcse-slr11-truth-tables</p>
<ul style="list-style-type: none"><input type="checkbox"/> Create, modify and interpret simple logic circuit diagrams.	<p>Paul Long Book: Chapter 4, Page 15 AQA Book: Page 105 Video: 13</p>

4.3 Software classification

<ul style="list-style-type: none"><input type="checkbox"/> Explain what is meant by:<ul style="list-style-type: none">o system softwareo application software.<input type="checkbox"/> Give examples of both types of software.	<p>Paul Long Book: Chapter 4, Page 27 AQA Book: Page 111 https://student.craigndave.org/videos/aqa-gcse-slr6-the-purpose-and-functionality-of-system-software</p>
<ul style="list-style-type: none"><input type="checkbox"/> Understand the need for, and functions of, operating systems (OS) and utility programs.<input type="checkbox"/> Understand that the OS handles management of the:<ul style="list-style-type: none">o processor(s)	<p>Paul Long Book: Chapter 4, Page 28 https://student.craigndave.org/videos/aqa-gcse-slr6-utility-system-software https://student.craigndave.org/videos/aqa-gcse-slr6-operating-systems-part-1</p>

<ul style="list-style-type: none"> ○ memory ○ I/O devices ○ applications ○ security. 	https://student.craigndave.org/videos/aqa-gcse-slr6-operating-systems-part-2
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4.4 Systems architecture

<input type="checkbox"/> Explain the Von Neumann architecture.	<p>Paul Long Book: Chapter 4, Page 33 AQA Book: Page 105 Video: 9</p> <p>https://student.craigndave.org/videos/aqa-gcse-slr1-the-von-neumann-architecture</p>
<input type="checkbox"/> Explain the role and operation of main memory and the following major components of a central processing unit (CPU): <ul style="list-style-type: none"> ○ arithmetic logic unit ○ control unit ○ clock ○ bus. 	<p>Paul Long Book: Chapter 4, Page 33 AQA Book: Page 105 Video: 9</p> <p>https://student.craigndave.org/videos/aqa-gcse-slr1-the-common-characteristics-of-cpus</p>
<input type="checkbox"/> Explain the effect of the following on the performance of the CPU: <ul style="list-style-type: none"> ○ clock speed ○ number of processor cores ○ cache size ○ cache type. 	<p>Paul Long Book: Chapter 4, Page 33 AQA Book: Page 105 Video: 9</p> <p>https://student.craigndave.org/videos/aqa-gcse-slr1-the-common-characteristics-of-cpus</p>
<input type="checkbox"/> Understand and explain the Fetch-Execute cycle.	<p>Paul Long Book: Chapter 4, Page 33 AQA Book: Page 105 Video: 9</p> <p>https://student.craigndave.org/videos/aqa-gcse-slr1-the-common-characteristics-of-cpus</p>
<input type="checkbox"/> Understand the differences between main memory and secondary storage. <input type="checkbox"/> Understand the differences between RAM and ROM.	<p>Paul Long Book: Chapter 4, Page 45 AQA Book: Page 119 Video: 16</p> <p>https://student.craigndave.org/videos/aqa-gcse-slr2-ram-rom</p>

<input type="checkbox"/> Understand why secondary storage is required.	<p>Paul Long Book: Chapter 4, Page 53 AQA Book: Page 1123 Video: 23 https://student.craigdave.org/videos/aqa-gcse-slr2-the-need-for-secondary-storage</p>
<input type="checkbox"/> Be aware of different types of secondary storage (solid state, optical and magnetic). <input type="checkbox"/> Explain the operation of solid state, optical and magnetic storage. <input type="checkbox"/> Discuss the advantages and disadvantages of solid state, optical and magnetic storage.	<p>Paul Long Book: Chapter 4, Page 47 https://student.craigdave.org/videos/aqa-gcse-slr2-common-types-of-secondary-storage-and-their-operation</p> <p>https://student.craigdave.org/videos/aqa-gcse-slr2-adv-and-dis-of-secondary-storage-for-a-given-application</p>
<input type="checkbox"/> Explain the term 'cloud storage'.	
<input type="checkbox"/> Explain the advantages and disadvantages of cloud storage when compared to local storage	<p>Paul Long Book: Chapter 4, Page 55 https://student.craigdave.org/videos/aqa-gcse-slr2-cloud-storage</p>
<input type="checkbox"/> Understand the term 'embedded system' and explain how an embedded system differs from a non-embedded system.	<p>Paul Long Book: Chapter 4, Page 57 https://student.craigdave.org/videos/aqa-gcse-slr1-embedded-systems</p>

5. Fundamentals of computer networks

<ul style="list-style-type: none"> □ Define what a computer network is. □ Discuss the benefits and risks of computer networks 	<p>Paul Long Book: Chapter 5, Page 2 AQA Book: Page 115 https://student.craigdave.org/videos/aqa-gcse-slr4-star-and-bus-network-topologies</p>
<ul style="list-style-type: none"> □ Describe the main types of computer network including: <ul style="list-style-type: none"> ○ Personal Area Network (PAN) ○ Local Area Network (LAN) ○ Wide Area Network (WAN). 	<p>Paul Long Book: Chapter 5, Page 2 AQA Book: Page 127 Video: 53 https://student.craigdave.org/videos/aqa-gcse-slr3-types-of-networks</p>
<ul style="list-style-type: none"> □ Understand that networks can be wired or wireless. □ Discuss the benefits and risks of wireless networks as opposed to wired networks. 	<p>Paul Long Book: Chapter 5, Page 7 https://student.craigdave.org/videos/aqa-gcse-slr3-benefits-and-risks-of-wireless-networks</p>
<ul style="list-style-type: none"> □ Explain the following common network topologies: <ul style="list-style-type: none"> ○ star ○ bus. 	<p>Paul Long Book: Chapter 5, Page 12 AQA Book: Page 129 Video: 56 https://student.craigdave.org/videos/aqa-gcse-slr4-star-and-bus-network-topologies</p>
<ul style="list-style-type: none"> □ Define the term 'network protocol'. 	<p>Paul Long Book: Chapter 5, Page 13 AQA Book: Page 133 Video: 58 https://student.craigdave.org/videos/aqa-gcse-slr4-common-network-protocols</p>
<ul style="list-style-type: none"> □ Explain the purpose and use of common network protocols including: <ul style="list-style-type: none"> ○ Ethernet ○ Wi-Fi ○ TCP (Transmission Control Protocol) ○ UDP (User Datagram Protocol) ○ IP (Internet Protocol) 	<p>Paul Long Book: Chapter 5, Page 17 AQA Book: Page 133 Video: 58 https://student.craigdave.org/videos/aqa-gcse-slr4-the-4-layer-tcp-ip-protocol-model</p>

<ul style="list-style-type: none"> ○ HTTP (Hypertext Transfer Protocol) ○ HTTPS (Hypertext Transfer Protocol Secure) ○ FTP (File Transfer Protocol) ○ email protocols: <ul style="list-style-type: none"> ▪ SMTP (Simple Mail Transfer Protocol) ▪ IMAP (Internet Message Access Protocol). 	
<ul style="list-style-type: none"> <input type="checkbox"/> Understand the need for, and importance of, network security. 	<p>Paul Long Book: Chapter 5, Page 29 AQA Book: Page 135 Video: 59</p>
<ul style="list-style-type: none"> <input type="checkbox"/> Explain the following methods of network security: <ul style="list-style-type: none"> ○ authentication ○ encryption ○ firewall ○ MAC address filtering. 	<p>Paul Long Book: Chapter 5, Page 29 AQA Book: Page 135 Video: 59</p>
<ul style="list-style-type: none"> <input type="checkbox"/> Describe the 4 layer TCP/IP model: <ul style="list-style-type: none"> ○ application layer ○ transport layer ○ internet layer ○ link layer. <input type="checkbox"/> Understand that the HTTP, HTTPS, SMTP, IMAP and FTP protocols operate at the application layer. <input type="checkbox"/> Understand that the TCP and UDP protocols operate at the transport layer. <input type="checkbox"/> Understand that the IP protocol operates at the internet layer. 	<p>Paul Long Book: Chapter 5, Page 25 AQA Book: Page 137 Video: 58</p>

6. Fundamentals of cyber security

<input type="checkbox"/> Be able to define the term cyber security and be able to describe the main purposes of cyber security.	Paul Long Book: Chapter 6, Page 29 AQA Book: Page 139
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6.1 Cyber security threats

<input type="checkbox"/> Understand and be able to explain the following cyber security threats: <ul style="list-style-type: none"> ○ social engineering techniques ○ malicious code ○ weak and default passwords ○ misconfigured access rights ○ removable media ○ unpatched and/or outdated software. 	AQA Book: Page 139 to 145 <u>social engineering techniques</u> Paul Long Book: Chapter 6, Page 2 <u>malicious code</u> Paul Long Book: Chapter 6, Page 7 <u>weak and default passwords</u> Paul Long Book: Chapter 6, Page 12 <u>misconfigured access rights</u> Paul Long Book: Chapter 6, Page 12 <u>removable media</u> Paul Long Book: Chapter 6, Page 11 <u>unpatched and/or outdated software.</u> Paul Long Book: Chapter 6, Page 14
<input type="checkbox"/> Explain what penetration testing is and what it is used for.	Paul Long Book: Chapter 6, Page 26

6.1.1 Social engineering

<input type="checkbox"/> Define the term social engineering. <input type="checkbox"/> Describe what social engineering is and how it can be protected against. <input type="checkbox"/> Explain the following forms of social engineering: <ul style="list-style-type: none"> ○ blagging (pretexting) ○ phishing ○ pharming ○ shouldering (or shoulder surfing). 	Paul Long Book: Chapter 6, Page 29 AQA Book: Page 139 <u>Blagging (pretexting)</u> Paul Long Book: Chapter 6, Page 2 <u>Phishing</u> Paul Long Book: Chapter 6, Page 2 <u>Pharming</u> Paul Long Book: Chapter 6, Page 3 <u>shouldering (or shoulder surfing).</u> Paul Long Book: Chapter 6, Page 6
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6.1.2 Malicious code

<ul style="list-style-type: none">□ Define the term 'malware'.□ Describe what malware is and how it can be protected against.□ Describe the following forms of malware:<ul style="list-style-type: none">○ computer virus○ trojan○ spyware○ adware.	<p><i>Paul Long Book:</i> Chapter 6, Page 7</p> <p><u>computer virus</u> <i>Paul Long Book:</i> Chapter 6, Page 7</p> <p><u>Trojan</u> <i>Paul Long Book:</i> Chapter 6, Page 8</p> <p><u>Spyware</u> <i>Paul Long Book:</i> Chapter 6, Page 7</p> <p><u>adware.</u> <i>Paul Long Book:</i> Chapter 6, Page 8</p>
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6.2 Methods to detect and prevent cyber security threats

<ul style="list-style-type: none">□ Understand and be able to explain the following security measures:<ul style="list-style-type: none">○ biometric measures (particularly for mobile devices)○ password systems○ CAPTCHA (or similar)○ using email confirmations to confirm a user's identity○ automatic software updates	<p><u>biometric measures (particularly for mobile devices)</u> <i>Paul Long Book:</i> Chapter 6, Page 16</p> <p><u>password systems</u> <i>Paul Long Book:</i> Chapter 6, Page 16</p> <p><u>CAPTCHA (or similar)</u> <i>Paul Long Book:</i> Chapter 6, Page 18</p> <p><u>using email confirmations to confirm a user's identity</u> <i>Paul Long Book:</i> Chapter 6, Page 18</p> <p><u>automatic software updates</u> <i>Paul Long Book:</i> Chapter 6, Page 20</p>
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7. Ethical, legal and environmental impacts of digital technology on wider society, including issues of privacy

<ul style="list-style-type: none"><input type="checkbox"/> Explain the current ethical, legal and environmental impacts and risks of digital technology on society. Where data privacy issues arise these should be considered.	<p>Paul Long Book: Chapter 7 AQA Book: Page 147 Page 149 Video: 7</p> <p>Exam questions will be taken from the following areas:</p> <ul style="list-style-type: none"><input type="checkbox"/> cyber security<input type="checkbox"/> mobile technologies<input type="checkbox"/> wireless networking<input type="checkbox"/> cloud storage<input type="checkbox"/> theft of computer code<input type="checkbox"/> issues around copyright of algorithms<input type="checkbox"/> cracking<input type="checkbox"/> hacking<input type="checkbox"/> wearable technologies<input type="checkbox"/> computer based implants.<input type="checkbox"/> Students will be expected to understand and explain the general principles behind the issues rather than have detailed knowledge on specific issues. <p>Students should be aware that ordinary citizens normally value their privacy and may not like it when governments or security services have too much access.</p> <p>Students should be aware that governments and security services often argue that they cannot keep their citizens safe from terrorism and other attacks unless they have access to private data.</p>
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