H466 - Scheme of work teaching hours	
Teaching weeks:	35
Teaching hours/week:	5
Total teaching time:	175

Please read guidance notes on right when planning your scheme of work

Teaching Hours	Topic
6	Structure and Function of Processor
9	Types of Processor

	Input, Output and storage
9	Systems Software (A Level) Operating Systems (AS Level)
8	Applications Generation
7	Compression, Encryption and Hashing
6	Databases
5	Networks

7	Web Technologies
8	Data Types
5	Computing related legislation
5	Moreal and Ethical Issues

Component 1: Computer Systems
Computer Systems 01 - 2 hours and 30 minutes is worth 40% of the final mark. **Time allocation for topics will vary based on personal experience, cohort ability and progress. These timings are meant as a guide only and not a required or specified amount which is endorsed by OCR.**

Sub Topic
The Arithmetic and Logic Unit; The Fetch-Decode-Execute Cycle; including its effects on registers.
The use of pipelining in a processor to improve efficiency
Von Neumann, Harvard and contemporary processor architecture.
CISC RISC, GPUs and their uses (including those not related to graphics), Multicore and Parallel systems.
How different input, output and storage devices can be applied to the solution of different problems.

RAM, ROM and virtual storage
The need for, function and purpose of operating systems.
Memory Management
Interrupts
Scheduling
Operating systems
BIOS.
Device drivers.
Virtual machines
Applications
Utilities.
Open source vs. closed source.
Translators: Interpreters, compilers and assemblers.
Stages of compilation
Linkers, loaders, libraries.
Lossy vs. Lossless compression.
RLE
Symmetric and asymmetric encryption.
hashing.
Databases
Entity relationship model
Normalisation to 3NF.
SQL
SQL databases
ACID
Characteristics of networks and the importance of protocols and standards.
The internet structure
Network security
Network hardware.

HTML, CSS and JavaScript.
Search engine indexing.
PageRank algorithm.
Client server
Binary and Hexadecimal
ASCII
sign and magnitude
binary integers.
Bitwise manipulation and masks: shifts, combining with AND, OR, and XOR.
floating point representation
The Data Protection Act 1998.
The Computer Misuse Act 1990.
The Copyright Design and Patents Act 1988.
The Regulation of Investigatory Powers Act 2000.
The individual moral, social, ethical and cultural opportunities and risks of digital technology: • Computers in the workforce. • Automated decision making. • Artificial intelligence. • Environmental effects. • Censorship and the Internet. • Monitor behaviour. • Analyse personal information. • Piracy and offensive communications. • Layout, colour paradigms and character sets.

Intent:
Computer Science is a practical subject where students can apply the academic
a digital prism. The aims of this qualification are to enable learners to develop:
An understanding and ability to apply the fundamental principles and concepts o
The ability to analyse problems in computational terms through practical experie
The capacity to think creatively, innovatively, analytically, logically and critically
The capacity to see relationships between different aspects of computer science
Mathematical skills.

Homework:
Issue four hours of homework per week plus one hour of background reading, reflection/evaluation and preparatory work via Doddle and assign on Teams

Marking:
All work needs to be marked against mark scheme, green highlight correct answers, red highlight incorrect answers, insert correct answers in red font. Eight marked pieces including key assessment require teacher feedback with WWW, EBI, NOW

Lesson Objective
Describe the function of the ALU and Control Unit Describe the Fetch-Execute cycle and the role of the following registers:Program counter Accumulator Memory Address Register Memory data register Current instruction register
Describe the factors affecting the performance of the CPU: clock speed, number of cores, cache Understand the use of pipelining in a processor to improve efficiency
Describe von Neumann, Harvard and contemporary processor architecture
Describe the differences between, and uses of, CISC and RISC processors Describe GPUs and their uses Describe multicore and parallel systems
Describe different input devices Explain how different input devices can be applied as a solution to different problems, Describe how different output devices can be applied as a solution of different problems

Describe the characteristics and uses of RAM and ROM Understand what is meant by virtual storage Describe the uses of magnetic, flash and optical storage devices
Understand the function and purpose of an operating system
Describe memory management (paging, segmentation and virtual memory)
Describe scheduling algorithms: round robin, first come first served, multi-level feedback queues, shortest job first and shortest remaining time
Describe distributed, embedded, multi-tasking, multi-user and real-time operating systems
Describe BIOS,
Describe how device drivers are needed
Describe what virtual machines are and why they are needed
Be able to justify a suitable application for a specific purpose
Describe what is meant by a utility program and give examples
Distinguish between open source and closed source software
Understand the role of an assembler, compiler and interpreter
Describe the stages of compilation: lexical analysis, syntax analysis, code generation and optimisation
Describe the function of linkers and loaders. Describe the use of libraries.
Understand the difference between lossless and lossy compression
Explain run length encoding and dictionary based compression
Define symmetric and asymmetric encryption
Understand how and why hashing may be used to encrypt data
Explain the concept of a relational database Define the terms flat file, entity, attribute, primary key, foreign key, secondary key, entity relationship modelling, referential integrity
Produce an entity relationship model for a simple scenario involving multiple entities
Explain the concept of a relational database Normalise relations to third normal form Understand why databases are normalised
Be able to use SQL to retrieve data from multiple tables of a relational database Be able to interpret and modify SQL
Be able to use SQL to define a database table Be able to use SQL to update, insert and delete data from multiple tables of a relational database
Describe what is meant by transaction processing and ACID (Atomicity, Consistency, Isolation, Durability)
Understand the structure of the Internet Describe the term ‘Uniform Resource Locator’ (URL) in the context of networking
Explain the terms ‘domain name’ and ‘IP address’ Describe how domain names are organised Understand the purpose and function of the Domain Name Server (DNS) system Describe the characteristics of LANs and WANs
Discuss network security and threats Discuss use of firewalls, proxies and encryption Discuss worms, Trojans and viruses and the vulnerabilities that they exploit
Discuss the network hardware needed to create a network hubs, switches and routers

To understand HTML and the role of HTML on the World Wide Web To understand CSS and the role of CSS in Web Pages To be familiar with various HTML and CSS tags and their functions To use inline CSS directly within HTML files using the <style> tag, and with external style sheets
To understand how web pages are indexed by search engines
To understand the PageRank algorithm To be able to interpret and apply the PageRank algorithm to a given scenario
To understand the client/server and peer-to-peer models Describe situations where each model may be used To understand client and server side processing
List and define primitive data types Represent positive integers in binary and hexadecimal Convert between binary, hexadecimal and denary
Describe how character sets (ASCII and Unicode) are used to represent text
Use sign and magnitude to represent negative numbers in binary Use two's complement to represent negative numbers in binary Represent fractions in fixed point binary
Be able to Add and subtract binary integers
Perform logical, arithmetic and circular shifts on binary data Perform bitwise operations AND, OR and XOR Use masks to manipulate bits
Represent positive and negative numbers with a fractional part in floating point form Normalise un-normalised floating point numbers with positive or negative mantissas Add and subtract floating point numbers
To be aware of computing related legislation, including: The Data Protection Act 1998 The Computer Misuse Act 1990 The Copyright Design and Patents Act 1988The Regulation of Investigatory Powers Act 2000To understand that developments in digital technologies have enabled massive transformations in the capacity of organisations to monitor behaviour, amass and analyse personal information
Discuss the individual (moral), social (ethical) and cultural opportunities and risks of digital technology, including:computers in the work force automated decision making artificial intelligence analysis of personal information Discuss the environmental effects of computers

principles learned in the classroom to real-world systems. It’s an intensely creative subject th

f computer science, including: abstraction, decomposition, logic, algorithms and data represe
nce of solving such problems, including writing programs to do so

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Recap Resources
Advance notes Intermediate notes Concise notes Flash cards Exam questions Videos https://www.physicsandmathstutor.com/computer-science-revision/a-level-ocr/elements-of-computational-thinking

Recap/Intervention
Students who have no GCSE CS to revisit GCSE materials https://www.bbc.co.uk/bitesize/guides/zbfny4j/revision/1
https://www.bbc.co.uk/bitesize/guides/zbfny4j/revision/1
https://www.bbc.co.uk/bitesize/guides/zbfny4j/revision/1
https://www.bbc.co.uk/bitesize/guides/zd4r97h/revision/1

https://www.bbc.co.uk/bitesize/guides/z67j2nb/revision/1

https://www.bbc.co.uk/bitesize/guides/zmqw7p3/revision/1

https://www.bbc.co.uk/bitesize/guides/zd3cwmn/revision/1

https://www.bbc.co.uk/bitesize/guides/zqyrq6f/revision/4

https://www.bbc.co.uk/bitesize/topics/zwm6fg8

https://www.bbc.co.uk/bitesize/guides/zh4whyc/revision/1

https://www.bbc.co.uk/bitesize/guides/znkqn39/revision/8

https://www.bbc.co.uk/bitesize/guides/zfnny4j/revision/2

https://www.bbc.co.uk/bitesize/guides/zkhykqt/revision/1

https://www.bbc.co.uk/bitesize/guides/zhx26yc/revision/2

at combines invention and excitement, and can look at the natural world through

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SOW Resources
PG Online - Presentations, worksheet and marksheet, homework sheet and marksheet, end of unit assessment and marksheet
https://www.pgonline.co.uk/resources/computer-science/a-level-ocr/

Teach ICT
https://teach-ict.com/2016/A_Level_Computing/OCR_H446/OCR_H446_home.html

Isaac Computer Science
https://isaaccomputerscience.org/topics

Resource Links
Online Delivery Guide: Structure and function of the processor
Topic Exploration Pack - Teacher Instructions: Structure and function of the Processor
Learner Activity: Structure and Function of the Processor
Online Delivery Guide: Types of Processor
Topic Exploration Pack - Teacher Instructions: Types of Processor
Topic Exploration Pack - Learner Activity: Types of Processor
Online Delivery Guide: Input, output, storage

Online Delivery Guide: Systems Software
Topic Exploration Pack - Teacher Instructions: Systems Software
Topic Exploration Pack - Learner Activity: Systems Software
Topic Exploration Pack - Teacher Instructions: Application Generation
Topic Exploration Pack - Learner Activity: Application Generation
Online Delivery Guide: Compression, Encryption and Hashing
Topic Exploration Pack - Teacher Instructions: Compression, Encryption and Hashing
For AS LEVEL Lossy v Lossless Compression is part of 1.3.3 Web Technologies
Online Delivery Guide: Software Development
Topic Exploration Pack - Teacher Instructions: Software Development
Topic Exploration Pack - Learner Activity: Software Development
Online Delivery Guide: Networks
Topic Exploration Pack - Teacher Instructions: Networks

Online Delivery Guide: Web Technologies
Topic Exploration Pack - Teacher Instructions: Web Technologies
Topic Exploration Pack - Learner Activity: Web Technologies
Online Delivery Guide: Data Types
Topic Exploration Pack - Teacher Instructions: Data Types
Topic Exploration Pack - Learner Activity 1: Data Types
Topic Exploration Pack - Learner Activity 2: Data Types
Topic Exploration Pack - Learner Activity 3: Data Types
No current supporting resources for this unit
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