Computer Science Curriculum Plan – Nuneaton Academy

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KEY STAGE 3

YEAR	2nd Half of the year (Jan –July)
8	**Understanding computers** Understand the hardware and software components that make up computer systems, and how they communicate with one another and with other systems. Understand how instructions are stored and executed within a computer system; understand how data of various types (including text, sounds, and pictures) can be represented and manipulated digitally, in the form of binary digits; be able to convert between binary and decimal, and perform simple binary arithmetic. Python Programming: Understand the coding editor and interface, be able to compile, edit and run basic code spotting and correcting errors in both syntax and logic. Understand the 3 main constructs of programming; sequence, selection and iteration, applying these to real world scenarios in code. At the end of this Unit all pupils should be able to: • Feel comfortable with a python editor interfacess • Write basic python code • Edit basic python code • Spot and correct syntax errors • Spot and correct logic errors • Explain sequence, selection and iteration • Understand and embrace the importance of an error culture in relation to coding
	End of Year Assessment: Enter details UL Style assessment focused on the components of a computer system and programming.

9	Python Programming: Use of variables, sequence selection and iteration reading. Integrated development, IDLE, variable, string, assignment statement, data type, casting, integer, float, round, BIDMAS, selection, iteration, loop, syntax error, logic error, debug, list, array, index, procedure, function, call, argument, parameter, return value, modular program, dry run. Computer Networks: Principles and architecture of local and wide area networks. Pupils will learn that the World Wide Web is part of the Internet, and how web addresses are constructed and stored as IP addresses. Client-server, peer-to-peer networks and the concept of cloud computing are all described. Ways of keeping data secure and simple encryption techniques are also covered. In the final lesson, pupils will sit a multiple choice test which will form the Unit assessment.
	Mid-Year Assessment:

KEY STAGE 4

YEAR	1st Half of the year (Sept – Jan)		2nd Half of the year (Jan – July)	
	Paper 1	**Paper 2**	**Paper 1**	**Paper 2**
10	The purpose and function of a CPU • The need for primary storage • The difference between RAM and ROM • The purpose of ROM in a computer system • The purpose of RAM in a computer system • Virtual memory The need for secondary storage	Fundamentals of programming Sequence selection and iteration The use of variables, constants, operators, inputs, outputs and assignments The use of the three basic programming constructs used to control the flow of a program: • Sequence • Selection • Iteration (count- and condition-controlled loops)	The purpose and functionality of operating systems: • User Memory management and multitasking • Peripheral management and drivers • User management • File management • The purpose and functionality of utility software Utility system software: • Encryption software Defragmentation • Data compression	Principles of computational thinking: ▪ Abstraction ▪ Decomposition ▪ Algorithmic thinking Designing creating and refining algorithms • Identify the inputs, processes, and outputs for a problem Structure diagrams • Create, interpret, correct, complete, and refine algorithms using: • Pseudocode

	• Common types of storage: • Optical • Magnetic • Solid state • Suitable storage devices and storage media for a given application • The advantages and disadvantages of different storage devices and storage media relating to these characteristics: ▪ Capacity ▪ Speed ▪ Portability ▪ Durability ▪ Reliability ▪ Cost	The common arithmetic operators ¨ The common Boolean operators AND, OR and NOT The use of data types: • Integer • Real • Boolean • Character and string • Casting Defensive design considerations: • Anticipating misuse Authentication • Input validation. • Maintainability: • Use of sub programs • Naming conventions • Indentation Commenting	Impacts of digital technology on wider society including: • Ethical issues • Legal issues • Cultural issues • Environmental issues • Privacy issues • Legislation relevant to Computer Science: ▪ The Data Protection Act ▪ 2018 Computer Misuse Act ▪ 1990 Copyright Designs and Patents Act 1988 ▪ Software licences (i.e. open source and proprietary) Networks and topologies Types of network: • LAN (Local Area Network) • WAN (Wide Area Network) Factors that affect the performance of networks The different roles of computers in a client-server and a peer-to peer network The hardware needed to connect stand-alone computers into a Local Area Network: • Wireless access points • Routers • Switches • NIC (Network Interface Controller/Card) • Transmission media	• Flowcharts • Reference language/high-level programming language Identify common errors • Trace tables The use of basic string manipulation The use of basic file handling operations: Open Read Write Close The use of records to store data The use of SQL to search for data The use of arrays (or equivalent) when solving problems, including both one-dimensional (1D) and two-dimensional arrays (2D) ¨ How to use sub programs (functions and procedures) to produce structured code ¨ Random number generation

			The Internet as a worldwide collection of computer networks: DNS (Domain Name Server) Hosting The Cloud Web servers and clients Star and Mesh network topologies		
	Mid-Year Assessment: To cover all topics taught up to date.		**End of Year Assessment: Enter details here**		
YEAR	**September – November**		**December – March**		**March - June**
11	**Paper 1**	**Paper 2**	**Paper 1**	**Paper 2**	**Revision**
	Network Security Forms of attack: 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 Identifying and presenting vulnerabilities Penetration testing Anti-malware software Firewalls User access levels Passwords Encryption	Characteristics and purpose of different levels of programming language: o High-level languages o Low-level languages ¨ The purpose of translators ¨ The characteristics of a compiler and an interpreter Standard searching algorithms: Binary search Linear search Standard sorting algorithms: Bubble sort Merge sort Insertion sort Common tools and facilities available in	The purpose and functionality of operating systems: User interface Memory management and multitasking Peripheral management and drivers User management File management	The purpose of testing ¨ Types of testing: o Iterative o Final/terminal ¨ Identify syntax and logic errors ¨ Selecting and using suitable test data: o Normal o Boundary o Invalid/Erroneous ¨ Refining algorithms	

	Physical security	an Integrated Development Environment (IDE): Editors Error diagnostics Run-time environment Translators			
	November Mock Exam: Enter Details **Paper 1 Full** **Paper 2 Full**		**March Mock Exam: Enter Details** **Paper 1 Full** **Paper 2 Full**		**ACTUAL GCSE EXAM**