HAYDOCK HIGH SCHOOL

Grade	Problem Solving and Programming	Principles of Computer Science	Networks, Communication & ICT in Society
1-	Understand what an algorithm is	• Recognises that digital content can be represented in many forms. • Recognises that all software executed on digital devices is programmed.	• Uses software under the control of the teacher to create, store and edit digital content using appropriate file and folder names. (AB) (GE) (DE) • Obtains content from the world wide web using a web browser. (AL) • Shares their use of technology in school. • Knows common uses of information technology beyond the classroom. (GE)
1 (G+)	Be able to express a simple algorithm as a flow chart	• Distinguishes between some of these forms and can explain the different ways that they communicate information.	• Understands the importance of communicating safely and respectfully online, and the need for keeping personal information private. (EV) • Understands that people interact with computers. • Talks about their work and makes changes to improve it. (EV)
1+	Understand that computers need precise instructions Be able to interpret algorithms (flow chart)	• Understands that computers have no intelligence and that computers can do nothing unless a program is executed.	• Knows what to do when concerned about content or being contacted. (AL)
2-	Determine the correct output for an algorithm of specific data set	• Recognises that a range of digital devices can be considered a computer. (AB) (GE)	• Shares their experiences of technology in school and beyond the classroom. (GE) (EV) • Talks about their work and makes improvements to solutions based on feedback received.(EV)
2(E-)	Design simple algorithms using loops and selection Be able to interpret algorithms expressed in different forms (flow chart, written english, pseudo code)	• Recognises and can use a range of input and output devices.	• Navigates the web and can carry out simple web searches to collect digital content. (AL) (EV) • Demonstrates use of computers safely and responsibly, knowing a range of ways to report unacceptable content and contact when online. • Uses a variety of software to manipulate and present digital content: data and information. (AL)

Computer Studies Progress Grid

2+	Understand how to create Algorithms to solve a particular problem	• Understands how programs specify the function of a general purpose computer. (AB)	• Uses technology with increasing independence to purposefully organise digital content. (AB) • Shows awareness for the quality of digital content collected. (EV)
3-	Identify and correct errors in an algorithm	• Recognises different types of data: text, number. (AB) (GE)	• Collects, organises and presents data and information in digital content. (AB) • Recognises what is acceptable and unacceptable behaviour when using technologies and online services.
3(E+)	Understand the purpose of and how to use, arithmetic operators (add, subtract, divide, multiply)	• Appreciates that programs can work with different types of data. (GE) • Recognises that data can be structured in tables to make it useful. (AB) (DE) • Knows that computers collect data from various input devices, including sensors and application software. (AB) •	• Understands the difference between the internet and internet service e.g. world wide web. (AB) • Shows an awareness of, and can use a range of internet services e.g. VOIP. • Creates digital content to achieve a given goal through combining software packages and internet services to communicate with a wider audience e.g. blogging. (AL)
3+		• Understands the difference between hardware and application software, and their roles within a computer system. (AB)	• Understands how to effectively use search engines, and knows how search results are selected(AB) (GE) (EV) • Makes appropriate improvements to solutions based on feedback received, and can comment on the success of the solution. (EV)
4-	Understand the purpose of and how to use relational operators (more than, less than, equal to not equal to, less than or equal to, more than or equal to)	• 4.2.1 understand the function of the hardware components of a computer system (CPU, main memory, secondary storage, input and output devices) and how they work together	• Selects, combines and uses internet services. (EV) • Demonstrates responsible use of technologies and online services, and knows a range of ways to report concerns. • Makes judgements about digital content when evaluating and repurposing it for a given audience. (EV) (GE)
4 (D to C-)	Be able to write programs in a high level programming language	• Performs more complex searches for information e.g. using Boolean and relational operators. (AL) (GE) (EV) • Analyses and evaluates data and information, and recognises that poor quality data leads to unreliable results, and inaccurate conclusions. (AL) (EV) • Understands why and when computers are used. (EV)	• Understands how to effectively use search engines, and knows how search results are selected, including that search engines use 'web crawler programs'. (AB) (GE) (EV) • Recognises the audience when designing and creating digital content. (EV) • Understands the potential of information technology for collaboration when computers are networked. (GE) • Uses criteria to evaluate the quality of solutions, can identify improvements making some refinements to the solution, and

Computer Studies Progress Grid

		• Knows that digital computers use binary to represent all data. (AB)	future solutions. (EV)
4+	Understand how the choice of the algorithm is influenced by the data structures and data values that need to be manipulated	• Understands the main functions of the operating system. (DE) (AB) • Knows the difference between physical, wireless and mobile networks. (AB)	• Understands how to construct static web pages
5-	Understand the benefit of producing programs that are easy to read Understand the need for and how to manipulate, strings Understand the need for and how to use, data types (integer, real, Boolean, char)	• Knows that computers transfer data in binary. (AB) • Understands the relationship between binary and file size (uncompressed). (AB) • Recognises and understands the function of the main internal parts of basic computer architecture. (AB)	• Understands how to construct static web pages using HTML and CSS. (AL) (AB)
5 (C+ to B-)	Understand how standard algorithms work (Linear search, bubble sort) Understand the need for, and how to use, variables and constants Be able to differentiate different types of errors in a program (logic, syntax, runtime)	• Understands how bit patterns represent numbers and images. (AB) • Defines data types: real numbers and Boolean. (AB) • Queries data on one table using a typical query language. (AB) • Understands how numbers, images, sounds and character sets use the same bit patterns. (AB) (GE) •	• Understands how search engines rank search results. (AL) • Evaluates the appropriateness of digital devices, internet services and application software to achieve given goals. (EV) • Recognises ethical issues surrounding the application of information technology beyond school. • Designs criteria to critically evaluate the quality of solutions, uses the criteria to identify improvements and can make appropriate refinements to the solution. (EV)
5+	Understand the purpose of an how to use arithmetic operators (modulus, integer divide) Understand how standard algorithms work (Binary search, merge sort) Able to use techniques to improve readability and explain how the code works when programming	• Knows that there is a range of operating systems and application software for the same hardware. (AB) • Understands the concepts behind the fetch-execute cycle. (AB) (AL) •	• Understands data transmission between digital computers over networks, including the internet i.e. IP addresses and packet switching. (AL) (AB)
6-	understand the need for data structures (one dimensional array)	• 3.1.2 understand how computers represent and manipulate numbers	• Uses technologies and online services securely, and knows how to identify and report inappropriate conduct. (AL)

	understand the need for validation Understand the benefits of using subprograms	(unsigned integers, signed integers [sign and magnitude, two's complement])	• Justifies the choice of and independently combines and uses multiple digital devices, internet services and application software to achieve given goals. (EV) • Evaluates the trustworthiness of digital content and considers the usability of visual design features when designing and creating digital artefacts for a known audience. (EV)
6 (B)	be able to code an algorithm into a high level language	• Performs simple operations using bit patterns e.g. binary addition. (AB) (AL) • Understands the relationship between resolution and colour depth, including the effect on file size. (AB) • 3.4.2understand how a Caesar cipher algorithm works •	• Knows the names of hardware e.g. hubs, routers, switches, and the names of protocols e.g. SMTP, iMAP, POP, FTP, TCP/IP, associated with networking computer systems. (AB) • Designs criteria for users to evaluate the quality of solutions, uses the feedback from the users to identify improvements and can make appropriate refinements to the solution. (EV)
6+	be able to determine what value a variable will hold at a given point in a program using a trace table Be able to write code that uses user-written and pre-existing sub-programs	• Distinguishes between data used in a simple program (a variable) and the storage structure for that data. (AB) • Understands the von Neumann architecture in relation to the fetch execute cycle, including how data is stored in memory. (AB) (GE) • Understands the basic function and operation of location addressable memory.(AB) • 3.1.5understand why hexadecimal notation is used and be able to convert between hexadecimal and binary •	• Identifies and explains how the use of technology can impact on society.
7-	understand the need for and how to use data structures (records, one-dimensional arrays, two dimensional arrays)	• Performs operations using bit patterns e.g. conversion between binary and hexadecimal, binary subtraction etc. (AB) (AL) (GE) • Knows the relationship between data representation and data quality. (AB) • Understands the relationship between binary and electrical circuits, including Boolean logic.	• Knows the purpose of the hardware and protocols associated with networking computer systems. (AB) (AL) • Recognises that persistence of data on the internet requires careful protection of online identity and privacy. • Undertakes creative projects that collect, analyse, and evaluate data to meet the needs of a known user group. (AL) (DE) (EV)

			(AB)	
7 (A)	Understand the need for validation and how to implement it be able to interpret error messages and identify, locate and fix errors in a program	• Understands how and why values are data typed in many different languages when manipulated within programs. (AB) • Knows that processors have instruction sets and that these relate to low-level instructions carried out by a computer. (AB) (AL) (GE) • Knows what a relational database is, and understands the benefits of storing data in multiple tables. (AB) (GE) (DE) •	• Understands the client-server model including how dynamic web pages use server-side scripting and that web servers process and store data entered by users. (AL) (AB) (DE) • Effectively designs and creates digital artefacts for a wider or remote audience. (AL) (DE) • Considers the properties of media when importing them into digital artefacts. (AB) • Documents user feedback, the improvements identified and the refinements made to the solution. (AB)	
7+	Be able to use sub-programs that use parameters	• Understands and can explain the need for data compression, and performs simple compression methods. (AL) (AB) •	• Explains and justifies how the use of technology impacts on society, from the perspective of social, economical, political, legal, ethical and moral issues. (EV)	
8-	Be able to evaluate the fitness for purpose of an algorithm in meeting requirements efficiently using logical reasoning and test data Be able to decompose a problem into smaller sub-programs	• Understands and can explain multitasking by computers. (AB) (AL) (DE) • 4.5.2understand what is meant by an assembler, a compiler and an interpreter when translating programming languages and know the advantages and disadvantages of each •	• Understands the hardware associated with networking computer systems, including WANs and LANs	
8 (Low A*)	Be able to write code that reads/writes from/to a text file	• Understands and can explain Moore's Law. (GE) •	• Understands the hardware associated with networking computer systems, including WANs and LANs, understands their purpose and how they work, including MAC addresses. (AB) (AL) (DE) (GE) • 5.2.4understand methods of identifying vulnerabilities including penetration testing, ethical hacking, commercial analysis tools and review of network and user policies • Understands the ethical issues surrounding the application of information technology, and the existence of legal frameworks governing its use e.g. Data Protection Act, Computer Misuse Act, Copyright etc. (EV)	

8+ (A*)	Be able to determine the strengths and weaknesses of a program and suggest improvements	• Has practical experience of a small (hypothetical) low level programming language. (AB) (AL) (DE) (GE)	• 6.1.3understand the legal impact of using technology (intellectual property, patents, licensing, open source and proprietary software, cyber-security) on society
9-	Understand the concept of passing data into and out of subprograms (procedures and functions)		• Knows how to protect software systems
9 (High A*)	Understand the need for, and how to use, global and local variables when implementing subprograms		• 5.2.5understand how to protect software systems from cyberattacks
9+	Be able to program abstractions of real-world examples		• 5.2.5understand how to protect software systems from cyberattacks, including considerations at the design stage, audit trails, securing operating systems, code reviews to remove code vulnerabilities in programming languages and bad programming practices, modular testing and effective network security provision