



Strand	A	B	C	D	E	F	G	H	I
Computer Science									
Algorithms	<p>I know what an algorithm is and I can express simple algorithms using symbols.</p> <p>I know that computers need precise instructions.</p>	<p>I know that algorithms are implemented on digital devices as programs.</p> <p>I can design simple algorithms using loops, and selection i.e. if statements.</p>	<p>I can design solutions (algorithms) that use repetition and two-way selection i.e. if, then and else.</p> <p>I can use diagrams to express solutions.</p>	<p>I can show an awareness of tasks best completed by humans or computers.</p> <p>I can design solutions by decomposing a problem and creates a sub-solution for each of these parts (decomposition).</p>	<p>I know that iteration is the repetition of a process such as a loop.</p> <p>I know that different algorithms exist for the same problem.</p>	<p>I know that for some problems I can share the same characteristics and use the same algorithm to solve both (generalisation).</p> <p>I know the notion of performance for algorithms and I know that some algorithms have different performance characteristics for the same task.</p>	<p>I know that the design of an algorithm is distinct from its expression in a programming language (which will depend on the programming constructs available).</p> <p>I can evaluate the effectiveness of algorithms and models for similar problems.</p>	<p>I know a recursive solution to a problem repeatedly applies the same solution to smaller instances of the problem.</p> <p>I know where information can be filtered out in generalizing problem solutions (abstraction).</p>	<p>I can represent algorithms using a structured language.</p> <p>I can design a solution to a problem that depends on solutions to smaller instances of the same problem (recursion).</p>
Programming & Development	<p>I know that users can write their own programs.</p> <p>I can create a simple program.</p>	<p>I can use arithmetic operators, if statements, and loops, within programs.</p> <p>I can use logical reasoning to predict the behaviour of programs.</p>	<p>I can create programs that implement algorithms to achieve given goals.</p> <p>I can declare and assign variables.</p>	<p>I know the difference between, and appropriately I can use if and if, then and else statements.</p> <p>I can use variable and relational operators within a loop to govern termination.</p>	<p>I know that programming bridges the gap between algorithmic solutions and computers.</p> <p>I have practical experience of a high-level textual language, including using standard libraries when programming.</p>	<p>I can use nested selection statements.</p> <p>I know the need for, and can write, custom functions including use of parameters.</p> <p>I know and I can use negation with operators.</p>	<p>I know the difference between, and I can use appropriately, procedures and functions.</p> <p>I can use and manipulate one dimensional data structures.</p>	<p>I can apply a modular approach to error detection and correction.</p> <p>I can design and write nested modular programs that enforce reusability utilising sub-routines wherever possible.</p>	<p>I know the difference between 'While' loop and 'For' loop, which I can use a loop counter.</p> <p>I know and I can use two dimensional data structures.</p>
Data Representation	<p>I know that digital content can be represented in many forms.</p>	<p>I know different types of data: text, number, Boolean.</p>	<p>I know the difference between data and information.</p>	<p>I understand that computers represent everything using binary and binary is a number system based on two values – 1 and 0.</p>	<p>I know how bit patterns represent numbers and images.</p> <p>I know that computers transfer data in binary.</p>	<p>I know how numbers, images, sounds and character sets use the same bit patterns.</p> <p>I know the relationship between binary and file size (uncompressed).</p>	<p>I can perform simple operations using bit patterns e.g. binary addition.</p> <p>I know the relationship between resolution and colour depth, including the effect on file size.</p>	<p>I know the relationship between data representation and data quality.</p> <p>I know the relationship between binary and electrical circuits, including Boolean logic.</p>	<p>I can perform operations using bit patterns e.g. conversion between binary and hexadecimal, binary subtraction etc.</p> <p>I know and can explain the need for data compression, and performs simple compression methods.</p>
Hardware & Processing	<p>I know that computers have no intelligence and that computers can do nothing unless a program is run.</p> <p>I know that all software executed on digital devices is programmed.</p>	<p>I know that a range of digital devices can be considered a computer.</p> <p>I know and can use a range of input and output devices.</p>	<p>I know that computers collect data from various input devices, including sensors and application software.</p> <p>I know the difference between hardware and application software, and their roles within a computer system.</p>	<p>I know why and when computers are used.</p> <p>I know the main functions of the operating system.</p> <p>I know the difference between physical, wireless and mobile networks.</p>	<p>I know the function of the main internal parts of basic computer architecture.</p> <p>I know that there is a range of operating systems and application software for the same hardware.</p>	<p>I know the purpose of the hardware and protocols associated with networking computer systems.</p> <p>I know the client-server model including how dynamic web pages use server-side scripting and that web servers process and store data entered by users.</p>	<p>I know the von Neumann architecture in relation to the architecture of a computer and its advantages and disadvantages.</p> <p>I know names of hardware e.g. hubs, routers, switches, and the names of protocols e.g. SMTP, iMAP, POP, FTP, TCP/IP, associated with networking systems.</p>	<p>I know and can explain Moore's Law.</p> <p>I know and can explain multitasking by computers.</p> <p>I know that processors have instruction sets and that these relate to low-level instructions carried out by a computer.</p>	<p>I have practical experience of a small (hypothetical) low level programming language.</p> <p>I know the hardware associated with networking computer systems, including WANs and LANs, I know their purpose and how they work, including MAC addresses.</p>



Information Technology									
Data	I know the difference between some of the digital forms of data and can explain the different ways that they communicate information.	I know that programs can work with different types of data.	I can use filters or can perform single criteria searches for information.	I can perform more complex searches for information e.g. using Boolean and relational operators.	I can decide which queries to use to find specific data on one table.	I can distinguish between data used in a simple program (a variable) and the storage structure for that data.	I know how and why values are data typed in many different languages when manipulated within programs.	I know and can explain the need for data compression, and performs simple compression methods.	I know what a relational database is, and I know the benefits of storing data in multiple tables.
Using Application Software	I can use software under the control of the teacher to create, store and edit digital content using appropriate file and folder names. I know that people interact with computers.	I can use technology with increasing independence to purposefully organise digital content. I can show an awareness for the quality of digital content collected.	I can collect, organise and present data and information in digital content. I can create digital content to achieve a given goal through combining software packages and internet services to communicate with a wider audience e.g. blogging.	I can make judgements about digital content when evaluating and repurposing it for a given audience. I know the audience when I am designing and creating digital content. I know the potential of information technology for collaboration when computers are networked.	I can evaluate the appropriateness of digital devices, internet services and application software to achieve given goals. I can recognise ethical issues surrounding the application of information technology beyond school.	I can justify the choice of and independently combine and I use multiple digital devices, internet services and application software to achieve given goals. I can evaluate the trustworthiness of digital content and consider the usability of visual design features when designing and creating digital artefacts for known audience.	I can undertake creative projects that collect, analyse, and evaluate data to meet the needs of a known user group. I can effectively design and create digital artefacts for a wider or remote audience.	I can explain and justify how the use of technology impacts on society, from the perspective of social, economic, political legal, ethical and moral issues. I can document user feedback, the improvements identified and the refinements made to the solution.	I know the ethical issues surrounding the application of information technology, an existence of legal frameworks governing its use e.g. Data Protection Act, Computer Misuse Copyright etc.
Digital Literacy									
	I can find content from the world wide web using a web browser. I know the importance of communicating safely and respectfully online, and the need for keeping personal information private.	I can navigate the web and can carry out simple web searches to collect digital content.	I can show an awareness of, and can use a range of internet services e.g. VOIP.	I know how to effectively use search engines, and I know how search results are selected, including that search engines use 'web crawler programs'. I know what to do when concerned about content or being contacted.	I know how search engines rank search results and can determine how to find accurate results when researching using a variety of search tools. I can show use of computers safely and responsibly, knowing a range of ways to report unacceptable content and contact when online.	I can use technologies and online services securely, and I know how to identify and report inappropriate conduct. I know what is acceptable and unacceptable behaviour when using technologies and online services.	I am a confident user of technology, and know how to keep my data secure using both software and can recognise some basic forms of social engineering. I can select, combine and can use different internet services.	I know that persistence of data on the internet requires careful protection of online identity and privacy. I am confident in protecting myself and my data online and can recognise sophisticated attacks.	I have a very thorough knowledge of both software based and social aspects of cyber security and know how to protect myself in all situations, so that both my privacy and data is kept safe.