

COMPUTING ASSESSMENT FRAMEWORK

Assessment Grade		Key Knowledge and Skills
9	a	<p>Design a solution to a problem that depends on solutions to smaller instances of the same problem (recursion). • Design and write nested modular programs that enforce reusability utilising sub-routines wherever possible • Understand the difference between ‘While’ loop and ‘For’ loop, which uses a loop counter. • Understand and uses two dimensional data structures. • Perform operations using bit patterns e.g. conversion between binary and hexadecimal, binary subtraction etc. • Understand and can explain the need for data compression, and perform simple compression methods. • Know what a relational database is, and understand the benefits of storing data in multiple tables. • Understand the hardware associated with networking computer systems, including WANs and LANs, understand their purpose and how they work, including MAC addresses. • Understand 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.</p>
	b	
	c	
	d	
8	a	<p>• Evaluate the effectiveness of algorithms and models for similar problems. • Use logical reasoning to explain how an algorithm works. Represent algorithms using structured language. • Understand and applies parameter passing. • Understand the difference between, and uses, both pre-tested e.g. ‘while’, and post-tested e.g. ‘until’ loops. • Apply a modular approach to error detection and correction. • Knows the relationship between data representation and data quality. • Understands the relationship between binary and electrical circuits, including Boolean logic. • Understands how and why values are data typed in many different languages when manipulated within programs. • Knows that processors have instruction sets and that these relate to low-level instructions carried out by a computer. • Knows the purpose of the hardware and protocols associated with networking computer systems. • 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. • 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. • Effectively designs and creates digital artefacts for a wider or remote audience.</p>
	b	
	c	
	d	
7	a	<p>Understands a recursive solution to a problem repeatedly applies the same solution to smaller instances of the problem. • Recognises that some problems share the same characteristics and use the same algorithm to solve both. • Uses nested selection statements. • Appreciates the need for, and writes, custom functions including use of parameters. • Knows the difference between, and uses appropriately, procedures and functions. • Understands and uses negation with operators. • Uses and manipulates one dimensional data structures. • Detects and corrects syntactical errors. • Understands how numbers, images, sounds and character sets use the same bit patterns. • Performs simple operations using bit patterns e.g. binary addition. • Understands the relationship between resolution and colour depth, including the effect on file size. • Distinguishes between data used in a simple program (a variable) and the storage structure for that data. • Understands the von Neumann architecture in relation to the fetch-execute cycle, including how data is stored in memory. • Understands the basic function and operation of location addressable memory. • 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.</p>
	b	
	c	
	d	
6	a	<p>• Understands that iteration is the repetition of a process such as a loop. • Recognises that different algorithms exist for the same problem. • Represents solutions using a structured notation. • Can identify similarities and differences in situations and can use these to solve problems (pattern recognition). • Understands that programming bridges the gap between</p>

	b	algorithmic solutions and computers. • Has practical experience of a high-level textual language, including using standard libraries when programming. • Uses a range of operators and expressions e.g. Boolean, and applies them in the context of program control. • Selects the appropriate data types. • Knows that digital computers use binary to represent all data. • Understands how bit patterns represent numbers and images. • Knows that computers transfer data in binary. • Understands the relationship between binary and file size (uncompressed). • Defines data types: real numbers and Boolean. • Queries data on one table using a typical query language. • Recognises and understands the function of the main internal parts of basic computer architecture. • Understands the concepts behind the fetch-execute cycle. • Knows that there is a range of operating systems and application software for the same hardware. • Understands how to construct static web pages using HTML and CSS. • Understands networks
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5	a	• Designs solutions by decomposing a problem and creates a sub-solution for each of these parts. • Recognises that different solutions exist for the same problem. • Understands the difference between, and appropriately uses if and if, then and else statements. • Uses a variable and relational operators within a loop to govern termination. • Designs, writes and debugs modular programs using procedures. • Knows that a procedure can be used to hide the detail with sub-solution. • Performs more complex searches for information e.g. using Boolean and relational operators. • Analyses and evaluates data and information, and recognises that poor quality data leads to unreliable results, and inaccurate conclusions. • Understands why and when computers are used. • Understands the main functions of the operating system. • Knows the difference between physical, wireless and mobile networks. • Selects, combines and uses internet services. • Demonstrates responsible use of technologies and online services, and knows a range of ways to report concerns. • Recognises the audience when designing and creating digital content. • Understands the potential of information technology for collaboration when computers are networked. • Uses criteria to evaluate the quality of solutions, can identify improvements making some refinements to the solution, and future solutions.
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4	a	Designs solutions (algorithms) that use repetition and two-way selection i.e. if, then and else. • Uses diagrams to express solutions. • Uses logical reasoning to predict outputs, showing an awareness of inputs. • Creates programs that implement algorithms to achieve given goals. • Declares and assigns variables. • Uses post-tested loop e.g. 'until', and a sequence of selection statements in programs, including an if, then and else statement. • Understands the difference between data and information. • Knows why sorting data in a flat file can improve searching for information. • Uses filters or can perform single criteria searches for information. • Knows that computers collect data from various input devices, including sensors and application software. • Understands the difference between hardware and application software, and their roles within a computer system. • Understands the difference between the internet and internet service e.g. world wide web. • Shows an awareness of, and can use a range of internet services e.g. VOIP. • Recognises what is acceptable and unacceptable behaviour when using technologies and online services.
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3	a	• Understands that algorithms are implemented on digital devices as programs. • Designs simple algorithms using loops, and selection i.e. if statements. • Uses logical reasoning to predict outcomes. • Detects and corrects errors i.e. debugging, in algorithms. • Uses arithmetic operators, if statements, and loops, within programs. • Uses logical reasoning to predict the behaviour of programs. • Detects and corrects simple semantic errors i.e. debugging, in programs. • Recognises different types of data: text, number. • Appreciates that programs can work with different types of data. • Recognises that data can be structured in tables to make it useful. • Recognises that a range of digital devices can be considered a computer. • Recognises and can use a range of input and output devices. • Understands how programs specify the function of a general purpose computer. • Navigates the web and can carry out simple web searches to collect digital content. • Demonstrates use of computers safely and responsibly, knowing a range of ways to report
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	d	unacceptable content and contact when online. ●Uses technology with increasing independence to purposefully organise digital content.
2	a	● Understands what an algorithm is and is able to express simple linear (non-branching) algorithms symbolically. ● Understands that computers need precise instructions. ● Demonstrates care and precision to avoid errors. ● Knows that users can develop their own programs, and can demonstrate this by creating a simple program in an environment that does not rely on text e.g. programmable robots etc. ● Executes, checks and changes programs. ● Understands that programs execute by following precise instructions.
	b	Recognises that digital content can be represented in many forms. ● Distinguishes between some of these forms and can explain the different ways that they communicate information. ● Understands that computers have no intelligence and that computers can do nothing unless a program is executed. ● Recognises that all software executed on digital devices is programmed.
	c	
	d	
1	a	●Draws a storyboard for an everyday activity ● knows actions will result from a sequence of instructions ●Gives another pupil a series of precise instructions to move around objects, ●Understands what an algorithm is ●Understands that algorithms are implemented on digital devices as programs ●Identifies the order of actions that will happen from sequence of instructions ● Uses logical reasoning to identify outcomes ● Knows computers need more precise information than humans, ●Plans and enters a sequence of instructions forming an algorithm specifying distance and turns, ●Debugs a simple program ● Uses simple logo program ● Looks at similarities between a floor robot and logo on a screen
	b	
	c	
	d	
S	a	● Orders a series of pictures into the correct sequence ● Discusses an existing storyboard ● Identifies and talks through a range of algorithms ie. Fire alarm, recipe, washing hair ●
	b	Understands a simple set of instructions, and can both physically follow and give forward, backward and turn instructions to move from one point to another ● Knows that computers need exact instructions and make every effort to avoid errors ● Knows that devices and software can be controlled by switches ● Can explore the results of pressing a button on a robot and can create simple programs using symbols.
	c	
	d	