# KS3 Computing Assessment Grid June 2021
## KS3 Assessment Rubric - Computing

<table>
<tr><th></th><th>Algorithms</th><th>Programming & Development</th><th>Data & Data Representation</th><th>Hardware & Processing</th><th>Communication & Networks</th><th>Information Technology</th></tr>
<tr><td rowspan="4">Emerging</td><td>I know what an algorithm is and I can express simple algorithms using symbols.</td><td>I know that users can write their own programs.</td><td>I know that digital content can be represented in many forms.</td><td>I know that computers have no intelligence and that computers can do nothing unless a program is run.</td><td>I can find content from the world wide web using a web browser.</td><td>I can use software under the control of the teacher to create, store and edit digital content using appropriate file and folder names.</td></tr>
<tr><td>I know that computers need precise instructions.</td><td>I can create a simple program.</td><td rowspan="3">I know the difference between some of these digital forms and can explain the different ways that they communicate information.</td><td rowspan="3">I know that all software executed on digital devices is programmed.</td><td>I know the importance of communicating safely and respectfully online, and the need for keeping personal information private.</td><td>I know that people interact with computers.</td></tr>
<tr><td rowspan="2">I can show care and precision to avoid errors</td><td>I can run, check and change programs.</td><td rowspan="2">I know what to do when concerned about content or being contacted.</td><td>I can share my use of technology in school. I know common uses of information technology beyond the classroom.</td></tr>
<tr><td>I know that programs run by following precise instructions.</td><td>I can talk about my work and make changes to improve it.</td></tr>
<tr><td rowspan="5">Developing</td><td>I know that algorithms are implemented on digital devices as programs.</td><td>I can use arithmetic operators, if statements, and loops, within programs.</td><td>I know different types of data: text, number.</td><td>I know that a range of digital devices can be considered a computer.</td><td>I can navigate the web and can carry out simple web searches to collect digital content.</td><td>I can use technology with increasing independence to purposefully organise digital content.</td></tr>
<tr><td>I can design simple algorithms using loops, and selection i.e. if statements.</td><td>I can use logical reasoning to predict the behaviour of programs.</td><td>I know that programs can work with different types of data.</td><td>I know and can use a range of input and output devices.</td><td rowspan="3">I can show use of computers safely and responsibly, knowing a range of ways to report unacceptable content and contact when online.</td><td>I can show an awareness for the quality of digital content collected.</td></tr>
<tr><td>I can use logical reasoning to predict outcomes.</td><td rowspan="2">I can find and correct simple semantic errors i.e. debugging, in programs.</td><td rowspan="2">I know that data can be structured in tables to make it useful.</td><td rowspan="2">I know how programs specify the function of a general purpose computer.</td><td>I can use a variety of software to manipulate and present digital content: and information.</td></tr>
<tr><td>I can find and correct errors i.e. debugging, in algorithms.</td><td>I can share my experiences of technology in school and beyond the classroom.</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td>I can talk about my work and make improvements to solutions based on feedback received.</td></tr>
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| **Secure** | I can design solutions (algorithms) that use repetition and two-way selection i.e. if, then and else. | I can create programs that implement algorithms to achieve given goals. | I know the difference between data and information. | I know that computers collect data from various input devices, including sensors and application software. | I know the difference between the internet and internet service e.g. world wide web. | I can collect, organise and present data and information in digital content. |
| | I can use diagrams to express solutions. | I can declare and assign variables. | I can use filters or can perform single criteria searches for information. | I know the difference between hardware and application software, and their roles within a computer system. | I can show an awareness of, and can use a range of internet services e.g. VOIP. | 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 use logical reasoning to predict outputs, showing an awareness of inputs. | I can use post-tested loops e.g. 'until', and a sequence of selection statements in programs, including use of if…then… else statement. | | | I know what is acceptable and unacceptable behaviour when using technologies and online services. | I can make appropriate improvements to solutions based on feedback received, and can comment on the success the solution. |
| | I can show an awareness of tasks best completed by humans or computers. | I know the difference between, and appropriately I can use if and if, then and else statements. | I can perform more complex searches for information e.g. using Boolean and relational operators. | I know why and when computers are used. | 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 can make judgements about digital content when evaluating and repurposing it for a given audience. |
| | I can design solutions by decomposing a problem and creates a sub-solution for each of these parts (decomposition). | I can use variable and relational operators within a loop to govern termination. | Analyses and evaluates data and information, and I know that poor quality data leads to unreliable results, and inaccurate conclusions. | I know the main functions of the operating system. | Selects, combines and I can use internet services. | I know the audience when I am designing and creating digital content. |
| | I know that different solutions exist for the same problem. | I can design, write and debug modular programs using procedures. | | I know the difference between physical, wireless and mobile networks. | I can show responsible use of technologies and online services, and I know a range of ways to report concerns. | I know the potential of information technology for collaboration when computers are networked. |
| | | I know that a procedure can be used to hide the detail with subsolution (procedural abstraction). | | | | I can use criteria to evaluate the quality of solutions and can identify improvements making some refinements to the solution, and future solutions. |

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| **Confident** | I know that iteration is the repetition of a process such as a loop. | I know that programming bridges the gap between algorithmic solutions and computers. | I know that digital computers use binary to represent all data. | I know the function of the main internal parts of basic computer architecture. | I know how search engines rank search results. | I can evaluate the appropriateness of digital devices, internet services and application software to achieve given goals. |
| | I know that different algorithms exist for the same problem. | I have practical experience of a high-level textual language, including using standard libraries when programming. | I know how bit patterns represent numbers and images. | I know the concepts behind the fetchexecute cycle. | I know how to construct static web pages using HTML and CSS. | I can recognise ethical issues surrounding the application of information technology beyond school. |
| | I can represent solutions using a structured notation. | I can use a range of operators and expressions e.g. Boolean, and applies them in the context of program control. | I know that computers transfer data in binary. | I know that there is a range of operating systems and application software for the same hardware. | I know data transmission between digital computers over networks, including the internet i.e. IP addresses and packet switching. | I can design criteria to critically evaluate the quality of solutions, I can use the criteria to identify improvements and can make appropriate refinements to the solution. |
| | I can identify similarities and differences in situations and can use these to solve problems (pattern recognition). | I can select the appropriate data types. | I know the relationship between binary and file size (uncompressed). | | | |
| | | | I can define data types: real numbers and Boolean. | | | I can identify and explain how the use of technology can impact on society. |
| | | | I can query data on one table using a typical query language. | | | |
| | I know a recursive solution to a problem repeatedly applies the same solution to smaller instances of the problem. | I can use nested selection statements. | I know how numbers, images, sounds and character sets use the same bit patterns. | I know the von Neumann architecture in relation to the fetch-execute cycle, including how data is stored in memory. | 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. | 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 know the need for, and can write, custom functions including use of parameters. | | | | |
| | I know that for some problems I can share the same characteristics and use the same algorithm to solve both (generalisation). | I know the difference between, and I can use appropriately, procedures and functions. | I can perform simple operations using bit patterns e.g. binary addition. | I know the basic function and operation of location addressable memory. | I can use technologies and online services securely, and I know how to identify and report inappropriate conduct. | 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 know and I can use negation with operators. | I know the relationship between resolution and colour depth, including the effect on file size. | | | |
| | I know the notion of performance for algorithms and I know that some algorithms have different performance characteristics for the same task. | I can use and manipulate one dimensional data structures. | I can distinguish between data used in a simple program (a variable) and the storage structure for that data. | | | I can design criteria for users to evaluate the quality of solutions, and can use the feedback from users to identify improvements and can make appropriate refinements to the solution. |
| | | I can find and corrects syntactical errors. | | | | |

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<tr><td rowspan="6">Skilled</td><td>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).</td><td>I know the effect of the scope of a variable e.g. a local variable can't be accessed from outside its function.</td><td>I know the relationship between data representation and data quality.</td><td rowspan="6">I know that processors have instruction sets and that these relate to low-level instructions carried out by a computer.</td><td>I know the purpose of the hardware and protocols associated with networking computer systems.</td><td>I can undertake creative projects that collect, analyse, and evaluate data to meet the needs of a known user group.</td></tr>
<tr><td>I can evaluate the effectiveness of algorithms and models for similar problems.</td><td>I know and apply parameter passing.</td><td>I know the relationship between binary and electrical circuits, including Boolean logic.</td><td>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.</td><td>I can effectively design and create digital artefacts for a wider or remote audience.</td></tr>
<tr><td>I know where information can be filtered out in generalizing problem solutions (abstraction).</td><td>I know the difference between, and I can use, both pre-tested e.g. 'while', and post-tested e.g. 'until' loops.</td><td rowspan="3">I know how and why values are data typed in many different languages when manipulated within programs.</td><td rowspan="3">I know that persistence of data on the internet requires careful protection of online identity and privacy.</td><td>I consider the properties of media when importing them into digital artefacts.</td></tr>
<tr><td>I can use logical reasoning to explain how an algorithm works.</td><td rowspan="2">I can apply a modular approach to error detection and correction.</td><td>I can document user feedback, the improvements identified and the refinements made to the solution.</td></tr>
<tr><td>I can represent algorithms using a structured language.</td><td>I can explain and justify how the use of technology impacts on society, from the perspective of social, economical, political legal, ethical and moral issues.</td></tr>
<tr><td rowspan="3">Mastered</td><td>I can design a solution to a problem that depends on solutions to smaller instances of the same problem (recursion).</td><td>I can design and write nested modular programs that enforce reusability utilising sub-routines wherever possible.</td><td>I can perform operations using bit patterns e.g. conversion between binary and hexadecimal, binary subtraction etc.</td><td>I have practical experience of a small (hypothetical) low level programming language.</td><td rowspan="3">I know the hardware associated with networking computer systems, including WANs and LANs, I know their purpose and how they work, including MAC addresses.</td><td rowspan="3">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.</td></tr>
<tr><td rowspan="2">I know that some problems cannot be solved computationally.</td><td>I know the difference between 'While' loop and 'For' loop, which I can use a loop counter.</td><td>I know and can explain the need for data compression, and performs simple compression methods.</td><td>I know and can explain Moore's Law.</td></tr>
<tr><td>I know and I can use two dimensional data structures.</td><td>I know what a relational database is, and I know the benefits of storing data in multiple tables.</td><td>I know and can explain multitasking by computers.</td></tr>
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