



LAURUS  
RYECROFT

# **Curriculum and Assessment in Computing at KS3**

# Curriculum Statement: Computing

In a world that's changing really quickly, the only strategy that is guaranteed to fail is not taking risks.

- Mark Zuckerberg

## Powerful Knowledge in Computing

Powerful Knowledge in Computing is based on the ability to abstract and decompose a problem to produce a solution through thorough investigation. Students have opportunities throughout KS3 to produce robust and considered solutions to problems posed in class. Alongside this, it is important students develop an understanding of how the hardware within a computer functions, removing the 'black box' nature of technology.

## Curriculum features

The KS3 curriculum is designed to ensure students studying GCSE Computer Science have a grounding in the fundamental concepts covered at KS4. Students start with the 'big picture', studying Hardware and Algorithms, giving them the skills to access later topics such as Binary and Hexadecimal where students study the mathematical makeup of machines. Over the 3 years, students learn to program in 3 languages, starting with block-based languages before progressing to High-Level Languages. The development of programming skills is also built into physical Computing tasks such as coding thermometers and LED lights to effectively apply the knowledge learnt in earlier Algorithm and Programming units.

## Co Curriculum enrichment

- Students have the opportunity to enter a range of National Competitions such as game design and development for YGD BAFTA and competing against other secondary schools in CyberGame events.
- Students from the University of Manchester run 'Mini MIT' for KS3 students to learn how to program robots.
- Amaze, a digital marketing agency, support our year 9 female students through web development sessions in Girl:Code.
- The First Tech Robotics challenge features as part of the Electives programme.

## Computing Curriculum at KS3 – An Overview

**Year 7** students begin the year by learning to create a game through Scratch Programming. They will then move onto an investigation of data representation through binary, hex and images. Following these units, students will study E-Safety to remind them all on how to use technology safely, respectfully, responsibly and securely before finishing the year 'Getting to know a Computer' where they will develop their knowledge and skills of hardware and software.

**Year 8** students begin the year investigating data representation through binary, hex and images, before moving onto physical programming using BBC Microbits. Students will develop advanced coding skills in Scratch and creation of a website using HTML. They will then move onto an exploration of ethical issues surrounding technology before finishing the year looking into what the future of technology looks like.

**Year 9** students will start the year developing skills in basic programming skills in a high level programming language such as Python before investigating future developments in technology. They will end the year learning about the Internet and how networks are developed and maintained.

## KASH Reporting Criteria in Computing: Knowledge and Skills at KS3

### Year 7:

Students will develop their **KNOWLEDGE** of:

- knowing if a task would be best completed by humans or computers
- knowing that different solutions exist for the same problem
- knowing what is acceptable and unacceptable behaviour when using technologies and online services
- knowing a range of ways to report concerns
- knowing what 'if statements' and 'loops' are and how to use them effectively
- knowing what software is most suitable for a particular task
- different ways to keep data safe
- how binary is used in computing

Students will develop their **SKILLS** in:

- using logical reasoning to predict outcomes
- being able to break down a problem and create a suitable solution
- being able to effectively use search engines
- collecting, organising and presenting data and information that is suitable for the purpose.
- making appropriate improvements to solutions based on feedback received, and comment on the success of the solution
- being able to create digital products for a particular audience
- being able to use arithmetic operators, 'if statements' and 'loops' to create a game
- being able to find and correct errors in programs (debugging)
- being able to declare and assign variables
- binary conversions and addition

## KASH Reporting Criteria in Computing: Knowledge and Skills at KS3

### Year 8:

Students will develop their **KNOWLEDGE** of:

- the difference between hardware and software and their role within a computer system
- the main functions of an operating system
- digital computers using binary to represent all data
- how an image is represented in binary
- whether a task would be best completed by humans or computers
- different solutions exist for the same problem
- what 'if statements' and 'loops' are and how to use them effectively
- which software is most suitable for a particular task
- how a network and the internet work
- different ways to keep data safe
- encryption and how it is used to keep data safe

Students will develop their **SKILLS** in:

- using a range of input and output devices
- binary and decimal conversions
- binary addition
- using logical reasoning to predict outcomes
- being able to break down a problem and create a suitable solution
- being able to effectively use search engines
- making appropriate improvements to solutions based on feedback received, and comment on the success of the solution
- being able to use arithmetic operators, 'if statements' and 'loops' to create a game
- being able to find and correct errors in programs (debugging)
- being able to declare and assign variables
- using HTML to create a simple website

## KASH Reporting Criteria in Computing: Knowledge and Skills at KS3

### Year 9:

Students will develop their **KNOWLEDGE** of:

- encryption and how it is used to keep data safe
- whether a task would be best completed by humans or computers
- different solutions for solving the same problem • what 'if statements' and 'loops' are and how to use them effectively
- what software is most suitable for a particular task
- how a network and the internet work
- different ways to keep data safe

Students will develop their **SKILLS** in:

- using of logical reasoning to predict outcomes
- breaking down a problem to create a suitable solution
- effectively using search engines
- making appropriate improvements to solutions based on feedback received, and comment on the success of the solution
- creating digital products for a particular audience
- using arithmetic operators, 'if statements' and 'loops' to create a small program
- finding and correcting errors in programs (debugging)
- declaring and assigning variables



## Foundation Stages in Computing – Assessment Criteria at KS3

	Algorithms	Communication	Data	Information Technology	Programming	The Computer
Pre FS	<p>Fix problems with an algorithm</p> <p>Make a loop in an algorithm</p>	<p>Use a search engine to find suitable information quickly</p> <p>Give rules for keeping safe online</p> <p>Give examples of what would be inappropriate when online</p> <p>Explain how to report inappropriate things that might happen online</p>	<p>Explain what data is</p> <p>Give examples of different types of data</p> <p>Explain how data links to information</p> <p>Tell you the difference between text and numbers</p> <p>Use a database to store data</p>	<p>Create, store and edit files using appropriate file and folder names independently</p> <p>Choose suitable images and text</p> <p>Use lots of different programs</p> <p>Help other people when they get stuck</p> <p>Explain how to make improvements using feedback from others</p>	<p>Make a simple program using LOGO.</p> <p>Fix problems in a program.</p> <p>Explain why instructions need to be accurate for computers.</p> <p>Use an IF statement in a program.</p> <p>Look at some simple code and explain what it does.</p> <p>Spot some mistakes in code.</p> <p>Solve a simple logic problem.</p>	<p>Explain why computers aren't intelligent.</p> <p>Explain some basic things you need to start using a computer.</p> <p>Know that somebody has to write programs.</p> <p>Explain what coding is.</p> <p>List different types of digital devices.</p> <p>Give an example of hardware and software.</p> <p>Tell you what a program/app is.</p>
FS1	<ul style="list-style-type: none"> <li>• Use selections (IF and ELSE)</li> <li>• Use inputs or outputs</li> </ul>	<ul style="list-style-type: none"> <li>• Tell the difference between the internet and the World Wide Web.</li> <li>• List different ways to communicate online.</li> <li>• Give a list of acceptable and unacceptable behaviour when using technologies and online services.</li> </ul>	<ul style="list-style-type: none"> <li>• Give examples of changing data into information</li> <li>• Use a database to search for information</li> <li>• Use filters</li> <li>• Explain some ways of keeping data safe</li> </ul>	<ul style="list-style-type: none"> <li>• Collect, organise and present data and information that is suitable for the purpose.</li> <li>• Make appropriate improvements to solutions based on feedback received</li> <li>• Comment on the success of the solution they've made.</li> </ul>	<ul style="list-style-type: none"> <li>• Make a program from the algorithm designed.</li> <li>• Use a variable.</li> <li>• Use an IF ELSE statement.</li> </ul>	<ul style="list-style-type: none"> <li>• Explain examples of input devices.</li> <li>• Give you examples of sensors.</li> <li>• Explain what sensors are used for (data).</li> <li>• Explain how software can be used to collect data.</li> <li>• Explain the difference between software and hardware and give examples.</li> <li>• Explain what the main parts of a computer are.</li> </ul>
FS2	<ul style="list-style-type: none"> <li>• Be able to explain why algorithms are necessary.</li> <li>• Be able to explain how algorithms</li> </ul>	<ul style="list-style-type: none"> <li>• Explain what 'web crawler programs' are.</li> <li>• Explain lots of golden rules for being a responsible online user.</li> </ul>	<ul style="list-style-type: none"> <li>• Create a complex search using more than one field.</li> <li>• Use Boolean and other operators in my searches</li> </ul>	<ul style="list-style-type: none"> <li>• Decide how to change work to meet different audiences.</li> <li>• Evaluate own work.</li> </ul>	<ul style="list-style-type: none"> <li>• Explain when to use and IF ELSE instead of just an IF.</li> <li>• Use a FOR loop.</li> <li>• Write a procedure.</li> <li>• Explain why you use a procedure.</li> </ul>	<ul style="list-style-type: none"> <li>• Explain what computers are used for and the benefits to society.</li> <li>• Explain three functions of an operating system.</li> </ul>

	<ul style="list-style-type: none"> <li>relate to computers.</li> <li>Show a different way of writing an algorithm for the same problem.</li> </ul>	<ul style="list-style-type: none"> <li>Give at least two ways to report concerns when online.</li> </ul>	<p>(not,and,or,&gt;,&lt;,/,*,-,+).</p> <ul style="list-style-type: none"> <li>Explain what GIGO means.</li> <li>List at least four different ways to keep data from harm.</li> </ul>	<ul style="list-style-type: none"> <li>Explain how IT can be used for collaboration when computers are networked.</li> <li>Use criteria to evaluate the quality of solution.</li> <li>Identify improvements making some refinements to the solution, and future solutions.</li> </ul>		<ul style="list-style-type: none"> <li>Explain the hardware needed to setup wired and wireless networks.</li> </ul>
FS3	<ul style="list-style-type: none"> <li>Use an iteration and explain what this means.</li> <li>Write different algorithms for a simple problem.</li> <li>Algorithms are well organised and presented neatly.</li> <li>Make a search/sort algorithm.</li> </ul>	<ul style="list-style-type: none"> <li>Explain how search engines rank search results.</li> <li>Make a simple website using HTML.</li> <li>Explain (and use) CSS.</li> <li>Explain how the internet works.</li> <li>Explain how a network works (LAN).</li> <li>Explain what cloud computing means.</li> <li>Explain the difference between LAN and WAN.</li> </ul>	<ul style="list-style-type: none"> <li>Know what binary is and why computers use it.</li> <li>Know how images are represented on a computer.</li> <li>Explain what compression is.</li> <li>Give examples of data types; real, integer, Boolean.</li> <li>Use a range of queries to find answers to problems.</li> <li>Use a simple query language to query a data structure.</li> <li>Explain what DDOS and other attacks are.</li> </ul>	<ul style="list-style-type: none"> <li>Evaluate the appropriateness of digital devices, internet services and application software to achieve given goals.</li> <li>Come up with own criteria and use it to evaluate the quality of solutions.</li> <li>Use the criteria to identify improvements and can make appropriate improvements to the solution.</li> </ul>	<ul style="list-style-type: none"> <li>Explain how algorithms match code.</li> <li>Use a text based programming language.</li> <li>Use more than one operand (/ * - +) in a programming language.</li> <li>Use a Boolean (true/false).</li> <li>Select and use different data types.</li> <li>Explain why translators are needed.</li> <li>Explain some facilities of programming languages.</li> </ul>	<ul style="list-style-type: none"> <li>Explain what the main parts of the computer do.</li> <li>Explain how the CPU works with memory.</li> <li>Explain the fetch-execute cycle.</li> <li>List more than three operating systems.</li> <li>Explain what open source means.</li> <li>Explain how to maintain an operating system using some utilities.</li> </ul>
FS4	<ul style="list-style-type: none"> <li>Use a loop inside a loop.</li> <li>Describe how to improve their algorithm. so that it uses less lines</li> </ul>	<ul style="list-style-type: none"> <li>Explain what these devices do; hubs, routers and switches</li> <li>Explain what these protocols are used for ; SMTP, POP, FTP, HTTP/S,TCP/ IP</li> </ul>	<ul style="list-style-type: none"> <li>Explain how numbers, images, sounds and character sets are represented on a computer.</li> <li>Add binary numbers.</li> </ul>	<ul style="list-style-type: none"> <li>Justify the choice of and independently combine and uses multiple digital devices, internet services and application</li> </ul>	<ul style="list-style-type: none"> <li>Use IF statements inside other IF statements.</li> <li>Write their own procedure/function.</li> <li>Pass a parameter to a function.</li> </ul>	<ul style="list-style-type: none"> <li>Explain what the Von Neumann architecture is.</li> <li>Explain how main memory works.</li> <li>Explain what an embedded system is and why we need one.</li> </ul>

	<ul style="list-style-type: none"> <li>Suggest another problem using the same algorithm design.</li> </ul>	<ul style="list-style-type: none"> <li>Know how to use technologies and online services securely.</li> <li>Explain how packet switching works.</li> </ul>	<ul style="list-style-type: none"> <li>Explain how resolution effects file sizes.</li> <li>Explain how colour depth effects file sizes.</li> <li>Explain what a data structure is and compare it to a variable.</li> <li>Explain more than two methods of security and give advice on how to keep data safe.</li> </ul>	<p>software to achieve given goals.</p> <ul style="list-style-type: none"> <li>Evaluate the trustworthiness of digital content and considers the usability of visual design features when designing and creating products for a known audience.</li> <li>Identify and explains how the use of technology can impact on society.</li> <li>Design criteria for users to evaluate the quality of solutions.</li> <li>Use the feedback from users to identify improvements.</li> <li>Make appropriate refinements to the solution.</li> </ul>	<ul style="list-style-type: none"> <li>Choose the right procedure and function for the right job.</li> <li>Use NOT operands (e.g. not equal to)</li> <li>Make a 1d array.</li> <li>Make a 2D array.</li> <li>Bug fix syntax and logic errors.</li> <li>Write a routine to save data to a file.</li> </ul>	<ul style="list-style-type: none"> <li>Explain how the CPU uses registers and how memory is located.</li> </ul>
FS5	<ul style="list-style-type: none"> <li>Recognise that the design of an algorithm is distinct from its expression in a programming language.</li> <li>Evaluate the effectiveness of algorithms and models for</li> </ul>	<ul style="list-style-type: none"> <li>Explain how web servers process and store data.</li> <li>Explain how the data protection act relates to online users.</li> </ul>	<ul style="list-style-type: none"> <li>Explain why some images become pixelated.</li> <li>Explain why higher resolution means better data quality.</li> <li>Create different logic gate and truth tables.</li> <li>Explain the different ways data is stored</li> </ul>	<ul style="list-style-type: none"> <li>Create creative projects that collect, analyse, and evaluate data to meet the needs of a known user group (target audience).</li> <li>Effectively design and</li> </ul>	<ul style="list-style-type: none"> <li>Pass parameters to different functions.</li> <li>Use variables in different procedures and explain how variables work in/out functions.</li> <li>Appreciates the effect of the scope of a variable.</li> </ul>	<ul style="list-style-type: none"> <li>Explain what virtual memory is.</li> <li>Explain what a disk defragmenter does.</li> </ul>

	<p>similar problems.</p> <ul style="list-style-type: none"> <li>Recognise where information can be filtered out in generalizing problem solutions.</li> <li>Use logical reasoning to explain how an algorithm works.</li> <li>Represents algorithms using structured language.</li> </ul>		<p>in programs and explain how to convert data types.</p>	<p>create digital artefacts for a wider or remote audience</p> <ul style="list-style-type: none"> <li>Consider the properties of media when importing them into digital artefacts (file types)</li> <li>Document user feedback, the improvements identified and the refinements made to the solution.</li> <li>Explain and justify how the use of technology impacts on society, from the perspective of social, economic, political, legal, ethical and moral issues.</li> </ul>	<ul style="list-style-type: none"> <li>Use a wide range of loop structures for the correct purpose.</li> <li>Explain when to use different loop structures.</li> <li>Find errors in complex programs and then correct them.</li> </ul>	
BFS	<ul style="list-style-type: none"> <li>Design a solution to a problem that depends on solutions to smaller instances of the same problem (recursion).</li> <li>Be able to understand that some problems cannot be solved computationally.</li> </ul>	<ul style="list-style-type: none"> <li>Explain how to setup a LAN and a WAN including hardware, protocols and MAC addresses.</li> </ul>	<ul style="list-style-type: none"> <li>Convert between binary, denary and hexadecimal numbers.</li> <li>Subtract binary numbers.</li> <li>Explain the different types of compression (and why we need them).</li> <li>Explain (and make) a simple relational database.</li> </ul>	<ul style="list-style-type: none"> <li>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.</li> </ul>	<ul style="list-style-type: none"> <li>Design a program - with pseudocode optimised (least no of lines).</li> <li>Write a complex program.</li> <li>Always write procedures.</li> <li>Code is always commented and optimised.</li> <li>Use a range of loops including while, for and loop counters</li> </ul>	<ul style="list-style-type: none"> <li>Know what a low level programming language is and can give some examples.</li> <li>Explain Moore's Law.</li> <li>Explain how processors multitask.</li> </ul>

	<ul style="list-style-type: none"><li>• Be able to select, justify and apply appropriate techniques and principles to develop data structures and algorithms for the solution of problems.</li></ul>			<ul style="list-style-type: none"><li>• Comment critically on the consequences of current uses of computing, including economic, social, legal and ethical issues explains emerging technologies and their implications for future use of ICT.</li></ul>	<ul style="list-style-type: none"><li>• Use 2D data structures.</li><li>• Explain 2D data structures.</li><li>• Create a detailed test plan and code is bullet proof.</li></ul>	
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# Attitudes and Habits

At Laurus Ryecroft we expect all of our students to display the following **Attitudes and Habits in all of their subjects.**

Development in each area will be judged by the subject teacher as either, **emerging, establishing, secure, enhancing or excelling** dependant on the progress being made.

## ATTITUDES

- Ready to learn and quick to settle
- Takes responsibility for learning
- Has a thirst for learning
- Willing to work independently with focus/without teacher input
- Willing to actively participate in a variety of situations
- Seeks to develop learning by questioning
- Takes risks to further learning
- Maintains a positive relationship with others
- Shows respect at all times
- Always puts effort into learning/classwork/P & P
- Understands the importance of working to deadlines
- Takes responsibility for their own and others safety in school/classroom/learning environment
- Meets school expectations of behaviour/learning/attendance

## HABITS

- Prepared to learn
- Fully equipped for lessons
- Prepared for assessment
- Actively engages with learning
- Always responds to targets/feedback
- Seeks to demonstrate knowledge through answering questions
- Seeks opportunities to be challenged
- Able to work independently with focus
- Willing to ask for help if needed and knows where to find help
- Follows all instructions
- Work is well organised
- P & P is always completed
- Regularly meets deadlines
- Seeks opportunities to participate in extra-curricular activities and/or roles of responsibility
- Attendance follows school's expectations