

RET Computer Science - KS3 Stage Ladder

- Students will be taught:
- To think logically about how problems can be solved
 - To Implement algorithms using a range of languages
 - How computers represent information, communicate and operate
 - How to use IT to communicate ideas and knowledge safely



Stage		Algorithms	Programming & Development	Data & Data Representation	Hardware & Processing	Communication & Networks	Information Technology
Y9++	7	<ul style="list-style-type: none"> • Recognises where information can be filtered out in generalizing problem solutions. 	<ul style="list-style-type: none"> • Understands the difference between 'While' loop and 'For' loop, which uses a loop counter. • Understands and applies parameter passing. • Appreciates the need for, and writes, custom functions including use of parameters. 	<ul style="list-style-type: none"> • Understands the relationship between binary and electrical circuits, including Boolean logic. 	<ul style="list-style-type: none"> • Knows that there is a range of operating systems and application software for the same hardware 	<ul style="list-style-type: none"> • Knows the purpose of the hardware and protocols associated with networking computer systems. 	
Y9+	6	<ul style="list-style-type: none"> • Evaluates the effectiveness of algorithms and models for similar problems. • Recognises that some problems share the same characteristics and use the same algorithm to solve both. 	<ul style="list-style-type: none"> • Uses nested selection statements. • Understands and uses negation with operators • Uses and manipulates one dimensional data structures. 	<ul style="list-style-type: none"> • Performs operations using bit patterns e.g. conversion between binary and, denary etc • Knows what a relational database is, and understands the benefits of storing data in multiple tables. • Understands the relationship between resolution and colour depth, including the effect on file size. 	<ul style="list-style-type: none"> • Understands the main functions of the operating system. 	<ul style="list-style-type: none"> • Knows the names of hardware e.g. hubs, routers, switches - associated with networking computer systems. 	<ul style="list-style-type: none"> • Undertakes creative projects that collect, analyse, and evaluate data to meet the needs of a known user group • Considers the properties of media when importing them into digital artefacts. • Documents user feedback, the improvements identified and the refinements made to the solution.
Avg EOY9	5	<ul style="list-style-type: none"> • Represents algorithms using structured language (pseudo-code) • Designs solutions by decomposing a problem and creates a sub-solution for each of these parts. • Understands that iteration is the repetition of a process such as a loop. 	<ul style="list-style-type: none"> • Has practical experience of a high-level textual language, including using standard libraries when programming. (e.g. random, maths etc...) • Uses a range of operators and expressions e.g. Boolean, and applies them in the context of program control. • Uses a variable and relational operators within a loop to govern termination. 	<ul style="list-style-type: none"> • Understands how bit patterns represent numbers and images • Understands the difference between data and information. 	<ul style="list-style-type: none"> • Understands why and when computers are used. • Knows the difference between physical, wireless and mobile networks 	<ul style="list-style-type: none"> • Recognises that persistence of data on the internet requires careful protection of online identity and privacy. • Uses technologies and online services securely, and knows how to identify and report inappropriate conduct. 	<ul style="list-style-type: none"> • Explains and justifies how the use of technology impacts on society, from the perspective of social, economical, political, legal, ethical and moral issues. • 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.
Avg EOY8	4	<ul style="list-style-type: none"> • Represents solutions using a structured notation. (flow charts) • Shows an awareness of tasks best completed by humans or computers. 	<ul style="list-style-type: none"> • Understands that programming bridges the gap between algorithmic solutions and computers. • Selects the appropriate data types. 	<ul style="list-style-type: none"> • Knows that digital computers use binary to represent all data.6 • Defines data types: real numbers and Boolean. 	<ul style="list-style-type: none"> • Knows that computers collect data from various input devices, including sensors and application software. 	<ul style="list-style-type: none"> • Understands how to construct static web pages using HTML and CSS. Mobile apps • Understands data transmission between digital computers over networks, including the internet 	<ul style="list-style-type: none"> • Understands the ethical issues surrounding the application of IT, and the existence of legal frameworks governing its use e.g. Data Protection Act, Computer Misuse Act, Copyright etc

		<ul style="list-style-type: none"> • Designs solutions (algorithms) that use two-way selection i.e. if, then and else. 	<ul style="list-style-type: none"> • Detects and corrects syntactical errors. • Understands the difference between, and appropriately uses if and if, then and else statements. • Uses arithmetic operators, if statements, and loops, within programs. 	<ul style="list-style-type: none"> • Knows why sorting data in a flat file can improve searching for information. • Uses filters or can perform single criteria searches for information 	<ul style="list-style-type: none"> • Understands the difference between hardware and application software, and their roles within a computer system 	<p>i.e. IP addresses and packet switching.</p>	<ul style="list-style-type: none"> • Undertakes creative projects that collect, analyse, and evaluate data to meet the needs of a known user group
Avg EOY7	3	<ul style="list-style-type: none"> • Recognises that different solutions exist for the same problem • Uses logical reasoning to predict outputs, showing an awareness of inputs. • Detects and corrects errors i.e. debugging, in algorithms. 	<ul style="list-style-type: none"> • Creates programs that implement algorithms to achieve given goals. • Declares and assigns variables 	<ul style="list-style-type: none"> • Recognises different types of data: text, number6 • Recognises that data can be structured in tables to make it useful. 	<ul style="list-style-type: none"> • Recognises that a range of digital devices can be considered a computer. 	<ul style="list-style-type: none"> • Understands how to effectively use search engines, and knows how search results are selected, including that search engines use 'web crawler programs'. • Selects, combines and uses internet services • Demonstrates responsible use of technologies and online services, and knows a range of ways to report concerns • Understands the difference between the internet and internet service e.g. world wide web. • Recognises what is acceptable and unacceptable behaviour when using technologies and online services. 	<ul style="list-style-type: none"> • Evaluates the appropriateness of digital devices, internet services and application software to achieve given goals. • Evaluates the trustworthiness of digital content and considers the usability of visual design features when designing and creating digital artifacts for a known audience • Recognises ethical issues surrounding the application of IT beyond school • Recognises the audience when designing and creating digital content. • Understands the potential of IT for collaboration when computers are networked.
Avg EOY6	2	<ul style="list-style-type: none"> • Understands what an algorithm is and is able to express simple linear (non-branching) algorithms symbolically. • Demonstrates care and precision to avoid errors. 	<ul style="list-style-type: none"> • Detects and corrects simple semantic errors i.e. debugging, in programs. 		<ul style="list-style-type: none"> • Recognises and can use a range of input and output devices. • Understands how programs specify the function of a general purpose computer. 	<ul style="list-style-type: none"> • 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 unacceptable content and contact when online. 	<ul style="list-style-type: none"> • Collects, organises and presents data and information in digital content. • Makes appropriate improvements to solutions based on feedback received, and can comment on the success of the solution.
	1	<ul style="list-style-type: none"> • Uses logical reasoning to predict outcomes. Understands that computers need precise instructions. 	<ul style="list-style-type: none"> • Uses logical reasoning to predict the behaviour of programs. • Understands that programs execute by following precise instructions. 		<ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> • Obtains content from the world wide web using a web browser. • Understands the importance of communicating safely and respectfully online, and the need for keeping personal information private. • Knows what to do when concerned about content or being contacted. 	<ul style="list-style-type: none"> • Uses technology with increasing independence to purposefully organise digital content. • Uses a variety of software to manipulate and present digital content: data and information. • Shares their experiences of technology in school and beyond the classroom. • Talks about their work and makes improvements to solutions based on feedback received.