Alcester Academy Curriculum Planning: Key Stage 4 Computer Science – Year 10 2021-22

Pupils in GCSE Computer Science in year 10 have two (1 hour) lessons each week.

Department: *ICT & Computing*							
Term	Topic/Subject	Assessment Objectives	Knowledge Acquisition	Skill building & intent	Wider reading opportunities, including numeracy & SMSC.	Assessment Task	SEND & PP
Aut 1	**1.4 Network Security**	● Understand the different forms of attack to computer systems. ● Understand brute force attacks. ● Understand how to identify and protect against brute force attacks. ● Understand denial of service attacks. ● Understand how to identify and protect against denial of service attacks. ● Understand data interception and theft as a security threat. ● Understand how to identify and protect against data interception. ● Understand the concept of SQL injection. ● Understand how to protect against SQL injection. ● Understand ways in which people are a weak point in secure systems. ● Known how the following prevention methods help again the various forms of attack: ○ Penetration testing	Pupils learn key concepts of network security, including types of attacks, how to protect against attacks, and the weak points in network security.	Pupils to continue to use the Google Classroom teaching resources for this topic. Theory topics are introduced during each lesson through video based resources, supported by google slide presentations. Pupils use flip learning & cornell note taking methods to complete a series of online workbook based tasks. All resources are accessible at home, and are supported through 'CraignDave' Smart Revise platform of self quizzing.	A combination of visual & google classroom based resources are used, and all are delivered to pupils in lesson time. Pupils can access all resources, and SmartRevise revision platform is used throughout. Key Questions: ● What are the threats to devices and computers? ● What effect do different malware attacks have on your computer? ● How is a phishing attack used? ● How is a phishing attack used? ● How does a brute force attack work on passwords? ● What is the effect of a DDOS? ● What do we mean by "humans are a weak point"? ● How does a SQL injection hack work? ● How can you protect yourself against hackers?	Smart Revise assessment evidence is used to track progress from start to end of topic. End of topic written test is also completed.	Additional support to be provided where required for both SEND & PP pupils to help access resources.

		○ Anti-malware software ○ Firewalls ○ User access levels ○ Passwords ○ Encryption ○ Physical security ● Understand ways in which people are a weak point in secure systems. ● Know how the following prevention methods help again the various forms of attack: ○ Penetration testing ○ Anti-malware software ○ Firewalls ○ User access levels ○ Passwords ○ Encryption ○ Physical security					
	Python programming - TIME workbook activities Workbooks 4, 5.	● Understand how to adopt the Try, Investigate, Make, Evaluate (TIME) approach to developing Python programming skills. ● Understand how to use string data types. ● Understand how to use counter controlled iteration.	Pupils to continue to build on core programming skills, and start to develop the TIME approach to coding. Try, Investigate, Make, and Evaluate activities through structured workbook tasks.	Pupils use TIME programming activities to continue to build on core skills & knowledge already delivered. Pupils have 11 workbooks to progress through. Workbook 4 - how to use string data types, workbook 5 - how to use counter controlled iteration.	A combination of tutorial video, and google slides based resources are used, together with demonstrations outlining core coding concepts.	Pupils complete a range of different coding challenges, covering core concepts.Pupils to progress through Make activities in workbooks, achieving point scored solutions based on complexity of each challenge completed.	Additional support to be provided where required for both SEND & PP pupils to help access resources

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Aut 2	**1.5 System Software**	• Know the purpose and functionality of operating systems. • Know the different types of user interface and understand the features of each. • Know what is meant by the term multi-tasking. • Understand how the OS manages the memory. • Understand the need for device drivers. • Understand what is meant by the term, 'user management'. • Understand ways in which the operating system manages files • Understand encryption utilities. • Understand defragmentation utilities. • Understand data compression utilities.	Pupils learn key concepts of system software including, operating systems, interfaces, drivers, utilities, defragmentation & compression.	Pupils to continue to use the Google Classroom teaching resources for this topic. Theory topics are introduced during each lesson through video based resources, supported by google slide presentations. Pupils use flip learning & cornell note taking methods to complete a series of online workbook based tasks. All resources are accessible at home, and are supported through 'CraignDave' Smart Revise platform of self quizzing.	A combination of visual & google classroom based resources are used, and all are delivered to pupils in lesson time. Pupils can access all resources, and SmartRevise revision platform is used throughout. Key Questions: • Why does your computer need an operating system? • How does a computer manage having lots of programs open and running at the same time? • What features does an operating system give users? • What is the purpose of utility software?	Smart Revise assessment evidence is used to track progress from start to end of topic. End of topic written test is also completed.	Additional support to be provided where required for both SEND & PP pupils to help access resources.
	Python programming - TIME workbook activities Workbooks 6,7.	• Understand how to adopt the Try, Investigate, Make, Evaluate (TIME) approach to developing Python programming skills. • Understand how to use condition controlled iteration. • Understand how to handle user inputs.	Pupils to continue to build on core programming skills, and start to develop the TIME approach to coding. Try, Investigate, Make, and Evaluate activities through structured workbook tasks.	Pupils use TIME programming activities to continue to build on core skills & knowledge already delivered. Pupils have 11 workbooks to progress through. Workbook 6 - how to use condition controlled iteration, workbook 7 - how to handle user inputs.	A combination of tutorial video, and google slides based resources are used, together with demonstrations outlining core coding concepts.	Pupils complete a range of different coding challenges, covering core concepts.Pupils to progress through Make activities in workbooks, achieving point scored solutions based on complexity of each challenge completed.	Additional support to be provided where required for both SEND & PP pupils to help access resources

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Spr 1	**1.6 Ethical, legal, cultural & environmental issues.**	• Know a range of things to consider beyond development when implementing new computer systems.
		• Understand at least one ethical issue of computer technology.
		• Understand at least one issue related to privacy and computer technologies
		• Know the principles of the Acts of Parliament:
		  ◦ Data Protection Act 2018
		  ◦ Computer Misuse Act 1990
		  ◦ Copyright Designs and Parents Act 1988
		• Understand some of the key cultural issues of computer science:
		  ◦ The impact of technology on our daily lives.
		  ◦ The 'digital divide'.
		  ◦ Globalisation.
		• Understand the environmental impact of computers in terms of:
		  ◦ Manufacturing
		  ◦ Use
		  ◦ Disposal
			Pupils learn key concepts of ethical, legal, cultural & environmental issues including technologies, acts of parliament, cultural issues, and environmental impacts such as manufacturing, use, disposal of equipment.	Pupils to continue to use the Google Classroom teaching resources for this topic. Theory topics are introduced during each lesson through video based resources, supported by google slide presentations. Pupils use flip learning & cornell note taking methods to complete a series of online workbook based tasks. All resources are accessible at home, and are supported through 'CraignDave' Smart Revise platform of self quizzing.	A combination of visual & google classroom based resources are used, and all are delivered to pupils in lesson time. Pupils can access all resources, and SmartRevise revision platform is used throughout.
					
					Key Questions:
					• What are the ethical issues of computing?
					• What privacy issues does computing give society?
					• What does the legislation for computing prohibit?
					• What is the impact of computing on people?
					• What is the environmental impact of computing?
					• How can digital technology have an impact on society at a local, national and international level?
					• What recommendations would you give to someone considering software for their PC?
						Smart Revise assessment evidence is used to track progress from start to end of topic.
						End of topic written test is also completed.
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		● Know how to identify key stakeholders. ● Know how to consider a scenario from the perspective of the stakeholders. ● Understand at least one scenario of the impact of computer science. ● Know the difference between open source and proprietary software. ● Understand the implications of using open source and proprietary software.					
	Python programming - TIME workbook activities Workbooks 8,9.	● Understand how to adopt the Try, Investigate, Make, Evaluate (TIME) approach to developing Python programming skills. ● Understand how to use arrays & lists. ● Understand how to use serial files.	Pupils continue to build on core python coding skills.	Pupils use TIME programming activities to continue to build on core skills & knowledge already delivered. Pupils have 11 workbooks to progress through. Workbook 8 - how to use arrays & lists, & workbook 9 - how to use serial files.	A combination of tutorial video, and google slides based resources are used, together with demonstrations outlining core coding concepts.	Pupils complete a range of different coding challenges, covering core concepts.Pupils to progress through Make activities in workbooks, achieving point scored solutions based on complexity of each challenge completed.	Additional support to be provided where required for both SEND & PP pupils to help access resources.
Spr 2	**Python programming - TIME workbook activities Workbook 10 parts 1&2**	● Understand how to adopt the Try, Investigate, Make, Evaluate (TIME) approach to developing Python programming skills. ● Pupils learn how to master the basics by evaluating, developing & testing challenges, recapping on all code to date.	Pupils continue to build on core python coding skills.	Pupils use TIME programming activities to continue to build on core skills & knowledge already delivered. Pupils have 11 workbooks to progress through. Workbook 10 parts 1 & 2; more complex open ending challenges, with specific design, test & evaluate challenges.	A combination of tutorial video, and google slides based resources are used, together with demonstrations outlining core coding concepts.	Pupils complete a range of different coding challenges, covering core concepts.Pupils to progress through Make activities in workbooks, achieving point scored solutions based on complexity of each challe	Additional support to be provided where required for both SEND & PP pupils to help access resources.

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	Telium Text Based Adventure game	• Understand how to create larger and more complex code solutions. • Understand how to debug code. • Understand how to use .txt files within programs, to record user inputs. • Understand difference between local and global variables. • Understand validation techniques.	Pupils continue to build on core python coding skills.	Pupils to build on programming knowledge & abilities to produce a larger text based adventure game.	A combination of tutorial video, and google slides based resources are used, together with demonstrations outlining core coding concepts	Pupils complete a range of different coding challenges, covering core concepts.	Additional support to be provided where required for both SEND & PP pupils to help access resources.
Sum 1	**2.2 Programming Fundamentals**	• Know what is meant by the following key terms: o Variables o Constants o Input o Output o Assignment • Know the 3 basic programming constructs. • Know the different variable data types. • Understand the need for casting. • Know the arithmetic operators. • Know the Boolean operators. • Know the comparison operators. • Understand how to use computer-related mathematic operators.	Pupils learn key concepts of programming fundamentals, including constructs, Boolean operators, file handling, arrays & random number generation.	Pupils to continue to use the Google Classroom teaching resources for this topic. Programming topics are introduced during each lesson through google slide presentations. Pupils complete a series of online workbook based tasks. All resources are accessible at home, and are supported through 'CraignDave' Smart Revise platform of self quizzing.	A combination of visual & google classroom based resources are used, and all are delivered to pupils in lesson time. Pupils can access all resources, and SmartRevise revision platform is used throughout. Key Questions: • What terms are associated with programming? • Why are numbers sometimes stored as strings? • What are the steps to using data files with programs? • How is SQL used to search for data? • What does a two dimensional array or list mean? • Why are sub-programs used? • In what sort of problems might we	Smart Revise assessment evidence is used to track progress from start to end of topic. End of topic written test is also completed.	Additional support to be provided where required for bothSEND & PP pupils to help access resources.

		• Understand basic string manipulation commands. • Understand how to use basic file handling operations: o Open files o Read from files o Write to files o Close files • Understand the term 'record'. • Understand the SQL commands: o SELECT o FROM o WHERE (including the Boolean operators) o LIKE • Know the purpose of nested SELECTs. • Understand how an array or list can be used to store data. • Understand that arrays can be one or two dimensional. • Understand that programs can be structured using procedures and functions. • Understand how to use random number generation.			need to generate a random number or sequence of random numbers?		

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Sum 2	**2.1 Algorithms**	• Know what is meant by the term 'abstraction'. • Know some examples of abstraction. • Know what is meant by problem decomposition. • Know the advantages of decomposition when applied to programming. • Know an example of problem decomposition. • Know how to produce a structure diagram to aid in decomposing a problem. • Understand how to solve computational problems by applying algorithmic thinking. • Understand the linear search algorithm. • Understand it is not an efficient algorithm, but it is easier to program than alternatives and does not require the items to be in any order. • Understand the binary search algorithm. • Know the special condition of the list of items for the binary search to work.	Pupils continue to learn key concepts of algorithms, including abstraction, decomposition, linear & binary searches, bubble/merge/insertion sorts, flowcharts & pseudocode.	Pupils to continue to use the Google Classroom teaching resources for this topic. Theory topics are introduced during each lesson through video based resources, supported by google slide presentations. Pupils use flip learning & cornell note taking methods to complete a series of online workbook based tasks. All resources are accessible at home, and are supported through 'CraignDave' Smart Revise platform of self quizzing.	A combination of visual & google classroom based resources are used, and all are delivered to pupils in lesson time. Pupils can access all resources, and SmartRevise revision platform is used throughout. Key Questions: • What are the principles of computational thinking? • What is the purpose of decomposition and how can producing structure diagrams help with this process? • What do we mean by "thinking algorithmically"? • How does a linear search work? • How does a binary search work? • How does a bubble sort work? • How does a merge sort work? • How does an insertion sort work? • How can algorithms be described without ambiguity? • How do you express algorithms using the exam board reference language? • What are the different types of errors that can occur when programming?	Smart Revise assessment evidence is used to track progress from start to end of topic. End of topic written test is also completed.	Additional support to be provided where required for both SEND & PP pupils to help access resources.

		• Understand which searching algorithm is quicker. • Understand the bubble sort algorithm • Understand the merge sort algorithm. • Understand the insertion sort algorithm. • Know the flow diagram symbols. • Know that flow diagrams are also called flowcharts. • Know how to make a flow diagram. • Understand how to construct a program from a flow diagram. • Know what is meant by the term pseudocode. • Understand how to write pseudocode. • Understand the OCR reference language.			• How and why do programmers use a trace table?		