

Year 10	Substantive Knowledge	Disciplinary Knowledge	Assessment
Half Term 1	<ul style="list-style-type: none"> • Unit 4: Network Security & System Software (Moved due to Pat leave) <ul style="list-style-type: none"> ○ Network Threats <ul style="list-style-type: none"> ▪ Malware ▪ Phishing ▪ Social engineering ▪ Brute force attacks ▪ Denial of service attacks ▪ Data interception and theft ▪ SQL injection ○ Identifying & Preventing Vulnerabilities <ul style="list-style-type: none"> ▪ penetration testing ▪ anti-malware software ▪ firewalls ▪ user access levels ▪ passwords ▪ encryption ▪ physical security ○ Operating Systems Software <ul style="list-style-type: none"> ▪ User interface ▪ Memory management and multitasking ▪ Peripheral management and drivers ▪ User management ▪ File management ○ Utility Software <ul style="list-style-type: none"> ▪ Encryption software ▪ Defragmentation software ▪ Data compression software ○ Revision covering all topics to this point 	<ul style="list-style-type: none"> • Explain different forms and threats of network attacks • Explain how to prevent different forms and threats of network attacks • Explain the need for an OS along with the functionality that it provides • Describe the purpose and functionality of Utility Software in a given scenario 	Written assessment using exam style questions.

	<ul style="list-style-type: none"> • Introduction to Python Programming <ul style="list-style-type: none"> ○ First steps <ul style="list-style-type: none"> ▪ Basic Statements ○ Crunching numbers <ul style="list-style-type: none"> ▪ Common misconceptions ▪ Arithmetic expressions ○ At a crossroads <ul style="list-style-type: none"> ▪ How to use selection ○ More branches <ul style="list-style-type: none"> ▪ Understand what iteration is ○ Round & Round <ul style="list-style-type: none"> ▪ How to use iteration ▪ Uses of variables ○ Putting it all together 	<ul style="list-style-type: none"> • Execute your first python program • Identify the difference between a program and an algorithm • Identify the different errors and misconceptions • Generate random number • Applying the correct Arithmetic expression to a given task • Use complex selection • Apply selection to given programs • Apply iteration to a program • Identify when it is appropriate to use a variable as a counter • Apply the knowledge gained to a program 	
Half Term 2	<ul style="list-style-type: none"> • Python Programming with sequences of data <ul style="list-style-type: none"> ○ Warm up <ul style="list-style-type: none"> ▪ Use selection ▪ Understand syntax errors ○ Playlist <ul style="list-style-type: none"> ▪ Understand how to create lists ○ In a while, crocodile <ul style="list-style-type: none"> ▪ Use iteration (while) 	<ul style="list-style-type: none"> • Control the flow of a program using selection • Identify syntax errors in a program • Create lists • Access items within a list • Control the flow of a 	

	<ul style="list-style-type: none"> ○ The famous for <ul style="list-style-type: none"> ▪ Using iteration (for) ○ Make a thing <ul style="list-style-type: none"> ▪ Using iteration ▪ Using variables ▪ Using selection ○ Wrap up <ul style="list-style-type: none"> ▪ Using iteration ▪ Using variables ▪ Using selection ● Unit 1: System Architecture <ul style="list-style-type: none"> ○ Architecture of the CPU <ul style="list-style-type: none"> ▪ Purpose of the CPU ▪ Registers ▪ CPU components ○ CPU performance <ul style="list-style-type: none"> ▪ Function of Cache ▪ Clock speed ▪ Cache Size ▪ Number of Cores ▪ Describe what an embedded system is ○ Memory <ul style="list-style-type: none"> ▪ Primary Storage ▪ RAM ▪ ROM ▪ Virtual Memory ○ Secondary Storage <ul style="list-style-type: none"> ▪ Optical ▪ Magnetic ▪ Solid State 	<p>program using iteration</p> <ul style="list-style-type: none"> ● Performing operation of data in a list or individually ● Performing iteration on a list ● Combining skills to create a finished program <ul style="list-style-type: none"> ● Explain how the registers work and interact with the different components ● Explain the purpose of an embedded system in each scenario ● Explain why primary storage is required ● Explain the purpose of RAM & ROM ● Explain why virtual memory is required ● Discuss the needs of Secondary storage ● Evaluate the factors of choosing the most appropriate Secondary Storage ● Evaluate the impact of performance differences in each of the components 	<p>Written assessment using exam style questions.</p>
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<p>Half Term 3</p>	<ul style="list-style-type: none"> • Unit 2 Data Representation <ul style="list-style-type: none"> ○ Units & Binary <ul style="list-style-type: none"> ▪ Units of storage ▪ Converting 8-bit Binary to Denary ▪ Converting Denary to 8-bit Binary ○ Binary Arithmetic and Hexadecimal <ul style="list-style-type: none"> ▪ Converting 8-bit Binary to 2-digit Hexadecimal and vice versa ▪ Converting 2-digit Hexadecimal to Denary and vice versa ▪ Converting 8-bit Binary to Hexadecimal and vice versa ▪ Binary Shifts ○ Characters <ul style="list-style-type: none"> ▪ Character Sets <ul style="list-style-type: none"> • ASCII • Extended ASCII • Unicode ○ Images <ul style="list-style-type: none"> ▪ Bitmap Graphics ▪ Metadata ▪ Image Resolution ▪ Image Size ○ Sound <ul style="list-style-type: none"> ▪ Sampling <ul style="list-style-type: none"> • Sample Rate • Bit Depth ▪ Representing sound in binary ▪ File size versus Quality ○ Compression <ul style="list-style-type: none"> ▪ Lossy 	<ul style="list-style-type: none"> • Explain why data needs to be converted into a binary format so it can be processed • Explain what happens when a binary shift occurs • Explain the relationship between the number of bits per character in a character set • Explain the relationship between the number of characters that can be represented when using ASCII, Extended ASCII, and Unicode • Explain how pixels of images are represented in Binary • Describe how the number of bits per pixel determines the number of available colours for an image • Explain the relationship between file size and image resolution • Explain how sampling intervals and resolution affect the size of a sound 	<p>Written assessment using past exam questions.</p>
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	<ul style="list-style-type: none"> ▪ Lossless <p>Students will use 1 lesson a week of Python tasks.</p>	<p>file</p> <ul style="list-style-type: none"> • Explain the trade-off between file size and the quality of playback • Explain the need for compression • Describe the difference between lossy and lossless compression 	
<p>Half Term 4</p>	<ul style="list-style-type: none"> • Unit 3: Networks, connections, and protocols <ul style="list-style-type: none"> ○ The Internet & Wide Area Networks (WAN) <ul style="list-style-type: none"> ▪ Define a WAN ▪ NICs ▪ MAC Address ▪ DNS ○ Local Area Network (LAN) <ul style="list-style-type: none"> ▪ Network topologies ▪ Ethernet standards to transmit data ▪ Virtual networks ○ Wireless networking <ul style="list-style-type: none"> ▪ WiFi ▪ Bluetooth ▪ WAP ▪ Encryption ○ Client-Server & Peer-to-Peer Networks <ul style="list-style-type: none"> ▪ Hosting ▪ The Cloud ▪ Transmission media ▪ Network Performance ○ Protocols & Layers <ul style="list-style-type: none"> ▪ HTTP ▪ HTTPS 	<ul style="list-style-type: none"> • Describe the internet as a collection of computer networks • Explain the need for IP address • Explain how packet switching works • Discuss advantages and disadvantages of different network topologies • Explain the need for virtual networks • Choosing the best wireless connection for a given scenario • Describing how data is encrypted in a given scenario • Describe the factors that affect network performance • Explain the advantages and disadvantages of 	<p>Written assessment using exam style questions.</p>

	<ul style="list-style-type: none"> ▪ FTP ▪ POP ▪ IMAP ▪ SMTP ▪ TCP/IP ▪ Network Layers <p>Students will use 1 lesson a week of Python tasks.</p>	<p>various transmission media</p> <ul style="list-style-type: none"> • Explain why networks are layers 	
Half Term 5	<ul style="list-style-type: none"> ○ Revision covering all topics to this point ○ End of Year Assessments <ul style="list-style-type: none"> • Unit 5: Impacts of Digital Technology <ul style="list-style-type: none"> ○ Ethical & Cultural Issues <p>Students will use 1 lesson a week of Python tasks.</p>	<ul style="list-style-type: none"> • Discuss the impacts of digital technology on the wider society • Explain in the given scenario how each different piece of legislation applies to it 	<p>End of Year Assessment</p> <p>Written assessment using past exam questions.</p>
Half Term 6	<ul style="list-style-type: none"> • Unit 5: Impacts of Digital Technology <ul style="list-style-type: none"> ○ Environmental Issues <ul style="list-style-type: none"> ▪ The impact of manufacture and disposal ▪ The impact of upgrading or replacing ▪ The impact of e-waste ○ Legislation & Privacy ○ Legal issues ○ Privacy issues ○ The Data Protection Act 2018 ○ Computer Misuse Act 1990 ○ Copyright Designs and Patents Act 1988 ○ Software licences including open source and proprietary <p>Students will use 1 lesson a week of Python tasks.</p>		<p>Written assessment using exam style questions.</p>

	<ul style="list-style-type: none"> ▪ Malware ▪ Phishing ▪ Social engineering ▪ Brute force attacks ▪ Denial of service attacks ▪ Data interception and theft ▪ SQL injection ○ Identifying & Preventing Vulnerabilities <ul style="list-style-type: none"> ▪ penetration testing ▪ anti-malware software ▪ firewalls ▪ user access levels ▪ passwords ▪ encryption ▪ physical security ○ Operating Systems Software <ul style="list-style-type: none"> ▪ User interface ▪ Memory management and multitasking ▪ Peripheral management and drivers ▪ User management ▪ File management ○ Utility Software <ul style="list-style-type: none"> ▪ Encryption software ▪ Defragmentation software ▪ Data compression software <p>Students will use at least 1 lesson a fortnight of Python tasks.</p>		
Half Term 2	<ul style="list-style-type: none"> • Unit 8: Logic and Language <ul style="list-style-type: none"> ○ Logic Diagrams and Truth Tables <ul style="list-style-type: none"> ▪ Logic Gates <ul style="list-style-type: none"> • NOT 	<ul style="list-style-type: none"> • Analyse the results of truth tables • Create maintainable programs 	Written assessment using exam style questions.

	<ul style="list-style-type: none"> <ul style="list-style-type: none"> • AND • OR ▪ Truth Tables ○ Defensive Design <ul style="list-style-type: none"> ▪ Input validation ▪ Anticipating misuse ▪ Authentication ○ Errors and Testing <ul style="list-style-type: none"> ▪ Syntax Errors ▪ Logic Errors ▪ Test Data <ul style="list-style-type: none"> • Normal • Boundary • Invalid • Erroneous ○ Translators and Facilities <ul style="list-style-type: none"> ▪ Low-level languages ▪ High-level languages ▪ Translators ▪ Compiler ▪ Interpreter ○ Integrated Development Environment (IDE) <ul style="list-style-type: none"> ▪ Editors ▪ Error diagnostics ▪ Run-time environment • Unit 1: System Architecture <ul style="list-style-type: none"> ○ Architecture of the CPU <ul style="list-style-type: none"> ▪ Purpose of the CPU ▪ Registers ▪ CPU components ○ CPU performance <ul style="list-style-type: none"> ▪ Function of Cache 	<ul style="list-style-type: none"> • Identify syntax and logic errors • Select and use suitable test data • Explain the purpose of testing • Describe the characteristics and purpose of different levels of programming language • Describe the purpose of translators • Describe the characteristics of a compiler and interpreter • Explain the differences of a compiler and an interpreter • Explain the use of an Integrated Development Environment (IDE) to develop programs • Evaluate the impact of performance differences in each of these components • Explain how the registers work and interact with the different components 	
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	<ul style="list-style-type: none"> ▪ Clock speed ▪ Cache Size ▪ Number of Cores ▪ Describe what an embedded system is ○ Memory <ul style="list-style-type: none"> ▪ Primary Storage ▪ RAM ▪ ROM ▪ Virtual Memory ○ Secondary Storage <ul style="list-style-type: none"> ▪ Optical ▪ Magnetic ▪ Solid State <p>Students will use at least 1 lesson a fortnight of Python tasks.</p>	<ul style="list-style-type: none"> • Explain the purpose of an embedded system in each scenario • Explain why primary storage is required • Explain the purpose of RAM & ROM • Explain why virtual memory is required • Discuss the needs of Secondary storage • Evaluate the factors of choosing the most appropriate Secondary Storage 	
Half Term 3	<ul style="list-style-type: none"> • Mid-Year Assessment • Unit 2 Data Representation <ul style="list-style-type: none"> ○ Units & Binary <ul style="list-style-type: none"> ▪ Units of storage ▪ Converting 8-bit Binary to Denary ▪ Converting Denary to 8-bit Binary ○ Binary Arithmetic and Hexadecimal <ul style="list-style-type: none"> ▪ Converting 8-bit Binary to 2-digit Hexadecimal and vice versa ▪ Converting 2-digit Hexadecimal to Denary and vice versa ▪ Converting 8-bit Binary to Hexadecimal and vice versa ▪ Binary Shifts ○ Characters <ul style="list-style-type: none"> ▪ Character Sets <ul style="list-style-type: none"> • ASCII 	<ul style="list-style-type: none"> • Explain why data needs to be converted into a binary format so it can be processed • Explain what happens when a binary shift occurs • Explain the relationship between the number of bits per character in a character set • Explain the relationship between the number of characters that can be represented when using ASCII, Extended ASCII, and Unicode 	Written assessment using exam style questions. (No past papers available due to being new specification)

	<ul style="list-style-type: none"> • Extended ASCII • Unicode ○ Images <ul style="list-style-type: none"> ▪ Bitmap Graphics ▪ Metadata ▪ Image Resolution ▪ Image Size ○ Sound <ul style="list-style-type: none"> ▪ Sampling <ul style="list-style-type: none"> • Sample Rate • Bit Depth ▪ Representing sound in binary ▪ File size versus Quality ○ Compression <ul style="list-style-type: none"> ▪ Lossy ▪ Lossless 	<ul style="list-style-type: none"> • Explain how pixels of images are represented in Binary • Describe how the number of bits per pixel determines the number of available colours for an image • Explain the relationship between file size and image resolution • Explain how sampling intervals and resolution affect the size of a sound file • Explain the trade-off between file size and the quality of playback • Explain the need for compression • Describe the difference between lossy and lossless compression 	<p>Written assessment using exam style questions.</p>
Half Term 4	<ul style="list-style-type: none"> • Unit 5: Impacts of Digital Technology <ul style="list-style-type: none"> ○ Ethical & Cultural Issues ○ Environmental Issues <ul style="list-style-type: none"> ▪ The impact of manufacture and disposal ▪ The impact of upgrading or replacing ▪ The impact of e-waste ○ Legislation & Privacy 	<ul style="list-style-type: none"> • Discuss the impacts of digital technology on the wider society • Explain in the given scenario how each different piece of legislation applies to it • Apply decomposition, abstraction and algorithmic 	<p>Written assessment using exam style questions.</p>

	<ul style="list-style-type: none"> ▪ Legal issues ▪ Privacy issues ▪ The Data Protection Act 2018 ▪ Computer Misuse Act 1990 ▪ Copyright Designs and Patents Act 1988 ▪ Software licences including open source and proprietary <ul style="list-style-type: none"> • Algorithms <ul style="list-style-type: none"> ○ Computational thinking <ul style="list-style-type: none"> ▪ Decomposition ▪ Abstraction ▪ Algorithmic Thinking ○ Representing Algorithms <ul style="list-style-type: none"> ▪ Flowcharts ○ Tracing Algorithms <ul style="list-style-type: none"> ▪ Trace Tables <ul style="list-style-type: none"> • While Loops • For Loops • Lists 	<p>thinking to help solve a problem</p> <ul style="list-style-type: none"> • Analyse and create flowcharts using the flowchart symbols • Use a trace table to detect and correct errors in a program • Perform a linear search to find the position of an item in a list • Describe how linear search is used for finding the position of an item in a list of items • Describe how binary search is used for finding the position of an item in a list of items • Perform a binary search to find the position of an item in a list • Identify scenarios when a binary search can and cannot be carried out 	<p>Written assessment using exam style questions.</p>
Half Term 5	<ul style="list-style-type: none"> ○ Linear Search <ul style="list-style-type: none"> ▪ Need for computers to search ○ Binary Search <ul style="list-style-type: none"> ▪ Need for computers to search ○ Comparing Searching Algorithms <ul style="list-style-type: none"> ▪ Features of linear and binary ○ Bubble Sort 	<ul style="list-style-type: none"> • Compare the features of linear and binary search and decide which is most suitable in a given context • Interpret the code for linear search and binary search 	

	<ul style="list-style-type: none"> ▪ Need for computers to search ○ Insertion Sort <ul style="list-style-type: none"> ▪ Need for computers to search ○ Coding Sorting Algorithms ○ Merge Sort <ul style="list-style-type: none"> ▪ Need for computers to search 	<ul style="list-style-type: none"> • Trace code for both searching algorithms with input data • Identify why computers often need to sort data • Perform a bubble sort to order a list containing sample data • Insert an item into an ordered list of items • Perform an insertion sort to order a list containing sample data • Interpret the code for bubble sort and insertion sort • Trace code for both sorting algorithms with input data • Identify factors that could influence the efficiency of a bubble sort implementation • Describe how merge sort is used for ordering a list of items <p>Perform a merge sort to order a list containing sample data</p>	
Half Term 6	N/A		

