

Westbourne Academy Curriculum Planning Document

Subject: Computer Science Year: 10

Timescale	Autumn						
Prior Learning	7.3 Binary, Bits & Bobs 8.2 Problem Solving 8.5 Back to the future 9.2 Problem Solving	7.3 Binary, Bits & Bobs 7.4 Hardware Guide	7.3 Binary, Bits & Bobs 2.4.1 Boolean Logic 1.2.3 Units	7.3 Binary, Bits & Bobs 8.2 Problem Solving 8.5 Back to the future 9.2 Problem Solving	7.3 Binary, Bits & Bobs 2.4.1 Boolean Logic 1.2.3 Units	7.5 Flowcharts & Pseudocode 8.2 Problem Solving 8.5 Back to the future 9.2 Problem Solving	7.3 Binary, Bits & Bobs 2.4.1 Boolean Logic
Unit Title	2.4.1 Boolean Logic	1.2.3 Units	1.2.4 Data Storage (Numbers and Characters)	2.1.1. Computational Thinking	1.2.4 Data Storage (Images and Sound)	2.1.2 Designing, creating & refining algorithms	1.2.5 Compression
Key knowledge (5-10 points)	1. Simple logic diagrams using the operations AND, OR and NOT 2. Truth tables 3. Combining Boolean operators using AND, OR and NOT 4. Applying logical operators in truth tables 5. Solve problems using logical operators and truth tables	1. Why data must be stored in binary 2. Familiarity with data units 3. Link data units to capacity of storage devices 4. Applying data units to file size requirements 5. How to calculate size of sound, image and text files	1. Understand significant bits 2. The binary, denary & hex number bases 3. Conversion 4. Binary shifts 5. Representing characters 6. Character sets 7. ASCII and Unicode 8. Converting characters into binary and vice versa	1. What is Computational Thinking? 2. Why is Computational Thinking important? 3. What are the component parts of Computational Thinking? 4. How to use Computational Thinking to solve problems? 5. How to recognise patterns and solve algorithms?	1. How are images represented 2. What is meta data 3. How does colour depth & resolution affect size & quality 4. How are sounds stored in digital form 5. How does sample rate & bit depth affect size & quality	1. Identify the inputs, processes, and outputs for a problem 2. Structure diagrams 3. Understand structure of Pseudocode 4. Understand structure & symbols of Flow charts 5. Compare flowcharts / pseudocode and plain English 6. Identify common errors 7. Trace tables	1. The need for compression 2. Lossy Compression 3. Lossless Compression 4. Advantages & disadvantages of methods 5. Effects on files of each type of compression
Key skills (optional)	<ul style="list-style-type: none"> Draw logic diagrams Draw complex logic diagrams Interpret logic diagrams Draw & interpret truth tables 	<ul style="list-style-type: none"> Calculate capacity of devices Calculate required capacity for a given set of files Calculate file sizes for multimedia 	<ul style="list-style-type: none"> Binary conversion Denary conversion Hex conversion Binary addition Encryption/decryption Binary shifts 	<ul style="list-style-type: none"> Problem solve using aspects of Computational Thinking 		<ul style="list-style-type: none"> Interpret Flowcharts & pseudocode Create, edit and refine algorithms Create and use trace tables 	
Key terminology	<i>And, Or, Not, truth table, Boolean symbol. Logic diagram, logical operators, transistor, logic gate</i>	<i>Bit, Nibble, Byte, Kilobyte, Megabyte, Gigabyte, Terabyte, Petabyte, Data Capacity, Storage Devices</i>	<i>Character set, ASCII, Unicode, Hexadecimal, Binary, Binary shift, encryption, decryption, significant bits</i>	<i>Computational thinking, Decomposition, Abstraction, Algorithmic thinking, Pattern recognition, Algorithm, Complex problem, Solution</i>	<i>Pixel, Resolution, Meta Data, Colour depth, Bit depth, sample, sample rate, analogue, digital,</i>	<i>Algorithm, flowchart, selection, condition, pseudocode, input, output, trace, iteration, sequence, variable, data type, string, integer, real, Boolean</i>	<i>Compression, Lossless, Lossy</i>
Assessment (methods to assess)	<ul style="list-style-type: none"> Written assessment /50 Dynamic Learning Kahoot Quizlet 	<ul style="list-style-type: none"> Written assessment at end of 1.2 Unit /50 Dynamic Learning Kahoot Quizlet 	<ul style="list-style-type: none"> Written assessment at end of 1.2 Unit /50 Dynamic Learning Kahoot Quizlet 	<ul style="list-style-type: none"> Bebras Test end of unit /100 Dynamic Learning Kahoot Quizlet 	<ul style="list-style-type: none"> Written assessment at end of 1.2 Unit /50 Dynamic Learning Kahoot Quizlet 	<ul style="list-style-type: none"> Written assessment /50 Dynamic Learning Kahoot Quizlet 	<ul style="list-style-type: none"> Written assessment at end of 1.2 Unit /50 Dynamic Learning Kahoot Quizlet
Links to other units in KS4.	2.1 Algorithm 2.2 Programming fundamentals 1.1 System Architecture	2.1 Algorithms 2.2 Programming Fundamentals 1.1 System Architecture	2.1 Algorithms 2.2 Programming Fundamentals 1.1 System Architecture	2.2 Programming Fundamentals	2.1 Algorithms 2.2 Programming Fundamentals 1.1 System Architecture	2.2 Programming Fundamentals Practical Programming Project	2.2 Programming Fundamentals

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Timescale	Spring						
Prior Learning	7.4 Hardware Guide 1.2.3 Units 1.2.4 Data Storage	7.2 Coding in Scratch 7.5 Flowcharts & Pseudocode 7.6 Micro:Bit Madness 9.2 Python	1.2.3 Units 1.2.4 Data Storage 2.1.2 Designing, creating & refining algorithms	7.4 Hardware Guide 1.1.1 Data Storage 1.2.4 Data Storage	7.4 Hardware Guide 1.1.1 Data Storage 1.1.2 CPU Performance 1.2.4 Data Storage	7.4 Hardware Guide 1.1.1 Data Storage 1.2.3 Units	7.5 Flowcharts & Pseudocode 7.6 Micro:Bit Madness 9.2 Python 2.2.1 Prog Fundamentals
Unit Title	1.1.1 Architecture of the CPU	2.2.1 Programming Fundamentals	2.2.2 Data Types	1.1.2 CPU Performance	1.1.3 Embedded Systems	1.2 Memory & Storage	2.2.3 Additional Prog. Techniques
Key knowledge (5-10 points)	<ol style="list-style-type: none"> What is the purpose of the CPU? What happens in the Fetch – Decode – Execute cycle? What are the components of a CPU? What do the components do? What are registers? What are the purpose of registers? How do they interact? What is the difference between data & address 	<ol style="list-style-type: none"> The use of variables, constants, operators, inputs, outputs and assignments What are the basic program constructs? Sequence Selection Iteration Count & condition controlled loops Using arithmetic operations (BIDMAS) Using logic operators (AND, OR, NOT) 	<ol style="list-style-type: none"> Identify different data types Understand the properties of different data types Analyse the use of data types What is casting? Why is casting used? 	<ol style="list-style-type: none"> How do common characteristics of CPUs affect performance? What is Clock speed and how does it affect performance? What is Cache size and how does it affect performance? How does the number of cores affect performance? How do the characteristics affect performance when working together? 	<ol style="list-style-type: none"> What are embedded systems? What are the characteristics of embedded systems? What are the purposes of embedded systems? Identify a range of embedded systems Compare embedded systems with other computer systems 	<ol style="list-style-type: none"> What is primary storage? RAM and ROM Virtual Memory What is secondary storage? Types of storage (optical, magnetic, solid state) Characteristics of storage Storage devices & media Advantages and disadvantages of devices & media 	<ol style="list-style-type: none"> String manipulation File handling Records Using SQL to search for data Using lists & arrays 1D & 2D arrays Functions & procedures Calling & creating functions Random number generation
Key skills (optional)		<ul style="list-style-type: none"> Program in a high level language Recognise program constructs Use arithmetic & logic operators 	<ul style="list-style-type: none"> Program in a high level language Analyse high level programs Practice casting in a high level language 	<ul style="list-style-type: none"> Apply knowledge to a range of scenarios 		<ul style="list-style-type: none"> Apply knowledge to a range of scenarios 	<ul style="list-style-type: none"> Use high level language to manipulate strings File handling Use SQL to search Program using functions Program using arrays
Key terminology	<i>CPU, Bus, ALU, Control Unit, FDE Cycle, Register, MAR, MDR, Accumulator, Program Counter, Cache</i>	<i>Program, instruction, construct, sequence, selection, IF, ELIF, ELSE, iteration, loop, COUNT and CONDITION controls</i>	<i>Data Type, Integer, Real, Boolean, Character, string, Casting</i>	<i>CPU Characteristics, Cache Size, Clock Speed, Cores, Quad Core, Multicore, Multi-tasking, Parallel programming</i>	<i>Embedded system, Expert Systems, Multipurpose systems</i>	<i>Primary storage, memory, secondary storage, magnetic, laser, optical, HDD, SSD, reliability, portability, durability</i>	<i>Slicing, indexing, concatenation, array, list, function. Procedure, parameter, calling, SQL, query, record, file handling</i>
Assessment (methods to assess)	<ul style="list-style-type: none"> Written assessment at end of 1.1 Unit /50 Dynamic Learning Kahoot/ Quizlet 	<ul style="list-style-type: none"> Written assessment at end of 2.2 Unit /50 Dynamic Learning Kahoot / Quizlet 	<ul style="list-style-type: none"> Written assessment at end of 2.2 Unit /50 Dynamic Learning Kahoot / Quizlet 	<ul style="list-style-type: none"> Written assessment at end of 1.1 Unit /50 Dynamic Learning Kahoot / Quizlet 	<ul style="list-style-type: none"> Written assessment at end of 1.1 Unit /50 Dynamic Learning Kahoot / Quizlet 	<ul style="list-style-type: none"> Written assessment /50 Dynamic Learning Kahoot / Quizlet 	<ul style="list-style-type: none"> Written assessment at end of 2.2 Unit /50 Dynamic Learning Kahoot / Quizlet
Links to other units in KS4.	1.2 Memory and Storage 1.3 Computer networks, connections & protocols	2.1 Algorithms 2.3 Robust Programs 2.5 Program Language & IDEs	2.1 Algorithms 2.3 Robust Programs 2.5 Program Language & IDEs	2.2 Programming Fundamentals	1.2 Memory and Storage 1.3 Computer networks, connections & protocols 1.5 System Security	1.3 Computer networks, connections & protocols 1.5 System Security	2.2 Programming Fundamentals Practical Programming Project

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Timescale	Summer				
Prior Learning	7.4 Hardware Guide 1.1.1 Data Storage 1.2.3 Units	7.5 Flowcharts & Pseudocode 7.6 Micro:Bit Madness 9.2 Python 2.2.1 Prog Fundamentals	8.3 HTML 8.4 Web Design 1.1.1 System Architecture	2.1 Algorithms 2.2 Programming Fundamentals	1.1.1 System architecture 1.3.1 Networks & Topologies
Unit Title	1.2 Memory & Storage	2.2.3 Additional Prog. Techniques	1.3.1 Networks & Topologies	Practical Programming Project	1.3.2 Wired & wireless networks, protocols & layers
Key knowledge (5-10 points)	<ol style="list-style-type: none"> What is primary storage? RAM and ROM Virtual Memory What is secondary storage? Types of storage (optical, magnetic, solid state) Characteristics of storage Storage devices & media Advantages and disadvantages of devices & media 	<ol style="list-style-type: none"> String manipulation File handling Records Using SQL to search for data Using lists & arrays 1D & 2D arrays Functions & procedures Calling & creating functions Random number generation 	<ol style="list-style-type: none"> LANs & WANs Factors affecting network performance Client Server & Peer to Peer to Peer Networks Network hardware Transmission media The internet DNS & URL Hosts and ISPs Web Servers & Clients Star & Mesh Topologies 	<p><i>All students must be given the opportunity to undertake a programming task or tasks during their course of study.</i></p> <p><i>This allows for application and independent learning linked to</i></p>	<ol style="list-style-type: none"> Transmission media IP & MAC addressing What are protocols? What do protocols do? The concept of layers
Key skills (optional)	Apply knowledge to a range of scenarios	<ul style="list-style-type: none"> Use high level language to manipulate strings File handling Use SQL to search Program using functions Program using arrays 		<ul style="list-style-type: none"> Design a program Write a program Test a program Refine a program 	
Key terminology	Primary storage, memory, secondary storage, magnetic, laser, optical, HDD, SSD, reliability, portability, durability	Slicing, indexing, concatenation, array, list, function. Procedure, parameter, calling, SQL, query, record, file handling	Internet, Intranet, WWW, LAN, WAN, Client, Server, P2P, hub, switch, bridge, router, WAP, NIC, Star, Mesh	In addition to 2.1 and 2.2 ..Test, test data, success criteria, client, audience	Transmission, media, WIFI, Bluetooth, IP address, MAC address, TCP/IP, HTTP, HTTPS, FTP, POP, IMAP, SMTP Layers
Assessment (methods to assess)	<ul style="list-style-type: none"> Written assessment /50 Dynamic Learning Kahoot / Quizlet 	<ul style="list-style-type: none"> Written assessment at end of 2.2 Unit /50 Dynamic Learning Kahoot / Quizlet 	<ul style="list-style-type: none"> Written assessment at end of 1.3 Unit /50 Dynamic Learning Kahoot / Quizlet 	<ul style="list-style-type: none"> Written assessment using model exam questions Unit /50 Kahoot / Quizlet 	<ul style="list-style-type: none"> Written assessment at end of 1.3 Unit /50 Dynamic Learning Kahoot / Quizlet
Links to other units in KS4.	1.3 Computer networks, connections & protocols 1.5 System Software	2.2 Programming Fundamentals Practical Programming Project	1.4 Network Security	2.3 Programming Robust Programs	1.4 Network Security

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Subject: Computer Science Year: 11

Timescale	Autumn						
Prior Learning	8.1 Digital World 9.3 Ready Player One 1.3 Networks, connections & protocols	2.1 Algorithms 2.2 Programming Fundamentals	8.1 Digital World 9.3 Ready Player One 1.3 Networks, connections & protocols, 1,4,1	1.1 System Architecture	2.1 Algorithms 2.2 Programming Fundamentals Practical Programming Project	9.1 Python 1.1 System Architecture 2.2 Programming Fundamentals	8.1 Digital world 9.3 Ready Player One
Unit Title	1.4.1 Threats to Computer Systems & Networks	2.3.1 Defensive Design	1.4.2 Identifying & preventing vulnerabilities	1.5.1 Operating Systems & 1.5.2 Utility Software	2.3.2 Testing	2.5.1 Languages & 2.5.2 IDEs	1.6 Ethical, Legal, Cultural & Environmental Impacts
Key knowledge (5-10 points)	<ol style="list-style-type: none"> Identify threats & devices How are attacks used? What is the purpose of attacks? What is Malware? What is Social Engineering? What other attacks are there? 	<ol style="list-style-type: none"> Catering for different input types Anticipating misuse Authenticating different users Validation & Verification How to prepare programs for future use Features of maintainability Commenting 	<ol style="list-style-type: none"> Identify different methods of prevention Understand how to limit threats posed in 1.4.1 Understand methods used to remove vulnerabilities Understand what each measure controls Understand how attacks are limited 	<ol style="list-style-type: none"> The purpose and functionality of operating systems User interfaces Memory management and multitasking Peripheral management and drivers User management File management The purpose and functionality of utility software Encryption Defragmentation 	<ol style="list-style-type: none"> The purpose of testing Types of testing Syntax errors & logic errors Selecting & using test data Types of test data Refining algorithms 	<ol style="list-style-type: none"> Compare high and low level languages The purpose of translators Characteristics of compilers & interpreters Differences benefits & drawbacks between translators Identify common tools and facilities of IDEs How do tools & facilities help programmers 	<ol style="list-style-type: none"> Understand ethical, legal, cultural, environmental & privacy issues linked to technology Examples of how technology impacts on society Know the purpose of relevant legislation and the specific actions it allows or prohibits Software licencing Open source and proprietary software
Key skills (optional)		<ul style="list-style-type: none"> Use high level language to cater for unexpected inputs and future use 	<ul style="list-style-type: none"> 	<ul style="list-style-type: none"> 	<ul style="list-style-type: none"> Identify test data for a given scenario Create/complete test plans 	<ul style="list-style-type: none"> Use an IDE to investigate how features would help a programmer 	<ul style="list-style-type: none"> Ability to discuss two points of an argument Ability to draw measured conclusions
Key terminology	<i>Attack, Threat, Malware, DDOS, SQL injection, Brute force attack, SQL Injection, Social Engineering</i>	<i>Input types, Validation, Verification, Defensive Design, Authentication, Comments, Naming conventions</i>	<i>Vulnerability, Penetration testing, Anti-malware software, Firewalls, User access levels, Passwords, Encryption, Physical security</i>	<i>System software, utility software, user interface, memory management, multitasking, peripheral management, drivers, user management, file management, encryption, defragmentation, compression</i>	<i>Testing, Test plan, Syntax errors, Logic Errors, Test data, Unexpected errors, Boundary data, invalid data, erroneous data,</i>	<i>High level language, low level language, translators, compilers, interpreters, IDEs, Editors, Error diagnostics, Run-time environment</i>	<i>Ethical, moral, technology, legal, cultural, privacy, environmental, digital divide, licencing, proprietary, open source, Computer Misuse Act, Data Protection Act, Copyright</i>
Assessment (methods to assess)	<ul style="list-style-type: none"> Written assessment at end of Unit 1.4 /50 Dynamic Learning Kahoot / Quizlet 	<ul style="list-style-type: none"> Written assessment at end of Unit 2.3 /50 Dynamic Learning Kahoot / Quizlet 	<ul style="list-style-type: none"> Written assessment at end of Unit 1.4 /50 Dynamic Learning Kahoot / Quizlet 	<ul style="list-style-type: none"> Written assessment at end of Unit 1.5 /50 Dynamic Learning Kahoot / Quizlet 	<ul style="list-style-type: none"> Written assessment at end of Unit 2.3 /50 Dynamic Learning Kahoot / Quizlet 	<ul style="list-style-type: none"> Written assessment for 2.5 /50 Dynamic Learning Kahoot / Quizlet 	<ul style="list-style-type: none"> Written assessment for 1.6 /50 Dynamic Learning Kahoot / Quizlet
Links to other units in KS4.	2.3.1 Defensive Design 1.4.2 Identifying & preventing vulnerabilities 2.3.2 Testing	2.3.2 Testing					

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Timescale	Spring						
Prior Learning	2.1 Algorithms						
Unit Title	2.1.3 Searching & Sorting Algorithms	REVISION	REVISION	REVISION	REVISION	REVISION	REVISION
Key knowledge (5-10 points)	1. Understand the main steps of ... a) Linear Search b) Binary Search c) Bubble Sort d) Insertion Sort e) Merge Sort 2. Identify pre requisites of each method 3. Identify the algorithm if a given code is given 4. Compare benefits & drawbacks of each method						
Key skills (optional)	Apply algorithms to a given data set						
Key terminology	<i>Sort, Search, Algorithm, Binary Search, Linear Search, Bubble Sort, Insertion Sort, Merge Sort</i>						
Assessment (methods to assess)	<ul style="list-style-type: none"> Written assessment at end of Unit 1.3.1 /50 Dynamic Learning Kahoot / Quizlet 						
Links to other units in KS4.							