

Computing Policy

Whitefriars School



Approved by: SLT
Effective from: September 2022
Review date: September 2022
Next Review Date: July 2023

Intent



Article 29: *Your right to become the best that you can be.*

The pupils will learn about the modern and changing world of computing. They will combine invention and excitement and learn to look at the natural world through a digital prism.

The pupils will apply the academic principles learned in the classroom to real-world systems and will greatly develop their computational thinking and analytical skills. They will solve real world problems, design their own systems and grow to appreciate the power and limits of human and machine intelligence.

Implementation



Article 28: *Your right to learn and go to school.*



Article 16: *Your right to have privacy.*



Article 36: *You should be protected from doing things that could harm you.*

Skills and content

In the curriculum the pupils learn about a variety of technological units and software development applications. The order of these units and the structure of this curriculum has been designed to allow for correct understanding of how technology is used in the real world.

The pupils learn a variety of programming skills. These develop through the whole school, from the beginning of the primary section to the end of the secondary section. The programming skills taught in each year group and each key stage is well-designed and based on the through-school approach. Skills and content seamlessly develop across all year groups in the through-school. Secondary section teaching is fully integrated with and builds upon the development of skills in the primary section.

Our curriculum fully embraces and meets all the requirements of the National Curriculum and enhances this according to the needs of our pupils.

Timetable

In the primary section Computing is taught in a bespoke Computing lesson each week. The primary Computing curriculum allows pupils from Year 1 to Year 6 to build upon their skills in programming, publishing, and computer hardware.

In Key Stage 3 pupils have bespoke Computing lessons. Pupils have two timetabled lessons per week in Years 7, 8 and 9.

Pupils have the option of studying Computer Science at GCSE (Years 10-11) and A-level (Years 12-13). Pupils have three lessons per week in Years 10 and 11 and five lessons per week in Years 12 and 13.

Primary section

In Year 1 pupils learn a range of basic Computing skills including creating a simple algorithm for Bee-Bots, logging onto school computers and tablets, saving learning that is completed on computers and staying safe online.

In Years 2 - 6 there are a variety of Computing topics including online safety, programming of different robotics systems, and creating publications.

Secondary section

The curriculum fully builds on the primary section curriculum and continues the incremental development of programming skills through the use of different languages such as: Python, JavaScript, HTML, Macros, and visual basic.

Pupils learn about the role of different components that create a computer system and computer networks. Pupils learn about the threats posed to a device/network and thus how they can protect themselves online.

GCSE and A-Level

The curriculum has been designed so that Computer Science teaching at GCSE and A-level fully develops from that taught in the earlier key stages. As such pupils are fully prepared for this higher level of study.

GCSE and A-Level exam boards provide a lot of choice for schools regarding the content to be covered. The modules chosen reflect the needs and interests of our pupils as well as being fully integrated in our whole school curriculum. The modules allow pupils to gain an in-depth understanding of how computer systems are used in the real world.

The modules taught include the learning of complex algorithms as well as developing further understanding of previously taught computer systems.

Pupils program specifically with python and learn higher level programming techniques to create larger programs and to solve more complex problems. There are a range of theoretical topics that inform pupils about computer science in depth. These include system architecture, memory, storage, networks, network security, system software, and ethical, legal, cultural and environmental impacts of digital technology.

Extra-curricular

There are a range of extra-curricular activities for pupils to engage in which enhance the curriculum.

Primary section pupils produce and edit films in order to make entries for the annual Harrow Film Festival. They also take part in various virtual reality workshops and experiences which extend the curriculum.

There are various coding and computing clubs and workshops which take place throughout the academic year. These include Scratch, Minecraft, GameMaker, AppMaker, Hour of code and Drone club.

There are a variety of trips which deepen the curriculum. These include primary section visits to the RAF Museum where pupils attend coding and navigation workshops. KS3 pupils visit Bletchley Park and KS4 pupils visit the Centre for Computing History museum. Secondary section pupils can apply to be Computing Ambassadors where they learn how to be Computing technicians. There are end of year trips to virtual reality gaming experiences to reward pupils for their efforts.

Implementation - Skills

	Coding	Logical Reasoning	Information technology	Digital Literacy	Digital Wellbeing	Online Safety
Year 1	<p>Know that an algorithm is an instruction</p> <p>Start reading, creating and debugging code (programs) using simple algorithms in block code</p> <p>Explain why errors in our code mean that it will not work properly</p>	<p>Start predicting what will happen based on an algorithm</p>	<p>Begin to create and save (and Save As) learning on a computer</p> <p>Begin to find where learning has been saved on the computer</p> <p>Follow instructions to find learning online</p>	<p>Begin to recognise technology in the world around us, e.g. traffic lights</p>	<p>Explain why it is good to limit screen time</p> <p>Explain why we should not use technology right before bedtime</p>	<p>Describe what personal information is and how to keep it private</p> <p>Explain who to speak to if they feel upset</p> <p>Explain why there should be an adult in the room when going online</p>
Year 2	<p>Read, create and debug code (programs) using simple algorithms in block code</p> <p>Explain why algorithms need to be precise</p> <p>Sequence algorithms accurately</p>	<p>Logically predict what a simple algorithm will do</p>	<p>Create, save (and Save As) and organise learning on a computer</p> <p>Use copy and paste</p> <p>Resize images</p> <p>Move text boxes and images around on a page</p>	<p>Recognise more common uses of information technology beyond school</p>	<p>Explain which games are age-appropriate and why</p> <p>Explain how things are shared online e.g., Email, YouTube...</p>	<p>Explain why you should ask for permission before going online</p>
Year 3	<p>Write block code for a purpose</p> <p>Debug code by looking at it line by line</p> <p>Experiment using loop and timers when coding</p>	<p>Logically predict what an algorithm will do</p> <p>Find an error in code and make a logical attempt to fix it</p>	<p>Use different applications to present and examine information, e.g., Word, Excel, PPT</p>	<p>Explain some uses for the internet</p> <p>Begin to use search technologies</p> <p>Begin to use email</p>	<p>Explain how people should behave online</p> <p>Explain the benefits of being in an online world</p>	<p>Explain the consequences of not keeping personal information safe</p> <p>Explain various ways to report upsetting behaviour online</p>
Year 4	<p>Use sequencing, loop and timers when coding in block code</p> <p>Begin to use if statements to simulate real world situations e.g., if the light turns red then stop</p> <p>Use logical reasoning to detect errors in code</p>	<p>Explain why program code may not have executed in the manner expected</p> <p>Use logical reasoning to debug an error in code</p>	<p>Use audio recording software to plan and compose an original piece of music</p>	<p>Begin to determine whether a web page is relevant for the search requirements</p> <p>Explain how requests for web pages are transmitted through the internet</p>	<p>Begin to show an awareness of how behaviour online can be viewed by others (e.g., School network manager or ISP)</p> <p>Describe the etiquette for collaborating, online and offline, e.g., via office 365 / shared learning</p>	<p>Explain what makes a password secure</p> <p>Explain what constitutes personal information and how to keep it safe</p>
Year 5	<p>Use sequencing, if statements, loops and timers when coding in block code</p> <p>Begin to use variables when coding in programs</p> <p>Solve problems in programs by decomposing them into smaller parts</p>	<p>Explain why program code may not have executed in the manner expected due to multiple errors</p> <p>Use logical reasoning to debug multiple errors in code</p>	<p>Combine a variety of apps to accomplish a particular purpose e.g., Presentations, podcasts...</p>	<p>Evaluate the quality of the information found on the internet</p> <p>Explain how search results are ranked</p>	<p>Explain the consequences of online behaviour</p>	<p>Explain what to do if you receive an inappropriate message</p>
Year 6	<p>Write and debug their code, explaining what bugs they found and how they fixed them</p> <p>Review their code, decide for themselves how this might be extended or improved</p> <p>Implement, test and debug these modifications using block code</p>	<p>Explain and justify choices when coding using logical reasoning to create an algorithm</p>	<p>Choose from a range of available programs and state why that program would be best to use. E.g., using photos, the internet, and a computer-based program to make a newsletter</p>	<p>Explain what a network is</p> <p>Explain how to connect to a network</p> <p>Know the difference between LAN and WAN and WLAN</p>	<p>Explain why some photos, videos and other media should not be shared with others</p> <p>Explain how the use of digital technologies can affect others</p>	<p>Explain how to respect the rights of others when using digital technologies</p> <p>Explain how to safely use the internet</p>
Year 7	<p>Create small codes with block editors and text editors that utilise variables and if statements. Include the debugging of errors.</p>	<p>Use logical reasoning to reflect on the accuracy of code and debug if inaccurate</p>	<p>Use a range of skills to create a publication such that assist with the consolidation of learning</p>	<p>Identify and explain the purpose of a small selection of components that make up a computer system/network</p>	<p>Explain why the over-use of technology has negative impacts on mental health</p>	<p>Explain the dangers of online communication with strangers</p> <p>Explain the dangers of malware</p>

Year 8	<p>Create programs that utilise loops and lists.</p> <p>Explain the context in which these constructs are used in existing programs</p>	<p>Explain how codes work using key terminology</p>	<p>Learn how to create and make spreadsheets tailored to a given scenario</p>	<p>Compare different between components of a computer system</p> <p>Explain the concept of binary within a computer system</p> <p>Explain the concept of a network using examples in the real world</p>	<p>Explain the negative impacts technology may have on people in the long term</p>	<p>Identify online abuse and explain how to stop and report it</p>
Year 9	<p>Apply programming techniques to a given scenario.</p>	<p>Design and plan algorithms by applying logic.</p> <p>Use the algorithms to create programs in a given scenario</p>	<p>Use cloud serviced applications to complete work online.</p> <p>Explain the concept of cloud computing further, including data transmission</p>	<p>Compare components and explain which device is more suitable</p> <p>Explain how binary logic is used within all aspects of the computer system</p> <p>Identify and explain different network topologies</p>	<p>Explain the issues people may encounter whilst using technology</p>	<p>Explain the impact online abuse can have on peoples' mental health</p>
Year 10	<p>Create programs that use a range of programming techniques such as variables, string manipulation, if statements, loops, lists, sub programs, modules, and text files</p>	<p>Plan and design algorithms using flowcharts and pseudocode that illustrate programs based on a given scenario</p>	<p>Choose suitable applications to produce a publication suited to the needs of its purpose</p>	<p>Explain the differences between internal components of a computer system and how they manage binary</p> <p>State and explain the pros and cons of different network topologies. Explain the role software has on threatening and protecting them</p>	<p>Reflect on the positive and negative impacts of digital technology, enabling them to make conscious decisions to protect themselves</p>	<p>Identify a range of different malware and know how to protect from malicious attacks</p> <p>Explain how to act responsibly when faced with challenging situations online</p>
Year 11	<p>Create a program based on a project brief provided. Test programs to ensure correct outcomes and document them</p>	<p>Read a brief and design a set of criteria points to ensure the program fully functions as requested.</p> <p>Plan, design, test and evaluate all areas of a program to ensure a successful final product has been created</p>	<p>Independently use skills developed to complete tasks in the wider world</p>	<p>Identify, explain and compare all aspects of computer systems, software and networks</p>	<p>Apply key wellbeing concepts in the wider world and their own lives</p>	<p>Apply internet safety knowledge to daily lives and support others to do the same</p>
Year 12-13	<p>Create complex programs using object orientated programming techniques. Use this knowledge to create a program that solves a real-world problem</p>	<p>Create a brief with criteria points to ensure the program fully functions as intended.</p> <p>Plan, design, test, gain feedback, develop and evaluate all areas of a program to ensure a successful final product has been created</p>	<p>Use a wide range of information technology skills to create reports in order to show progress and final outcomes of a creative project</p>	<p>Identify, explain and compare all aspects of system architecture, software development, data structures, algorithms, networks and binary</p>	<p>Apply key digital footprint knowledge to their daily lives. Especially when applying for jobs and universities</p>	<p>Identify and explain key internet safety threats to a network. As well as apply key knowledge about internet safety in their daily lives.</p>

Implementation – Content



Article 13: *Your right to have information.*

	Half Term 1	Half Term 2	Half Term 3	Half Term 4	Half Term 5	Half Term 6
Year 1	What is personal information and how is it kept private?	What is an algorithm?		What technology is around us?	What are the parts of a computer?	How can work be saved on a computer?
Year 2	How can information be shared safely online?	How can a poster be made on a computer?		How are algorithms used?		What are the parts of a computer?
Year 3	What happens when personal information is not safe?	Which programs can be used for presenting information?		How is code debugged?		How can search engines be used safely?
Year 4	What is a password and how can it be secure.	How can music be composed on a computer?		How can loops and timers be used in code?		What is a web page?
Year 5	How should people behave online?	Which programs can be used to make presentations?		How can variables affect a block of code?		What is a computer virus?
Year 6	How can the rights of others be respected online?	What is a Network?		What makes an effective block of code?		Which programs are best for making posters and newsletters?
Year 7	Cyber security	PC HALO (Computer systems)	Micro: Bit	Superhero database	Python (introduction)	Home Networks
Year 8	Spreadsheets	App Maker	Computer Land (Computer systems)	Python (intermediate)	Web life	Graphic design
Year 9	Micro: Bit / Hardware	Apps / Software	Python (advanced) / Binary	HTML / Internet	Game Maker	SVG coding
Year 10	Computer systems			Algorithms and programming skills		
Year 11	Computer systems			Computational thinking and programming project		
Year 12	Computer systems			Algorithms and programming		
Year 13	Computer systems			Programming project		

Implementation – GCSE Computer Science (OCR)

Component title	Content Overview
<p>Computer systems</p> <p>50%</p> <p>1 hour and 30 minutes written paper</p>	<ul style="list-style-type: none">• Systems architecture• Memory and storage• Computer networks, connections and protocols• Network security• Systems software• Ethical, legal, cultural and environmental impacts of digital technology
<p>Computational thinking, algorithms and programming</p> <p>50%</p> <p>1 hour and 30 minutes written paper</p>	<ul style="list-style-type: none">• Algorithms• Programming techniques• Producing robust programs• Boolean logic• Programming languages and integrated development environments
<p>Programming project</p> <p>20 hours</p>	<ul style="list-style-type: none">• Variables• If statements• String manipulation• Loops• Arrays• Functions/procedures• Text files

Implementation – A-Level Computer Science (OCR)

Component title	Content Overview
<p>Computer systems</p> <p>40%</p> <p>2 hours 30 minutes written paper</p>	<p>The characteristics of contemporary processors, input, output and storage devices</p> <p>Types of software and the different methodologies used to develop software</p> <p>Data exchange between different systems</p> <p>Data types, data structures and algorithms</p> <p>Legal, moral, cultural and ethical issues.</p>
<p>Algorithms and programming</p> <p>40%</p> <p>2 hours 30 minutes written paper</p>	<p>What is meant by computational thinking? (thinking abstractly, thinking ahead, thinking procedurally etc.)</p> <p>Problem solving and programming – how computers and programs can be used to solve problems</p> <p>Algorithms and how they can be used to describe and solve problems.</p>
<p>Programming project</p> <p>20%</p> <p>Non-exam assessment.</p>	<p>You will apply the principles of computational thinking to a practical coding programming project. You will analyse, design, develop, test, evaluate and document a program written in a suitable programming language. You will choose your own project and work in your chosen computer language.</p>

Impact

Teacher questioning about and after all explanations, using techniques to ensure that all pupils are included in the questioning, allows the teacher to assess the level of understanding of their teaching. This allows future explanations to be planned during lessons. This keeps pupils at the point of learning.

Teacher guiding of first practise supports pupils with new knowledge and skills when they first use it and ensures that misconceptions are immediately rectified. Pupils are targeted for guiding based on the assessment information gleaned from lesson questioning and distance feedback.

Learning tasks are differentiated so that pupils focus on their precise next steps and practise what they most need to practise. Distance feedback, questioning and guiding allows the teacher to glean the assessment information necessary to plan this.

Teachers track and monitor the achievement of skills and content in order to plan future learning.

Secondary section teachers complete class feedback logs to provide distance feedback. These identify individual, group and whole class misconceptions which are used to plan the next lesson's explanations, questioning, next steps and guided group.

Questioning, live tweaks to explanations, teacher guiding, a focus on next steps and class feedback logs all ensure that any knowledge or skill gaps are immediately closed so that pupils have the key information needed for subsequent learning, lessons and examinations.

Year 10, Year 11 and Year 12 pupils complete an assessment or examination each half term. These assessments match final examination criteria and generate working at grades for the pupils for that particular content. This assessment, combined with ongoing teacher assessment and professional judgement is used to generate half termly predicted grades. Predicted grades are the Computer Science department's judgement as to the grades pupils are most likely to achieve in the final GCSE and A-level examinations.