Computing

Subject leader: Miss Singh

Intent: "***Everybody should learn to program a computer, because it teaches you how to think***." - Steve Jobs, former CEO and creator of Apple

The Computing curriculum at CMA equips pupils with the knowledge and skills to thrive in a digital world. Through a carefully sequenced programme from Years 7–9, pupils explore computer systems, data, programming, and networks while developing practical digital literacy.

We aim to inspire creativity, resilience, and problem-solving, ensuring all learners can design, build, and evaluate solutions that reflect real-world contexts. Alongside technical skills, pupils learn how to use technology safely, responsibly, and ethically. Our intent is to develop confident digital citizens and prepare pupils for successful progression into KS4 and beyond.

What enrichment opportunities are available and how do these support learning?

- Extra-curricular visits universities such as UA92 to look at University courses.
- Innovate Her projects to support female intake into STEM subjects
- Career visits at KS4 to broaden and enrich students' minds at GCSE.

Where can I visit to help with my learning?

Isaac Computer Science – GCSE Computer Science resources

Tynker – coding lessons.

Computing Careers: Studying computing can lead to a range of exciting careers including:

- App/Website Developer
- Computer Programmer
- Data Scientist/Analyst
- Finance
- IT
- Software Engineer

Year 7 Curriculum Plan

Term	Topic	Key Knowledge
Autumn 1	Baseline, Micro: Bit Transition and Computer Hardware	- Students will complete a baseline of knowledge for computing - Students will be able to identify the use of a Micro bit and how to utilise the components. - Students will be able to differentiate between the concept of input devices and output devices. - Students will be able identify other pieces of computer hardware such as

		CPU Motherboard RAM ROM GPU Expansion Slot Power Supply Unit Heat Sink Hard Disk Drive - Students will be able to create a PowerPoint presentation on three to five pieces of computer hardware and identify their purpose, benefits, and drawbacks. - Students will be able to identify how the CPU and other components can connect to process data. - Students will be able to demonstrate how the CPU is the brain of the computer and how to measure the instructions using Hertz.
Autumn 2	Computational Thinking	- Students will be able to demonstrate the need for decomposition - Students will be able to demonstrate the need for algorithms and how to apply them - Students will be able to demonstrate how to use abstraction to remove unnecessary detail when breaking down a problem

		- Students will be able to use pattern recognition to identify patterns and make predictions
Spring 1	Spreadsheets	-Students should be able to identify with common mathematical operators such as +, -, x and divide. -Students will be aware of the necessary means to produce a chart based on collation of data. -Students will be able to apply the selection concept when applying conditional formatting to a cell. -Students will understand the need for inputting data, how to process it using calculations and how to output it visually.
Spring 2 and Summer 1	Scratch and Scratch Game Maker	- Students should be able to produce a simple program which follows a sequential structure -Students should be able to break down a problem and solve it using computational thinking methods. -Students should be able to identify with common mathematical operators such as +, -, x and divide. -Students should be commonly associated with comparison operators such as more than, less than and equals to. -Students should be able to identify with the three strands of computational thinking: Sequence, Selection, and Iteration (count-controlled)

		-Students will be aware of the mathematical operators and comparison operators used within a programming environment -Students should be able to identify the differences between a count-condition controlled loop and a condition-controlled loop. -Students should be able to identify and debug errors that occur within a given program -Students should be able to apply these skills to make a scratch-based game
Summer 2	Introduction to the Micro bit	- Students should be able to identify the inputs and outputs of a Micro bit - Students will be able to apply the computational thinking strands from the previous scratch units to create programs for the Microbit

Year 8 Curriculum Plan

Term	Topic	Content
Autumn 1	Computer Systems	The intent of the unit is to give learners a clear, accessible overview of how computing systems function across different layers, while introducing contemporary topics like artificial intelligence and open-source software. This unit of work will retrieve knowledge of computer hardware which is accessed in Year 7.
Autumn 2	Introduction to Python	The intent of this topic is to draw on the computational thinking strands: sequence and selection learned in Y7 via block-based programming and extend these skills into text-based programs. Students will be able to acquire a range of skills which include: - Identifying inputs and outputs - The need for variables to store data - Identifying the correct data type for data to be stored within a program - Using arithmetic operations to carry out calculations within a program.
Spring 1	Binary Bits and Bobs	The intent of this topic is to introduce students to the concept of data and how computers interpret it as binary. Students learn about the concept of bits and how to convert from binary to decimal and vice versa. Students are taught about the units of data from bits to bytes to kilobytes to megabytes and gigabytes. Students will be able to identify why we need bitmaps and how they are stored in binary. Students will be able to use Audacity to demonstrate how sound can be converted from analogue to digital sound using binary.

Spring 2	Python Turtle	The intent of this topic is to continue the theme of computational thinking aspect of the curriculum using Python as one of the languages we use in the KS3 curriculum. Students will be able to code shapes using the imported Python Turtle using Python IDLE.
Summer 1	Mobile APP	The intent of this unit is to explore another language within the curriculum JavaScript. Students will be able to create an APP using JavaScript code. The unit also provides opportunities to identify real-world problems that can be addressed with apps is a means of exploring computer programming by relating it to students' interests. Students develop their skills to identify real-world problems; review the content in relevant apps; understand the potential of varied content (such as images, video, and text) in app design; understand the importance of user interaction in app design and identify an original idea for an app that addresses a real-world problem.
Summer 2	Micro Bit Madness	Following the theme of physical computing for the final summer term for all KS3 groups, this unit will retrieve knowledge for learners on their use of the BBC Micro: Bit, developing their understanding of event-driven programming, computational thinking, and core programming concepts such as variables, loops, and conditionals. Learners will begin with accessible block-based coding before progressing to Python, enabling them to program real-world features like the accelerometer, compass, and temperature sensor. The intent is to build creativity, problem-solving, and digital literacy, empowering learners to design and code interactive projects while gaining confidence in both visual and text-based programming.

Year 9 Curriculum Plan

Term	Topic	Content
Autumn 1	Networks	Identify the need for a network and why it is important to understand that it has rules known as protocols. Students will be able to differentiate between a wired and wireless network to identify the benefits and drawbacks. Students will be able to identify the need for high bandwidth in relation to the performance of a network. Students will identify that the Internet is a network and data travels in packets. Students will be able to identify what makes up an IP address. Students will be able to differentiate between the Internet being a network and the world wide web being a collection of websites. Students will be able to identify the structure which makes up the world wide web and differentiate between a URL and IP address. Students will be able to identify Network threats and how to counteract them.
Autumn 2	Python Revisited	The Python Revisited unit is designed to provide students with a deeper and more comprehensive understanding of Python programming. Building upon the foundational concepts introduced earlier in the Y8 unit “Introduction to Python”, this unit delves into more advanced topics such as data structures and iteration.

		Students will have the opportunity to revisit and reinforce their knowledge of Python syntax and semantics while exploring real-world applications and problem-solving scenarios. By the end of this unit, students will be equipped with the skills and knowledge necessary to tackle more complex programming challenges, setting the stage for their continued growth as proficient Python programmers and computer scientists.
Spring 1	Back to the Future	The "Back to the Future" unit takes students on a journey through the history and foundations of computer science and technology. Students learn about Sir Tim-Berners-Lee and the birth of the World Wide Web, gaining skills in creating simple web pages. They delve into the world of George Boole and Boolean Logic, as well as the importance of logic gates in CPUs. Finally, students explore the contributions of Charles Babbage and how his work laid the groundwork for problem-solving and logical thought in Computer Science. These lessons provide students with a comprehensive understanding of key figures and concepts in computer science, setting the stage for a deeper appreciation of the digital world.
Spring 2	Creative Python Project	This intent of this unit is to secure learners' skills in designing and programming real-world scenarios. Learners will explore key programming concepts including inputs, outputs, variables, use of iteration and the use of lists.
Summer 1	Artificial Intelligence	The Artificial Intelligence (AI) is a comprehensive learning unit that encompasses six distinct lessons. It introduces students to fundamental AI concepts and the distinction between data-driven and rule-based approaches. In that students will delve into the role of data in AI and machine learning and explores data's impact on machine learning models and the potential for bias. The unit focuses on decision tree models, emphasizing their structure and data-driven nature. It guides students through the AI project lifecycle, enabling them to solve problems using machine learning. Students will complete the project lifecycle, learning to evaluate and explain their models while also exploring career opportunities in AI and related fields. The lessons of the unit collectively provide a

		comprehensive understanding of AI and machine learning principles and practical applications.
Summer 2	Physical Computing and the Micro: Bit	This unit builds on learners' prior programming knowledge by introducing physical computing with the BBC micro: bit. Learners will first explore its built-in components and create simple Python programs to interact with the physical world. They will then apply their skills in pairs to design, prototype, and document a purposeful physical computing project. The unit reinforces core programming patterns, encourages collaboration and creativity, and requires knowledge of the Year 8 and 9 programming units as preparation.

Key Stage 4

The computing curriculum at CMA has been designed solely to encourage learners to be secured computational thinkers. We encourage the curriculum to extend students' knowledge on how to use the computer and how information online can be totally biased. We also focus on computational thinking elements such as algorithmic thinking, decomposition and abstraction which supports the programming elements of the curriculum.

The curriculum for KS4 offers pupils two pathways:

GCSE Computer Science or

BTEC Digital Information Technology

The Computer Science curriculum is separated into two components:

Paper 1- Computing systems

Paper 2- Computational thinking, algorithms, and programming which is in the form of an online exam in Y11.

Diversity is a major focus within our curriculum. We aim to give students access to information about computer scientists from all walks of life. We want our students to enjoy the course whilst reaching their true potential.

Year 10 Curriculum Plan GCSE Computer Science (Edexcel)

Term	Topics	Key Knowledge
Term 1	Systems Architecture	-Pupils will have an awareness of the components of a computer. For example, the CPU is needed for the computer to perform. -Pupils will have an awareness of the measurement of clock speed in Hertz. -Pupils will be aware of everyday machines which will use a CPU to control its entire functions. -Pupils will be able to identify with RAM and ROM which are basic hardware components within a computer. - Pupils will be able to identify the need for secondary storage and why primary storage is temporary
	Algorithms and Computational Thinking	-Pupils will understand computational thinking and its strands - Pupils will be able to demonstrate how to visually represent an algorithm in the form of a flowchart -Pupils will be able to identify pseudocode and how to recognise it when solving problems -Pupils will be able to produce trace tables based on inputs and outputs of an algorithm

		-Pupils will be able to identify logic gates and how to produce truth tables based on the inputs and outputs
Term 2	Operating Systems	-Pupils will know the different types of operating systems available to the world. -Pupils will be able to identify common utility software which protect a device such as Encryption, Defragmentation and Disk clean ups.
Term 2	Data Representation	-Pupils know the range of secondary storage but will need categorise it based on their capacity. -Pupils will know some characteristics of the need for secondary storage such as cost, speed, storage, and reliability. -Pupils will be aware of file sizes such as Bit, Byte, KB, MB, GB, TB and PB -Pupils will be able to calculate data using binary. -Pupils can identify that image and sound file have different sizes. -Pupils should be able understand why files have different sizes based on the need to compress files.
Term 3- Autumn Y11	Network Security	-Pupils should be able to identify the common methods of attack to a network. -Pupils will have a basic understanding of how to combat network security issues. -Pupils will know that things such as an acceptable use policy should protect themselves and individuals within a workplace. -Pupils should know that we follow certain types of legislation which combat crimes made on a network.

	Networks	-Pupils will know that a network is used to connect to the Internet. They will be able to identify the differences between a wired and wireless network. -Pupils should know that we have a range of different modes of connection for a network. --Pupils know that data these days is backed up using cloud-based software. -Pupils should be able to identify a series of factors which affect performance. For example, latency and bandwidth. -Pupils should be able to identify the basic protocols and standards used to transmit data across a network.

Year 11 Curriculum Plan GCSE Computer Science (Edexcel)

Term	Topics	Key Knowledge
Term 1	Networks	-Pupils will know that a network is used to connect to the Internet. They will be able to identify the differences between a wired and wireless network. -Pupils should know that we have a range of different modes of connection for a network. --Pupils know that data these days is backed up using cloud-based software. -Pupils should be able to identify a series of factors which affect performance. For example, latency and bandwidth. -Pupils should be able to identify the basic protocols and standards used to transmit data across a network.
	Ethical, Legal and Environmental Issues	- Learn how computers affect the **environment**, from making and using them to how they are recycled. - Think about **ethical questions** such as online piracy, fraud, and who should be responsible for harmful content online. - Explore **privacy concerns**, including smart devices that listen to us and how governments may use our data. - Understand the rules of the **Data Protection Act (2018)** and **Privacy and Electronic Communications Regulations (2003)** and why they matter. - Learn about important laws like the **Computer Misuse Act (1990)** and **Copyright, Designs and Patents Act**, which protect people and their work. - Discuss new technologies like **artificial intelligence, robots, and driverless cars**, and the moral choices they raise. - Find out about issues such as **bias in algorithms**, safety, and who is responsible when things go wrong. - Compare **open source and proprietary software** and understand the differences in cost, access, and support.

	Basic Programming Concepts	- Think about how digital technology impacts **people, society, and the wider world**. - **Learn** about different data types like integers, strings, and floats, and why choosing the right one matters. - **Understand** how casting lets us change data between types, such as turning text into a number. - **Explore** how arrays store collections of data of the same type, and how lists in Python can store both same and mixed data types. - **Find out** how records can combine different kinds of data into one structure, like storing a student's name, payment, and date. - **Use** operators in programming, including arithmetic, comparison, and logical operators, to solve problems. - **Apply** mathematics in programming, including division, remainders, and powers, to make programs more powerful. - **Learn** how variables store changing values, constants hold fixed values, and assignments give values to them. - **Customise** program outputs using string formatting to make results clear and professional. - **Understand** the three key programming constructs: Sequence (step by step) Selection (making choices) Iteration (repeating instructions). - **Practice** building nested loops and decisions to solve more complex problems. - **Develop** structured programs by writing functions (that return values) and procedures (that perform tasks).

		- **See** how sub-programs make code easier to read, reuse, and maintain.
Term 2	Advanced Programming Concepts Robust and Secure Programming	- **Learn** how to manipulate strings, including finding characters, checking if text is letters or numbers, replacing words, splitting text, and removing unwanted characters. - **Understand** how concatenation joins strings together and how substrings can extract parts of text. - **Explore** how random numbers can be generated and used in programs, especially in games like rolling dice. - **Use** the math module to carry out calculations such as rounding up, rounding down, square roots, and using π (pi). - **Find out** how the time module can be used to measure or control how long programs run. - **Discover** how the turtle module lets us draw shapes and patterns with code. - **Learn** how to read from a file, line by line, and use the data in a program. - **Practise** writing data to files, either overwriting old data or appending new data at the end. - **Understand** why we use subprograms (functions and procedures) to make code reusable, structured, and easier to maintain. - **Explore** the difference between local and global variables, and why scope matters when sharing data between subprograms. - **Learn** about the different types of programming errors: syntax, logic, and runtime, and how to spot them. - **Understand** why robust software important and how well-written programs will prevent problems.

		- **Explore** how to make code easier to read and maintain by using clear names, comments, and structure. - **Practice** using data validation checks, such as type, range, presence, format, and length, to ensure inputs are correct. - **Find out** how whitelists and blacklists can be used to control which inputs are accepted or rejected. - **See** how algorithms can be refined to make them more robust, such as by checking for valid ages or ensuring inputs follow rules. - **Understand** why authentication is needed to protect systems and data from misuse or attacks. - **Explore** different methods programmers use to identify vulnerabilities in code and improve security.
	Classification of programming languages	- **Learn** about the different levels of programming languages, from machine code to high-level languages. - **Understand** the advantages and disadvantages of using low-level languages like assembly code. - **Explore** the relationship between machine code and assembly language, and how they interact with hardware. - **See** how the hierarchy of languages builds from hardware → machine code → assembly → high-level languages. - **Find out** why translators are needed to convert code into instructions the computer can run. - **Understand** the purpose and characteristics of assemblers, compilers, and interpreters, and how they differ.

Term 3	Revision	- In preparation for the exam, students will retrieve knowledge in preparation for their final exams.

Year 10_ 11 Curriculum Plan BTEC Digital Information Technology

Intent:

The BTEC Level 1/2 in Digital Information Technology is designed to provide students with the essential skills, knowledge, and understanding necessary to thrive in the digital world. This qualification offers a practical, hands-on approach to the study of technology, enabling students to develop the technical proficiency, problem-solving abilities, and understanding of digital systems required in today's technology-driven society.

Key Aims:

1. **Develop Technical Skills**: Students will gain competence in using digital tools, systems, and applications, including data management, information systems, web development, and cybersecurity principles. The curriculum encourages students to apply these skills in real-world scenarios to solve problems and create solutions.
2. **Foster Critical Thinking and Problem-Solving**: Through project-based learning, students will tackle complex challenges, applying logical reasoning, and creative thinking to address problems. This develops their ability to analyse and evaluate digital information, preparing them for a wide range of career paths or further study in the digital sector.
3. **Build Understanding of Digital Systems and their Impact**: Students will explore the broader context of digital technology, including how digital systems impact society, businesses, and personal lives. Topics like data security, ethical considerations, and the role of technology in modern work environments are covered, ensuring students are aware of the challenges and responsibilities associated with using digital technology.
4. **Promote Independent and Collaborative Learning**: By engaging with both individual and group-based tasks, students will develop the ability to work independently and as part of a team. The course is structured to enable students to manage their time effectively, enhance their communication skills, and learn how to present their work clearly to others.
5. **Prepare for Further Study and Employment**: The qualification supports progression to higher-level courses, apprenticeships, or direct entry into the workforce. It equips students with foundational knowledge and practical skills that are highly valued by employers across a variety of sectors, including IT, business, and creative industries.

Through this curriculum, we aim to inspire students to explore the possibilities of the digital world and equip them with the tools to succeed in an increasingly digital future.

Term	Topic	Content

Autumn to Spring Y10	Component 2: Collecting, Presenting and Interpreting Data	Learners will understand the characteristics of data and information and how they help organisations in decision making. They will use data manipulation methods to create a dashboard to present and draw conclusions from information. In order to make decisions, organisations collect vast amounts of data from a range of different sources. They need to use appropriate data-collection methods and ensure that the data is of sufficient quality to enable decision making. Data must then be converted into information to allow it to become useful. Even when data has been converted into information, it will not provide any conclusions on its own. It is up to the data user to be able to look at the information and draw conclusions, so how the information is presented is key to ensuring that effective and accurate decisions are made. In this component, students will learn the different data manipulation tools that can be used to change the way that data is presented. Students will provide clear summaries of the data and present them in a dashboard that will allow organisations to make effective decisions. Students will learn the different presentation features that can be used to ensure that information is understood clearly in an objective way so that it is not misinterpreted. Students will develop their understanding of how to represent information in different ways to give it more meaning.

Spring to Autumn Y11	Component 1: Exploring User Interface Design Principles and Project Planning Techniques	Learners will develop their understanding of what makes an effective user interface and how to effectively manage a project. They will use this understanding to plan, design and create a user interface. Introduction As digital technologies and organisations continue to evolve, each new development offers new and exciting ways of completing tasks and interacting with our hardware devices and opens a new project with a new set of user requirements that needs to be solved. User interfaces allow individuals and individuals in organisations to interact with digital technologies. The design of the user interface is crucial in ensuring that users can interact positively with their hardware devices. In this component, students will learn different project planning techniques that can be used to plan and deliver a project that meets a set of user requirements. Students will learn the different design principles that can be used to design effective user interfaces and apply appropriate project planning techniques to create a user interface that meets user requirements. Learning outcomes • A Understand interface design for individuals and organisations • B Be able to use project planning techniques to plan, design and develop a user interface • C Be able to review a user interface.

Year 11 Curriculum Plan BTEC Digital Information Technology

Term	Topic	Content
Autumn Year 11	Component 2: Collecting, Presenting and Interpreting Data	Learners will understand the characteristics of data and information and how they help organisations in decision making. They will use data manipulation methods to create a dashboard to present and draw conclusions from information. In order to make decisions, organisations collect vast amounts of data from a range of different sources. They need to use appropriate data-collection methods and ensure that the data is of sufficient quality to enable decision making. Data must then be converted into information to allow it to become useful. Even when data has been converted into information, it will not provide any conclusions on its own. It is up to the data user to be able to look at the information and draw conclusions, so how the information is presented is key to ensuring that effective and accurate decisions are made. In this component, students will learn the different data manipulation tools that can be used to change the way that data is presented. Students will provide clear summaries of the data and present them in a dashboard that will allow organisations to make effective decisions. Students will learn the different presentation features that can be used to ensure that information is understood clearly in an objective way so that it is not misinterpreted. Students will develop their understanding of how to represent information in different ways to give it more meaning.

Spring to Summer	Component 3: Effective Digital Working Practices	Learners will explore how organisations use digital systems, and the wider implications associated with their use. Modern organisations are increasingly reliant on the use of digital systems to complete every day, business-critical tasks. The development of these systems has presented organisations with many opportunities to work in new, inventive and flexible ways to achieve their aims. The systems have also brought new challenges and a range of responsibilities. This component will give students an opportunity to explore how the developments in technology over recent years have enabled modern organisations to communicate and collaborate more effectively than ever before. The component is designed to allow you to explore the digital systems available to organisations and how their features have an impact on the way organisations operate. Students will explore how developments in technology have led to more inclusive and flexible working environments, and how regulation and ethical and security concerns influence the way in which organisations operate. Students will be able to analyse information in a range of vocational contexts so that you develop a greater understanding of the use of digital systems by organisations and so that you are able to make reasoned judgements on the systems. In this component, students will learn about how organisations can use technology safely and about the cyber security issues when working in a digital organisation.