Computing – Year 10

	Year 10 – Block A	Year 10 – Block B
What do we teach?	Specification: OCR (J277)	
	Students begin by focussing on Boolean Logic (paper 2) and Data storage (numbers, images, sound, and compression) (paper 2). Alongside this, students continue to develop their practical python programming skills and [re]visit computational thinking and algorithms. Finally, we end the block with a focus on the CPU's architecture and performance.	This block will continue to develop and refine practical programming and algorithm writing skills. The theoretical aspects will further be developed looking at data types and defensive design (paper 2). Students will then [re]visit computer systems – the types, memory and storage and finish the year by considering the use of technology focusing on the ethical, legal, cultural and environmental impact (paper1).
How does this meet the National curriculum?	Logic and computational thinking meet NC point 1: students understand and apply concepts of computer science, including abstraction, logic, algorithms and data representation. The frequent practical programming and the designing and writing of algorithms to solve a range of problems also meets NC point 2 and 3. Moreover, these practical opportunities further fulfils the wider expectations of the computing curriculum with students being able to develop their creativity and knowledge with using technology as well as enhancing their analytic and problem-solving skills.	Algorithms and programming meet NC points 1, 2 and 3: students understand and apply concepts of computer science and develop computational thinking techniques. NC point 3 as well as 4 is met particularly with the last unit, where technology is evaluated looking at the ethical, legal and environmental impact. This helps to ensure students are responsible, competent and confident users of technology and achieves the wider expectation of students understanding how technology affects safety and how it concerns their privacy and identity.
Why does this knowledge matter?	Computers are now an integral part of our daily lives with many people becoming reliant on its provision – at home and at work. Headlines such as: 'UK 'heading towards digital skills shortage disaster" (BBC, 2021) further reinforces the strong need and the high demand for computing knowledge and skills to be taught. Computational thinking develops the skills to help prepare students for living and working in the digital world. Growing and developing solutions to posed problems develops organisation, team-work skills and resilience. Our learning on algorithms cultivates these skills, which can apply to any project-based work.	According to Hiscox, one small business in the UK is successfully hacked every 19 seconds. With the increased reliance and exposure to computers it is crucial that students are prepared to anticipate, mitigate and resolve potential technical problems that could arise. Understanding the computer-related laws will help ensure students remain legal citizens and keep themselves protected against online dangers. This unit also allows students to develop skills in forming and presenting well-reasoned arguments and considering alternative views. Moreover, learning to code remains important as it is the fundamental skill for several jobs in the computing industry and demonstrates hard-work, determination and creativity – desirable skills for employers.
Why do we teach in this sequence?	Students learn components from paper 1 and 2 simultaneously so that links can be made across the curriculum, thus facilitating a deeper understanding of the content taught. Frequently practicing programming helps make coding a habit – 'routines of behaviour that are repeated regularly and tend to occur subconsciously' and the repetition helps promote independence and develops confidence. Block A combines brand new units with others being revisited from Key Stage Three. This order should help maximise retrieval, increase confidence and help maintain high enjoyment.	Students continue to learn content from paper 1 and 2 simultaneously and have frequent opportunities to keep practicing, refining and building on their programming skills. A foundation knowledge for several units would have been previously provided. This will allow students to feel confident as they further advance their understanding on computer systems and allow them to recognise the importance and relevance of the topics and how they relate to one another. The defensive design unit helps to prepare students for their year eleven programming, where there will be increased expectations of independent programming skills. Block B ends on a broader topic where students can revisit earlier content and begin to explore the wider impact of using technology. This also develops several skills which can be particularly useful for their work experience placement in the following term.
What career links are made?	Computing can assist with the majority of careers through digital skills as well as through the problem-solving and teamwork skills developed. Careers benefitting from this content include jobs in cybersecurity, AI, robotics, software developing and engineering.	This content can help develop skills and prepare for careers requiring public speaking and critical thinking. There are strong links with the legal system and generally working in a business. More specifically this content further helps prepare students for careers in software engineering, software developing, human resources and cyber security.

Computing – Year 11

	Year 11 – Block A	Year 11 – Block B
What do we teach?	Specification: OCR (J277)	
	We introduce networks, protocols and layers before developing our understanding further through exploring network topologies and then threats to both our computer networks and individual computer systems (paper 1). Alongside this we continue to develop our programming skills and understanding of algorithms- looking at sorting and searching methods and we explore features of programming languages and the IDE (paper 2). Towards the end of the block we revisit software, looking deeper into operating systems and utility software (paper 1).	Now students have achieved a high level of programming skill, we learn how to test our programs (paper 2). We then further develop our coding skills with more independent coding projects and we spend a significant time of this block re-visiting and revising the year's content in preparation for the summer exams. This will cover all units, particularly focusing on misconceptions that have risen during the year and practicing past exam and sample exam-style questions (paper 1 and 2).
How does this meet the National curriculum?	Students continue to meet the NC points 1, 2 and 3 with their programming and algorithm practice. Focusing on malware threats achieves NC point 4 with students becoming more competent and confident users of technology. The wider expectations of developing creativity and knowledge in computer science, developing and applying computational skills and understanding how changes in technology affect safety will also be captured with these units.	Students cover NC points 1, 2 and 3 with their programming and algorithm practice. Revisiting the curriculum topics for revision will also help fulfil the NC with students using technology to also assist with their revision, which further increases their competence and confidence with online tools.
Why does this knowledge matter?	According to CSonline, Saphos reported that 48% of UK organisations were hit by ransomware last year. With most organisations relying on networks it thus seems imperative that students gain an understanding of how these works, the threats that exist and how they can mitigate and resolve these if they were to arise. Moreover, students will likely have several personal devices that could experience some of the threats that we explore. Teaching students how to manage these effectively could therefore prevent future data and money loss. Programming benefits computational thinking, analytical thinking, creative thinking, teamwork and leadership skills. As students' confidence and experience continues to develop, they will become more confident and natural in applying these skills to new contexts, both inside and outside of the classroom.	Testing and planning are important to ensure success. When IT systems fail, billions of pounds can be lost, data can be leaked and a lot of inconvenience is caused. Computerworld.com's article of top software failures in recent-history helps demonstrate such implications. Learning to test a program helps students anticipate and prepare for user-errors, helps develop their understanding of their code, speeds up the debugging process and allows for more efficient solutions to be created. Students can then apply all stages of development to a posed problem. Allocating time to code projects independently/ in pairs really helps students develop their confidence, autonomy and creativity. Similarly, having time to revisit previous content and reinforce key learning will aid confidence and provide students with a greater appreciation of the concepts taught and how they all relate. The curriculum is designed to not only prepare students for their exams and potentially future study but also to equip them with skills and knowledge to live in the digital world.
Why do we teach in this sequence?	Students should have a strong foundation of computer systems which they can then apply to the new topics of networks. Understanding is then gradually developed to achieve a deeper appreciation of how networks are implemented and how this links to previous content. Introducing this earlier therefore allows for frequent testing and checking of understanding. Coding continues to be developed simultaneously, in order to keep refining and progressing these practical skills.	Students spend the majority of Block B building on or applying knowledge and skills taught. They should have gained a strong understanding of the concepts and have increased confidence in more independent practice. Significant time is allocated to re-visiting previous content and preparing for the summer exams. This allows for consolidation of knowledge and skills taught and provides an opportunity to reflect on the relationship between the units. This focus also helps familarise students with exam expectations and provides a good opportunity to identify and address misconceptions.
What career links are made?	Desirable career skills are developed through programming, particularly resilience, team-work, analytical thinking and leadership. Specific computing careers related to this content include: computer network architect, network/helpdesk support, IT technicians, IT /systems support engineer and network administrator. There are also strong links with careers in cyber security –e.g. cloud security consultant, software security officer and ethical hackers.	This block [re]visits a wide range of curriculum units all of which have their own career links – from jobs in machine learning and software developing to cyber security roles. More broadly, the increased confidence and competence in IT skills, developed with programming and through general technology use, will assist particularly in office-based jobs, but it will likely benefit any career using technology. Moreover, skills such as quick typing, planning and evaluating with be crucial in future career applications.