KS3 Computing & Computer Science

Curriculum Intent 2021-2022

Computer Science is a subject in demand within in a globally competitive world. It has become an ever-growing part of human life, affecting many aspects of a person's day. Computer systems are embedded ubiquitously in everyday devices, smart phones, washing machines, heating systems and vehicles, as our world embraces "The Internet of Things". Computer scientists have an impact on how our society advances by developing and maintaining these systems: whether it be for our home, work, learning or entertainment environments. Computer Science is an exciting and rapidly evolving subject that offers excellent employment prospects and well-paid careers.

The Computer Science department at Brine Leas aims to develop the mind-set of a computer scientist through equipping students with the skills to participate in a rapidly changing world. The curriculum journey incorporates challenging and engaging topics, giving students the opportunity to develop their capability, creativity and subject knowledge. It also capitalises upon, and feeds into, learning within other subject disciplines including mathematics, science and design and technology. It is these opportunities that enable students to develop and hone skills that can be applied in day-to-day life.

Steve Jobs said "Everyone should learn how to code, it teaches you to think." Computational thinking is an essential skill for everyone to have and helps in all subject areas and careers.

The curriculum has been designed to ensure learners have sufficient knowledge to stay safe online and use computers safely in life. We want students to not only understand how to use technology effectively, safely and responsibly, but also how technology is developed and constantly redeveloped into new and exciting tools. The curriculum also provides a focus on developing resilient learners who are able to recover from mistakes and effectively solve problems. This will help develop a lifelong effect of learning and how to develop themselves further and prepare for the future.

The curriculum is developed so that students are taught the principles of problem solving and computation, which prepares them to solve the problems of tomorrow, by developing learner's knowledge, skills and understanding through key computational concepts and experience. They develop understanding for all the technology that surrounds them by not just understanding how computer systems work, but how to put this knowledge to use through programming and problem solving. Building on this knowledge and understanding, students are equipped to use information technology to create programs, systems and a range of content whilst developing programming skills. Students will also analyse problems in computational terms and devise creative solutions by designing, writing, testing and evaluating programs. This also ensures that students become digitally literate – able to use, and express themselves and develop their ideas through, information technology – at a level suitable for the future workplace and as active participants in a digital world. We endeavour to make the curriculum as motivational and interesting as possible with a high level of challenge by offering breadth and depth of experiences for the students. Our aim is to ensure that students develop and

achieve ICT capability that is directly transferable, not only to other subjects, but also to the future learning pathways and beyond, developing a wide range of digital skills that will prepare learners for the future.

The key stage 3 curriculum provides challenges and new experiences in computing, digital literacy and digital media (regardless of their prior knowledge of using computers) and is designed to ensure students studying GCSE Computer Science have a basis of knowledge, skills and understanding in the fundamental concepts covered at KS4. Over time, students learn to, and develop proficiency in, program in 3 languages, starting with block-based languages before progressing to High-Level Languages. The **development** of programming skills is also built into physical Computing tasks using Micro:Bits for example coding LED lights to effectively apply the knowledge learnt in earlier Algorithm and Programming units. The curriculum journey connects to other curriculum areas holistically to ensure learning contexts are authentic, meaningful and provide opportunities for application of skills, investigation and purposeful play. In addition, references to key events and developments through the history of technology using role models from all aspects of society are used in an **inspirational** and **motivational** way for students.

We aim to enable students to develop a love for the subject and an understanding that there are no limits to their own development in programming and IT. To enthuse students to have an understanding far deeper than the interface that they currently operate. This is done by offering challenging opportunities and personal development.

A wealth of irresistible and enriching learning opportunities is open to all students to enrich educational experiences, to engage learners, and cultivate and extend lifelong effect of learning. All students in year 9 will take part in challenging opportunities by completing The Bebras challenge and achieve badges for their iDEA award. Girls in year 8 compete in the CyberFirst Girls competition. The CyberFirst Girls Competition provides a fun and challenging environment to inspire the next generation of young women to consider a career in cyber security. Furthermore, students are given the opportunity to enter a range of National Competitions such as game design and development for YGD BAFTA and competing against other secondary schools in CyberFirst and Cyber Centurion events. The CyberFirst Competition provides a fun and challenging environment to inspire the next generation of young people to consider a career in cyber security.

Due to the forever changing world of technology the curriculum and skills need is taken into account. Staff are involved with the local primary schools and the whole community including Computing at School and exam boards to ensure that the curriculum is achievable and forward thinking, to ensure that students are equipped for their future pathways.

Assessment
Each module is assessed
Quiz completed for each module
Test completed as part of whole school assessment weeks
Please see website for the formal assessment record.

Homework

Homework set on Teams

Clubs and/or intervention

Code Club
Lunchtime drop-in sessions available
Competitions

Parental/Carer support

Parents evening
Website information

Helpful sources of information

https://filestore.aqa.org.uk/resources/computing/specifications/AQA-8525-SP-2020.PDF - exam board subject homepage
https://www.senecalearning.com/ - This is a highly effective revision website that tracks pupil progress through the specification
https://www.bbc.com/bitesize/subjects/z34k7ty – BBC Bitesize revision theory and questions
https://repl.it – programming practice challenges
https://w3schools.com – tutorials, references for programming languages
www.codeacademy.com – learn technical skills in an interactive environment
www.teach-ict.com

Year 7 Overview

Knowledge	Assessment	Connections to learning	Connections to future pathways
E-safety How to become effective digital citizens? Essential for safe use of technology in their digital lives, as they become frequent users of social media and the Internet.			
➢ Computer room rules ➢ Email/respectful communication ➢ Use of OneNote ➢ Password security ➢ E-safety	➢ Teacher/pupil questioning ➢ Application of O365 ➢ Practice using Teams (homework's)	➢ Build on the IT use from primary and their homes ➢ HEE 2a, 2b ➢ SMSC 2a, 2b,2c ➢ RSEE 1g,2a,2e, 3a,b,c,d,e,f,g,h,4b	➢ Useful throughout their digital lives. ➢ GCSE Computer Science ➢ Btec Tech Award DIT

➢ Be kind-Safe use of social media.		➢ GCSE Computer Science ➢ 3.8 Impacts of digital technology on wider society	
Bits and Binary Why is Binary so important? Introduction to how data is stored in Binary Apply Binary addition to a given problem Understand how images and sound are stored using binary.			
➢ Computers use Binary. ➢ Character set is a binary bit pattern that represents character in coding methods. ➢ Binary addition to a given problem. ➢ Images stored in a binary bit pattern. ➢ Represent numbers/characters using binary. ➢ Develop knowledge of images using 1 bit image representation. ➢ Sound is analogue ➢ Computers use digital ➢ Create, modify and interpret simple logic circuit diagrams.	➢ Teacher/pupil questioning ➢ Create an image using binary bit patterns. ➢ Create simple logic gate diagrams ➢ End of unit assessment MCQs	Future learning: ➢ webpages (Yr 8) ➢ GCSE Computer Science 3.3 Data representation ➢ 3.4.2 Boolean Logic	➢ GCSE Electronics ➢ GCSE/A level Computer Science ➢ Maths Careers: ➢ Electronics
Human Computer How do computers work? **How do computers talk to each other?** Understand the hardware and software components that make up computer systems Understand how a network is set out.			
➢ To define a computer in terms of Von Neuman architecture, including inputs, outputs, process and storage; the Fetch, Decode, Execute cycle. ➢ Components of a laptop – inputs and outputs • Monitor • Keyboard • Motherboard	➢ Teacher/pupil questioning ➢ Students complete worksheets to evidence their understanding with short definitions and matching pair activities. ➢ End of unit assessment MCQs	Future learning: ➢ GCSE Computer Science 3.4.1 Hardware and software 3.4.3 Software classification 3.4.5 System architecture ➢ 3.5 Fundamentals of computer networks	➢ GCSE/A level computer science Careers: ➢ IT technician ➢ Network engineer

- CPU - RAM - ROM - Graphics Card - Sound Card - Fan - Secondary Storage ➢ Advantages and disadvantages of networking, network types and network topologies.			

<table>
<tr><td colspan="4" align="center">Research Fake news searching the web
Enable students to be able to identify fake news
Search for information efficiently</td></tr>
<tr>
<td>➢ What is fake news?
➢ Primary & secondary information
➢ Searching the internet
➢ Advanced searches
AND
OR
NOT
wildcard</td>
<td>➢ Teacher/pupil questioning
➢ End of unit assessment MCQs</td>
<td>➢ RSE 3h
Future learning:
➢ GCSE Computer Science
➢ 3.8 Impacts of digital technology on wider society</td>
<td>Research for other subject areas

Careers:
➢ Journalism</td>
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<tr><td colspan="4" align="center">App Design
Applab Inventor is an intuitive, visual programming environment that allows students to build fully functional apps for smartphones and tablets.
Blocks-based coding programs inspire intellectual and creative empowerment.</td></tr>
<tr>
<td>➢ Students introduced to App design software
➢ Students create basic Apps and emulate
➢ Plan and develop a quiz app on a chosen subject area.</td>
<td>➢ Teacher/pupil questioning
➢ Students create apps using online software
➢ Students screenshots to show their understanding in OneNote
➢ Students to emulate their App.
➢ End of unit assessment MCQs</td>
<td>Future learning:
➢ Micro:bits (Yr 8)
➢ GCSE Computer Science 3.2 Programming
➢ 3.8 Impacts of digital technology on wider society</td>
<td>➢ App designer
➢ Btec Tech Award DIT

Careers:
➢ App designer</td>
</tr>
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Year 8 Overview

Knowledge	Assessment	Connections to learning	Connections to future pathways
E-safety How to become effective digital citizens? Essential for safe use of technology in their digital lives, as they continue to become frequent users of social media and the Internet.			
➢ Computer room rules ➢ Email/respectful communication ➢ Use of OneNote ➢ Password security ➢ E-safety ➢ Be kind-Safe use of social media.	➢ Teacher/pupil questioning ➢ Practice using Teams (homeworks)	➢ HEE 2a, 2b ➢ SMSC 2a, 2b,2c ➢ RSEE 1g,2a,2e, 3a,b,c,d,e,f,g,h,4b ➢ GCSE Computer Science ➢ 3.8 Impacts of digital technology on wider society	➢ Useful in Computing GCSE and throughout their digital lives. ➢ GCSE Computer Science ➢ Btec Tech Award DIT
Data Representation Understand how data is represented. Understand representations are used to store, communicate and process information			
➢ Representations are used to store, communicate, and process information. ➢ Examples of how symbols are carried on physical media. ➢ Measure the length of a representation as the number of symbols that it contains. ➢ Binary digits are in terms of familiar symbols such as digits or letters. ➢ Characters can be represented as sequences of symbols and list examples of character coding schemes.	➢ Teacher/pupil questioning ➢ Practice using Teams (homeworks)	Future learning: ➢ Edublocks (Yr 8) ➢ GCSE Computer Science 3.3 Data representation	➢ GCSE Electronics ➢ GCSE/A level Computer Science ➢ Maths Careers: Electronics
Edublocks Simple intro to a text language programme			
➢ Understand what python is. ➢ Understand and use a variety of basic constructs in Python such as if	➢ Teacher/pupil questioning ➢ Students complete tasks using an IDLE evidence on OneNote	Previous learning: ➢ App Inv (Yr 7) ➢ Future learning: Micro:bits (Yr 8)	➢ GCSE/A level Computer Science Careers:

➢ Variables
➢ Comments
➢ IF statements
➢ Loops
➢ Lists and dictionaries.
➢ Application of basic constructs in Python
	➢ Students submit a collection of annotated codes outlining each skill.
	➢ End of unit assessment MCQs
		➢ GCSE Computer Science
		   3.1 Fundamentals of algorithms
		   3.2.1 Data types
		   ➢ 3.2.2 Programming
			➢ Web designer
			➢ Software development
			➢ Programmer

Webpages
Simple into to text language program. What language are webpages created in?

➢ Web browser ➢ HTML basic ➢ Plan a website with user in mind. ➢ Efficient website design ➢ Evidencing and evaluating website with peer review ➢ Apply feedback form (MS embedded)	➢ Teacher/pupil questioning ➢ Plan sitemap, page design and content on all pages ➢ Evidence webpages using OneNote. ➢ End of unit assessment MCQs	➢ Previous learning: ➢ App Inv (Yr 7) ➢ Future learning: ➢ GCSE Computer Science ➢ 3.2.2 Programming concepts ➢ 3.8 Impacts of digital technology on wider society	➢ Btec Tech Award DIT ➢ OCR iMedia ➢ Careers: ➢ Digital design and image manipulation ➢ Interface design ➢ Web designer ➢ Software development

Flowol
Develop logical reasoning and problem-solving talents, develop programming skills and explore the world of automatic, autonomous systems and robots.
Develop computational thinking skills.

➢ Establish the idea of computational thinking.
➢ Learn the main flow chart symbols.
➢ Understand the main tools and use of Flowol 4 software.
➢ What are sub-routines?
➢ Advantages/Disadvantages of subroutines
➢ What are sensors?
➢ Use of Input-control-output automated systems.
	➢ Teacher/pupil questioning
	➢ Students to design flowcharts for logging in to Brine leas system.
	➢ Students to screenshot flowcharts to control automated house in OneNote
	➢ End of unit assessment MCQs
		Future learning:
		➢ Flowcharts as planning tool
		➢ Algorithms
		➢ GCSE Computer Science
		   3.1 Fundamentals of algorithms
		   3.2.2 Programming concepts
		   3.2.3 Arithmetic operations in a programming language
		➢ 3.2.4 Relational operations in a programming language
			➢ GCSE/A level Computer Science
			
			Careers:
			➢ Robotics
			➢ Programmer
			➢ Telemetry analyst data in car racing

Microbits How do we program a computer?

A physical computer to give students an easy experience of coding and seeing the results instantaneously.			
➢ Know how to create basic programmes to control events on a Micro:bit. ➢ Develop programming skills, resilience and problem solving.	➢ Teacher/pupil questioning ➢ Screenshots and annotation of completed programs in OneNote. ➢ Download programs and run then on micro:bits. ➢ End of unit assessment MCQs	Previous learning: ➢ App Inv (Yr 7) Future learning: ➢ Raspberry Pi at code club (extra-curricular) ➢ GCSE Computer Science 3.1 Fundamentals of algorithms ➢ 3.2 Programming	➢ Btec Tech Award DIT ➢ GCSE/A level Computer Science Careers: ➢ Software programmer

Year 9 Overview

Knowledge	Assessment	Connections to learning	Connections to future pathways
E-safety How to become effective digital citizens? Essential for safe use of technology in their digital lives, as they continue to become frequent users of social media and the Internet.			
➢ Computer room rules ➢ Email/respectful communication ➢ Use of OneNote ➢ Password security ➢ E-safety ➢ Be kind-Safe use of social media. ➢ Legislation	➢ Teacher/pupil questioning ➢ Practice using Teams (homeworks)	➢ HEE 2a, 2b ➢ SMSC 2a, 2b,2c ➢ RSEE 1g,2a,2e, 3a,b,c,d,e,f,g,h,4b Future learning: ➢ GCSE Computer Science ➢ 3.8 Impacts of digital technology on wider society	➢ Useful in Computing GCSE and throughout their digital lives. ➢ GCSE Computer Science ➢ Btec Tech Award DIT
Computational Thinking How to use computational thinking to problem solve? Understand the need and how to follow legislation in computer science. Students to be responsible, competent, confident and creative users of information and communication technology			
➢ Apply abstraction and decomposition to a problem ➢ Eisteins Riddle ➢ Knights Tale ➢ Logic puzzles ➢ iDEA award	➢ Teacher/pupil questioning ➢ Students complete task and evidence work on OneNote	Future learning: ➢ GCSE Computer Science 3.1 Fundamentals of algorithms ➢ Problem solving ➢ Resilience	➢ Btec Tech Award DIT ➢ GCSE/A level Computer Science Careers: ➢ Project management

➢ Bebras challenge			
Python Understand and apply the fundamental principles and concepts of computer science, including abstraction, logic, and algorithms.			

➢ Understand what python is.
 ➢ Understand and use a variety of basic constructs in Python such as if
 ➢ Variables
 ➢ Comments
 ➢ IF statements
 ➢ Loops
 ➢ Lists and dictionaries
 ➢ Application of basic constructs in Python
	➢ Teacher/pupil questioning
	 ➢ Students complete tasks using an IDLE evidence on OneNote
	 ➢ Students submit a collection of annotated codes outlining each skill
	 ➢ End of unit assessment MCQs
		Previous learning:
		 ➢ App Inv (Yr 7)
		 ➢ Small basic (Yr 8)
		 ➢ Micro:bits (Yr 8)
		
		 Future learning:
		 ➢ GCSE Computer Science
		    3.1 Fundamentals of algorithms
		    3.2.1 Data types
		 ➢ 3.2.2 Programming
			➢ GCSE/A level Computer Science
			
			 Careers:
			 ➢ Web designer
			 ➢ Software development
			 ➢ Programmer

Cryptography & Cybersecurity How do we stay safe from hacker? Develop problem-solving skills, resilience, and computational thinking skills.			
➢ To understand how cryptography has been used in history. ➢ Understand the need for cryptography today. ➢ Develop skill in using a variety of ciphers.	➢ Teacher/pupil questioning ➢ Students complete evidence OneNote ➢ End of unit assessment MCQs	Future learning: ➢ GCSE Computer Science Legislation	➢ Btec Tech Award DIT ➢ GCSE/A level Computer Science Careers: ➢ GCHQ ➢ Cybersecurity ➢ Cryptologist
Ecommerce How the change in technology is affecting people's lives Develop understanding of technology within business			
➢ What is a business? ➢ What is an entrepreneur?	➢ Teacher/pupil questioning ➢ Students complete evidence OneNote ➢ End of unit assessment MCQs	Future learning: ➢ GCSE Computer Science Legislation	➢ Btec Tech Award DIT ➢ Computer Science GCSE/A level ➢ Business Studies ➢ Btec Enterprise Careers: ➢ Entrpreneur