COMPUTER SCIENCE GCSE

Course Overview

This course gives you a real, in-depth understanding of how computer technology works. The course will give you an insight into what goes on 'behind the scenes', including computer programming.

Students will be able to understand the fundamentals of computers including hardware and software, along with the basics of computer programming. This includes Algorithms and how networks are created.

Within the course, students can expect to:

- develop critical thinking, analysis and problem-solving skills
- look at the impact of computer science on society
- learn programming language such as Python and Java

Examination Board and Assessment

AQA Examination Board			
Paper 1	Computational Thinking and Problem Solving	Written examination 1 hour 30 minutes	50%
Paper 2	Written assessment	Written examination 1 hour 30 minutes	50%

Is this course right for me?

This course requires strong literacy and mathematical skills due to the coding and programming elements of the course. Students interested in working in the IT industry will find this course interesting and challenging.

COMPUTING DEPARTMENT: STATEMENT OF CURRICULUM INTENT

INTENT

In a world that's changing really quickly, the only strategy that is guaranteed to fail is not taking risks.
- Mark Zuckerberg

In computing lessons, we seek to inspire each other and learn to value greatness, ambition and achievement by making mistakes, persevering, discovering and encouraging independence. Our students are provides with fundamental communication and technological skills that they can apply in a professional and personal capacity. They become literate in logical computational thinking which can be applied to real life problem solving scenarios such as weekly shopping trip, creating a game and cooking. They also become confident in their understanding of their legal and ethical responsibility in behaviour and in staying safe online. Our department helps build resilience as students struggle before succeeding with elements such as binary manipulation, programming or logical theory. We equip students with these tools to successfully solve complex challenges by giving them the ability to independently break down, tackle and master computing problems. We also challenge students to consider the ethical and social impact around the legal and moral principles that given how an individual or a collective body conducts themselves. At present the students use of digital media as a conduit (use of social media apps) in relation to cyber bullying or internet safety while also considering if we can truly be original as we debate copyright law. Increasingly, students raise social and ethical questions with respect to how we relate to Artificially Intelligent entities, and how they relate to us as we prepare them for a future that hasn't yet been discovered. Computing provides students with the ability to make appropriate and safe decisions when using modern day technology and prepares them for life in our technologically advanced world post-16.

KS3

At KS3 students study IT, computer science and digital literacy so they have a firm foundation of knowledge to build upon as we prepare them for future life and study skills.

The KS3 curriculum is designed to ensure students have a clear understanding of the fundamental concepts of computer science while also ensuring these threshold concepts can be transferred into deeper knowledge and understanding for those who choose to take the subject further into KS4. Students start with the 'big picture', studying hardware and algorithms which gives them the skills to access later topics such as binary and hexadecimal where students study the mathematical makeup of machines. Over the 3-year curriculum, students learn to program in two computing languages, starting with block-based languages before progressing to higher-level languages such as *** At the end of KS3, we expect students to have developed programming skills to the point where they can successful apply them to physical tasks such as coding websites or controlling LED light displays.
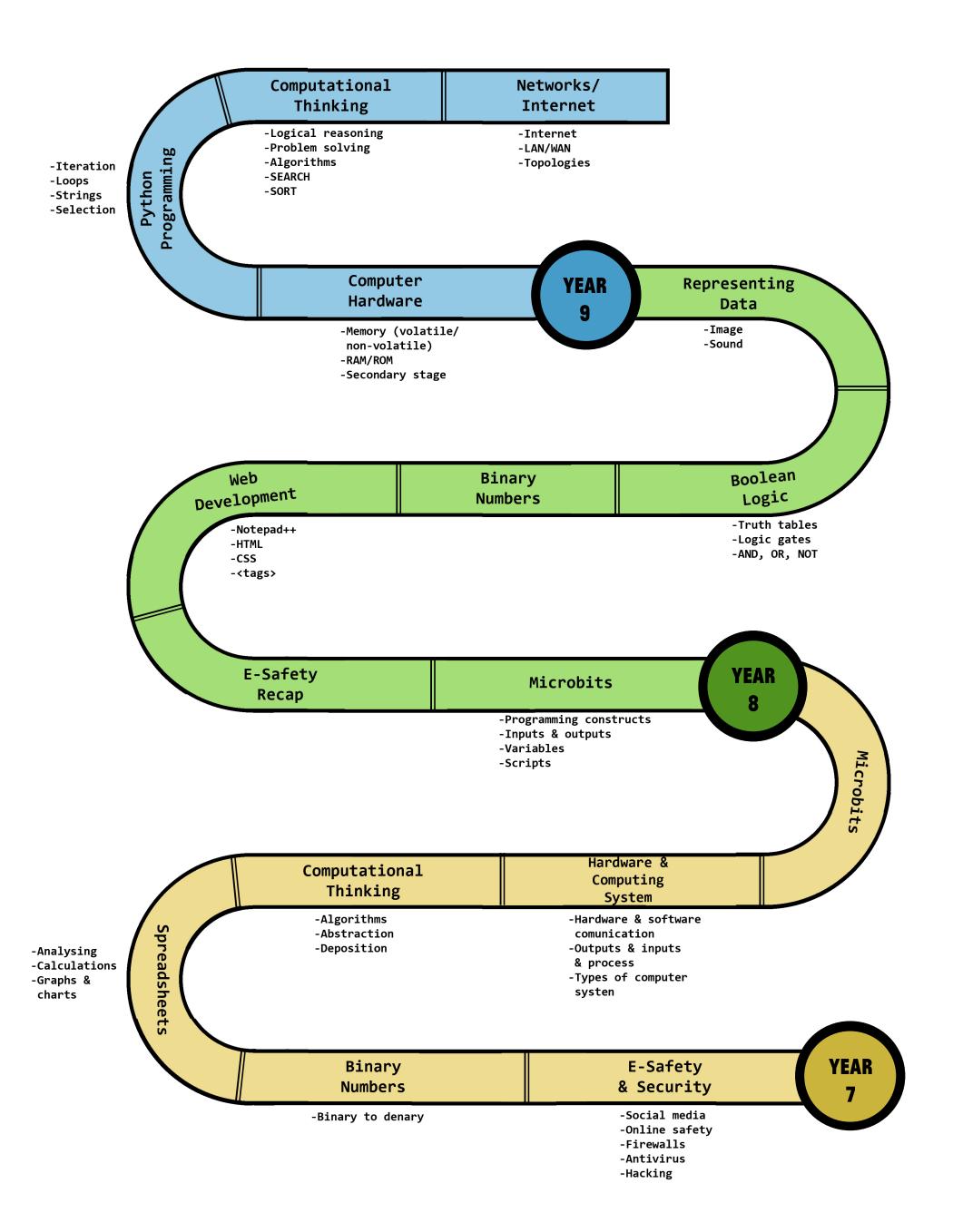
KS4

At KS4 our students study the design and development of software used to solve problems in a variety of business, scientific and social contexts. Because computers solve problems to serve people, there is a significant human side to computing as well. The most important aspect of computer science is developing knowledge and understanding of algorithms and computational thinking skills to solve problems as well as understanding how technology can be used to proactively help current issues that impact on modern society. The key aspects of Computer Science enable students to unleash their creative minds….

It is important to be cognisant of the technological trends of the 21st Century, but the intention of the Computer Science curriculum at The Brittons Academy is not simply to equip students to attain employment in a variety of information technology jobs. It is to foster within them a deep understanding of the principles outlined above, and to provide them with the communication skills, the flexibility of mind-set, and the fearlessness when tackling complex problems that will serve them so well in the future.

This Computer Science scheme of work has been developed to reflect the current National Curriculum for Computer Science in Key Stages 3 and 4, and the AQA GCSE Computer Science (8520) specification.

COMPUTING KS3

Computational Thinking
- Logical reasoning
- Problem solving
- Algorithms
- SEARCH
- SORT

Networks/ Internet
- Internet
- LAN/WAN
- Topologies

Python Programming
- Iteration
- Loops
- Strings
- Selection

Computer Hardware
- Memory (volatile/ non-volatile)
- RAM/ROM
- Secondary stage

YEAR 9

Representing Data
- Image
- Sound

Web Development
- Notepad++
- HTML
- CSS
- <tags>

Binary Numbers

Boolean Logic
- Truth tables
- Logic gates
- AND, OR, NOT

E-Safety Recap

Microbits
- Programming constructs
- Inputs & outputs
- Variables
- Scripts

YEAR 8

Microbits

Computational Thinking
- Algorithms
- Abstraction
- Deposition

Hardware & Computing System
- Hardware & software comunication
- Outputs & inputs & process
- Types of computer systen

Spreadsheets
- Analysing
- Calculations
- Graphs & charts

Binary Numbers
- Binary to denary

E-Safety & Security
- Social media
- Online safety
- Firewalls
- Antivirus
- Hacking

YEAR 7

Building Knowledge, Inspiring Futures

COMPUTING KS4

Recap

- Fundamentals of algorithms
- Data representation
- Computer systems
- Computer networks

NEA Programming Project

Cyber Security

- Social engineering
- Phishing
- Pharming
- Malicious code
- Virus, spyware, adware
- Software & user solutions

Ethical, Legal & Environmental Imapcts

- Ethical impacts
- Biometric security drones
- Legal impacts
- Copyright
- Software licensing
- Environmental impacts
- Waste disposal
- Usage
- Manufacturing cost

Programming Techniques

YEAR 11

NEA Programming Project Practice

Data Representation

- Number bases
- Binary (base 2)
- Decimal (base 10)
- Hexadecimal (base 16)
- Units of info
- Bits & bytes
- Data compression

Computer Systems

- Data type
- Selection
- Iteration
- Subroutine (procedure/ function)

Computer Networks

- System architecture
- Von Neumann architecture
- Fetch-execute cycle
- Performance of the CPU
- Operating systems
- I/0 devices
- Memory application
- Boolean logic
- NOT, AND, OR
- Hardware
- Input & output

Programming

- Arithmetic operations
- Data structure
- Arrays
- 2D arrays

Fundamentals of Algorithms

- Algorithms
- Decomposition
- Abstraction
- Pattern cognition
- Pseudo code
- Flow charts
- Trace table
- Searching & sorting

YEAR 10