COMPUTER SCIENCE
CURRICULUM MAP

Our subject vision:

Aspiration	**Mission Statement:** We aim to provide a high quality and engaging curriculum to equip students to be well-rounded digital learners and to use that knowledge to understand and solve the problems of the ever changing and challenging global world. **Knowledge:** In Computer Science we aim to use computational thinking and creativity to understand and change the world we live in. We teach students the principles of information and computation, how digital systems work, and how to put this knowledge to use through programming. We have a spiral curriculum, so key topics are revisited and built-upon such as data, computer hardware and software, networks, the internet and programming. **Skills:** Students learn the basics of a programming language each year. They then undertake a programming project/task which allows them to analyse a problem, design and devise a solution using algorithm, develop a solution, test and evaluate the produced solution. They are taught to be competent users of the school network and systems. We believe all students should think like computer scientists. **Understanding:** At the end of their study students will aspire to become digitally literate and computational thinkers. They will be prepared for further study and will be able to develop their ideas at a level suitable for the future workplace and as active participants in a digital world.
Opportunity	**Within the classroom:** In Computer Science lessons, students study a range of topics along with developing their programming skills. All students at KS3 participate in the UK Bebras Challenge which focuses on computational and logical thinking and is designed to get students excited about computing. Later they are invited to take part in the Raspberry Pie Coding Challenge. **Beyond the classroom:** Beyond the curriculum, students may participate in: • Coding club held during lunchtime • Masterclass in Computer Science • Oxfordshire ROBOCON – robotics competition • STEM event hosted by external presenter
Integrity	**Knowledge:** Computer Science understand a range of ways to use technology safely, respectfully, responsibly and securely, including protecting their online identity and privacy. They recognise inappropriate content, contact and conduct and know how to report concerns. **Skills:** Students have access to their own computers during lessons. They learn how to use and look after the computers, report any faults or damages and are encouraged to leave the workstation neat and tidy for the next person. Students understand that they must create a strong memorable and secure password which should not be shared with anyone. **Understanding:** Through their work, students demonstrate that they are competent, confident and creative users of information and communication technology. They have an increasing awareness of the importance of environmental, legal and ethical issues when using digital device/media.

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Our subject vision:

'To provide a high quality and engaging curriculum to equip students to be well-rounded digital learners and to use that knowledge to understand and solve the problems of the ever changing and challenging global world.'

- What we learn - the principles of information and computation, how digital systems work, and how to put this knowledge to use through programming.
- How we learn it - the KS3 curriculum covers the fundamental elements of Computer Science. Students are given the opportunity to cover units that will prepare them for the GCSE at Key 4. The OCR syllabus is covered at KS4.
- What makes this so important:- It is a crucial tool needed to survive in our modern world. It has become part of the way we all learn, work and entertain ourselves.
- Key assessment objectives - which can be linked throughout!
    - Acquiring and applying knowledge of the use of algorithms in computer programs to solve problems
    - Developing computer programs to solve problems
    - Evaluating the effectiveness of computer programs/solutions and the impact of, and issues related to, the use of computer technology in society
    - An understanding of current and emerging technologies, how they work and applying this knowledge in a range of contexts

How this document works:

This Curriculum Map will show you everything we do in Computer Science. It shows the learning journey from year 7 to year 11 and beyond.

At each point it will show you what is covered and how it will be assessed. Click on each topic and it will automatically take you to an explanation of why we learn it.

If you have any further questions, contact Eurion Brown: email ebrown@fitzharrys.school

SUBJECT CURRICULUM MAP: KS3

Year 7

Data Representation 1
Binary and decimal conversions
ASCII character sets
Bitmap images
Lossy and lossless compression

Computer Systems
Hardware
Input Devices
Output devices
Storage devices
CPU
Software

Scratch
Sequencing
Variables
Selection
Operators
Iteration
Problem solving 2 (project)

Online Safety 1 Induction
Cyber bullying
Computer viruses
Passwords
Health and Safety
ICT skills

Binary conversions assessment

Assessment

BEBRAS challenge
Small Basic assessment

Internet safety and Induction assessment

Year 8

Computer networks & data transmission
Introduction to computer networks
Protocols & IP addresses
Wired and Wireless networks
The internet
Exploring the WWW
Internet of things

Networking Assessment

Media self-evaluation Assessment

Using media to gain support for a cause
Features of a blog
Using images appropriately
The credibility of sources
Research and planning a blog
Promoting a cause
Use criteria to develop a blog

End of year assessment

Online Safety 2
Online grooming
Selfies
Sexting
Digital footprint
Screen time

Online safety quiz

Web Development
Introduction to HTML
HTML
CSS
HTML project

HTML project BEBRAS challenge

Computer Networks and Protocols
Networks and protocols
Networking hardware
Wired and wireless network
The Internet
Internet services
The world wide web

Network assessment

Year 9

Python Programming
Data types
Input and output
Variables
Selection
Iteration

Python programming assessment

Cyber security
You and your data
Social Engineering
Script kiddies
Attack of the bots
There's no place like 127.0.0.1
Under attack

Cyber security assessment

Small Basic
Getting started
Making decisions
Repeating
Graphics
Turtle graphics
Subroutines
Arrays

Turtle graphics design assessment

Data Representation 2: Code Breaking & Modelling
Crack the code history
Crack the code encryption
Who shot Mr Burns
Getting to know a spreadsheet
Quick calculations
Modelling

Modelling data assessment

Mobile App Development
App for that
Tappy tap app
School lab studios
User input
App development
Project completion

App Development assessment

KS4

Fundamentals of Algorithms 2
Algorithm efficiency
Searching Algorithms
Sorting Algorithms

Apps for Good
App launch
Team building
Spotting problems
Screening ideas
Understanding the user's needs
Plan build

3D Animation
Move rotate scale colour
Keyframe animation and parenting objects
Complex models and colours
Organic modelling
Lighting and cameras
Render and export animations

End of year assessment

Apps for good project

Fundamentals of Algorithms 1
Computational Thinking
Decomposition
Pattern recognition
Abstraction
Flow charts
Pseudocode

Searching and sorting assessment

BEBRAS challenge

SUBJECT CURRICULUM MAP: KS4

Further study

AS and A-levels, University degrees, Technical Awards, apprenticeships

Career pathways

Software development, AI engineering , Cyber security analyst, Games developer, Clothes designer, Music data analyst, Day trader, Web content editor, CAD designer

Year 11

Revision

Programming Processes 2

Files
Relational databases
Structured query language
Validation and authentication

Summer exams

Programming Processes 1

Subroutines
Robust and secure programming
Classification of programming languages

Y11 students have end of unit assessments after each topic

Societal Impacts

Cultural
Ethical
Legal
Environmental

Mock exams

Computer Networks

LANs, WANs and PANs
Network types and shapes
Network protocols
Four Layer Model

Programming Components 2

Input and output
String handling
Nested selection
Nested iteration
Random number generation
Subroutines

Mock exams

The Mock exam is a combined Paper 1 and Paper 2 written paper

Programming Components 3

Operations
Classification of programming languages
Arrays
Two dimensional arrays
databases

The Mock exam is a combined Paper 1 and Paper 2 written paper

Year 10

Programming Components 1

Data types
Programming concepts
Arithmetic operations
Relational operations
Boolean operations
Data structures

Y10 students have end of unit assessments after each topic.

Cyber security

Cyber security threats
Security weaknesses
Security methods

Fundamentals of Algorithms

Representing algorithms
Efficiency of algorithms
Searching algorithms
Sorting algorithms

Data Representation

Binary, decimals and hexadecimal conversions
Units of information
Binary arithmetic
Character encoding
Representing images
Representing sound
Data compression

Computer Systems

Hardware and software
Boolean Logic
Software classification
Systems Architecture
CPU registers

Year 9

1 Cyber security

Why this?	Students learn about techniques used by cybercriminals disrupt systems, and infiltrate networks and prevention. (social engineering, hacking, DDoS attack and malware).
Why now?	Students have prior knowledge of malware and online security issues from Y7 & Y8.

2 Python programming

Why this?	Students are introduced to another text-based programming language Python. They use 2 environments: the Editor and Shell They progress from simple programs to more complex iteration.
Why now?	Students build on their knowledge of programming constructs from Scratch and visual basic.

3 Fundamentals of Algorithms 1

Why this?	Students understand several key algorithms that reflect computational thinking. They use logical reasoning to compare the utility of alternative algorithms for the same problem.
Why now?	Students know how to solve problems using python. They can link it to algorithms, flowcharts and pseudocode

4 Fundamentals of Algorithms 2

Why this?	Students should use several key algorithms that reflect computational thinking, for example, algorithms for sorting and searching
Why now?	Students must be familiar with creating flowcharts .

5 Apps for Good 1

Why this?	Students will understand how problems can be solved using Technology. Student work in teams or individually to design and build an app that solves a problem they care about.
Why now?	Students build on their practical coding skills from Y8 Mobile App Development.

6 3D-Animation

Why this?	Students learn how to create and animate 3D models using basic shapes, editing tools, materials, lighting, and cameras. They explore animation techniques like keyframing and rendering to produce realistic scenes and export final outputs.
Why now?	To develop creative and technical skills in 3D modelling and animation, preparing students for digital media projects and potential careers in design, animation, and game development.

Year 8

1 Online Safety 2

Why this?	Students are using more screen time, so they must learn about leaving a digital footprint, the appropriate use of selfies and the dangers of online grooming and sexting,
Why now?	Students are at the right age to learn about these online issues. They will also be building on their knowledge from Y7.

2 Web Development

Why this?	Students learn text-based coding language to design a website. They use notepad to code html and learn new practical skills.
Why now?	Further to writing block-based coding in Year 7, students will learn a new coding language, html.

3 Computer Networks and Protocols

Why this?	Students will define network, address the benefits of networking and explain how data is transmitted across networks using protocols.
Why now?	Students have basic knowledge of hardware from Y7. They will build on this knowledge and learn about network hardware.

4 Mobile App Development

Why this?	Students take on the role from designer to project manager to developer in order to create their own mobile app. They code on Java script.
Why now?	Students build on their knowledge of programming concepts from Y7 before undertaking their project.

5 Data Representation 2: Code Breaking & Modelling

Why this?	Students learn about encryption and different methods used to crack codes. They also learn about spreadsheet modelling
Why now?	Students have prior knowledge of binary system from Y7 which they can apply to binary messages.

6 Small Basic

Why this?	Students learn a new coding language, Small Basic. They learn to code in a powerful development environment using the Editor and IntelliSense.
Why now?	Students are introduced to the Editor environment for writing the code and a different environment for running the program.

Year 7

1 Online Safety 1

Why this?	Students are online all the time and need to be taught about the risk from unsuitable content, accidentally disclosing their personal data, illegal downloads, file sharing, spyware, viruses, inappropriate advances and cyberbullying.
Why now?	Students can start the academic year knowing how to keep safe, behave sensibly online and where/who to go to for help.

2 Scratch

Why this?	Students learn block-based programming. They learn basic coding skills and how to implement programming constructs in Scratch.
Why now?	To introduce block-based programming. To use essential constructs which will be used in other programming languages in Y9 and KS4.

3 Computer Systems

Why this?	Students must understand the hardware and software components that make up a computer system and how the communicate with one another and other systems. They will understand how instructions are stored and executed within a computer system
Why now?	Students have no prior knowledge from KS2 and will need to have the basic understanding in KS3 for in depth learning at KS4.

4 Data Representation 1

Why this?	Students will understand how numbers can be represented in binary. They understand how text and images can be represented digitally in the form of binary digits
Why now?	Students have no prior knowledge from KS2

5 Networks & Data Transmission

Why this?	Students learn how devices communicate over networks, how the internet works, and how data and privacy are managed online.
Why now?	To help students understand how digital communication works, why privacy matters, and to prepare them for further study in KS4 and responsible use of technology.

6 Using Media

Why this?	Students learn how to create effective blog content, evaluate online sources for credibility, and avoid plagiarism through proper referencing. They explore features of blogs and microblogs, use formatting for clarity, and apply evaluation techniques to improve their work.
Why now?	To develop digital literacy, responsible content creation, and critical thinking skills essential for effective communication and ethical use of online information.

Year 11

1 Computer Networks

Why this?	Students can explain what a computer network is, discuss the merits of wired and wireless networking, LAN, Wan, Pan, topologies, protocols and the 4-layer TCP/IP model
Why now?	Students have learnt the basics of computer network at KS3 and computer systems in Y10. They will now build on their knowledge learning more details about the topic.

2 Programming Components 2

Why this?	Students learn and apply advanced programming concepts which include string handling nested selection, nested iteration, subroutines and random number generation.
Why now?	Students build on their knowledge and application of of programming components in Y10.

3 Programming Components 3

Why this?	Students understand and know the differences between low- and high-level languages. They understand structured approach to programming, arrays, 2-dimensional arrays and databases.
Why now?	Students build on their advanced knowledge and application of programming component 2..

4 Programming Process 1

Why this?	Students learn robust and secure programming processes. They can discuss the merits of translators, compilers, assembly languages and interpreters and the differences
Why now?	Students build on their knowledge of programming components modules in Y10 Y11.

5 Programming Processes 2 Revision

Why this?	Students understand and can create and use files, relational databases, and structured query language. They also learn testing, Validation and authentication in programming.
Why now?	Students build on their knowledge from the programming modules in Y11..

6 Revision

Why this?	Students consolidate their learning. They ruse past papers and other resources like Seneca, Educake and worksheets and directed to online learning resources for revision.
Why now?	Students have finished the syllabus and need to improve their exam technique.

Year 10

1 Computer Systems

Why this?	Students will explain Logic gates and circuits, the Von Neuman architecture and the role of main and secondary memory, the components of the CPU and Fetch-Execute cycle.
Why now?	Students have learnt the basics of computer system at KS3 and will build on their knowledge and delve into more details on the topic.

2 Data Representation 3

Why this?	Students will convert from binary, decimal and hexadecimal ,add multiply and divide binary numbers and calculate file sizes. They will understand character sets, sound, image and compression of data.
Why now?	Students have learnt the basics of data representation at KS3 and will build on that knowledge and delve into more details on the topic.

3 Fundamentals of Algorithms 3

Why this?	Students understand algorithms expressed in pseudocode and flowcharts and use these to write algorithms. They can understand and explain decomposition, abstraction, efficiency, searching and sorting algorithms.
Why now?	Students will build on their knowledge of the basics of fundamentals of algorithms which they learnt at KS3.

4 Cyber security

Why this?	Students are able to explain cyber security and cybersecurity threats. They can describe methods that suitable for protecting from cyber threats
Why now?	Students will build on their knowledge of cyber security from KS3.

5 Programming Components 1

Why this?	Students understand and use data types, operators, variable declaration and assignment. They can apply programming techniques and constructs.
Why now?	Students will build on their knowledge of programming and practical skills from KS3.

6 Societal Impact

Why this?	Students learn about the laws that govern the use of computer systems and technology.. They are able to discuss moral, ethical, legal, social and environmental issues regarding computer technology
Why now?	Students will build on their knowledge of online safety in KS3 and cyber security .in Y10.