"Whether you want to uncover the secrets of the universe, or you want to pursue a career in the 21st century, basic computer programming skills is essential skill to learn." **Stephen Hawking**

Curriculum Map Computing

Intent

It is the aim of the department to enable students to develop skills and knowledge in computer science, digital technologies and online safety to prepare them for a future in a world where the use of this technology is fully embodied.

Students will be given the opportunity to develop their computer coding skills. Learning the language of code is an important as students will be able to grasp the magic behind the computers.

Key Stage 3 Curriculum Computing

1. Design, use and evaluate computational abstractions that model the state and behaviour of real-world problems and physical systems.
2. Understand several key algorithms that reflect computational thinking [for example, ones for sorting and searching]; use logical reasoning to compare the utility of alternative algorithms for the same problem.
3. Use two or more programming languages, at least one of which is textual, to solve a variety of computational problems; make appropriate use of data structures [for example, lists, tables or arrays]; design and develop modular programs that use procedures or functions.
4. Understand simple Boolean logic [for example, AND, OR and NOT] and some of its uses in circuits and programming; understand how numbers can be represented in binary, and be able to carry out simple operations on binary numbers [for example, binary addition, and conversion between binary and decimal]

Key Stage 2 Curriculum Computing

Design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts.
Use sequence, selection, and repetition in programs; work with variables and various forms of input and output
Use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs
Understand computer networks, including the internet; how they can provide multiple services, such as the World Wide Web, and the opportunities they offer for communication and collaboration
Use search technologies effectively, appreciate how results are selected and ranked, and be discerning in evaluating digital content
Select, use and combine a variety of software (including internet services) on a range of digital devices to design and create a range of programs, systems and content that accomplish given goals, including collecting, analysing, evaluating and presenting data and information

5. Understand the hardware and software components that make up computer systems, and how they communicate with one another and with other systems. 6. Understand how instructions are stored and executed within a computer system; understand how data of various types (including text, sounds and pictures) can be represented and manipulated digitally, in the form of binary digits. 7. Undertake creative projects that involve selecting, using, and combining multiple applications, preferably across a range of devices, to achieve challenging goals, including collecting and analysing data and meeting the needs of known users Create, reuse, revise and repurpose digital artefacts for a given audience, with attention to trustworthiness, design and usability. 8. Understand a range of ways to use technology safely, respectfully, responsibly and securely, including protecting their online identity and privacy; recognise inappropriate content, contact and conduct, and know how to report concerns.	Use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact. **Strands of Computing** **Information Technology** **Computer Science** **Digital Literacy**

7	**Impact of technology – Collaborating online respectfully** **Rationale:** Important that students can effectively use the school systems to aid the transition from primary to secondary. E-safety is looked at as the first unit as its fundamental that students that students have this knowledge first. **Substantive:** Identify how to use online collaboration tools respectfully. Able to use the computing lab appropriately. **Disciplinary:** Understand the risks when using technology and how to protect against them. **Keywords:** computing, password,	**Networks** **Rationale:** As students using a network in school. How are they used to share information? **Substantive:** Recognise networking hardware and explain how networking components are used for communication. **Disciplinary:** Understand how networks can be used to retrieve and share information. **Keywords:** network, protocol, network hardware, network cable, hub, server, router, wired, wireless, WiFi, protocol, internet, world wide web, WWW, internet of things (IoT), bandwidth, connectivity	**Using media: gaining support for a cause** **Rationale:** Students now using software to support computing work. They will develop a deeper understanding of information technology and digital literacy by using their skills across the unit to create a blog post about a real world cause that they are passionate about and would like to gain support for. **Substantive:** Able to create digital products for a real-world cause. **Disciplinary:** Use software tools appropriately to support work. Select and create a range of media. **Keywords:** application software, word processor, formatting, icons, copyright, licensing, credibility,	**Programming essentials in Scratch part 1** **Rationale:** Teaching programming in Year 7 is important for two core reasons: it is a form of digital literacy and develops problem-solving skills, secondly by embedding this skill in Year 7 we can build in later years. **Substantive:** Apply the programming constructs of sequence, selection and iteration in Scratch. **Disciplinary:** Create programs independently to allow computers to solve problems. **Keywords:** sequence, selection, iteration subroutines, instructions, variable, commands, execute, input, process, output	**Programming essentials in Scratch part 2** **Rationale:** Teaching programming in Year 7 is important for two core reasons: it is a form of digital literacy and develops problem-solving skills, secondly by embedding this skill in Year 7 we can build in later years. **Substantive:** Use subroutines to decompose a problem that incorporate lists in Scratch. **Disciplinary:** Create programs independently to allow computers to solve problems. Be able to comprehend, design, create and evaluate algorithms. **Keywords:** sequence, selection, iteration subroutines, instructions, variable, commands,	**Modelling data spreadsheets** **Rationale:** The spreadsheet unit for Year 7 takes learners from having very little knowledge of spreadsheets to being able to confidently model data with a spreadsheet. This unit will give learners a good set of skills that they can use in computing lessons and in other subject areas. **Substantive:** Able to sort and filter data using formulas and functions in spreadsheet software. **Disciplinary:** Understand how data is used to represent real-world scenarios **Keywords:** spreadsheet, navigating, data, cell, cell reference, row,

	email, recipient, cyberbullying, presentation		source, audience, plagiarism, referencing, blog, sway		execute, input, process, output.	column, range, functions, formulas, charts, formatting, data and information
8	**Media: Vector graphics** **Rationale:** Vector graphics can be used to design anything from logos and icons to posters, board games, and complex illustrations. Through this unit, students will be able to better understand the processes involved in creating such graphics and will be provided with the knowledge and tools to create their own. **Substantive:** Able to create vector graphics through objects, layering and path manipulation **Disciplinary:** Able to select and create a	**Representations** **Rationale:** This unit conveys essential knowledge relating to binary representations. The activities gradually introduce learners to binary digits and how they can be used to represent text and numbers. **Substantive:** Understand how to represent numbers and text using binary digits **Disciplinary:** Understand what a computer is in terms of how data is stored. **Keywords:** representations, binary digits denary numbers, digital systems, decimal numbers, binary	**Bitmap Graphics – Movie Poster** **Rationale:** With this unit you can take learners through the entire process of creating a bitmap graphic for a set of crtieria. Building on the graphics concepts learners used in previous units. **Substantive:** Able to use bitmap software to create an asset **Disciplinary:** Create an asset using a range of tools on a bitmap software. Understand the importance of each tool. **Keywords:** vector, bitmap, pixels, photoshop, canvas, tools, objects, images,	**Computing systems** **Rationale:** This unit takes learners on a tour through the different layers of computing systems: boolean logic, hardware, software and AI **Substantive:** Explore fundamental elements that make up a computer system **Disciplinary:** Understand what a computer is, and how its constituent parts function together as a whole **Keywords:** Computer, system, device, program, software, hardware, processor, memory, storage, input and output, boolean logic, logical operators (NOT, AND, OR), truth values (true, false),	**Introduction to python programming** **Rationale:** This unit introduces learners to text-based programming with Python. The lessons form a journey that starts with simple programs involving input and output, and gradually moves on through arithmetic operations, randomness, selection, and iteration. The Year 7 Programming units are a prerequisite for this unit. **Substantive:** Apply the programming constructs of sequence, selection and iteration in Python **Disciplinary:** Create programs independently to allow computers to solve problems	**iDEA** **Rationale:** By the end of year 8 students should be capable of working independently on the Bronze badges with computers in a range of fields. iDEA is a nationally recognised qualification which is gained by students working on badges covering topics across all aspects of computing. **Substantive:** How do computers think? How are computers used to communicate? How do aspects of the virtual world work (bitcoin etc..) How do I solve problems using software? How can I stay safe? How ethical

	range of media including text, images, sounds, and video **Keywords:** digital graphics, vector image, bitmap image, paths, pixels, rectangle, ellipse, segment, arc, polygon, star, fill, stroke, select, move, resize, rotate, group, ungroup, align, distribute, union, difference, intersection, object, path, node, freehand, logo, illustration, icons	numbers, conversion (between number systems), units, ASCII	text, font, layers transform, crop, saturation, white space, resolution, JPEG, PNG	logic gates, logic circuits, artificial intelligence.	**Keywords:** programming language, input, output, variables, assignment, sequence, selection, logical (if else) iteration, execution	are some aspects of virtual society? **Disciplinary:** Students will learn/ retrieve a wide range of computer skills and knowledge to gain their award, the badges cover all aspects of digital learning. **Keywords:** citizenship, ethics, communication, presentation, problem solving, creativity, design, research, evaluation, management, production, coding
9	**Cybersecurity** **Rationale:** Builds on safety concepts previously looked at in Year 7. Focus now on techniques cybercriminals use to steal data, disrupt	**Media: animations** **Rationale:** Films, television, computer games, advertising, and architecture have been revolutionised by computer-based 3D modelling and animation. In this unit	**Data science** **Rationale:** In this unit, learners will be introduced to data science, and by the end of the unit they will be empowered by knowing how to use data.	**Representations: going audiovisual** **Rationale:** Draws on familiar examples of composing images out of individual elements, mix elementary colours to produce new ones, take samples of analogue signals	**iDEA** **Rationale:** By the end of year 9 students should be capable of working independently on the Bronze and Silver badges with computers in a range of fields. iDEA is a nationally recognised	**Physical computing** **Rationale:** Use physical computing to demonstrate skills picked up in prior programming. Physical computing offers tactile and sensory

	systems, and infiltrate networks. **Substantive:** Identify how users and organisations can protect themselves from cyberattacks **Disciplinary:** Understand the risks when using technology and how to protect against them. **Keywords:** Data, information, cybersecurity, cybercriminals, privacy, data protection, malware, social engineering, phishing, blagging, shouldering, scam, ethical hacking, penetration testing, brute force attacks, DoS (denial of service), DDoS (distributed denial of service), viruses,	learners will discover how professionals create 3D animations using the industry-standard software package **Substantive:** Create 3D animations through object manipulation and tweaking and adjusting lighting and camera angles **Disciplinary:** Select and create a range of media including text, images, sounds, and video. **Keywords:** Object, sphere, cone, add, move, rotate, scale, colour, keyframe, tweening, stop motion, animation, timeline, parenting, scale, extrude, face, edge, vertex, render, lights, camera, focus.	**Substantive:** Use data to investigate problems Represent data on a spreadsheet **Disciplinary:** Able to analyse data using a range of techniques. Able to create a spreadsheet using a range of techniques to create a spreadsheet of data. **Keywords:** data science, visualisation, infographic, spreadsheet, formula, function, data, cell, cell reference, row, column, range, autofill, chart, pie chart, bar, series, axis/axes, labels, headers, function, maximum, minimum, vlookup, header, filter, average, criteria, condition, conditional formatting	to illustrate these ideas, and then bring all these things together to form one coherent narrative. **Substantive:** Represent images and sounds using binary digits **Disciplinary:** Understand how instructions are stored and executed within a computer system in the form of binary digits. **Keywords:** binary image representation, pixels, resolution, colour depth, representation size, compression, sound, waves, microphone, speaker, analogue, digital, sound representation, sampling rate, sample size	qualification which is gained by students working on badges covering topics across all aspects of computing. **Substantive:** How do I use algorithms to solve problems? How do computers think? How are computers used to communicate? How do aspects of the virtual world work (bitcoin etc..) How do I solve problems using software? How effective are existing solutions? How can I stay safe? How ethical are some aspects of virtual society? **Disciplinary:** Students will learn/ retrieve a wide range of computer skills and knowledge to gain their award, the badges cover all aspects of digital learning. All students will also learn/ utilise skills in time planning.	experience to enhance learning. **Substantive:** Able to use sensing and controlling with the micro:bit **Disciplinary:** Create programs independently to allow computers to solve problems **Keywords:** Input, output, sensors, hardware components, selection, iteration, expressions, prototype, decomposition

	firewall, authentication				**Keywords:** citizenship, ethics, communication, presentation, problem solving, creativity, design, research, evaluation, management, production, coding	