COMPUTING PROGRESSION DOCUMENT
**Computing**

A high-quality computing education equips pupils to use computational thinking and creativity to understand and change the world. Computing has deep links with mathematics, science and design and technology.

**Intent:**

At Ayresome Primary School, we aim to provide a high-quality Computing curriculum that challenges our children to not only consume technology but to create it.  This will equip children with the skills and knowledge they need to use technology safely, responsibly and creatively, in the home and beyond and inspire a lifelong love of play, design, code and invention with technology. Computing is solving complex problems, being able to collaborate with others and learn from our mistakes. We want children to become independent and to have fun with technology while developing skills for the 21$^{st}$ century and beyond! As technology evolves, we want to build resilience in our children in using new technology. We believe in a curriculum that meets the interests of all learners, with a range of exciting creative activities and open-ended challenges based on the essential requirements of the computing program of study, incorporating Computer Science, Information Technology and Digital Literacy. We believe that there are non-negotiable digital skills that children must possess: -

- All children must have a basic understanding of coding and how the web works.
- All children must be able to evaluate online information and be social media savvy.
- All children must understand online safety rules and know how to report and block.
- All children must be proficient with word processing.
- All children must be able to create visually engaging content/presentations in order to present learning to others.
- All children must have experience of online collaboration and using communication tools.
- All children must be taught the concept of personal archiving and possess their own digital portfolio of work.
- All children are able to articulate how technology can be used across the curriculum in a supportive way.

Today's children and young people are growing up in a digital world. As they grow older, it is crucial that they learn to balance the benefits offered by technology with a critical awareness of their own and other's online behaviour, and develop effective strategies for staying safe and making a positive contribution online. Online Safety is an integral part of our computing curriculum to ensure that our children live knowledgeably, responsibly and safely in a digital world.

**Implementation:**

Our Computing curriculum follows the Teach Computing scheme of work.   The Teach Computing scheme puts creativity and collaboration to the fore.  It draws on deep and extensive knowledge of computing, progression and continuity, and is well planned, innovative, cross-curricular, and stretching yet accessible. The scheme is comprised of six units per year group that covers programming, creating a vast array of digital media, computer systems and networks and data and information. Teach Computing provides clear guidance for core steps with extensions to consider for home and school. These include suggestions for stretch and challenge, and how content can be adapted for pupils with SEND or EAL. Teach Computing gives children opportunities to solve a real-life problem using digital technology. In each year group there are two units each on computing science and information technology, one unit on computer systems and networks and one unit on data and information with digital literacy throughout.

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A complete curriculum ensures that all three strands are covered. Computational thinking should be a key component of a computing curriculum as it is not only useful for helping develop algorithms and programming but it also develops problem solving skills that can be used in all aspects of life.  At Ayresome Primary School, computing is taught through standalone lessons and promoted through other cross-curricular subjects including maths, science and design and technology.  Teachers ensure that a range of teaching and learning approaches are used in the delivery of computing lessons and that assessment for learning is used effectively to drive progress for all learners.  Further to this, we will ensure that students develop and understand the links to everyday life and the relevance that technology has in their lives.

**Impact:**

Our Computing Curriculum has been structured to demonstrate a progression of skills and ensures that children can build on their understanding, as each new concept and skill is taught with opportunities for children to revisit skills and knowledge as they progress through school. Pupils leave Ayresome with a secure understanding of the academic content of our national curriculum and by the end of each key stage, pupils are expected to know, apply and understand the skills and processes specified in the relevant programme of study. Our Computing curriculum provides the children with the skills and knowledge needed for the next chapter and later life. Our scheme of work ensures that children know how to keep themselves safe and that they are alert to social media and the risks of being online. We aim for all of our children to leave us as respectful, skilful, ambitious young people equipped to embrace technology through their lives, especially in a town evolving as a digital centre and striding for city status.

**Cultural capital in Computing at Ayresome Primary School:**

As Ayresome Primary School is in an area of high deprivation and poverty, it is very important for us to ensure that we expose our children to a wide range of technology and that children are given the opportunity to access technology that they don't have at home, for example VR headsets.

Throughout Early Years there are opportunities for children to become more culturally aware using the immediate environment of home, school and local area.  Technology is used in the form of images and videos to bring the world into the classroom as stated in Development Matters. In this way, our youngest children use technology to observe the natural world. Expectations around pupils becoming effective communicators are enhanced in school in partnership with increasing parental engagement through the use of technology.

Throughout Key Stage 1 and Key Stage 2, pupils' life skills are further developed by using technology. The varied and rich enhancements offered to pupils develop their range of vocabulary and debating skills around technology for the 21st century. By the end of primary school, pupils are confident and clear communicators who are able to articulate their views and opinions, in a range of situations, thus enabling them to become responsible digital citizens who enhance the community they live in.

| Computing Science | ICT | Digital Literacy |
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| Pupils learn to follow simple instructions and the language associated with this.<br>Pupils learn to move a basic floor turtle using simple instructions and understand the relationship between cause and effect. | Pupils learn to open simple apps to play games.<br>Pupils learn to use a camera to take pictures/photographs.<br>Pupils learn to zoom in and out using a camera or camera app.<br>Pupils learn to create a video using a camera or camera app.<br>Pupils learn how to close apps and return to the homepage.<br>Pupils use apps to create marks and music.<br>Pupils use technology to listen to videos and audiobooks. | Pupils learn to identify risks or danger.<br>Pupils understand they are responsible for technology and have autonomy.<br>Pupils know and understand that an adult should know what they are doing when using technology.<br>Pupils understand there are rules they need to follow when using technology. |
| **Key Vocabulary** | | |
| instructions, forwards, backwards, left, right, arrows, move, go, start, finish, Beebot, | iPad, app, camera, picture, photo(graph), zoom, video, homepage, audiobook | internet, games, apps, safe, adult, danger, technology, rules |

| | Computer Science: | ICT: | Digital Literacy: |
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| YEAR 1: | Pupils will be introduced to early programming concepts.  They will explore using individual commands, both with other pupils and as part of a computer program.  They will identify what each command for the floor robot (BeeBot) does, and use that knowledge to start predicting the outcome of programs.  Pupils will be introduced to on-screen programming through ScratchJr.  They will explore the way a project looks by investigating sprites and backgrounds.  They will use programming blocks to use, modify and create programs.  Pupils will also be introduced to the early stages of program design through the introduction of algorithms. | Pupils will develop their understanding of a range of tools used for digital painting.  They will use these tools to create their own digital paintings, while gaining inspiration from a range of artists' work.  Pupils will consider their preferences when painting with and without the use of digital devices.  Pupils will develop their understanding of using a computer to create and manipulate text.  They will become more familiar with using a keyboard and mouse to enter and remove text.  Pupils will also consider how to change the look of their text, and will be able to justify their reasoning in making these changes.  They will consider the differences between using a computer to create text and writing on paper.  They will be able to explain their reasoning for choosing this. | Pupils will develop their understanding of technology and how it can help them in their everyday lives.  They will start to become familiar with the different components of a computer by developing their keyboard and mouse skills.  Pupils will also consider how to used technology responsibly. |
| YEAR 2: | Pupils will develop their understanding of instructions in sequences and the use of logical reasoning to predict outcomes.  They will use given commands in different orders to investigate how the order affects the outcome.  They will also learn about design in programming.  Pupils will develop artwork and test it for use in a program.  They will design algorithms and then test those algorithms as programs and debug them.  Pupils will begin to understand that sequences of commands have an outcome and they will make predictions based on their learning.  They will use and modify designs to create their own quiz questions in ScratchJr and create their own | Pupils will learn to recognise that different devices can be used to capture photographs and they will gain experience capturing editing and improving photos.  They will use this knowledge to recognise that images they see may not be real.  Pupils will use computers to create music.  They will listen to a variety of pieces of music and consider how music can make them think and feel.  They will compare creating music digitally and non-digitally.  Pupils will look at patterns and purposefully create music. | Pupils will develop their understanding of what digital technology is and will begin to identify examples.  They will discuss where they have seen digital technology in school and beyond, in settings such as shops, hospitals and libraries.  They will then investigate how digital technology improves our world and they will learn about the importance of use it responsibly. |

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| | designs using blocks of code. Pupils will evaluate their work and make improvements to their programming projects. | | |
| YEAR 3: | Pupils will explore the concept of sequencing in programming through Scratch. They be introduced to a selection of motion, sound, and event blocks which they will use to create their own programs featuring sequences. Pupils will focus on all aspects of sequences and will ensure that knowledge is built in a structured manner. Pupils will also apply stages of program design.<br>Pupils will explore the links between events and actions, while consolidating prior learning relating to sequencing. Pupils will begin by moving a sprite in four directions (up, down, left, and right). They will then explore movement within the context of a maze, using design to choose an appropriately sized sprite. Pupils are given the opportunity to draw lines with sprites and change the size and colour of lines. Pupils will design and code their own maze-tracing program. | Pupils will use a range of techniques to create a stop-frame animation using tablets. They will apply those skills to create a story-based animation. Pupils will also add other types of media to their animation, such as music and text.<br>Pupils will become familiar with the terms 'text' and 'images' and understand that they can be used to communicate messages. They will use desktop publishing software and consider careful choices of font size, colour and type to edit and improve premade documents. Pupils will be introduced to the terms 'templates', 'orientation', and 'placeholders' and begin to understand how these can support them in making their own template for a magazine front cover. They will start to add text and images to create their own pieces of work using desktop publishing software. Pupils will look at a range of page layouts thinking carefully about the purpose of these and evaluate how and why desktop publishing is used in the real world.<br>Pupils will develop their understanding of what a branching database is and how to create one. They will use yes/no questions to gain an understanding of what attributes are and how to use them to sort groups of objects. Pupils will | Pupils will develop their understanding of digital devices with an initial focus on inputs, processes and outputs. They will also compare digital and non-digital devices. Pupils will be introduced to computer networks, including devices that make up a network's infrastructure, such as wireless access points and switches. They will discover the benefits of connecting devices in a network. |

| | | create physical and on-screen branching databases. They will create an identification tool using a branching database, which they will test by using it. They will also consider real-world applications for branching databases. | |
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| YEAR 4: | Pupils will create programs by planning, modifying, and testing commands to create shapes and patterns. They will use Logo, a text-based programming language.
Pupils will explore the concept of repetition in programming using the Scratch environment. Pupils will look at the difference between count-controlled and infinite loops, and use their knowledge to modify existing animations and games using repetition. They will design and create a game which uses repetition, applying stages of programming design throughout. | Pupils will identify the input device (microphone) and output devices (speaker or headphones) required to work with sound digitally. They will discuss the ownership of digital audio and the copyright implications of duplicating the work of others. In order to record audio themselves, pupils will use Audacity to produce a podcast, which will include editing their work, adding multiple tracks, and opening and saving the audio files. Pupils will evaluate their work and give feedback to their peers.
Pupils will develop their understanding of how digital images can be changed and edited, and how they can then be resaved and reused. They will consider the impact that editing images can have, and evaluate the effectiveness of their choices.
Pupils will consider how and why data is collected over time. They will consider the senses that humans use to experience the environment and how computers can use special input devices called sensors to monitor the environment. Pupils will collect data as well as access data captured over long periods of time. They will look at data points, data sets, and logging intervals. They will spend time using a computer to review and analyse data. Pupils will pose questions and then use data loggers to | Pupils will apply their knowledge and understanding of networks to appreciate the internet as a network of networks which need to be kept secure. They will learn that the World Wide Web is part of the internet, and will be given opportunities to explore the World Wide Web for themselves in order to learn about who owns content and what they can access, add and create. Pupils will evaluate online content to decide how honest, accurate, or reliable it is, and understand the consequences of false information. |

| | | automatically collect the data needed to answer those questions. | |
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| YEAR 5: | Pupils will use physical computing to explore the concept of selection in programming through the use of the Crumble programming environment. They will be introduced to a microcontroller (Crumble controller) and learn how to connect and program it to control components (including output devices — LEDs and motors). Pupils will be introduced to conditions as a means of controlling the flow of actions in a program. They will make use of their knowledge of repetition and conditions when introduced to the concept of selection (through the 'if...then...' structure) and write algorithms and programs that utilise this concept.  They will design and make a working model of a fairground carousel that will demonstrate their understanding of how the microcontroller and its components are connected, and how selection can be used to control the operation of the model.<br><br>Pupils will develop their knowledge of 'selection' by revisiting how 'conditions' can be used in programming, and then learning how the 'if… then… else...' structure can be used to select different outcomes depending on whether a condition is 'true' or 'false'. They will represent this understanding in algorithms, and then by constructing programs in the Scratch programming environment. They will learn how to write programs that ask questions and use selection to control the outcomes based on the answers given. They will use this knowledge to | Pupils will learn how to create short videos by working in pairs or groups. They will be exposed to topic-based language and develop the skills of capturing, editing, and manipulating video. Pupils will be guided with step-by-step support to take their idea from conception to completion. Pupils will have the opportunity to reflect on and assess their progress in creating a video.<br><br>Pupils will look at how a flat-file database can be used to organise data in records. They will use tools within a database to order and answer questions about data. They will create graphs and charts from their data to help solve problems. They will also use a real-life database to answer a question and present their work to others.<br><br>Pupils will start to create vector drawings. They will learn how to use different drawing tools to help them create images. They will learn to recognise that images in vector drawings are created using shapes and lines and each individual element in the drawing is called an object. Pupils will be taught to layer their objects and begin grouping and duplicating them to support the creation of more complex pieces of work. | Pupils will develop their understanding of computer systems and how information is transferred between systems and devices. They will consider small-scale systems as well as large-scale systems. They will explain the input, output and process aspects of a variety of different real-world systems. Pupils will discover how information is found on the World Wide Web, through learning how search engines work (including how they select and rank results) and what influences searching, and through comparing different search engines. |

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| | design a quiz in response to a given task and implement it as a program. Pupils will evaluate their program by identifying how it meets the requirements of the task, the ways they have improved it and further ways it could be improved. | | |
| YEAR 6: | Pupils will explore the concept of variables in programming through games in Scratch. They will find out what variables are and relate them to real-world examples of values that can be set and changed. They will use variables to create a simulation of a scoreboard. Pupils will experiment with variables in an existing project, then modify them, before they create their own project. Pupils will design their own project and apply their knowledge of variables and design to improve their games in Scratch. | Pupils will be introduced to creating websites for a chosen purpose. They will identify what makes a good web page and use this information to design and evaluate their own website using Google Sites. Pupils will be introduced to spreadsheets. They will be supported in organising data into columns and rows to create their own data set. Pupils will be taught the importance of formatting data to support calculations, while also being introduced to formulas and will begin to understand how they can be used to produce calculated data. Pupils will be taught how to apply formulas that include a range of cells, and apply formulas to multiple cells by duplicating them. They will use spreadsheets to plan an event and answer questions. They will create charts and evaluate their results in comparison to questions asked. Pupils will develop their knowledge and understanding of using a computer to produce 3D models. They will initially familiarise themselves with working in a 3D space, moving, resizing and duplicating objects. They will then create hollow objects using placeholders and combine multiple objects to create a model of a desk tidy. Pupils will examine the benefits of grouping and ungrouping 3D objects before | Pupils will explore how data is transferred over the internet. They will initially focus on addressing, before they move on to the makeup and structure of data packets. Pupils will look at how the internet facilitates online communication and collaboration. They will learn how to communicate responsibly by considering what should and should not be shared on the internet. |

| | | moving on to planning, developing and evaluating their own 3D model of a building. | |
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KS3

Pupils should be taught to:

- Design, use and evaluate computational abstractions that model the state and behaviour of real-world problems and physical systems
- 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
- 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
- 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]
- Understand the hardware and software components that make up computer systems, and how they communicate with one another and with other systems
- 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
- 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, re-use, revise and re-purpose digital artefacts for a given audience, with attention to trustworthiness, design and usability
- 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.

GCSE

All pupils must have the opportunity to study aspects of information technology and computer science at sufficient depth to allow them to progress to higher levels of study or to a professional career. All pupils should be taught to:

- Develop their capability, creativity and knowledge in computer science, digital media and information technology
- Develop and apply their analytic, problem-solving, design, and computational thinking skills
- Understand how changes in technology affect safety, including new ways to protect their online privacy and identity, and how to identify and report a range of concerns.

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CAREERS IN COMPUTING:

Computer and Information Research Scientist. Computer Network Architect. Computer Support Specialist. Computer Systems Analyst. Database Administrator. Information Security Analyst. Network and Computer Systems Administrator. Software Developer. YouTuber / vlogger Blogger Rendering programmer Gameplay programmer Console programmer Games designer Technical artist Mobile engine programmer Recruitment consultant: Games industry UI artist. Assistant producer: mobile games Data analyst Games writer Video artist / Editor Technical sales engineer (manufacturing) Technical project manager (manufacturing) CAD technician AutoCad designer CAD engineer Architectural CAD Technician Structural CAD Technician IT manager Hardware systems engineer Communications, Media & Technology Strategy Consultant Legal Technology Marketing & Communications Manager PR & Communications Manager