



Ark John Archer Primary Academy *Computing*



Computing: Rationale

The Ark John Archer Computing Curriculum acknowledges that computational devices and software are a part of everyday life and that civilised society is becoming increasingly reliant on technology to guide practice and developments. The curriculum is designed therefore to equip pupils with the computational thinking, knowledge and understanding required to be successful in the future workplace; participate effectively in an ever-changing digital world; address challenges and opportunities offered by the technologically rich world in which we live; become active innovators and critical thinkers in the digital age.

The curriculum has been developed to focus and build on three core areas; programming, coding and e-safety with a careful and consistent progression of skills and knowledge that allows the pupil to make the necessary connections to piece their learning together throughout their learning journey. As children progress through the Computing Curriculum, explicit links and connections are made to support pupils to continually build upon the knowledge and skills they have accumulated in previous year groups.

The sequence of learning builds pupils' understanding of how computers and a range of computational systems work, and how they are designed and programmed. Pupils learn to design and build their own programs and develop their ideas using a range of technology; creating, evaluating and refining content designed for a variety of purposes and audiences. As pupils grow in competency and begin to think computationally, they are better able to conceptualise, understand and use computer-based technology. They feel empowered to draw upon familiar and unfamiliar software and technology to solve problems and design systems with increasing confidence, while recognising the power and limits of both human and machine intelligence. The ideas of computing are applied to understanding real-world systems and creating purposeful products; invention, creativity and resourcefulness are all encouraged.

In Key Stage One, pupils begin to explore the impact and common uses of information technology beyond school and within the wider society. They develop a foundational understanding of what algorithms are, how they are implemented as programs on digital devices, and that programs execute by following precise and unambiguous instructions. They use this knowledge to create and debug simple programs, using technology purposefully to create, organise, store, manipulate and retrieve digital content. Pupils further draw upon their knowledge and logical reasoning to predict the behaviour of simple programs.



As they enter Key Stage Two, pupils continue to expand their experience and knowledge of computational systems, networks and software. They design, write and debug programs that target a particular audience and accomplish specific goals, with increasing complexity. They learn to control and simulate physical systems, using sequence, selection, and repetition in programs, and working with a range of variables and various forms of input and output. Pupils use logical reasoning to explain how simple algorithms work and to detect and correct errors in algorithms and program, solving problems by decomposing them into smaller parts and components. Pupils grow in confidence in their understanding and use of the Internet and the opportunities this offers for communication and collaboration. They learn to use search technologies, are taught to appreciate how results are selected and ranked, and develop the knowledge required to effectively evaluate digital content for purpose, audience and safety.

While pupils develop a secure understanding and ability to engage with a range of technological programs, software and devices, all learning is underpinned by the principles of online safety, with all lessons making direct reference to safe practices when necessary. Pupils are taught to use technology safely, respectfully and responsibly. They learn to keep personal information private and grow increasingly more confident to recognise the differences between acceptable and unacceptable online behaviour and how to approach this. Pupils learn where to go for help and support when they have concerns about content, identifying a range of ways to report concerns about both content and contact through a range of technological devices.

Computing: *Our Aims*

- Pupils understand and apply the fundamental principles and concepts of computer science, including abstraction, logic, algorithms and data representation.
- Pupils are confident to analyse problems in computational terms, and have repeated practical experience of writing computer programs in order to solve such problems.
- Pupils are able to evaluate and apply information technology, including new or unfamiliar technologies, analytically to solve problems.
- Pupils become responsible, competent, confident, safe and creative users of information and communication technology.

Computing: *Programming Progression Map*

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Programming [Autumn Term]	<p>We are painters: Pupils engage with the illustrations in the books they read. Use the web safely to find ideas for an illustration and select and use appropriate painting tools to create and change images on the computer. Understand how this use of ICT differs from using paint and paper. Create an illustration for a particular purpose, knowing how to save, retrieve and change their work. Reflect on their work and act on feedback received.</p>	<p>We are photographers: Review photos online, considering the technical and artistic merits of photographs. Use a digital camera or camera app¹¹ to take digital photographs. Review and reject or pick images; edit and enhance photos; select the best images to include in a shared portfolio.</p>	<p>We are presenters: Learn how to make a short narrated video of themselves practising a sport or other skill, and to use this to help improve their performance. Gain skills in shooting live video, such as framing shots, holding the camera steady, and reviewing. Edit video, including adding narration and editing clips by setting in/out points. Understand the qualities of effective video, such as the importance of narrative, consistency, perspective and length.</p>	<p>We are software developers: Play and analyse educational computer games, identifying features that make a game successful. Plan and design a game using selection and repetition, with a clear target audience in mind. Create a working prototype using a range of variables, develop it further to add functionality and improve the user interface. Recognise the importance of user interface design, including consideration of input and output. Test games and make any necessary changes, including debugging.</p>	<p>We are game developers: Create original artwork (including characters and backgrounds) and sound for a game. Design and create a computer program for a sequence, selection, repetition and variables. Detect and correct errors in computer game. Use iterative development techniques (making and testing a series of small changes) to improve a game.</p>	<p>We are adventure gamers: Learn some of the syntax of a text-based programming language. Use commands to display text on screen, accept typed user input, store and retrieve data using variables and select from a list. Plan a text-based adventure with multiple 'rooms' and user interaction. Thoroughly debug the program.</p>
	<p>We are storytellers: Use sound recording equipment to record sounds. Develop skills in saving and storing sounds on the computer. Understand how a talking book differs from a paper-based book. Talk about and reflect on their use of ICT, sharing recordings with an audience.</p>	<p>We are researchers: Develop collaboration skills through working as part of a group. Develop research skills through searching for information on the internet. Improve note-taking skills through the use of mind mapping. Develop presentation skills through creating and delivering a short multimedia presentation.</p>	<p>We are vloggers: Research using web-based sources and a search engine. Design and deliver an interesting and engaging presentation. Search for, and evaluate, online images, while also creating their own original images. Create a screencast video of a narrated presentation, with video content and a recorded spoken commentary. Develop understanding of how the internet, the web and search engines work.</p>	<p>We are musicians: Learn to use one or more programs to edit music¹² and create and develop a musical composition for a purpose and audience. Refining ideas through reflection and discussion. Develop an awareness of how their composition can enhance work in other media.</p>	<p>We are architects: Understand the work of architects, designers and engineers working in 3D. Develop familiarity with a simple CAD (computer-aided design) tool. Develop spatial awareness by exploring and experimenting with a 3D virtual environment. Develop greater aesthetic awareness.</p>	<p>We are advertisers: Think critically about how video is used to promote a cause, reviewing existing adverts and promotional films. Storyboard an effective advert for a cause. Work collaboratively to shoot suitable original footage and source additional content, acknowledging intellectual property rights. Work collaboratively to edit the assembled content to make an effective advert.</p>

Computing: Coding Progression Map

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Coding [Spring Term]	<p>We are treasure hunters: Understand how to program a toy to move around a map to find buried treasure. They start by thinking of algorithms for their routes, then input and record these instructions as stored programs for the robot.</p>	<p>We are astronauts: Program a sprite (such as a spaceship) to move around the screen. Have a clear understanding of algorithms as sequences of instructions, converting simple algorithms to programs. Predict what a simple program will do and learn to spot and fix (debug) errors in programs.</p>	<p>Scratch: Design, write and debug programs that accomplish specific goals. Use sequence and repetition in programs. Work with different forms of input and output. Use of software to create a range of programs that accomplish given goals.</p> <p>Powerpoint: Use sequence and selection in programs. Use logical reasoning to explain how some simple algorithms work, and to detect and correct errors in algorithms. Use a variety of software to design and create content that accomplish given goals, including presenting data and information.</p> <p>Excel: Design, write and debug programs that accomplish specific goals, including simulating physical systems. Use selection in program, working with variables and various forms of input and output. Use a variety of software on a range of digital devices to design and create a range of programs, systems and content to accomplish given goal, including analysing data.</p>	<p>Scratch: Design, write and debug programs that accomplish specific goals. Use sequence and repetition in programs. Work with variables and various forms of input and output. Use logical reasoning to explain how simple algorithms work. Use software to design and create programs.</p> <p>Lightbot: Design, write and debug programs that accomplish specific goals. Solve problems by decomposing them into smaller parts. Use sequence, selection and repetition in programs. Use logical reasoning to explain how some simple algorithms work, and to detect and correct errors in algorithms and programs.</p> <p>w3schools: Work with various forms of input and output. 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.</p>	<p>Kodu: Design, write and debug programs that accomplish specific goals. Use sequence and selection 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. Use software to design and create programs.</p> <p>Logo: Design, write and debug programs that accomplish specific goals. Use repetition programs. Work with variables. Use logical reasoning to explain how some simple algorithms work, and to detect and correct errors in algorithms and programs.</p> <p>Snap!: Design, write and debug programs that accomplish specific goals. Solve problems by decomposing into smaller parts. Use sequence and selection 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.</p>	<p>Python: Design, write and debug programs that accomplish specific goals, including simulating physical systems. 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. Use a variety of software to design and create programs that accomplish given goals.</p> <p>App Inventor: Design, write and debug programs that accomplish specific goals, including simulating physical systems. Solve problems by decomposing them into smaller parts. Use sequence 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.</p> <p>MakeCode for Micro:Bit: Design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems. Use sequence, selection and repetition in programs; work with variables and various forms of input and output.</p>

Computing: E-Safety Progression Map

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
E-Safety [Summer Term]	<p>We are kind and thoughtful: Understand that unkind behaviour online can affect other people, even though we can't see them and explore how we can apply online safety rules to any concerns they may have about their online activities.</p> <p>We are responsible internet and device users: Understand the very basic principles of what the internet is and how people use it. Understand that using computer devices too often can be bad for us and we should take time out from technology to do other things. Discuss what to do if they see or hear something online that upsets them.</p> <p>We are information protectors: Understand what is meant by 'personal information' and recognise that anyone online who we don't know in real life is a stranger. Understand how we can protect our personal information, including reporting worries to trusted adults.</p> <p>We are good digital citizens: Understand what is meant by 'digital citizen', and how to be responsible, respectful and safe online. Understand that being a good digital citizen means having a kind heart, a warning tummy and a thinking brain; all things that keep us safe online. recall what to do if something happens online that makes them feel uncomfortable.</p>	<p>We are not online bullies: Understand the concept of online bullying and the role of the bystander. Develop an understanding of the consequences of online bullying. Recall online safety rules for reporting concerns and inappropriate behaviour.</p> <p>We are safe searchers: Understand the very basic principles of how search engines work and the key steps for searching the web safely. Understand how to report concerns when searching the web.</p> <p>We are code masters: Understand that passwords are an important part of keeping information safe and explore the differences between strong and weak passwords. Understand that sharing a password makes it weak.</p> <p>We are online behaviour experts: Understand that the way technology is used is as important as good online behaviour, exploring the way technology impacts the people around us. Further develop responses to incidents of poor behaviour online.</p> <p>We are game raters: Recognise the PEGI age rating system for digital games. Understand that the system is useful for helping people decide which games are</p>	<p>We are digital friends: Begin to understand that information shared online cannot always be controlled. Develop a deeper understanding of the consequences of online bullying for both victims and perpetrators. Understand the role of a bystander in online bullying.</p> <p>We are internet detectives: Assess the trustworthiness of websites, learning how to decide if a website is trustworthy. Develop a checklist of clues to critically compare websites. Understand that not all links are safe or trustworthy. Understand different ways to report concerns and inappropriate behaviour.</p> <p>We are aware of our digital footprint: Understand that every time we use the internet we leave a digital trail that can be found, copied, shared and broadcast. Explore this in the context of apps.</p> <p>We are netiquette experts: Understand that good online behaviour is important for making the internet an enjoyable and safe place for everyone. Understand that email is a widely used form of digital communication that lasts forever and can be shared.</p>	<p>We are standing up to peer pressure: Understand that peer pressure can be a positive and negative influence. Understand that access to the internet is not the same for everyone. Recall ways to report concerns and inappropriate behaviour.</p> <p>We are aware that our online content lasts forever: Understand that because of the internet, information can be spread more quickly and reach more people now than at any time in the past. Understand that although information posted on the internet might not always be true or accurate, it lasts forever.</p> <p>We are online risk managers: Understand the risks involved in clicking on and opening links on suspicious websites and in emails. Understand that hacking can be illegal and has consequences for the hacker. Develop awareness of viruses and what to do if they think their account has been compromised.</p> <p>We are respectful of digital rights and responsibilities: Understand that both digital rights and responsibilities are important to ensure the internet is a great place for everyone. Understand that there are consequences for</p>	<p>We are responsible for our online actions: Understand that we must take responsibility for our own actions regardless of what others are doing. Pupils take on the role of characters in online safety scenarios and make decisions about who the bystanders are and whether the scenario constitutes online bullying. They decide how each character should respond to the situation.</p> <p>We are content evaluators: Understand that some online content creators are paid by companies to support their products. They learn how vloggers can get paid and start to ask probing questions about online content.</p> <p>We are protecting our online reputation: Understand that posting inappropriate, rude or offensive content online can affect our online reputation. Pupils consider how a negative online reputation might affect us and discuss different ways they can help prevent putting something online they might later regret.</p> <p>We are respectful of copyright: Understand that copyright rules exist to protect original content creators. Pupils review a scenario to work out if copyright rules apply and what the rights and</p>	<p>We will not share inappropriate images: Pupils will learn about the consequences of sharing inappropriate images. They discuss why people might post such images and how these could be requested by others.</p> <p>We are safe social networkers: Pupils learn how we can minimise the risks of using social networking sites. They learn that most popular networking sites have age restrictions which should be adhered to. Pupils discuss ways of reducing risks when using social networking sites.</p> <p>We are respectful to others: Understand that everyone has a right to privacy and that they need to be mindful of protecting other people's personal information online. We are safe gaming experts: Understand possible online safety risks of online gaming, including exposure to inappropriate content, bullying and trolling, and bribery.</p>

<p>We are responsible gamers: Understand the importance of playing games in shared spaces where grown-ups are available for support. Understand the importance of taking breaks away from technology.</p>	<p>appropriate. Understand what to do if someone nearby is playing a game, which is inappropriate for them.</p>	<p>We are avatar creators: Understand that internet identities are actively constructed by the user. Recognise that internet identities can be misleading or not representative of the creator. Recall that personal information should not be shared by anyone online who we do not know in real life.</p>	<p>knowingly ignoring rights. Further develop a positive and responsible attitude towards technology and internet use.</p> <p>We are careful when talking to virtual friends: Understand that virtual friends are still strangers that they do not know. Apply their knowledge of online safety to decide what information they, as virtual friends, can safely share online. Recap rules for reporting suspicious or uncomfortable online situations.</p>	<p>responsibilities are of the parties involved. They will then review how copyrighted content could be used in school and provide alternatives for this.</p> <p>We are game changers: Learn the different ways that game developers ensure their games are successful and make money. They discover different strategies to help guide them when making good choices about the games they play and then apply their knowledge to create a safe online gaming guide.</p>	
<p>We are collectors: Use web search engines to collect pictures of different types of animals and then explore ways in which those pictures can be organised. Apply principles of online safety when exploring the internet.</p>	<p>We are detectives: Children are challenged to solve a mystery by reading, sending and replying to emails, and by listening to a witness statement. They use a fact file sheet to create a table and identify the culprit. Develop skills in editing and formatting text in emails, apply principals for online safety when doing so.</p>	<p>We are communicators: Learn how to use email and video conferencing safely. Apply knowledge of online safety to collect, analyse, evaluate and present information, drawing upon a variety of application software, including both desktop based programs and internet-based services.</p>	<p>We are HTML editors: Learn about the history of the web, before studying HTML (hypertext mark-up language), the language in which web pages are written. They learn to edit and write HTML, and then use this knowledge to create a web page, considering some of the risks faced when using the web.</p>	<p>We are bloggers: Learn how to publish for a worldwide audience, while also commenting on others' work to extend pupils' sense of membership of a learning community beyond school. Pupils create a media-rich blog, comment on blogs and respond to comments. Apply learning about online safety when creating blog posts and analyse content.</p>	<p>We are travel writers: Learn how to document an educational visit; research the destination and explore different routes; capture photographs, audio and video. Add this content to a digital map and select a medium through which to showcase their shared media content, in consideration of principals of online safety.</p>