



## **Computing Subject Leaders' Sequence and Progression Document**

### **INTRODUCTION**

The purpose of this document is to outline the approach and method that has been adopted to implement the Computing curriculum at St. Andrew's. It sets out what we aim to achieve and the knowledge and understanding that we have apportioned to each class and key stage. The decisions made have been done so by reference to the school's *Mission Statement*, the staff and Governing Body's vision for the future of our school. This document summarises the organisation of the Computing curriculum and the school's method of securing children's entitlement to essential knowledge and skills to equip them for the next stage of their education and for later life.

### **AIMS**

- To ensure standards remain high and English and Maths is taught discretely
- To ensure reading remains a high priority
- To utilise the rich resource and history of our local community of Boothstown
- To support our school's values and ethos
- To ensure pupils leave as 'well rounded' and confident individuals
- To ensure the wider sports curriculum and the arts are a key focus

### **LIFESKILLS WE DEVELOP**

- Resilience
- Assertiveness and confidence
- Self esteem
- Communication skills
- Social skills
- Coping skills
- Stress management
- Problem solving
- Emotional awareness

### **END POINTS IN THE CURRICULUM**

Our high-quality computing education at St. Andrew's equips pupils to benefit from the global technology revolution. The three pillars of progression detailed in the Computing National Curriculum (digital literacy, information technology and computer science) are necessary for business, industry and for individuals to thrive in our ever-changing world, which we as a school recognise. Computing has deep links with mathematics, science and design and technology. Our curriculum enhances these links, whilst ensuring that computing is taught discretely and thoroughly. We ensure that our pupils at St. Andrew's:

- Understand and apply the fundamental principles of computer science
- Can analyse problems in computational terms
- Have experience of writing programs and de-bugging them
- Can evaluate and apply information technology
- Can problem solve and be analytical
- Are responsible, competent and confident users of information and communication technology
- Can express themselves and their ideas creatively using information and communication technology

- Know how to use technology safely and be a responsible digital citizen

## **INTENT**

At St. Andrew's, we offer a structured sequence of lessons which enable our pupils to cover the skills and knowledge required to meet the aims of the National Curriculum. The content we teach allows for a broad, deep understanding of computing and helps children to link their computing learning to 'real-life' situations. We offer a range of opportunities for consolidation, challenge and variety. We intend for our pupils to apply the fundamental principles and concepts of computer science to a variety of situations and challenges. Our pupils develop analytical problem-solving skills and learn to evaluate and apply information technology. As mentioned above, we intend for our pupils to be responsible, competent, confident and create users of information technology. As a school, we pride ourselves on the high-quality hardware we have that the children are able to use in their day-to-day computing lessons. We recognise that our pupils are entitled to quality hardware and software and we ensure a structured and progressive approach to the learning of the skills needed to enable them to use it effectively. Computing is integrated into other subject areas and is used daily as a tool to enhance learning. As we intend for our pupils to be responsible digital citizens, e-safety is taught through computing lessons, PSHE lessons and whole school assemblies. This ensures that our children are equipped with the knowledge and skills to remain safe and become positive members of the online world.

## **CULTURAL CAPITAL**

Our computing curriculum supports our school's values and ethos. In computing lessons, children are taught how to work independently and also how to work with their peers collaboratively. Teachers encourage our pupils to listen to others, respect each other, develop resilience, develop their communication skills and to use and develop their problem solving skills. Moreover, we encourage our pupils to take ownership of their ideas and to recognise the value of information held on ICT systems. Children develop their knowledge and understanding of important ideas, processes and skills and relate these to everyday experiences. Our pupils are aware of the security of their own and other people's information in electronic form. Children consider the origin and quality of information and its fitness for purpose. Children evaluate, critically, the use of ICT and recognise the strengths and limitations of ICT. Through computing lessons, our pupils are encouraged to be confident and able to overcome challenges.

## **IMPLEMENTATION**

We provide a relevant, challenging and enjoyable curriculum for computing, fulfilling the statutory requirements of the National Curriculum and also covers the government's Education for a Connected World framework (2020). Computing is taught discretely from year 1 to year 6, with each year group teaching at least 18 computing lessons plus at least 3 online safety lessons. These online safety lessons are in addition to PSHE lessons covering online safety and whole school assemblies, such as Safer Internet Day. Children in EYFS have access to technology, as part of continuous provision.

Three strands run throughout our computing curriculum:

- Computer science
- Information technology
- Digital literacy

These three standards are then organised into five key learning areas:

- Computing systems and networks
  - Identifying hardware and using software, while exploring how computers communicate and connect to one another.
- Programming
  - Understanding that a computer operates on algorithms, and learning how to write, adapt and debug code to instruct a computer to perform set tasks.
- Creating media

- Learning how to use various devices — record, capture and edit content such as videos, music, pictures and photographs.
- Data handling
  - Ensuring that information is collected, recorded, stored, presented and analysed in a manner that is useful and can help to solve problems.
- Online safety
  - Understanding the benefits and risks of being online — how to remain safe, keep personal information secure and recognising when to seek help in difficult situations.

Our computing curriculum is a spiral curriculum. We ensure that pupils revisit the five key areas throughout KS1 and KS2. Each time a key area is revisited, it is covered with greater complexity. Upon returning to each key area, prior knowledge is utilised so pupils can build on previous foundations, rather than starting again. Teachers record evidence of learning in computing in floor books and make use of knowledge organisers to assist children with their learning. Teachers assess the children every term on our assessment system, Target Tracker. Teachers also constantly assessing formatively during computing lessons. Teachers have access to CPD videos on Kapow. These are used as and when necessary.

### **IMPACT**

Learning in computing is enjoyed across the school. Teachers have high expectations and quality evidence is presented in floor books. Children use digital and technological vocabulary accurately, alongside a progression in their technical skills. They are confident using a range of hardware and software and will produce high-quality purposeful products. Children see the digital world as part of their world, extending beyond school, and understand that they have choices to make. They are confident and respectful digital citizens going on to lead happy and healthy digital lives. Children are problem solvers who are able to overcome challenge, showing resilience and confidence. Children's declarative knowledge is deepened and their procedural knowledge is built upon. Declarative knowledge and procedural knowledge are identified by staff, sequenced and connected in our computing curriculum.

**Computing Long Term Plan updated with new EY framework**

N 3-4	Use tablets and magnifying app					
Rec	Laptops available as part of continuous provision.					
	Aut 1	Aut 2	Spr 1	Spr 2	Sum 1	Sum 2
Y1	E-safety  Improving mouse skills  Introduction to data		E-safety  Algorithms unplugged  Digital imagery		E-safety  Bee-bot	
Y2	E-safety  What is a computer?		E-safety  Algorithms and debugging	E-safety  International space station	E-safety  Scratch Jr	Stop motion
Y3	E-safety  Networks and the internet  Journey inside a computer		E-safety  Scratch  Comparison cards databases		E-safety  Video trailers	
Y4		E-safety  Collaborative learning	E-safety  Further coding with Scratch	E-safety  Investigating weather	E-safety  Computational thinking	E-safety  Website design
Y5	E-safety  Search engines		E-safety  Mars Rover	E-safety  Stop motion animation	E-safety  Programming music	E-safety  Mars Rover 2
Y6	E-safety  Skills showcase	E-safety  Bletchley Park	E-safety  History of computers		E-safety  Intro to Python	E-safety  Big data 1

**NC Content – Computing (Understanding the World in EY) updated to new EY framework (Declarative knowledge)**

Nurs 3-4		Talk about what they see -use tablets with magnifying app
Rec		Laptops available as part of continuous provision

**Computing systems and networks**

YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6
To know that "log in and log out" means to begin and end a connection with a computer. To know that a computer and mouse can be used to click, drag, fill and select and also add backgrounds, text, layers, shapes and clip art. To know that passwords are	To know the difference between a desktop and laptop computer. To know that people control technology. To know that buttons are a form of input that give a computer an instruction about what to do	To know what a tablet is and how it is different from a laptop/desktop computer. To understand what a network is and how a school network might be organised. To know how the internet uses networks to	To understand that software can be used collaboratively online to work as a team. To know that you can use images, text, transitions and animation in presentation slides.	To know how search engines work. To understand that anyone can create a website and therefore we should take steps to check the validity of websites. To understand what copyright is. To know the	To understand the importance of having a secure password and what "brute force hacking" is. To know that the first computers were created at Bletchley Park to crack the Enigma code to help the war effort in World War 2

important for security. To know that when we create something on a computer it can be more easily saved and shared than a paper version. To know some of the simple graphic design features of a piece of online software.	(output). To know that computers often work together.	share files. To know what a packet is and why it is important for website data transfer. To know the roles that inputs and outputs play on computers. To know what some of the different components inside a computer are e.g. CPU, RAM, hard drive, and how they work together		difference between ROM and RAM.	
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### **Programming**

YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6
To understand that an algorithm is when instructions are put in an exact order. To understand that decomposition means breaking a problem into manageable chunks and that it is important in computing. To know that we call errors in an algorithm 'bugs' and fixing these 'debugging'. To understand the basic functions of a Bee-Bot. To know that you can use a camera/tablet to make simple videos. To know that algorithms move a bee-bot accurately to a chosen destination.	To understand what machine learning is and how that enables computers to make predictions. To know that abstraction is the removing of unnecessary detail to help solve a problem. To know that coding is writing in a special language so that the computer understands what to do. To understand that the character in ScratchJr is controlled by the programming blocks. To know that you can write a program to create a musical instrument or tell a joke.	To know that Scratch is a programming language and some of its basic functions. To understand how to use loops to improve programming. To understand how decomposition is used in programming. To understand that you can remix and adapt existing code.	To understand that a variable is a value that can change (depending on conditions) and know that you can create them in Scratch. To know what a conditional statement is in programming. To understand that pattern recognition means identifying patterns to help them work out how the code works. To understand that algorithms can be used for a number of purposes e.g. animation, games design etc	To know that a soundtrack is music for a film/video and that one way of composing these is on programming software. To understand that using loops can make the process of writing music simpler and more effective.	To know that there are text-based programming languages such as Logo and Python. To know that nested loops are loops inside of loops

### **Creating media**

YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6
To understand that holding the camera still and considering angles and light are important to take good pictures. To know that you can edit, crop and filter photographs. To know how to		To know that different types of camera shots can make my photos or videos look more effective. To know that I can edit photos and videos using film editing software.		To understand that stop motion animation is an animation filmed one frame at a time using models, and with tiny changes between each photograph. To know that	

search safely for images online.		To understand that I can add transitions and text to my video.		decomposition of an idea is important when creating stop-motion animations. To know that editing is an important feature of making and improving a stop motion animation.	
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### **Data handling**

YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6
	To understand that you can enter simple data into a spreadsheet. To understand what steps you need to take to create an algorithm. To know what data to use to answer certain questions. To know that computers can be used to monitor supplies.		To know that computers can use different forms of input to sense the world around them so that they can record and respond to data. This is called 'sensor data'. To know that a weather machine is an automated machine that responds to sensor data. To understand that weather forecasters use specific language, expression and pre-prepared scripts to help create weather forecast films	To know that Mars Rover is a motor vehicle that collects data from space by taking photos and examining samples of rock. To know what numbers using binary code look like and be able to identify how messages can be sent in this format. To know what simple operations can be used to calculate bit patterns.	To know that data contained within barcodes and QR codes can be used by computers. To know that Radio Frequency Identification (RFID) is a more private way of transmitting data. To know that data is often encrypted so that even if it is stolen it is not useful to the thief.

### **Online safety**

YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6
To know that the internet is many devices connected to one another. To know that you should tell a trusted adult if you feel unsafe or worried online. To know that people you do not know on the internet (online) are strangers and are not always who they say they are. To know that to stay safe online it is important to keep personal information safe. To know that 'sharing online means giving	To understand the difference between online and offline. To understand what information I should not post online. To know what the techniques are for creating a strong password. To know that you should ask permission from others before sharing about them online and that they have the right to say 'no.' To understand that not everything I	To know that not everything on the internet is true: people share facts, beliefs and opinions online. To understand that the internet can affect your moods and feelings. To know that privacy settings limit who can access your important personal information, such as your name, age, gender etc. To	To understand some of the methods used to encourage people to buy things online. To understand that technology can be designed to act like or impersonate living things. To understand that technology can be a distraction and identify when someone might need to limit the amount of time spent using technology. To understand what	To know different ways we can communicate online. To understand how online information can be used to form judgements. To understand some ways to deal with online bullying. To know that apps require permission to access private information and that you can alter the permissions. To know where I	To know that a 'digital footprint' means the information that exists on the internet as a result of a person's online activity. To know what steps are required to capture bullying content as evidence. To understand that it is important to manage personal passwords effectively. To understand what it means to have a positive online reputation. To

something specific to someone else via the internet and 'posting' online means placing information on the internet.	see or read online is true.	know what social media is and that age restrictions apply	behaviours are appropriate in order to stay safe and be respectful online.	can go for support if I am being bullied online or feel that my health is being affected by time online.	know some common online scams.
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<b>Computing Skills (Procedural knowledge)</b>					
<b>Computing</b>					
<b>YEAR 1</b>	<b>YEAR 2</b>	<b>YEAR 3</b>	<b>YEAR 4</b>	<b>YEAR 5</b>	<b>YEAR 6</b>
<b>Computer science</b>					
<p>Learning how to operate a camera or tablet to take photos and videos. Learning how to explore and tinker with hardware to find out how it works. Learning where keys are located on the keyboard. Learning that decomposition means breaking a problem down into smaller parts. Using decomposition to solve unplugged challenges. Using logical reasoning to predict the behaviour of simple programs. Developing the skills associated with sequencing in unplugged activities. Following a basic set of instructions. Assembling instructions into a simple algorithm. Programming a Floor robot to follow a planned route. Learning to debug instructions when things go wrong. Learning to debug an algorithm in an unplugged scenario.</p>	<p>Understanding what a computer is and that it's made up of different components. Recognising that buttons cause effects and that technology follows instructions. Learning how we know that technology is doing what we want it to do via its output. Developing confidence with the keyboard and the basics of touch typing. Articulating what decomposition is. Decomposing a game to predict the algorithms used to create it. Learning that there are different levels of abstraction. Explaining what an algorithm is. Following an algorithm. Creating a clear and precise algorithm. Using logical thinking to explore software, predicting, testing and explaining what it does. Using an algorithm to write a basic computer program.</p>	<p>Using decomposition to explain the parts of a laptop computer. Using decomposition to explore the code behind an animation. Using repetition in programs. Using logical reasoning to explain how simple algorithms work. Explaining the purpose of an algorithm. Forming algorithms independently. Using logical thinking to explore more complex software; predicting, testing and explaining what it does. Incorporating loops to make code more efficient. Continuing existing code. Understanding what the different components of a computer do and how they work together. Drawing comparisons across different types of computers. Learning about the purpose of routers. Understanding the role of the key components</p>	<p>Using decomposition to solve a problem by finding out what code was used. Using decomposition to understand the purpose of a script of code. Identifying patterns through unplugged activities. Using abstraction to identify the important parts when completing both plugged and unplugged activities. Creating algorithms for a specific purpose. Coding a simple game. Using abstraction and pattern recognition to modify code. Incorporating variables to make code more efficient. Using tablets or digital cameras to film a weather forecast. Understanding that weather stations use sensors to gather and record data which predicts the weather. Understanding that computer networks provide multiple services, such as the World Wide Web, and opportunities for</p>	<p>Decomposing animations into a series of images. Decomposing a story to be able to plan a program to tell a story. Predicting how software will work based on previous experience. Writing more complex algorithms for a purpose. Iterating and developing their programming as they work. Confidently using loops in their programming. Using a more systematic approach to debugging code, justifying what is wrong and how it can be corrected. Writing code to create a desired effect. Using a range of programming commands. Using repetition within a program. Learning that external devices can be programmed by a separate computer. Learning the vocabulary associated with data: data and transmit. Recognising that computers transfer data in binary and understanding</p>	<p>Decomposing a program into an algorithm. Using past experiences to help solve new problems. Writing increasingly complex algorithms for a purpose. Debugging quickly and effectively to make a program more efficient. Remixing existing code to explore a problem. Using and adapting nested loops. Programming using the language Python. Changing a program to personalise it. Evaluating code to understand its purpose. Predicting code and adapting it to a chosen purpose. Learning about the history of computers and how they have evolved over time. Using the understanding of historic computers to design a computer of the future. Understanding and identifying barcodes, QR codes and RFID. Identifying devices and applications that can scan or read barcodes, QR codes and RFID.</p>

		<p>of a network. Identifying the key components within a network, including whether they are wired or wireless. Understanding that websites and videos are files that are shared from one computer to another. Learning about the role of packets. Understanding how networks work and their purpose. Recognising links between networks and the internet. Learning how data is transferred.</p>	<p>communication and collaboration.</p>	<p>simple binary addition. Learning that messages can be sent by binary code, reading binary up to eight characters and carrying out binary calculations.</p>	
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### Information technology

<p>Using a basic range of tools within graphic editing software. Taking and editing photographs. Developing control of the mouse through dragging, clicking and resizing of images to create different effects. Developing understanding of different software tools. Recognising devices that are connected to the internet. Understanding that we are connected to others when using the internet. Recognising common uses of information technology, including beyond school. Understanding some of the</p>	<p>Developing word processing skills, including altering text, copying and pasting and using keyboard shortcuts. Using word processing software to type and reformat text. Using software (and unplugged means) to create story animations. Creating and labelling images. Searching for appropriate images to use in a document. Collecting and inputting data into a spreadsheet. Interpreting data from a spreadsheet. Learning how computers are used in the wider world.</p>	<p>Taking photographs and recording video to tell a story. Using software to edit and enhance their video adding music, sounds and text on screen with transitions. Recognising how social media platforms are used to interact.</p>	<p>Use online software for documents, presentations, forms and spreadsheets. Using software to work collaboratively with others. Understanding why some results come before others when searching. Understanding that information found by searching the internet is not all grounded in fact. Searching the internet for data. Understanding that data is used to forecast weather. Recording data in a spreadsheet independently. Sorting data in a spreadsheet to compare using the 'sort by...' option. Designing a device which gathers and</p>	<p>Using logical thinking to explore software more independently, making predictions based on their previous experience. Using software programme Sonic Pi/Scratch to create music. Using the video editing software to animate. Identify ways to improve and edit programs, videos, images etc. Independently learning how to use 3D design software package TinkerCAD. Developing searching skills to help find relevant information on the internet. Understanding how data is collected in remote or dangerous places. Understanding how data might</p>	<p>Using logical thinking to explore software independently, iterating ideas and testing continuously. Using search and word processing skills to create a presentation. Understanding how search engines work. Understanding how barcodes, QR codes and RFID work. Gathering and analysing data in real time. Creating formulas and sorting data within spreadsheets. Learning how 'big data' can be used to solve a problem or improve efficiency.</p>
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ways we can use the internet.			records sensor data. Understanding that software can be used collaboratively online to work as a team.	be used to tell us about a location. Learn about different forms of communication that have developed with the use of technology.	
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**Digital Literacy**

<p>Logging in and out and saving work on their own account. When using the internet to search for images, learning what to do if they come across something online that worries them or makes them feel uncomfortable. Understanding how to interact safely with others online. Recognising how actions on the internet can affect others. Recognising what a digital footprint is and how to be careful about what we post.</p>	<p>Learning how to create a strong password. Understanding how to stay safe when talking to people online and what to do if they see or hear something online that makes them feel upset or uncomfortable. Identifying whether information is safe or unsafe to be shared online. Learning to be respectful of others when sharing online and ask for their permission before sharing content. Learning strategies for checking if something they read online is true.</p>	<p>Recognising that different information is shared online including facts, beliefs and opinions. Learning how to identify reliable information when searching online. Learning how to stay safe on social media. Considering the impact technology can have on mood. Learning about cyberbullying. Learning that not all emails are genuine, recognising when an email might be fake and what to do about it.</p>	<p>Recognising that information on the internet might not be true or correct and that some sources are more trustworthy than others. Learning to make judgements about the accuracy of online searches. Identifying forms of advertising online. Recognising what appropriate behaviour is when collaborating with others online. Reflecting on the positives and negatives of time spent online. Identifying respectful and disrespectful online behaviour.</p>	<p>Identifying possible dangers online and learning how to stay safe. Evaluating the pros and cons of online communication. Recognising that information on the internet might not be true or correct and learning ways of checking validity. Learning what to do if they experience bullying online. Learning to use an online community safely</p>	<p>Learning about the positive and negative impacts of sharing online. Learning strategies to create a positive online reputation. Understanding the importance of secure passwords and how to create them. Learning strategies to capture evidence of online bullying in order to seek help. Using search engines safely and effectively. Recognising that updated software can help to prevent data corruption and hacking.</p>
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