Progression in Computing

All years

Clearwell C of E Primary School

Children should be taught	Progression in knowledge, skills and understanding by the end of the phase, children will be able to		
About hardware **(Computer Science)**	Year 2	Year 4	Year 6
	• Explore and tinker with hardware to find out how it works. • Recognise that some devices are input devices and others are output devices. • Understand what a computer is and that it's made up of different components. • Know how we know that technology is doing what we want it to do via its output. • Know where keys are located on the keyboard and develop confidence with the keyboard and the basics of touch typing. • Use greater control when taking photos with cameras, tablets or computers and know how to operate a camera or tablet to take photos and videos. • Know that buttons cause effects and that technology follows instructions.	• Know what the different components of a computer do and how they work together. • Draw comparisons across different types of computers. • Know about the purpose of routers. • Use tablets or digital cameras to film a weather forecast. • Understand that weather stations use sensors to gather and record data which predicts the weather.	• Know that external devices can be programmed by a separate computer. • Know the difference between ROM and RAM. • Recognise how the size of RAM affects the processing of data. • Understand the fetch, decode, execute cycle. • Learn about the history of computers and how they have evolved over time. • Use the understanding of historic computers to design a computer of the future. • Understand and identify barcodes, QR codes and RFID. • Identify devices and applications that can scan or read barcodes, QR codes and RFID. • Understand how corruption can happen within data during transfer (for example when downloading, installing, copying and updating files.

Progression in Computing

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Children should be taught	Progression in knowledge, skills and understanding by the end of the phase, children will be able to		
About Networks and Data Representation **(Computer Science)**	Year 2	Year 4	Year 6
		• Understand that computer networks provide multiple services, such as the World Wide Web, and opportunities for communication and collaboration. • Understand the role of the key components of a network. • Identify the key components within a network, including whether they are wired or wireless. • Understand that websites and videos are files that are shared from one computer to another. • Learn about the role of packets. • Understand how networks work and their purpose. • Recognise links between networks and the internet. Learn how data is transferred.	• Learn the vocabulary associated with data: data and transmit. • Learn how the data for digital images can be compressed. • Recognis that computers transfer data in binary and understanding simple binary addition. • Relate binary signals (Boolean) to the simple character-based language, ASCII. • Learn that messages can be sent by binary code, reading binary up to eight characters and carrying out binary calculations. • Understand how bit patterns represent images as pixels. • Understand that computer networks provide multiple services.

Progression in Computing

All years

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Children should be taught	Progression in knowledge, skills and understanding by the end of the phase, children will be able to		
Computational Thinking **(Computer Science)**	Year 2	Year 4	Year 6
	• Learn that decomposition means breaking a problem down into smaller parts and articulating this. • Use decomposition to solve unplugged challenges. • Use logical reasoning to predict the behaviour of simple programs. • Develop the skills associated with sequencing in **unplugged activities**. • Follow a basic set of instructions. • Assemble instructions into a simple **algorithm**. • Follow an algorithm. • Create a clear and precise algorithm. • Learn that programs execute by following precise instructions. • Incorporate loops within algorithms. • Decompose a game to predict the algorithms used to create it. • Learn that there are different levels of **abstraction**. • Use decomposition to solve unplugged challenges. • Use logical reasoning to predict the behaviour of simple programs. • Develop the skills associated with sequencing in unplugged activities. • Learn that programs execute by following precise instructions. Incorporating loops within algorithm.	• Use decomposition to explore the code behind an animation. • Use repetition in programs. • Use logical reasoning to explain how simple algorithms work. • Explain the purpose of an algorithm. • Form algorithms independently. • Use decomposition to solve a problem by finding out what code was used. • Use decomposition to understand the purpose of a script of code. • Identify patterns through unplugged activities. • Use past experiences to help solve new problems. • Use abstraction to identify the important parts during both plugged and unplugged activities. • Use decomposition to explain the parts of a laptop computer. • Explain the purpose of an algorithm.	• Decompose a program without support. • Predict how software will work based on previous experience. • Use past experiences to help solve new problems. • Write increasingly complex algorithms for a purpose. • Decompose a program into an algorithm. • Decompose animations into a series of images. • Decompose a story to be able to plan a program to tell a story.

Progression in Computing

All years

Clearwell C of E Primary School

Children should be taught	Progression in knowledge, skills and understanding by the end of the phase, children will be able to		
Programming **(Computer Science)**	Year 2	Year 4	Year 6
		• Use logical thinking to explore more complex software; predicting, testing and explaining what it does. • Incorporate loops to make code more efficient. • Continue an existing code. • Make reasonable suggestions for how to debug their own and others' code. • Create algorithms for a specific purpose. • Code a simple game. • Use abstraction and pattern recognition to modify code. • Incorporate variables to make code more efficient. • Remix existing code.	• Programme an animation. • Iterate and develop their programming as they work. • Confidently use loops in programming. • Use a more systematic approach to debugging code, justifying what is wrong and how it can be corrected. • Write code to create a desired effect, using a range of programming commands. • Use repetition within a program. • Predict code and adapt it to a chosen purpose. • Change a program to personalise it. • Evaluate code to understand its purpose. • Debug quickly and effectively to make a program more efficient. • Remix existing code to explore a problem. • Use and adapt nested loops. • Programme using the language Python.

Progression in Computing

All years

Clearwell C of E Primary School

Children should be taught	Progression in knowledge, skills and understanding by the end of the phase, children will be able to		
How to use software **(Information Technology)**	Year 2	Year 4	Year 6
	• Use a basic range of tools within graphic editing software. • Take and edit photographs. • Develop control of the mouse through dragging, clicking and resizing of images to create different effects. • Develop understanding of different software tools. • Develop word processing skills, including altering text, copying and pasting and using keyboard shortcuts. • Use word processing software to type and reformat text. • Create and label images. Use software (and unplugged means) to create story animations.	• Take photographs and recording video to tell a story. • Use software to edit and enhance their video adding music, sounds and text on screen with transitions. • Design and create a webpage for a given purpose. • Build a web page and creating content for it. • Use software to work collaboratively with others. • Use online software for documents, presentations, forms and spreadsheets.	• Use logical thinking to explore software more independently, making predictions based on their previous experience, iterating ideas and testing continuously. • Identify ways to improve and edit programs, videos, images etc. • Use search and word processing skills to create a presentation. • Independently learn how to use 3D design software package TinkerCAD. • Plan, record and edit an audio recording. • Create and edit sound recordings for a specific purpose. • Create and edit videos, adding multiple elements: music, voiceover, sound, text and transitions. • Use design software TinkerCAD to design a product. • Create a website with embedded links and multiple pages. • Use software programme Sonic Pi/Scratch to create music. • Use video editing software to animate.

Progression in Computing

All years

Children should be taught	Progression in knowledge, skills and understanding by the end of the phase, children will be able to		
How to use email and internet searches **(Information Technology)**	Year 2	Year 4	Year 6
	• Recognise devices that are connected to the internet. • Understand that we are connected to others when using the internet. • Search for appropriate images to use in a document. • Understand what online information is. Search for and download images from the internet safely.	• Learn to log in and out of an email account. • Write an email including a subject, 'to' and 'from.' • Send an email with an attachment. • Reply to an email. • Understand why some results come before others when searching. • Use keywords to effectively search for information on the internet. • Understand that information found by searching the internet is not all grounded in fact. • Search the internet for data	• Understand how search engines work. • Develop searching skills to help find relevant information on the internet. • Learn how to use search engines effectively to find information, focussing on keyword searches and evaluating search returns.

Progression in Computing

All years

Children should be taught	Progression in knowledge, skills and understanding by the end of the phase, children will be able to		
How to use data **(Information Technology)**	Year 2	Year 4	Year 6
	• Understand that technology can be used to represent data in different ways: pictograms, tables, pie charts, bar charts, block graphs etc. • Collect and input data into a spreadsheet. • Interpret data from a spreadsheet. • Use representations to answer questions about data. • Use software to explore and create pictograms and branching databases.	• Understand the vocabulary associated with databases: field, record, data. • Learn about the pros and cons of digital versus paper databases. • Sort and filter databases to easily retrieve information. • Create and interpret charts and graphs to understand data. • Understand that data is used to forecast weather. • Record data in a spreadsheet independently. • Sort data in a spreadsheet to compare using the 'sort by…' option. • Design a device which gathers and records sensor data.	• Understand how data is collected in remote or dangerous places. • Understand how data might be used to tell us about a location. • Understand how barcodes, QR codes and RFID work. • Gather and analysing data in real time. • Create formulas and sorting data within spreadsheets.
About the wider use of technology **(Information Technology)**	• Recognise common uses of information technology, including beyond school. • Understand some of the ways we can use the internet. • Know how computers are used in the wider world.	• Understand the purpose of emails. • Recognise how social media platforms are used to interact. • Understand that software can be used collaboratively online to work as a team.	• Know about the Internet of Things and how it has led to 'big data'. • Know how 'big data' can be used to solve a problem or improve efficiency. • Know about different forms of communication that have developed with the use of technology.

Progression in Computing

All years

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Children should be taught	Progression in knowledge, skills and understanding by the end of the phase, children will be able to		
Digital Literacy	Year 2	Year 4	Year 6
	• Log in and out and saving work on their own account. • When using the internet to search for images, know what to do if they come across something online that worries them or makes them feel uncomfortable. • Understand how to interact safely with others online. • Recognise how actions on the internet can affect others. • Recognise what a digital footprint is and how to be careful about what we post. • Know how to create a strong password. • Understand 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. • Identify whether information is safe or unsafe to be shared online. • Know the importance of being respectful of others when sharing online and ask for their permission before sharing content. • Know strategies for checking if something they read online is true.	• Recognise that different information is shared online including facts, beliefs and opinions. • Know how to identify reliable information when searching online. • Know how to stay safe on social media. • Consider the impact technology can have on mood. • Know about cyberbullying. • Know that not all emails are genuine and recognise when an email might be fake and what to do about it. • Recognise that information on the internet might not be true or correct and that some sources are more trustworthy than others. • Know to make judgements about the accuracy of online searches. • Identify forms of advertising online. • Recognise what appropriate behaviour is when collaborating with others online. Reflect on the positives and negatives of time spent online. • Identify respectful and disrespectful online behaviour.	• Identify possible dangers online and learning how to stay safe. • Evaluate the pros and cons of online communication. • Recognise that information on the internet might not be true or correct and learning ways of checking validity. • Know what to do if they experience bullying online. • Know how to use an online community safely. • Use search engines safely and effectively. • Understanding the importance of secure passwords and how to create them. • Know about the positive and negative impacts of sharing online. • Know strategies to create a positive online reputation. • Know strategies to capture evidence of online bullying in order to seek help. • Recognise that updated software can help to prevent data corruption and hacking.

Progression in Computing

All years

Children should be taught	Progression in knowledge, skills and understanding by the end of the phase, children will be able to		
Knowledge about how to Create Media	Year 2	Year 4	Year 6
	• Understand that holding the camera still and considering angles and light are important to take good pictures. • Know that you can edit, crop and filter photographs. • Know how to search safely for images online. • Understand that an animation is made up of a sequence of photographs. • Know that small changes in my frames will create a smoother looking animation. • Understand what software creates simple animations and some of its features e.g. onion skinning.	• Know that different types of camera shots can make my photos or videos look more effective. • Know that I can edit photos and videos using film editing software. • Understand that I can add transitions and text to my video. • Know some of the features of web design software. • Know that a website is a collection of pages that are all connected. • Know that websites usually have a homepage and subpages as well as clickable links to new pages, called hyperlinks. • Know that websites should be informative and interactive.	• Know that sound clips can be recorded using sound recording software and that sound clips can be edited and trimmed. • Understand that stop motion animation is an animation filmed one frame at a time using models, and with tiny changes between each photograph. • Know that decomposition of an idea is important when creating stop-motion animations. • Know that editing is an important feature of making and improving a stop motion animation

Progression in Computing

All years

Clearwell C of E Primary School

Children should be taught	Progression in knowledge, skills and understanding by the end of the phase, children will be able to		
Knowledge about computer systems and networks	Year 2	Year 4	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 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. • 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 (output). • To know that computers often work together. • To know that touch typing is the fastest way to type. • To know that I can make text a different style, size and colour.	• To know what a tablet is and to understand that email stands for 'electronic mail.' • To know that an attachment is an extra file added to an email. • To understand that emails should contain appropriate and respectful content. • To know that cyberbullying is bullying using electronics such as a computer or phone. • To understand that software can be used collaboratively online to work as a team. • To know what type of comments and suggestions on a collaborative document can be helpful. • To know that you can use images, text, transitions and animation in presentations. • 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 that a server is central to a network and responds to requests made. • To know how the internet uses networks to share files. • To know that a router connects us to the internet. • To know what a packet is and why it is important for website data transfer.	• To know the difference between ROM and RAM. • 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. • To know about some of the historical figures that contributed to technological advances in computing. • To understand what techniques are required to create a presentation using appropriate software. • 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 know that web crawlers are computer programs that crawl through the internet. • To understand what copyright is.

Progression in Computing

All years

Children should be taught	Progression in knowledge, skills and understanding by the end of the phase, children will be able to		
Knowledge about computer systems and networks (cont.)	Year 2	Year 4	Year 6
	• To know that "copy and paste" is a quick way of duplicating text. • To know what a tablet is and to understand that email stands for 'electronic mail.' • To know that an attachment is an extra file added to an email. • To understand that emails should contain appropriate and respectful content. • To know that cyberbullying is bullying using electronics such as a computer or phone.	• To know the roles that inputs and outputs play. To know what some of the different components inside a computer are e.g. CPU, RAM, hard drive, and how they work together.	

Progression in Computing

All years

Clearwell CofE Primary School

Children should be taught	Progression in knowledge, skills and understanding by the end of the phase, children will be able to		
Knowledge about programming	Year 2	Year 4	Year 6
	• To understand that an algorithm is when instructions are put in an exact order. • To know that input devices get information into a computer and that output devices get information out of a computer. • 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 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 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 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 variables can help you to create a quiz on Scratch. • To know that combining computational thinking skills (sequence, abstraction, decomposition etc) can help you to solve a problem. • 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 Micro:bit is a programmable device. • To know that Micro:bit uses a block coding language similar to Scratch. • To understand and recognise coding structures including variables. • To know what techniques to use to create a program for a specific purpose (including decomposition). • To know that there are text-based programming languages such as Logo and Python. • To know that nested loops are loops inside of loops. • To understand the use of random numbers and remix Python code. • 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 how to adapt their code while performing their music.

Progression in Computing

All years

Children should be taught	Progression in knowledge, skills and understanding by the end of the phase, children will be able to		
Knowledge about programming (cont.)	Year 2	Year 4	Year 6
	• To understand what machine learning is and how that enables computers to make predictions. • To know that loops in programming are where you set a certain instruction (or instructions) to be repeated multiple times. • To know that abstraction is the removing of unnecessary detail to help solve a problem		

Progression in Computing

All years

Clearwell CofE Primary School

Children should be taught	Progression in knowledge, skills and understanding by the end of the phase, children will be able to		
Knowledge about data handling	Year 2	Year 4	Year 6
	• To know how that charts and pictograms can be created using a computer. • To understand that a branching database is a way of classifying a group of objects. • To know that computers understand different types of 'input'. • 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 a database is a collection of data stored in a logical, structured and orderly manner. • To know that computer databases can be useful for sorting and filtering data. • To know that different visual representations of data can be made on a computer. • 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 understand that RAM is Random Access Memory and acts as the computer's working memory. • 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 infrared waves are a way of transmitting data. • 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. • To know that data can become corrupted within a network but this is less likely to happen if it is sent in 'packets'. • To know that devices that are not updated are most vulnerable to hackers.

Progression in Computing

All years

Clearwell CofE Primary School

			• To know the difference between mobile data and WiF.

Children should be taught	Progression in knowledge, skills and understanding by the end of the phase, children will be able to		
Knowledge about online safety	Year 2	Year 4	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 something specific to someone else via the internet and 'posting' online means placing information on the internet. • 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	• 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: information, such as your name, age, gender etc. • To know what social media is and that age restrictions apply. • 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 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 to go for support if they are being bullied online or feel that their health is being affected by time online. • 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 know some common online scams.

Progression in Computing

All years

	online and that they have the right to say 'no.' • To understand that not everything I see or read online is true.	• To understand what behaviours are appropriate in order to stay safe and be respectful online.	