COMPUTING SKILLS PROGRESSION

Computing Intent

"The Web as I envisaged it, we have not seen it yet. The future is still so much bigger…" (Tim Berners-Lee, Inventor of the World Wide Web)

Computing is immersive, engaging and thrillingly creative. Children at Great Bradfords Junior School thoroughly enjoy its hands-on and practical opportunities, and thrive upon being creators, as well as skilful users of technology. The computing curriculum champions excellence by supporting pupils across three main areas: **computer science**, **information technology** and **digital literacy**. The core of the subject is computer science, in which pupils solve challenging problems through coding. The skills of information technology centre on the cross-curricular use of software and hardware to produce exciting and purposeful project work. Through digital literacy, children learn how to use technology safely and to show respect for others when working online.

With computing embedded across a range of subjects at Great Bradfords Junior School, children become responsible users of technology that can work together as developers to shape the future.

Procedural Knowledge: **Skills** the children develop when learning about Computing

The national curriculum for Computing aims to ensure that all pupils:

- apply the fundamental principles and concepts of **computer science**.
- analyse problems in computational terms, and have repeated practical experience of writing computer programs in order to solve such problems.
- evaluate and apply **information technology**, including new or unfamiliar technologies, analytically to solve problems.
- are responsible, competent, confident and creative users of information and communication technology (**digital literacy**).

Throughout their time at Great Bradfords Junior School, children will start to develop the skills of **Computational thinking**: how to take a big, difficult problem and break it down into smaller, simpler steps. By the end of the Key Stage, pupils will have had the opportunity to apply computational thinking across the curriculum. More specifically, they will hone the following skills to help them become confident and responsible users of technology:

- Designing and debugging programs that accomplish specific goals.
- Using logical reasoning to explain how algorithms work and to detect and correct errors in algorithms and programs.
- Understanding computer networks (such as the internet), how such networks can provide multiple services, such as the World Wide Web, and the opportunities they offer for communication and collaboration.
- Using search technologies effectively and being discerning in evaluating digital content.
- Selecting, using and combining a variety of software (including internet services) on a range of digital devices to accomplish given goals, including collecting, analysing, evaluating and presenting data and information.
- Using technology safely and responsibly, reporting concerns about content and contact.

Disciplinary Knowledge: **knowledge** the children will learn to develop excellence in Computing

	Year 3/4		Year 5/6
Computer science	Understand what **algorithms** are. Understand how algorithms are implemented as **programs** on **digital devices**; and that programs execute by following precise and unambiguous instructions. To be able to write **algorithms** to create and debug simple programs. Learn how to use **repeat loops**. Use **logical reasoning** to predict the behaviour of simple programs. To understand that **sequence** is the step-by-step nature of computer programs, mirroring the sequence of steps the algorithm would list.	To understand that **conditionals** refer to selection instructions (such as **If/Else, While** and **Until**) and that these are decisions in which the operation (what the program does) depend on whether or not certain conditions are met. For example, a quiz provides different feedback if the player answers the question correctly or incorrectly. To recap **repetition** as a programming structure (for example, using the **Repeat ... until** loop) in which the computer runs part of the program a certain number of times or until a particular condition is met. To understand that **events** instruct your program to wait for when something happens (for example a user input) before performing an action. To learn how to use **variables** to keep track of the things that can change while a	Design, write and **debug** programs that accomplish specific goals, for example controlling or simulating physical systems. To solve problems by **decomposing** them into smaller parts. To further deepen understanding of **sequence**, **selection** and **repetition** in Computer science. To more confidently work with **variables** and various forms of **input** and **output**. To understand that a **nested repeat loop** is a repeat loop inside of a repeat loop. To recognise that **Functions** are self-contained modules of code that accomplish a specific task. To understand that **functions** usually "take in" data, process it, and "return" a result. Once a function is written, it can be used over and over and over again. To use **logical reasoning** to explain how some simple **algorithms** work and to detect and correct errors in algorithms and programs. To apply the skills that have been learnt to create a game or drawing that can be shared with friends and family. To understand the cornerstones of computational thinking and be able to define the following terms: **decomposition**, **pattern location**, **abstraction**, **algorithms**, **logic** and **data representation**.

		program is running (for example, to keep track of the player's score during a quiz).		
Information technology	**<u>Word, Publisher</u>** **All pupils to learn the following elements of Word processing:** - To revise and locate the basic keys on the keyboard: **Shift, Caps Lock, Enter, the Spacebar and Backspace.** - How to use Undo and Redo. - Select text by highlighting it. - To know that the Shift key and Caps Lock are used to make capital letters. - To Align text by selecting it and clicking the Align Left, Align Right, Centre or Justify icons in the Home tab. - To insert text boxes. - To insert / copy and paste images from search engines. - To know how to format the font - how to make text bold, italic or underline or a different font colour. - To learn the following keyboard shortcuts: Ctrl+c (Copy), Ctrl+v (Paste) and Ctrl+s (Save).	**<u>PowerPoint</u>** **Pupils to learn the following elements of PowerPoint:** - To insert a new slide and format the slide background. - To insert and resize images. - To insert text boxes. - To know how to insert lines, arrows and shapes. - To animate shapes, images and text boxes. - To know how to use slide transitions. - To insert audio / video to enhance a presentation. - To design slides with an effective layout. - To evaluate slide layout and make improvements, editing as required to maintain an effective design. - To evaluate the use of themes, transitions and animation in a presentation, justifying their effect on the target audience.	**<u>Word and PowerPoint recap</u>** **Pupils build upon prior learning from years 3 and 4** to apply their Word processing and PowerPoint presentation skills for a meaningful purpose and target audience. **Pupils learn the following word processing / PowerPoint skills:** - Two-handed typing. - How to insert bullet points and numbering to organise text. - How to cut, copy and paste text. - How to insert screenshots from other applications. - How to crop images. - How to format an image's text wrapping (Tight, In Front of Text, etc.) - How to arrange images: Send to Back, Bring to Front, Send Backward, Bring forward. - How to rotate images. - Consolidate keyboard shortcuts: Ctrl+c (Copy), Ctrl+v (Paste) and Ctrl+s (Save).	**<u>Excel</u>** **Pupils will be taught to use Excel** to gather data, analyse it and make informed decisions with it, designing spreadsheets **to fulfil a specific purpose**. <u>Specific objectives:</u> - Identify and refer to spreadsheet cells by row and column. - Enter formulae with the SUM function. - Use further functions including AVERAGE, MIN and MAX. - Create graphs from data which pupils have researched or collected. - Know how to sort data by different criteria. - Replicate formulae over several cells and check calculations for errors. **Pupils will select, use and combine a variety of software (including internet services) on a range of digital devices to**

	<u>Please note:</u> Two-handed typing should be taught and encouraged at all times. **Apart from word processing, pupils should use a range of applications.**	*<u>Please note:</u> Two-handed typing should be taught and encouraged at all times.* **Apart from PowerPoint, pupils should continue to develop their use of a range of applications.**	- Learn new keyboard shortcuts: Ctrl+x (Cut), Ctrl+z (Undo) and Ctrl+y (Redo). **Use technology purposefully to create, organise, store, manipulate and retrieve digital content.**	**design and create a range of content that accomplish given goals for a target audience**, including collecting, analysing, evaluating and presenting data and information.
Digital Literacy	**Understand that not all information on the internet is necessarily true.** Use technology safely and respectfully, keeping personal information private. Recognise common uses of information technology beyond school. Understand what adults mean by 'unacceptable and acceptable behaviour' when using digital devices (including sharing photos and videos without consent). **Know the SMART rules and how to report E-Safety incidents to a trusted adult (parents/carers and school staff).**	**Understand what makes a strong password.** Understand the definition and consequences of cyber bullying and how to report it. Be aware of the importance of HTTPS - secure webpages. Understand what adults mean by 'unacceptable and acceptable behaviour' when using digital devices (including sharing photos and videos without consent). **Know the SMART rules and how to report E-Safety incidents to a trusted adult (parents/carers and school staff).**	**Understand what information can be shared, and what information should not be shared online (including what <u>data protection</u> is – in simplistic terms).** Understand the opportunities networks offer for communication and collaboration. Demonstrate how to use digital devices responsibly, particularly when collaborating online, over Teams for example. Be discerning in evaluating the safety of digital content. **Know the SMART rules and how to report E-Safety incidents to a trusted adult (parents/carers and school staff).**	**Use search technologies safely and effectively.** To understand how search engines use 'web crawler' programs and algorithms such as Google's PageRank to select and rank results. To be aware that photos and images can be manipulated - illegal activity, copyright and data protection. Begin to understand advertising – how it attracts its audience (including bias, persuasion and manipulation – also links to extremism). **Know the SMART rules and how to report E-Safety incidents to a trusted adult (parents/carers and school staff).**

Networks	To understand that computer networks, including the internet, are made up of computers connected together. To understand **inputs** and **outputs**, and that digital devices have an input, a process and an output. To explain how computer networks can be used to share information - simulating this in the classroom. To understand that computers include fast, dedicated machines that pass on data that's not intended for them (called 'routers', 'gateways', 'hubs' or 'switches', depending on particular roles), and 'servers' (always-on machines looking after emails, web pages and files that other computers might ask for from time to time).	To understand the internet as a network of networks. To demonstrate how information is shared across the internet. To understand why a network needs protecting. To identify the different networked devices and how they connect. To understand the difference between the Internet and the World Wide Web - that the World Wide Web is the part of the internet that contains websites and web pages. To understand where information is stored when uploaded to the World Wide Web and that not everything on the web is true. To think carefully before sharing or re-sharing content online.	To understand that a computer system features inputs, processes and outputs, and that computer systems communicate with other devices. To understand that information stored on computers and information travelling over networks must be digitised (represented as numerical data). The data is broken up into small 'packets'. These packets of information make their way across the internet from source to recipient. To understand that networked digital devices have unique addresses. To recognise that connected digital devices allow us to access shared files stored online. To identify different ways of working together online. To recognise that working together on the internet can be public or private.	To compare results from different search engines. To appreciate how search results are selected and ranked. To recognise the role of web crawlers in creating an index. To relate a search term to the search engine's index. To identify the criteria that a search engine checks to decide on the order of results. To explain the different ways in which people communicate online and to choose methods of communication to suit particular purposes. To compare different methods of communicating on the internet. To understand that communication on the internet may not be private.

Useful links for teachers and pupils, to understand the cornerstones of computational thinking:

https://www.bbc.co.uk/bitesize/guides/zp92mp3/revision/1

https://www.theschoolrun.com/what-abstraction-computing

https://www.theschoolrun.com/what-computational-logic

https://www.theschoolrun.com/what-program#:~:text=In%20computing%2C%20programs%20are%20a,that%20the%20computer%20can%20understand.