Computing Progression in knowledge, skills and understanding

Computing at Felbridge is largely based on two schemes of work which together cover the requirements of the National Curriculum: 'Kapow Primary' and 'Discovery Coding.' Online Safety is taught explicitly through a unit of work in Years 1-6; it will also be covered through work in PSHE, RSE and when pupils are using devices for research and presentation purposes.

Long Term Overview

	Autumn			**Spring**		**Summer**	
R	Exploring hardware	Programming Bee-Bots		Using a computer	Discovery Coding	Introduction to data	All about instructions
1	Online Safety	Discovery Coding 1A	Introduction to data	Algorithms unplugged	Digital imagery	Discovery Coding 1B	Rocket to the moon
2	Online Safety	Discovery Coding 2A	Stop motion -	What is a computer?	International Space Station	Discovery Coding 2B	Algorithms and debugging
3	Online Safety	Discovery Coding 3A	Creating Media- Video Trailers	Networks and the internet	Journey inside a computer	Discovery Coding 3B	Top trumps databases
4	Online Safety	Discovery Coding 4A	Collaborative learning	Investigating weather	The internet	Discovery Coding 4B	Website design
5	Online Safety	Discovery Coding 5A	Stop motion animation	Programming: music	Search engines	Discovery Coding 5B	Mars Rover 1
6	Online Safety	Discovery Coding 6A	Big Data 1	Bletchley Park 1	Intro to Python	Discovery Coding 6B	Skills showcase

EYFS / National Curriculum Links – Computing

EYFS

Within the revised EYFS statutory framework for 2021, the 'Technology' strand within *Understanding the World* has been removed. However, there are opportunities within each area of the framework to enable us to effectively prepare children for studying the computing National Curriculum requirements.

The September 2020 release of Development Matters outlines how effective teaching and learning gives children the opportunity to play and explore, participate in active learning and create and think critically. Many opportunities exist to use technology with younger children; particularly when linked to a topic studied within class.

Key Stage 1

Computer science	Information technology	Digital literacy
understand what algorithms are; how they are implemented as programs on digital devices; and that programs execute by following precise and unambiguous instructions	use technology purposefully to create, organise, store, manipulate and retrieve digital content	recognise common uses of information technology beyond school
create and debug simple programs		use technology safely and respectfully, keeping personal information private; identify where to go for help and support when they have concerns about content or contact on the internet or other online technologies.
use logical reasoning to predict the behaviour of simple programs		

Key Stage 2

Computer science	Information technology	Digital literacy
design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts	select, use and combine a variety of software (including internet services) on a range of digital devices to design and create a range of programs, systems and content that accomplish given goals, including collecting, analysing, evaluating and presenting data and information	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 and collaboration
use sequence, selection, and repetition in programs; work with variables and various forms of input and output		use search technologies effectively, appreciate how results are selected and ranked, and be discerning in evaluating digital content
use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs		use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact

The progression below will develop as we implement new curriculum units in 2021-2022. It will be reviewed in 2022 when the impact of a year's units are reviewed. It will also be reviewed in the light of new technology as it becomes available for children to use.

Progression of Knowledge, Skills and Understanding

Computer Science

	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Hardware	• Learning how to operate a camera, for example to take photographs of creations or moments. • Learning how to explore and tinker with hardware to develop familiarity and introduce relevant vocabulary. • Recognising that a range of technology is used in places such as homes and schools. • Learning what a keyboard is and how to locate relevant keys. • Learning what a mouse is and developing basic skills e.g. moving and clicking.	• Learning how to explore and tinker with hardware and find out how it works. • Understanding that computers and devices around us use inputs and outputs, identifying some of these. • Learning where keys are located on a keyboard. • Learning how to operate a camera.	• 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. • Using greater control when taking photos with tablets or computers. • Developing confidence with the keyboard and the basics of touch typing.	• Understanding what the different components of a computer do and how they work together. • Drawing comparisons across different types of computers. • Learning what a server does.	• Learning about the purpose of routers.	• Learning that external devices can be programmed by a separate computer. • Learning the difference between ROM and RAM. • Recognising how the size of RAM affects the processing of data. • Understanding the fetch, decode, execute cycle	• 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. • Learning how barcodes, QR codes and RFID work. • Learning about some of the methods which cause data corruption.
Networks and Data Representations				• Learning what a network is and its purpose. • Identifying the key components within a network, including whether they are wired or wireless. • Recognising links between networks and the internet, • Learning how data is transferred.	• Consolidating understanding of the key components of a network. • Understanding that websites and videos are files that are shared from one computer to another. • Learning about the role of packets. • Understanding that computer networks provide multiples services, such as the World Wide Web, and opportunities for communication and collaboration.	• Learning the vocabulary associated with data: data and transmit. • Learning how the data for digital images can be compressed. • Recognising that computers transfer data in binary and understanding simple binary addition. • Relating binary signals (Boolean) to the simple character-based language, ASCII. • Learning that messages can be sent by binary code, reading binary up to 8 characters and carrying out binary calculations. • Understanding how bit patterns represent images as pixels.	• Understanding that computer networks provide multiple services.

	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Computational Thinking	• Using logical reasoning to read simple instructions and predict the outcome.	• 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. • Learning that an **algorithm** is a set of step-by-step instructions used to carry out a task, in a specific order. • Follow a basic set of instructions. • Assembling instructions into a simple algorithm.	• Articulating what decomposition is. • Decomposing a game to predict the algorithms used to create it. • Using decomposition to decompose a story into smaller parts. • Learning what **abstraction** is. • Learning that there are different levels of abstraction. • Explaining what an algorithm is. • Following an algorithm. • Creating a clear and precise algorithm. • Learning that computers use algorithms to make predictions. • Learning that programs execute by following precise instructions.	• Using decomposition to explain the parts of a laptop computer. • Using decomposition to explore the code behind an animation. • Using repetition in programs. • Understanding that computers follow instructions. • Using an algorithm to explain the roles of different parts of a computer. • Using logical reasoning to explain how simple algorithms work. • Explaining the purpose of an algorithm. • Forming algorithms independently.	• Solving unplugged problems by decomposing them into smaller parts. • Using decomposition to understand the purpose of a script of code. • Using decomposition to help solve problems. • Identifying patterns through unplugged activities. • Using past experiences to help solve new problems. • Using abstraction to identify the important parts when completing both plugged and unplugged activities. • Creating algorithms for a specific purpose.	• Decomposing animations into a series of images. • Decomposing a program without support. • 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.	• Decomposing a program into an algorithm. • Using past experiences to help solve new problems. • Writing increasingly complex algorithms for a purpose.
Programming	• Following instructions as part of practical activities and games and learning to debug when things go wrong. • Learning to give simple instructions. • Experimenting with programming a Bee-bot/Blue-bot and learning how to give simple commands. • Learning to use a set of instructions to carry out a task, in a specific order (to lead to 'algorithm'). • Learning to debug instructions with the help of an adult when things go wrong.	• Programming a Bee-bot/Blue-bot to follow a planned route. • Learning to debug instructions when things go wrong. • Learning that an algorithm is a set of instructions to carry out a task, in a specific order.	• Use logical thinking to explore software, predicting, testing and explaining what it does. • Using an algorithm to write a basic computer program. • Learning what loops are. • Incorporating loops to make code more efficient.	• Using logical thinking to explore more complex software; predicting, testing and explaining what it does. • Incorporating loops to make codes more efficient. • Using a more systematic approach to debugging code, justifying what is wrong and how it can be corrected.	• Understanding that websites can be altered by exploring the code beneath the site. • Coding a simple game.	• Programming an animation. • Iterating and developing programming as they work. • Beginning to use nested loops (loops within loops). • Debugging their own code. • Writing code to create a desired effect. • Using a range of programming commands. • Using repetition within a program.	• Debugging quickly and effectively to make a program more efficient. • 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.

Information Technology

	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Using Software	• Using a simple online paint tool to create digital art.	• Using a basic range of tools within graphic editing software. • Taking and editing photographs. • Understanding how to create digital art using an online paint tool. • Developing control of the mouse through dragging, clicking and resizing of images to create different effects. • Developing understanding of different software tools.	• 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 to create story animations. • Creating and labelling images.	• Taking photographs and recording video to tell a story. • Using software to edit and enhance a video for example by adding music, sounds and text on the screen with transitions. • Beginning to use Google online software for documents, presentation, forms and spreadsheets.	• Building a web page and creating content for it. • Using Google online software for documents, presentation, forms and spreadsheets. • Work collaboratively with others.	• Using logical thinking to explore software more independently, making predictions based on their previous experience. • Using animation software to create video animation. • Identify ways to improve and edit final products.	• Using logical thinking to explore software independently, iterating ideas and testing continuously. • Using search and word processing skills to create a presentation. • Creating and editing sound recordings for a specific purpose. • Creating a website with embedded links and multiple pages.
Using Data	• Representing data through sorting and categorising objects in unplugged scenarios. • Representing data through pictograms. • Exploring branch databases through physical games.	• Introduction to spreadsheets. • Representing data in tables, charts and pictograms. • Sorting data and creating branching databases. • Identifying where digital content can have advantages over paper when storing and manipulating data.	• Collecting and inputting data into a spreadsheet. • . interpreting data.	• Understanding the vocabulary associated with databases: field, record, data. • Learning about the pros and cons of digital versus paper databases. • Sorting and filtering databases to easily retrieve information. • Creating and interpreting charts and graphs to understand data.	• Design a weather station which gathers and records sensor data.	• Understanding how data is collected.	• Understanding how barcodes, QR codes and RFID work. • Gathering and analysing data in real time. • Creating formulas and sorting data within spreadsheets
Wider use of technology and the internet	• Participating in group image searches, led by the teacher.	• Searching and downloading images from the internet safely. • Recognising common uses of information technology, including beyond school. • Recognising uses of technology beyond school.	• Learning how computers are used un the wider world	• Learning how to log in and out of an email account. • Writing and replying to emails, including a subject, ‘to’ and ‘from’. • Sending an email with an attachment. • Understand the purposes of email.	• Understanding that software can be used collaboratively online to work as a team.	• Learning what a search engine is. • Developing searching skills and effective use of search engines to help find relevant information on the internet. • Evaluating search results	• Understanding how search engines work. • Learning about the Internet of Things and how is has led to ‘big data’. • Learning how ‘big data’ can be used to solve problems and improve efficiency.

Digital Literacy

	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Digital Literacy, including Online Safety	• Recognise that a range of technology is used in places such as homes and schools. • Learning how to log in and log out. • When using the internet alongside an adult, or independently, learning what to do if they come across something that worried them or makes them fell uncomfortable.	• Logging in and out save saving work on their own account. • Understand the importance of a password. • When using the internet to search for images, learning what to do if they come across something online that worried them or makes them feel uncomfortable.	• Understanding how to stay safe when talking to people online. Not sharing personal information and what to do if they see or hear something online that makes them feel upset or uncomfortable.	• Learning to be a responsible digital citizen. • Understanding their responsibilities to treat others respectfully and recognising when digital behaviour is unkind. • Learning about cyberbullying. • Learning that not all emails are genuine. • Recognising when an email might be fake and what to do about it.	• Recognising what appropriate behaviour is when collaborating with others online. • Recognising that information on the Internet might not be true or correct and that some sources are more trustworthy than others.	• Identifying possible dangers online and learning how to stay safe. • Creating an animation about digital safety. • Recognising that information on the Internet might not be true or correct and learning ways of checking validity. • Learning how to use an online community safely.	• Understanding the importance of secure passwords and how to create them. • Using search engines safely and effectively. • Recognising that updated software can help to prevent data corruption and hacking.