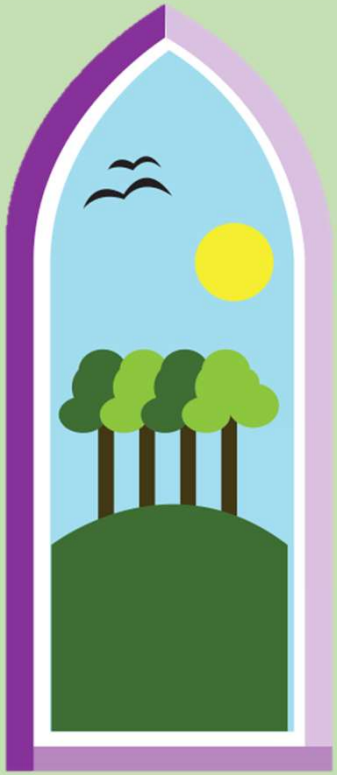
Computing Intent



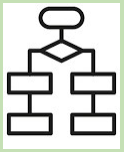
Strength in difference, together we are one, together we fly high

Our vision of *strength in difference, together we are one, together we fly high* drives our computing curriculum: we aim to develop a sense of how computer hardware, software and coding languages are the result of international communities of people collaborating.

Our curriculum teaches pupils to use computational thinking and creativity to understand and change the world. Computing has deep links with mathematics, science, and design and technology, and provides insights into both natural and artificial systems.

The core of our computing curriculum is computer science, in which pupils are taught the principles of information and computation, how digital systems work, and how to put this knowledge to use through programming. Building on this knowledge and understanding, pupils are equipped to use information technology to create programs, systems and a range of content. Our curriculum also ensures that pupils become digitally literate – able to use, and express themselves and develop their ideas through, information and communication technology – at a level suitable for the future workplace and as active participants in a digital world.

Computing Structure



We organise our knowledge into key concepts

As digital learners, we use these concepts to investigate.

Computing

Computing is the study of computer science (coding) and how we use technology effectively and appropriately to express ourselves.

Computer Science

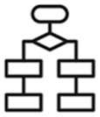
Systems & Networks
- Communication & collaboration
- Computer hardware
- The internet

Programming
- Events & actions
- Computer games
- Software
- Coding languages

Digital Literacy

Data & Information
- Organising data
- Spreadsheets
- Databases
- Graphs & charts

Creating Media
- Making music
- Animation
- Digital photography
- Computer games
- Webpage creation



We organise our knowledge into key concepts

Skills for the digital world

As computer scientists, we use these concepts to investigate.

Algorithms

Be able to comprehend, design, create, and evaluate algorithms: sets of instructions that are followed in order to express an idea or solve a problem.

Design and Development

The process of planning, creating and evaluating digital tools, software and media.

Effective Use of Tools

How we use technology effectively to boost productivity via collaboration, automation, digital record-keeping, e-commerce and digital media.

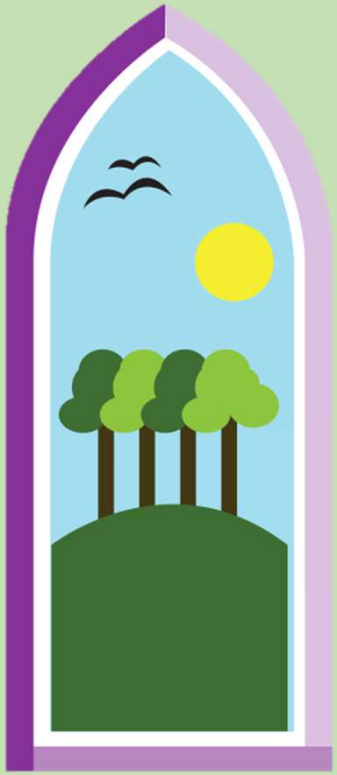
Impact of technology

The extent to which technology is changing our lives and the world around us. The ethical, legal, cultural, and environmental concerns surrounding computing.

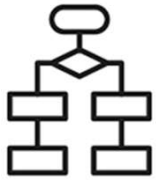
Safety & Security

How we use technology safely, respectfully, and responsibly. The emerging changes in online safety, cybersecurity, AI and 'Big Data', which will profoundly impact young people's lives.

Computing Concepts



Our knowledge is organised into key concepts and disciplinary concepts. The core knowledge is laid out in coherent, sequential progression documents which detail the end points which we aim children to achieve. The foundations for the computing curriculum are laid in KS1 as novice digital learners, leading to more expert digital learners in KS2. This provides the firm building blocks for children to become disciplined digital learners in KS3 and beyond.

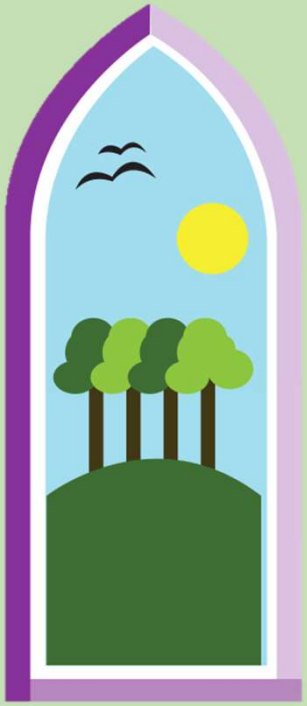


Key concepts

Key concepts support children in developing an understanding of their experience, a system of categorisation, and how they learn and use these systems. In this way, children build a schema of knowledge about some of the key themes through which they can reason and talk about the world and its diversity. Key concepts shape the overarching enquiry question for our units, which we call 'spines'. We have two main concepts in geography which sub divide into further key concepts.

Computer science		Digital literacy	
Systems and networks Knowledge of components of computer hardware, devices, computer networks and the internet.	Programming Understanding how computational concepts (such as sequence, repetition and selection) underpin computer programming, and how algorithms form the basis of all programs.	Data and information Understanding how electronic data is organised and stored, and knowledge of basic data-handling operations using simple programs (such as spreadsheets or online forms).	Creating media Learning about how to design and create a range of multimedia projects including digital music, video, webpages and 3D models.

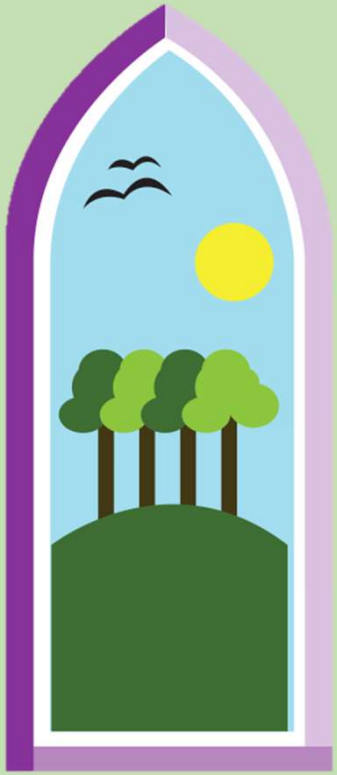
Computing Concepts



Our enquiry 'spines' will seek to develop knowledge in both main key concepts, reinforcing the knowledge that computing is about both computer science and the effective use of technology to express ourselves.

	Computer Science		Digital Literacy	
	Systems & Networks	Programming	Creating Media	Data & Information
EYFS				
KS1	**A1:** Technology around us How do we use technology at school? **A3:** IT around us How is technology used beyond school?	**A4:** Moving a robot How do I control a robot? **A6:** Robot algorithms What is a sequence? **B3:** Programming animations What is an algorithm? **B5:** Programming quizzes What is a program?	**B1:** Digital writing Pencil or keyboard? **A2:** Digital painting How can we paint using computers? **A5:** Digital music What is digital music? **B6:** Digital photography Are all photos real?	**B2:** Grouping data Why do we group data? **B4:** Pictograms How can I represent data?
Lower KS2	**C1:** Connecting computers What does our school network look like? **C3:** The internet What is the internet?	**C2:** Sequencing sounds Why does sequence matter? **C6:** Repetition in shapes How can I use count-controlled loops? **D2:** Events and actions How do I program events and actions? **D5:** Repetition in games What is the impact of repetition in programs?	**C4:** Desktop Publishing Why do we use desktop publishing? **D1:** Stop-frame animation How can I make a picture move? **D3:** Photo editing Why do we edit images? **D4:** Audio production How can I create a podcast?	**C5:** Data logging How and why do we collect data over time? **D6:** Branching databases What is a branching database?
Upper KS2	**E1: Sharing information** How can we work collaboratively online? **E3:** Communication and collaboration How do we communicate responsibly online?	**E2:** Selection in physical computing How can we use microcontrollers to control physical components? **E5:** Selection in quizzes How is selection used in programming? **E6:** Webpage creation What makes a good web page? **F4:** Variables in games What is the impact of variables in programs? **F5:** Sensing movement What is a programmer?	**E4:** Video production How do we create a film? **F1:** Vector drawing What is vector drawing? **F3:** 3D-modelling How do we 3D model?	**F2:** Flat-file databases Why do we have databases? **F5:** Spreadsheets Calculator or spreadsheet?
Digital security & online safety				

Computing Concepts



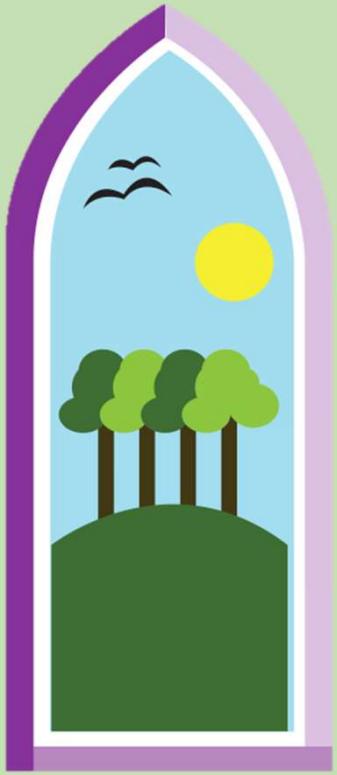
Disciplinary Concepts

Computing is a rich, interconnected subject; in reality, any typical computing lesson is likely to encompass a mixture of our key concepts. Consequently, we have organised and categorised our computing curriculum into five **disciplinary concepts** which span across the whole subject: **algorithms**, **safety and security**, **effective use of tools**, **design and development**, and the **impact of technology**. Our curriculum is driven by curiosity, language and resilience and pupils at Dunbury are encouraged to be curious about computing and use these disciplinary concepts to support their learning.

Disciplinary concepts shape the enquiry questions asked in a subject and organise the subject knowledge progressively. The disciplinary concepts drive the teaching sequence towards answering the overarching key question for the spine. They can all be applied across the entire subject and every one is interconnected.

Algorithms Be able to comprehend, design, create, and evaluate algorithms: sets of instructions that are followed in order to express an idea or solve a problem.	**Safety and security** How we use technology safely, respectfully, and responsibly. Understanding the emerging changes in online safety, cybersecurity, AI and 'Big Data', which will profoundly impact young people's lives.	**Effective use of tools** How we use technology effectively to boost productivity via collaboration, automation, digital record-keeping, e-commerce and digital media.
Design and development The process of planning, creating and evaluating digital tools, software and media.		**Impact of technology** The extent to which technology is changing our lives and the world around us. The ethical, legal, cultural, and environmental concerns surrounding computing.

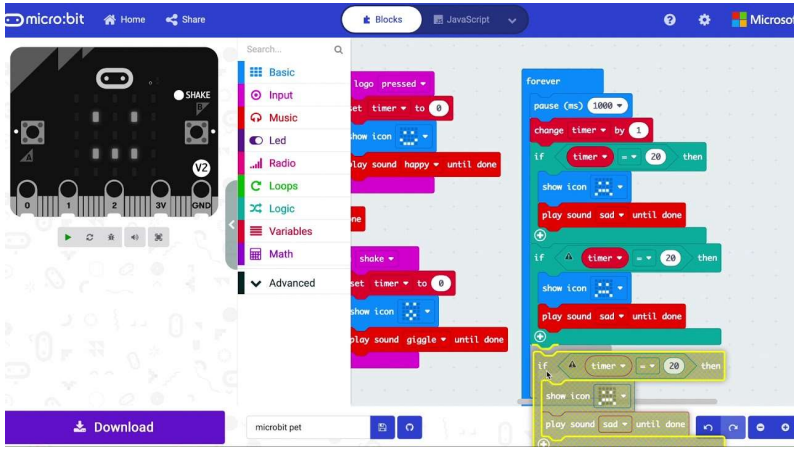
Computing Skills

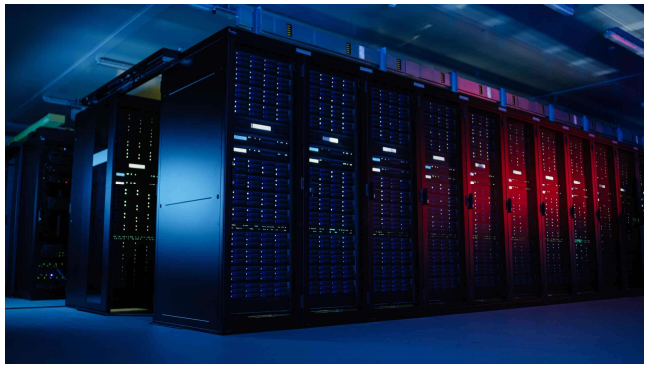


Computing Skills

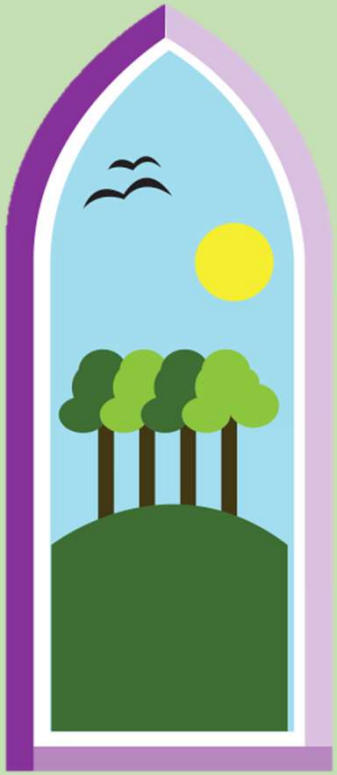
By thoroughly addressing the themes set out by our key and disciplinary concepts, our aim is that children will be taught the computational thinking and practical skills required to be an effective user of technology – as well as guided on the responsible application of those skills. They will learn to:

- understand and apply the fundamental principles and concepts of computer science, including logic, algorithms and data representation;
- analyse problems in computational terms, and have practical experience of writing computer programs in order to solve such problems;
- be responsible, competent, confident and creative users of information and communication technology.





Computing Progression



Flight path from Novice to Disciplinary

Children in Early Years begin to lay the foundations for being able to use, and express themselves and develop their ideas through, technology. They learn how to recognise the components of a range of devices and begin to explore how technology is used at home and at school. They learn how to operate simple devices to create media.

Novice	Expert	Disciplinary
KS1	KS2	KS3 +

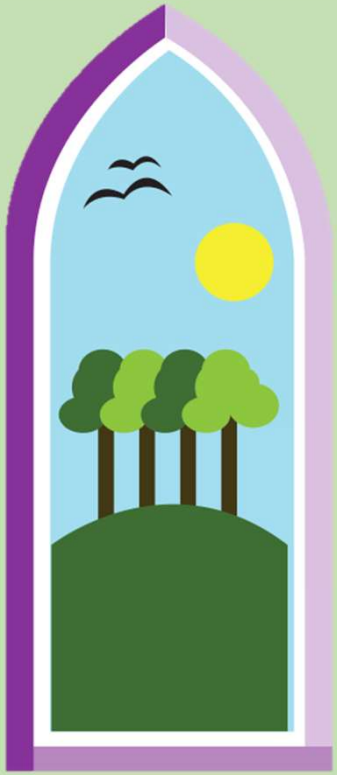
Novice

• use technology purposefully to create, organise, store, manipulate and retrieve digital content (photos, audio, pictures and text);
• understand that algorithms are sets of instructions, create and debug simple programs, and use logical reasoning to predict the behaviour of simple programs;
• recognise common uses of information technology (laptops, phones, printers) both within and beyond school (shops, cafes, offices); and
• use technology safely and identify where to go for help and support when they have concerns about content or contact on the internet or other online technologies.

Expert

• select, use and combine a variety of software (including online) on a range of digital devices to design and create a programs and content that accomplish given goals, including collecting, analysing, evaluating and presenting data and information;
• 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; and use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs;
• 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; and
• use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; and identify a range of ways to report concerns about content and contact.

Computing Implementation



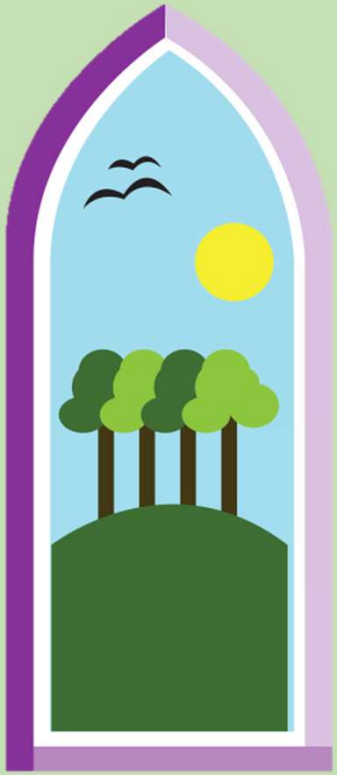
Planning:

Within the clearly set out teaching sequence, individual lessons are designed around an enquiry question, which children are expected to be able to answer at the end of the lesson. Each lesson builds in small steps upon the previous, with prior learning referenced within the teaching sequence through a variety of means such as low stakes cumulative quizzing, structured talk and retrieval practice. This ensures that children are able to secure their learning in small steps, with teaching informed by continuous assessment of and for learning and misconceptions addressed at point in time. At the end of learning sequences, children use their accumulated knowledge to answer their key overarching enquiry question. Quizzes on essential knowledge are also sometimes used to support teacher understanding of their knowledge retention and to inform future planning.

Teachers plan lessons using a mastery teaching approach, driven by our curriculum drivers, following the sequence of learning indicated below:

Connect	Curiosity		Resilience		Spoken Language
Activate prior learning	Learning questions shaped the disciplinary concept.	Explicit instruction and modelling by teacher.	Guided Practice so that all children can access independent practice	Independent practice with tasks that match the learning question. Structured in small steps	Structured reflection for children to talk about what they know and their developing schema.
Recalling previous pertinent knowledge and building blocks.	How does this new knowledge fit into my existing geography schema? How does it build to my final application questions?	What do I notice? How does this connect and build on my knowledge? What new vocabulary am I acquiring. What questions do I have? Do I feel confident enough to have a go?	How am I doing? How do I know? Are there sufficient models, examples and resources to help me have a go?	I can apply new learning through practicing what I was taught, shown or modelled.	I can talk about what I have learnt today, using new vocabulary and generalisations. I can talk about where my new knowledge fits into the spine and how it is building me as a geographer.

Computing Impact



Vocabulary

Vocabulary is an essential building block to enable children to access the curriculum; within geography teaching sequences we use explicitly planned vocabulary to teach tier 2 and 3 vocabulary to all children. Teachers ensure that all children understand the key vocabulary needed to access the learning, with careful scaffolding for children with SEND. To support their vocabulary acquisition, the etymology and morphology of key vocabulary is also taught explicitly in our spelling lessons throughout KS2.

Adaptation for children with SEND

Following the expectations laid out by the SEN Code of Practise, the following adaptations are made for individuals who need something that is addition to or different from others in the class. (click here for document)

Impact

At Dunbury, children's saved work shows learning sequences that develop their computational and conceptual understanding through a variety of rich tasks that make them think hard. Recorded work evidences snapshots of the learning sequence, with rich vocabulary, guided and independent work. Independent work shows the children's understanding of the lesson question and gives a snapshot of their learning throughout the overall lesson. Learning sequences show that over time, children know more and can apply this knowledge across their wider learning in geography.

We use the laid out essential knowledge in the progression table to set the standard that we expect children to reach by the end of EY, KS1, lower KS2 and upper KS2.