

## Computing



Through the computing curriculum, pupils will develop an understanding of the following key concepts. These concepts are revisited through different units as pupils move through the school. By the end of primary school, children will know and understand these key concepts.

1. **Computing systems and networks:** (systems, networks and how they are used, the internet, hardware and software)
2. **Programming:** (interpreting, creating and evaluating algorithms, programming to accomplish specific goals, detecting and correcting errors)
3. **Data and information:** (collecting, analysing, evaluating, presenting data and information)
4. **Creating media:** (design and development, communicating and collaborating online, evaluating online content, respectful and responsible communication, presenting, creating content)

**As part of the work on each key concept, children also explore and learn about:**

- **The effective use of tools**
- **The impact of technology**
- **Safety and security**

**End points:**

1. Understanding how to use algorithms to solve problems
2. Be able to use a computer programme to write code to perform a task
3. Be able to use mathematical and logical concepts to solve problems
4. Understand different networks and how they communicate
5. Understand how to work safely and responsibly online, how to recognise and report security issues and concerns
6. Be able to explain the different hardware in computers and how they work together
7. Be able to evaluate real world issues by using personal experiences and real life examples

### Domains of knowledge:

The computing curriculum provides pupils with an understanding of the following domains of knowledge.

<b>NW</b>	<b>Networks:</b> (How networks can be used to retrieve and share information)
<b>CM</b>	<b>Creating Media:</b> (Selecting and creating a range of media including text, images, sounds and video)
<b>DI</b>	<b>Data and Information:</b> (How data is stored, organised and used to represent real world artefacts and scenarios)
<b>DD</b>	<b>Design and Development:</b> (The activities involved in planning, creating and evaluating computing artefacts)
<b>CS</b>	<b>Computing Systems:</b> (What a computer is and how its constituent parts function as a whole)
<b>IT</b>	<b>Impact of Technology:</b> (How individuals, systems and society as a whole interact with computer systems)
<b>AL</b>	<b>Algorithms:</b> (Comprehending, designing, creating and evaluating algorithms)
<b>PG</b>	<b>Programming:</b> (Creating software to allow computers to solve problems)
<b>ET</b>	<b>Effective Use of Tools:</b> (Using software tools to support computing work)
<b>SS</b>	<b>Safety and Security:</b> (Understanding risks when using technology and how to protect individuals and systems)

### Second order concepts:

Through each unit of science, the following second order concepts are explored:

- **Responsibility:** (being safe online, using social media responsibly and respectfully, privacy, cyberbullying)
- **Similarity and difference:** (making comparisons, finding patterns, noting differences and drawing conclusions)
- **Cause and consequence:** (inputs and outputs, programming)
- **Significance:** (significant inventions, significant figures from the world of computing )
- **Chronology:** (changes in technology over time, inventions, future technology)
- **Written and oral expression:** (Using computing terminology, using technology to support and improve communication, using technology to presenting and interpreting data, digital media)

## Progressive objectives:

Our progressive objectives show what pupils should know and be able to do in each aspect of computing by the end of each year group. The key concepts of computing are developed through each unit of work. These are used to support planning and the ongoing assessments of pupils' work.

	<b>Key Concept:</b> <b>1. Computing systems and networks:</b> (systems, networks and how they are used, the internet, hardware and software)
Y1	To identify technology
	To identify a computer and its main parts
	To use a mouse in different ways
	To use a keyboard to type
	To use the keyboard to edit text
	To create rules for using technology responsibly
Y2	To recognise the uses and features of information technology
	To identify information technology in the home
	To identify information technology beyond school
	To explain how information technology benefits us
	To show how to use information technology safely
	To recognise that choices are made when using information technology
Y3	To explain how digital devices function
	To identify input and output devices
	To recognise how digital devices can change the way we work
	To explain how a computer network can be used to share information
	To explore how digital devices can be connected
	To recognise the physical components of a network

Y4	To describe how networks physically connect to other networks
	To recognise how networked devices make up the internet
	To outline how websites can be shared via the World Wide Web
	To describe how content can be added and accessed on the World Wide Web
	To recognise how the content of the WWW is created by people
	To evaluate the consequences of unreliable content
Y5	To explain that computers can be connected together to form systems
	To recognise the role of computer systems in our lives
	To recognise how information is transferred over the internet
	To explain how sharing information online lets people in different places work together
	To contribute to a shared project online
	To evaluate different ways of working together online
Y6	To identify how to use a search engine
	To describe how search engines select results
	To explain how search results are ranked
	To recognise why the order of results is important, and to whom
	To recognise how we communicate using technology
	To evaluate different methods of online communication

	<p><b>Key Concept:</b></p> <p><b>2. Programming:</b> (interpreting, creating and evaluating algorithms, programming to accomplish specific goals, detecting and correcting errors)</p>
Y1	To explain what a given command will do
	To act out a given word
	To combine forwards and backwards commands to make a sequence
	To combine four direction commands to make sequences
	To plan a simple program
	To find more than one solution to a problem
	To choose a command for a given purpose
	To show that a series of commands can be joined together
	To identify the effect of changing a value
	To explain that each sprite has its own instructions
	To design the parts of a project
	To use my algorithm to create a program
Y2	To describe a series of instructions as a sequence
	To explain what happens when we change the order of instructions
	To use logical reasoning to predict the outcome of a program (series of commands)
	To explain that programming projects can have code and artwork
	To design an algorithm
	To create and debug a program that I have written
	To explain that a sequence of commands has a start
	To explain that a sequence of commands has an outcome
	To create a program using a given design
	To change a given design
	To create a program using my own design
	To decide how my project can be improved

Y3	To explore a new programming environment
	I can identify that each sprite is controlled by the commands I choose
	To explain that a program has a start
	To recognise that a sequence of commands can have an order
	To change the appearance of my project
	To create a project from a task description
	To explain how a sprite moves in an existing project
	To create a program to move a sprite in four directions
	To adapt a program to a new context
	To develop my program by adding features
	To identify and fix bugs in a program
	To design and create a maze-based challenge
Y4	To identify that accuracy in programming is important
	To create a program in a text-based language
	To explain what 'repeat' means
	To modify a count-controlled loop to produce a given outcome
	To decompose a program into parts
	To create a program that uses count-controlled loops to produce a given outcome
	To develop the use of count-controlled loops in a different programming environment
	To explain that in programming there are infinite loops and count controlled loops
	To develop a design which includes two or more loops which run at the same time
	To modify an infinite loop in a given program
	To design a project that includes repetition
	To create a project that includes repetition

Y5	To control a simple circuit connected to a computer
	To write a program that includes count-controlled loops
	To explain that a loop can stop when a condition is met, eg number of times
	To conclude that a loop can be used to repeatedly check whether a condition has been met
	To design a physical project that includes selection
	To create a controllable system that includes selection
	To explain how selection is used in computer programs
	To relate that a conditional statement connects a condition to an outcome
	To explain how selection directs the flow of a program
	To design a program which uses selection
	To create a program which uses selection
	To evaluate my program
Y6	To define a 'variable' as something that is changeable
	To explain why a variable is used in a program
	To choose how to improve a game by using variables
	To design a project that builds on a given example
	To use my design to create a project
	To evaluate my project
	To create a program to run on a controllable device
	To explain that selection can control the flow of a program
	To update a variable with a user input
	To use an conditional statement to compare a variable to a value
	To design a project that uses inputs and outputs on a controllable device
	To develop a program to use inputs and outputs on a controllable device

	<p><b>Key Concept:</b></p> <p><b>3. Data and information:</b> (collecting, analysing, evaluating, presenting data and information)</p>
Y1	To label objects
	To identify that objects can be counted
	To describe objects in different ways
	To count objects with the same properties
	To compare groups of objects
	To answer questions about groups of objects
Y2	To recognise that we can count and compare objects using tally charts
	To recognise that objects can be represented as pictures
	To create a pictogram
	To select objects by attribute and make comparisons
	To recognise that people can be described by attributes
	To explain that we can present information using a computer
Y3	To create questions with yes/no answers
	To identify the object attributes needed to collect relevant data
	To create a branching database
	To identify objects using a branching database
	To explain why it is helpful for a database to be well structured
	To compare the information shown in a pictogram with a branching database
Y4	To explain that data gathered over time can be used to answer questions
	To use a digital device to collect data automatically
	To explain that a data logger collects 'data points' from sensors over time
	To use data collected over a long duration to find information
	To identify the data needed to answer questions
	To use collected data to answer questions



Y5	To use a form to record information
	To compare paper and computer-based databases
	To outline how grouping and then sorting data allows us to answer questions
	To explain that tools can be used to select specific data
	To explain that computer programs can be used to compare data visually
	To apply my knowledge of a database to ask and answer real-world questions
Y6	To identify questions which can be answered using data
	To explain that objects can be described using data
	To explain that formula can be used to produce calculated data
	To apply formulas to data, including duplicating
	To create a spreadsheet to plan an event
	To choose suitable ways to present data

	<p><b>Key Concept:</b></p> <p><b>4. Creating media:</b> (design and development, communicating and collaborating online, evaluating online content, respectful and responsible communication, presenting, creating content)</p>
Y1	To describe what different freehand tools do
	To use the shape tool and the line tools
	To make careful choices when painting a digital picture
	To explain why I chose the tools I used
	To use a computer on my own to paint a picture
	To compare painting a picture on a computer and on paper
	To use a computer to write
	To add and remove text on a computer
	To identify that the look of text can be changed on a computer
	To make careful choices when changing text
	To explain why I used the tools that I chose
	To compare writing on a computer with writing on paper
Y2	To know what devices can be used to take photographs
	To use a digital device to take a photograph
	To describe what makes a good photograph
	To decide how photographs can be improved
	To use tools to change an image
	To recognise that images can be changed
	To say how music can make us feel
	To identify that there are patterns in music
	To describe how music can be used in different ways
	To show how music is made from a series of notes
	To create music for a purpose
	To review and refine our computer work

Y3	To explain that animation is a sequence of drawings or photographs
	To relate animated movement with a sequence of images
	To plan an animation
	To identify the need to work consistently and carefully
	To review and improve an animation
	To evaluate the impact of adding other media to an animation
	To recognise how text and images convey information
	To recognise that text and layout can be edited
	To choose appropriate page settings
	To add content to a desktop publishing publication
	To consider how different layouts can suit different purposes
	To consider the benefits of desktop publishing
Y4	To identify that sound can be digitally recorded
	To use a digital device to record sound
	To explain that a digital recording is stored as a file
	To explain that audio can be changed through editing
	To show that different types of audio can be combined and played together
	To evaluate editing choices made
	To explain that digital images can be changed
	To change the composition of an image
	To describe how images can be changed for different uses
	To make good choices when selecting different tools
	To recognise that not all images are real
	To evaluate how changes can improve an image

Y5	To recognise video as moving pictures, which can include audio
	To identify digital devices that can record video
	To capture video using a digital device
	To recognise the features of an effective video
	To identify that video can be improved through reshooting and editing
	To consider the impact of the choices made when making and sharing a video
	To identify that drawing tools can be used to produce different outcomes
	To create a vector drawing by combining shapes
	To use tools to achieve a desired effect
	To recognise that vector drawings consist of layers
	To group objects to make them easier to work with
	To evaluate my vector drawing
Y6	To review an existing website and consider its structure
	To plan the features of a web page
	To consider the ownership and use of images (copyright)
	To recognise the need to preview pages
	To outline the need for a navigation path
	To recognise the implications of linking to content owned by other people
	To use a computer to create and manipulate three-dimensional (3D) digital objects
	To compare working digitally with 2D and 3D graphics
	To construct a digital 3D model of a physical object
	To identify that physical objects can be broken down into a collection of 3D shapes
	To design a digital model by combining 3D objects
	To develop and improve a digital 3D model