



ICT - Computing



Purpose of study

A high-quality computing education equips 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 computing 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. Computing 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.

Aims

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

- can understand and apply the fundamental principles and concepts of computer science, including abstraction, logic, algorithms and data representation
- can analyse problems in computational terms, and have repeated practical experience of writing computer programs in order to solve such problems
- can 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

Pupils should be taught to:

- understand what algorithms are, how they are implemented as programs on digital devices, and that programs execute by following precise and unambiguous instructions
 - create and debug simple programs
 - use logical reasoning to predict the behaviour of simple programs
 - use technology purposefully to create, organise, store, manipulate and retrieve digital content
 - recognise common uses of information technology beyond school
- 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

Using technology

- To become skilful in using different tools to control technology.
- To understand the purpose of, and begin to use a range of different technology.
- To begin to develop typing speed and accuracy to enable independent access to a computer.

Using the Internet

- To understand that the internet needs to be used safely and that we should be supervised when using it.
- To understand that information comes from different sources e.g. books, web sites, TV etc.
- To understand that ICT can give access quickly to a wide variety of resources
- To talk about their use of ICT and the Internet and other methods to find information.
- To be able to explore a variety of electronic information as part of a given topic
- To know buttons/icons can represent different functions e.g. record, pause, play.

Communicating and collaborating online

- To start to understand that messages can be sent electronically over distances.

Creating and Publishing

- To use technology to combine text with photographs, graphics and drawings.
- To create their own text based content, including adding basic effects to sections of text.

Pupils should be taught to:

- understand what algorithms are, how they are implemented as programs on digital devices, and that programs execute by following precise and unambiguous instructions
 - create and debug simple programs
 - use logical reasoning to predict the behaviour of simple programs
 - use technology purposefully to create, organise, store, manipulate and retrieve digital content
 - recognise common uses of information technology beyond school
- 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

Digital Media

- To know they can explore sound and music using technology and that they can create sound using computer programs.
- To know they can record sound using ICT that can be stored and played back.
- To take photographs for a range of different purposes.
- To understand that video can be recorded using technology and to begin to record video.
- To understand that a range of different technology can be used to record sounds.

Using Data

- To use ICT to begin to organise items..
- To begin to use technology to create graphs and pictograms, recognising there is a link between data collected and the information presented on screen.

Programming and Control

- To understand that devices respond to commands.
- To begin to understand how a computer processes instructions and commands (computational thinking).
- To understand that they can program a simple sequence of commands into a programmable robot or toy to send it on a route.

Modelling and Simulations

- To understand computers can represent real or fantasy situations.
- To understand computer representations allows the user to make choices and that different decisions produce different outcomes.

Pupils should be taught to:

- understand what algorithms are, how they are implemented as programs on digital devices, and that programs execute by following precise and unambiguous instructions
 - create and debug simple programs
 - use logical reasoning to predict the behaviour of simple programs
 - use technology purposefully to create, organise, store, manipulate and retrieve digital content
 - recognise common uses of information technology beyond school
- 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

Using technology

- To continue to develop typing speed and accuracy to enable independent and efficient access to a computer.
- To understand the purpose of, and begin to independently use a range of different technology.

Using the Internet

- To talk about the different forms of information (text, images, sound, multimodal) and understand some are more useful than others.
- To understand and talk about how the information can be used to answer specific questions.
- To begin to develop key questions and find information to answer them.
- To recognise the layout of a web page, recognise web addresses, menu buttons and links.
- To understand that the internet contains a large amount of information and recognise the need to use search tools and search engines to begin to find information.

Communicating and collaborating online

- To start to understand that messages can be sent electronically over distances.
- To understand that email can be used to send messages electronically and people can reply to emails.

Creating and Publishing

- To use technology to word process work, making a wide range of edits and using common features of word processing tools.
- To use technology to create basic presentations giving consideration to the layout of slides and combining images and sound.
- To use the skills and techniques learnt to organise, reorganise and communicate ideas for a specific purpose in different contexts.

Pupils should be taught to:

- understand what algorithms are, how they are implemented as programs on digital devices, and that programs execute by following precise and unambiguous instructions
 - create and debug simple programs
 - use logical reasoning to predict the behaviour of simple programs
 - use technology purposefully to create, organise, store, manipulate and retrieve digital content
 - recognise common uses of information technology beyond school
- 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

Digital Media

- To know they can explore sound and music in ICT using keyboards, and onscreen music software.
- To know they can record sound using ICT that can be stored and played back and independently use a range of tools to record sound.
- To independently record video and sound using a range of tools.
- To use the computer to create basic images.
- To choose to take photographs for a range of different purposes.

Using Data

- To use technology to create graphs and amend created graphs.
- To begin to create their own branching databases using ICT, identifying objects and questions to classify data.

Programming and Control

- To continue to develop their understanding of how a computer processes instructions and commands.
- To understand that devices or on screen turtles are controlled by sequences of instructions or actions, and that these can be inputted using icons or by text.
- To create, edit and refine sequences of instructions for a variety of programmable devices.

Modelling and Simulations

- To use a range of basic simulations to represent real life situations and explore the effects of changing variable and the benefits of using the simulations.

Pupils should be taught to:

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

Using technology

- To continue to develop typing speed and accuracy to develop competency in typing.
- To understand the purpose of and use independently a range of different technology.
- To begin to make choices about when to use technology, which piece(s) of technology to use, which software/tools they are going to use on the technology and be able to explain their choices to others.

Using the Internet

- To follow a simple search to find specific information from a web site
- To find and use appropriate information.
- To identify how different web pages are organised e.g. graphics, hyperlinks, text.
- To navigate a web page to locate specific information.
- To know that ICT enables access to a wider range of information and tools to help find specific information quickly.
- To understand a website has a unique address.

Communicating and collaborating online

- To understand that Cloud based tools can allow multiple people to contribute to shared documents and Google Sites.

Creating and Publishing

- To continue to produce work using a computer, using more advanced features of programs and tools.
- To work collaboratively together to create documents, including presentations.
- To use desk top publishing tools effectively and understand the differences between a word processor and desk top publisher.

Pupils should be taught to:

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

Digital Media

- To understand they can compose music using icons to represent musical phrases
- To understand ICT allows easy creation, manipulation and change.
- To know they can record sound using ICT that can be stored and played back and independently use a range of tools to record sound.
- To independently record video using a range of devices and for a range of purposes.
- To independently take photographs taking into account the audience and/or purpose for the image.
- To create digital artefacts using photographs which they have taken or found.
- To edit photographs using a range of basic tools.

Using Data

- To understand the basic structure of a database.
- To be able to add data to a pre-made database.
- To use the data in a pre-made database to generate graphs and charts.
- To use technology to create graphs and charts.

Programming and Control

- To continue to develop their understanding of how computer and technology works and how computers process instructions and commands.
- To create, edit and refine more complex sequences of instructions for a variety of programmable devices.
- To use a computer to create basic applications, investigating how different variables can be changed and the effect this has.

Modelling and Simulations

- To use a range of increasingly simulations to represent real life situations.
- Use simulations to make and test predictions.

Pupils should be taught to:

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

Using technology

- To continue to develop typing speed and accuracy to develop competency in typing.
- To understand the purpose of and use independently a range of different technology.
- To begin to make choices about when to use technology, which piece(s) of technology to use, which software/tools they are going to use on the technology and be able to explain their choices to others.

Using the Internet

- To draw information from a question to develop keywords to find relevant information e.g. What did Romans eat?
- To understand the dynamics of a search engine and know that there are different search engines (some within specific sites e.g. BBC, and some the whole of the Internet e.g. Google, Yahoo!igans, Ask Jeeves)
- To understand that the information they use needs to be appropriate for the audience they are writing for e.g. copying and pasting difficult language.
- To evaluate different search engines and explain their choices for using these for different purposes.
- To begin to recognise that anyone can publish on the Internet and sometimes authors on the Internet can produce content which is offensive, rude and upsetting and to follow school rules if anything is found.

Communicating and collaborating online

- To understand a small range of web 2.0 tools that can help them work together and collaborate; forums, shared documents etc.
- To use the web 2.0 tools to work collaboratively on a project (e.g. sharing comparative data, creating a story).
- To understand how e-mails work and be able to send an e-mail, including choosing a suitable subject and entering addresses in the 'to', 'cc' and 'bcc' fields.
- To share and exchange their ideas using e-mail and electronic communication- inside the school environment.

Creating and Publishing

- To create a website, giving thought to it's audience and including links, images and embedded media and documents.
- To understand that evaluation and improvement is a vital part of a design process and ICT allows changes to be made quickly and efficiently.

Pupils should be taught to:

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

Digital Media

- To know they can record sound using ICT that can be stored and played back and independently using a range of tools to record sound, choosing appropriate tools for the situation and purpose.
- To use a range of technology to sequence sound samples, giving consideration to the audience and purpose.
- To create basic stop motion animations using technology.
- To independently record video using a range of devices and for a range of purposes.
- To use technology to create images and apply effects to these images.
- To use technology to edit video, applying basic effects and transitions.
- To independently take photographs taking into account the audience and/or purpose for the image.

Using Data

- To continue to use technology, including spreadsheets to create graphs and present data in different ways.
- To be able to design and create a basic database, including using basic data validation.
- To use a database to answer questions by constructing queries.

Programming and Control

- To continue to develop their understanding of how computer and technology works and how computers process instructions and commands.
- To create, edit and refine more complex sequences of instructions for a variety of programmable devices.
- Use templates on a computer to create a game, which can be controlled by external inputs, changing parameters and algorithms and investigating the effect this has on the response.

Modelling and Simulations

- To understand that ICT allows for situations to be modelled, or those which it would be impractical to try out in real life and investigate the effect of changing variables in these simulations.
- To use software to model 3D objects made up of cuboids.

Pupils should be taught to:

- design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts
 - use sequence, selection, and repetition in programs; work with variables and various forms of input and output
 - 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
 - use search technologies effectively, appreciate how results are selected and ranked, and be discerning in evaluating digital content
 - 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
- use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact

Using technology

- To continue to develop typing speed and accuracy to develop competency in typing
- To understand the purpose of and use independently a range of different technology.
- To make choices about when to use technology, which piece(s) of technology to use, which software/tools they are going to use on the technology and be able to explain their choices to others.

Using the Internet

- To use a range of sources to check validity and recognise different viewpoints and the impact of incorrect data.
- To save and use pictures, text and sound and be able to import into a document for presentation (ref. multimedia presentation).
- To recognise that the Internet may contain material that is irrelevant, bias, implausible and inappropriate.
- To understand the issues of copyright and how they apply to their own work.

Communicating and collaborating online

- To share and exchange their ideas using e-mail and electronic communication- inside the school environment.
- To use collaboration tools to work together to produce a joint piece of work.

Creating and Publishing

- To create non-traditional presentations using a range of tools, for a specific purpose.
- To create websites for a specific purpose and improve these sites.
- To use technology to help them present their work, showing an increasing degree of skill and using advanced features of software and tools.
- To select tools which they can use to help them achieve a specific aim and justify these choices to others.

Pupils should be taught to:

- design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts
 - use sequence, selection, and repetition in programs; work with variables and various forms of input and output
 - 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
 - use search technologies effectively, appreciate how results are selected and ranked, and be discerning in evaluating digital content
 - 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
- use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact

Digital Media

- To use a range of technology to sequence sound samples, giving consideration to the audience and purpose.
- To use technology to electronically compose music or sounds including creating melodies and save these as audio files.
- To use technology to capture and edit video, applying a range of different effects and incorporating numerous video clips.
- To use technology to create images including using layers.
- To understand the difference between a image and a vector drawing.
- To independently take photographs and record video taking into account the audience and/or purpose for the image/video.

Using Data

- To continue to use, search, enter data into and create their own databases.
- To continue to use technology, including spreadsheets to create graphs and present data in different ways.

Programming and Control

- To continue to develop their understanding of how computer and technology works and how computers process instructions and commands, including the use of coding languages.
- To explore ways in which software can be planned.
- To use assisted programming software to create basic software which interacts with external controllers, and elements on screen, creating algorithms and using logic and calculations.

Modelling and Simulations

- To understand that ICT allows for situations to be modelled, or those which it would be impractical to try out in real life and investigate the effect of changing variables in these simulations.
- Know that simulations are often guided by hidden rules.
- To use software to model 3D objects.

Pupils should be taught to:

- design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts
 - use sequence, selection, and repetition in programs; work with variables and various forms of input and output
 - 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
 - use search technologies effectively, appreciate how results are selected and ranked, and be discerning in evaluating digital content
 - 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
- use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact

Using technology

- To continue to develop typing speed and accuracy to develop competency in typing.
- To understand the purpose of and use independently a range of different technology.
- To make choices about when to use technology, which piece(s) of technology to use, which software/tools they are going to use on the technology and be able to explain their choices to others.

Using the Internet

- To check plausibility of information from a variety of sources on the same topic.
- To use a range of sources to check validity and recognise different viewpoints and the impact of incorrect data.
- To understand plagiarism and the importance of acknowledging sources.

Communicating and collaborating online

- To use appropriate forms of communication to share information or ideas.
- To use collaboration tools to work together to produce a joint piece of work with children in other schools.

Creating and Publishing

- To use tools to help them design and create a web based application for smart phones/tablets, giving consideration to the market/audience for their application.
- To create websites for a specific purpose and improve these sites.
- To use technology to help them present their work, showing an increasing degree of skill and using advanced features of software and tools.
- To select tools which they can use to help them achieve a specific aim and justify these choices to others.
- Understand the importance of evaluation and adaptation of individual features to enhance the overall product.

Pupils should be taught to:

- design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts
 - use sequence, selection, and repetition in programs; work with variables and various forms of input and output
 - 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
 - use search technologies effectively, appreciate how results are selected and ranked, and be discerning in evaluating digital content
 - 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
- use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact

Digital Media

- To use technology to electronically compose music or sounds including creating melodies and save these as audio files.
- To begin to recognise the different layers of sound in a professional broadcast and use technology to record and manipulate music/sound refining for a given audience or project.
- To use technology to create a stop motion animations and add audio and video effects to these animations.
- To use a computer to add complex effects to photographs and to perform common photograph edits.
- To compare different image creation and editing tools and select the most appropriate tool to use, justifying their choices.

Using Data

- To continue to use, search, enter data into and create their own databases.
- To continue to use technology, including spreadsheets to create graphs and present data in different ways. To be able to design, construct, evaluate and modify simple models i.e. enter data, enter formulae, copy cells and use simple formatting in a spreadsheet.
- To use a spreadsheet to draw a graph to show data.
- To understand that ICT allows quick and easy changes to be made to different variables once a spreadsheet is set up. Talk about how the spreadsheet helps them to manipulate a model easily.

Programming and Control

- To continue to develop their understanding of how computer and technology works and how computers process instructions and commands, including the use of coding languages.
- To use assisted programming software to create basic software which interacts with external controllers, and elements on screen, creating algorithms and using logic and calculations.
- To use assisted programming software to more complex software which interacts with external controllers, and elements on screen, creating algorithms and using logic and calculations.
- To control an on screen icon using text based programming, including writing complex written algorithms which involve sensors.
- To begin to write simple scripts in an international recognised coding language.

Modelling and Simulations

- To understand that ICT allows for complex situations to be modelled, or those which it would be impractical to try out in real life investigate the effect of changing variables in these simulations.
- Know that simulations are often guided by hidden rules
- To use software to model 3D objects, working to a scale.