

Computing Curriculum Summary

Through computing lessons, pupils develop digital literacy and computational thinking, equipping them with the knowledge, skills and confidence to use technology effectively, safely and creatively, while developing their ability to approach problems systematically.

Digital literacy is the ability to use computers safely and effectively, with the aim of enhancing learning and supporting pupils across all areas of the curriculum. These skills will continue to be relevant throughout pupils' adult lives, both personally and professionally, as they increasingly interact with digital technologies in a wide range of contexts. Central to digital literacy is an understanding of how thoroughly computers and digital technologies are integrated into modern life, alongside an appreciation of how they can be used effectively in day-to-day situations.

An important aspect of this is ensuring that pupils engage with technology safely and responsibly. Through age-appropriate examples and activities, pupils develop an awareness of the opportunities, risks and challenges associated with using computers, with particular attention given to online spaces. This includes developing an understanding of how to protect personal information, recognise potentially harmful situations and make sensible decisions when interacting with others online. In doing so, the curriculum aims not only to support pupils during their time at school, but also to prepare them to participate confidently and responsibly in the wider digital world.

At the core of computational thinking is the ability to solve problems. Computational thinking is an approach to problem solving that can be applied across a wide range of disciplines, including mathematics, science and engineering, as well as to everyday problems more generally. Pupils will encounter the principles of computational thinking through a range of computer science activities, while also considering how these principles can be applied to problems that do not directly involve computers.

Programming provides an especially useful environment in which pupils can explore and apply these ideas.

Through learning the fundamentals of programming, pupils will practise breaking complex problems into manageable parts, identifying patterns, developing algorithms, testing solutions and refining their approaches when things do not work as expected. By developing these skills, pupils will become increasingly able to approach unfamiliar and complex problems with reason, creativity and confidence, equipped with a framework for thinking systematically about how problems can be understood and solved.

Skills and content:

Kindergarten (KG):

Key Skills include knowing how to...

- Manipulate images on screen
- Develop hand-eye co-ordination
- Create content using various programs.
- Use the iPad keyboard to type simple words such as their names
- Perform basic algorithms through a range of unplugged activities.
- Recognize that the internet can be used as a source of information
- Recognize that a range of technology is used in places such as homes and schools
- Select and use technology for a particular purpose
- Online Safety

Transition 1 (T1):

Key Skills include knowing how to...

- Handle a range of equipment and devices

- Use the trackpad, shift key, space bar and return buttons effectively
- Being aware of how to save, retrieve and print their work
- Search for a range of apps and how to launch them independently
- Format text, including changing the size, shape, style and colour
- Add an image to a piece of work
- Use the internet safely to research simple information and pictures.
- Copy and paste digital images into another app.
- Perform basic algorithms through a range of apps and unplugged activities
- Program an avatar on screen to follow a set of clear instructions
- Create their own digital images using appropriate apps
- Use a digital device to take photographs and video.
- Online Safety

Transition 2 (T2):

Key Skills include knowing how to...

- Load, save and print work using a range of programs on a range of different devices including laptops and iPads
- Format and edit text, including changing the font size, colour and style
- Perform more complex algorithms through a range of apps, online resources and unplugged activities.
- Program toys
- Use digital cameras and create animations using video editing techniques
- Create electronic presentations including images, text, voice tags.
- Search child friendly websites to access information
- Be aware of digital communication
- Online Safety

Form 1:

Key Skills include knowing how to...

- Navigate to apps and software programs on a range of devices (Chromebooks, iPads and laptops)
- Print, save and retrieve their work
- Keep themselves safe online, protect their personal information and understand the importance of strong and weak passwords
- Format text, manipulate text boxes and add images to their work
- Be able to discriminate between data (words, letters, numbers and information), enter data into a database with a predetermined structure and use it to answer straightforward questions and produce bar charts
- Capture and download still photos and video using the digital cameras
- Demonstrate an awareness of their audience and use some of the features of a Google Slides to help them match their work to their audience
- Online Safety

Form 2:

Digital literacy and computational thinking skills are taught through STEM lessons, in which science, technology and computing are taught in a cross-curricular way.

Key Skills include knowing how to...

- Access Google accounts from Chromebooks.
- Online Safety
- Google Doc skills including taking and inserting photographs and videos.
- Using Google sheets for data storage and data handling including the production of charts and graphs.
- File handling using Google drive.
- Computer aided design using West Point Bridge Designer.
- Scratch programming using looping, variables and conditional statements.

- Understand the risks involved in using the internet and how to stay safe.
- Computer control (lighthouse project)

From Form 3 onward computing is taught in discrete topics. These topics may have a digital literacy or computational thinking focus, but both skills are heavily present in all topics. What follows is a list of each topic along with the key skills and knowledge covered.

Form 3:

Topic 1: Computing Lab Introduction

- Managing credentials
- Basic computer operation
- Using a mouse and keyboard
- Creating and managing digital files in multiple formats
- Making effective use of a search engine

Topic 2: Ball Maze

- Manage files during a long-term project
- Precise mouse use to draft accurate diagrams
- Navigating a complex interface

Topic 3: Video Editing

- Managing multiple files during a long-term project
- Making effective use of a search engine to find appropriate resources
- Audio and video editing
- Navigating a complex interface
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Topic 4: Online Safety

- How to critically evaluate their online relationships and sources of information, including awareness of the risks associated with people they have never met.
- How to recognise harmful content or harmful contact, and how to report this.

Topic 5: Programming

- Importing libraries
- Object instantiation
- Using methods
- Using for loops
- Writing functions
- Decomposition, abstraction, algorithm design, pattern recognition
- Troubleshooting

Form 4:

Topic 1: Websites

- Creating and editing a website using Google Sites
- Planning and organising website content
- Creating and managing web pages
- Formatting text and images
- Adding hyperlinks and multimedia
- Applying effective layouts and design

Topic 2: Computational thinking

- Breaking problems into smaller steps
- Writing clear, step by step instructions
- Identifying the sequence of actions
- Giving precise and unambiguous instructions

- Testing and improving solutions
- Identifying errors in instructions
- Applying logical thinking to solve problems

Topic 3: Programming

- Writing simple programs
- Using variables to store data
- Using input and output
- Using selection with if statements
- Using loops to repeat instructions
- Understanding basic programming syntax
- Testing and debugging programs

Topic 4: Computer Safety

- The risks relating to online gaming, video game monetisation, scams, fraud and other financial harms, and that gaming can become addictive.
- Why social media, some apps, computer games and online gaming, including gambling sites, are age restricted.
- How to understand the information they find online, including from search engines, and know how information is selected and targeted

Topic 5: Code breaking

- Exploring historic methods of encryption
- Encrypting and decrypting messages
- Using a range of ciphers
- Identifying patterns in encrypted messages
- Applying techniques to break simple codes
- Understanding how codes and ciphers have been used throughout history

Topic 6: Robotics

- Programming a robotic buggy
- Controlling motors and movement
- Programming sequences of instructions
- Programming remote-controlled behaviour
- Testing and debugging robotic programs
- Solving problems using physical computing

Form 5:

Topic 1: Hardware

- Identifying the main components of a computer
- Understanding the purpose of different hardware components
- Understanding how components work together
- Identifying common computer peripherals
- Understanding the purpose of different peripherals
- Distinguishing between input and output devices
- Understanding how hardware enables a computer to function

Topic 2: Networks

- Understanding how computer networks work
- Identifying different types of networks
- Understanding how devices communicate across networks
- Understanding how the internet works
- Understanding how search engines work
- Using search engines effectively
- Evaluating the reliability of search results

Topic 3: Programming

- Writing programs using multiple data types
- Understanding and using different data types
- Creating and using lists
- Using variables to store and manipulate data
- Using selection and iteration
- Combining programming concepts to solve problems
- Testing and debugging programs

Topic 4: Computer safety

- How information and data is generated, collected, shared and used online.
- The importance of being cautious about sharing personal information online and of using privacy and location settings appropriately to protect information online.
- Not to provide material to others that they would not want to be distributed further.
- How advertising and information is targeted at them and how to be a discerning consumer of information online

Topic 5: Bletchley Park

- Understanding the role of Bletchley Park in World War II
- Exploring the history of codebreaking
- Understanding the Enigma machine
- Exploring methods of encryption and decryption
- Understanding the importance of Alan Turing and other codebreakers
- Applying codebreaking techniques to historical ciphers
- Understanding the impact of computing and codebreaking on the war

Topic 6: Binary

- Understanding the binary number system
- Converting between binary and denary numbers
- Understanding how numbers are represented in binary
- Understanding how images are represented digitally
- Understanding how sound is represented digitally
- Understanding how video is represented digitally
- Understanding how computers represent different types of data

Form 6:**Topic 1: Computational thinking**

- Breaking complex problems into smaller parts
- Designing clear and precise algorithms
- Comparing different solutions to a problem
- Evaluating the efficiency of algorithms
- Optimising solutions to improve efficiency
- Identifying and removing unnecessary steps
- Applying computational thinking to solve complex problems

Topic 2: AI

- Understanding what artificial intelligence is
- Exploring how AI systems learn and make decisions
- Understanding machine learning
- Understanding how AI uses data
- Exploring the uses of AI in everyday life
- Identifying the strengths and limitations of AI
- Considering the impact of AI on society

Topic 3: Programming

- Sorting and organising data
- Using algorithms to process data
- Creating and manipulating lists
- Designing graphical user interfaces
- Using GUI components such as buttons and text boxes
- Responding to user interactions
- Testing and debugging programs

Topic 4: Online Safety

- The prevalence of deepfakes including videos and photos.
- That websites may share personal data about their users, and information collected on their internet use.
- That AI chatbots are an example of how AI is rapidly developing, and that these can pose risks by creating fake intimacy or offering harmful advice.

Topic 5: Ethics

- Exploring ethical issues in computing
- Discussing current issues in technology
- Considering the impact of technology on society
- Exploring different perspectives on technological issues
- Evaluating the benefits and risks of new technologies
- Developing reasoned opinions on ethical issues
- Considering the responsibilities of technology users and developers

Extra-curricular opportunities:

Two after school computing labs where F3-6 students engage in self-directed learning.

Regular lunch and break time computing labs for forms 3-6, including access to board games and puzzles during to encourage a love for problem solving.

Puzzle Club (F3&4 Elective Early Morning Activity).

Contribution to Spiritual, Moral, Social and Cultural Development:

Computing contributes to students' Spiritual, Moral, Social and Cultural Development by encouraging them to consider the ethical and social implications of technology. Students explore issues such as online safety, privacy, artificial intelligence, digital communication and the impact of technology on society. They are encouraged to consider different perspectives, develop reasoned opinions and understand their responsibilities as users and creators of technology.