COMPUTING CURRICULUM

Computing Curriculum

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.

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 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.

Key stage 1

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.

Key stage 2

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.

Curriculum Design

The HCAT Computing curriculum is structured into units for each year group, each unit is underpinned by a key concept. Learning objectives have been sequenced to ensure that they are progressive from EYFS to Year 6. These concepts have been sequenced to ensure that children are equipped with the appropriate knowledge and understanding to support them in accessing more complex concepts such as programming. The Creating Media and Programming concepts are revisited twice within each year group to provide opportunities for children to apply their prior knowledge and build upon their understanding.

HCAT Computing Key Concepts			
Online Safety & Cyberbullying			
Computing Systems & Networks	Creating Media	Data & Information	Programming

Upperwood Computing Curriculum

HCAT Computing Curriculum Coverage	KS1		LKS2		KS2	
	Cycle A	Cycle B	Cycle A	Cycle B	Cycle A	Cycle B
	Online Safety and Cyber Bullying to be taught throughout Computing curriculum sessions					
Autumn Term 1	**Computing Systems and Networks:** *Technology Around Us*	**Data and Information:** *Grouping Data*	**Computing Systems and Networks:** *Connecting Computers*	**Data and Information:** *Branching Databases*	**Computing Systems and Networks:** *Sharing Information*	**Data and Information:** *Flat – File Databases*
Autumn Term 2	**Computing Systems and Networks:** *IT around us*	**Data and information:** *Pictograms*	**Computing Systems and Networks:** *The Internet*	**Data and information:** *Data Logging*	**Computing Systems and Networks:** *Communications*	**Data and information:** *Spreadsheets*
Spring Term 1	**Creating Media A:** *Digital Painting*	**Creating Media B:** *Digital Writing*	**Creating Media A:** *Animation*	**Creating Media B:** *Desktop Publishing*	**Creating Media A:** *Video Editing*	**Creating Media B:** *Vector Drawing*
Spring Term 2	**Creating Media A:** *Digital Photography*	**Creating Media B:** *Making Music*	**Creating Media A:** *Audio Editing*	**Creating Media B:** *Photo Editing*	**Creating Media A:** *Web Page Creation*	**Creating Media B:** *3D Modelling*
Summer Term 1	**Programming A:** *Moving a Robot*	**Programming B:** *Introduction to Animation*	**Programming A:** *Sequencing in Music*	**Programming B:** *Events and Actions*	**Programming A:** *Selection in Physical Computing*	**Programming B:** *Selection in Quizzes*
Summer Term 2	**Programming A:** *Robot Algorithms*	**Programming B:** *Introduction to Quizzes*	**Programming A:** *Repetition in Shapes*	**Programming B:** *Repetition in Games*	**Programming A:** *Variables in Games*	**Programming B:** *Sensing*

Concepts	EYFS	KS1	LKS2	UKS2
Online Safety & Cyber-bullying	I know to seek adult permission when accessing technology. I know how to follow online safety rules.	I know how to follow online safety rules and understand the importance of these. I know how to use the search engines agreed by my school. I know what to do if I see anything I am unhappy with or receive a message I do not like. I know how to act responsibly and respectfully and understand the consequences when using the internet or iPads. I know how to navigate age appropriate websites. I know how to use the internet with care and respect	I am aware of online safety rules and adopt these when using the internet and other technologies. I am aware of rules and understand that they exist to help keep me safe when online. I am aware of the consequences of not following the rules. I am aware of online safety rules and adopt these when using the internet and other technologies. I am aware of rules and understand that they exist to help keep me safe when online. I am aware of the consequences of not following the rules.	I am aware of online safety rules and adopt these when using the internet and other technologies. I am aware of rules and understand that they exist to help keep me safe when online. I am aware of the consequences of not following the rules. I am aware of online safety rules and adopt these when using the internet and other technologies. I am aware of rules and understand that they exist to help keep me safe when online. I am aware of the consequences of not following the rules.
	I know how to explore and identify IT in the environment. (uses electrical power) I know how to develop hand-eye co-ordination with the mouse. USEFUL RESOURCES Penguin book National Online Safety (website – EYFS Lesson Plans and Bundle)	I know what to do if I find something inappropriate online. I know that any personal information (home address or any other information that could be used to identify me) should not be shared online. **Reliability/Fake news** I know not everything on the internet is true. I know how to recognise advertising on websites and appropriately evaluate when to ignore this.	**Personal info.** I know I should behave online as I would in the real world: respecting other people's views. I understand the importance of keeping personal information private. I know to identify when emails should not be opened and when an attachment may not be safe. **Safe usage** I know how to explain and demonstrate how to use apps and gaming safely. I know how to use different search engines safely. I know how to use a username and password to use any secure network. USEFUL RESOURCES INTERLAND bbc.com/cwrit net-aware.co.uk	**Online behaviour** I know I should behave online as I would in the real world: respecting other people's views. I understand the importance of keeping personal information private. I am aware of the negative impact cyber bullying can have on its victims and am aware of where I can go for help and advice if I need to. **Validity/Reliability** I know how to explore the validity of information on the internet. I know how to make sensible and considered judgments about whether or not to trust online content
		Communication I understand people can communicate with other people online (through online forums, email, gaming, blogging). I know how to send and receive emails as a class. I know how to use a username and password to use any secure network. I discuss and recognise some uses of ICT beyond school.	**Communication** I demonstrate how to use emails/ the internet safely. **Communication/ Responsible use** I explore the difference in communicating face-to-face and online. I use technologies in ways that minimize risk (e.g. responsible use of online discussions etc.). I understand the phrase screen time and can discuss its impact on my well-being. I use social media safely and ensure I am aware of age restrictions for popular apps/platforms. I understand that computer networks, including the internet, can provide multiple services including communication and collaboration. (e.g. Facetime, Email, YouTube, Blogging, Vlogging, Music/video streaming).	**Communication/Digital footprint** I know how to independently, and with regard to online safety, select and use appropriate communication tools to solve problems by collaborating and communicating with others, with and beyond school. I know that content put online is extremely difficult to remove. I understand the rules and legality of using online social media platforms and apps. USEFUL RESOURCES SRE links bbc.com/cwrit net-aware.co.uk The internet matters

Computing Systems and Networks (Cycle A)		To know what technology is To know and identify a computer and its main parts To know how to use a mouse in different ways To know how to use a keyboard to type on a computer To know how a keyboard can edit text To create rules for using technology responsibly To know and recognise the uses and features of information technology To know how to identify the uses of information technology in the school To know and identify information technology beyond school To know and explain how information technology helps us To know and explain how to use information technology safely To know and recognise that choices are made when using information technology	To know and explain how digital devices function To know and identify input and output devices To know and recognise how digital devices can change the way we work To know and explain how a computer network can be used to share information To know how to explore how digital devices can be connected To know to recognise the physical components of a network To know and describe how networks physically connect to other networks To know and recognise how networked devices make up the internet To know and outline how websites can be shared via the World Wide Web (WWW) To know and describe how content can be added and accessed on the World Wide Web (WWW) To know and recognise how the content of the WWW is created by people To know how to evaluate the consequences of unreliable content	To know and explain that computers can be connected together to form systems To know and recognise the role of computer systems in our lives To know and recognise how information is transferred over the internet To know and explain how sharing information online lets people in different places work together To know and contribute to a shared project online To know and evaluate different ways of working together online To know how to identify how to use a search engine To know and describe how search engines select results To know how to explain how search results are ranked To know and recognise why the order of results is important, and to whom To know and recognise how we communicate using technology To know and evaluate different methods of online communication
Data and Information (Cycle B)		To know how to label objects To know and identify that objects can be counted To know and describe objects in different ways To know how to count objects with the same properties To know and compare groups of objects To know how to answer questions about groups of objects To know and recognise that we can count and compare objects using tally charts To know and recognise that objects can be represented as pictures To know how to create a pictogram To know how to select objects by attribute and make comparisons To know how to recognise that people can be described by attributes	To know how to create questions with yes/no answers To know and identify the object attributes needed to collect relevant data To know how to create a branching database To know and explain why it is helpful for a database to be well structured To know how to identify objects using a branching database To know and compare the information shown in a pictogram with a branching database To know how to explain that data gathered over time can be used to answer questions To know how to use a digital device to collect data automatically To know and explain that a data logger collects 'data points' from sensors over time To know how to use data collected over a long duration to find information	To know how to use a form to record information To know and compare paper and computer-based databases To know how grouping and then sorting data allows us to answer questions To know and explain that tools can be used to select specific data To know and explain that computer programs can be used to compare data visually To know and apply my knowledge of a database to ask and answer real-world questions To know to identify questions which can be answered using data To know and explain that objects can be described using data To know to explain that formulas can be used to produce calculated data

		To know and explain that we can present information using a computer	To know and identify the data needed to answer questions To know to use collected data to answer questions	To know how to apply formulas to data, including duplicating To know how to create a spreadsheet to plan an event To know to choose suitable ways to present data
Creating Media A (Cycle A)		To know and describe what different freehand tools do To know what the shape tool and the line tools To know how to make careful choices when painting a digital picture To know and explain why I chose the tools I used To know how to use a computer on my own to paint a picture To know and compare painting a picture on a computer and on paper To know how to use a digital device to take a photograph To know to make choices when taking a photograph To know and describe what makes a good photograph To know and decide how photographs can be improved To know how to use tools to change an image To know and recognise that photos can be changed	To know and explain that animation is a sequence of drawings or photographs To know to relate animated movement with a sequence of images To know and plan an animation To know and identify the need to work consistently and carefully To know how to review and improve an animation To know and evaluate the impact of adding other media to an animation To know and identify that sound can be digitally recorded To know how to use a digital device to record sound To know and explain that a digital recording is stored as a file To know and explain that audio can be changed through editing To know how to show that different types of audios can be combined and played together To know how to evaluate editing choices made	To know and explain what makes a video effective To know and identify digital devices that can record video To know and capture video using a range of techniques To know how to create a storyboard To know and identify that video can be improved through reshooting and editing To know and consider the impact of the choices made when making and sharing a video To know and review an existing website and consider its structure To know and plan the features of a web page To know to consider the ownership and use of images (copyright) To know and recognise the need to preview pages To know and outline the need for a navigation path To know and recognise the implications of linking to content owned by other people
Creating Media B (Cycle B)		To know how to use a computer to write To know how to add and remove text on a computer To know and identify that the look of text can be changed on a computer To know how to make careful choices when changing text To know and explain why I used the tools that I chose To know and compare typing on a computer to writing on paper To know and say how music can make us feel To identify and know that there are patterns in music To know how music is made from a series of notes	To know and recognise how text and images convey information To know and recognise that text and layout can be edited To know and choose appropriate page settings To know how to add content to a desktop publishing publication To know and consider how different layouts can suit different purposes To know and consider the benefits of desktop publishing To know and explain that digital images can be changed To know how to change the composition of an image	To know and identify that drawing tools can be used to produce different outcomes To know how to create a vector drawing by combining shapes To know and use tools to achieve a desired effect To know and recognise that vector drawings consist of layers To know how to group objects to make them easier to work with To know how to evaluate my vector drawing To know use a computer to create and manipulate three-dimensional (3D) digital objects

		To know how music is made from a series of notes To know how to create music for a purpose To know how to review and refine our computer work	To know and describe how images can be changed for different uses To know how to make good choices when selecting different tools To know and recognise that not all images are real To know and evaluate how changes can improve an image	To know and compare working digitally with 2D and 3D graphics To know how to construct a digital 3D model of a physical object To know and identify that physical objects can be broken down into a collection of 3D shapes To know how to design a digital model by combining 3D objects To know and develop and improve a digital 3D model
Programming A (Cycle A)		To know and explain what a given command will do To know how to act out a given word To know how to combine forwards and backwards commands to make a sequence To know how to combine four direction commands to make sequences To plan a simple program To know how to find more than one solution to a problem To know how describe a series of instructions as a sequence To know and explain what happens when we change the order of instructions To know how to use logical reasoning to predict the outcome of a program (series of commands) To know and explain that programming projects can have code and artwork To know how to design an algorithm To know how to create and debug a program that I have written	To know and explore a new programming environment To know how to identify that commands have an outcome To know and explain that a program has a start To know how to recognise that a sequence of commands can have an order To know and change the appearance of my project To know how to create a project from a task description To know how to identify that accuracy in programming is important To know how to create a program in a text-based language To know and explain what 'repeat' means To know how to modify a count-controlled loop to produce a given outcome To know how to decompose a task into small steps To know how to create a program that uses count-controlled loops to produce a given outcome	To know how to control a simple circuit connected to a computer To know and write a program that includes count-controlled loops To know and explain that a loop can stop when a condition is met To know explain that a loop can be used to repeatedly check whether a condition has been met To know and design a physical project that includes selection To know how to create a program that controls a physical computing project To know to define a 'variable' as something that is changeable To know and explain why a variable is used in a program To know to choose how to improve a game by using variables To know how to design a project that builds on a given example To know to use my design to create a project To evaluate my project
Programming B (Cycle B)		To know how to choose a command for a given purpose To know and show that a series of commands can be joined together To know and identify the effect of changing a value To know and explain that each sprite has its own instructions To know how to design the parts of a project To know how to use my algorithm to create a program	To know and explain how a sprite moves in an existing project To know how to create a program to move a sprite in four directions To know how to adapt a program to a new context To know how to develop my program by adding features To know and identify and fix bugs in a program To know how to design and create a maze-based challenge	To know and explain how selection is used in computer programs To know and relate that a conditional statement connects a condition to an outcome To know to explain how selection directs the flow of a program To know and design a program which uses selection To know and create a program which uses selection

		To know how to explain that a sequence of commands has a start To know and explain that a sequence of commands has an outcome To know how to create a program using a given design To know how to change a given design To know and create a program using my own design To know and decide how my project can be improved	To know and develop the use of count-controlled loops in a different programming environment To know and explain that in programming there are infinite loops and count controlled loops To know to develop a design that includes two or more loops which run at the same time To know and modify an infinite loop in a given program To know and design a project that includes repetition To know and create a project that includes repetition	To know to evaluate my program To know how to create a program to run on a controllable device To know and explain that selection can control the flow of a program To know to update a variable with a user input To know and use a conditional statement to compare a variable to a value To know and design a project that uses inputs and outputs on a controllable device To know and develop a program to use inputs and outputs on a controllable device