



Nacton C of E Primary School

WE ARE COMPUTER SCIENTISTS- Computer Knowledge Gems

In each Computing unit we build on our computational knowledge and skills though our knowledge gems centred around; **EXPERTISE**, **APPLICATION** and **EVALUATION**. The knowledge gems are the key things we learn and try to remember. We apply our learning using our previous computational knowledge and skills.

EXPERTISE	APPLICATION	EVALUATION
We learn key skills to enable us to effectively use technologies for different purposes. These are basic skills that will allow us to develop a competency in computing that will equip us for the future. We also learn what to do if we come across concerning content or contact on line so that we can be safe in our use of technology.	We learn to apply our expertise and computational thinking skills to information and communication technologies in purposeful ways: to solve problems, create content and express ourselves. We know how to do this safely and respectfully.	We learn to evaluate information technology by choosing the best application or method to solve a problem. We are discerning in evaluating digital content and the risks involved when working online which enables us to know how to use technology safely. We reflect on our own use of technology to solve problems or present information effectively and respectfully.

EYFS

All about me (Digital wisdom – how to stay safe online)

Autumn 1	EXPERTISE	APPLICATION	EVALUATION
		I know who to go to for help if something goes wrong on the computer or I am unsure what to do.	I know not to share my personal information online.

Explorers (Computer science – exploring robots)

Autumn 2	EXPERTISE	APPLICATION	EVALUATION
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	I know how to move a robot forward and backward.	I know how to move a robot around a map giving one instruction at a time.	
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Life long ago (Digital technology – things that use technology)

Spring 1	EXPERTISE	APPLICATION	EVALUATION
			I know about things that use technology at home.

In Emergency (Digital literacy – drawing)

Spring 2	EXPERTISE	APPLICATION	EVALUATION
	I know how to make marks on a touch screen. I know how to select a colour.	I know how to choose what marks to make to create a picture.	I know how to talk about what I have created.

Farming (Digital literacy – multimedia presentation)

Summer 1	EXPERTISE	APPLICATION	EVALUATION
	I know how to record audio into a device. I know how to take a simple photo.		I know how to choose the best audio and photo for my work. I know how to talk about what I have created.

Seasides (Computer science – instructions)

Summer 2	EXPERTISE	APPLICATION	EVALUATION
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	I know how to give someone a simple instruction.	I know how to tell others what to do to move a robot around a map.	I know how to talk about how clear my instructions were.
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Key Stage One

Digital Technology: Technology around us

Cycle A Autumn	EXPERTISE	APPLICATION	EVALUATION
	I know how to use a mouse in different ways.	I know how to use my keyboard and mouse skills to edit typing.	I know that technology can help us and am able to identify technology in the classroom.
	I know how to use a keyboard to type.	I know the rules for using technology safely and know when to use them.	I know the names of different parts of the computer and what they do.

Digital literacy: digital writing

Cycle A Autumn	EXPERTISE	APPLICATION	EVALUATION
	I know how to open a word processor and I can recognise and find keys on a keyboard.	I know how to change the look of text on a computer	I know how to make careful choices when changing text on a computer.
	I know how writing on a computer and writing on paper are different	I know how to add and remove text on a computer.	I know why I used the tools that I chose to change text.

Digital Literacy: Creating media – digital painting

Cycle A Spring	EXPERTISE	APPLICATION	EVALUATION
	I know what different freehand tools do.	I know how to make careful choices of shape and colour when creating a digital painting.	I know why I have chosen different tools to use and can explain this to others.
	I know how to use the shape and line tools.	I know how to apply my digital painting skills to create my own picture.	I know how pictures on paper and computers are different and can say which I prefer and why.

Digital literacy: Grouping Data

Cycle A Spring	EXPERTISE	APPLICATION	EVALUATION
	I know how to label objects.	I know how to describe objects in different ways.	I know how to compare groups of objects.
	I know that objects can be counted.	I know how to count objects with the same properties.	I know how to answer questions about groups of objects.

Computer science: Moving Robots

Cycle A Summer	EXPERTISE	APPLICATION	EVALUATION
	I know what a given command will do.	I know how to combine forwards and backwards commands to make a sequence.	I know how to plan a simple program
	I know how to act out a given word.	I know how to combine four direction commands to make sequences.	I know how to find more than one solution to a problem.

Computer science: Animation

Cycle A Summer	EXPERTISE	APPLICATION	EVALUATION
	I know that each sprite has its own instructions.	I know what effect changing a value will have.	I know how to design the parts of a project.
	I know that a series of commands can be joined together.	I know how to choose a command for a given purpose.	I know how to use my algorithm to create a program.

Digital Technology: IT around us.

Cycle B Autumn	EXPERTISE	APPLICATION	EVALUATION
	I know the uses and features of information technology.	I know how to identify information technology beyond school.	I know how to use information technology safely.
	I know the uses of information technology in the school.	I know how information technology helps us.	I know that choices are made when using information technology.

Digital Literacy: Pictograms

Cycle B Autumn	EXPERTISE	APPLICATION	EVALUATION
	I know that we can count and compare objects using tally chart.	I know how to create a pictogram.	I know how to we can present information using a computer.

	I know that objects can be represented as pictures.	I know that that people can be described by attributes.	I know how to select objects by attribute and make comparisons.
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Digital Literacy: Making music

Cycle B Spring	EXPERTISE	APPLICATION	EVALUATION
	I know how music can make us feel.	I know how to use a computer to create a musical pattern.	I know how to experiment with sound using a computer.
	I know that there are patterns in music.	I know how to create music for a purpose.	I know how to review and refine my computer work.

Digital literacy: Digital Photography

Cycle B Spring	EXPERTISE	APPLICATION	EVALUATION
	I know how to use a digital device to take a photograph.	I know how photographs can be improved.	I know that I can make choices when taking a photograph.
	I know what makes a good photograph.	I know how to use tools to change an image.	I know that photos can be changed to improve them and I know when a photo is real or changed.

Computer Science: Robot Algorithm

Cycle B Summer	EXPERTISE	APPLICATION	EVALUATION
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	I know that a series of instructions is a sequence.	I know that programming projects can have code and artwork.	I know how to use logical reasoning to predict the outcome of a program.
	I know what happens when we change the order of instructions.	I know how to design an algorithm.	I know how to create and debug a program that I have written.

Computer Science: Quizzes

Cycle B Summer	EXPERTISE	APPLICATION	EVALUATION
	I know that that a sequence of commands has a start.	I know how to create a program using a given design.	I know how to change a given design.
	I know that that a sequence of commands has an outcome.	I know how to create a program using my own design.	I know how my project can be improved.

Lower Key Stage Two

Digital Technology: Connecting Computers

Cycle A Autumn	EXPERTISE	APPLICATION	EVALUATION
	I know that digital devices give outputs and take inputs.	I know how a simple process works by designing a digital device.	I know how useful a digital device is by evaluating how well it works.

	I know what a computer network is and how it passes messages.	I know how digital devices are connected through computer networks and electrical parts.	I know how beneficial computer networks can be by evaluating the devices around me.
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Digital Literacy: Branching databases

Cycle A Autumn	EXPERTISE	APPLICATION	EVALUATION
	I know what questions you ask to create a yes/ no answer.	To know how to select attributes to ask yes/ no questions.	To know how a branching database works effectively by choosing accurate groupings for objects.
	I know how to create a branching database.	I know how a branching database is created and can plan my own.	I know why a database is effective by evaluating its structure.

Computer Science: Sequences

Cycle A Spring	EXPERTISE	APPLICATION	EVALUATION
	I know that programming is a series of commands.	I know how to create a programme following a design.	I know how to explain the sequences of commands I have created and how they will respond.
	I know that commands have a chronological order.	I know how to create a sequence of commands with my own design choices.	I know how to edit and evaluate a project from the task description.

Computer Science: Events and Actions

Cycle A Spring	EXPERTISE	APPLICATION	EVALUATION
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	I know how to create commands to move an object.	I know how an object has been moved and can explain the programming steps.	I know how to create and edit a programme, moving an object in four directions.
	I know what bugs in a programme are and how to identify them.	I know how to develop a programme by adding features.	I know how to adapt a programme to fit a new idea/context.

Digital Literacy: Desktop Publishers

Cycle A Summer	EXPERTISE	APPLICATION	EVALUATION
	I know that text and images give information.	I know that text and images can be edited to communicate more clearly.	I know how layouts can be effective for the purpose of writing.
	I know what page orientation and page place holders are.	I know how to add content using images, text and design choices of my own.	I know how to consider the benefits of desktop publishing and why it is useful in the real world.

Digital Literacy: Animation

Cycle A Summer	EXPERTISE	APPLICATION	EVALUATION
	I know animation is a sequence of drawings or photographs.	I know what a sequence of images will look like by predicting the final animation.	I know how I can improve my animation by reviewing its effectiveness.
	I know how to plan an animation by drawing clear images.	I know how my work will look by how consistent and careful it is.	I know how to explain the changes I have made to an animation by editing and adding other media.

Digital Technology: The Internet

Cycle B Autumn	EXPERTISE	APPLICATION	EVALUATION
	I know how networks connect to other networks.	I know how websites can be shared via the World Wide Web.	I know how to explain why people create content on the WWW and reflect on why there are rules to protect its content.
	I know how networks allow us to view the world wide web.	I know how to add media and content to the World Wide Web.	I know how to evaluate the consequences of unreliable content.

Digital Literacy: Audio Editing

Cycle B Autumn	EXPERTISE	APPLICATION	EVALUATION
	I know devices can record sound as inputs and play it back as outputs.	I know how to explain where digital sounds are stored and how to access them.	I know I can discuss ways to edit audio recordings and edit sections to do so.
	I know how to use digital device to record sound.	I know how to combine sounds to play them together.	I know how to suggest improvements and identify what I like on an audio recording.

Computer Science: Repetition

Cycle B Spring	EXPERTISE	APPLICATION	EVALUATION
	I know what repeat means and can apply it to commands.	I know that I need to give accurate commands to make a clear programme.	I know what the chunks of a programme are that I made by decomposing the commands.

	I know what a count-controlled loop is and can apply it to commands.	I know how to create a plan for a programme in text-based language.	I know how to design and develop a programme that uses count-controlled loops and repeats, checking for any bugs.
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Computer Science: Repetition in games

Cycle B Spring	EXPERTISE	APPLICATION	EVALUATION
	I know what a count-controlled loop is and can apply it to different programmes.	I know how to design a programme that has 2 or more loops.	I know how to modify a programme with infinite loops.
	I know what infinite loops are and can apply them.	I know how to design my own project using repetition.	I know how to evaluate and edit a project that includes repetition.

Digital Literacy – Photo editing

Cycle B Summer	EXPERTISE	APPLICATION	EVALUATION
	I know that digital images can be changed.	I know how to change the composition of an image.	I know how images can be changed for different uses and explain my choices.
	I know that not all images are real.	I know how an image has been retouched for negative and positive effects.	I know how to evaluate and make changes to improve an image.

Digital Literacy – Data Logging

Cycle B Summer	EXPERTISE	APPLICATION	EVALUATION
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	I know how to use a digital device to collect automatic data.	I know how to look at data over time and ask questions.	I know I can propose a question, plan how to collect data and investigate my data.
	I know that a data logger collects data points from sensors.	I know I can collect data over time and sort data on a computer programme.	I know I can interpret data, draw conclusions and explain the benefits of data loggers.

Upper Key Stage Two

Digital Technology: Sharing information

Cycle A Autumn	EXPERTISE	APPLICATION	EVALUATION
	I know that computer can be connected together to form systems.	I know about the role that computer systems play in our lives.	I know that sharing information online allows people in different places to work together.
	I know how information is transferred over the internet.	I know how to contribute to a shared project online.	I know how to evaluate different ways of working together online.

Digital Literacy: Vector Drawing

Cycle A Autumn	EXPERTISE	APPLICATION	EVALUATION
	I know the tools used for vector drawing	I know how to create a vector drawing	I know how to duplicate multiple objects

	I know how to be effective when drawing vectors	I know how to add layers in vector drawings	I know how to design and evaluate pictures using pixels
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Digital Literacy – Video Editing

Cycle A Spring	EXPERTISE	APPLICATION	EVALUATION
	I know the history of moving images	I know how to use a range of devices to capture video and audio	I know how to import and edit a video
	I know different devices to capture video and audio	I know how to add different features to a video	I know how to evaluate a video

Digital Literacy - Databases

Cycle A Spring	EXPERTISE	APPLICATION	EVALUATION
	I know how to create a paper version of a record card database	I know how records can be used and grouped	I know that using different visual representations creates an effective chart, and how charts can be used to review data
	I know how to use a computer-based database to examine how data can be recorded and used	I know how to develop search techniques to answer questions about data	I know how to use a real-life database to ask questions and find answers in the context of a flight search based on set parameters

Computer Science: Selection

Cycle A Summer	EXPERTISE	APPLICATION	EVALUATION
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	I know how to connect the crumble controller with the correct associated components	I know how certain conditions in an algorithm can change and control the flow of a program	I know how to use the understanding of micro-controllers to design a project and evaluate it.
	I know how to develop my understanding of the crumble controller by adding additional devices	I know that the flow of algorithm can be controlled by conditions.	I can create an algorithm to extend a project I have created.

Computer Science – Selection in Quizzes

Cycle A Summer	EXPERTISE	APPLICATION	EVALUATION
	I know how to select and identify how conditions are used to control the flow of actions in a program	I know how the If... Then... Else... structure can be used to identify two responses to a binary question	I know how to use the Scratch programming environment to implement the first section of the algorithm as a program
	I can select the correct parts of an algorithm to ensure conditions are repeatedly checked.	I know how to use selection to control the outcomes in an interactive quiz.	I know how to identify ways that the program can be improved.

Digital Technology - Communication

Cycle B Autumn	EXPERTISE	APPLICATION	EVALUATION
	I know that data is transferred using agreed methods and that internet devices have addresses.	I know how to access shared files that are online and can share information over the internet in different ways.	I know that there are a variety of ways to communicate over the internet, and can choose methods of communication that are suitable for particular purposes.
	I know that data is transferred and received in packets and can identify and explain the main parts of a data packet.	I know different ways of working together online and can explain how the internet enables effective collaboration.	I can compare different methods of communicating over the internet and evaluate which are the best methods to communicate over the internet.

Digital Literacy - Spreadsheets

Cycle B Autumn	EXPERTISE	APPLICATION	EVALUATION
	I know that a spreadsheet is a programme that stores, organises and analyses data.	I know how to use formulae to change data.	I can plan, create and evaluate a spreadsheet.
	I know how a spreadsheet is modified.	I know how to calculate and duplicate data.	I can create and evaluate a range of charts on a spreadsheet.

Digital Literacy – Web Pages

Cycle B Spring	EXPERTISE	APPLICATION	EVALUATION
	I know how to explore websites and identify the different types of media on a website.	I know what copy-right means and can give examples of media that is copy-right. I know and understand how to use copy-right free images.	I know what a navigation path is and can explain why a navigation path is useful.
	I know how to identify common features of a web page.	I know how to add a range of content and media to a web page.	I know how to hyperlink others work to my own website and understand the implications of linking to other peoples content.

Digital Literacy – 3D Modelling

Cycle B Spring	EXPERTISE	APPLICATION	EVALUATION
	I know a range of 3D shapes, including how they move and the space around them	I know how to produce a 3D model and how to change the shape and rotate it.	I can plan and evaluate my own 3D model creation.

	I know the similarities and differences between 2D and 3D shapes, including how to make changes to them.	I know how to make holes in a 3D model.	I can create, evaluate and make changes to my 3D model creation.
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Computer Science: Variables

Cycle B Summer	EXPERTISE	APPLICATION	EVALUATION
	I know how to identify examples of information that is a variable.	I know how to apply the concept of variables to enhance an existing game in Scratch.	I know how to implement an algorithm I have created into code.
	I know that variables are used in programs, and that they can hold a single value at a time	I know how to choose appropriate artwork to design a program.	I know how to build and evaluate a code that includes a range of variables.

Computer Science: Sensing

Cycle B Summer	EXPERTISE	APPLICATION	EVALUATION
	I know how to apply previous knowledge of programming to a micro:bit.	I know how to use the buttons to change the value of a variable using selection.	I know how to design the algorithm for a project, including what variables to choose and what algorithm flow I will use.
	I know how to determine the flow of a program using selection	I know how to complete code to make a micro:bit perform the functions of a compass	I will use a design I have created to make a micro:bit step counter.