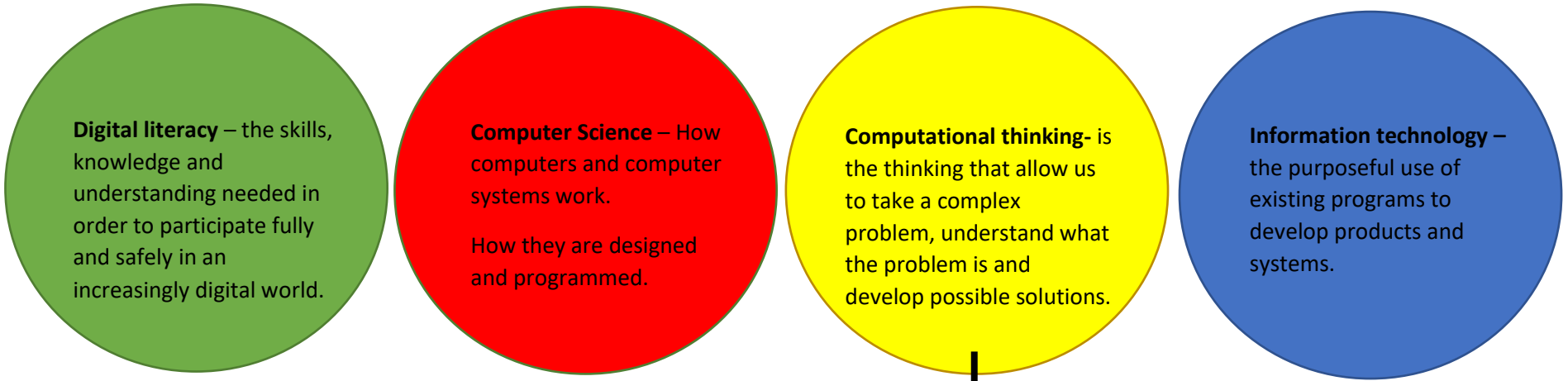
Knaphill Lower School: Computing Domains and Knowledge Progression

Computing Knowledge Domains:



Throughout the domains of computing knowledge, the knowledge is divided into:

- Substantive knowledge – the established computing facts
- Disciplinary knowledge – the methods of working and within the computing subject

Computer science and information technology largely include an emphasis on disciplinary knowledge.

Digital literacy emphasizes substantive knowledge, with the application of this discipline outside of school.

Computational thinking is woven throughout the computing curriculum, and within other subjects.

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Substantive Knowledge:

Computer Science: The design of new software, the solution to computing problems and the development of different ways to use technology.

Information Technology: The design, use and understanding of hardware and software; computers and electronic systems for storing and using information.

Digital Literacy: The ability to use information and communication technologies to find, create, evaluate, and communicate information.

Computation thinking: the knowledge of logical reasoning; abstraction, through the selection of what is most important; pattern, through comparing; algorithms, through instructions and sequencing and decomposition of problems.

Disciplinary Knowledge:

Computer Science: Code Using and writing codes to produce instructions and algorithms; to solve problems; to test and use logic and sequences against inputs and outputs.

Information Technology: Being able to safely, efficiently and confidently use apps and information technology to communicate ideas. Being able to safely, efficiently and confidently find, evaluate, store, sort and use appropriate data.

Digital Literacy: Being able to safely, efficiently and confidently digitally connect with others.

Computational thinking: implement computing knowledge by applying logical reasoning, abstraction, pattern and decomposition, to complete tasks.

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<table>
<tr><th>Domains of knowledge</th><th colspan="2">End points</th><th>EYFS</th><th>Year 1</th><th>Year 2</th></tr>
<tr><td rowspan="3">Computer Science</td><td rowspan="3">National curriculum:
• 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

KLS end point:
Children apply their understanding of algorithms with confidence to create and debug simple programs on a computer and using programmable technology.

Children explain their reasoning and reflect on how they can improve their approach.</td><td colspan="4">Substantive Knowledge – established computing facts (concepts)
Disciplinary knowledge (skills) *also identified in bold within sequence of learning</td></tr>
<tr><td>Programming/ Coding</td><td>Barefoot Computing – Computation Thinkers: weekly, throughout the continuous provision, an area of learning will be used to develop computation skills, including:

Concepts:
• Logical reasoning – anticipating and explaining
• Abstraction – working out what is important and ignoring what is not important
• Patter – comparing, spotting similarities and differences
• Algorithms – instructions and sequencing
• Decomposition – breaking problems down into steps</td><td>Programming A – Moving a robot
• To explain what a given command will do
• 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

Programming B – Programming an animation
• 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
•</td><td>Programming A – Robot algorithms
• 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
• To explain that programming projects can have code and artwork
• To design an algorithm
• To create and debug a program

Programming B - Programming quizzes
• 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</td></tr>
<tr><td colspan="4">Disciplinary Knowledge – methods of working within computing
*also identified in bold within sequence of learning</td></tr>
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<table>
<tr><td rowspan="2"></td><td rowspan="2">KLS end point:
Children are able to use computer hardware confidently – including some fluency in typing and control of a computer mouse.
Children make links with technology and a balanced, healthy lifestyle to make informed choices.</td><td colspan="2">Approaches:
• Tinkering- playing and exploring
• Creating – making things, checking things and fixing things
• Collaboration – playing and working collaboratively
• Persevering – not giving up</td><td>• Create simple algorithms by creating precise and unambiguous instructions
• Create and debug simple programs
• Use logical reasoning to predict the behaviour of simple programs</td><td>• Create algorithms by creating precise and unambiguous instructions
• Create and debug simple programs
• Use logical reasoning to predict the behaviour of simple programs</td></tr>
<tr><td>Systems and networks</td><td></td><td>Computing systems and networks – Technology around us
• To identify technology
• To explain that technology is something that can help us
• To identify a computer and its main parts
• To use a mouse in different ways
• To use a keyboard to type on a computer
• To use the keyboard to edit text
• To create rules for using technology responsibly</td><td>Computing systems and networks – IT around us
• To recognise the uses and features of information technology
• To identify the uses of information technology in the school
• To identify information technology beyond school
• To explain how information technology helps us
• To explain how to use information technology safely
• To recognise that choices are made when using information technology</td></tr>
<tr><td></td><td>National Curriculum:</td><td colspan="4">Substantive Knowledge – established computing facts (concepts)
Disciplinary knowledge (skills) *also identified in bold within sequence of learning</td></tr>
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<tr>
<td rowspan="4">Information technology</td>
<td rowspan="4">• Use technology purposefully to create, organise, store, manipulate and retrieve digital content
• Recognise common uses of information technology beyond school

<u>KLS end point:</u>
Children build a strong foundation of knowledge to enable them to understand and use a widening range of technology to create, organise, store, manipulate and retrieve digital content. When creating media, children understand

Children apply this understanding to other curriculum subjects and their life outside of school to create digital media with guidance.</td>
<td>Creating Media</td>
<td>Children are given access to a range of simple programs on the interactive white board.</td>
<td><u>Creating media – digital painting</u>
• 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

<u>Creating Media – Digital Writing</u>
• 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 typing on a computer to writing on paper</td>
<td><u>Creating media – Digital photography</u>
• To use a digital device to take a photograph
• To make choices when taking 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 photos can be changed

<u>Creating media - Digital music</u>
• To say how music can make us feel
• To identify that there are patterns in music
• To experiment with sound using a computer
• To use a computer to create a musical pattern
• To create music for a purpose
• To review and refine our computer work</td>
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<tr>
<td>Data and information</td>
<td></td>
<td><u>Data and information- Grouping Data</u>
• 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</td>
<td><u>Data and information – Pictograms</u>
• 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</td>
</tr>
<tr>
<td colspan="3"><u>Disciplinary Knowledge – methods of working within computing</u>
*also identified in bold within sequence of learning</td>
</tr>
<tr>
<td colspan="2"></td>
<td>• Use technology purposefully to create, organise, store, manipulate and retrieve digital content</td>
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<tr>
<td>Digital literacy</td>
<td>National Curriculum:</td>
<td colspan="3"><u>Substantive Knowledge – established computing facts (concepts)</u>
<u>Disciplinary knowledge (skills)</u> *also identified in bold within sequence of learning</td>
</tr>
</table>

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	Use technology safely and respectfully, keeping personal information private; identify where to go for help and support when they have concerns about *In this domain of knowledge, key links are made with the PSHE curriculum to further safeguard children.* <u>KLS end point:</u> Children are beginning to become effective, discerning and safe digital citizens, who apply their values at all times. Children utilise a range of technology positively, whilst maintaining a healthy and balanced lifestyle. Children understand the lasting impact of their online behaviour and choices.	Self-Image & Identity	• Recognise, online or offline, that anyone can say 'no' - 'please stop' - 'I'll tell' - 'I'll ask' to somebody who makes them feel sad, uncomfortable, embarrassed or upset.	• Recognise that there may be people online who could make someone feel sad, embarrassed or upset. *PSHE link: Jigsaw; Celebrating Difference piece 6*	Explain how other people may look and act differently online and offline. • Give examples of issues online that might make someone feel sad, worried, uncomfortable or frightened; I can give examples of how they might get help. *PSHE link: Jigsaw; Celebrating Difference piece 6*
		Online Relationships	• Recognise some ways in which the internet can be used to communicate.	• **Use the internet with adult support to communicate with people I know.** • Explain why it is important to be considerate and kind to people online and to respect their choices. *PSHE link: Jigsaw; Celebrating Difference piece 4*	• Give examples of how someone might use technology to communicate with others they don't also know offline and explain why this might be risky. (e.g. email, online gaming, a pen-pal in another school / country). • **Use the internet with adult support to communicate with people I know.**
		Online Reputation	• Identify ways that I can put information on the internet.	• Recognise that information can stay online and could be copied. • Describe what information I should not put online without asking a trusted adult first.	• Explain how information put online about someone can last for a long time. • Know who to talk to if something has been put online without consent or if it is incorrect.
		Online Bullying	• Describe ways that some people can be unkind online.	• Describe how to behave online in ways that do not upset others and can give examples. *PSHE link: Jigsaw; Celebrating Difference pieces 3 & 4*	• Explain what bullying is, how people may bully others and how bullying can make someone feel. • Discuss how anyone experiencing bullying can get help.
		Managing Online Information	• Talk about how to use the internet as a way of finding information online. • Give simple examples of how to find information using digital technologies, e.g. search engines, voice activated searching.	• Give simple examples of how to find information using digital technologies, e.g. search engines, voice activated searching. • Know how to get help from a trusted adult if we see content that makes us feel sad, uncomfortable, worried or frightened. *PSHE link: Jigsaw; Relationships piece 4*	• **Use simple keywords in search engines** • Explain why some information I find online may not be real or true.

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		Health, Well-Being & Lifestyle	Covered by completing the AUP (acceptable use policy) at the start of the year.	Covered when children complete the AUP (acceptable use policy) at the start of the year.	Covered when children complete the AUP (acceptable use policy) at the start of the year.
		Privacy & Security	• Identify some simple examples of my personal information (e.g. name, address, birthday, age, location).	• Recognise more detailed examples of information that is personal to someone (e.g where someone lives and goes to school, family names). • Explain how passwords are used to protect information, accounts and devices. *PSHE link: Jigsaw; Relationships piece 4*	• Describe and explain some rules for keeping personal information private (e.g. creating and protecting passwords). • Explain how passwords can be used to protect information, accounts and devices.
		Copyright & Ownership	Ongoing throughout all activities where work is produced.	Through all work produced in NCCE and other computing units NCCE Y1 IT Drawing unit	Through all work produced in NCCE and other computing units NCCE Y1 IT Drawing unit
		Disciplinary Knowledge – methods of working within computing			
		• Use technology safely and respectfully, keeping personal information private.		• Use technology safely and respectfully, keeping personal information private.	• Use technology safely and respectfully, keeping personal information private.

Reception Computational Thinking – Long term plan						
	Autumn 1	**Autumn 2**	**Spring 1**	**Spring 2**	**Summer 1**	**Summer 2**
Substantive knowledge (concepts) **Disciplinary knowledge (computing skills) - BOLD**	Develop the use of algorithms to support areas of the Continuous provision – sequences and instructions: • Construction area • Playdough – linked to Dough Disco • Sequence – linked to creative development • Introduce algorithms for learning sequences (toileting, pencil control)	Develop the use of algorithms to support areas of the Continuous provision – sequences and instructions. • Sequencing – making bread, gingerbread men, chapattis • Modelled by teacher, repeated by children to follow algorithm/ create own algorithm	Logical reasoning – before children complete understanding the world chronology learning (history). Children develop understanding of cause and effect to anticipate and explain changes. • Simple materials • Toys • Seasons • Natural world	Patterns – comparing familiar animals (wider selection during topic) to identify similarities and differences. Introduction of grouping to associate animals with their habitat/ common features. Exploration of Beebots – following simple floor mats.	Maths link- addition and subtraction – algorithms. First, then and now. Abstraction – linked to floating and sinking, boats, sustainability seaside link. Children developing understanding of what is/ isn't important.	Maths link: On the move - Patterns and relationships - Spatial reasoning - Mapping

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	Maths link- patterns in continuous provision – drawn and using objects to create pattern			Adult supported to explore parts of the beebot.	Decomposition of task to create kites/ boats.	
Substantive knowledge – digital literacy	**Online relationships** Recognise some ways in which the internet can be used to communicate.	**Self-image** Recognise, online or offline, that anyone can say 'no' - 'please stop' - 'I'll tell' - 'I'll ask' to somebody who makes them feel sad, uncomfortable, embarrassed or upset. **Online Bullying** Describe ways that some people can be unkind online.	**Managing Online Information** Talk about how to use the internet as a way of finding information online. Give simple examples of how to find information using digital technologies, e.g. search engines, voice activated searching.	**Online Reputation** Identify ways that I can put information on the internet.	**Healthy Lifestyles** Covered when children complete the AUP (acceptable use policy) at the start of the year. Review this learning. Jigsaw – Healthy Me sequence of learning	**Privacy and Security** Identify some simple examples of my personal information (e.g. name, address, birthday, age, location).
Continuous Provision – enhancements	• Logical reasoning – anticipating and explaining • Abstraction – working out what is important and ignoring what is not important • Patterns – comparing, spotting similarities and differences • Algorithms – instructions and sequencing – used throughout year for WAGOLLs linked to teaching input to develop independent learning • Decomposition – breaking problems down into steps – developed through indoor construction area, creative development area and outdoor tinkering workshop (Spring 2024) – progressing to woodwork bench in summer term.					

Year 1 Computing – Long term plan						
	Autumn 1	**Autumn 2**	**Spring 1**	**Spring 2**	**Summer 1**	**Summer 2**

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Substantive knowledge (concepts) **Disciplinary knowledge (computing skills) - BOLD**	**Computing systems and networks – Technology around us** To identify technology **To identify a computer and its main parts** **To use a mouse in different ways** **To use a keyboard to type on a computer** **To use the keyboard to edit text** To create rules for using technology responsibly Technology: use of Chromebook, mouse/ keyboard	**Creating media – digital painting** 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 Technology: use of Chromebook, mouse/ keyboard – Paintz.app https://paintz.app/	Programming A – Moving a robot To explain what a given command will do **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** Technology: use of Beebots and Stop and Go Mouse programmable robots	**Data and information- Grouping Data** **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** Technology: Chromebooks, mouse, keyboard	**Creating Media – Digital Writing** **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 typing on a computer to writing on paper Technology: Chromebooks – word processing, Google Docs, mouse, keyboard	Programming B – Programming an animation **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** Technology: Chromebook, mouse, Scratch Junior
Substantive knowledge – digital literacy	**Online relationships** **Use the internet with adult support to communicate with people I know.** Explain why it is important to be considerate and kind to people online and to respect their choices. *PSHE link: Jigsaw; Celebrating Difference piece 4*	**Self-image** Recognise that there may be people online who could make someone feel sad, embarrassed or upset. *PSHE link: Jigsaw; Celebrating Difference piece 6* **Online Bullying** Describe how to behave online in ways that do not upset others and can give examples. *PSHE link: Jigsaw; Celebrating Difference pieces 3 & 4* ***Anti-bullying week link***	**Managing Online Information** Give simple examples of how to find information using digital technologies, e.g. search engines, voice activated searching. Know how to get help from a trusted adult if we see content that makes us feel sad, uncomfortable, worried or frightened. *PSHE link: Jigsaw; Relationships piece 4*	**Online Reputation** Recognise that information can stay online and could be copied. Describe what information I should not put online without asking a trusted adult first.	**Healthy Lifestyles** Covered when children complete the AUP (acceptable use policy) at the start of the year. Review this learning. Jigsaw – Healthy Me sequence of learning	**Privacy and Security** Recognise more detailed examples of information that is personal to someone (e.g where someone lives and goes to school, family names). Explain how passwords are used to protect information, accounts and devices. *PSHE link: Jigsaw; Relationships piece 4*
Disciplinary knowledge **National Curriculum objectives**	**Use technology safely and respectfully, keeping personal information private; identify where to go for help and support when they have concerns about**	**Use technology purposefully to create, organise, store, manipulate and retrieve digital content** **Use technology safely and respectfully, keeping personal information private; identify where to go for help**	**Create simple algorithms by creating 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** **Use technology safely and respectfully, keeping personal information private; identify where to go for help and**	**Use technology purposefully to create, organise, store, manipulate and retrieve digital content** **Use technology safely and respectfully, keeping personal information private; identify where to go for help and**	**Create simple algorithms by creating precise and unambiguous instructions** **Create and debug simple programs** **Use logical reasoning to predict the behaviour of simple programs**

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		and support when they have concerns about	**Use technology safely and respectfully, keeping personal information private; identify where to go for help and support when they have concerns about**	**support when they have concerns about**	**support when they have concerns about**	**Use technology safely and respectfully, keeping personal information private; identify where to go for help and support when they have concerns about**

Year 2 Computing – Long term plan						
	Autumn 1	**Autumn 2**	**Spring 1**	**Spring 2**	**Summer 1**	**Summer 2**
Substantive knowledge	**Creating media – Digital photography** **To use a digital device to take a photograph** **To make choices when taking 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 photos can be changed Application of digital photography skills – London trip	**Computing systems and networks – IT around us** To recognise the uses and features of information technology **To identify the uses of information technology in the school** **To identify information technology beyond school** To explain how information technology helps us To explain how to use information technology safely To recognise that choices are made when using information technology	Before teaching sequence – lesson 3 & 4 from Year 1 Unit A need to be taught to learn forwards/ backwards/ left & right turn Programming A – Robot algorithms 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** To explain that programming projects can have code and artwork **To design an algorithm** **To create and debug a program**	Before teaching sequence – lesson need to teach Lesson 2 & 4 from Year 1 data lessons (grouping objects and making different groups) **Data and information – Pictograms** 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	Make link with Kapow music lessons – music composition **Creating media - Digital music** To say how music can make us feel To identify that there are patterns in music **To experiment with sound using a computer** **To use a computer to create a musical pattern** **To create music for a purpose** **To review and refine our computer work**	Before teaching sequence – need to complete lesson 2, 3 & 4 of Year 1 unit B (joining blocks, make a change and adding sprites). Programming B - Programming quizzes 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**
Substantive knowledge – digital literacy	**Online relationships** Give examples of how someone might use technology to communicate with others they don't also know offline and explain why this might be risky. (e.g. email, online gaming, a pen-pal in another school / country).	**Self-image and Identity** Explain how other people may look and act differently online and offline. Give examples of issues online that might make someone feel sad, worried, uncomfortable or frightened; I can give examples of how they might get help.	**Managing Online Information** **Use simple keywords in search engines** Explain why some information I find online may not be real or true.	**Online Reputation** Explain how information put online about someone can last for a long time. Know who to talk to if something has been put online without consent or if it is incorrect.	**Health and Wellbeing** Covered when children complete the AUP (acceptable use policy) at the start of the year. Review this learning. Jigsaw – Healthy Me sequence of learning	**Privacy and Security** Describe and explain some rules for keeping personal information private (e.g. creating and protecting passwords). Explain how passwords can be used to protect information, accounts and devices.

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	Use the internet with adult support to communicate with people I know.	*PSHE link: Jigsaw; Celebrating Difference piece 6* **Online Bullying** Explain what bullying is, how people may bully others and how bullying can make someone feel. Discuss how anyone experiencing bullying can get help.				
Disciplinary knowledge **National Curriculum objectives**	**Use technology purposefully to create, organise, store, manipulate and retrieve digital content** **Use technology safely and respectfully, keeping personal information private; identify where to go for help and support when they have concerns about**	**Use technology safely and respectfully, keeping personal information private; identify where to go for help and support when they have concerns about**	**Create algorithms by creating precise and unambiguous instructions** **Create and debug simple programs** **Use logical reasoning to predict the behaviour of simple programs** **Use technology safely and respectfully, keeping personal information private; identify where to go for help and support when they have concerns about**	**Use technology purposefully to create, organise, store, manipulate and retrieve digital content** **Use technology safely and respectfully, keeping personal information private; identify where to go for help and support when they have concerns about**	**Use technology purposefully to create, organise, store, manipulate and retrieve digital content** **Use technology safely and respectfully, keeping personal information private; identify where to go for help and support when they have concerns about**	**Create algorithms by creating precise and unambiguous instructions** **Create and debug simple programs** **Use logical reasoning to predict the behaviour of simple programs** **Use technology safely and respectfully, keeping personal information private; identify where to go for help and support when they have concerns about**

Whole School – online safety themes	**Online relationships** Recognise some ways in which the internet can be used to communicate. Digiduck's Big Decision – key text Importance of reflection value of kindness online.	**Anti-bullying week – extra assemblies** **Self-image** Recognise, online or offline, that anyone can say 'no' - 'please stop' - 'I'll tell' - 'I'll ask' to somebody who makes them feel sad, uncomfortable, embarrassed or upset. **Online Bullying** Describe ways that some people can be unkind online.	**Managing Online Information** Protecting information online.	**Online Reputation** Identify ways that I can put information on the internet.	**Healthy Lifestyles** Covered when children complete the AUP (acceptable use policy) at the start of the year. Review this learning. Jigsaw – Healthy Me sequence of learning	**Privacy and Security** Identify some simple examples of my personal information (e.g. name, address, birthday, age, location).

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Support for parents	**Digiduck's Big Decision – key text – shared as PDF with parents.** **Importance of reflection value of kindness online.** **Key questions shared with parents on 13.10.23 in weekly update**	**Anti-bullying week resources + video** Definition of bullying/ friendship issues shared with parents Support for bullying and clear process for reporting at school Signs to look out for at home				