Sir Edmund Hillary Primary School Computing Curriculum

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.

Intent - *What are we trying to achieve for our children in Computing?*

At Sir Edmund Hillary Primary School we believe that 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.

At SEH the Computing curriculum has been carefully sequenced so that as pupils progress, they gain a coherent knowledge and understanding about of the elements of computing both as separate fields within the subject, but also in the interaction of these elements. In this way we hope to create critical thinkers, with an ever growing comprehensive view of the subject.

Implementation - *How is the curriculum delivered?*

Computing is not explicitly referenced within the 'Development Matters' guidance in EYFS, but our Nursery and Reception children use computational thinking and electronic technologies to support their learning. There are many opportunities for this within each of the 7 areas of the Foundation Stage Curriculum. At Sir Edmund Hillary, we implement the Computing curriculum from KS1 that;

- meets the objectives outlined in the National Curriculum, through the NCTEM framework.
- is delivered in weekly lessons with a focus for each half term arising for a unit of work from the NCTEM Themes: Computing Systems and Networks, Creating Media, Data and Information and Programming.
- acknowledges that Computing has many composite features that can be found within each of the main domains of Computer Science, Information Technology and Digital Literacy, and it has concepts that are interdependent of each other. We therefore use the NCTEM framework to ensure sufficient knowledge is sequenced prior to children encountering more composite concepts.
- has progressive skills from within each NCTEM strand, expressed through the regular sequence of Themes providing opportunities for retrieval practice of prior knowledge and vocabulary

A typical teaching sequence in Computing will:

- have the key concept at its heart, led by the terms and vocabulary that will build a consistent understanding of the subject.
- be collaborative to enable the children to articulate the concepts taught and allow for paired programming and peer instruction.
- combine electronics with arts, design technology and sciences to provide engaging contexts in which to explore and apply computing concepts.
- unpack complex ideas and explore them in 'unplugged' / situations outside of direct IT , and then repackaged to support understanding of the original concept, thereby making abstract concepts concrete.
- be heavily modelled as a scaffold that can gradually be removed to promote independence in an activity, yet have a variety of activities that have different levels of direction.
- create a Project as an end point with design criteria similar to those used in DT.
- feature Regular recall and revision of key concepts as progression is made through the subject.
- Be alert to the misconceptions that may develop and therefore be full of discussion, concept mapping and simple quizzes to help identify areas of confusion.
- have regular and predictable structures such as Use/Modify Create, and Read and explore Before Creating code.

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Impact - *What difference is the curriculum making? How do we know whether pupils know what we think they know?*

Our Computing Curriculum aims to be high quality, well thought out and planned to demonstrate progression. Children will become more analytical and improved critical and creative thinkers in using the tools that technology has to offer. Pupils are equipped to use information technology to safely create programs, systems and a range of content in a range of platforms.

We measure the impact of our Computing curriculum using the following measures:

- All lessons include formative assessment to ensure misconceptions are addressed.
- Clear Learning Objectives and Success Criteria enable pupils and staff to recognise the effectiveness of learning in each session.
- Observational Assessments will capture the skills of computing rather than those of literacy sometimes focussing on specific/ selected groups of children , sometimes reflected in a checklist.
- Our Long-Term Plan will show a clear progression of knowledge and skills across Key Stage 1 and 2 that builds on prior knowledge.
- End point assessment of a pupil's ability to meet the Success Criteria for a given project will help staff understand the effectiveness of the taught curriculum.

National Curriculum

Key stage 1

Pupils should be taught to:

1.1 understand what algorithms are; how they are implemented as programs on digital devices; and that programs execute by following precise and unambiguous instructions

1.2 create and debug simple programs

1.3 use logical reasoning to predict the behaviour of simple programs

1.4 use technology purposefully to create, organise, store, manipulate and retrieve digital content

1.5 recognise common uses of information technology beyond school

1.6 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:

2.1 design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts

2.2 use sequence, selection, and repetition in programs; work with variables and various forms of input and output

2.3 use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs

2.4 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

2.5 use search technologies effectively, appreciate how results are selected and ranked, and be discerning in evaluating digital content

2.6   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

2.7 2.7 use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact

Curriculum Structure

Computer Science

Programming, Algorithms and Logic
NC ref - 1.1, 1.2, 1.3, 2.1, 2.2, 2.3

- Programming
- Algorithms
- Effective Use of Tools
- Design & Development

Systems- Input, Process, Output
NC ref - 2.2

- Programming
- Algorithms
- Effective Use of Tools
- Computing Systems

Information Technology

Making Digital Content
NC ref - 1.4, 2.6

- Design & Development
- Data & Information
- Creating Media

Computing Contexts
NC ref - 1.5, 2.4, 2.6

- Networks
- Impact of Technology
- Data & Information
- Computing Systems

Digital Literacy

Effective Use - software & devices
NC ref - 1.4, 1.6, 2.6,

- Networks
- Effective Use of Tools
- Data & Information
- Computing Systems

Strong Searching and Selection
NC ref - 2.5

- Data & Information
- Effective Use of Tools

E-safety
NC ref - 1.6, 2.7

- Networks
- Safety & Security
- Impact of Technology

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Route Planning

Programmer,
Systems Analyst,
Network Designer,
Robotics Engineer,
Game Designer,
App Creator,
Website Coder,
Digital Animator

When I learn **Computing**
I am learning how **computers** work through **programmes** made of **algorithms**.
I will learn how to write **programmes** to make things happen or solve problems. I will learn how to de-bug programmes to make them work well. I will be able to work with loops and nests within sequences.
I will use different software to show different forms of **data & information** and **design** and create different types of **programmes** and **media** to show interesting ideas.
I will know how to use hardware and software **tools effectively**
I will act in a safe and responsible way, knowing what can make information or communications unsafe or unreliable.

Data & Info Spread sheets

Data & Info Flat File Databases

Creating Media Webpage Creation

Creating Media 3D Modelling

Programming Variables Iin Games

Data & Info Flat File Databases

Systems Netwrks Comm & Collab

Creating Media Video Production

Creating Media Vector Graphics

Programming Sensing Movt

Programming Selection in Quizes

Programming Sensing Movt

Programming Variables Iin Games

Programming Selection in Phys Comp

Systems Netwrks Comm & Collab

Data & Info Spread sheets

Creating Media 3D Modelling

Creating Media Webpage Creation

Creating Media Vector Graphics

Creating Media Video Production

Systems Netwrks Systems & Searching

Systems Netwrks Systems & Searching

Programming Selection in Phys Comp

Programming Selection in Quizes

Upr KS2

Upr KS2

Data & Info Data Logging

Creating Media Photo Editing

Data & Info Branching Databases

Creating Media Desk Top Publishing

Creating Media S-Frame Animation

Systems Netwrks The Internet

Systems Netwrks Connecting Computers

Programming Sequencing Sounds

Programming Events & Actions

Creating Media Audio Production

Programming Repetition in Shapes

Programming Repetition in Games

Systems Netwrks Connecting Computers

Cycle B

Cycle A

Upr KS2

Systems Netwrks The Internet

Creating Media S-Frame Animation

Creating Media Desk Top Publishing

Data & Info Branching Databases

Creating Media Photo Editing

Data & Info Data Logging

Programming Repetition in Games

Programming Repetition in Shapes

Creating Media Audio Production

Programming Events & Actions

Programming Sequencing Sounds

Systems Netwrks Connecting Computers

Lwr KS2

Lwr KS2

Programming Programg Quizes

Programming Robot Algorithms

Creating Media Digital painting

Programming Programg Animations

Programming Moving A Robot

Systems Netwrks Info Techgy

Creating Media Digital music

Creating Media Digital Writing

Data & Info Grouping Data

Data & Info Pictograms

Creating Media Digital Photos

Systems Netwrks Tech Around Us

Programming Moving A Robot

Programming Programg Animations

Creating Media Digital painting

Programming Robot Algorithms

Programming Programg Quizes

Systems Netwrks Info Techgy

Creating Media Digital Photos

Data & Info Grouping Data

Data & Info Pictograms

Creating Media Digital Writing

Creating Media Digital music

Cycle B

Cycle A

KS1

Foundation

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Items in green indicate they repeat within other domains

	EYFS	Y1	Y2	Y3	Y4	Y5	Y6
Programming		- combine forwards and backwards commands to make a sequence -combine four direction commands to make sequences -plan a simple program -choose a command for a given purpose -show that a series of commands can be joined together - identify the effect of changing a value -explain that each sprite has its own instructions	-To use logical reasoning to predict the outcome of a program - explain that programming projects can have code and artwork -create and debug a self- created program -explain that a sequence of commands has a start -explain that a sequence of commands has an outcome -create a program using a given design - change a given design - create a program using my own design - decide how my project can be improved	- explore a new programming environment -identify that commands have an outcome -explain that a program has a start - recognise that a sequence of commands can have an order -change the appearance of my project -create a project from a task description -explain how a sprite moves in an existing project - create a program to move a sprite in four directions - adapt a program to a new context - develop my program by adding features - identify and fix bugs in a program - design and create a maze-based challenge	- identify that accuracy in programming is important -create a program in a text-based language - modify a count-controlled loop to produce a given outcome - modify a count-controlled loop to produce a given outcome -develop the use of count-controlled loops in a different programming environment - explain that in programming there are infinite loops and count controlled loops - develop a design that includes two or more loops which run at the same time - modify an infinite loop in a given program -design and create a programming project that includes repetition - create a program that uses count-controlled loops to produce a given outcome	- control a simple circuit connected to a computer - write a program that includes count-controlled loops -explain that a loop can stop when a condition is met - explain that a loop can be used to repeatedly check whether a condition has been met - design a physical project that includes selection - create a program that controls a physical computing project - explain how selection is used in computer programs -relate that a conditional statement connects a condition to an outcome - explain how selection directs the flow of a program - design, create and evaluate a program which uses selection	- define a 'variable' as something that is changeable - explain why a variable is used in a program - choose how to improve a game by using variables - design a project that builds on a given example - use own design to create & evaluate a project - explain that formulas can be used to produce calculated data - apply formulas to data - create a program to run on a controllable device - explain that selection can control the flow of a program - update a variable with a user input - use a conditional statement to compare a variable to a value - design and develop a programming project that uses inputs and outputs on a controllable device
Algorithms		- explain what a given command will do - find more than one solution to a problem - use my algorithm to create a program	-describe a series of instructions as a sequence - explain what happens when we change the order of instructions - design an algorithm	-identify that commands have an outcome -explain that a program has a start - recognise that a sequence of commands can have an order	- identify that accuracy in programming is important -create a program in a text-based language - explain what 'repeat' means - modify a count-controlled loop to produce a given outcome	- explain how selection is used in computer programs -relate that a conditional statement connects a condition to an outcome - explain how selection directs the flow of a program	- update a variable with a user input - use a conditional statement to compare a variable to a value

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	EYFS	Y1	Y2	Y3	Y4	Y5	Y6
Computing Systems		-identify a computer and its main parts	- recognise the uses and features of information technology - identify information technology beyond school -recognise that choices are made when using information technology -use a digital device to take a photograph	- explain how digital devices function -identify input and output devices - recognise how digital devices can change the way we work - explore how digital devices can be connected - explore how digital devices can be connected -recognise how networked devices make up the internet	- describe how networks physically connect to other networks -identify that sound can be recorded -use a digital device to collect data automatically	- explain that computers can be connected together to form systems - recognise the role of computer systems in our lives - identify digital devices that can record video - control a simple circuit connected to a computer - create a program that controls a physical computing project	- recognise how data is transferred across the internet - create a program to run on a controllable device - explain that selection can control the flow of a program - update a variable with a user input - use a conditional statement to compare a variable to a value - design and develop a programming project that uses inputs and outputs on a controllable device
Networks			-identify the uses of information technology in the school - identify information technology beyond school	- explain how a computer network can be used to share information - explore how digital devices can be connected - recognise the physical components of a network	- describe how networks physically connect to other networks -recognise how networked devices make up the internet - outline how websites can be shared via the World Wide Web (WWW) -To recognise how the content of the WWW is created by people	- experiment with search engines -describe how search engines select results - explain how search results are ranked - recognise why the order of results is important, and to whom	- explain the importance of internet addresses - recognise how data is transferred across the internet - explain how sharing information online can help people to work together - recognise how we communicate using technology - evaluate different methods of online communication

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	EYFS	Y1	Y2	Y3	Y4	Y5	Y6
Creating Media		-explain why I chose the tools I used - use a computer on my own to paint a picture - use a computer to write - make careful choices when changing text	- make choices when taking a photograph -To say how music can make us feel -To identify that there are patterns in music - experiment with sound using a computer -use a computer to create a musical pattern	- explain that animation is a sequence of drawings or photographs - relate animated movement with a sequence of images - review and improve an animation -To evaluate the impact of adding other media to an animation - create a branching database - recognise how text and images convey information -add content to a desktop publishing publication -consider how different layouts can suit different purposes - design and create a maze-based challenge	- identify that sound can be recorded - explain that audio recordings can be edited -recognise the different parts of creating a podcast project -evaluate the effective use of audio - combine images for a purpose	- capture video using a range of techniques -create a vector drawing by combining shapes	- plan the features of a web page - consider the ownership and use of images (copyright) - recognise the need to preview pages - outline the need for a navigation path - recognise the implications of linking to content owned by other people - create a spreadsheet to plan an event - choose suitable ways to present data - recognise that you can work in three dimensions on a computer - identify that digital 3D objects can be modified - recognise that objects can be combined in a 3D model - create a 3D model for a given purpose - plan & create a 3D model
Design & Development		- make careful choices when painting a digital picture - compare painting a picture on a computer and on paper -plan a simple program -design the parts of a programming project -make careful choices when changing text - explain why I used the tools that I chose - compare typing on a computer to writing on paper	- describe what makes a good photograph -To decide how photographs can be improved -To recognise that photos can be changed -design an algorithm -create and debug a self- created program -create music for a purpose -create a program using a given design - change a given design - create a program using my own design - decide how my project can be improved	- plan an animation - review and improve an animation -change the appearance of my programming project -create a programming project from a task description -consider how different text layouts can suit different purposes - identify and fix bugs in a program - design and create a maze-based challenge	-recognise the different parts of creating a podcast project -evaluate the effective use of audio -evaluate how changes can improve an image -develop the use of count-controlled loops in a different programming environment - develop a design that includes two or more loops which run at the same time -design and create a programming project that includes repetition	-explain what makes a video effective - create a storyboard for video - consider the impact of the choices made when making and sharing a video - design a physical project that includes selection - create a program that controls a physical computing project -compare paper and computer-based databases - design, create and evaluate a program which uses selection	- review an existing website and consider its structure - plan the features of a web page - consider the ownership and use of images (copyright) - recognise the need to preview pages - outline the need for a navigation path - recognise the implications of linking to content owned by other people - choose how to improve a game by using variables - design a project that builds on a given example - use own design to create & evaluate a project - create a 3D model for a given purpose - plan & create a 3D model- design and develop a programming project that uses inputs and outputs on a controllable device

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	EYFS	Y1	Y2	Y3	Y4	Y5	Y6
Data & Information		-label objects -identify that objects can be counted - describe objects in different ways - count objects with the same properties - compare groups of objects - answer questions about groups of objects	-recognise that we can count and compare objects using tally charts - recognise that objects can be represented as pictures - create a pictogram - select objects by attribute and make comparisons - recognise that people can be described by attributes - explain that we can present information using a computer	- create questions with yes/no answers - identify the attributes needed to collect data about an object - create a branching database -plan the structure of a branching database - independently create an identification tool	identify that sound can be recorded - explain that data gathered over time can be used to answer questions - explain that a data logger collects 'data points' from sensors over time - recognise how a computer can help us analyse data - recognise how a computer can help us analyse data - identify the data needed to answer questions - use data from sensors to answer questions	- recognise why the order of results is important, and to whom -use a form to record information -compare paper and computer-based databases - outline how you can answer questions by grouping and then sorting data - explain that tools can be used to select specific data - explain that computer programs can be used to compare data visually -use a real-world database to answer questions	- recognise how data is transferred across the internet - create a data set in a spreadsheet - explain that formulas can be used to produce calculated data - apply formulas to data - create a spreadsheet to plan an event - choose suitable ways to present data
Impact Of Technology		-To identify technology	- explain how information technology helps us	-recognise how digital devices can change the way we work -consider the benefits of desktop publishing - evaluate the consequences of unreliable content	-evaluate the effective use of audio -evaluate how changes can improve an image	- recognise the role of computer systems in our lives -describe how search engines select results	- explain how sharing information online can help people to work together - evaluate different ways of working together online - recognise how we communicate using technology - evaluate different methods of online communication

Effective Use of Tools						
		- use a mouse in different ways - use a keyboard to type on a computer - use the keyboard to edit text - describe what different freehand tools do -use the shape tool and the line tools - add and remove text on a computer - identify that the look of text can be changed on a computer	- use tools to change an image - review and refine our computer work	- identify the need to work consistently and carefully - explore a new programming environment -recognise that text and layout can be edited -choose appropriate page settings	- apply audio editing skills independently - combine audio to enhance my podcast project - explain what 'repeat' means - use a digital device to collect data automatically - explain that the composition of digital images can be changed - explain that colours can be changed in digital images - explain how cloning can be used in photo editing -explain that images can be combined	- explain how search results are ranked -identify that video can be improved through reshooting and editing -use a form to record information - explain that tools can be used to select specific data - explain that computer programs can be used to compare data visually -use a real-world database to answer questions -identify that drawing tools can be used to produce different outcomes -To use tools to achieve a desired effect - recognise that vector drawings consist of layers -To group objects to make them easier to work with	- explain how sharing information online can help people to work together - evaluate different ways of working together online - recognise how we communicate using technology - evaluate different methods of online communication - explain that formulas can be used to produce calculated data - apply formulas to data - create a spreadsheet to plan an event - choose suitable ways to present data - identify that digital 3D objects can be modified - recognise that objects can be combined in a 3D model
Safety & Security		-create rules for using technology responsibly	- explain how to use information technology safely		- evaluate the consequences of unreliable content	- recognise why the order of results is important, and to whom	- consider the ownership and use of images (copyright) - recognise the implications of linking to content owned by other people

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Rationale: Maintaining a progression in **Programming** by keeping it in one cycle. Focussing Media and Data in the alternative cycle.

	Aut 1	Aut 2	Spr1	Spr2	Sum1	Sum2
Y1/2 Cycle A	Systems Netwrks Tech Around Us	Programming Moving A Robot	Programming Programg Animations	Creating Media Digital Painting	Programming Robot Algorithms	Programming Programg Quizes
Y1/2 Cycle B	Systems Netwrks Info Techgy	Creating Media Digital Photos	Data & Info Grouping Data	Data & Info Pictograms	Creating Media Digital Writing	Creating Media Digital music
Y3/4 Cycle A	Systems Netwrks Connecting Computers	Programming Sequencing Sounds	Programming Events & Actions	Creating Media Audio Production	Programming Repetition in Shapes	Programming Repetition in Games
Y3/4 Cycle B	Systems Netwrks The Internet	Creating Media S-Frame Animation	Creating Media Desk Top Publishing	Data & Info Branching Databases	Creating Media Photo Editing	Data & Info Data Logging
Y5/6 Cycle A	Systems Netwrks Systems & Searching	Programming Selection in Phys Comp	Programming Selection in Quizes	Programming Sensing Movement	Programming Variables Iin Games	Data & Info Flat File Databases
Y5/6 Cycle B	Systems Netwrks Comm & Collab	Creating Media Video Production	Creating Media Vector Graphics	Creating Media Webpage Creation	Creating Media 3D Modelling	Data & Info Spread sheets

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