

Computing



Holywell C of E Primary School

Flowing, Strengthening, Deepening

INTENT

At Holywell, we use our school vision, *Flowing, Strengthening, and Deepening*, to guide our intent for the teaching of Computing:

- **Flowing** - developing confidence in using technologies with a range of software. Develop an understanding of key concepts across the four learning themes: Understanding Technology, Programming, Digital Literacy and Online Safety.
- **Strengthening** -To become increasingly confident in tackling problems and not being afraid of making mistakes. To make links between what is learnt in the classroom and real-life situations. To develop a logical approach to problem solving.
- **Deepening** - To use logic to break down problems into smaller pieces, in order to find a solution. To recognise that some problems may have more than one solution and that making mistakes can aid learning through debugging the problem. Recognising the impact that computers have on everyday life and how they should be used responsibly.

Our own Computing curriculum is based on the National Curriculum (2014) for Computing which states 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.

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*

Computing is fundamentally about problem solving. At Holywell we want our children to have the confidence to tackle problems, breaking them down in smaller pieces to help them find the solution. After all problem solving is a part of everyday life! Our curriculum helps to engage the children in their learning, builds on their knowledge and experience and develops their resilience and ability to think logically. Relating their classroom experiences to the real world makes the learning more meaningful.

Making mistakes is an important part of learning and we want our children to have the attitude of let's find out why it's not working (let's debug it!) rather than saying it doesn't work and giving up. Developing the idea that there may be more than one answer to a problem is also important as it allows children to explore different methods and evaluate which solution works best.

Whilst computer science is the core to the three main areas of the curriculum: Understanding Technology, Programming and Digital Literacy, developing our children's knowledge of using technologies safely is essential. We want our children to feel safe and happy online and we aim to ensure they understand the implications of technology for themselves and the wider society as they become digitally literate.

IMPLEMENTATION

I. The Long-Term Plan

EYFS

In EYFS our learning is based around computational thinking concepts and approaches. We teach the children the problem-solving skills they need for everyday life. We support the children to work collaboratively giving children choices about resources they might use and how they might approach it. We use ideas and interests from the children to plan fun, engaging, cross curricular activities. We have a holistic approach to computing which covers these key concepts:

Logical Reasoning - Where children can anticipate outcomes and explain why they think this will happen.

Abstraction - Where children work out what is important and what is not, when problem solving.

Pattern - Where children look for similarities and differences and compare and spot patterns.

Algorithms - Where children follow instructions and put things into the correct order (sequencing)

Decomposition - Where children break problems down into small steps, to make the problem easier to solve.

We use these approaches to do this:

Tinkering - Where children learn through playing and exploring

Creating - Where children make things, check that they are working and fix problems or improve designs.

Collaboration - Where children play and work together, co-operatively.

Persevering - Children are encouraged not to give up.

Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
-explore and play with a wide range of resources - tinkering -talk about what I have made -make something with a friend -complete a model -listen to and talk about a story/activity -identify patterns		-choose resources that are fit for purpose eg round things for wheels - tinkering/creating -talk about what they have used to make their models/pictures, talk about what I like or don't like -plan what they are going to make with a friend and finish it -talk about and follow the sequence of events -copy patterns		-identify and fix any problems with my model -talk about how I could improve my model -work as a team to construct something, not giving up if things go wrong -sequence objects/pictures correctly -create patterns	
				Logical Reasoning - Where children can anticipate outcomes and explain why they think this will happen. Abstraction - Where children work out what is important and what is not, when problem solving. Pattern - Where children look for similarities and differences and compare and spot patterns. Algorithms - Where children follow instructions and put things into the correct order (sequencing) Decomposition - Where children break problems down into small steps, to make the problem easier to solve.	

KSI/KS2

Computing at Holywell is split into four learning themes: Understanding Technology (UT), Programming (P), Digital Literacy (DL) and Online Safety (OS). These are covered by these units of work as laid out in our long-term plan for Computing below

	KEY STAGE ONE					
	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Y1	Computing Systems & Networks Technology Around Us (TCC/PM)	Programming A Moving a Robot BEEBOTS (TCC)	Data and Information Grouping and Sorting Data (TCC/PM)	Creating Media Digital Pictures (TCC/PM)	Introduction to Spreadsheets (PM) Lego Builders (PM)	Programming B Introduction to Coding (TCC)
Y2	Computing Systems & Technology IT Around Us (TCC)	Programming A Robot Algorithms BEEBOTS (TCC)	Data and Information Spreadsheets (PM)	Creating Media Digital Music (TCC)	Questioning Introduction to Branching Databases (PM)	Programming B Coding (TCC)

	KEY STAGE TWO					
	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Y3	Computing Systems & Technology Connecting Computers (TCC)	Programming A Scratch Animation Sequencing Sounds (TCC)	Data and Information Branching Databases (PM)	Creating Media Stop Frame Animation (TCC/PM)	E-Safety E-Mail (PM/3 lessons) Introduction to Spreadsheets (PM/3 lessons)	Programming B Events and Actions in Programming (TCC)
Y4	Computing Systems & Technology The Internet (TCC)	Programming A Repetition in Shapes (TCC/PM)	Data and Information Spreadsheets (PM)	E-Safety Band Runner (3 lessons) Effective Searching (PM)	Data and Information Data Logging (TCC)	Programming B Repetition in Games Scratch (TCC)
Y5	Computing Systems & Technology Systems and Searching (TCC)	Programming A Scratch Programming Make a Pong Game	Data and Information Spreadsheets (PM)	E-Safety SMART CREW	Data and Information Classifying Animals Databases (PM)	Programming B Selection in Quizzes (TCC)
Y6	Computing Systems & Technology Communication and Collaboration Binary Code (TCC)	Programming A Scratch Animation Make an Arcade Game	Understanding Binary Code E-Safety	Data and Information Using formulae in spreadsheets (TCC)	Creating Media 3D Modelling (TCC)	Programming B Sensing Movement Microbits (TCC)

2. The Key Concepts in Computing, which underpin our learning themes.

	Key Stage 1	Key Stage 2
Computer Science	• 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	• 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 Appreciate how [search] results are selected and ranked
Information Technology	• Use technology purposefully to create, organise, store, manipulate and retrieve digital content	• Use search technologies effectively • 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

Digital Literacy	• 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	• Understand the opportunities [networks] offer for communication and collaboration • Be discerning in evaluating digital content • Use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report
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3. Cultural Capital

“Remember to look up at the stars and not down at your feet. Try to make sense of what you see and wonder about what makes the universe exist. Be curious. And however difficult life may seem, there is always something you can do and succeed at. It just matters that you don’t give up.” Stephen Hawking

At Holywell School, we recognise that for students to aspire and be successful academically and in the wider areas of their lives, they need to be given rich and sustained opportunities to develop their cultural capital. All children take part in weekly computing lessons, which cover a range of skills to prepare them for secondary school and beyond. They are encouraged to be curious about how things work and have a thirst for knowledge. All children have the opportunity to use technology to facilitate this and use internet services to explore beyond their own experiences. Children are encouraged to use the correct terminology relating to computing and how computers are used in real-life situations. We look at how technology has changed and the impact this has had on society and they research and discuss key figures e.g. Tim Berners-Lee. Children are given the opportunity to use different forms of communication e.g. email and blogging and are taught how to communicate appropriately online.

4. Unit Overviews

Year 1

Computing Systems and Networks - Technology Around Us (Autumn 1)	
Learning Objectives	
1	To use a login card to login to an App on an iPad, safely.
2	To use a touchscreen to create a picture and add text.
3	To name the main parts of a computer
3	To understand the importance of logging out
4	To explain technology as something that helps us
5	To locate examples of technology in the classroom.
6	To explain how these technology examples help us.
Key Outcomes	
Children will be able to login to PurpleMash using their own login. They will understand that when they save their work it is to a private area of the computer that is just for their own work. They will understand the importance of keeping passwords safe. They will learn how to save and retrieve work and edit it, adding text and pictures where appropriate. They will learn the importance of logging out when they have finished to protect their work. They will be able to recognise a variety of technology and be able to explain what it is used for.	
Programming A - Moving a Robot - Beebots Part 1 (Autumn 2)	
Learning Objectives	
1	To explain what a given command will do.
2	To act out a given word.
3	To combine 'forwards' and 'backwards' commands to make a sequence.
4	To combine four direction commands to make sequences.
5	To plan a simple program.
6	To find more than one solution to a problem.

Key Outcomes		
Children will be able to use simple Logo language to plan simple programs. They will be able to use logical reasoning to predict the behaviour of these programs. Children will understand that instructions need to be clear and precise, in order for devices to follow them.		
Data and Information - Grouping and Sorting Data (Spring 1)		
Learning Objectives		
1	To sort items using a range of criteria, both physically and digitally.	
2	To understand that data can be represented in picture format.	
3	To contribute to a class pictogram.	
4	To use a pictogram to record the results of an experiment.	
Key Outcomes		
Children will be able to sort items using a range of criteria. They will understand that the criteria they use may affect the result. They will learn that data can be represented in picture format. They will contribute to a class pictogram and then use a pictogram to record the results of their own experiment.		
Creating Media - Digital Pictures (Spring 2)		
Learning Objectives		
1	To make marks using a variety of tools.	To m
2	To choose appropriate shapes and colours for a given task.	To ch
3	To choose appropriate tools for a given task.	
4	To create a picture in the style of an artist.	
5	To be able to say which tools were helpful and why.	
6	To compare digital art with using paint and paper.	
Key Outcomes		
Children will be able to select appropriate tools to create a variety of digital artwork. They will be able to save their work and understand that they can retrieve and edit it, if required. They will be able to compare creating artwork digitally with using other methods and be able to say which they prefer.		

Introduction to Spreadsheets (Summer 1 - Part 1)

1	To understand what a spreadsheet looks like.
2	To navigate around a spreadsheet and enter data.
3	To learn new vocabulary, related to spreadsheets, e.g. row, column, cell
4	To add clipart to a spreadsheet and assign it a value.
5	To use the count tool, to count items.

Key Outcomes

Children will be able to navigate around a spreadsheet and explain what columns and rows are. They will be able to enter data into cells and use the count tool, to count items.

Lego Builders (Summer 1 - Part 2)

1	To understand the importance of following instructions.
2	To follow and create simple instructions on the computer.
3	To consider how the order of the instructions affects the result.
4	To know that an algorithm is a precise, step-by-step set of instructions, to solve a problem.

Key Outcomes

Children will learn that algorithms need to be clear and precise in order to achieve the desired results. They will understand that the order of the instructions affects the outcome.

Programming B - Coding (Summer 2)

Learning Objectives

1	To understand what instructions are and predict outcomes.
2	To use code to make a computer program.
3	To understand what objects and actions are, in terms of computer programming.
4	To understand what an event is and use one to control an object.
5	To begin to understand how code executes when a program is run.
6	To plan and then make a computer program.

Key Outcomes

Children will be able to give and follow instructions. They will be able to arrange code blocks to create a set of instructions known as an algorithm. Children will use a variety of code blocks in their programs, including objects, actions and events. They will begin to understand how the code executes when the program is run. Children will design their own program and then use code to create it.

Year 2

Computing Systems and Networks - IT Around Us (Autumn 1)

Learning Objectives

- | | |
|---|---|
| 1 | To recognise the uses and features of Information Technology. |
| 2 | To identify the uses of Information Technology in school. |
| 3 | To identify Information Technology beyond school. |
| 4 | To explain how Information Technology helps us. |
| 5 | To explain how to use Information Technology safely. |
| 6 | To recognise that choices are made when using Information Technology. |

Key Outcomes

Children will be able to recognise a range of Information Technology in school and beyond. They will be able to identify which form of Information Technology may be best suited for a particular task. They will think about rules that may need to be followed and explain how these keep them safe.

Programming A - Beebots Part 2 (Autumn 2)

Learning Objectives

- | | |
|---|---|
| 1 | To describe a set of instructions as a sequence. |
| 2 | To explain what happens when we change the order of instructions. |
| 3 | To use logical reasoning to predict the outcome of a program. |
| 4 | To explain that programming projects can have code and artwork. |
| 5 | To design an algorithm, using Logo. |
| 6 | To create and debug a program, they have written for a Beebot. |

Key Outcomes

Children will be able to describe a series of instructions as a sequence. They will be able to explain what will happen if the order of the instructions changes. Children will be able to create algorithms, using Logo, using logical reasoning to predict outcomes. They will then test their programs, using a Beebot, debugging if necessary. Children will begin to plan larger programming tasks, breaking the problem down into chunks to make it easier to solve.

Data and Information - Spreadsheets (Spring 1)

Learning Objectives

- | | |
|---|--|
| 1 | To understand the terms: cell, row and column |
| 2 | To use images in a spreadsheet and assign them values. |
| 3 | To use the count tool effectively. |
| 4 | To use tools to automatically total rows and columns. |
| 5 | To create a table of data within a spreadsheet. |
| 6 | To use the table to manually make a block graph. |

Key Outcomes

Children will be able to explain the terms: cell, row and column. They will be able to enter data into a spreadsheet, including images and assign these a value. They will be able to use tools to calculate totals automatically. Children will be able to create a table of data and use this to manually create a block graph.

Creating Media - Digital Music (Spring 2)

Learning Objectives

- | | |
|---|--|
| 1 | To say how music can make us feel. |
| 2 | To identify that there are patterns in music. |
| 3 | To experiment with sound using a computer. |
| 4 | To use a computer to create a musical pattern. |
| 5 | To create music for a purpose. |
| 6 | To review and refine our computer work. |

Key Outcomes

Children will be able to say how a piece of music makes them feel and identify differences between two pieces of music. They will be able to recognise patterns within a piece of music and create simple rhythms using a computer.

Questioning - An Introduction to Branching Databases (Summer 1)

Learning Objectives

- | | |
|---|---|
| 1 | To show that the information contained in pictograms can only be used to answer simple questions. |
| 2 | To use yes/no questions to separate information. |
| 3 | To construct a binary tree to separate different answers. |
| 4 | To use a binary tree to answer questions. |
| 5 | To use a branching database to answer more complex search questions. |

Key Outcomes

Children will be able to use yes/no questions to sort information. They will understand that questions are limited to yes and no when using a binary tree to search for information. Children will design a binary tree to sort pictures of children. They will recognise that storing data in a database makes searching for information more efficient.

Programming B - Coding (Summer 2)

Learning Objectives

- | | |
|---|--|
| 1 | To understand what an algorithm is. |
| 2 | To use an algorithm to create a program, using a given design. |
| 3 | To understand algorithms follow a sequence. |
| 4 | To use a timer in their program. |
| 5 | To understand the purpose of different events. |
| 6 | To understand the term 'debugging' and the need to test programs repeatedly. |

Key Outcomes

Children will be able to describe an algorithm as a set of instructions and understand that they follow a sequence. They will be able to create algorithms for a given design and understand the purpose of a variety of code blocks including events, timers, objects etc. Children will understand the need to test their programs regularly and debug their programs when necessary.

Year 3

Computing Systems and Technology - Connecting Computers (Autumn 1)

Learning Objectives

1	To explain how digital devices function.
2	To identify input and output devices
3	To recognise how digital devices can change the way that we work
4	To explain how a computer network can be used to share information
5	To explore how digital devices can be connected
6	To recognise the physical components of a network

Key Outcomes

Children will be able to explain that digital devices accept inputs, process that data and then produce outputs. They will recognise how digital devices change the way we work. Children will understand that a network is made up of different devices, connected by switches, wireless access points and servers. They will understand that networks are needed to share information electronically and be able to demonstrate how messages move through a network.

Scratch Programming - Programming A (Autumn 2)

1	To explore a new learning environment.
2	To identify that commands have an outcome.
3	To explain that a program has a start.
4	To recognise that a sequence of commands can have an order.
5	To change the appearance of my project.
6	To create a project from a task description.

Key Outcomes

Children will create a simple game using Scratch code. They will learn and use the vocabulary use in Scratch programming. They will be able to change the background and add new sprites to their program. They will add command blocks and will be able to say what will happen on the screen. Children will be able to read through their algorithms to identify errors (debugging).

Branching Databases (Spring 1)

Learning Objectives

1	To create questions with yes/no answers
2	To identify the attributes needed to collect data about an object
3	To create a branching database
4	4. To explain why it is helpful for a database to be well structured.
5	To plan the structure of a branching database.
6.	To independently create an identification tool.

Key Outcomes

Children will understand that data can be sorted by asking questions that have a yes or no answer. They will learn how to structure questions so that the answers are yes or no and use this to play a simple game. They will be able to complete a branching database and begin to structure a new database explaining why they chose a particular question to split the database.

Creating Media - Stop Frame Animation (Spring 2)

Learning Objectives

- | | |
|---|--|
| 1 | To explain that animation is a sequence of drawings or photographs |
| 2 | To relate animated movement with a sequence of images |
| 3 | To plan an animation. |
| 4 | To identify the need to work consistently and carefully |
| 5 | To review and improve an animation. |
| 6 | To evaluate the impact of adding other media to an animation. |

Key Outcomes

Children will be able to explain that animations are created using a sequence of drawings or photographs. They will plan and create a stop frame animation. Children will review their animation regularly, making improvements as necessary. They will evaluate their finished projects and consider what the impact of adding other media e.g. sound would be.

Spreadsheets - (Summer 1 - Part 1)

Learning Objectives

- | | |
|---|--|
| 1 | To create a table of data in a spreadsheet. |
| 2 | To use a spreadsheet program to create charts and graph from data. |
| 3 | To use 'more than', 'less than' and 'equal to' tools to compare different numbers. |
| 4 | To be able to describe a cell location in a spreadsheet e.g. A1 |
| 5 | To be able to specified locations in a spreadsheet |

Key Outcomes

Children will be able to use '<', '>' and '=' to compare values in a spreadsheet. They will be able to create a spreadsheet and enter data collected by the class and produce a variety of graphs to represent this data. They will be able to use the terms row, column and cell confidently and be able to refer to a particular cell by its cell reference.

E-Safety - (Summer 1 - Part 2)

Learning Objectives

- | | |
|---|---|
| 1 | To understand what makes a safe password and the consequences of giving your password away. |
| 2 | To understand how the internet can be used for effective communication. |
| 3 | To consider that not everything you read online is true. |
| 4 | To understand that you should use more than one website to verify information. |
| 5 | To understand the PEGI ratings and why they exist. |
| 6 | To know where to go if they experience inappropriate content or contact. |

Key Outcomes

Children will be able to explain why passwords must be kept private and what may happen if they share it with others. They will understand how the internet can be used for effective communication and name a variety of methods which would suit a different purpose. They will learn to consider whether what they read online is true, and to use more than one website to verify information. They will understand the use of PEGI ratings and why these are used and what to do if they experience inappropriate content or contact.

Programming B - Events and Actions in Coding (Summer 2)

Learning Objectives

- | | |
|---|---|
| 1 | To explain how a sprite moves in an existing project |
| 2 | To create a program to move a sprite in four directions |
| 3 | To adapt a program to a new context |
| 4 | To develop my program by adding features |
| 5 | To identify and fix bugs in a program |
| 6 | To design and create a maze-based challenge |

Key Outcomes

Children will be able to explain the relationship between an event and an action. Children will be able to program movement, selecting appropriate blocks. Children will become more confident in identifying errors in their programs and fixing them. Children will design and create a maze-style game, justifying their choices of design and evaluating its success.

Year 4

Computing Systems and Technology - The Internet (Autumn 1)

Learning Objectives

1	To describe how networks physically connect to other networks
2	To recognise how networked devices make up the internet
3	To outline how websites can be shared via the World Wide Web (WWW)
4	To describe how content can be added and accessed on the World Wide Web (WWW)
5	To recognise how the content of the WWW is created by people
6	To evaluate the consequences of unreliable content

Key Outcomes

Children will begin to understand the term selection in computer programming and understand how IF and IF/ELSE statements work. They will learn how to use co-ordinates in programming. They will understand the 'repeat until' command and what a variable is. They will be able to use a number variable and create a playable game.

Programming A - Repetition in Shapes (Autumn 2)

Learning Objectives

1	To know what the common instructions are in 2Logo and how to type them.
2	To follow simple Logo instructions.
3	To create 2Logo instructions to create patterns of increasing complexity, including using the repeat function.
4	To follow 2Logo code to predict the outcome.
5	To use the repeat command to draw shapes.
6	To use procedures in their programs, to create more complex patterns.

Key Outcomes

Children will be able to recognise the common instructions used in Logo. They will be able to follow simple instructions to create shapes on paper. They will begin to create 2Logo instructions to create patterns of increasing complexity and use logical reasoning to predict outcomes. Children will be able to use the repeat command to draw shapes and combine with procedures to create more complex patterns.

Data and Information - Spreadsheets (Spring 1)

Learning Objectives

- | | |
|---|---|
| 1 | To explore how numbers entered can be set as currency or decimals. |
| 2 | To add formulae to a cell. |
| 3 | To use the timer, random number and spin tool to create a number game. |
| 4 | To use a line graphing tool. |
| 5 | To interpret a line graph and estimate the values between the data readings. |
| 6 | To use a spreadsheet to model a real-life situation and begin to understand the benefits of using a spreadsheet for this purpose. |

Key Outcomes

Children will be able to use formatting tools within a spreadsheet so that data is represented as a decimal or currency. They will be able to add a formula to a cell to perform a calculation. They will use a spreadsheet to model a real-life situation and consider the benefits of using a spreadsheet for this purpose.

E-Safety - Play, Like, Share (Spring 2, Part 1)

Learning Objectives

- | | |
|---|---|
| 1 | To identify signs of manipulative, pressurising or threatening behaviour online. |
| 2 | To respond safely if they think someone is trying to manipulate, pressure or threaten them. |
| 3 | To understand their rights online. |
| 4 | To take measures to control their privacy and their digital footprint. |
| 5 | To get help from an appropriate source when they need it. |

Key Outcomes

Children will be able to identify signs of manipulative, pressurising or threatening behaviour online and respond appropriately if this happens to them. They will learn to take measures to control their privacy and digital footprint and be able to identify an appropriate source for help, when they need it.

Effective Searching (PM) (Spring 2, Part 2))

Learning Objectives

- | | |
|---|---|
| 1 | To locate information on the search results page. |
| 2 | To use search effectively to find out information. |
| 3 | To assess whether an information source is true and reliable. |

Key Outcomes

Children will learn how to structure search queries to locate specific information. They will use search to answer a series of questions and structure questions for a friend to answer. Children will analyse the contents of a webpage to judge whether they think the information is reliable.

Data and Information - Data Logging (TCC) (Summer I)

Learning Objectives

- | | |
|---|---|
| 1 | To explain that data gathered over time can be used to answer questions |
| 2 | To use a digital device to collect data automatically |
| 3 | To explain that a data logger collects 'data points' from sensors over time |
| 4 | To recognise how a computer can help us analyse data |
| 5 | To identify the data needed to answer questions |
| 6 | To use data from sensors to answer questions |

Key Outcomes

Children will have an increased understanding data and now it may be collected over time. They will use a device to log and collect data and interpret the results, using graphs and tables.

Programming B - Repetition in Games

Learning Objectives

- | | |
|---|--|
| 1 | To develop the use of count-controlled loops in a different programming environment. |
| 2 | To explain that in programming there are infinite loops and count-controlled loops. |
| 3 | To develop a design that includes two or more loops which run at the same time. |
| 4 | To modify an infinite loop in a given program. |
| 5 | To design a project that includes repetition. |
| 6 | To create a project that includes repetition. |

Key Outcomes

Children will learn the difference between count-controlled loops and infinite loops. They will learn how to modify existing programs using repetition. Children will design and create a game that uses repetition, applying stages of programming design throughout.

Year 5

Computing Systems and Technology (TCC) - Systems and Searching (Autumn 1)	
Learning Objectives	
1	To explain that computers can be connected together to form systems
2	To recognise the role of computer systems in our lives
3	To identify how to use a search engine
4	To describe how search engines select results
5	To explain how search results are ranked
6	To recognise why the order of results is important, and to whom
Key Outcomes	
Children will develop their understanding of computer networks and how they can provide multiple services, including the WWW. They will use search technologies effectively and gain an understanding of how results are returned and ranked. They will learn how the results can be influenced and how to be discerning when evaluating digital content.	
Scratch Programming (Autumn 2)	
1	To use coding vocabulary appropriately.
2	To begin to create more complex algorithms in their programs.
3	To begin to create and assign variables, appropriately.
4	To begin to use more complex selection statements e.g. if, then, else
5	To understand the importance of breaking problems down into smaller parts (decomposition)
6	To understand how the X and Y position of a sprite, affects its position on the screen.
Key Outcomes	
Children will create an interactive 'Pong' game. They will be able to create and assign variables within their game. They will be able to use selection statements with more confidence and understand how to create realistic looking effects. Children will understand the relevance of the X and Y position of the sprite and be able to set the position of their sprites, appropriately. Children will regularly run their programs and debug if necessary.	

Data and Information - Spreadsheets (PM) (Spring I)

Learning Objectives

1	To use a formula in a spreadsheet to convert m into cm.
2	To use a spreadsheet to work out which letters appear most often, using the count tool.
3	To use a spreadsheet to work out the area and perimeter of rectangles.
4	To use these calculations to solve a real-life problem.
5	To create simple formulae that use different variables.
6	To use a spreadsheet to model a real-life situation and come up with solutions that can be practically applied.

Key Outcomes

Children will be able to use formulae in a spreadsheet to convert measurements of length and distance. Children will be able to use the count tool to answer hypotheses about common letters in use. Children will be able to use a spreadsheet to model a real-life problem. They will be able to use formulae to calculate the area and perimeter of shapes and create formulae that uses text variables. Children will create a spreadsheet to help plan a school cake sale.

Online Safety (Spring 2)

Learning Objectives

1	To think critically about the information that they share online, both about themselves and others
2	To know who to tell if they are upset by something that happens online.
3	To be able to use the SMART rules as a source of guidance when online.
4	To be able to use keywords and search techniques to find relevant information and increase the reliability of results.
5	To show an understanding of the advantages and disadvantages of different forms of communication and when it is appropriate to use each.

Key Outcomes

Children will gain a deeper understanding of the impact that sharing digital content can have. Children will be confident about reporting content that they find upsetting to an appropriate adult and use the SMART rules as a guide when online. Children will use a variety of search techniques to improve the quality of the results returned and to show a consideration for the reliability of the results. Children will be able to show an understanding for the advantages and disadvantages of different forms of communications.

Classification of Animals (Summer I)

Learning Objectives

1	To understand how to use search engines effectively and responsibly, by using child friendly search engines and key words to refine searches.
2	To demonstrate responsible use of technologies and know a range of ways to report concerns.
3	To create two different types of database around a chosen topic, and consider the benefits/drawbacks of using each method.
4	To search for information in a database.
5	Analyses and evaluates data and information and recognises that poor quality data leads to unreliable results and inaccurate information.

Key Outcomes

Children will be able to search for information, using appropriate search engines and by using key words to refine searches. Children create a record based database and a branching database and use them to search for information. They will be able to consider the benefits and drawbacks of using each. They will be able to analyse and evaluate information and recognise that poor quality data leads to unreliable results and inaccurate information.

Programming B - Selection in Quizzes (Summer 2)

Learning Objectives

- | | |
|---|---|
| 1 | To explain how selection is used in computer programs |
| 2 | To relate that a conditional statement connects a condition to an outcome |
| 3 | To explain how selection directs the flow of a program |
| 4 | To design a program that uses selection |
| 5 | To create a program that uses selection |
| 6 | To evaluate my program |

Key Outcomes

Children will develop their knowledge of 'selection' by revisiting how 'conditions' can be used in programming, and then learning how the 'if... then... else...' structure can be used to select different outcomes depending on whether a condition is 'true' or 'false'. They represent this understanding in algorithms, and then by constructing programs in the Scratch programming environment. They learn how to write programs that ask questions and use selection to control the outcomes based on the answers given. They use this knowledge to design a quiz in response to a given task and implement it as a program. To conclude the unit, children evaluate their program by identifying how it meets the requirements of the task, the ways they have improved it, and further ways it could be improved.

Year 6

Computing Systems and Technology (Autumn 1)

Learning Objectives

- | | |
|---|--|
| 1 | To explain the importance of internet addresses. |
| 2 | To recognise how data is transferred across the internet. |
| 3 | To explain how sharing information online can help people work together. |
| 4 | To evaluate different ways of working together online. |
| 5 | To recognise how we communicate using technology. |
| 6 | To evaluate different methods of online communication. |

Key Outcomes

Children will learn how data is transferred across the internet. They will learn how web addresses and data packets are structured. Children will learn how the internet facilitates communication and collaboration online and how to communicate responsibly, considering what should and should not be shared.

Scratch Programming (Autumn 2)

- | | |
|---|---|
| 1 | To be able to read more complex algorithms and predict the outcome. |
| 2 | To be able to create and assign variables, appropriately. |
| 3 | To change a sprite's costume to within a game to improve the visual appearance of the game. |
| 4 | To be able to broadcast a message from one sprite to another, effectively. |
| 5 | To create multiple backgrounds within their game and set these appropriately within the game. |
| 6 | To understand that there may be more than one solution to a problem. |

Key Outcomes

Children will create an underwater, interactive game. They will add multiple sprites and write the code for each one. They will be able to add and assign variables confidently to control the speed, create lives for the player and a scoreboard. They will create multiple backgrounds e.g. an end of game message and add the code so that the correct background appears at the right time. They will use selection statements and control blocks with increased confidence. Children will recognise that there may be more than one solution to a problem.

Data and Information - An Introduction to Spreadsheets (PM) (Spring 1)

Learning Objectives

- | | |
|---|--|
| 1 | To create data in a spreadsheet. |
| 2 | To build a data set in a spreadsheet. |
| 3 | To explain that formulae can be used to produce calculated data. |
| 4 | To apply formulae to data. |
| 5 | To create a spreadsheet to plan an event. |
| 6 | To choose suitable ways to present data. |

Key Outcomes

They will use the correct terminology when describing a spreadsheet. They will learn how to use a variety of formulae and use these to make calculations. They will use a spreadsheet to plan an event and choose suitable ways to present data.

Understanding Binary Code - (Spring 2 - Part 1)

Learning Objectives

- | | |
|---|---|
| 1 | Children can explain how all data in a computer is saved in the computer memory in a binary format. |
| 2 | To be able to explain that binary uses only the integers 0 and 1. |
| 3 | To be able to relate an '0' to off and 1 to 'on' switch. |
| 4 | To be able to convert denary numbers into binary and vice versa, using a visual aid if necessary. |
| 5 | To relate bits to computer storage. |
| 6 | To recognise that all characters on a keyboard will have an 8 digit (bit) binary code. |

Key Outcomes

Children will gain an understanding of how computers store data, digitally. They will learn to convert binary numbers into denary and vice versa. They will relate this to the work covered in Unit 1 and how data is sent over the internet.

Online Safety (Spring 2 - Part 2)

Learning Objectives

1	To consolidate their knowledge of the risks they might encounter online, including sharing location, secure websites, spoof websites, phishing and other scams.
2	To understand how what they share impacts upon themselves and upon others in the long-term.
3	To be able to take more informed ownership of the way that they choose to use their free time, recognising that there should be a balance between active and digital activities.
4	To be able to talk about the positive and negative aspects of technology and balance these opposing views.
5	To understand how their digital footprint is created and that digital content is hard to remove.
6	To have a clear idea of what is and what is not appropriate behaviour online.

Key Outcomes

Children will know what risks they may encounter online and how they can best protect themselves. Children will be more aware of how what they share may impact on others in the long-term. Children will recognise that they need to find a balance between online and offline activities and recognise that there are negative and well as positive effects of using technology. Children will understand what is meant by their digital footprint and how this is created, being aware that digital content may be difficult to remove. Children will have a clear idea of what is appropriate and inappropriate behaviour online.

Creating Media - 3D Modelling (Summer 1)

Learning Objectives

1	To recognise that you can work in three dimensions on a computer.
2	To identify that digital 3D objects can be modified.
3	To recognise that objects can be combined in a 3D model.
4	To create a 3D model for a given purpose.
5	To plan my own 3D model.
6	To create my own 3D model.

Key Outcomes

Children will develop their knowledge and understanding of using a computer to produce 3D models. They will initially familiarise themselves with working in a 3D space, moving, resizing, and duplicating objects. They will then

create hollow objects using placeholders and combine multiple objects to create a model of a desk tidy. Finally, children will examine the benefits of grouping and ungrouping 3D objects, then go on to plan, develop, and evaluate their own 3D model of a building.

Programming B - Sensing (Summer 2)

Learning Objectives

- | | |
|---|--|
| 1 | To create a program to run a controllable device i.e. Microbit. |
| 2 | To explain that selection can control the flow of a program. |
| 3 | To update a variable with a user input. |
| 4 | To use an conditional statement to compare a variable to a value. |
| 5 | To use an conditional statement to compare a variable to a value. |
| 6 | To develop a program to use inputs and outputs on a controllable device. |

Key Outcomes

Children will combine aspects of computing they have learned in previous units of work: Sequencing (Y3), Repetition (Y4), Selection (Y5) and Variables (Y6). They will learn how to apply their knowledge of coding to the MakeCode environment and how to transfer that code to a physical device i.e. a Microbit. They will create code with increasing complexity, test it using an emulator before transferring the code to a Microbit.