Year 1 Long-term planning

ALGORITHMS AND PROGRAMMING

The National Curriculum states that children should be taught to:

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

- Children should be taught that an algorithm is a precise way of solving a problem.
- Children will be familiar with following instructions from their teachers and rules when playing games. They should extend this knowledge to recognise and give examples of algorithms in everyday life.
- Through testing different algorithms, children should learn to create their own algorithms for specific purposes. They should then refine the steps to ensure that they are clear and easy to follow.
- Children should be shown that algorithms can be followed by humans and also by computers and they need precise, unambiguous instructions.

HOW COMPUTERS WORK

The National Curriculum states that children should be taught to:

- recognise common uses of information technology beyond school

- Most children will have experienced using computers in the Reception year, nursery or at home. There are different types of computers, such as desktop, laptop and tablet and they will be able to recognise these.
- Through exploration in school, the children will be able to name places where desktop and laptop computers are used. They need to learn that other devices contain computers, for example, the photocopier or DVD player.
- Outside of school, the children should develop an understanding of common uses of computers, for example, mobile phones, supermarket checkout tills and in other places they visit.
- Children need to be able to name the parts of a computer and describe its simple functions.

DATA AND INFORMATION

The National Curriculum states that children should be taught to:

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

- In everyday life, children will have experienced digital content through photographs, videos and music. This content can be organised in different ways. In order to do this, the children need to be able to recognise different types of content and name them.
- Through practice, children should learn that digital content can be manipulated by grouping different types together, for example, text and images or audio and images.
- Children need to be taught how to organise and manipulate the digital content purposefully.

COMMUNICATION AND E-SAFETY

The National Curriculum states that children should be taught to:

- 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

- Children will be familiar with sharing information about themselves, such as, name, age, address and interests. They need to be taught that sometimes they need to keep information private. They need to be shown through careful examples when it is appropriate to share and with whom.
- In school, the children have friends they talk to and play games with. They are aware of the concept of friends and how they should behave towards each other. However, this is not always borne out in practice. Therefore, they should identify the characteristics of a 'good' friend and how they behave. This learning is then transferred to communicating with friends online and how they should behave towards one another.
- Children should be taught who to ask for help and support, whether at home or at school, if they have concerns or are worried by something they see on a computer.

Overview of progression in Year 1

Algorithms and programming

In Year 1, children will begin with very simple lists of instructions, delivered through familiar contexts, such as, 'Simon says' games. The children will develop their use of instructions to show how they can be combined to perform more complex tasks, laying the foundations for programming in Year 2.

With algorithms, it is important that the children start to develop sequences of instructions that are accurate – for example, when putting on shoes it is important to stress that there are *two* instructions, for the left and right foot, rather than just saying *'put on shoes'*. This will prepare the children to *'debug'* instructions in the following years, and is an important skill to develop.

When the children are focusing on their instructions, try to make links to their learning about sentences in English. For example, a sentence must contain at least one verb and a subject; a capital letter is found at the start of the sentence and a full stop at the end. There is a strong need in both English and computing for precision in creating clear instructions.

Linking to the mathematics curriculum, the children will be learning about sequencing numbers. For example, a list of instructions can be numbered and then 'jumbled up'; the task is then to order them numerically. An understanding of place value is important in this example and can be supported using number lines and 100 squares.

Data and information

The children's vocabularies will be extended through discussion and by focusing on new words from their reading and listening. They begin with identifying data types within a dinosaur theme, such as, name and size. They move on to recognizing types of data, for example, text, image, video and sound. This is important for subsequent years, where they will be identifying file types, for example, txt, jpg, wmv and mp3. This learning is reinforced through the English curriculum, for example, by identifying pronouns and letter patterns.

Children progress in mathematics by recognizing simple patterns in data and then processing the information to represent it in different ways. For example, they can order the dinosaurs from smallest to largest and vice versa. They move on to recognise the digits in the data and name them; this prepares them for naming large numbers in the hundreds and thousands ranges.

How computers work

During Year 1, children will begin to name the parts of a computer and what they do, using nouns and adjectives. They also create models of a computer, offering opportunities for speaking and listening as they role-play using each part and explain what it does.

Children then begin to recognise that computers can be found in different devices both inside and outside of school, from desktop computers to DVD players, mobile phones and checkout tills.

Communication and e-safety

In Year 1, the children focus on communicating information from a story. They read the story and retell it to each other and begin to consider how they can share the story digitally. They use a variety of techniques to capture their stories including the use of photos, video and audio; this links very clearly with the English curriculum and will in particular help to develop speaking and listening skills.

Progression in e-safety begins with identifying *'What is personal information?'.* Reflecting upon the 'Data' and 'Information' lessons, they will know about names and facts about dinosaurs, so they can identify similar pieces of data about themselves. This enables the children to use pronouns, verbs and adjectives to create sentences about themselves. These effective comprehension techniques will then be built upon in Year 2 and subsequent years.

To develop an understanding about e-safety, the children consider with whom they should share information, in-person or online. They should know who to tell if they have concerns and this should link to the school's own policies and procedures for e-safety.

Medium-term planning Autumn 1: Dinosaurs

National Curriculum objective

Childen should be taught to:
- use technology purposefully to create, organise and manipulate digital content

W	Outcomes	Objectives
1	Can identify the names of dinosaurs. Can describe the different characteristics of dinosaurs.	• To identify the name of the dinosaur. • To identify the size of the dinosaur. • To identify the characteristics of a dinosaur, for example, scales, tail, teeth.
2	Can sort the dinosaurs in simple ways. Can categorise the dinosaurs into groups.	• To sort the names alphabetically. • To sort the dinosaurs in order of size, from largest to smallest and from smallest to largest. • To group by characteristics, for example, horns, wings.
3	Can describe and use basic types of data. Can combine images and audio data types in simple ways.	• To identify the basic data types of image, video, audio and text. • To match images and audio data types using a simple drag and drop activity.
4	Can combine text and image data for a particular purpose.	• To draw their favourite dinosaur, add a text name and simple text description.
5	Can collect and organise data.	• To collect data using a tally sheet.
6	Can manipulate data in graphical formats.	• To display data using simple pictograms.
Assess and review		• To assess the half-term's work.

Medium-term planning Autumn 2: Traditional stories

National Curriculum objective

Children should be taught to:
- understand what algorithms are

W	Outcomes	Objectives
1	Can follow a sequence of instructions. Can verbally give instructions for someone else to follow.	• To be able to follow a series of simple instructions through games. • To participate in giving instructions for others to follow. • To know that instructions can be given in a number of different ways (for example, verbally and using images and text).
2	Can understand that instructions need to be accurate. Can rearrange a sequence of instructions.	• To identify incorrectly sequenced instructions. • To predict what will happen if incorrectly sequenced instructions are followed. • To sequence instructions into the correct order.
3	Can discuss why stories need to be in the correct order. Can reorganise stories and number sequences into the correct order.	• To identify the beginning, middle and end of traditional stories. • To identify errors in the sequencing of traditional stories. • To sequence traditional stories into the correct order.
4	Can solve simple logic problems. Can verbally describe solutions to problems.	• To begin to know strategies to solve simple logic problems. • To be able to solve simple logic problems successfully (independently or in pairs). • To explain in simple terms the steps taken to solve simple logic problems.
5	Can plan a series of instructions. Can check the accuracy of a series of instructions.	• To be able to create a simple image plan of a sequence of instructions. • To compare the plan created by the children with a prepared plan and make adjustments, as necessary. • To follow pictorial plans to complete simple tasks.
6	Can explain that an algorithm is a precise way of solving a problem. Can explain that algorithms need to be accurate, so a computer can execute them.	• To learn that an 'algorithm' is a term used to describe a sequence of instructions for a computer to follow. • To create algorithms for human robots. • To understand why algorithms should be accurate. • To predict what might happen if given algorithms are inaccurate.
Assess and review		• To assess the half-term's work.

Medium-term planning Spring 1: Computers in everyday life

National Curriculum objective

Children should be taught to:
- recognise common uses of information technology beyond school

W	Outcomes	Objectives
1	Can name parts of the classroom computer. Can describe how to use the keyboard, mouse and screen.	• To learn the names of basic parts of the computer using simple songs and rhymes. • To be able to name mouse, screen, keyboard and CPU. • To explain, in simple terms, the functions of the main parts of a computer.
2	Can explain that a mouse is an input device. Can use a mouse to complete simple tasks.	• To learn that a mouse is an input device that controls a pointer on the screen. • To learn that a mouse allows a user to control elements on the screen. • To become more confident using a mouse when completing simple tasks.
3	Can explain that a keyboard is an input device. Can accurately use a keyboard to type simple sentences.	• To learn that a keyboard is an input device that allows a user to input letters, numbers and symbols. • To become more confident using a keyboard by typing simple words and sentences combining numbers, letters and symbols.
4	Can explain that a screen is an output device. Can recognise the common features of different types of computer screens.	• To learn that a screen is an output device that displays information for the user. • To be able to explain what they can usually expect to see on a screen.
5	Can understand in simple terms how a CPU works. Can explain that a CPU follows instructions.	• To learn that a CPU contains the computer 'brain'. • To be able to explain that a CPU processes instructions given by input devices. • To be able to explain that a CPU gives instructions to output devices.
6	Can build a simple computer model. Can explain in simple terms the main parts of a computer and how a computer works.	• To know the main parts of a computer. • To verbally explain the main parts of a computer. • To identify input and output devices on a simple computer model. • To identify the CPU and explain how it works in simple terms.
Assess and review		• To assess the half-term's work.

Medium-term planning Spring 2: Plants and animals

National Curriculum objective

Children should be taught to:
- understand what algorithms are, how they are implemented as programs on digital devices, and that programs execute by following precise and unambiguous instructions

W	Outcomes	Objectives
1	Can rearrange a sequence of images into the correct order. Can identify and correct errors within a sequence of images.	• To rearrange images into the correct sequence. • To explain verbally the reasons behind their choice of sequencing. • To identify and correct errors in sequencing. • To be introduced to the term 'debugging'.
2	Can create sequences of images in the correct order. Can explain why accuracy is important and how they debug their work.	• To create a sequence of images. • To identify and correct errors in sequences of images. • To know and understand the term 'debugging'. • To understand the importance of accurate sequences.
3	Can use simple flowcharts to represent instructions. Can identify and represent repetition in flowcharts.	• To know what a flowchart is and understand how it can be followed. • To rearrange a simple flowchart into the correct order. • To debug their own and others' flowcharts. • To identify and represent repetition in a flowchart.
4	Can explain that algorithms need to be accurate so they can be followed. Can create simple algorithms to control an object.	• To be able to explain that an algorithm is a term used to describe a sequence of instructions for a computer to follow. • To create simple, accurate algorithms to move an object. • To explain how they have created their algorithms to ensure accuracy. • To be able to debug algorithms to ensure accuracy.
5	Can control an onscreen device. Can give instructions and predict the outcome.	• To control an onscreen device. • To predict what will happen when controlling an onscreen device. • To give instructions accurately to an onscreen device. • To begin to understand that a computer program executes an algorithm.
6	Can control an onscreen device using precise instructions to achieve a specific goal. Can debug instructions to ensure a specific goal is achieved.	• To control an onscreen device accurately. • To predict what will happen when controlling an onscreen device. • To give instructions to an onscreen device to achieve specific goals. • To be able to spot errors and debug instructions to achieve specific goals. • To begin to understand that a computer program executes an algorithm.
Assess and review		• To assess the half-term's work.

Medium-term planning Summer 1: 'Handa's Surprise'

National Curriculum objective

Children should be taught to:
- use technology purposefully to create, organise and manipulate digital content

W	Outcomes	Objectives
1	Can sequence a series of events into the correct order.	• To identify the correct order of a story. • To be able to explain and describe the beginning, middle and end of a story. • To be able to sequence a story into the correct order. • To create a simple, pictorial storyboard, retelling a story in the correct order.
2	Can follow a sequence of instructions. Can use digital cameras to capture content.	• To role-play a sequence in a story. • To capture role-play, using a simple digital camera. • To work effectively in small groups.
3	Can use audio devices to record accompanying music.	• To role-play a sequence in a story. • To capture role-play, using a simple digital audio device (microphone). • To work effectively in small groups.
4	Can use audio devices to record narration.	• To role-play a sequence in a story. • To capture role-play, using a simple digital audio device (microphone). • To work effectively in small groups.
5	Can use digital cameras to capture video content.	• To role-play a sequence in a story. • To capture role-play, using a simple digital camera. • To work effectively in small groups.
6	Can combine digital content purposefully. Can understand that images, audio and video can be combined effectively.	• To learn that images, audio and video can be combined using software. • To evaluate images, audio and video and give simple feedback.
Assess and review		• To assess the half-term's work.

Medium-term planning Summer 2: Sea and coast

National Curriculum objective

Children should be taught to:
- keep 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

W	Outcomes	Objectives
1	Can identify what makes a good friend both off and online. Can identify features of appropriate behaviour online.	• To list what makes a 'good' friend. • To identify how 'good' friends communicate through role-play. • To discuss methods of face-to-face communication. • To discuss methods of communication that are not face-to-face (for example, letters, postcards, email, *Facebook*).
2	Can create a list using text. Can order a list alphabetically and numerically.	• To create a list (for example, objects you would see at the seaside). • To identify and discuss how to stay safe at different physical locations. • To begin to understand how to stay safe when online.
3	Can protect their identity online by not using their full name. Can protect their identity online by choosing an avatar.	• To understand how to behave positively with others when face-to-face and online. • To learn how to protect private information when online (for example, considering when to share address details).
4	Can create a secure password and understand the need to protect it.	• To create a memorable password that is not easily identified by others. • To understand why passwords need to be kept private.
5	Can create a list of websites that the children visit and sort, in order of popularity. Can understand the need for accuracy when entering website addresses.	• To create a list of websites. • To sort a list based on one criteria. • To stay safe by accurately entering the website address. • To understand what to do if they visit a website they don't recognise.
6	Can write a poem based on staying safe online.	• To begin to understand how to stay safe when online.
Assess and review		• To assess the half-term's work.

Year 1 Background knowledge

The new computing curriculum offers many opportunities for children to develop their thinking and their early knowledge of computers. They bring a wide and varied experience of problem solving to the classroom and it is important they share this with the other children.

Computational thinking

The National Curriculum for computing follows the fundamentals of computational thinking, which is a problem-solving process. Computational thinking can involve:

- formulating problems in a way that enables us to use computers to help solve them
- logically organising and analysing data
- representing data through abstractions, such as models and simulations
- automating solutions through algorithmic thinking (a series of ordered steps)
- identifying, analysing, and implementing possible solutions with the goal of achieving the most efficient and effective combination of steps and resources
- generalising and transferring problem-solving processes to a wide variety of problems.

Reference: ISTE (2013)

The *100 Computing Lessons* series follows the National Curriculum and highlights the use of computational thinking throughout the learning journey.

Algorithms and programming

An algorithm is a step-by-step list of instructions, which can be followed precisely, to solve a problem. Children use algorithms every day, for example, getting dressed, putting their clothes on in the correct order etc. Also, many games, such as, 'Simon Says', follow a set of instructions. In computational thinking, algorithms help to solve problems, which will then enable a computer to follow the steps and automate the process. In Key Stage 1, developing the core skills of creating and following instructions are the building blocks for later work.

Data and information

From an early stage, children are bombarded by data and information. Data can include names of people and objects, sounds, images and numbers. Children will have sorted data in nursery and in Reception, by using various characteristics. In Year 1 computing, they encounter dinosaurs and organise and manipulate the data, based on their prior experiences. It is important to address any misconceptions as they demonstrate their understanding of sorting and recognising the types of data. In computational thinking, this involves the logical organising of the data. In Year 2, they will develop their analytical skills using data.

How computers work

Children may have encountered computers at home, nursery or during their Reception Year. This could be through using desktops, laptops, tablets or accessing different games and activities on a smart phone. It is important for them to recognise the parts of the computer and begin to understand their functions. Most children will be able to name the mouse and keyboard of a desktop computer and may have different names for the screen, but still understand that it is for displaying the information. However, they might have difficulty in finding the CPU, memory and hard drive and saying what they do; this may be because those components are integrated into the screen or that they have never considered the 'big box' under the screen or on the floor. In Year 1, the children build a cardboard box representation of a desktop computer and learn the names and basic functions of the parts. They also begin to recognise computers in everyday life, such as mobile phones, washing machines and checkout shopping tills.

Communication and e-safety

The children are familiar with sharing information about themselves, such as, name, age, where they live. In Year 1, the children are asked to consider keeping some information private; this is in preparation for Year 2, when they consider the differences between sharing in-person and online. It also lays the foundations for looking for help and support when they find content which might worry or upset them.