

Medium Term Plan – Computing – Year 5 Autumn 1: **COMPUTING SYSTEMS AND NETWORKS – Systems and searching**

Length of unit - 6 Sessions (2 sessions taught per week)

	Disciplinary and Substantive Knowledge	Vocabulary	Learning Sequence
Pre-learning	- Some of the devices that make up a network - The difference between the WWW and the internet - How websites are stored (on servers) - IP addresses (internet protocol—number of a specific computer or network) and web addresses - How not all information on the internet is accurate or true.	- System - Connection - Digital - Input - Process - Output - Protocol - Address - Packet - Chat - Explore - Slide deck - Reuse - Remix - Collaboration	Systems
			This lesson introduces learners to the concept of a system. Learners will develop their understanding of components working together to make a whole. They will outline how digital systems might work and the physical and electronic connections that exist.
			Computer systems and us In this lesson, learners will consider how larger computer systems work. Learners will consider how devices and processes are connected. They will also reflect on how computer systems can help us.
			Searching the web This lesson introduces the idea that parts of a computer system are not always in the same place or country. Instead, those parts of a system must transfer information using the internet. This lesson builds on the introduction to the internet in the Year 4 ‘What is the internet?’ unit, adding awareness of IP addresses and the rules (protocols) that computers have for communicating with one another.
Learning in this unit Resources Google Slides	- To explain that computers can be connected together to form systems - To recognise the role of computer systems in our lives - To recognise how information is transferred over the internet - To explain how sharing information online lets people in different places work together - To contribute to a shared project online - To evaluate different ways of working together online		Selecting search results In this lesson, learners will consider how people can work together when they are not in the same location. They will discuss ways of working and start a collaborative online project. The online activity assumes that learners can make simple slides including text and images. If your learners are unsure how to do this, you may wish to spend some time on the Year 3 ‘Desktop publishing’ unit before this lesson .
			How search results are ranked In this lesson, learners will reflect on how they worked together in the previous lesson and how their working together might be improved. Learners will work together on an un-plugged activity and use that experience to develop their own ideas of good collective working practices.
			How are searches influenced In the previous two lessons, learners worked together online on a shared project. This lesson introduces another approach to online working: reusing and modifying work done by someone else. (Using someone else’s work needs to be done within the bounds of copyright and with the relevant permissions.) This lesson uses the Scratch programming tool, which allows learners to use other people’s work.

Medium Term Plan – Computing – Year 5 Autumn 2: **CREATING MEDIA – Video production**

Length of unit - 6 Sessions (2 sessions taught per week)

	Disciplinary and Substantive Knowledge	Vocabulary	Learning Sequence
Pre-learning	• Digital images • How animations are a sequence of photos or images • What digital recording is • Input and output devices (microphones and speakers, cameras and video), • How audio files can be edited to improve them or compose digital content.	• Video • Audio • Recording • Storyboard • Script • Soundtrack • Dialogue • Capture • Zoom • Storage • Digital • Tape • AV recording • Save • Videographer • Video techniques:	What is video?
			Learners will be introduced to video as a media format. They will see examples of videos featuring production and editing techniques that they will work towards using their own videos. Learners will begin by explaining what the medium of video is before analysing Filming techniques Learners will explore the capabilities of a digital device that can be used to record video. Once they are familiar with their device, learners will experiment with different camera angles, considering how different camera angles can be used for different purposes.
			Using a storyboard Learners will use a storyboard to explore a variety of filming techniques, some of which they will use in their own video project later in the unit. They will evaluate the effectiveness of these techniques before offering feedback on others' work.
Learning in this unit	• To recognise video as moving pictures, which can include audio • To identify digital devices that can record video • To capture video using a digital device • To recognise the features of an effective video • To identify that video can be improved through reshooting and editing • To consider the impact of the choices made when making and sharing a video	• Zoom, pan, tilt, angle • Lighting • Setting • Content • Camera angle • Export • Computer • Split • Trim/clip • Edit • Titles • End credits • Timeline • Transitions • Soundtrack • Content • Retake/reshoot • Special effects	Planning a video
			Learners will plan a video by creating a storyboard. Their storyboard will describe each scene, and will include a script, camera angles, and filming techniques. Learners will use their storyboards to film the first scene of their film. Importing and editing video Learners will film the remaining scenes of their video, and then import their content to video editing software. They will then explore key editing techniques and decide whether sections of their video can be edited or need to be shot again.
			Video evaluation Learners will complete their video by removing unwanted content and reordering their clips. They will then export their finished video and evaluate the effectiveness of their edits.

Medium Term Plan – Computing – Year 5 Spring 1: **PROGRAMMING A – Selection in physical computing**

Length of unit - 6 Sessions (2 sessions taught per week)

	Disciplinary and Substantive Knowledge	Vocabulary	Learning Sequence
Pre-learning	• How software uses algorithms • How to code using a block coding environment (Scratch) • How some algorithms use repetition and that these are defined as loops • Debugging and how to ensure that a program works.	• Microcontroller • Crumble controller • Components • LED • Sparkle • Crocodile clips • Connect • Battery box • Program • Repetition • Infinite loop • Crumble controller • Output devices • Motor • Count-controlled loop • Switch • Condition • True • False • Input • Selection • Action • Task • Design • Condition • Algorithm • Debug • Evaluate	Connecting Crumbles In this lesson, learners will become familiar with the Crumble controller, some of its associated components, and the programming environment used to control it. They will explore how the items connect together to create a complete circuit, and how to construct programs that turn an LED on and off and set its colour. Learners will apply their understanding of repetition by identifying how their programs can be modified to make an LED.
			Combining output components In this lesson, learners will develop their knowledge of a Crumble controller further by connecting additional devices (another Sparkle and a motor) to the controller, and they will construct programs to control more than one of these. They will design sequences of actions for these output devices. They will then apply their understanding of repetition by using count-controlled loops when implementing their design as a program.
			Controlling with conditions In this lesson, learners will be introduced to conditions, and how they can be used in algorithms and programs to control their flow. They will identify conditions in statements, stating if they are true or false, and learn how they can be used to start and stop a set of actions. Learners will be introduced to a Crumble switch, and learn how it can provide the Crumble controller with an input that can be used as a condition. They will explore how to write programs that use an input as a condition and use this knowledge to write a program that uses a condition to stop a repeating light pattern.
Learning in this unit Resources Crumble kits	• To control a simple circuit connected to a computer • To write a program that includes count-controlled loops • To explain that a loop can stop when a condition is met, e.g., number of times • To conclude that a loop can be used to repeatedly check whether a condition has been met • To design a physical project that includes selection • To create a controllable system that includes selection		Starting with selection In this lesson, learners will develop their understanding of how the flow of actions in algorithms and programs can be controlled by conditions. They will be introduced to selection and learn to represent conditions and actions using the 'if... then...' structure. They will apply their understanding by using selection in an algorithm created to meet the requirements of a task. They will discover that infinite repetition is required when programming input de-vices to repeatedly check if a condition has been met.
			Drawing designs In this lesson, learners will apply their understanding of microcontrollers, output devices, and selection when de-signing a project to meet the requirements of a given task. To ensure their understanding, they will identify how selection might be used in real-world situations, then they will consider how they can apply this knowledge when designing their project. They will produce detailed drawings to show how their model will be made and how they will connect the microcontroller to its components.

			Writing and testing algorithms In this final lesson of the unit, learners will build on the designs that they developed in Lesson 5 by creating an algorithm to meet the requirements of the given task. They will identify how they are going to use selection before writing their algorithm. They will then move into the code level to test their algorithm by implementing it as a pro-gram, running it, identifying any bugs, and returning to the algorithm to debug it where necessary. Finally, to conclude the unit, they will evaluate their algorithms and other areas of their designs.
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Medium Term Plan – Computing – Year 5 Spring 2: **DATA AND INFORMATION – Flat-file databases**

Length of unit - 6 Sessions (2 sessions taught per week)

	Disciplinary and Substantive Knowledge	Vocabulary	Learning Sequence
Pre-learning	• That objects can be described using characteristics and labels • Data and what types of data exist • How data can be collected and grouped • How questions can be answered by analysing data.	• Database • Data • Information • Record • Field • Sort • Order • Group • Search • Value • Search • Criteria • Graph • Chart • Axis • Compare • Filter • Presentation	Creating a paper-based database
			This lesson will set the scene for the unit of work. Pupils will consider what data can be collected and how it is collected. They will think about data being collected over time. Pupils will also think about questions that can and can't be answered using available data, and reflect on the importance of collecting the right data to answer questions. Later in the unit, pupils will put into practice the ideas that they have thought about in this lesson.
			Computer databases This lesson will build on the idea of collecting data over time, and introduce the idea of collecting data automatically using computers. Computers can capture data from the physical world using input de-vices called 'sensors. Sensors can be connected to data loggers, which can collect data while not attached to a computer. Data collected by a data logger can be downloaded for use later.
			Using a database In this lesson, pupils will explore how data loggers work. Pupils will try recording data at set moments in time and draw parallels with the data points that a data logger captures at regular intervals. Pupils will use data loggers independently from a computer, then they will connect the loggers to a computer and download the data.
Learning in this unit	• To use a form to record information • To compare paper and computer-based databases • To outline how grouping and then sorting data allows us to answer questions • To explain that tools can be used to select specific data • To explain that computer programs can be used to compare data visually • To apply my knowledge of a database to ask and answer real-world questions		Using search tools
			In this lesson, pupils will open an existing data file and use software to find out key information. The data file is a five-hour log of hot water cooling to room temperature.
			Comparing data visually
			In this lesson, pupils will think about questions that can be answered using collected data. Pupils will choose a question to focus on and then plan the data logging process that they need to complete. After they have completed their plan, they will set up the data loggers to check that their plan will work. This setting up is designed to ensure that the data collection will work, and that pupils will have data to use in Lesson 6.
Resources J2data Database			Databases in real life
			In this lesson, pupils will access and review the data that they have collected using a data logger. They will then use the data collected to answer the question that they selected in Lesson 5. Pupils will also reflect on the benefits of using a data logger.

Medium Term Plan – Computing – Year 5 Summer 1: **CREATING MEDIA – Introduction to vector graphics**

Length of unit - 6 Sessions (2 sessions taught per week)

	Disciplinary and Substantive Knowledge	Vocabulary	Learning Sequence
Pre-learning	- Digital images - How to produce digital images in a digital paint package - How digital paintings are made up of pixels - How apps and software contain tools that can be used to create and edit digital images.	- Vector - Drawing tools - Shapes - Object - Icons - Toolbar - Move - Resize - Colour - Rotate - Duplicate/copy - Organise - Zoom - Select - Alignment grid - Handles - Modify - Layers - Order - Copy - Paste - Group - Ungroup - Improvement - Evaluate - Alternatives - Vector drawing	The drawing tools
			In this lesson learners will be introduced to vector drawings and begin to have an understanding that they are made up of simple shapes and lines. Learners will use the main drawing tools within a software package. Learners will discuss how vector drawings differ from paper-based drawings.
			Creating images
			During this lesson learners will begin to identify the shapes that are used to make vector drawings. They will be able to explain that each element of a vector drawing is called an object . Learners will create their own vector drawing by moving, resizing, rotating, and changing the colours of a selection of objects. They will also learn how to duplicate the objects to save time.
Learning in this unit	- To identify that drawing tools can be used to produce different outcomes - To create a vector drawing by combining shapes - To use tools to achieve a desired effect - To recognise that vector drawings consist of layers - To group objects to make them easier to work with - To evaluate my vector drawing		Making effective drawings
			During this lesson learners will continue to increase the complexity of their vector drawings by using the zoom tool to help them add detail. They will begin to understand how grids and resize handles can be used to improve consistency in their drawings and use tools to modify objects, creating different effects.
			Layers and objects
			During this lesson learners will gain an understanding of layers and how they are used in vector drawings. They will learn that each object is built on a new layer and that these layers can be moved forward and backward to create effective vector drawings.
			Manipulating objects
Resources Google Drawings			During this lesson learners will be taught how to duplicate multiple objects. They will learn how to group objects to make them easier to work with, how to copy and paste these images, and then make simple alterations.
			Create a vector drawing
			During this lesson learners will understand how digital images can be made from shapes or pixels. They will suggest and implement improvements to vector drawings and complete the unit by creating their own labels for the classroom using the skills they have learned.

Medium Term Plan – Computing – Year 5 Summer 2: **PROGRAMMING B – Selection in quizzes**

Length of unit - 6 Sessions (2 sessions taught per week)

	Disciplinary and Substantive Knowledge	Vocabulary	Learning Sequence
Pre-learning	• How software uses algorithms • How to code using a block coding environment (Scratch) • How some algorithms use repetition and that these are defined as loops • Debugging and how to ensure that a program works.	• Selection • Condition • True • False • Count controlled loop • Outcomes • Conditional statement • Algorithm • Program • Debug • Question • Answer • Task • Design • Input • Implement • Design • Test • Run • Setup • Share • Evaluate • Constructive	Exploring conditions
			In this lesson, learners revisit previous learning on ‘selection’ and identify how ‘conditions’ are used to control the flow of actions in a program. They are introduced to the blocks for using conditions in programs using the Scratch programming environment. They modify the conditions in an existing program and identify the impact this has.
			Selecting outcomes In this lesson, learners will develop their understanding of selection by using the ‘if... then... else...’ structure in algorithms and programs. They will revisit the need to use repetition in selection to ensure that conditions are repeatedly checked. They identify the two outcomes in given programs and how the condition informs which outcome will be selected. Learners use this knowledge to write their own programs that use selection with two outcomes.
Learning in this unit	• To explain how selection is used in computer programs • To relate that a conditional statement connects a condition to an outcome • To explain how selection directs the flow of a program • To design a program which uses selection • To create a program which uses selection • To evaluate my program		Asking questions
			In this lesson, learners consider how the ‘if... then... else...’ structure can be used to identify two responses to a binary question (one with a ‘yes or no’ answer). They identify that the answer to the question is the ‘condition’, and use algorithms with a branching structure to represent the actions that will be carried out if the condition is true or false. They learn how questions can be asked in Scratch, and how the answer, supplied by the user, is used in the condition to control the outcomes. They use an algorithm to design a program that uses selection to direct the flow of the program based on the answer provided. They implement their algorithm as a program and test whether both outcomes can be achieved.
			Planning a quiz
Resources Scratch			In this lesson, learners will be provided with a task: to use selection to control the outcomes in an interactive quiz. They will outline the requirements of the task and use an algorithm to show how they will use selection in the quiz to control the outcomes based on the answer given. Learners will complete their designs by using storyboards to identify the questions that will be asked, and the out-comes for both correct and incorrect answers. To demonstrate their understanding of how they are using selection to control the flow of the program, learners will identify which outcomes will be select-ed based on given responses.
			Testing a quiz In this lesson, learners will use the Scratch programming environment to implement the first section of their algorithm as a program. They will run the first section of their program to test whether they have correctly used selection to control the outcomes, and debug their program if required. They will then continue implementing their algorithm as a program. Once completed, they will consider the value of sharing their program with others so that they can receive feedback. Learners conclude the lesson by using another

			learner's quiz and providing feedback on it.
			Evaluating a quiz In this lesson, learners will return to their completed programs and identify ways in which the program can be improved. They will focus on issues where answers similar to those in the condition are given as inputs, and identify ways to avoid such problems. Learners will also consider how the outcomes may change the program for subsequent users and identify how they can make use of setup to pro-vide all users with the same experience. They will implement their identified improvements by returning to the Scratch programming environment and adding to their programs. They conclude the unit by identifying how they met the requirements of the given task, and identifying the aspects of the pro-gram that worked well, those they improved, and areas that could improve further.