Year 5 Computing Curriculum

Unit Autumn 1	Systems and Searching
Summary	Recognising IT systems in the world and how some can enable searching on the internet.
NC Objectives	- 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 - 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 - Use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact.
Teacher Subject Knowledge Required	You will need be aware that digital systems are used in a wide range of public contexts and should be familiar with the concept of a computerised locker (which allows customers to collect parcels they have ordered online). You will need an awareness of internet searching and an understanding of the search engines introduced in the lessons. Basic searching skills are required, such as an understanding of how to refine search terms to get more relevant results and the fact there are two ways to conduct a web search: from within a search engine and using the address bar (omnibox). You will need to know how search engines use web crawlers to create an index of the World Wide Web. There is a useful guide here: https://www.bbc.co.uk/bitesize/topics/z7wtb9q/articles/ztbjq6f You will need to be aware that search engines use ranking to determine the order in which search results are displayed and that search engine optimisation (SEO) is applied to websites to help them rank as highly as possible. You should consider the impact that searchers, search engines, and webpage creators have on the effectiveness of a search: - Searchers: the search term, the links that they click on, the location of the searcher, the choice of search engine, and the settings that they have chosen - Search engines: the rules that their web crawlers follow to create an index, adverts and sponsored results, and the settings available - Webpage creators: the terms, text, and images used; and the links in and out of a page
Hardware/Software required	Access to the internet and a search engine
Key Vocabulary	System, connection, digital, input, process, storage, output, search, search engine, refine, index, bot, ordering, links, algorithm, search engine optimisation (SEO), web crawler, content creator, selection, ranking
Progression	This unit progresses students' knowledge and understanding of the internet from that developed in the Year 4 The Internet unit In Year 6, they will continue to develop their knowledge and understanding of the internet, looking at how data is transferred and how the internet facilitates communication and collaboration online.
Adaptations	

Year 5 Computing Curriculum

Unit Autumn 2	**Programming A – Selection in physical computing**
Summary	Exploring conditions and selection using a programmable microcontroller.
NC Objectives	- 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 - 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
Teacher Subject Knowledge Required	For this unit, you will need experience of constructing programs using the Crumble programming software. It uses the same drag-and-drop style as Scratch. You will need to write programs that turn LEDs (Sparkles) on and off, change LED colours, spin motors, use push switches as inputs, and combine a number of these components. Additionally, you will connect the Crumble controller to battery packs, Sparkles, motors, and push switches. For further support on using Crumbles, see the Crumble 'Getting Started' guide at redfernelectronics.co.uk/crumble-getting-started. **Repetition** You will need to know that repetition is used in programming to give the same instruction or set of instructions several times. Repetition uses loops as the means to give these instructions. This unit makes use of two types of loops: infinite and count-controlled, which have been defined below: - Infinite loop: An infinite loop is a loop that commands the instruction/set of instructions to repeat forever. When an infinite loop is used in a program, there is no way of ending the program, as the command(s) within the loop will be repeated endlessly. For this reason, infinite loops should only be used when writing a program that is intended to run forever. The exception to this is when using selection in physical computing, as you will see throughout this unit. - Count-controlled loop: A count-controlled loop is a form of repetition in which a set of commands are carried out a specific number of times. Count-controlled loops should only be used when it is known how many times a set of commands needs to be repeated. - Condition-controlled loop: A condition-controlled loop is a form of repetition in which a set of commands stop being carried out when a condition is met. The condition could be anything from when the 'score' in a game reaches a certain value to when a key on a keyboard has been pressed. **Conditions** Conditions are statements that need to be met for a set of actions to be carried out. They can be used in algorithms and programs to control the flow of actions. When a condition is met, it is referred to as 'true' and when it is not met, it is referred to as 'false'. You will need to be able to identify and use conditions in algorithms in the form of statements to both start and stop sets of action. Additionally, you will need to understand that conditions can be used in loops, and when they are, that the set of actions in the loop will be carried out repeatedly until the condition is true, for example, 'until button A is pressed'.

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	Selection Selection is "part of a program where, if a condition is met, then a set of commands are run". Selection is implemented in programming using if...then... statements. Selection is used to control the flow of actions in algorithms and programs by checking if a condition (see above) has been met. If it has been met, the identified actions will be carried out. When selection is used in programs, loops (see above) often have to be used to instruct the device to check the condition repeatedly. Without using loops, the condition would only be checked once. It's important to understand that each loop cycle will complete before the condition is checked again. In the Crumble programming software, selection is implemented through the if...then... command block. In addition to the above, you will also need to understand that programs are an implementation of an algorithm, and that when the program does not produce the required output, the algorithm should be debugged. This should then be implemented in the program.
Hardware/Software required	Learners will need devices capable of running the Crumble software with a USB port to connect the crumble.
Key Vocabulary	Microcontroller, USB, components, connection, infinite loop, output component, motor, repetition, count-controlled loop, Crumble controller, switch, LED, Sparkle, crocodile clips, connect, battery box, program, condition, input, output, selection, action, debug, circuit, power, cell, buzzer
Progression	Prior experience of programming using a block-based language (e.g. Scratch) and understand the concepts of sequence and repetition (Year 4 Programming A and B).
Adaptations	

Year 5 Computing Curriculum

Unit Spring 1	**Flat file Databases**
Summary	Using a database to order data and create charts to answer questions.
NC Objectives	• Use search technologies effectively, appreciate how results are selected and ranked, and be discerning in evaluating digital content • 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
Teacher Subject Knowledge Required	Teachers will need to know that a flat-file database is a collection of data organised in a single table. The term 'database' means 'a collection of organised data that is stored on a computer'. Databases allow people to search and sort large quantities of data to find information. Data can be letters, words, numbers, dates, images, sounds, etc. In addition, teachers will need to be familiar with the basic structure of a database, and the concept of 'grouping' and 'sorting' data records based on different fields. For example, grouping objects by colour, or sorting into alphabetical order. A database is composed of 'records', which are sets of data on a particular object. Records are formed from one or more 'fields' of data. A field is one specific piece of data in a database record. For example, a record all about a country could have fields such as 'country name' and 'country population'. The value within the record is the 'answer' to each field, e.g. Mexico is the value in the 'country name' field and '126.2 million' is the value in the 'country population' field. Teachers will also need to be aware that all objects have attributes. An attribute includes its 'name' and a 'value'. For example, a ball will have a 'colour', which might be 'red'. 'Colour' is the attribute 'name'; 'red' is the attribute 'value'. In a flat-file database the attribute names become the fields when the data about the object is stored as a record. The values of the attributes become the values that are saved in the database fields. Teachers will need to be familiar with using J2Data sample databases. Support with navigating the databases can be found at http://www.j2e.com/help/videos/datags4. Knowledge of how to carry out a flight search using https://www.expedia.co.uk/Flights, and the ability to screenshot flight details from a web browser would also be beneficial.
Hardware/Software required	https://www.j2e.com/database
Key Vocabulary	Database, data, information, record, field, sort, order, group, search, value, criteria, graph, chart, axis, compare, filter, presentation.
Progression	This unit progresses learners' knowledge and understanding of why and how information might be stored in a database and looks at how tools within a database can help us to answer questions about our data.
Adaptations	

Year 5 Computing Curriculum

Unit Spring 2	Video Production
Summary	Planning, capturing and editing video to produce a short film.
NC Objectives	- Use search technologies effectively, appreciate how results are selected and ranked, and be discerning in evaluating digital content - 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 - Use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact.
Teacher Subject Knowledge Required	This unit focuses on the skills associated with planning, recording, editing, and creating a video. You will need to be able to explain that video is the recording, reproducing, or broadcasting of moving visual images. You will also need to be familiar with a number of shot types and filming techniques, which are introduced in Lessons 2 and 3. A storyboard is used as a planning tool. It will be useful if you are familiar with the format of the storyboard. Once learners begin filming, you will need to be familiar with the device they are using, including how to start and stop recording, how to zoom in and out, and how to download content from the device to a computer for editing. It is important that you are familiar with the devices and apps or programs that you will use to import and edit video content. You need to know where to locate the video files and where to save them for easy retrieval. Once recording has been completed, learners will need to import their video files to the video editing software, so you will need to be familiar with this process, including where videos will be stored. You will need to have a clear understanding of how to edit and complete the video creation process, deleting or reordering clips. Finally, you should be able to demonstrate how to export the video project into an *.mp4 format for viewing.
Hardware/Software required	iPads, iMovie app
Key Vocabulary	Video, audio, camera, talking head, panning, close-up, video camera, microphone, lens, mid-range, long shot, moving subject, side by side, angle (high, low, normal), static, zoom, pan, tilt, storyboard, filming, review, import, split, trim, clip, edit, reshoot, delete, reorder, export, evaluate, share
Progression	This unit progresses learners' knowledge and understanding of creating media by guiding them systematically through the process involved in creating a video. The unit builds on the Year 4 Photo editing unit where composition is introduced and the Year 3 unit 'Stop-frame animation' where learners explored some of the features of video production.
Adaptations	

Year 5 Computing Curriculum

Unit Summer 1	Vector Drawing
Summary	Creating images in a drawing program by using layers and groups of objects.
NC Objectives	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
Teacher Subject Knowledge Required	Teachers need a good understanding of the tools available in their chosen software. These tools include shape and line drawing tools, fill, undo and redo, select, and delete. In the unit, learners also need to move, resize, and rotate shapes, including the use of size and alignment guides. Many of these tools are available in presentation software such as Google Slides and Microsoft PowerPoint. Teachers need to know that vector drawings are created using shapes and lines. In vector drawings, all these shapes and lines are called objects. Within vector drawings, each object is created using a new layer. These can be rearranged using the menu tool, which allows the objects to be sent backwards and forwards (one at a time) or sent to the back or front. Objects within these programs can be grouped, which enables the objects to be treated as though they are a single object. It is important to recognise that although they act as though they are a single object, grouped objects are still a number of individual objects. Teachers need to have an understanding of how digital images can be made. This could be using shapes and lines in a vector drawing, or using pixels in a freehand paint program.
Hardware/Software required	Google Drawings application *Note: pupils are creating vector-style drawings in this unit, not true vector drawings, as these require specialised software.*
Key Vocabulary	Vector, drawing tools, object, toolbar, vector drawing, move, resize, colour, rotate, duplicate/copy, zoom, select, align, modify, layers, order, copy, paste, group, ungroup, reuse, reflection
Progression	This unit progresses learners' knowledge and understanding of digital painting and has some links to the Year 3 'Creating media – Desktop publishing' unit, in which learners used digital images.
Adaptations	

Year 5 Computing Curriculum

Unit Summer 2	**Programming B – Selection in Quizzes**
Summary	Exploring selection in programming to design and code an interactive quiz.
NC Objectives	• 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 • 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
Teacher Subject Knowledge Required	This unit focuses on developing learners' understanding of selection in an on-screen context. It highlights what 'conditions' are and how they are used as part of 'selection'. **Conditions** 'Conditions' are statements that need to be met for a set of actions to be carried out. They can be used in algorithms and programs to control the flow of actions. When a condition is met it is referred to as 'true' and when it is not met it is referred to as 'false'. You need to be able to identify and use conditions in algorithms in the form of statements to both start and stop sets of action. Additionally, you need to understand that conditions can be used in loops, and when they are, that the set of actions in the loop will be carried out repeatedly until the condition is true. For example, 'until button 'A' is pressed'. **Selection** When designing programs, there are often points where a decision must be made. These decisions are known as 'selection', and are commonly implemented in programming using 'if' statements. Selection is used to control the flow of actions in algorithms and programs by checking whether a condition (see above) has been met. If it has been met, the identified actions will be carried out. When selection is used in programs, infinite loops (see above) are often used to instruct the device to check the condition repeatedly. Without using loops, the condition would only be checked once following the sequence of the code.
Hardware/Software required	Scratch
Key Vocabulary	Selection, condition, true, false, count-controlled loop, outcomes, conditional statement, algorithm, program, debug, question, input, implement, test, run, setup, operator
Progression	This unit assumes that learners will have prior experience of programming using block-based construction (e.g. Scratch), understand the concepts of 'sequence' (Year 3 units: Sequencing Sounds and Events and actions in programs) and 'repetition' (Year 4 units: Repetition in shapes and Repetition in games), and have some experience of using 'selection'. Learners will have completed 'Programming A – Selection in physical computing' before undertaking this unit, as this will provide them with the required knowledge of 'selection'.
Adaptations	