

Sheffield Scheme of Work for Primary Computing 2017 - SAMPLE

*“A high-quality computing education equips pupils to use computational thinking and creativity to understand and change the world. [...] 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.”*

Purpose of Study, Computing Programs of Study 2014

This scheme is offered as an example only and should be modified and refined to suit different school settings. It enables children to make, refine and critically evaluate digital content as active participants in our digital world. This benefits them in terms of their personal safety, economic potential and ability to influence the world around them.

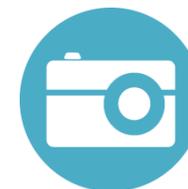
The scheme of work is organised into six strands:

Strand 0	Key Skills: What is a Computer?
Strand 1	Communicating: Text & Images
Strand 2	Communicating: Multimedia
Strand 3	Understanding & Sharing Data
Strand 4	Programming A & Computational Thinking
Strand 5	Programming B & Computational Thinking

These strands should not be taught in strict order, but rather where they fit in with the wider curriculum. Ideally Strand 4 will be taught prior to Strand 5, and with time in between.

Key **Online Safety** messages are taught across all strands of the scheme. These should also be covered in PSHE lessons where appropriate, and reference should be made to the **Sheffield Safeguarding Children Board’s eSafety Curriculum** which can be accessed for free by Sheffield Schools.

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Year	Digital Literacy, eSafety and ICT				Computational Thinking	
	Strand 0 Key Skills	Strand 1 Communicating: Text and Images	Strand 2 Communicating: Multimedia	Strand 3 Understanding & Sharing Data	Strand 4 Programming A	Strand 5 Programming B
1	What is a Computer?; Mouse & Keyboard Skills; Logging on; Opening & saving work; Organising files; Searching for information	1.1 How do I use the school computer independently?	2.1 How do I record sounds and pictures?	3.1 How do I present data using pictures?	<i>Algorithms – Sequencing and Sorting</i>	
					4.1 What is an algorithm?	5.1 What is a program?
2		1.2 How do I use a computer as a writer?	2.2 How do I create a multimedia story?	3.2 What is a branching database?	<i>Algorithms - Precise instructions; Debugging</i>	
					4.2 How do I improve my algorithms?	5.2 How do I improve my programs?
3		1.3 What makes a good poster?	2.3 How do I use a computer as a musician?	3.3 How do we use databases to find out information?	<i>Repetition, Selection and Events</i>	
					4.3 How do I draw complex shapes in Logo?	5.3 How do I design simple programs?
4		1.4 How do I use a computer as an artist?	2.4 What makes an excellent multimedia story?	3.4 How is data shared online?	<i>Decomposition, Procedures and Efficiency</i>	
					4.4 How do I write efficient programs in Logo and Scratch?	5.4 How do I use interaction in a program to tell stories?
5		1.5 How do we collaborate online?	2.5 How do I create a radio advert?	3.5 How do I find and share data safely and responsibly?	<i>Inputs and Outputs; Variables</i>	
					4.5 How do I program physical systems?	5.5 How do I create maths games in Scratch?
6		1.6 How do I use a computer as a designer?	2.6 What makes an excellent film?	3.6 Why do we use spreadsheets?	<i>Generalisation and Abstraction</i>	
					4.6 How do I build complex physical systems?	5.6 How do I use Scratch as a game designer?



0.6 Key Skills : Understanding the Computer

This unit is not meant to be taught as a standalone piece of work. It is ideally taught at the start of the year alongside whichever computing unit is most appropriate or as part of the wider curriculum. These are the key skills that will help pupils to use technology appropriately and effectively. This will enable pupils to use computers more independently in order to enhance learning in the wider primary curriculum, which will ultimately save time and effort for both pupil and teacher.

Progression

Entering: *Pupils understand that you can organise files using folders, and can delete, move and copy files. They use right-click, left-click and double-click appropriately on a mouse. Pupils use a search engine to find specific information, and know how to copy text and images from a web page or document into another document.*

Developing: *Pupils use the keyboard confidently to type at a suitable pace, and can use common keyboard shortcuts, e.g. Ctrl + C = copy; Ctrl + V (paste). They create and use a strong password where appropriate. They organise their files using folders and appropriate file names.*

Secure: *Pupils understand that different devices can have different operating systems, and can give examples, e.g. Windows, iOS, Android, and they understand the main functions of an operating system (i.e. it determines the look and feel of the interface, the programs that run on the computer, and manages the hardware connected to it). They use more advanced searching techniques when using a search engine. Pupils recognise common file types and extensions, and examples of why this is useful.*





0.6 Key Skills : Understanding the Computer

Suggested Learning Activities	Resources
<p>a) Operating Systems (OS) – discuss what an operating system is (i.e. the basic software that computers need to manage the software and hardware, and it determines the type of software you can use.) What OS do we have on the school computers? On the school tablets? On our computers at home? On our phones? On our tablets at home? There are 3 main ones – Windows, iOS (Apple) and Android. They are not compatible with each other: for example, you can't get Garageband (iOS) software on a Windows PC, and you can't use an Android app on an iOS (Apple) phone! Bring in different examples if possible.</p> <p>b) Continue to type using all digits without looking at hands: Time how many words the children can type in a session. Can they beat their score next lesson?</p> <p>c) Branding: Understand that there is a difference between a brand and a program. For example <i>Microsoft</i> is a brand, and <i>Internet Explorer</i> is one example of an internet browser made by them. You could also use <i>Google Chrome</i>, <i>Mozilla Firefox</i>, <i>Safari</i> or <i>Opera</i> browsers. There are many types of word processing packages (Microsoft Word, Google Docs, Evernote) and drawing/presentation programs (Microsoft PowerPoint, Google Slides, ActivInspire).</p> <p>d) Searching: Use the search tools/filters when finding something online. Search by “type”, “colour”, “size”, “date”, “usage rights” (copyright) or “country of origin”. For example, search for an image which is tiny to use as a border. Alternatively find one which is large, and therefore high quality, to use as a background. Make a rainbow collage using pictures of a certain colour.</p> <p>e) File types: Recognise common file types and extensions. Understand that different files work in different ways. For example:</p> <ul style="list-style-type: none">- JPEG files are images that can be easily copied and pasted- PNG image files can have transparent backgrounds, which lets you load them onto programs such as Scratch and use them as characters (without borders around the edge)- GIF files can be moving pictures, which can make short videos (very popular on social media)- MP3 files are compressed sound files, that take up less memory- WAV files are very large and high quality sound files <p>f) Children could complete an activity where they match the file type to a description of it, and an icon showing how that type of file is represented. Extend with choosing a file type for a particular purpose.</p>	<p>b) Free typing test website</p> <p>b) Typing games</p> <p>b) Typing games</p> <p>b) Keyboard practice</p> <p>b) BBC Bitesize: Dance mat typing</p> <p>e) Explanation of the most common image file types</p>



LEARNING OBJECTIVE:

I understand that a computer is a type of machine and we use computers to help us find out and present information.

Progression

Entering: Pupils use technology to explore and access digital content. They create simple digital content, e.g. add basic text to a document that is already open. Pupils choose media to convey information from a selection. Pupils are aware that information can be public or private.*

Developing: Pupils understand that you can edit and change digital content, e.g. the appearance of text. They select basic options to change the appearance of digital content, e.g. making text bold. They combine media with support to present information, e.g. they choose images to accompany text from a selection. Pupils recognise what is personal information.*

Secure: Pupils can apply simple edits to digital content to achieve a particular effect, e.g. change the font of text for a reason. They select media (e.g. images) to present information on a topic. They understand that digital images belong to the person that created them, and save and reuse content found online.* Pupils recognise what is personal information and understand the need to keep it private.*

Context for Teachers: In this unit children learn about computers in the world around us and different ways of using them. They should learn that computers in a school are connected, and you need to login to access them – stress importance of passwords.* Children will explore how to create a document including text and an image, making simple edits. They should be taught where to save and access their work. This unit introduces the idea of personal information and what should and shouldn't be shared online. The text-based work may be taught later in the year when pupils are more confident writers and it is more meaningful.

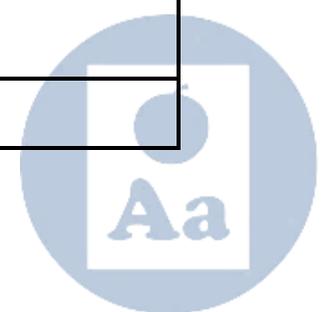
* If using tablets in KS1, some of this learning may need to be picked up in later years.

***Online Safety & Digital Literacy:** Sharing personal information; Passwords

English Links: Reading: word reading, comprehension – inference of meaning; Writing: transcription, grammar & punctuation



Suggested Learning Activities	Resources
<p><i>These initial activities are best taught at the beginning of the year:</i></p> <ul style="list-style-type: none"> a) What is a computer? Look at examples of technology around us – in school and at home. Watch the BBC Bitesize clip: What is a Computer? b) Discuss different ways of using a computer/digital device: e.g. taking photos, painting a picture, playing a game. Explain that this depends on the hardware and software available on the device and a person has made these programs. c) Revise the basics of accessing computer: How to log on to the computer – discuss simple passwords.* A class could produce their own algorithm for logging on by taking pictures of the process. (This repeats activities suggested in Unit 0.1). d) Discuss what is meant by personal information (your picture is one of the most personal of all). Who would you share your image with? Discuss what pupils use the Internet for, and why you would use an avatar for use online. Create an avatar using the suggested links in resources.* <hr/> <p><i>The text-based activities may be picked up later in the year when pupils are more confident writers</i></p> <ul style="list-style-type: none"> e) Discuss text around us: talk about books, signs, posters etc. What is created using a computer? Why use a computer? Link with phonics, punctuation and inferring meaning from what they read. f) Create a new document, enter text and save to a suitable folder with a relevant file name with support. Discuss what makes a good file name. g) Demonstrate different text effects – size, colour, font. Talk about how effects can improve text and give examples: posters, signs, websites etc. Experiment with different effects in the previous document. h) Discuss how you can improve your document – what could you add? Model how to insert an image from a given folder into the document (discuss briefly - who owns the image?) 	<ul style="list-style-type: none"> a) BBC Bitesize: What is a Computer? d) Thinkuknow – Hector's World d) *SCC Online Safety Curriculum d) BBC Bitesize: How can you use the Internet? d) Avatar Maker d) Create your own Superhero avatar d) Build Your Wild Self
<ul style="list-style-type: none"> i) Suggested assessment task: Create labels for drawers/pegs in the classroom using text and an image. 	





Suggested Applications

Microsoft Word; Google Docs; ActivInspire; Pages

Alternative Delivery – Tablets

Revise getting started with iPad. Use apps to work with text and images. Model how to add photos pupils have taken with the camera. Lower ability pupils can dictate into Notes or similar (select microphone on keyboard – requires wifi to work).

Suggested apps: *Pages, Google Docs, Pic Collage, Office 365, Notes, Doodle Buddy, Notes*

National Curriculum: Program of Study Statements

Use technology purposefully to create, organise, store, manipulate and retrieve digital content. Use technology safely and respectfully, keeping personal information private.





LEARNING OBJECTIVE:

I understand that music can be used to affect mood of digital content. Digital music is owned by the person that created it.

Progression

Entering: Pupils combine media with support to present information, e.g. images and music, and select basic options to change how a piece of music or audio sounds. They understand that music belongs to the person that first created it.*

Developing: Pupils plan out digital content and present ideas by combining media independently. They apply edits to digital content to achieve a particular effect. They talk about what makes digital content good or bad and edit it to improve it. They understand that the digital content we make belongs to us and others need to ask permission to use it.*

Secure: Pupils edit existing digital content to make a new version with an awareness of copyright. They evaluate existing and their own digital content, and edit it to improve it according to feedback. They design and create digital content for a specific purpose. Pupils understand that people can give permission for others to use their content e.g. using [Creative Commons](#).*

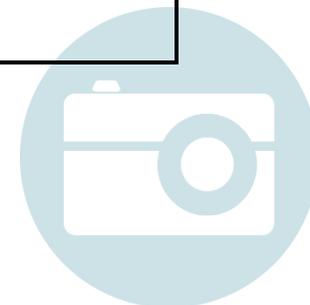
Context for Teachers: In this unit children explore using technology to produce musical compositions. They will learn that music is a powerful tool to add impact and change the mood of a piece of media. They will create and develop musical ideas on a given theme using simple software. They will review and refine their compositions to improve them. Discuss copyright and ownership of music.

***Online Safety & Digital Literacy:** Copyright

English Links: Reading: comprehension – inferring feelings, identifying themes of text to add music to (h)



Suggested Learning Activities	Resources
<p>a) Listen to different music. How does it make you feel and why? Show film clips with and without audio – what difference does it make?</p> <p>b) Discuss what types of computers and devices we use to listen to music, watch videos and view photos. Discuss the types of media, programs and apps that use music/jingles/sound effects to enhance the user experience, and why. (E.g. games, adverts, films, radio programs, message alerts etc.)</p> <p>c) Explore music composition software, including:</p> <ul style="list-style-type: none"> - how to add layers/tracks - adding, moving and deleting music loops - recording your own voice or an instrument - how to trim a clip to shorten it or remove unwanted parts - how to export as a music file <p>d) Experiment to create a variety of musical compositions e.g. happy song/angry song. You could edit and enhance an existing piece of music.</p> <p>e) Discuss pitch and tempo, and how it affects the mood and melody. Change the tempo of a composition to change the mood.</p> <p>f) Review and refine work.</p> <p>Discuss copyright with regard to music – who owns a piece of music? Can anyone use and remix it? Look at current examples of plagiarism (see Resources).*</p>	<p>a) SWGfL Audio Network (free downloadable music through school internet access).</p> <p>c) Using Audacity helpsheet</p> <p>g) Name That Tune – Music Plagiarism resource</p> <p><i>Other useful sites:</i></p> <ul style="list-style-type: none"> - http://www.incredibox.com/ - Create cool music mixes on this site. - http://www.jamstudio.com/Studio/index.htm - http://virtualpiano.net/ - https://soundation.com/ - to create compositions online
<p>h) Suggested assessment task: Create a piece of music to accompany artwork or a piece of writing. Review and refine according to feedback. Where possible present final piece on a blog or school website.</p>	





Suggested Applications

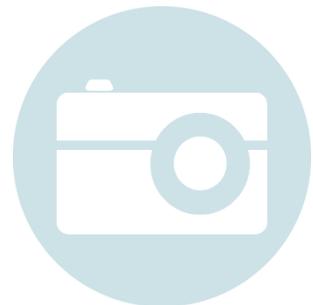
2Simple Music Toolkit, e.g. 2Sequence, 2Explore (also on Purple Mash); Garageband; Audacity

Alternative Delivery - Tablets

Music composition apps include *Garageband*, *Toc 'n' Roll*, *Super-Looper*. You can add a Garageband track to a film in iMovie. There are also a large number of basic music making apps on the iPad, pupils could use different ones to create a class composition and record on a PC in Audacity or for a class performance. You can also record sounds in *Scratch Jnr*, then sequence and loop them.

Program of Study

Select, use and combine a variety of software (including internet services) on a range of digital devices to accomplish given goals, including collecting, analysing, evaluating and presenting data and information; use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour.





LEARNING OBJECTIVE:

I understand that anyone can put information on the World Wide Web; information can be biased or unreliable

Progression

Entering: Pupils understand that the Internet is made up of computers from all around the world connected together, and we can use it to share information. They understand that we use a web browser to access information stored on the Internet. They know different ways of reporting unacceptable content and contact online.* They understand when to share personal information and when not to.* Pupils recognise what kind of websites are trustworthy sources of information.*

Developing: Pupils understand that school computers are connected together in a network. They understand the difference between the Internet and the World Wide Web, and between a search engine and a web browser. They are aware that some people lie about who they are online, and recognise the benefits and risks of different apps and websites.* Pupils demonstrate responsible use of online services and technologies, and know a range of ways to report concerns.*

Secure: Pupils understand the difference between physical, mobile and wireless networks. They can explain the difference between the World Wide Web and the Internet. They understand the basics of how search engines work, and that different search engines may give different results. Pupils perform complex searches for information using advanced settings in search engines. They critically evaluate websites for reliability of information and authenticity.* They become increasingly savvy online consumers: know that algorithms are used to track online activities with a view to targeting advertising and information.*

Context for Teachers: In this unit children develop their understanding of internet search technologies and the World Wide Web. They explore the functions that are available to improve how searches are completed. They will also consider validity of information, copyright and responsible use. The children will learn about how they share their data with online sites and games, and what this means.

***Online Safety & Digital Literacy:** Understand how the Internet works and that anyone can post information on there; understand how search engines rank results; personal information and data

English Links: Writing: summarising information; persuasive writing and non-chronological reports





Suggested Learning Activities	Resources
<p>a) Discuss the difference between mobile, physical and wireless networks. Revisit how the internet works – introduce that all computers have a unique IP address (which identifies individual devices). Discuss the difference between the Internet and World Wide Web (if not already done so in Unit 1.5). View the BBC Bitesize resources. Discuss with pupils the difference between a web browser and a search engine.</p> <p>b) Use several different search engines (e.g. <i>Google, Bing, Duck Duck Go</i>) to search for the same thing. The search should be for a site the children already know about, e.g. the school website. Do the expected results get returned by each search engine? Can the results be improved by adding additional words? Are there any questions you can't find the answer to using a search engine?</p> <p>c) Investigate Help, Search Tips, Advanced Search link, Search Operators to learn about the special features of each search engine. Revise how to search according to usage rights of media.</p> <p>d) Investigate how websites are ranked by search engines – web crawlers (spiders) visit web pages and store information about them in a database. Most search engine ranking makes use of keywords appearing on a page, their frequency and location, and the importance of links into and out of a website. Ext: Complete the Barefoot activity.</p> <p>e) Discuss how content found on the World Wide Web may not be reliable – investigate the All About Explorers and Tree Octopus websites (<i>see links right</i>). What type of URL implies reliability (e.g. <i>.gov.uk</i>)? How do you report illegal or inappropriate material found online? See Thinkuknow.co.uk – Report Abuse.*</p> <p>f) Discuss: how do we share and control our own data? What online games, apps and social media sites do the pupils use? What data do they share with them? Do they read the Terms and Conditions? Complete the 'Controlling My Data Online' resource as a class.</p>	<p>a) BBC Bitesize: How does the Internet Work?</p> <p>a) BBC Bitesize: What is the World Wide Web?</p> <p>a) BBC Bitesize: How do Search Engines Work?</p> <p>c) How to find copyright-free images</p> <p>d) Barefoot: Selecting Search Results</p> <p>e) BBC Bitesize: Should I trust Everything I Read on the Web?</p> <p>e) All About Explorers</p> <p>e) Tree Octopus</p> <p>e) *SCC Online Safety Curriculum</p> <p>f) Controlling My Data Online</p>
<p>g) Suggested assessment task: Plan out and create a response to the activity 'Controlling My Data Online' using the skills developed in Strands 1 and 2, incorporating key Online Safety messages.</p>	





Suggested Applications

Internet browser; Publisher/Word

Alternative Delivery - Tablets

The activities can be done on a tablet using the web browser. Use the multimedia apps for the assessment task as detailed in Strands 1 and 2.

Program of Study

Select, use and combine a variety of software (including internet services) on a range of digital devices to 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.





LEARNING OBJECTIVE:

I understand that algorithms are made up of clear and precise instructions. I know that making mistakes is part of writing a program – a good programmer debugs!

Progression

Entering: Pupils understand that we control computers by giving them instructions. They can identify and list steps of a known task in order, and understand that this is called an algorithm. They can input instructions into software to draw a simple shape.

Developing: Pupils can create a simple algorithm, and understand that the order of instructions is important. They can debug an error in a simple algorithm or program, and predict the outcome of an algorithm or program. Pupils understand that computers have no intelligence and we have to program them to do things.

Secure: Pupils understand that instructions need to be clear and unambiguous in an algorithm. They can evaluate the success of an algorithm or program, and identify and correct errors (debugging). Pupils use the language **if... then** to describe the relationship between two actions.

Context for Teachers: Algorithms are a sequence of instructions to be followed by a computer to carry out a task. This unit enables children to understand the importance of clear and precise instructions in an algorithm. They will learn about debugging: identifying and correcting errors in an algorithm or program. It is important to emphasise that making mistakes is an integral part of computer programming. Pupils will apply their knowledge in **Logo** or **Scratch Jnr**, writing their own programs to create simple shapes (Logo) or an animated story (Scratch Jnr) – this links with Unit 2.2.

***Online Safety & Digital Literacy:** Someone programs computers to make games

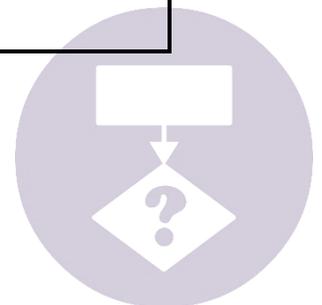
English Links: Writing: instructions; planning – keywords (b); evaluating writing (b); Retelling a story or event (Scratch Jnr)

Maths Links: Directional and positional language; 2D shapes; estimating distance covered – how far is 1 unit of distance in Logo?



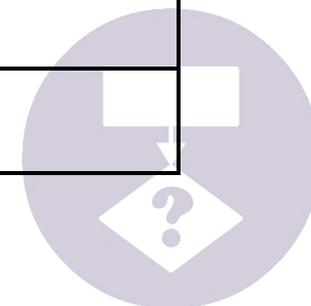


Suggested Learning Activities	Resources
<p>a) Revise algorithms from Y1 – a set of instructions to make something happen. Talk about how algorithms can be used to make a computer do something. When the instructions are entered on a computer in a specific language they are called programs, and all software is programmed by a person. Look at examples of different software and how specific controls make things happen (model the language <i>if...then...</i>). For example in Word <i>if</i> I press return <i>then</i> the cursor moves down a line; in Wii Tennis <i>if</i> I move the controller <i>then</i> the racquet hits the ball in that direction.</p> <p>b) Introduce the idea of debugging – a good programmer has to identify and correct errors in their program or algorithm. View the BBC Bitesize resource. Provide examples of algorithms with errors in them for pupils to debug, e.g. running a bath.</p> <p>c) As a class, children instruct an adult (sandwich robot) how to make a jam sandwich (see Resources). Instructions could be written down or simply given orally. The robot must carry out the instructions exactly as given. Is there a problem with the instructions? Debug the instructions - in this case identify where instructions need to be more precise. Pupils can work in pairs/groups to write clear and precise instructions using examples of key language, with scaffolding where required, and retest. See resources for more information on this task.</p> <p>d) Back-to-back activity: one pupil is given a simple shape and gives instructions to a partner to reproduce it without them seeing it. Discuss the problems that occur. Introduce specific language (<i>pen up, pen down, right quarter turn, left quarter turn, forward</i>) and repeat task using a grid. Explain that when we give instructions to a computer, we have to use the correct language otherwise it won't understand them.</p> <p>See below for the next activities – choose from Logo or Scratch Jnr.</p>	<p>b) BBC Bitesize: What are computer bugs?</p> <p>c) See Phil Bagge's website for more on the jam sandwich bot.</p> <p>d) Barefoot: 2D Shape Drawing</p>
<p>e) Suggested assessment task: Work with a partner or independently produce an algorithm for making a glass of squash, running a bath or other every day activity. Exchange algorithms with others to test, review, and then debug.</p>	





Suggested Learning Activities – Choose Logo OR Scratch Jnr	Resources
<p><i>Complete the algorithm activities above before completing these activities.</i></p> <p>LOGO:</p> <p>a) Introduce Logo – explain that it is a programming language that we can use to draw shapes on the computer. It needs precise instructions (e.g. be careful with spaces / spellings). Introduce commands <i>fd</i>, <i>bk</i>, <i>lt</i>, <i>rt</i>. Ask pupils to follow simple instructions to create a shape on screen. Try <i>fd10</i> and <i>fd 10</i> – what happens?</p> <p>b) Introduce commands <i>pu</i>, <i>pd</i>, <i>cs</i>, <i>home</i> and explore drawing simple shapes.</p> <p>c) Pupils create a design on paper, then plan it out and program it in Logo. Debug and improve the program where required. Encourage pupils to debug their own work (check command, spelling, spaces), or to ask a friend before asking the teacher for help.</p>	<p>a) FMS Logo Commands</p>
<p><i>Complete the algorithm activities above before completing these activities.</i></p> <p>SCRATCH JNR:</p> <p>a) Introduce/revise Scratch Jnr on the iPad. Show an example of an animated story or an event in history on the app full screen – explain that pupils will be retelling a story being studied using the app. (Use Scratch Jnr Resource #1 if introducing for the first time). Can pupils predict which code blocks were used to make the story?</p> <p>b) Ask pupils to plan out their animated story by writing out their dialogue for each character (see Scratch Jnr Resource #2 for an example).</p> <p>c) Model how to add a sprite and background from a printed image using the camera (see Scratch Jnr teacher Guide on how to do this). Model how to add text in a speech bubble.</p> <p>d) Pupils create their animated story using given characters and background. Add the speech from their planning using the SAY block – this should be triggered when the character is tapped.</p> <p>e) Model how to record sounds and add these to their programs, and to add a <i>Wait</i> command. Pupils can add these blocks to their stories to extend and improve them, so that the characters speak in turn when the program starts.</p>	<p>Scratch Jnr – Teacher Guide</p> <p>Scratch Jnr Resource #1</p> <p>Scratch Jnr Resource #2</p>
<p>Suggested assessment task: Provide an algorithm or a completed Logo/Scratch Jnr program with errors in it – pupils identify the errors and rewrite the algorithm so it is correct, then test it out.</p>	





Suggested Applications

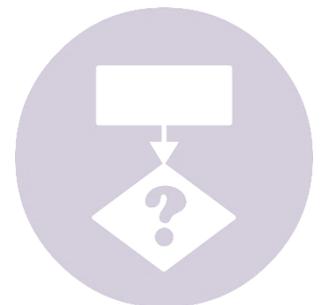
Word; ActivInspire; FMS Logo; Purple Mash Logo; Probot

Alternative Delivery - Tablets

Play different activities with a range of controls to investigate how programs work. Use a drawing app to complete the back-to-back activity. *Move the Turtle* app uses Logo type commands. Use *Scratch Jnr* to look at programs containing errors for pupils to debug. Pupils can plan and create a Scratch Jnr activity to fulfil a purpose, and then evaluate how successful it was (see extension activities above).

Program of Study

Recognise common uses of information technology beyond school; understand what algorithms are; how they are implemented as programs on digital devices; and that programs execute by following precise and unambiguous instructions.





LEARNING OBJECTIVE:

I understand that there are many ways to write a program to achieve the same result – some may be more efficient than others

Progression

Entering: Pupils evaluate the success of an algorithm or program. They identify and correct errors in a given algorithm or program. They understand that we can decompose a problem into smaller steps to make it simpler. Pupils use the language *If... then* to describe the relationship between two actions. They recognise loops in a program and can make simple changes to a block-based program to change it.

Developing: Pupils use repetition to make programs more efficient. They predict the outcome of a block-based program, and can remix and change an existing program. They use diagrams to represent an algorithm, e.g. a flowchart. They use forever loops in a program.

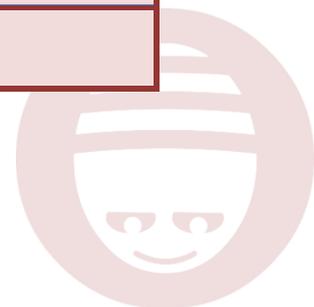
Secure: Pupils create a program using a range of events/inputs to control what happens. They use selection in algorithms and programs, i.e. *if... then...* They can decompose a problem and create a solution (sub-routine) for each step.

Context for Teachers: Choose your delivery method: **Scratch** or **Hopscotch**. In this unit children will use conditional loops developing repeating procedures to show interaction. Forever loops are essential when using selection to ensure the program is constantly checking if a condition has been met. Children will develop skills of debugging and decomposition. They will learn that there are many ways to write a program to achieve the same goal - some may be a more efficient solution to the problem.

***Online Safety & Digital Literacy:** Someone makes the games and animations we play and watch.

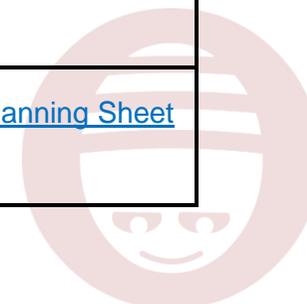
English Links: Writing: (re)telling a story; plan out characters, settings, plot, speech

Maths Links: X and Y co-ordinates in Scratch/Hopscotch; negative numbers





Suggested Learning Activities - SCRATCH	Resources
<p>a) Revise Events and Routines in programs, and talk about decisions – if it is sunny then I ..., if it is raining then I... Explain that these decisions in a program are called Selection. Explain that you need to use a loop in a program to tell the computer to keep looking out for events. Investigate flowcharts with every day activities, where something happens depending on the answer to a question. E.g. when crossing the road, ask ‘Is it safe to cross?’ – repeat until true, then cross. See Selection PowerPoint resource.</p> <p>b) Show the Scratch Etchasketch Example 1 activity and ask pupils to try it out on the board – can they explain how it works? Provide key language prompts, e.g. <i>if...then...</i>, <i>events</i>, <i>routines</i>, <i>sprite</i>. Show the code and ask pupils to talk through what happens for each event.</p> <p>c) Pupils can remix the Etchasketch example to create their own version (<i>File > Download to my computer</i>). Can they add extra Events to change the colour/width of pen when a specific key is pressed? (More able pupils could try to recreate it using the helpsheet.) How does the clear button work? Explain <i>Broadcast message</i> and <i>When message received</i> blocks. These are used to make sprites interact in some way.</p> <p>d) Show the Etchasketch version 2 and look at the code. What is different? Explain that instead of the individual Event commands blocks, you can use an <i>if...then...</i> block to make something happen in a program – this waits for a condition to be true to do the instructions contained within it. Remind pupils that this is called Selection. What else do you need for this block to work properly? (When does it need to check if the condition is true? – i.e. need to use a forever loop).</p> <p>e) There is another way of making sprites interact using <i>if... then...</i> commands and a <i>Sensing</i> command. Download the Scratch: Selection Example 1. Add a command to make something happen when the sprites touch. Can pupils add another sprite and make it interact? Show pupils the <i>hide</i> and <i>show</i> commands, and see if they can make a sprite disappear when they touch something else. How would you make it reappear?</p> <p>f) Explain that you can create an animated story using the skills they have learnt in this unit. Show the Fantastic Mr. Fox example and ask pupils to breakdown (decompose) how it works using a flowchart. Model how to change a backdrop to create a new scene. Remind them how the broadcast message command works, plus how to hide and show sprites.</p>	<p>a) Selection Ppt Resource</p> <p>b) Scratch: Etchasketch version 1</p> <p>b) Scratch – Etcha Sketch helpsheet</p> <p>d) Scratch: Etchasketch version 2</p> <p>e) Scratch : Selection Example 1</p> <p>e) Scratch: Selection example 2</p> <p>f) Scratch example: Animated story – Fantastic Mr Fox</p> <p>Ext. Barefoot: Animated Poem Decomposition</p>
<p>g) Suggested assessment tasks: Plan and create an activity with 2 or more characters that interact to retell a story using the Scratch planning sheet. Decompose the problem: what code needs to go on each sprite, what happens when? Use <i>Broadcast Message</i>, <i>wait</i> and <i>if...then...</i> commands.</p>	<p>g) Scratch Planning Sheet A</p>





Suggested Learning Activities - HOPSCOTCH	Resources
<p>a) Revise Events and Routines in programs, and talk about decisions – if it is sunny then I ..., if it is raining then I... Explain that these decisions in a program are called Selection. Explain that you need to use a loop in a program to tell the computer to keep looking out for events. Investigate flowcharts with every day activities, where something happens depending on the answer to a question. E.g. when crossing the road, ask ‘Is it safe to cross?’ – repeat until true, then cross. See Selection PowerPoint resource.</p> <p>b) Revise how to create an activity in Hopscotch, adding sprites and code. How would you create an EtchaSketch in Hopscotch using the Events <i>is Tilted Right/Left/Up/Down</i>? How do you move a sprite in all four directions? Discuss x and y co-ordinates, positive and negative numbers: so <i>Change X by -5</i> will move a sprite to the left. Explain that the Events in Hopscotch are examples of Selection.</p> <p>c) Start a new program - add two sprites and make them move around the screen constantly. Introduce the <i>Random</i> script to move and turn a random number of steps and degrees</p> <p>d) In Hopscotch there are two events you can use to make sprites interact: <i>bumps</i> and <i>is Touching</i>. Add an event so that when the 2 sprites bump, one of them grows or changes colour.</p> <p>e) Create a game where you control one sprite by tilting the iPad to catch objects or other sprites that are moving around the screen – use the <i>Set Invisibility</i> script to make things disappear.</p>	<p>a) Selection Ppt Resource</p>
<p>f) Suggested assessment tasks: Plan and create an activity or game with 2 or more characters that interact in some way.</p>	





Suggested Applications

Scratch 2.0; Hopscotch

Alternative Delivery - Tablets

Scratch Jnr can be used to investigate events, routines and loops, and you can trigger events when sprites bump and through messages. *Pyonkee* is an app version of Scratch 1.4 with more functionality than Scratch Jnr. You could also use *Hopscotch* to create simple activities using events, loops and if...else... statements – see alternative activities above.

Program of Study

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. Use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs.

