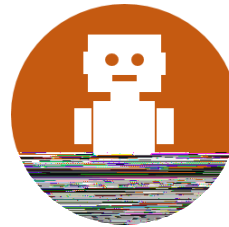


Sheffield Scheme of Work

- Primary Computing -

*“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



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Year	Digital Literacy, Online Safety 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?	Algorithms; Programs; Sequence	
					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?	Algorithms; Programs; Debugging	
					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?	Sequence; Repetition; Input	
					4.3 How do I use repetition in programs?	5.3 How do I use forever loops in 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?	Decomposition, Selection	
					4.4 How do I write efficient programs?	5.4 How do I use selection in a program?
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?	Inputs and Outputs; Variables	
					4.5 How do I program physical systems?	5.5 How do I use variables in programs?
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?	Variables; Operators	
					4.6 How do I build complex physical systems?	5.6 How do I design complex programs?

How to use the scheme

This scheme is offered as an example only and should be **modified and refined** to suit different school settings and may depend on resources being used. It is not about teaching specific software packages; it enables children to make, refine and critically evaluate digital content as active participants in our digital world.

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 do not need to be taught in this order across the year, 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 the two.

The weighting of units in each year may vary – in key stage 1 you may wish to concentrate on key skills, and strands 1 and 2 to ensure pupils are confident users of technology. In upper key stage 2, more time can be spent on the programming and computational thinking units. Key skills should be taught explicitly throughout the year, where appropriate.

In schools where computing is still in development as a subject, teachers should consider starting with units from lower years in order to ensure that key knowledge and concepts are introduced before moving on. For example, year 5 pupils could start with year 3 units around programming and computational thinking if this hasn't previously been covered.

The scheme includes a Foundation Stage 2 Computing Toolkit, with ideas for using technology with learners in early years. There is also a Sheffield Computing Progression Framework which will help teachers to assess progress through the curriculum – each unit also contains the relevant statements from the framework.

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 Online Safety Curriculum](#) which can be accessed for free by Sheffield Schools.

All links were correct at the time of publication, and we take no responsibility for the content of external sites.

Thanks to [Malin Bridge Primary School](#) for the addition of lesson planning material in a number of units.



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 recognise that you can organise files using folders and explain what a good file name would look like. They delete and move files and use key parts of a keyboard effectively, e.g. shift, arrow keys, delete). Pupils use a search engine to find specific information, and recognise that school computers are connected together on a network.

Developing: Pupils type using fingers on both hands and use common keyboard shortcuts, e.g. ctrl C (copy), ctrl V (paste). They can explain what makes a strong password, and use folders to organise files. Pupils recognise that there is more than one search engine, and they may produce different results. They use a search engine effectively to find information and images and know how to search for an application on a computer/tablet. They recognise that different devices may have different operating systems.

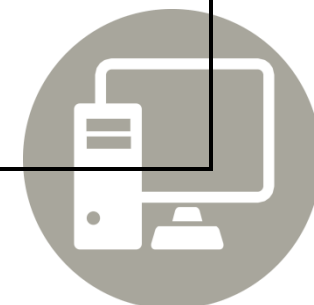
Secure: Pupils type efficiently using both hands and use a range of keyboard shortcuts. They organise files effectively using folders and files names. Pupils use the advanced search tools when using a search engine to find specific information and images. They explain the basic function of an operating system and recognise common file types and extensions, e.g. jpeg, png, doc, wav.





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>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. See also the Bitesize article on images types.</p>	<p>b) Free typing test website</p> <p>b) Typing games</p> <p>b) Typing games</p> <p>b) Keyboard practice (flash required)</p> <p>b) BBC Bitesize: Dance mat typing</p> <p>e) BBC Bitesize: How do digital images work?</p>





1.1 How do I use school technology independently?

Communicating: Text and Images

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, e.g. image for a poster. Pupils are aware that information can be public or private.

Developing: Pupils create digital content, e.g. labels for the cloakroom. They understand that you can edit digital content to change its appearance e.g. the appearance of text. They choose media (e.g. images) to present information on a topic. Pupils recognise what is personal information, e.g. name, image.

Secure: Pupils select basic tools/options to change the appearance of digital content, e.g. font / bold. They combine media with support to present information, e.g. text and images. They recognise that digital content belong to the person that created it. Pupils recognise what is personal information and the need to keep it private.

Context for Teachers: In this unit children learn about computers in the world around them, different ways of using them, and start to talk about why we use computers. 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. A discussion around internet use can inform later online safety discussions.

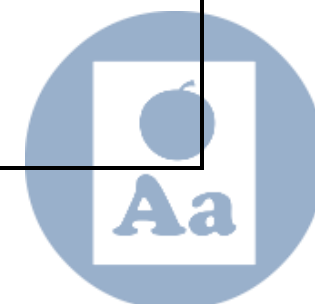
N.B. If using tablets in KS1, some of the learning points may need to be picked up in later years.

***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> <p>a) What is a computer? Access the BBC Bitesize resource: What is a Computer? Look at examples of technology around us – in school and at home. What do these have in common? Work towards developing a definition that includes the idea of input > process > output (see also image here).</p> <p>[See also NCCE resources Year 1 Computing Systems & Networks – Lesson 1: Technology in our Classroom for a lesson plan]</p> <p>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 (the parts you can touch) and software (programs and applications) available on the device. Who has made these computers and programs? Discuss that it is someone's job to design these. What do children use technology for at home – this could be used as a starting point to discuss screen time (see <i>Sheffield Online Safety Curriculum: L1/L2</i>).</p> <p>c) Revise the basics of accessing computer: How to log on to the computer – discuss simple passwords (see <i>Sheffield Online Safety Curriculum: C1</i>). A class could produce their own algorithm for logging on by taking pictures of the process. (This repeats activities suggested in Unit 0.1).</p> <p>d) Discuss safe use of computers and school rules for using technology. [See also NCCE resources Year 1 Computing Systems & Networks – Lesson 6: Using a Computer Responsibly for a lesson plan]</p> <p>e) 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. (See <i>Sheffield Online Safety Curriculum: L2/S1</i>)</p> <hr/> <p><i>The text-based activities may be picked up later in the year when pupils are more confident writers</i></p> <p>f) 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.</p> <p>g) Create a new document, enter text and save to a suitable folder with a relevant file name with support. Discuss</p>	<p>a) BBC Bitesize: What is a Computer?</p> <p>b) BBC Bitesize: How can you use the Internet?</p> <p>d) Peanuts avatar maker</p> <p>d) Create your own Superhero avatar</p> <p>*Sheffield Online Safety Curriculum</p> <p>NCCE Resources</p>



<p>what makes a good file name.</p> <p>h) 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.</p> <p>i) 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?)</p> <p>[See also NCCE resources Year 1: Creating Media – Digital Writing: Lessons 1 & 2]</p>	
<p>i) <u>Suggested assessment task</u>: Create labels for drawers/pegs in the classroom using text and an image.</p>	





1.1 How do I use school technology independently?

Communicating: Text and Images

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 internet connection to work).

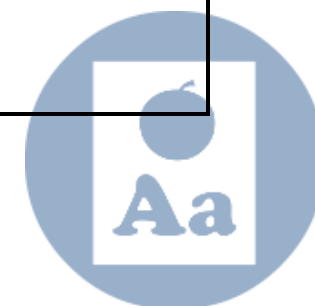
Suggested apps: Pages, Google Docs, Pic Collage, Office 365, Notes, Doodle Buddy, Notes

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.

Key words

Computer Technology Hardware Software Avatar Password	Save Open Document File Folder Font Edit	Apps Personal Information
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LEARNING OBJECTIVE:

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

Progression

Entering: Pupils create digital content, e.g. piece of music, or combine media with support to present information, e.g. sound and images. They select basic tools/options to change digital content, e.g. pitch or instrument. They recognise that digital content belongs to the person that created it. Pupils recognise what personal information is and the need to keep it private.

Developing: Pupils apply edits to digital content to achieve a particular effect, e.g. change pitch or tempo. They plan out digital content, and present ideas and information by combining media, e.g. music and images. They can explain that you can search for information on the internet, and can identify the common features of digital content. They recognise that digital content belongs to the person who created it.

Secure: Pupils design and create simple digital content by combining media for a purpose/audience, e.g. setting a poem to music. They edit digital content to improve it, e.g. trim clips or change tempo, and can identify the features of a good piece of digital content. Pupils can explain why we use technology to create digital content and recognise why we use different types of media to convey information, e.g. text, image, audio, video. They recognise that digital content belongs to the person who first created it, but we can give permission for others to use it.

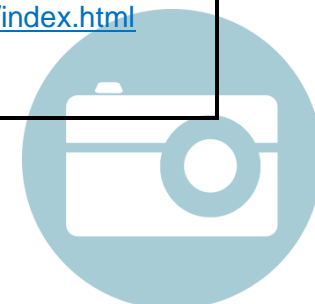
Context for Teachers: In this unit children explore using technology to produce musical compositions. They will learn that music is a powerful tool to add impact and change the mood of a piece of media. They will create and develop musical ideas on a given theme using simple software. They will review 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 (or experiment with music using links on right), 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 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>g) 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).* <i>See also Sheffield Online Safety Curriculum: C3</i></p> <p>[See also NCE materials Year 2 Creating Media – Making Music for comprehensive lesson plans]</p>	<p>a) SWGfL Audio Network (free downloadable music through school internet).</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">- https://musiclab.chromeexperiments.com/ - Lots of music tools to experiment with.- http://www.jamstudio.com/Studio/index.htm- http://virtualpiano.net/- https://soundation.com/ or https://www.soundtrap.com/ - to create compositions online- https://learningmusic.abl-eton.com/index.html
<p>h) Suggested assessment task: Create a piece of music to accompany artwork or a piece of writing. Review and refine according to feedback.</p>	





2.3 How do I use a computer as a musician?

Communicating: Multimedia

Suggested Applications

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

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.

National Curriculum: Program of Study Statements

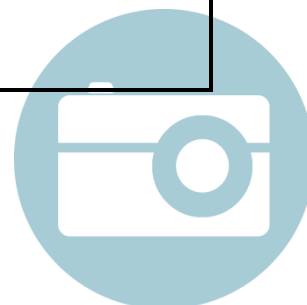
Select, use and combine a variety of software (including internet services) on a range of digital devices to accomplish given goals, including collecting, analysing, evaluating and presenting data and information; use technology safely, respectfully and responsibly; recognise acceptable/unacceptable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

Key words

Copyright
Audio
Tempo
Pitch

Record
Play
Stop
Pause
Media

Loop
Export
Track
Edit







3.5 How do I find and share data safely and responsibly?

Understanding & Sharing Data

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. They use a search engine to find simple information and recognise that school computers are connected (if using PCs). They understand when to share personal information and when not to.

Developing: Pupils recognise that school computers are connected together on a network, and that the Internet is made up of computers and other digital devices connected together all around the world. Pupils know that you use a web browser to access information stored on the internet, and use a search engine effectively to find information and images. They recognise what kinds of websites are trustworthy sources of information and the benefits and risks of different apps and websites.

Secure: Pupils explain the difference between the Internet and the World Wide Web. They know the difference between a search engine and a web browser. They can explain 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, and recognise the benefits and risks of sharing data online.

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

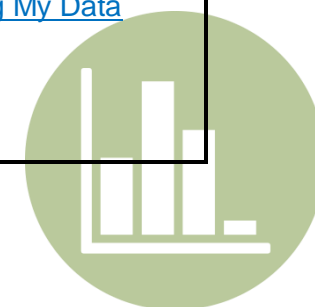




3.5 How do I find and share data safely and responsibly?

Understanding & Sharing Data

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>[See also NCCE materials Year 4 Computer Systems & Networks – The Internet, Lesson 3 for a lesson plan]</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>[See also NCCE materials Year 6 Computer Systems & Networks – Communication for lesson plans around searching]</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>)? Try the Factitious quiz to spot real and fake news. How do you report illegal or inappropriate material found online? See Thinkuknow.co.uk – Report Abuse. (See <i>Sheffield Online Safety Curriculum: L3, N1, N2, N3, N4</i>)</p> <p>[See also NCCE materials Year 4 Computer Systems & Networks – The Internet, Lesson 6 for a lesson plan around unreliable content]</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</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) Factitious Real v. Fake News Quiz</p> <p>e) *SCC Online Safety Curriculum</p> <p>f) Controlling My Data Online</p>



'Controlling My Data Online' resource as a class. (See <i>Sheffield Online Safety Curriculum: C1, C2</i>)	
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.	



3.5 How do I find and share data safely and responsibly?

Understanding & Sharing Data

Suggested Applications

Webbrowser; Publisher/Word/PowerPoint

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.

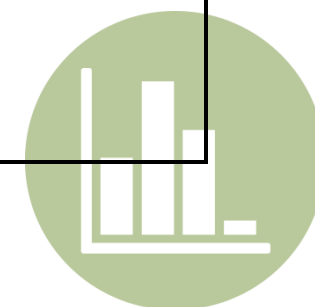
Program of Study

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.

Keywords

Data
Information
Network
Server
Web browser
Internet

World Wide Web
Search engine
Algorithm
Personal information
Terms & Conditions





4.2 How do I improve my algorithms?

Computational Thinking + Programming A

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 recognise that computers don't have a brain, and can explain that we control computers by giving them instructions. They create a simple program e.g. to control a floor robot. They can create a simple algorithm.

Developing: Pupils predict the outcome of a simple algorithm or program. They can explain what an algorithm is – a sequence of instructions to make something happen. They recognise that the order of instructions in an algorithm is important, and can debug an error in a simple algorithm or program e.g. for a floor robot.

Secure: Pupils explain that computers have no intelligence and we have to program them to do things. They create a program with multiple steps e.g. to control a floor robot. They predict the outcome of an algorithm or program with multiple steps and recognise that the instructions in an algorithm need to be clear and unambiguous. Pupils identify and correct errors in a given algorithm or program, and recognise the term debugging.

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?



4.2 How do I improve my algorithms?

Computational Thinking + Programming A

Suggested Learning Activities

Include a mix of programming and unplugged activities. Here are two possible learning journeys depending on software used:

1. [Scratch Jr learning journey](#)
2. [Logo learning journey](#)

Computational thinking

- 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.
- b) Introduce the idea of [debugging](#) – a good programmer has to identify and correct errors in their program or algorithm. View the [BBC Bitesize: What are computer bugs?](#) Provide examples of algorithms with errors in them for pupils to debug, e.g. running a bath.
- c) Complete algorithm activities to teach about the importance of clear and unambiguous instructions, e.g.:
 - Jam sandwich (see [Phil Bagge's website](#))
 - Barefoot Crazy Character Algorithm (<https://www.barefootcomputing.org>)
 - Drawing shapes activity (for details and more ideas see [Unplugged Activities](#) resource)

[See also [NCCE resources Year 2 Programming A – Robot Algorithms: Lesson 1](#)]

Programming

Scratch Jr

- i) Revise how to use Scratch Jr (from y1).
- ii) Revisit what the code blocks do and introduce any new ones.
- iii) Show an example of an activity in Scratch Jr telling part of a story or event in history. Can pupils predict the code blocks that were used?
- iv) Pupils plan their activity away from the computer, using a [Scratch Jr planning sheet](#).
- v) Model how to add sprites using the camera. Pupils then program their story in Scratch Jr, test out and debug as required.

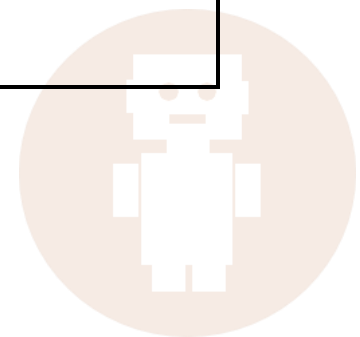
[See also [NCCE resources Year 2 Programming B – Introduction to Quizzes](#)]

Logo

- i) 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 *fd*, *bk*, *lt*, *rt*. Ask pupils to follow simple instructions to create a shape on screen. Try *fd10* and *fd 10* – what happens?

	<p>ii) Introduce commands <i>pu</i>, <i>pd</i>, <i>cs</i>, <i>home</i> and explore drawing simple shapes.</p> <p>iii) 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>iv) Pupils can then plan out and create programs to draw their initials or the numbers.</p> <p>[See also NCE resources Year 4 Programming A – Repetition in Shapes, Lessons 1 & 2 only]</p> <p><i>If neither software available, complete the Logo activities using a Bee-Bot – attach a pen to draw shapes.</i></p>
<p>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>	<p>Suggested assessment task: Plan out and create a program in Logo or Scratch Jr independently. Test out and debug as required.</p>

Resources
<p>FMS Logo Commands</p> <p>Scratch Jnr – Teacher Guide</p> <p>Scratch Jnr Resource #1</p> <p>Scratch Jnr Resource #2</p> <p>Scratch Jnr Website – official guides and lesson plans</p>





4.2 How do I improve my algorithms?

Computational Thinking + Programming A

Suggested Applications

[PC version of Scratch Jr](#); FMS Logo; Purple Mash Logo; <https://www.transum.org/Software/Logo/>

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.

National Curriculum: Program of Study Statements

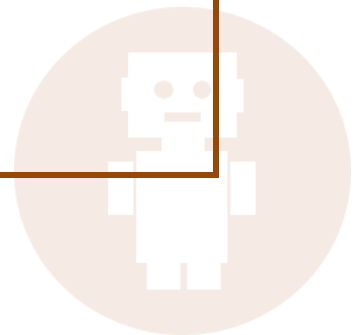
Recognise common uses of information technology beyond school; understand what algorithms are; how they are implemented as programs on digital devices; and that programs execute by following precise and unambiguous instructions. Create and debug simple programs; use logical reasoning to predict the behaviour of simple programs.

Key words

program
algorithm
computer
sequence
instructions
commands
sprite
to debug

Plus directional language:

forwards
backwards
left turn
right turn





LEARNING OBJECTIVE:

I understand that what happens in a program can change depending on if a condition is met. This is called selection.

Progression

Entering: Pupils predict the outcome of a block-based program, e.g. in Scratch/Hopscotch. They modify an existing program, e.g. change background, number of times something happens etc. They identify and correct errors in a given algorithm or program, and recognise the term debugging. Pupils recognise repeat loops in a program, and different events (inputs) that control a program.

Developing: Pupils successfully modify an existing program to change what happens. They recognise that we can create an algorithm to help plan out a program. They recognise that different (events) inputs can be used to control a program. They recognise repeat loops in a program or algorithm, and use loops in a program to keep something happening. Pupils identify errors in a block-based program and correct them. They recognise selection in a program or algorithm.

Secure: Pupils create a program using a range of events/inputs to control what happens. They can explain when to use forever loops and count-controlled loops, and use them effectively in programs. Pupils use selection in algorithms in programs to alter what happens when a condition changes, e.g. if...then... They design a program for a purpose, decompose it into parts and create an algorithm for each one. They recognise common mistakes in programs and how to correct them.

Context for Teachers: Selection is the structure by which programs change what happens when a certain condition is met, and it uses the language if...then...else... Often pupils forget to put a selection statement within a forever loop, if the program needs to constantly check if a condition is met. We can use programming languages like Scratch to tell stories.

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;



5.4 How do I use selection to change what happens in programs?

Computational Thinking + Programming B

Suggested Learning Activities	
Include a mix of programming and unplugged activities - a suggested order is provided. Choose one set of programming activities.	
Computational Thinking	Programming
<p>(1) We can use different Events in a program (e.g. When this sprite clicked) to determine when things happen. We can also use Selection. This is the programming structure through which a computer executes one or other set of instructions according to whether a particular condition is met. It uses the language <i>if...then...else...</i></p> <p>(2) Complete the Everyday Selection activity (see unplugged activities) – add your own examples. You could also do the PE Movement activity – this is also an example of selection, <i>if</i> the whistle blows, <i>then</i> do 10 press ups etc.</p> <p>[See also NCE resources Year 5 - Programming A – Selection in Physical Computing Lesson 3 (Activities 1 & 2 only, unless using Crumbles)</p> <p>(4) What is the algorithm for how an automatic door works? [<i>If</i> something moves in front of the motion sensor, <i>then</i> open the door]. When does the program need to check for motion? Once? Twice? Explain that you need to use a loop in a program to tell the computer to keep looking out for events. What kind of loop will you need? (forever loop – see y3 units).</p> <p>(5) 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 Ppt Resource.)</p>	<p>Scratch:</p> <p>(3) Explore activities Simple Dino Quiz and Crab Crawl in the Scratch Selection resource to introduce selection in Scratch.</p> <p>(6) Investigate the Bouncing Penguin or Simple Maze Game in the Scratch Selection resource to show how the selection statement needs to have a forever loop around it if the program needs to keep checking if the condition is true.</p> <p>(7) Revise using broadcast message to let sprites know when to do something. Investigate the Fantastic Mr. Fox - simple activity to see an example of using this in storytelling. (See the Scratch Selection resource).</p> <p>(8) Investigate the Fantastic Mr. Fox – explore activity – provide plenty of time for pupils to work out what each bit of code does. They can then design and plan out their own story, decomposing each part and planning the algorithm for each sprite.</p> <hr/> <p>CodeBug:</p> <p>(3) Introduction to CodeBug (see Codebug part 1 notes)– identify main parts. It has a 5x5 LED screen – most screens are made up of thousands of pixels, this one has 25 so you can only create very simple images. You use a computer to program the CodeBug and transfer the code via a USB cable.</p> <p>(3) Investigate the web interface, including the emulator and code blocks. Why use an emulator? Can you guess what any of the code does? Introduce basic</p>

<p>We can use flowcharts to represent an algorithm.</p> <p>Look at examples of selection with a forever loop in programs.</p>	<p>code and debug common mistakes (see Codebug part 1). Create a simple image using the <i>Draw</i> and <i>Build Sprite</i> commands and test on the emulator. Pupils can tinker with creating different images, and plan them out using a 5 by 5 grid on paper. Model how to download the program to the CodeBug.</p> <p>(3) How can you display more than one image at a time? Introduce <i>pause</i> and <i>clear</i> commands – how long does the program pause for (i.e. it uses milliseconds)? Compare with Scratch code containing wait and clear all commands. Ask pupils to plan out a program which displays 3 images one after the other by writing an algorithm or flowchart. Test and debug.</p> <p>(6) How do we use selection with Codebug to determine what happens when a button is pressed? See Codebug Selection resource. Can you create a program so that an image is displayed when button A is pressed? Consider how often the program needs to check whether button A is pressed – what kind of loop is required?</p> <p><i>[If the school has Crumble Controllers, there is a unit from the NCCE around selection and Crumbles you could use instead of the Code Bug: Year 5 - Programming A – Selection in Physical Computing]</i></p>
<p><u>Suggested assessment task:</u></p> <p>Scratch: Plan and create an activity with 2 or more characters that interact to retell a story using the Scratch Planning Sheet A. 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>CodeBug: Create simple animations by displaying a sequence of animations. Control this with a button press. Plan out the algorithm and animation on paper first.</p>	





5.4 How do I use selection to change what happens in programs?

Computational Thinking + Programming B

Suggested Applications

Scratch; Codebug.org

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.

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.

Key words

program
algorithm
sequence
sprite
decomposition
event
selection

to debug
repetition
loops
code
broadcast

