Teaching Guide.

Street Smart: Step, Safe, Repeat

While the curriculum material within this workshop is suitable for all ages, please be aware that Minecraft and Among Us, the video games used in this context, are rated PEGI 7 - suitable for ages 7+ only. Should you choose to use this workshop with a younger audience, we advise you to use different titles that carry a PEGI 3 rating. For more information about PEGI ratings please visit AskAboutGames https://www.askaboutgames.com/ or the Video Standards Council Rating Board https://videostandards.org.uk/RatingBoard/.

Introduction

Developed by Kucheza Gaming, this workshop provides learners with an understanding of physical safety, giving directions as a means of writing algorithms and reading and creating maps in a fun-filled and engaging way.

The workshop begins with an activity were learners write out detailed directions from or to their favourite locations. The activity is aimed at seeing how observant the learners are as they commute from place to place. This is followed by the learners understanding the concept of safety and different types of safety: Online Safety, Emotional Safety and Physical Safety. Subsequently, we focus on Physical Safety and

how to stay safe in places like the home, playground and whilst commuting. This session will also cover necessary safety rules and regulations that must be observed in the places covered. The concept of Stranger Danger will be introduced to teach the learners about strangers and how to deal with strangers. This includes watching a video on it and playing the game Among Us which reinforces learners understanding of the dangers of dealing with strangers.

We return to the activity at the start of the workshop where the learners gave detailed directions to their favourite places which is used as an entry point to discuss algorithms. Learners will develop their own algorithms using their written directions. The discussion will then move into understanding safe places and landmarks. The concept of mapping is introduced which helps us translate our algorithm written using a flow chart into a more visual piece that is drawn on paper using the basic skills of abstraction in mapping. Unplugged activities are used to introduce the concepts of safety, selection, landmarks, and mapping which also helps the learners understand abstraction in mapping.

This workshop makes use of Minecraft which learners will use to create a digital representation of our maps. The use of Minecraft introduces the element of play and gives the learners the opportunity to represent their physical locations in a virtual world.

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ukie edu PlayStation Electronic Arts SEGA UBISOFT Outright Games

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Learning Outcomes

1. to understand what an algorithm is
2. be able to write an algorithm to achieve a desired result
3. be able to implement changes on the written algorithm to include additional processes
4. to be able to represent an algorithm as a flowchart
5. to understand what is meant by conditional statements
6. to be able to include conditional statements when writing algorithms
7. to understand the concept of selection and be able to implement selection statements within an algorithm
8. to be able to evaluate the effectiveness of an algorithm
9. to be able to consider different forms of representation for an algorithm
10. to understand the concept of a map and be able to create a map based on an algorithm
11. to be able to use software to create a virtual world using a map drawn from an algorithm

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Files/Resources

U = Unplugged activity, B = Beginner activity, I = Intermediate activity, A = Advanced activity

Filename / Resource	Resource Type	Purpose / Description	Activity No
Dsh-teaching-presentation-street-smart	Teaching presentation	Main teaching presentation	All activities
Dsh-omm-executive-development-associate	Video	Video demonstrating a career that uses skills taught in the workshop	U1
Dsh-worksheets-street-smart	Worksheet	Worksheets required for learners to carry out the tasks and activities in the workshop	U3
Pen or pencil	Workshop resource	Resources needed to complete unplugged activities	All unplugged activities
Coloured pens, pencils, or crayons	Workshop resource	Resources needed to complete unplugged activities	All unplugged activities

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Plain paper	Workshop resource	Resources needed to complete unplugged activities	All unplugged activities
Among Us https://now.gg/apps/innersloth-llc/4047/among-us.html	Browser based game	Game for learners to develop their understanding of stranger dangers	P4
Minecraft	Software	Software for learners to create a visual representation of their map	P14, P15, P16, P17

PLEASE NOTE: The activities outlined in this workshop pack are a suggested outline of how the workshop can be delivered. It is envisaged that teachers will adapt the resources and the organisation of them according to the needs of their class.

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Session Overview

U = Unplugged activity, P = Plugged activity

SESSION 1

Activity No	Session Content / Activity	Resources Used
	Welcome and introduction. Introduce the key learning objectives by reading learners The Challenge slide.	DSH-teaching-presentation-Street-Smart – slides 1 and 2
U1	Watch the One Minute Mentor video with your learners – explain that the video introduces a career that uses skills taught in the workshop.	DSH- teaching-presentation-Street-Smart – Slide 3 DSH-OMM-executive-development-associate
U2	Slide 4 Put learners into pairs and ask all learners to think of a place they would like to visit that is close to their school. They should then take it in turns to give their partner directions to their place.	DSH- teaching-presentation-Street-Smart – Slide 4

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	Remind learners to think about where they would need to cross the road and places they could stop to check if they needed to check if they are going in the right direction.	
	Ask your learners to define safety. Collect a range of answers and then give the definition on slide 5. Read slides 6 - 11 to your learners, explaining the types of safety. Where the slides include questions, give opportunities for your students to give answers and then reveal the answers on the slide. Work through slides 12 – 15. Ask who a stranger is, get their opinion. Give the explanation of who a stranger is based on what is on the slides and emphasize how to deal with a stranger with the video provided.	DSH- teaching-presentation-Street-Smart – Slide 5 - 15
U3	Slide 16 Provide each pupil with the secret code card worksheet and ask them to write a secret code/word that only they and their family members know. Then ask them to keep the card and take them home. Explain to learners that they could also use the same secret code word to make sure that people are who they say they are online.	DSH- teaching-presentation-Street-Smart – Slide 16 - 20 DSH- worksheets-Street-Smart (printed, one per learner) Pen or pencil

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	Work though slides 17 – 20 to explain to students what to do if they are approached by a stranger.	
P4	Slide 21. Play the Among Us game with the learners to further explain what strangers are capable of. Slide 22. Remind learners that people may not be what they seem and that they should always tell a trusted adult if they are worried about something.	DSH- teaching-presentation-Street-Smart – Slide 21 - 22 https://now.gg/apps/innersloth-llc/4047/among-us.html

SESSION 2

Activity No	Session Content / Activity	Resources Used
U5	Slide 23. Ask the learners 4 ways that they can be safe at home. Show the answers and then discuss 5 things that they should not play with at home. Suggestions include: oven, knives, tools etc. Slide 24 - 27. Now ask your learners if they know how they can stay safe on the playground? Spend some time discussing their answers and then show them the 9 suggestions on slides 24 – 27. Slide 28. Using scrap paper or mini-white boards ask your learners to list 5 activities that they can do in a playground.	DSH- teaching-presentation-Street-Smart – Slide 23 – 28 Scrap paper and a pen or pencil or Mini-white board and pen

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U6	Slide 29 - 30. Ask your learners to think back to writing directions at the beginning of session 1, explain the concept of landmarks, safe places, and traffic signs for pedestrians. Slide 31. Clearly explain the meaning of the word algorithm with the emphasis on it meaning instructions. Explain that your learners designed an algorithm when they gave their partner instructions on how to get to their favourite place. Slide 32. Show your learners the flowchart example on slide 32 and explain that they can use a flowchart to represent their directions algorithm. Ask them to copy the shapes used in the flowchart and write out each step of their directions in a new rectangle. Explain that they can add more rectangles if they have more steps that they need to add.	DSH- teaching-presentation-Street-Smart – Slide 29 – 32 Plain paper and a pen or pencil
U7	Slides 33 - 36. Discuss the possibility of taking alternative routes to their destination. Ask your students how they think they might show alternative routes in their algorithm. Encourage your learners to think about why they might take an alternative route: that it may be easier or faster to get to their favourite place. Use this to explain the concept of conditional statements.	DSH- teaching-presentation-Street-Smart – Slide 33 - 37 Plain paper and a pen or pencil

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	Slide 37. Give your learners some time to add an optional route using a conditional statement to their flowchart.	

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SESSION 3

Activity No	Session Content / Activity	Resources Used
U8	Slide 38, Explain the concept of landmarks. Ask your learners to list 5 landmarks that they would see between school and their favourite place. Slide 39. Discuss with your learners how they could add their landmarks to their directions. Then give them some time to add them to a new version of their flowchart.	DSH- teaching-presentation-Street-Smart – Slide 38 - 39 Plain paper and a pen or pencil
U9	Slide 40. Explain the concept of safe places. Slide 41. Explain how to play 'True or False'. Learners should read each example on the board and write down true if they think that place is safe and false if they think it is not. Slide 42 – 49. Work through the example places, giving time for your learners to hold up true or false to identify whether each one is a safe place. Slide 50. Discuss the correct answers. Slide 51. Ask your learners to discuss the safe places where they could stop between school and their favourite place and then add them to a new version of their flowchart.	DSH- teaching-presentation-Street-Smart – Slide 40 - 51 Plain paper and a pen or pencil Mini-whiteboard and pen Or Scrap paper

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U10	Slide 52 Ask your learners if they know what a pedestrian is. Give some time for discussion and then read the definition on the slide. Explain the concept of traffic signs. Slide 53 - 55. Work through the slides to see what traffic signs your learners can identify. Slide 56. Ask your learners to discuss the traffic signs they see between school and their favourite place and then add them to a new version of their flowchart. Encourage your more able learners to include a conditional statement with any pedestrian lights that they add.	DSH- teaching-presentation-Street-Smart – Slide 52 - 56 Plain paper and a pen or pencil

SESSION 4

Activity No	Session Content / Activity	Resources Used
U11	Slide 57. Ask your learners if there are other ways they could represent their directions algorithm other than a flowchart. Give some time for your learners to suggest ideas. Slide 58. Explain the concept of maps, how maps give a visual representation of the direction to their favourite place and give examples like Google Streetview and others.	DSH- teaching-presentation-Street-Smart – Slide 57 - 61 Plain paper and a pen or pencil Coloured pens, pencils or crayons

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	Slide 59 - 60. Explain the term abstraction in mapping using the example provided on slide 60. Slide 61. Direct your learners to use abstraction to create a map version of their directions algorithm.	
U12	Slide 62 - 63. Explain the basic elements of a map using the map on slide 63 to give a clear view of what a standard map should look like according to Geography knowledge.	DSH- teaching-presentation-Street-Smart – Slide 62 - 63 Plain paper and a pen or pencil Coloured pens, pencils, or crayons
	Slide 63 – 67. Work through the quiz on slides 63 - 66 to test your learners Geography skills. Check your learners' answers using slide 67. Slide 67. Direct your learners to add the basic elements of a map to the one they created to direct someone to their favourite place.	DSH- teaching-presentation-Street-Smart – Slide 63 - 67 Plain paper and a pen or pencil Coloured pens, pencils, or crayons
U13	Slide 68. Ask each learner to exchange their map with another learner and have them answer the following questions: 1. Can they trace where the map is leading to?	DSH- teaching-presentation-Street-Smart – Slide 68 Plain paper and a pen or pencil Coloured pens, pencils, or crayons

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	2. Can they identify all the necessary landmarks, safe places and other points on the map? 3. Can they find all the basic elements on the map? Give your learners some time to make improvements based on their partners feedback.	
	Slide 69 - 70. Go over the session objectives. Giving learners opportunities to discuss how they have met each one.	DSH- teaching-presentation-Street-Smart – Slide 69 - 70

SESSION 5

Activity No	Session Content / Activity	Resources Used
	Slide 71. Recap key aspects from session 1, ask each pupil to write a word they have learnt in their books. Slide 72 - 73. Introduce the new session and stress its need in representing their maps in a digital world.	DSH- teaching-presentation-Street-Smart – Slide 71 - 73
P14	Slide 74. Direct your students to collect the resources they will need as shown on the slide. Explain that they will work in	DSH- teaching-presentation-Street-Smart – Slide 74 - 78 Minecraft

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	their pairs to create a digital world. Ask learners to suggest what software they could use to create a digital world. Slide 75. Introduce the game Minecraft and demonstrate how to open the game software on your computer, ask the learners to do the same on their computer. Explain the game Minecraft and the features which can be seen from slides 76-78. Explain why creative mode will be used in this lesson instead of the survival mode.	Map created in previous session
P15	Slide 79 - 80. Explain how to start the creative mode and ask the learners to do the same on their computers as you demonstrate it. Slide 81 - 84. Explain each control key to be used in playing the game and allow the learners to get used to the keys to perform the function they are meant for.	DSH- teaching-presentation-Street-Smart – Slide 79 - 84 Minecraft Map created in previous session
P16	Slide 85. Click on the inventory in the game to show all that will be needed in building their digital world. Pick anything from the inventory and build something with it. Ask the learners to do the same.	DSH- teaching-presentation-Street-Smart – Slide 85 - 89 Minecraft Map created in previous session

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	Slide 86 – 88. Show the example worlds on the slides and explain how to move around in Minecraft. Slide 89. Let each group start picking what they think will help them to digitize their map and start building their world. Guide each group as they engage in the task.	
P17	Slide 90. Each pair should swap computers with other pair with the copy of the map used to create the Minecraft world. Let them pick some places on the map and ask the other pair to use the map to navigate to the place inside the Minecraft world. Learners should then feedback to the pair that created the world on how easy or difficult it was to follow their map in Minecraft. The feedback given should be used to improve on the created Minecraft world.	DSH- teaching-presentation-Street-Smart – Slide 90 Minecraft Map created in previous session

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Digital Schoolhouse Progression Matrix

The Digital Schoolhouse progression matrix is a simplified mechanism for measuring pupil progress. It stretches from base level understanding at the beginner level to introducing GCSE content at the advanced level. The statements reflect skills and concepts covered in the workshop, these have been cross referenced to specific activities in order to reflect both their level of complexity and provide a guideline on which to measure progress.

U = Unplugged activity, P = Plugged activity

Algorithms

	Beginner	Activity No	Intermediate	Activity No	Advanced	Activity No
Understanding	Understands what an algorithm is	U6, U7, U8, U9, U10	Understands that algorithms are not the same as programming		Understands that different algorithms exist for the same problem	U7
Writing	Represents algorithms using graphical notation such as pictures	U8, U10, U11, U12	Represents algorithms using structured notation such as flowcharts	U6, U7, U8, U9, U10	Represents algorithms using pseudocode	
Limitations	Understands that computers need precise instructions	U6, U7, U8, U9, U10	Can identify tasks best completed by humans or computers		Understands that some problems cannot be solved computationally	
Planning	Can identify the steps needed to solve a problem	U2, U6, U7, U8, U9, U10, U11, U12	Can identify the programming constructs needed to solve a problem (pattern recognition)	U7, U8, U9, U10	Can identify the modules needed to solve a problem e.g. top down design	
Tracing	Uses logical reasoning to predict outputs and show an awareness of inputs	U2, P4, U6, U7, U8, U9, U10, U11, U12	Uses logical reasoning to explain how an algorithm works	U6, U7, U8, U9, U10	Evaluates the effectiveness of algorithms and models for similar problems	

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Designing	Designs solutions (algorithms) that use sequence, selection i.e. if, then and else and iteration	U7, U8, U9, U10, U11, U12	Designs solutions by decomposing a problem and creating a sub-solution for each of these parts	Designs a solution to a problem that uses generalization to create objects and classes (OOP)

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Programming

	Beginner	Activity No	Intermediate	Activity No	Advanced	Activity No
Writing	Can create a simple program in an environment that does not rely on text e.g. programmable robots etc		Has practical experience of a high-level textual language, including use of standard libraries		Has experience of designing programs that include a graphical user interface	
Program flow	Understands that programs execute by following precise instructions		Understands how modular programs work using sub-routines		Appreciates the effect of the scope of a variable e.g. a local variable can't be accessed from outside its function unless passed as a parameter	
Selection	Uses selection statements in programs, including an if, then and else statement		Understands the difference between, and appropriately uses if and if, then and else Statements		Uses nested selection statements	
Iteration	Uses loops, within programs		Understands the difference between, and uses 'while', 'until' and 'for' loops		Uses nested iteration and recursion	
Debugging	Detects and corrects simple semantic errors i.e. debugging, in programs		Detects and corrects syntactical errors		Applies a modular approach to error detection and correction	
Program design	Creates programs that implement algorithms to achieve given goals		Can design a program based on an algorithm		Designs modular programs using a range of methodologies e.g. RAD, waterfall	
Data types and structures	Declares and assigns variables		Selects appropriate data types		Understands and uses one and two dimensional data structures	
Operators	Uses arithmetic operators		Uses a range of operators and expressions e.g. Boolean		Understands and uses negation with operators e.g. not equal to	

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Data

	Beginner	Activity No	Intermediate	Activity No	Advanced	Activity No
Representation	Recognises that digital content can be represented in many forms	P14, P15, P16	Understands how bit patterns represent different forms of data e.g. character sets, sound, numbers and images		Understands how the same bit patterns can be used for different forms of data e.g. metadata	
Transfer	Knows that data can be transferred from one computer to another		Knows that computers transfer data in binary		Understands and can explain the need for data compression, and performs simple compression methods	
Types	Recognises different types of data: text, number		Defines data types: string, integer, real and Boolean		Understands how different data types can be used within data structures e.g. arrays must be made up of the same data type whereas lists can use several	
Binary	Can carry out simple binary to decimal conversions		Performs operations using bit patterns e.g. binary addition, conversion between binary and hexadecimal, binary subtraction etc		Understands the relationship between binary and electrical circuits, including Boolean logic	
File Size	Understands that data takes up space on a computer		Understands the relationship between binary and file size (uncompressed)		Knows the relationship between data representation and data quality e.g. resolution and colour depth etc, including the effect on file size	
Data and Information	Understands the difference between data and information		Recognises that poor-quality data leads to unreliable results, and inaccurate conclusions		Understand the mechanisms used to cleanse data e.g. validation, range checks etc	
Searching	Can sort data, use filters and perform single criteria searches for information		Queries data on one table using a typical query language, including more complex searches for information e.g. using Boolean and relational operators		Queries data on multiple tables using a typical query language	
Structure	Recognises that data can be structured in tables to make it useful		Understands that all the data about a person or thing can be stored as a record		Knows what a relational database is, and understands the benefits of storing data in multiple tables	

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Hardware and Software

	Beginner	Activity No	Intermediate	Activity No	Advanced	Activity No
Processing	Understands that computers have no intelligence and that computers can do nothing unless a program is executed		Knows that programs are executed by the processor i.e. the CPU		Understand that processors can work in different ways e.g. multitasking, scheduling	
Software	Recognises that all software executed on digital devices is programmed	U1	Knows that there is a range of operating systems and application software for the same hardware		Understands the concept of proprietary and open-source software including how this relates to licencing	
Devices	Recognises that a range of digital devices can be considered a computer		Understands why and when computers are used		Understands how technology has developed e.g. Moore's Law	
Components	Recognises and can use a range of input and output devices	P4, P14, P15, P16, P17	Recognises and understands the function of the main internal parts of basic computer architecture		Knows that processors have instruction sets and that these relate to low-level instructions carried out in the main internal parts of a computer	
Operating systems	Understands that the operating system is software that specifies the function of a computing device		Understands the main functions of the operating system		Understands that there are different types of operating system and some of there common uses e.g. real time on auto pilot systems on a plane	
Data transfer	Knows that data is transferred around a computer system using input devices, sensors and application software		Knows that data can be transferred between computer systems using physical, wireless and mobile networks		Knows how data can be transferred between computer systems e.g. packet and circuit switching	
Architecture	Understands the difference between hardware and software		Understands how hardware uses software to execute instructions e.g. the fetch-execute cycle		Understands computer architecture in relation to the fetch execute cycle, including how data is stored in memory	

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Communication

	Beginner	Activity No	Intermediate	Activity No	Advanced	Activity No
WWW	Accesses content using a web browser	P4	Understands that web pages are created using HTML and CSS		Understands how dynamic web pages use the client-server model and that web servers process and store data entered by users	
Online safety	Understands why and how to keep personal information private and knows what to do when concerned about something online	U3, U5, U9	Has an awareness of a range of online harms and demonstrates responsible use of technologies and online services in order to protect themselves	U3, U5, U9	Understands how and why online threats are carried out and how to protect against them	
Search engines	Navigates the web and can carry out simple web searches to collect digital content	P4	Understands how to effectively use search engines e.g. Boolean, advanced search functions etc		Knows how search results are selected and ranked, including that search engines use 'web crawler programs'	
Networks	Understands the difference between the internet and internet service e.g. world wide web		Understands data is transmitted between digital computers over networks, including different topologies e.g. ring, star, mesh		Knows the names and purposes of network components and protocols	
Internet services	Shows an awareness of, and can use a range of internet services e.g. email	P4	Selects, combines and uses internet services		Uses internet services to work collaboratively	

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Digital Skills

	Beginner	Activity No	Intermediate	Activity No	Advanced	Activity No
Invention	Uses software under the control of the teacher to create, store and edit digital content	P4, P14, P15, P16, P17	Uses and selects internet services, digital devices and application software to create, store and edit digital content		Evaluates the appropriateness of digital devices, internet services and application software to achieve given goals	
Audience	Understands what an audience is		Recognises the audience when designing and creating digital content		Undertakes creative projects that are tailored to meet the needs of an audience	
Purpose	Can talk about how they use computers	P4, P17	Can talk about how other people use computers	U1, P17	Can discuss the issues around how other people might use computers e.g. Data Protection Act, Computer Misuse Act, Copyright etc	
Evaluation	Can comment on the success of their solution	U7, U13, P17	Designs and uses criteria to critically evaluate the quality of solutions	U13, P17	Documents user feedback, the improvements identified, and the refinements made to the solution	
Content	Can gather content		Makes judgements about content when evaluating and repurposing it for a given audience	P14, P15, P16	Evaluates the trustworthiness of content, considers the usability of visual design features and properties of media when designing and creating digital artefacts	

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Computing Programmes of Study Links

1.1 understand what algorithms are; how they are implemented as programs on digital devices; and that programs execute by following precise and unambiguous instructions
1.2 create and debug simple programs
1.3 use logical reasoning to predict the behaviour of simple programs
1.4 use technology purposefully to create, organise, store, manipulate and retrieve digital content
1.5 recognise common uses of information technology beyond school
1.6 use technology safely and respectfully, keeping personal information private; identify where to go for help and support when they have concerns about content or contact on the internet or other online technologies

2.1 design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts
2.2 use sequence, selection, and repetition in programs; work with variables and various forms of input and output
2.3 use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs
~~2.4 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~~
~~2.5 use search technologies effectively, appreciate how results are selected and ranked, and be discerning in evaluating digital content~~
2.6 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
2.7 use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact

3.1 design, use and evaluate computational abstractions that model the state and behaviour of real-world problems and physical systems
3.2 understand several key algorithms that reflect computational thinking [for example, ones for sorting and searching]; use logical reasoning to compare the utility of alternative algorithms for the same problem

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3.3 use two or more programming languages, at least one of which is textual, to solve a variety of computational problems; make appropriate use of data structures [for example, lists, tables or arrays]; design and develop modular programs that use procedures or functions

~~3.4 understand simple Boolean logic [for example, AND, OR and NOT] and some of its uses in circuits and programming; understand how numbers can be represented in binary, and be able to carry out simple operations on binary numbers [for example, binary addition, and conversion between binary and decimal]~~

~~3.5 understand the hardware and software components that make up computer systems, and how they communicate with one another and with other systems~~

~~3.6 understand how instructions are stored and executed within a computer system; understand how data of various types (including text, sounds and pictures) can be represented and manipulated digitally, in the form of binary digits~~

3.7 undertake creative projects that involve selecting, using, and combining multiple applications, preferably across a range of devices, to achieve challenging goals, including collecting and analysing data and meeting the needs of known users

3.8 create, re-use, revise and re-purpose digital artefacts for a given audience, with attention to trustworthiness, design and usability

3.9 understand a range of ways to use technology safely, respectfully, responsibly and securely, including protecting their online identity and privacy; recognise inappropriate content, contact and conduct and know how to report concerns

4.1 develop their capability, creativity and knowledge in computer science, digital media and information technology

4.2 develop and apply their analytic, problem-solving, design, and computational thinking skills

4.3 understand how changes in technology affect safety, including new ways to protect their online privacy and identity, and how to identify and report a range of concerns.

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Computational Thinking Strands

AL – Algorithmic Thinking

Ref.	Activity
A1	Formulating instructions to achieve a desired effect
A2	Formulating instructions to be followed in a given order (sequence)
A3	Formulating instructions that use arithmetic and logical operations
~~A4~~	~~Writing sequences of instructions that store, move and manipulate data (variables and assignment)~~
~~A5~~	~~Writing instructions that choose between different constituent instructions (selection)~~
~~A6~~	~~Writing instructions that repeat groups of constituent instructions (loops/iteration)~~
~~A7~~	~~Grouping and naming a collection of instructions that do a well-defined task to make a new instruction (subroutines, procedures, functions, methods)~~
~~A8~~	~~Writing instructions that involve subroutines that use copies of themselves (recursion).~~
~~A9~~	~~Writing sets of instructions that can be followed at the same time by different agents (computers/people, parallel thinking and processing, concurrency)~~
~~A10~~	~~Writing a set of declarative rules (coding in Prolog or a database query language)~~
A11	Using an appropriate notation to write code to represent any of the above

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A12	Creating algorithms to test a hypothesis
A13	Creating algorithms that give experience-based solutions (heuristics)
A14	Creating algorithmic descriptions of real world processes so as to better understand them (computational modelling)
A15	Designing algorithmic solutions that take into account the abilities, limitations and desires of the people who will use them

DE – Decomposition

Ref.	Activity
D1	Breaking down artefacts into constituent parts to make them easier to work with
D2	Breaking down a problem into simpler versions of the same problem that can be solved in the same way (recursive and divide and conquer strategies)

GE – Generalisation

Ref.	Activity
G1	Identifying patterns and commonalities in artefacts
G2	Adapting solutions, or parts of solutions, so they apply to a whole class of similar problems
G3	Transferring ideas and solutions from one problem area to another

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AB – Abstraction

Ref.	Activity
Ab1	Reducing complexity by removing unnecessary detail
Ab2	Choosing a way to represent an artefact, to allow it to be manipulated in useful ways
Ab3	Hiding the full complexity of an artefact (hiding functional complexity)
~~Ab4~~	~~Hiding complexity in data, for example by using data structures~~
Ab5	Identifying relationships between abstractions
Ab6	Filtering information when developing solutions

EV – Evaluation

Ref.	Activity
E1	Assessing that an artefact is fit for purpose
E2	Assessing whether an artefact does the right thing (functional correctness)
E3	Designing and running test plans and interpreting the results (testing)
E4	Assessing whether the performance of an artefact is good enough (utility: effectiveness and efficiency)
E5	Comparing the performance of artefacts that do the same thing
E6	Making trade-offs between conflicting demands
E7	Assessing whether an artefact is easy for people to use (usability)

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E8	Assessing whether an artefact gives an appropriately positive experience when used (user experience)
E9	Assessment of any of the above against the specification and set criteria
E10	Stepping through processes or algorithms/code step-by-step to work out what they do (dry run/tracing).
~~E11~~	~~Using rigorous argument to justify that an algorithm works (proof)~~
~~E12~~	~~Using rigorous argument to check the usability or performance of an artefact (analytical evaluation)~~
~~E13~~	~~Using methods involving observing an artefact in use to assess its usability (empirical evaluation)~~
~~E14~~	~~Assessing whether a product meets general performance criteria (heuristics)~~

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