

Think, Compute, Grow!

**A strategy for teaching computing
and ICT through sustainable
agriculture**

PART 3- ASSESSMENT



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THEORY OF ASSESSMENT

Assessment in computing/ICT can be both **formative** and **summative**.

Formative assessment takes place continuously against the learning goals. It aims to give students regular feedback so that they can adjust and improve their work. Formative assessment can also help **inform teaching**, leading to **adaptive teaching**, which gives children the exact provision that they need. Formative assessment can involve frequent, low-stakes testing within lessons but crucially, should give children the chance to act on this feedback.

Summative assessment takes place at the end of a piece of work or unit. It provides assessment against the assessment goals, giving a final grade or mark. This helps students feel a sense of closure and accomplishment with a piece of work and helps the teacher to track children in their class.

Assessment in Computing/ICT can be challenging due to the nature of children's work being digital and often save across different platforms. To help with this, children can save their work into one place, such as a named folder. This can make it possible for the teacher to quickly find and comment on children's work.

For any assessment to take place, it is important that both the teacher and the children are clear about the standards that are expected of them in order to make a piece of work successful. These would usually be shared with the children via the **success criteria**. For larger projects, a combination of success criteria can be given to children, even in the form of 'gold', 'silver' and 'bronze' to let children know how successful they have been, and what they need to do to improve.

For summative assessment, the teacher needs to be clear about the skills that the children are aiming to meet for each topic, in each stage.

It is also important that children be given the opportunity to **self-assess** their work and to think about things they need to work at more in the future to improve. This is key to effective learning and progression and helps build **learner agency**.

The next few pages give standards that the children should meet for the foundation, intermediate and advanced stages of this strategy.

As this strategy is split into three, multi-age stages, the same assessment sheets can be used each year in a stage, with gradually increasing sophistication. Alternatively, the same skills could be demonstrated with increasing independence. Teachers may instead decide to use the same assessment sheet over several years within a stage.

Instructional alignment

This strategy is designed to make children competent in nine developmental goals which will help them succeed.

Foundational academic skills	Goal 1	Goal 2	Goal 3
	Foundational academic excellence	Functional and professional English	Geographic information and mapping
Understanding and using technology	Goal 4	Goal 5	Goal 6
	Introduction to software logic	Understanding computer systems and networks	Digital literacy, E-safety and AI
Applying technology to agriculture	Goal 7	Goal 8	Goal 9
	Agricultural financial literacy	Agricultural science	Modern marketing and business

Assessment can be thought of as a hierarchy, aiming for these goals. This is known as **‘instructional alignment’**.

1. Overall strategy objectives (the nine development goals)
2. Development goals are achieved through children meeting **milestones** for understanding of each goal in each stage
3. Milestones are met by children achieving **assessment standards**
4. Assessment standards are met by children achieving **lesson success criteria**

COMPUTING/ICT ASSESSMENT IN PRACTICE

How do teachers carry out assessment of children's ICT work?

For each of the three stages: **foundation**, **intermediate** and **advanced**, a list of **teaching objectives** is provided at the end of each unit.

The teaching objectives form the basis of lessons.

Teaching objectives covered in this unit

Teaching objectives covered in this unit (highlighted)	
ICT Skills	Taught in lesson(s):
1. Turn a computer on and off safely. Log in and open apps and own work.	1
2. Use a mouse to left and right click and draw boxes to select items	1, 2
3. Use design tools to change shape and colour. Erase mistakes, use 'undo'	2
4. Type full sentences, using 'shift' to capitalise.	2, 3
5. Copy and paste with the mouse and keyboard shortcuts.	5
6. Open the internet, access bookmarks and type in a URL.	5
7. Create a word document with a title, appropriate layout and style.	6, 27
8. Create a PowerPoint presentation, adding pictures and a clear layout.	28, 29, 31
Digital literacy and E-safety	Taught in lesson(s):
1. Describe ICT rules in the school and at home	1, 2, 19
2. Give examples of being kind and unkind online, talk about why this matters.	21
3. Describe how technology can be used as part of a balanced lifestyle.	19
4. Give examples of personal information and say who we would not share this with.	20
5. Explain what to do if inappropriate content is viewed online, or if you feel uncomfortable.	20, 21
6. Name different ways of reporting problems or contact online.	20, 22
7. Perform an internet search and select reliable results.	23
8. Gather information from websites provided by the teacher.	4, 5, 7, 26
9. Give real-world examples of AI and explain AI as a machine algorithm.	24
Programming and computational thinking	Taught in lesson(s):
1. Describe events that start programs (clicking on the green flag, sensors, touch).	9, 12, 13, 14
2. Place commands in the correct sequence, explain the effects of changing a sequence.	9, 12
3. Program precise movement, using distance, degrees and x and y.	9, 12
4. Program looks to change over time creating smooth animations.	9, 11
5. Notice commands and sequences that repeat, optimise code using loops.	9, 16, 17
6. Recognise and use conditional language in an 'if/else' structure	9, 10, 15, 16
7. Recognise and use variables in a program, i.e. 'score'. Set and change variables.	10
8. Use computational thinking to approach problems logically, including debugging.	9, 16, 17



Assessment Sheet – Foundation Stage			
Student name:			
Date of assessment:			
Best fit assessment – for each of the six sections, choose the closest descriptor			
	Working towards expectations	Achieving expectations	Exceeding expectations
ICT Skills			
Understanding and controlling computers	Needs help switching on a computer and logging in to access work. Still typing mostly with index fingers. Can sometimes open apps by double clicking.	Switches a computer on and logs in independently. Types with all fingers from the home row, uses a mouse to open programs and navigate the internet.	Connects and controls peripherals (i.e. speakers, USB devices). Uses mouse and keyboard shortcuts to manipulate content.
Creative and effective digital expression	Includes text and images in a document and is starting to change looks and layout.	Types and selects text, changing font, colour, size and layout. Combines text with images in documents and presentations.	Formats text and images, showing awareness of design principles. Navigates to familiar websites and searches for information and images.
Digital literacy, AI literacy and E-safety			
Digital citizenship and online safety	Is aware of school ICT rules and why we follow these. Gives some examples of unkind behaviour online and examples of personal information.	Confidently refers to ICT rules in school. Gives examples of unkind behaviour online. Differentiates personal and non-personal information.	Explains the importance of school ICT rules. Finds and uses reliable information online.
Media literacy, AI literacy and ethics	Can give an example of an AI tool. Understands that AI is a machine and not a human. Knows that online information can be false.	Gives examples of AI tools in the world around them. Recognises false or misleading digital information.	Explains how AI tools work as an algorithm. Identifies signs of AI generated content.
Programming and computational thinking			
Programming logic and computational thinking	Uses an event block to start code. Programs simple code with several similar blocks.	Places events in a sequence. Programs precise movement. Uses loops and conditions to structure code.	Recognises and uses variables with confidence. Creates smooth animations by changing costumes.
Understanding computer systems and networks	Needs support to open and navigate the internet. Can work within one window or tab but needs help managing several.	Understand the term 'internet browser' and can open and navigate a browser independently. Uses windows and tabs.	Uses bookmarks in an internet browser. Connects devices to the internet.

To make assessment manageable for teachers assessing all children in the class, the teaching objectives are summarised in an **assessment sheet** for each child.

The assessment sheet allows teachers to make a judgement about children's work in the three strands of computing: **ICT**, **Digital Literacy** and **Programming and Computational Thinking**, which are each split into two areas.

This assessment grid is a **best fit matrix**. Teachers will consider the students' work and choose the statement that best matches what is observed.

TEACHING OBJECTIVES – FOUNDATION-STAGE SKILLS

Foundation level (age 7-9) – teaching objectives	
ICT Skills	Taught in lesson(s):
1. Turn a computer on and off safely. Log in and open apps and own work.	1
2. Use a mouse to left and right click and draw boxes to select items	1, 2
3. Use design tools to change shape and colour. Erase mistakes, use 'undo'	2
4. Type full sentences, using 'shift' to capitalise.	2, 3
5. Copy and paste with the mouse and keyboard shortcuts.	5
6. Open the internet, access bookmarks and type in a URL.	5
7. Create a word document with a title, appropriate layout and style.	6, 27
8. Create a PowerPoint presentation, adding pictures and a clear layout.	28, 29, 31
Digital literacy, AI literacy and E-safety	Taught in lesson(s):
1. Describe ICT rules in the school and at home	1, 2, 19
2. Gives examples of being kind and unkind online, talk about why this matters.	21
3. Describe how technology can be used as part of a balanced lifestyle.	19
4. Give examples of personal information and say who we would not share this with.	20
5. Explain what to do if inappropriate content is viewed online, or if your feel uncomfortable.	20, 21
6. Name different ways of reporting problems or contact online.	20, 22
7. Perform an internet search and select reliable results.	23
8. Give real-world examples of AI and explain AI as a machine algorithm.	4, 5, 7, 26

Programming and computational thinking	Taught in lesson(s):
1. Describe events that start programs (clicking on the green flag, sensors, touch).	9, 12, 13, 14
2. Place commands in the correct sequence, explain the effects of changing a sequence.	9, 12
3. Program precise movement, using distance, degrees and x and y .	9, 12
4. Program looks to change over time creating smooth animations.	9, 11
5. Notice commands and sequences that repeat, optimise code using loops.	9, 16, 17
6. Recognise and use conditional language in an 'if/else' structure	9, 10, 15, 16
7. Recognise and use variables in a program, i.e. 'score'. Set and change variables.	10
8. Use computational thinking to approach problems logically, including debugging.	9, 16, 17

FOUNDATION-STAGE ASSESSMENT

Assessment Sheet – Foundation Stage			
Student name:			
Date of assessment:			
Best fit assessment – for each of the six sections, choose the closest descriptor			
	Working towards expectations	Achieving expectations	Exceeding expectations
ICT Skills			
Understanding and controlling computers	Needs help switching on a computer and logging in to access work. Still typing mostly with index fingers. Can sometimes open apps by double clicking.	Switches a computer on and logs in independently. Types with all fingers from the home row, uses a mouse to open programs and navigate the internet.	Connects and controls peripherals (i.e. speakers, USB devices). Uses mouse and keyboard shortcuts to manipulate content.
Creative and effective digital expression	Includes text and images in a document and is starting to change looks and layout.	Types and selects text, changing font, colour, size and layout. Combines text with images in documents and presentations.	Formats text and images, showing awareness of design principles. Navigates to familiar websites and searches for information and images.
Digital literacy, AI literacy and E-safety			
Digital citizenship and online safety	Is aware of school ICT rules and why we follow these. Gives some examples of unkind behaviour online and examples of personal information.	Confidently refers to ICT rules in school. Gives examples of unkind behaviour online. Differentiates personal and non- personal information,	Explains the importance of school ICT rules. Finds and uses reliable information online.
Media literacy, AI literacy and ethics	Can give an example of an AI tool. Understands that AI is a machine and not a human. Knows that online information can be false.	Gives examples of AI tools in the world around them. Recognises false or misleading digital information.	Explains how AI tools work as an algorithm. Identifies signs of AI generated content.
Programming and computational thinking			
Programming logic and computational thinking	Uses an event block to start code. Programs simple code with several similar blocks.	Places events in a sequence. Programs precise movement. Uses loops and conditions to structure code.	Recognises and uses variables. Creates smooth animations by changing costumes.
Understanding computer systems and networks	Needs support to open and navigate the internet. Can work within one window or tab but needs help managing several.	Understand the term 'internet browser' and can open and navigate a browser independently. Uses windows and tabs.	Uses bookmarks in an internet browser. Connects devices to the internet.

TEACHING OBJECTIVES – INTERMEDIATE-STAGE SKILLS

Intermediate level (age 10 – 12) – teaching objectives	
Pupil name:	
Year assessment carried out:	
ICT Skills	Skills taught in lesson(s):
1. Name the core parts of a computer. Manually connect and configure external devices (i.e. Speakers, mouse, Microbit).	1, 3
2. Navigate Windows file systems; create, rename and organise files and folders.	1
3. Use a full range of keyboard shortcuts (Ctrl+v, x, c, z, y, b, l, a).	2
4. Type accurately at a speed of 20 words per minute using two hands and correct home row positioning.	2
5. Navigate an internet browser, using back/refresh buttons, managing bookmarks, windows and multiple tabs.	2, 4, 5, 7, 9
6. Create advanced text documents using formatting tools, text boxes, images, tables and using proofreading tools.	6, 8, 10, 34
7. Create a dynamic presentation using unified styles, lists, diagrams, slide transitions and animations.	33
8. Create digital designs with precision using object grouping, custom layer fills and alignment tools.	33
9. Add data to a spreadsheet and use basic formulas (=SUM)	29
10. Generate graphs and tables to view and interpret data	30, 31
Digital literacy, AI literacy and E-safety	Skills taught in lesson(s):
1. Explain some ICT rules beyond school, i.e. copyright, age limits.	1, 26
2. Explain the concept of a 'digit footprint' and its effects.	24
3. Explain the effects of sharing personal information online.	24
4. Give clear examples of cyberbullying and articulate its emotional and legal consequences.	25
5. Describe how technology can be used in a healthy lifestyle.	25
6. Explain a procedure for reporting inappropriate content, contact and grooming online.	27
7. Critically assess the reliability, origin and trustworthiness of internet search results rather than clicking the first link.	28, 29
8. Identify advanced generative AI tools and their effects in society. Explain how AI and machine learning works using algorithms.	28, 29
9. Identify issues relating to misuse of AI including bias, deepfake misinformation, and issued with how AI-generated text can confuse younger users	28,29

Programming and computational thinking	Skills taught in lesson:
1. Explain the difference between ‘input’ and ‘output’; give algorithms for both and program inputs and outputs in physical devices and in on-screen environments.	14, 19, 20
2. Program precise movement using positive and negative values.	16, 18, 18
3. Use ‘wait’ commands in programs to improve results.	15,19
4. Use different types of loops, i.e. nested lops, repeat until loops.	14, 21
5. Use an ‘if, elif, else’ conditional structure; use nested conditions.	15, 19, 20
6. Create more than one variable for a program, program movement by a variable amount.	14, 15, 16
7. Independently decompose problems, look for repetition and debug.	15, 17, 18
8. Debug logically, based on behaviour. Identify sections of code that work.	14, 17, 18
9. Explain the components that make up a computer network and explain how data is transmitted across networks including the internet. Differentiate the internet from the world wide web.	22
10. Explain how search engines work and rank web pages (keywords, algorithms, paid ads), select reliable results.	23

INTERMEDIATE-STAGE ASSESSMENT

Assessment Sheet – Intermediate Stage			
Student name: Date of assessment: <i>Best fit assessment – for each of the six sections, choose the closest descriptor</i>			
	Working towards expectations	Achieving expectations	Exceeding expectations
ICT Skills			
Understanding and controlling computers	Cans switch on a computer but sometimes needs help opening work. Can use bookmarks to open internet pages. Uses shift to capitalise letters.	Name the key components of a computer. Use keyboard shortcuts and the mouse to navigate Windows and the internet. Typing accurately using 2 hands.	Independently navigates Windows, creating folders to save and organise work. Controls parts of a computer confidently, including Wi-Fi connections
Creative and effective digital expression	Creates functional documents and presentations using text media. Uses proofreading tools. Uses 'undo' to fix mistakes.	Uses formatting tools to create clear and effective documents and presentations. Adds data to a spreadsheet and uses the =SUM() formula.	Uses principles of design to creates documents and presentations that are visually appealing and effective, incorporating images and graphs.
Digital literacy, AI literacy and E-safety			
Digital citizenship and online safety	Follows ICT rules in school and gives equivalent rules for home. Recognises situations where we should ask for adult help. Types kind comments online.	Gives examples of rules for using technology beyond school and ways to protect personal information. Explains types of cyberbullying and reporting procedures.	Demonstrates a healthy and mature attitude to using technology, being a role model for others. Makes good decisions about screentime and online behaviour.
Media literacy, AI literacy and ethics	Recognises AI search results. Recognises that talking to an AI is not the same as talking to a human. Knows age-limits for using AI tools.	Assesses the reliability of internet sources, including AI results. Explains machine learning in terms of algorithms. Identifies bias and issues around misinformation.	Talks with confidence about issues relating to bias and misinformation and ways to avoid these. Critiques the role of AI in society.
Programming and computational thinking			
Programming logic and computational thinking	Programs movement with growing precision, often using a 'trial and error' approach. Uses loops for repetition.	Identifies input and outputs. Uses conditions and variables with sensor devices. Debugs logically, based on behaviour.	Uses nested loops and conditions. Controls movement by a variable. Breaks sections of code down to debug.
Understanding computer systems and networks	Describes the key components of a network in the environment around them.	Describes the components of a computer network. Explains search engine result ranking.	Differentiates the internet from the world wide web. Suggests ways that networks can be configured effectively.

TEACHING OBJECTIVES – ADVANCED-STAGE SKILLS

Advanced level (age 13 – 16) – teaching objectives	
ICT Skills	Lesson(s):
1. Type accurately, at a speed of 30wpm, using both hands correctly	3
2. Master advanced file systems/: identify structural extensions (.py, .csv, .pdf, .zip) and manage local desktop vs. cloud directory.	1
3. Establish physical hardware connections using both Bluetooth and USB, connect a Microbit to another Microbit via radio	28
4. Create multi-page documents including custom page margins, table of contents, text alignment adjustments, page breaks.	2
5. Design agricultural data models in a spreadsheet using comparative operators and complex, conditional formulas, e.g. SUM, AVERAGE, COUNTIF.	37, 38
6. Deliver a high-impact presentation designed for a target audience using design tools and following conventions.	9, 10
7. Use principles of graphics design to create 2D images, i.e. alignment, contrast.	40, 41, 42
8. Use sophisticated, interactive online tools to research and critically evaluate information using this to further learning and investigations and create original content	4, 5, 6, 7, 8, 11, 12, 39
Digital literacy, AI literacy and E-safety	Lesson(s):
1. Explain specific legal frameworks governing technology use. Contrast open-source content with copyright infringement.	1, 31
2. Describe and utilise strategies to identify and counter the effects of screen-addiction.	32
3. Analyse the effects of digital harassment, describing protocols to mitigate and report cyberbullying.	32
4. Cross reference primary sources to spot digital manipulation, deepfakes and automated disinformation campaigns.	33
5. Evaluate the local and global economic impacts of automation and artificial intelligence on rural labour markets and agricultural supply chains.	35
6. Outline the structural mechanics of machine learning, explaining concepts behind algorithms (i.e. decision trees and data pattern recognition).	34, 35
7. Critique the risks of modern generative models, covering training bias, data leaks, security risks and cognitive offloading.	36
8. Navigate the psychological hazards of anthropomorphised AI, explaining the risk of users forming inappropriate attachments to digital conversational agents.	36

Programming and computational thinking	Lesson(s):
1. Open an IDE (i.e. https://python.microbit.org/v/3/) and initialise a new script by importing the core hardware library (from microbit import *)	13
2. Use inputs (i.e. button_a.is_pressed()) and display output dynamically using the LED matrix (display.show()) and text scrolling	24, 25, 26
3. Use the built in functions in Python, including print(), input() and time.sleep()	13, 14
4. Read, process and convert analogue environmental inputs from alligator clip probes and onboard sensors (light, temperature, accelerometer)	25, 26
5. Use conditional structures (if, elif, else) and relational operators (<, =, >) to trigger outputs	15, 16
6. Use 'or', 'and', 'not' logic in conditional code and construct truth tables to map hardware decision making	16
7. Program text-based looping structures (while True: and for I in range()), use timing controls (sleep()) and break commands to manage iteration	17, 18
7. Notice examples of variables in text-based code. Define and call variables within a program	14, 15
8. Construct and manipulate lists to store sequential datasets (e.g. calculating daily soil temperature)	22, 23
9. Use functions to organise code logically, defining and using functions that accept parameters, execute instructions and return processed data values	19, 20, 21
10. Use the radio module to transmit and receive data packets between multiple Microbits	28
11. Use on-screen information to identify types and locations of bugs	13 - 28
12. Convert values between binary and decimal, explaining how sensor readings are stored in digital memory	
13. Apply standard searching (linear) and sorting techniques to process and organise datasets of sensor or spreadsheet data	27
14. Explain how information is sent over networks using packets and network topology.	29, 30

ADVANCED-STAGE ASSESSMENT

Assessment Sheet – Advanced Stage			
Student name: Date of assessment: <i>Best fit assessment – for each of the six sections, choose the closest descriptor</i>			
	Working towards expectations	Achieving expectations	Exceeding expectations
ICT Skills			
Understanding and controlling computers	Types using more than one finger, with growing accuracy. Uses bookmarks and files to organise work with growing independence.	Types accurately, at or close to 30 wpm using both hands. Uses file hierarchy and understands file extensions.	Takes on a leadership role in setting up and using computers and peripheral devices. Types accurately at a minimum of 30wpm with two hands.
Creative and effective digital expression	Uses document and spreadsheet software to convey ideas, creating documents that are clear but lacking in detail and design elements. Uses basic formulas in spreadsheets.	Creates multi-page documents and presentations, showing awareness of needs of a reader. Uses a range of formulas effectively in a spreadsheet.	Combines media with data and charts from spreadsheets to create clear and effective presentations. Understands and uses principles of graphics design.
Digital literacy, AI literacy and E-safety			
Digital citizenship and online safety	Uses reliable websites to source information and follow copyright rules. Distinguishes between kind and unkind online behaviour.	Contrasts open-source and copyright material. Uses technology safely and healthily, taking measures to prevent and report cyberbullying.	Leads others in using technology safely and healthily. Takes steps to prevent cyberbullying and demonstrates digital citizenship.
Media literacy, AI literacy and ethics	Recognises uses of AI in society, including in search results. Gives examples of issues associated with AI including reliability, bias and safety.	Gives examples of impact of AI in education and industry. Critically evaluates AI content for bias and misinformation. Explains algorithms behind machine learning.	Explains ways in which AI tools can be used for positive effects, locally and in society. Cross references sources on information.
Programming and computational thinking			
Programming logic and computational thinking	Uses an IDE to write code in Python, with mostly accurate syntax. Uses the print and input functions. Beginning to use loops and conditions.	Types code in Python, with accurate syntax. Uses variables, loops and conditions in Python. Debugs independently using onscreen prompts.	Organises code in Python using functions with parameters. Uses a range of Boolean logic (not, or). Controls sensors and outputs on devices.
Understanding computer systems and networks	Names some of the components of a network and beginning to talk about how they function.	Connects devices to a school network. Describes how data travels over a network.	Explains the benefits of different network topologies in relation to surroundings.