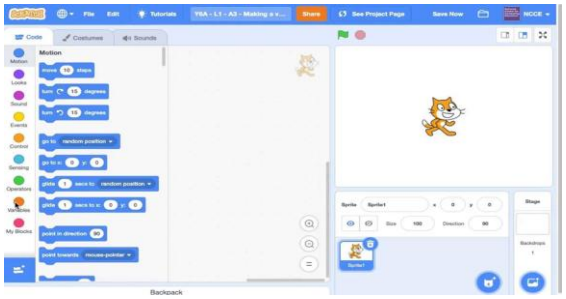
Jeavons Wood
Primary School

Knowledge Organiser for Year 6

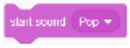
Big question: How can using variables help us design and improve interactive programs like games?

KS2 National curriculum specification
• Design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts • Use sequence, selection, and repetition in programs; work with variables and various forms of input and output • Use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs • Select, use and combine a variety of software (including internet services) on a range of digital devices to design and create a range of programs, systems and content that accomplish given goals, including collecting, analysing, evaluating and presenting data and information



In this unit, the children will:
Define a 'variable' as something that is changeable
Explain why a variable is used in a program
Choose how to improve a game by using variables
Design a project that builds on a given example
Design to create a project
Evaluate my project

Key vocabulary:	
Programming	Giving a computer instructions to follow so it can complete a task.
Variable	A placeholder in a program that stores information which can change, like a score or a name.
Scratch	A visual programming language where you create programs by joining blocks together.
Events	Actions that trigger something to happen in a program.
Code	The set of instructions written in a programming language that tells a computer what to do.
LED	A small light called a **Light Emitting Diode** that can turn on or off in electronic projects.
Algorithm	A step-by-step set of instructions to solve a problem or complete a task.
Motor	A device that turns electricity into movement, often used in robotics.
Modify	To change or improve something, like adjusting your program to make it better.
Debugging	Finding and fixing mistakes (bugs) in your code so the program works correctly.

Basic Variables	More Complex Variables
Variables: A variable is something that is changeable. A variable can be set and changed throughout the running of a program. In computer programming we use variables to store information that might change and can be used later in our program. E.g. in a game a variable could be the current score of the player; we would add 1 to the variable whenever the player gained a point.  **Making Variables in Scratch – The Basics** -Select 'Variables' (dark orange circle) from the menu on the left. Either choose from the available variables or 'Make A Variable.' -Select 'Events' (light orange circle) from the menu on the left. Choose what needs to happen for the variable to change. E.g.'When this sprite clicked' or 'when space key pressed.' -Select 'Variables' again from the menu on the left. Choose what will happen when the event happens, e.g. 'change score by 1' (to add a point) or 'change score by -1' to remove a point.	- Variables should always have a value and an appropriate name. -**Adding Callouts:** Select 'Looks' from the menu on the left. Add it to the variable program. Edit the text to change the callout.  -**Adding Motion:** Many games require sprites to change position. This is achieved using the 'Motion' commands. Select 'Motion' from the menu on the left. Choose from the available motion commands.  -**Adding Motion:** Many games require sprites to change position. This is achieved using the 'Motion' commands. Select 'Motion' from the menu on the left. Choose from the available motion commands.  -**Adding Comments:** Comments are a good way of showing that you understand what your code is doing. Right click on the block that you want to comment on, and add in your comment. 
Sequencing and Algorithms	Trialling and Debugging
-A **sequence** is a pattern or process in which one thing follows another. -We design **algorithms** (sets of instructions for performing a task) to help us program sequences involving multiple output devices (e.g. LEDs and motors).  -**Programming** is the process of keying in the code recognized by the computer into the software (using your algorithm).	-Programmers do not put their computer programs straight to work. They **trial** them first to find any errors:  -Sequence errors: An instruction in the sequence is wrong or in the wrong place. -Keying errors: Typing in the wrong code. -Logical errors: Mistakes in plan/thinking. -If your algorithm does not work correctly the first time, remember to **debug** it.

Teacher Information:	
Subject Knowledge	This unit focuses on developing learners' understanding of variables in Scratch, a block-based programming language. It emphasises where variables can be used and how they can be set and changed through the running of a program. **Variables** You need to be aware of the concept of variables in programming. In this lesson, a 'variable' is defined as something that can be set and changed throughout the running of a program. You need to know that a variable is a placeholder for a single value in the memory of a computer, and that all variables are uniquely named. You need to know that when the value of a variable is updated, the original value is replaced.

	Continual Professional Development Enhance your subject knowledge to teach this unit through the following free CPD: • Getting started in Year 6 • Introduction to primary computing • Teaching programming using Scratch and Scratch Jr • Introduction to Programming with Scratch
Progression	This unit assumes that learners will have prior experience of programming using block-based construction (e.g. Scratch), understand the concepts of 'sequence' (Year 3 units: Sequencing Sounds and Events and actions in programs), 'repetition' (Year 4 units: Repetition in shapes and Repetition in games), and 'selection' (Year 5 units: Selection in Physical Computing and Selection in quizzes). The constructs covered in the previous year groups will include at least one unit that develops the concept through the use of Scratch.
Resources	Learners will need to have access to Scratch for this unit. The online version of Scratch runs via a web browser and can be accessed on desktops, laptops and tablets. You may want to consider setting up a teacher account, to create logins for learners to save and access their projects. If internet connectivity is an issue in school, Scratch can be accessed offline via the Scratch app.
Misconceptions	When introducing variables, it is important to ensure that learners understand the meaning of the word within programming, as they are likely already familiar with the word from Science where it has a slightly different meaning. To avoid misconceptions forming, pupils need to know that a variable holds a piece of data, it can only hold one piece of data at once and this can change throughout the program. The analogy of a small box is often used to help pupils understand variables – the box can hold a piece of data, but because it is small, we have to get rid of the last piece of data to put a new one in. The box can only hold one piece of data. We can replace it, but it can only ever fit one piece of data in. Sticky notes are also used in the unit to demonstrate this. Ensure pupils remove the last sticky note before placing their new one, to demonstrate that the last value is gone. Score is often used to introduce variables, and is used in this unit. This is because score is a familiar variable that pupils have likely experienced before. However, it is important to emphasise that score is one example of a variable, but that not all variables are 'score'. This is covered in lesson two, but as score is used many times throughout the unit as a familiar example, pupils would benefit from being reminded of this.