Computing – Year 6

Spring 2	Programming B - Sensing					
Prior learning	This unit presumes that pupils are already confident in their understanding of sequence, repetition and selection independently within programming. If pupils are not yet ready for this, you may wish to revisit earlier programming units where these constructs are introduced. Programming units have been done in every year from year 1.					
Lesson objective	To create a program to run on a controllable device	To explain that selection can control the flow of a program	To update a variable with a user input	To use a conditional statement to compare a variable to a value	To design a project that uses inputs and outputs on a controllable device	To develop a program to use inputs and outputs on a controllable device
Key vocabulary	Micro:bit, MakeCode, input, process, output, flashing, USB, trace	Selection, condition, if then else, variable, random	Input, selection, condition, variable, sensing, accelerometer, value	Compass, direction, variable, navigation	Micro:bit, design, task, algorithm, variable, step counter	Plan, create, code, test, debug
Creative context	Real-world links / careers: **Software developer / embedded systems engineer** (programming devices that interact with the physical world (e.g. wearables, smart devices)), **Product designer** (designing and testing prototypes using sensors and programmable hardware), **Data analyst / sports technologist** (using step counters and movement data to track performance and activity), **Robotics and automation** (using inputs, variables, and selection to control automated systems). **Links to other subjects: Science** (sensors, forces, movement, data collection, and measuring acceleration), **Mathematics** (variables, comparison operators, ranges of values, and logical reasoning), **Design & Technology** (iterative design, prototyping, testing, and evaluating products), **PE (** step counting, movement tracking, and fitness data), **Geography** (navigation and compass directions). Videos: https://youtu.be/UT35ODxvmS0, https://www.youtube.com/watch?v=u2u7UJSRuko, https://www.youtube.com/watch?v=NkoS2JXaBuM,					
Substantive knowledge	I know that a micro:bit is a programmable device that follows an input, process, output model. I know that the micro:bit has different components, including LEDs, buttons, and an accelerometer. I know that programs for the micro:bit can be created using the MakeCode block-	I know that selection allows a program to make decisions and follow different paths. I know that 'if, then, else' statements are used to test conditions with true and false outcomes. I know that variables can store values that influence decisions in a program.	I know that a variable is a value that can be set and updated while a program is running. I know that different inputs, such as buttons and movement, can be used to change a variable's value. I know that checking a variable in a program does not change its value.	I know that comparison operators are used to compare a variable to a value. I know that compass directions can be represented using ranges of values. I know that the order of conditions affects how a program behaves.	I know that controllable devices use inputs, processing, and outputs to perform a task. I know that sensors, such as an accelerometer, can be used to detect movement. I know that variables are used to store and display data in a program.	I know that a controllable device uses inputs, processing, and outputs to perform a function. I know that programs can be tested using an emulator and on physical hardware. I know that bugs can occur due to code logic or input sensitivity.

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	based programming environment.					
Disciplinary knowledge	I know how to create a simple program using block-based code in a new programming environment. I know how to test a program using an emulator before running it on physical hardware. I know how to transfer (flash) a program onto a controllable device so it runs independently.	I know how to identify conditions and decisions in real-world situations. I know how to use a variable within an 'if, then, else' statement to control program flow. I know how to determine and trace the flow of a program that uses selection.	I know how to use conditions to update a variable based on a user input. I know how to experiment with different physical inputs, including the accelerometer, to control a program. I know how to trace a program to explain when and why a variable's value changes.	I know how to use comparison operators within an if, then statement to control program flow. I know how to order else, if conditions correctly so a program produces the intended outcome. I know how to modify an existing program to achieve a different result.	I know how to decide which variables are needed for a project. I know how to design an algorithm that meets a project brief. I know how to design and trace the program flow for a project that uses selection.	I know how to create a program based on a design specification. I know how to test my program against my design and identify errors. I know how to use different debugging strategies to find and fix bugs.
Recorded learning	Pupils will create, test, and run a simple MakeCode program on a micro:bit, using both the emulator and the physical device.	Pupils will create and test a micro:bit program that uses selection and variables to produce different outcomes based on a random value.	Pupils will create and test a program that updates a variable using different micro:bit inputs and explains how the variable behaves when it is checked.	Pupils will modify a program to use comparison operators and correctly ordered conditions to create a working micro:bit compass.	Pupils will design the variables, algorithm, and program flow for a step counter project using micro:bit inputs and outputs.	Pupils will create, test, and debug a micro:bit step counter program using both the emulator and a physical device.
Outcome for unit	The coding for the microbit programs should be saved as .hex files into their student accounts. End of unit evaluation – Please complete the teacher/self evaluation slide for this unit (the slide is in the folder), by writing their names in the correct boxes.					
Future learning	This programming unit should prepare them for programming units they will complete in KS3.					