Lesson 4 - Variables, Selection, Incrementing a Stored Value and Loops

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| The Big Picture – Why Is This Relevant? | Learning Objectives |
| * Functions and variables are staples of any program. This lesson explores how to use inputs to write to and overwrite the contents of a variable. This is a useful skill for the healthy eating quiz project * Many devices respond to being ‘touched’ – your phone screen, heating controls and also alarm systems. We can use the pins on the micro:bit to sense and respond to events | * Know what a variable is * Create a variable * Use selection, buttons and variables to keep a running total, similar to that used in a game * Understand the function of the pins and some of the uses * Wire up a circuit using the pins and program a response * Apply understating to build a simple alarm system |
| Engagement – How Can I Engage Learners? | Assessment for Learning |
| * Begin the lesson with some boxes and Learners to label or name them. Then invite them to write their name on a piece of paper and place it in one of the boxes. Discuss how this is now a variable, it contains a data which can be read, deleted or edited. * Demonstrate the ‘touch a micro:bit’ program * Learners share stories about triggering an alarm * Build an alarm system to secure the classroom, or a desk or even their bag. | **Expected Progress:**   * Learners can create a variable * Learners build the simple circuit * Learners adapt the responses   **Good Progress:**   * Learners update variables using the buttons * Learners add and subtract values from a variable * Learners use a loop in the program * Learners apply circuit to build an alarm   **Exceptional Progress:**   * Learners use selection to update and edit the values stored in a variable * Learners add the use of an additional pin |
| Links to KS3 Programme of Study | |
| * design, use and evaluate computational abstractions that model the state and behaviour of real-world problems and physical systems * use 2 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 * understand the hardware and software components that make up computer systems, and how they communicate with one another and with other systems | |
| Key Concepts | Key Words |
| * Learning what the role of variables is * How to update the value or contents of a variable * What are pins * Using loops, responses and circuits | * Variable * Selection * Increment * Pins * Looping * Circuit |
| Differentiation | Resources |
| When completing the activity, check for the indentation levels as this will stop the program from working.  Pair Learners up to support those slower at typing out the program code.  Most learners will be able to follow the initial program and then personalise it. Setting up the circuit could be done in pairs for support. Learners may need support with the indentation as more lines are code are used in the program. | * Lesson 4 ppt * Lesson 4 Activity Sheet * Sample Python code * 1 micro:bit per learner * 1 USB cable to connect the micro:bit to a PC * A PC * Access to [micro:bit Python Editor (microbit.org)](https://python.microbit.org/v/3) * Crocodile clips * Tin foil * Sticky tape |
| Lesson Flow | |
| * Teacher recaps what a variable is. Discuss how variables are similar to boxes that can store data. Use box example to identify what the variable is called, and what is stored on the variable. * Learners identify the difference between the two programs in the activity * Learners build program that keeps a running total stored in a variable based on which button is pressed * Learners adapt program to add questions and then use buttons to respond and store answer. This supports the basics of the Healthy Eating Quiz Project * Introduce the pins on the micro:bit and talk through the various features * Demonstrate the ‘touch’ program * Learners build their own version * Recap the use of the ‘loop’ and what it does in the program * Introduce what an alarm is, Learners could feedback their experiences of alarms (fire drill) * Show how an alarm circuit can be set up * Learners work through the activity sheet independently creating their own alarm system. Teacher intervenes where appropriate * Encourage more advanced learners to attempt the Stretch Tasks once they complete main task * Teacher asks learners for feedback on what they have learned in the lesson | |
| Making | |
| * A circuit that enables to micro:bit to respond to being touched * An alarm that is triggered by the circuit breaking | |