**Electrical conductors**

**Lesson 3: Inputs**

**Introduction**

In this lesson, pupils are introduced to inputs using the MakeCode editor. They use an experimental (‘tinkering’) approach to discover a range of inputs on the BBC micro:bit and use their knowledge of selection to record their findings using decision boxes.

**Time:** @60 minutes

**Learning objectives**

* To review outputs
* To understand what inputs are
* To use tinkering to find inputs on the BBC micro:bit
* To represent selection with inputs using decision boxes

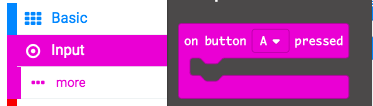
**Materials needed:** laptops/computers with access to the MakeCode editor, printouts of slides 12 and 13, lesson presentation, input-support hex file.

**Lesson summary**

1. Introduction: Introducing inputs (15 minutes)
2. Exploring inputs (30 minutes)
3. Reviewing inputs (15 minutes)

**Introduction: Introducing inputs (15 minutes)**

* Use **slide 3** to review pupils’ understanding of outputs and to identify that the micro:bit’s LEDs are an example of an output.
* Show pupils the program written with the MakeCode editor on **slide 4**. Ask pupils to predict what output the micro:bit will show and how this can be changed. [Click on the link to go to the MakeCode editor](https://makecode.microbit.org/#pub:_03F12hWbDUEC) to test out pupils’ ideas (see slide notes for the answer).
* Ask pupils to predict in which menu the *‘on button A pressed’* block can be found and to explain why they think that. (It is in the Input menu, which is the same colour).

* Use **slide 5** to introduce the term **inputs** and explore pupils’ understanding by asking them to identify everyday input example (volume buttons on TV, microphone on digital assistant, touch-screen on smartphone).

**Exploring inputs (30 minutes)**

* Recap selection (**slide 6**) and invite ideas on how the program on slide 4 used selection. (When button A is pressed, the micro:bit displays a smiley face, if it is not pressed it will display a sad face). Lead pupils to identify that the image displayed is an output.
* Display **slide 7** and ask pupils to identify what information needs to be placed in each part of the diagram to create the algorithm for the program. Discuss how the LED planner (**slide 8**) could be used to show the images that will be displayed.
* Explain to pupils that button A is one of several inputs on the micro:bit and they are going to tinker with the MakeCode editor to find out different inputs they can use to start programs.
* Explain that every time they find a way of starting the program with a new input, they should record it using the decision box recording sheet. Provide pupils with a number of copies of the decision box recording sheet and the LED planner (**slides 12 and 13**).
* Give pupils time to work in pairs using the MakeCode editor to explore different ways of starting programs with inputs and to record the selection involved. Explain to pupils that some of the inputs can only be used using the physical micro:bit itself. Exploring the additional inputs that required the use of the micro:bit hardware is suggested as a stretch and challenge task.

**Reviewing inputs (15 minutes)**

* Recap pupils’ learning by inviting them to share what they have discovered about inputs.
* Invite pupils to use the MakeCode editor and the whole class display screen to modify the [program](https://makecode.microbit.org/#pub:_03F12hWbDUEC) used in the introductory activity to use a different input.
* For each input, ask other pupils to identify what the condition that is needed to be met is and what the outputs will be if the condition is/isn’t met.
* Revisit the learning objectives on **slide 11** if you wish.

**Extension ideas**

Pupils could write a how to guide that explains the different ways of starting programs using the micro:bit’s inputs, or they could build on their learning from the volcanic eruption animation unit and modify their programs so that each stage of the animation in started by an input.

**Differentiation**

**Support:** Pupils could be given a program with the blocks and the structure already selected from the menus. Pupils would swap the blocks over to test out different inputs. You can import the **input support hex file** into the MakeCode editor from the lesson downloads folder to support this.

**Stretch & challenge:**

Pupils could explore how to combine the different ways they found to start programs into one program - an example is included in the lesson downloads folder (**extending inputs hex file**). If you have access to physical micro:bits, pupils could explore additional inputs linked to the movement of the micro:bit (tilt left, logo down, etc.).

**Opportunities for assessment**

* Informal assessment of pupils’ understanding of inputs through class, group and paired discussion.
* More formal assessment of pupils’ use of decision boxes to represent inputs and selection.