

Lesson Plan

Description
 Input and output in coding refers to the communication between a program and its user. Input is given to the program, while output is given to the user. Sometimes an input can be a movement, other times an output can set an object into movement. This lesson uses the Microbit to demonstrate movement associated with inputs and outputs.

<p>Learning Outcomes</p> <ul style="list-style-type: none"> Inputs are commands that are given to a program Outputs are given to the user Coding programs have at least one input and output Inputs and outputs can be associated with movement 	<p>Specific Expectations</p> <p>A2.1 write and execute code in investigations and when modelling concepts, with a focus on testing, debugging and refining programs</p> <p>C2.3 describe how different forces applied to an object, including forces of varying magnitude, can cause the object to start, stop, or change its direction, speed, or shape</p>
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Introduction

At its simplest, coding is how we communicate with computers using a set of instructions it can understand. The process of giving instructions to a computer is called input. This is the user giving the computer commands so that it knows the actions to take. A computer program can't run without an input. Computers then take that input and performs an action for the user to see. It may display an answer to a calculation, start a motor, turn on lights, or any number of other actions. These visible actions that we see are what is called an output. The whole purpose of a program is to have one or many outputs, making it equally important.

Understanding some of the different forms of input and output will give students a deeper understanding of what they can do when they code. In this lesson, some of those various inputs or outputs are explored, specifically ones that are associated with movement. Movement can be used to give the computer commands, and movement can be the result of a program as well. The MicroBit has a built-in accelerometer, which makes it a handy tool to explore motion and movement with coding, which is what we'll do in this lesson.

Materials

Here are the materials needed for this lesson plan:

- Computer or laptop
- Class-set of MicroBits

Action

This lesson is broken into three parts that demonstrate how motion can be used with various inputs and outputs using the Microbit.

Part 1: Input and Output with Arrows

The MicroBit is a very useful tool thanks to its built-in accelerometer. The accelerometer can track the movement of the Microbit and use it as an input. The different movements with the MicroBit give it functionality. With this first part, students will associate four different movements (inputs) with a directional arrow (outputs):

- Tilt left: display West arrow
- Tilt right: display East arrow
- Logo up: display North arrow
- Shake: display South arrow

Refer to the Coding Guide document for how to do this activity with the MicroBit.

Extension: Challenge students to display an image (smiley face, check mark, etc.) when the MicroBit is not displaying the four directional arrows as outputs.

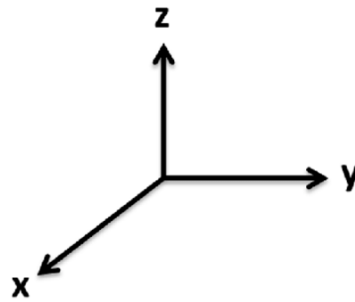
Part 2: Acceleration in the X, Y and Z Directions

The accelerometer in the MicroBit is sensitive enough that it can recognize the direction of the acceleration, whether it be in the X direction, Y direction or Z direction. In this part of the activity, students will use the plot feature to determine what these directions represent:

- Plot acceleration in the X direction
- Plot acceleration in the Y direction
- Plot acceleration in the Z direction

Refer to the Coding Guide document for how to do this activity with the MicroBit.

Students should observe that the X and Y directions are horizontal while the Z direction is vertical.



Part 3: Motion Sensor

In the final part of the lesson, students will use the MicroBit as a motion sensor. Their task will be to create a program that sends a message when movement is detected. This uses the radio feature that’s built into the MicroBit to relay a message to another MicroBit. This use of an output from one Microbit to an input in the other gives even more versatility.

Refer to the Coding Guide document for how to do this activity with the MicroBit.

Consolidation/Extension

There are many different inputs and outputs that can be used with a MicroBit. Challenge students to explore more of these inputs and outputs and to think of how they can be used.

An invention challenge can be a good way to promote creative thinking and coding skills. Have students try to create a device of their own using the MicroBit that responds to motion. Lights could turn on with a shake, sound can be played with a drop, etc.

Accommodations/Modifications

- Assign students a partner or into groups to facilitate the activities
- Programs can be started with blocks of coding to facilitate the coding piece
- The first part of the activity can be coded without a MicroBit, using the emulator

Assessment

Teachers can monitor the student work as *Assessment for Learning*. Gather information from the students throughout the activity to gauge their level of understanding.