

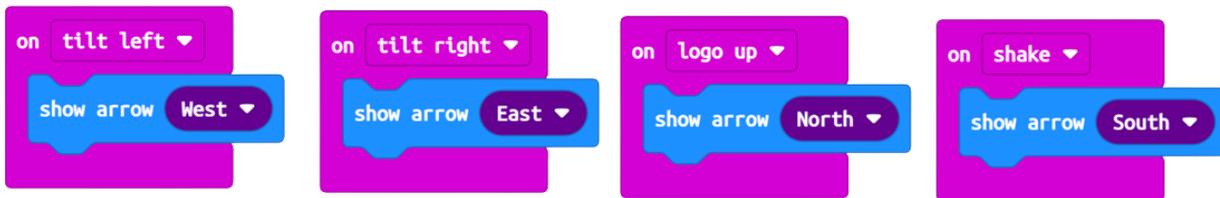
Input, Output and Movement	Grade 3 Forces and Motion
Coding Guide	

Part 1: Input and Output with Arrows

The first coding task will be to 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

This can be coded on a MicroBit as one program using the following code:



The extension for this activity includes displaying a symbol while the MicroBit is not being coded. For this, students will need to use conditional If statements such as what is shared below:

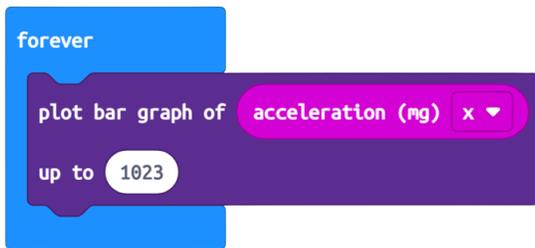


Part 2: Acceleration in the X, Y and Z Directions

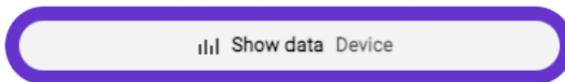
The second coding task requires students to use the plot feature to determine what these directions represent:

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

This can be done by using the code below. The example is done for the X-direction. Students will need to use the drop-down arrow and re-run the program for the other directions:



To get a plot of the acceleration and better understand the direction being monitored, students will need to connect the MicroBit to the computer, and when it is running, click the Show data Device option (not the Show data Simulator) button:



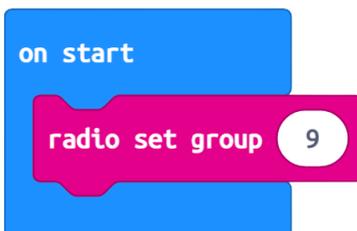
Students should observe:

- X-direction: acceleration in the left and right direction
- Y-direction: acceleration in the forward and backward direction
- Z-direction: acceleration in the up and down direction

Part 3: Motion Sensor

For the third coding task, students will need two MicroBits. They can work in groups for this. One MicroBit will send a radio message when it detects motion, the other will receive the radio message and display a warning when it does.

For each MicroBit, set the radio group number. Each group of students will need a different number. We used 9, it can be any number so long as they are paired and unique to the group:



The x and y acceleration have a base-value of 0 when it is sitting flat. Using this as a baseline, students can set-up the MicroBit to notice movement in the x or y direction. This is done on the first MicroBit. It will send a message when motion is detected:

```

forever
  if acceleration (mg) x > 100 or acceleration (mg) y > 100 then
    radio send string "Motion"
  
```

On a second MicroBit, set it up on the same group to receive the string:

```

on start
  radio set group 9

on radio received receivedString
  show icon [checkmark]
  
```

With this code, the MicroBit will display a checkmark when motion is detected. A button can be added to clear the screen between uses:

```

on button A pressed
  clear screen
  
```