



# The Micro:bit Challenge Games

## Teacher Guide

### Objectives

This activity introduces students to microelectronics, which are small circuits that make electronic devices work. Students learn coding with micro:bit, which is a small computer. They use MakeCode as the programming language and transfer their programs to micro:bits. To do so, students will learn how inputs, outputs, variables, and logic make a simple code.

### Materials

- 8-10 Microbits with battery packs and batteries
- 1 computer for every three students with Internet access to the Microsoft MakeCode: <https://makecode.microbit.org/>

### Instructions

This activity includes two parts. In part I, students will learn Block Coding. In part II, students will complete a challenge in which they will need to code four different micro:bit programming activities.

*Introduce microelectronics and micro:bit:* Ask students what they think microelectronics are. Define microelectronics with students. Microelectronics are the brains of electronic devices. They are small circuits etched into semiconductive materials that control how electricity moves information. Discuss the importance of microelectronics in everyday life. Have students record important information about microelectronics in their handout and answer question #1.

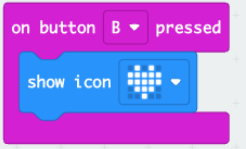
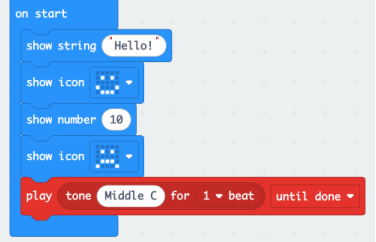
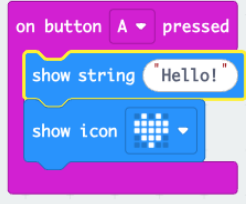
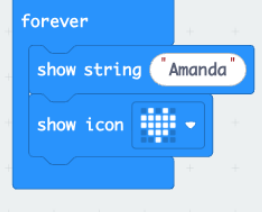

Ask students what a micro:bit is. Show [this video](#) and explain to students that a micro:bit is a small computer. The micro:bit must be programmed using Block Coding. The code fragments are colorful and need to be assembled together to make a program. The code is an algorithm, a set of instructions. The micro:bit shows words, numbers on its LED display. Have students record important information about micro:bits in their handout and answer question #2.

Go online to <https://makecode.microbit.org/> and click on “New Project.” When you create a new Make Code project, you will see the simulator on the left side of the screen. A simulator shows what the program will look like when it runs on the micro:bit. Next to the simulator, there is a menu called Toolbox. You can click on different drawers to open different blocks that you can use in your program. You can see the Workspace on the right side of the screen. You can build your program in the Workspace and there are already two blocks of code on your Workspace: On Start and Forever. Anything you put in the On Start block will automatically run when you start your program. Any code you put in the Forever box will run forever. The “Show String” block scrolls the string of letters that make up your name across the micro:bit’s LED display. Have students answer questions #3 and 4 on their handout.



Example responses are:

Explain to the students that they are going to code their micro:bits to complete several challenges. But to explore the programming language, they will first complete a matching activity. Share this matching handout with students and ask them to match each code snippet with its corresponding scenario.

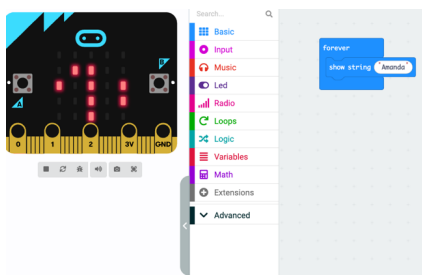
Code	Scenario
	<p>The micro:bit will display “hello” and a heart when pressed on button A.</p>
	<p>The micro:bit will display “hello”, smiley face, number 10, frown face, and then play a short beat.</p>
	<p>The micro:bit will display a heart when button B is pressed.</p>
	<p>When the micro:bit is shaken, it will generate a random number between 0 and 6.</p>
	<p>The micro:bit will display Amanda and then a heart (forever).</p>



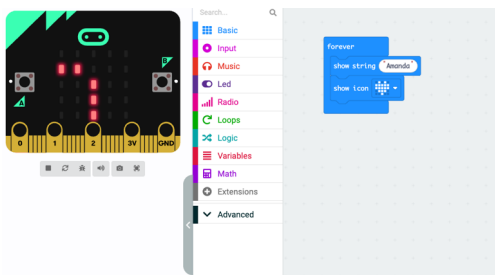
*Introduce coding with the micro:bit, online:* Ask students to open [makecode.microbit.org](https://makecode.microbit.org). They don't need to sign in; however, those who want to save their projects or continue creating new projects can create an account.

*Model building the code for displaying your name:* Create a new project. When your project opens, you will see the simulator on the left side of the screen. A simulator shows what the program will look like when it runs on the micro:bit. Next to the simulator, there is a menu called Toolbox. You can click on different drawers to open different blocks that you can use in your program. Click on the “Basic” drawer and search for the “Show String” block. Once you have selected the block and dragged it into the Forever loop, click on the parameter of the block and type in your name. Show string scrolls the string of letters that make up your name across the LED display.

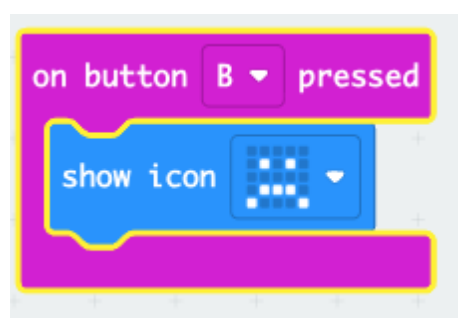
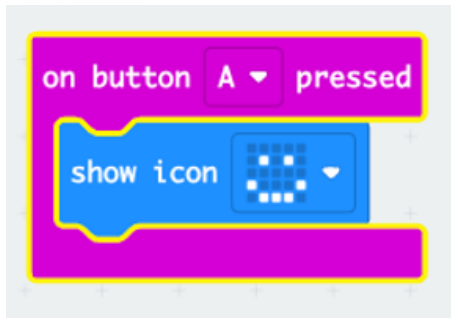
Have students use a forever loop to make their own name badges after you modeled (explained above).



Next, have students use the show icon to display an icon on the screen of the micro:bit.



*Model building the code for Displaying Emotions:* The “on button A pressed” block makes something happen when you press input button A. The “on button B pressed” block makes something happen when you press input button B. Using these two button inputs, students can make different outputs on the LED display. These blocks can be found in the “Input” drawer and can be dragged onto the workspace in the same manner as before. Below are two example code snippets showing how to program the micro:bit to display a frowning face and a smiling face.



Next, have students code an animation to display on the micro:bit.

*Introduce the engineering design process:* Share the design challenge with the students. Have students answer problem scoping questions before they start the coding.



Dear Contestant,

Welcome to Mr. Beast’s Micro:Bit Challenge Games! This is only the first stage of the challenge, but you must complete the following 4 tasks in order to advance to the next stage of the competition. In addition, your school might even be featured on the channel!

- First, you must program the micro:bit to play a musical note for 1 beat when Button A is pressed.
- Next, you must modify your program to display any type of icon (you can create your own!) when Button B is pressed.
- Now, one of the most difficult challenges in the history of the Mr. Beast channel, you must create your own animated animal (using the “show leds” block).
- Finally, you must program your micro:bit to display a random number between 1 and 10 when the micro:bit is shaken.

Once you complete all of the tasks, please give your teacher your completed Mr. Beast Challenge Sheet.

Best of luck,

Mr. Beast

*Collect the Mr. Beast Challenge Sheet* when the students are finished and provide feedback on their codes.



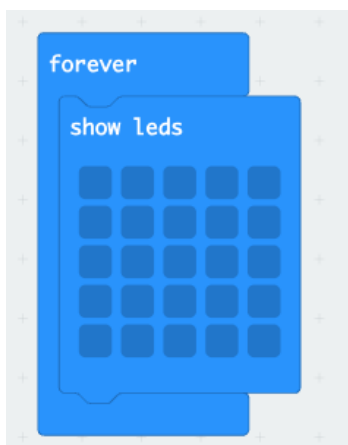
## The Micro:bit Challenge Games

### Student Handout

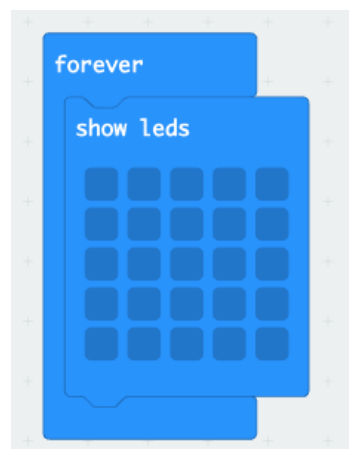
1) What do you think microelectronics are? Explain and draw below.

2) What do you think a micro:bit is? Explain and draw below.

3) You want your micro:bit to display a duck icon. Color the blocks to create a duck icon.

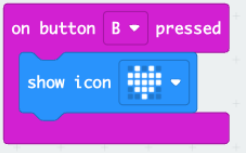
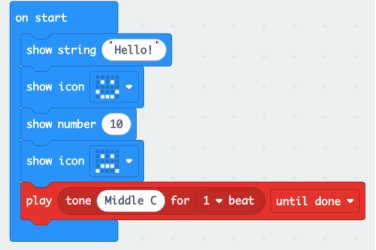
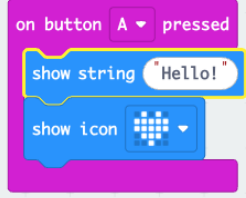
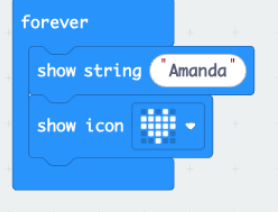



4) You want your micro:bit to display a ghost icon. Color the blocks to create a ghost icon.





Directions: Draw arrows to match each code to the corresponding scenario.

Code	Scenario
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- Finally, you must program your micro:bit to display a random number between 1 and 10 when the micro:bit is shaken.

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Best of luck,

Mr. Beast





## Mr. Beast Challenge Sheet

**Team and Project Name:**

Explain how you solved the challenges:

Code that you wrote to solve the first challenge:

Output of the code:



primeSTEM

Code that you wrote to solve the second challenge:

Output of the code:

Code that you wrote to solve the third challenge:

Output of the code:



primeSTEM

Code that you wrote to solve the fourth challenge:

Output of the code:

What could make your code better?