

Code a Purim Crown/Hat

Teacher's Workbook



Your students will make:

Light strips change color on the micro:bit which can be attached as wearable tech items

Equipment you will need:

- Laptop
- LED strips or 5 single addressable LEDs
- micro:bit
- Alligator clips
- Hat/crown template

Time needed:

1 - 2 lessons

Your students will learn:

In this lesson, your students will learn how to use **variables** and **inputs** on the micro:bit to control **addressable LEDs** in a variety of patterns. They will also use their knowledge of **circuits** to connect the LEDs to the correct points on the micro:bit using alligator clips. There are two types of LEDs that can be used in this project. More information can be found in **Student Workbook 2**. Here is a [video](#) of a student using logical reasoning to explain how their code works having completed this project.

Coding concepts and computational thinking:

Input: The inputs on a micro:bit include the buttons A and B, the shake feature as well as the pins 0, 1 and 2 along the bottom of the device

Variable: A variable is a placeholder for information which has the ability to change. In this lesson the variable is the LED strip and the colors are changing within the variable

Loop: A loop repeats a certain action or section of code for a specific amount of time

Algorithm: A list of steps to follow in order to complete a task

Debug: Finding and fixing problems in the algorithm

Science links:

LED: Light Emitting Diode

Addressable LED: An LED that can change color depending on how it is coded

Circuits: When connecting LEDs students need to know how a circuit works. One part of the circuit needs to be grounded, one part connected to power/voltage and the third to the input on the micro:bit

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Lesson:

Introduction:

Start by showing your students a micro:bit connected to LEDs that have been coded in different colors. Explain that we will be using at least two inputs on the micro:bit to start the program. These are Button A and Button B. The other input we are using is Pin 0. This is the pin that is controlling the LEDs. When Pin 0 is grounded, the LEDs will work. If the LEDs are not turning on, check that the pins are in the correct position.

Purim is a time for dressing up and having fun. This lesson creates part of a Purim costume that students can design and create themselves.

By the end of this unit, students should be able to use logical reasoning to explain how their algorithm (code) works. They should also be able to debug any issues within their code. The students should understand how circuits and inputs work within the micro:bit and how to connect LEDs.

Part One:

Students should work in pairs to follow the **Student Workbook 1** to create their light patterns testing them on the micro:bit emulator as they go along. This should take 1 lesson to complete depending on the coding level of the students.

Students should be able to work through this independently and the teacher should be available for support and guidance.

Extension: If the students finish coding both buttons A and B, can they make their light patterns more interesting? Instead of just showing the color red, can they change the lights so they flash in a pattern of 2 or three colors? Can they repeat this pattern 5 - 10 times?

Extension: Can students find the 'Shake' input and create an interesting light pattern

Part Two:

This part of the lesson looks at how to connect LEDs to the micro:bit. At the beginning of this lesson, discuss with students how circuits work and the importance of having a completed circuit instead of a broken circuit. It is important that students understand the role of the GND (ground) pin on the micro:bit to complete the circuit.

Students follow **Student Workbook 2** and work from the directions for the correct LED.

Once the LEDs are connected correctly, plug the micro:bit into the USB port of the computer and click the download button on the MakeCode website. Drag the downloaded file into the micro:bit external drive and wait for the program to load.

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While the program is loading, the light at the back of the micro:bit will flash. When this light is solid yellow, then students can test the program on their micro:bits.

Students may now need to debug some of their algorithm so that the code works.

Part Three:

Once the students have their code on the micro:bit and the LEDs connected, they can design their Purim costume. This is a good time to talk to students about the customs of Purim and why we dress up on this holiday.