MICROBIT PROGRAMMING (BLOCK-BASED)

(Time required 30-45 minutes session)

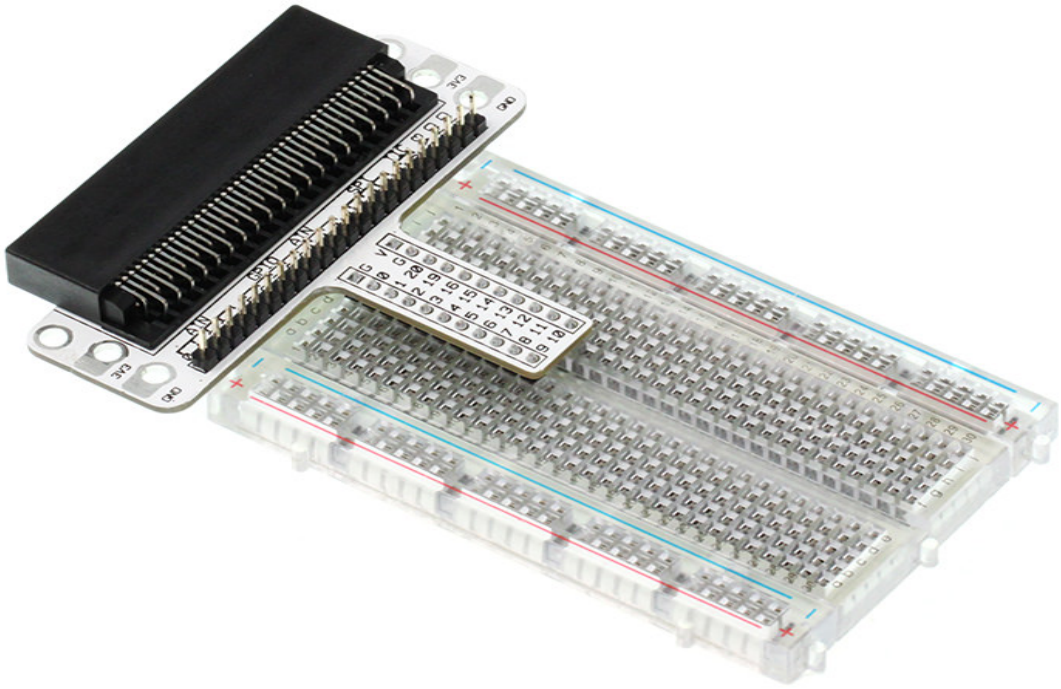
Introduction

LEDs are small, powerful lights that are used in many different applications. To start off, we will work on blinking an LED, the basic introduction of microcontrollers and building circuits. it's as simple as turning a light on and off. It might not seem like much, but establishing this important baseline will give you a solid foundation as we work toward more complex experiments.

Parts Needed:
1x micro:bit
1x Micro B USB Cable
1x micro:bit Breakout (with Headers)
1x Breadboard
1x Jumper Wire
1x LED
1x 100Ω Resistor

Building the Prototype

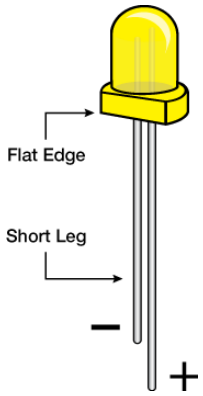
To extend the funtionality of the micro:bit we need to use the micro:bit Breakout. In combination with the breadboard, this module makes much more easier to use all the pins on the micro:bit. The breakout board lines up with the pins of a breadboard. We recommend using a full-sized breadboard with this breakout to give you enough room to prototype circuits on either end of the breadboard. Also, for durability's sake, insert the breakout pins about halfway into the breadboard so there is support under the board for when you insert a micro:bit and/or pull it out.



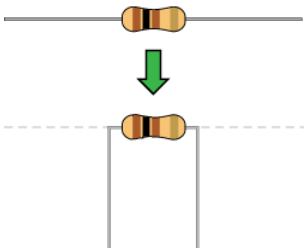
LED Introduction

A Light-Emitting Diode (LED) will only let current through in one direction. Think of an LED as a one-way street. When current flows through the LED, it lights up! When you are looking at the LED, you will notice that its legs are different lengths. The long leg, the "anode," (positive) is where current enters the LED. This pin should always be connected to the current source. The shorter leg, the "cathode," (negative) is the current's exit. The short leg should always be connected to a pathway to ground.

LEDs are finicky when it comes to how much current you apply to them. Too much current can lead to a burnt-out LED. To restrict the amount of current that passes through the LED, we use a resistor in line with the power source and the LED's long leg; this is called a current-limiting resistor. With the micro:bit, you should use a 100Ω resistor.



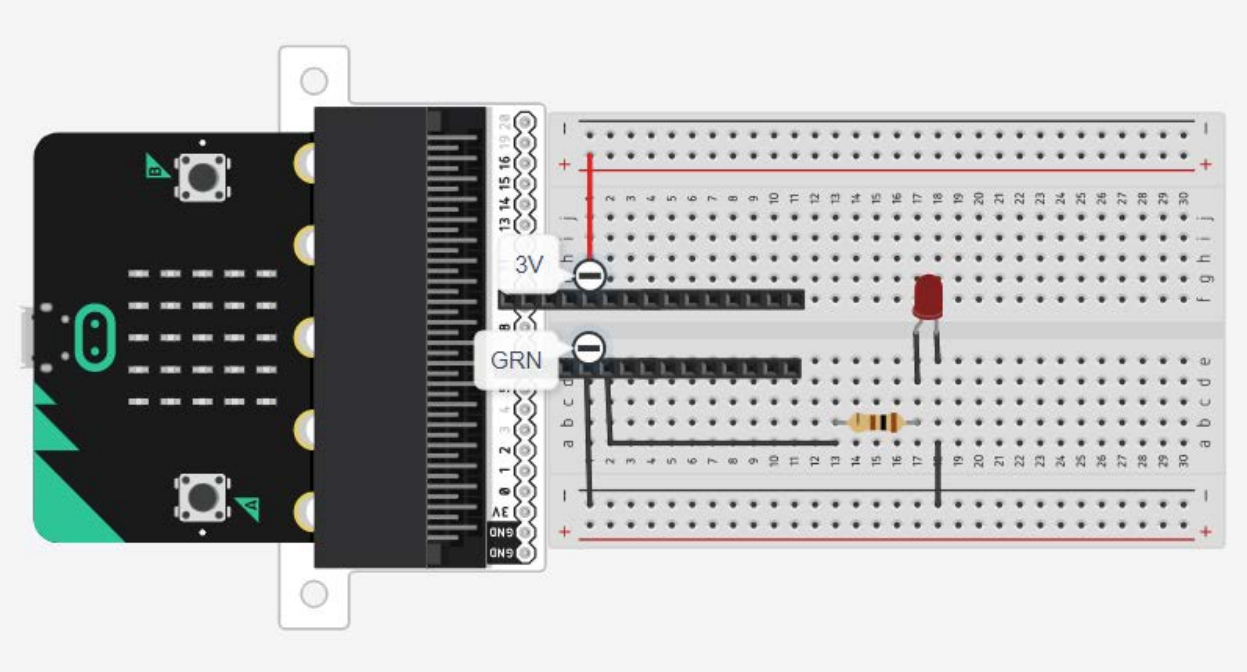
Components like resistors need to have their legs bent into 90° angles in order to correctly fit the breadboard sockets. You can also cut the legs shorter to make them easier to work with on the breadboard.



Blinking LED Wiring Diagram

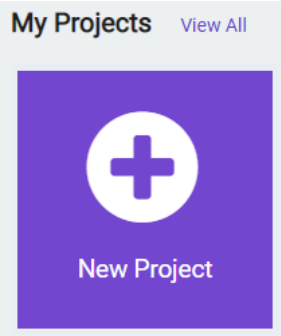
Step 1: Once we connect the micro:bit board into the micro:bit breakout board (make sure the LED arrays are facing up as shown in the figure below).

Step 2: build the circuit diagram as the figure below. Use a black jumper wire to connect the ground pin to the LED cathode (-) and a 100 Ω resistor to the LED anode (+).

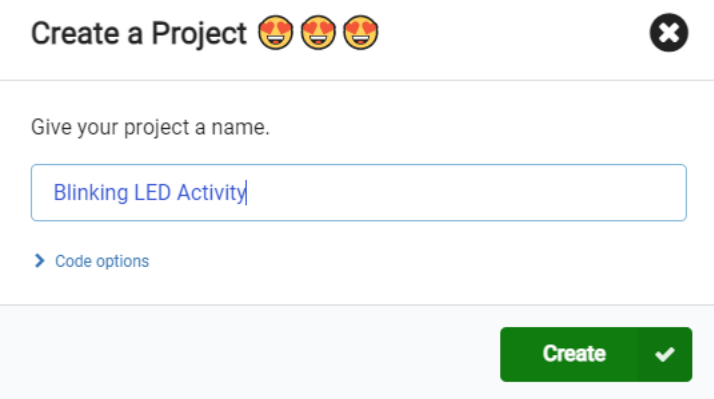


Building the "Blinking LED Activity"

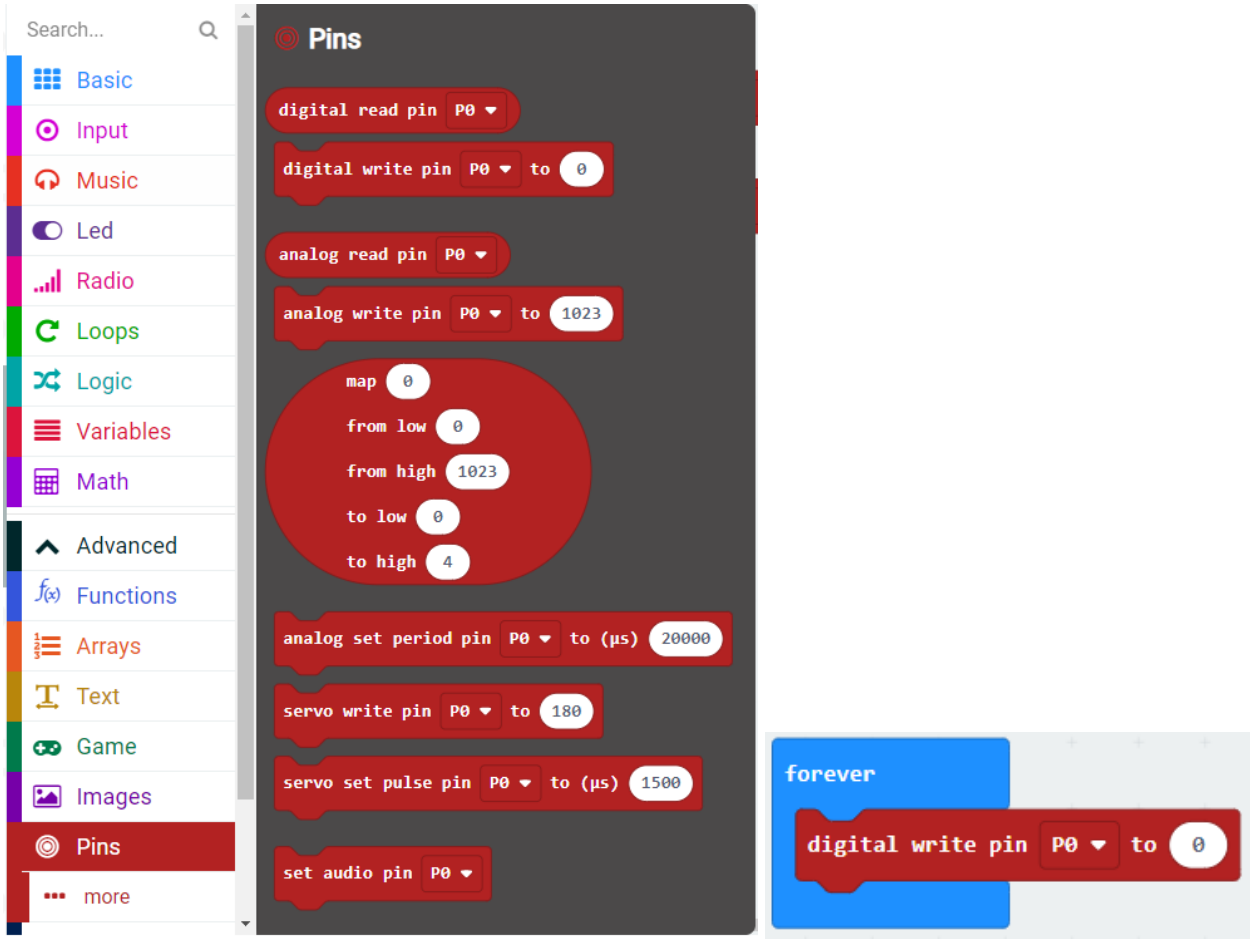
Step 1: Go to https://makecode.microbit.org/# and create a New Project



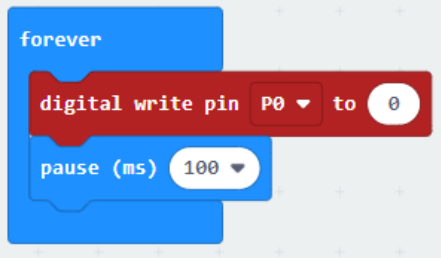
Step 2: Click on New Project and give it a project name – **Blinking LED Activity** and click Create



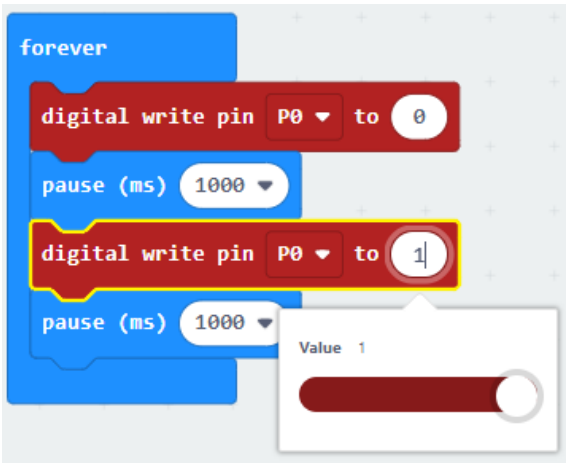
Step 3: Once the MakeCode is launched, click on the **Advance** category and then select **Pins.** Select and drag the **digital write pin P0 to 0** block into the **forever** block. The Digital write enable us to turn the pin on or off (1 or 0/true or false)



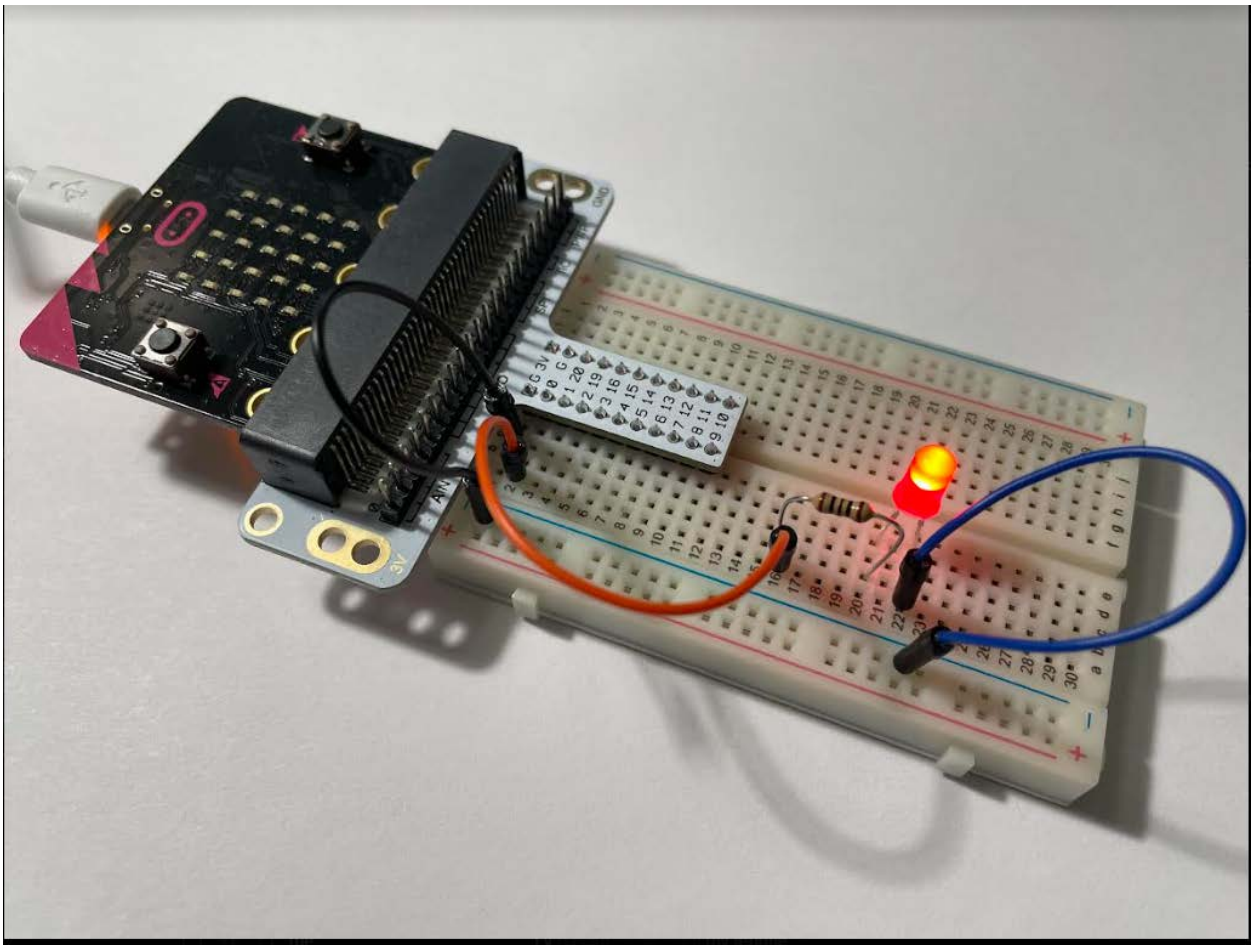
Step 4: Click on the **Basic** category and select and drag the **pause (ms) 100** block into the forever block. Change 100 ms to 1000 ms (1 second)



Step 5: Repeat **Step 3 and 4** to add an additional **digital write** and **pause (ms)** blocks. On the second digital write block change the value from 0 to 1 (just type or use the slider value to make the change)



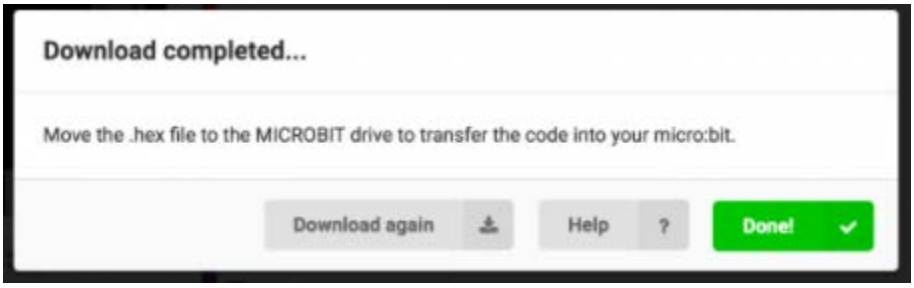
Final Prototype



Plug the USB cable to the micro:bit

Step 7: Click the download button in the lower lefthand corner of the code window. It will downloaded most probably in the Downloads folder

Step 8: Simply click and drag your program file from its download location to your micro:bit drive, which shows up as an external device.



Step 9: Your micro:bit will flash for a few seconds, and then your program will start automatically. The LED connected in the breadboard should start blinking.

Step 10: Disconnect the USB cable and make changes to your program. Add an additional LED (connect it to PIN 2 (P2)), your task is to make both LEDs blink, one at the time (when the first LED is on the second LED must be OFF and when second LED is ON, the first LED must be OFF). When you are finished let your mentor know.

Congratulations! You have successfully completed this activity.

Reference: Sparkfun Inventor's Kit for micro:bit Experiment Guide
https://learn.sparkfun.com/tutorials/sparkfun-inventors-kit-for-microbit-experiment-guide