Hands-on Coding for the Classroom

Make It Blink

An Introductory Lesson Plan

for Teachers

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Lesson Introduction

Getting an LED to blink on and off is a simple way to get started with microcontrollers. Here we'll build a simple circuit and play with the code to make the LED blink at different speeds.

In this lesson, students will get an introduction to microncontrollers, circuit building and coding. By using an Arduino microcontroller, students will build a simple circuit and make an LED blink while also learning how LEDs work, learning the basics of electricity flow, and understanding the basic structure of a computer program.

LEARNING OBJECTIVES

By the end of this lesson, students will be able to:

- correctly build a simple LED circuit
- write and alter the code to run a simple LED circuit
- describe how and LED works
- explain what a diode is and why their direction is important in a circuit
- understand how electricity flows through a simple circuit

STANDARDS

TEKS (Technology Applications, Grades 6-8):

- 4b, 4d, 4f,
- 6d, 6e, 6f, 6j, 6n

Common Core:

- EE A F SP SMP5 W8
- SL5,

ISTE:

- 1c, 1d, 3d, 4A, 4b, 4c, 4d, 5c, 5d, 6b

BEFORE THE LESSON

Assemble Your Parts

- Arduino microcontroller
- Breadboard
- Jumper wires
- 1 LED
- 1 100 Ohm or 220 Ohm resistor

Introduce the Concepts

- Review the basics of electricity flow with a video
- Learn how LEDs work

DURING THE LESSON

Getting an LED to blink on and off is a simple way to get started with microcontrollers. Here we'll build a simple circuit and play with the code to make the LED blink at different speeds.

Building the Circuit

Use the diagram below to construct a circuit. Be sure that the longer leg on your LED is on the right side of the center channel on your breadboard.

For step-by-step circuit building instructions, go to https://www.makecrate.club/project/make-it-blink-teachers/.

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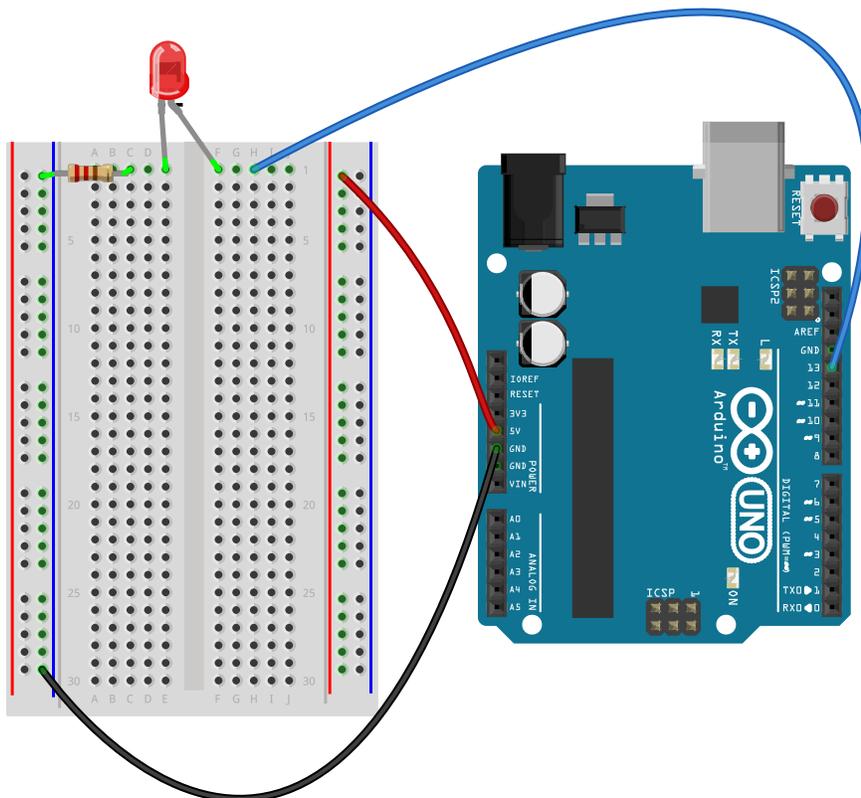
Writing the code

Copy this code into the Arduino Web Editor (see our Getting Started lesson for more information) or watch the tutorial at to write your own from scratch.

```
// This is the code to make an LED blink on and off.

const int ledPin = 13;

void setup() {
pinMode(ledPin,OUTPUT);
}

void loop() {
digitalWrite(ledPin,HIGH);
delay(1000);
digitalWrite(ledPin,LOW);
delay(1000);
}
```

Troubeshooting Your Project

DO YOU HAVE POWER TO YOUR BOARD?
Check that the lights on the Arduino board itself are on once you've either connected to your computer or to battery power. If they aren't you need a new power source. If you are powering your board via a USB cable, make sure that the cable is plugged into both the computer and the board. If you are powering the board via a battery pack, make sure you have fresh batteries and that the battery pack cable is securely pressed into the board.

ARE YOUR LEDS IN BACKWARDS?
Current can only go one direction through an LED, so if you have the positive and negative legs reversed, the LED won't light up. Try flipping your LED around.

HAVE YOU CORRECTLY CONNECTED THE 5V AND GND PINS?
If your wires are not in exactly the right spaces in the Arduino, things won't work. Double check that your wires go to the 5v and GND pins on the microcontroller and aren't off by a space or two.

HAVE YOU CORRECTLY CONNECTED YOUR LED TO THE ARDUINO?
Double check that the wire from your LED to the Arduino goes to pin 13. If you are off by even one space, the program you uploaded can't connect to the LED to turn it on.

ARE ALL YOUR WIRES IN THE CORRECT ROW ON THE BREADBOARD?
In order to complete the circuit, the components must connect properly on the breadboard, which means that you must connect them in the same row. If you have a wire that is off by a space or two, make sure it lines up with the legs of the LED.

IS YOUR LED BURNED OUT?
Sometimes LEDs burn out and you simply must try a new LED.

IS YOUR LED ATTACHED PROPERLY?
Make sure the LED legs are in the holes. Sometimes when the legs get bent the wires don't go into the holes smoothly.

AFTER THE LESSON

Now that the students have completed the lesson, challenge them with these exercises to test their skill mastery and extend their learning.

Challenge #1

There is a single line in the "Make It Blink" LED sketch that determines how fast the LED blinks. Find it, and make the LED blink faster or slower.

Challenge #2

Add a second and third LED to your "Make It Blink" circuit so that you have a red, green, and yellow light, and cycle through the three LEDs like a stoplight would.

Bring Hands-On Coding to your Classroom Today!

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