

Arduino Exploration: **Teacher Version**

Tinkercad

Corresponding Material

1.1- Intro to Arduino

Discussion

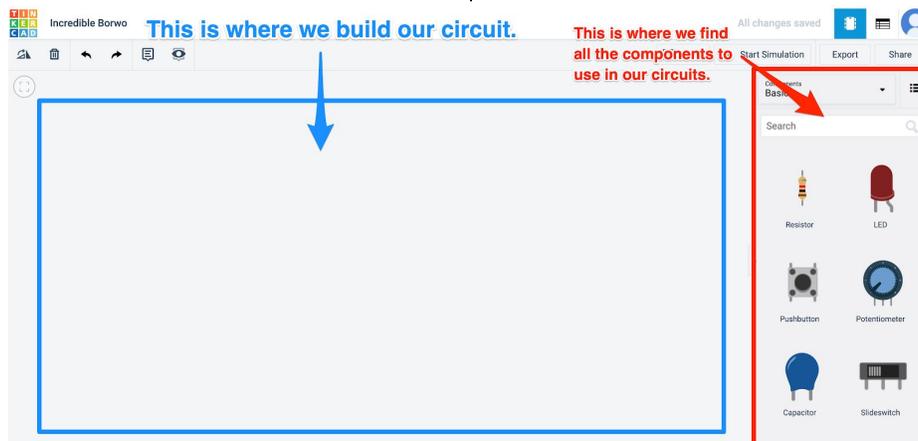
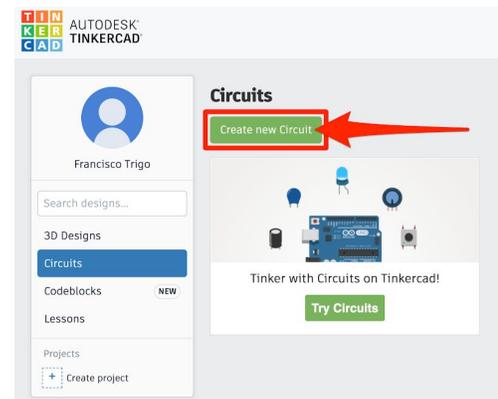
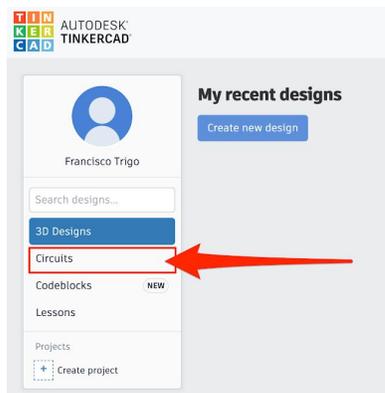
Welcome to Physical Computing with Arduino! Throughout this course, we're going to use a platform called **Tinkercad** to simulate and test our Arduino programs before running them on our physical devices. In this exploration, we'll dive deep into Tinkercad to see all of the available features and how to use them.

Teacher Notes

Students will use Tinkercad for the first time during this Exploration. They will continue using this platform to develop and test simulated circuits throughout the course. To have access to all of your student's work, you will want to set up a Tinkercad classroom. To do this, follow the steps laid out in the document at codehs.com/arduino_tinkercad. You'll need to provide your students with a class code or link as well as a 'nickname' that they will use to log in. Make sure this information is available before getting started.

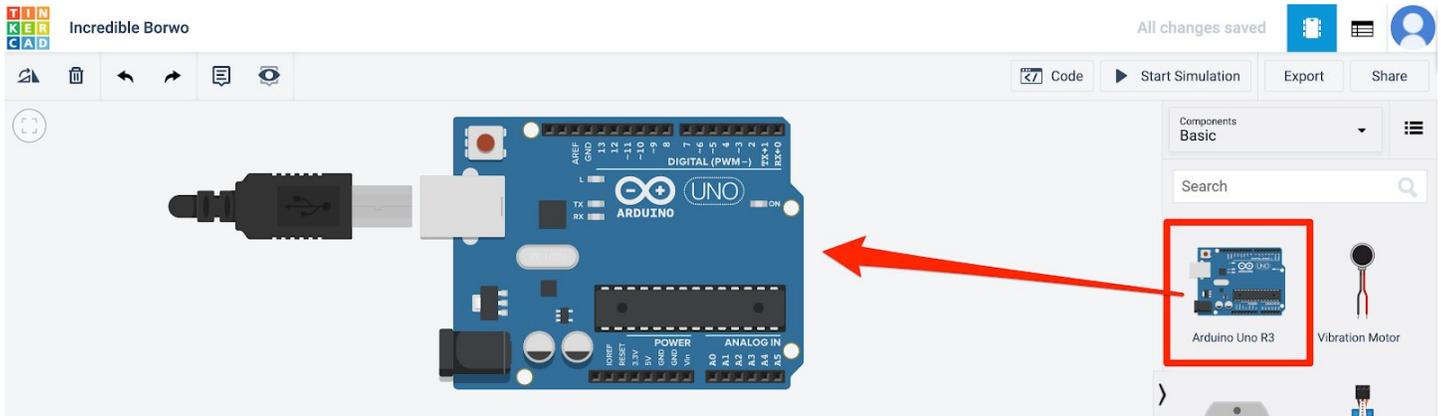
Class Exercise

1. Sign in to Tinkercad using the class link and nickname your teacher has provided.
2. Click on the *Circuits* button on the left hand navbar.
3. Click the green *Create new Circuit* button.

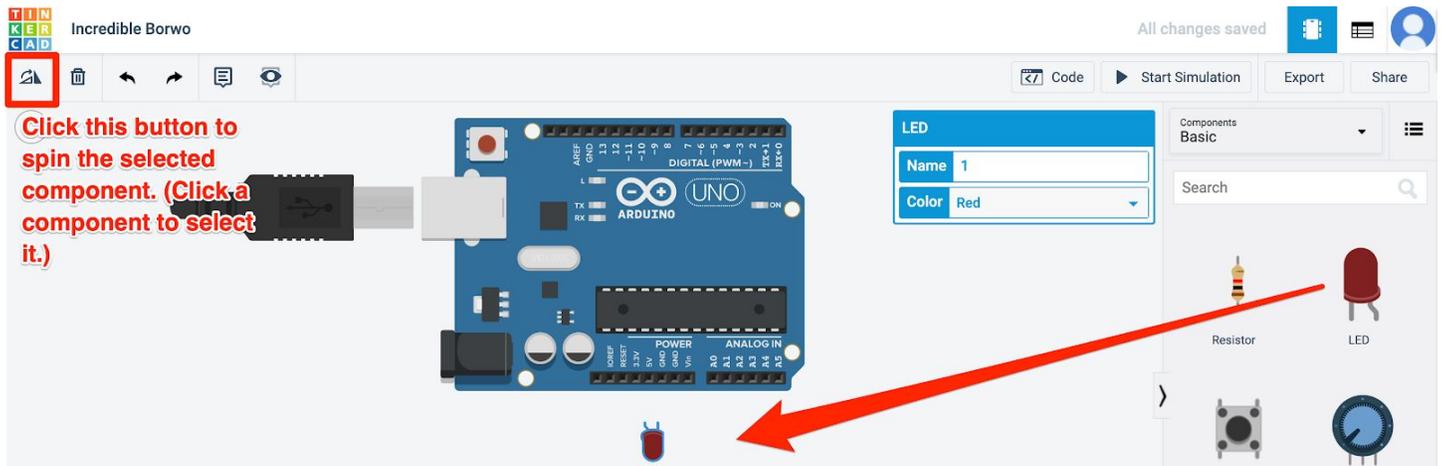


Circuit 1: Explore the **Arduino** and **LED** components

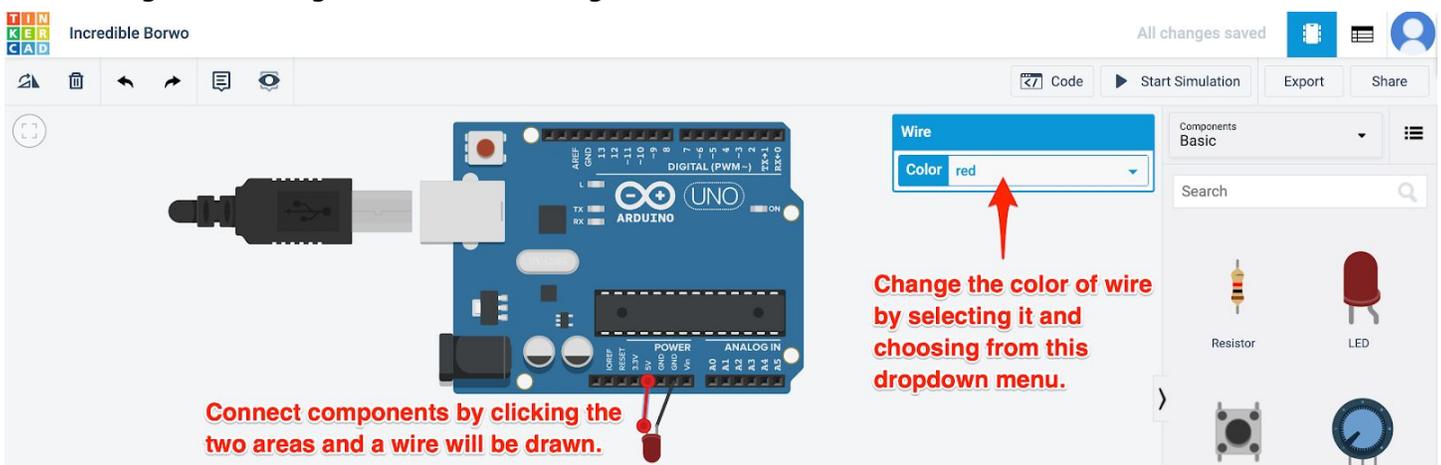
1. Scroll through the basic components on the right side and drag an **Arduino** into the center section of the page.



2. Scroll to the top of the basic components to find and drag an **LED** to the center.
3. Spin the LED so it is facing down.



4. Connect the LED to ground by clicking one of the GND pins on the Arduino and drawing a wire to the short or straight leg of the LED. Change the wire color to black.
5. Connect the LED to 5V by clicking the 5V pin on the Arduino and drawing a wire to the long or bent leg of the LED. Change the color of the wire to red.

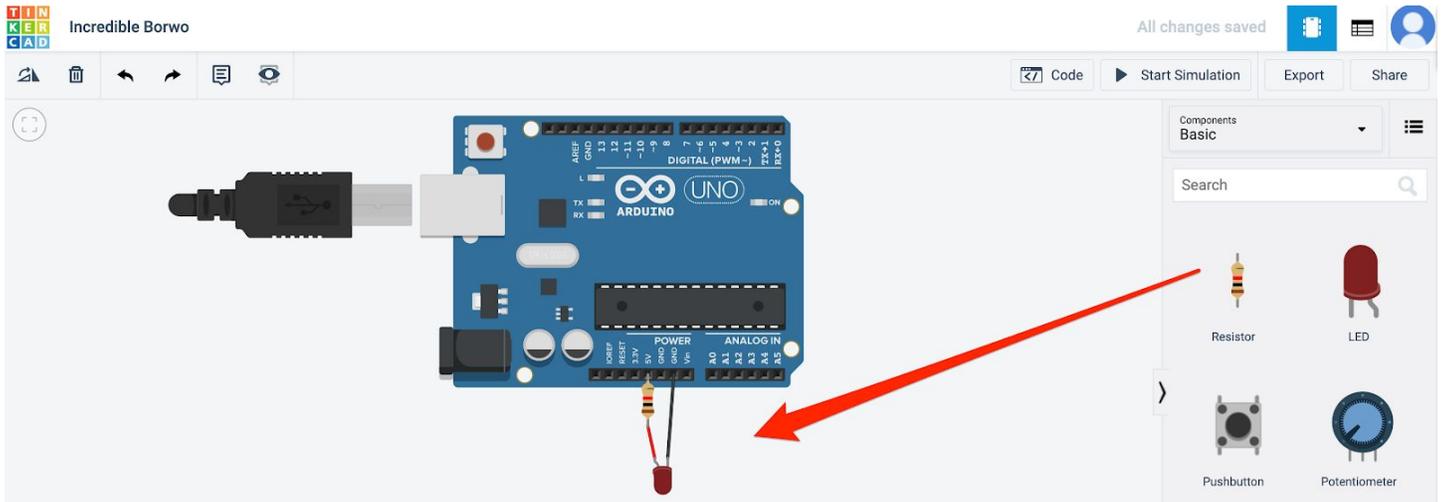


6. Click *Start Simulation*.

What happens to your LED? What does it say when you hover your mouse over the LED?

The LED has a red explosion symbol. When you hover over it, it says "Current through the LED is 483 mA, while absolute maximum is 20.0 mA."

7. Scroll in the basic components section to find and drag a **resistor** into the center section.
8. Click on your red wire. Drag the end of the wire from the 5V pin to one end of the resistor.
9. Drag the unconnected end of the resistor to the 5V pin.



10. Click *Start Simulation*.

What happens to your LED? What do you think a resistor does in a circuit?

The LED dimly lights up without an explosion symbol. The resistor is causing less current to flow through the LED.

1. Change the resistance by selecting the resistor and changing the value (Note: The unit of measurement can be changed in the drop down. 1 k Ω is equal to 1000 Ω)

What resistance value will allow the LED to be very bright but not dangerous? **Around 150 Ω**

Extension Questions

1. Scroll through the list of basic components. Find one you recognize or have used before. What is it? What does it do?

If students have no experience with physical computing, they should still be able to discuss a 9V battery. Other students may discuss buttons, motors, etc. depending on their level of experience.

2. Scroll through the list of basic components. Find one you do not recognize and research it. What is it? What does it do?

Students should have access to the internet to do some quick research on a component that looks interesting to them. You may have them share these answers with the class and can let them know if we will be studying their chosen components during this course.