Get to know your board

This is a solderless breadboard. Pretty, isn’t it?

This little guy lets you quickly and painlessly create circuits, attach components, and create beautiful things with no hassle, no permanent changes to your hardware.

It’s kind of like an artist’s sketchpad. It’s where great ideas are born and tweaked and tried out.

**Bus strips.** Also called power rails.

Two columns on either side that travel all the way up and down the board. Typically one is connected to a power supply (like a 5V pin on your Arduino) and the other to ground (a GND pin).

They don’t line up with the terminal strips, and they aren’t connected to them until you connect them yourself.

**Terminal strips.** They run left to right and are where you plug in your stuff. Lights, buzzers, cables, resistors. They all connect to each other through these strips. They have no power of their own until you connect them to the bus strips.

**More terminal strips.** These are exactly the same. Note that the strips on the left do not connect to the ones on the right. This is because of the bottomless chasm.

**Bottomless chasm.** Also called the notch, or the gap. It separates the left side from the right side. Some fancier components need a gap of this size in order to sit on the board.
We’re going to build our Blink sketch out on the breadboard.

Wire a **5V pin** to a red bus, and a **GND pin** to a blue bus. Now you can draw power to any row of terminal strips from any point along the bus.

Now check out this LED.

It has a long pin and a short pin. The long one needs to connects to the power, and the short one to ground.

⚠️ But before you do! ⚠️

There are 5 volts of electricity coming out of that Arduino. That’s enough to fry the weakling light. We need to slow down the current.

Check out this resistor. It’s a 330 **ohm resistor**, and you know that because of its color bands. This one is orange, orange, brown, gold. It’s hard to see because resistors were made by an ancient civilization of people with superhuman vision. Make sure you get the right one though. We’re dealing with electricity here. Get a magnifying glass or ask for help.

1. Go ahead and drop the LED into the board. It doesn’t matter where. Just make sure it connects to two different rows. Note which is the long pin and which is the short one. It matters because the current has to flow through it in the right direction: power goes to the long pin, and the short pin is grounded.

2. Drop the resistor in so that one pin is in the same row shorter LED pin. The other resistor pin goes to any other row. (The resistor isn’t like the LED. Either end can connect to the LED; it doesn’t matter.)

3. Now to wire it all up! Grab some jumper cables. Color doesn’t matter. Connect the long pin of the LED to any point along the red power bus. Doesn’t matter where. You powered the entire bus.

4. Wire the free end of the resistor to the blue grounded power bus. Doesn’t matter where because you grounded the entire bus.

If your Arduino is powered, your light should come on.
So your circuit is drawing 5 volts of electricity from the Arduino. The resistor is slowing down the current enough for it to be safe for the LED.

Dear learner, you have built your first circuit.

Now let's introduce something to the circuit that we can control and play with. Let's interact with it a little.

On your computer, open up the Arduino software and load the Blink example. Upload it.

If the upload is successful, you'll see the on-board LED attached to pin 13 start blinking on and off. Cool.

On your breadboard, find the jumper cable that connects the long pin of the LED to the power bus. Take the end connected to the power bus, unplug it, and plug it into pin 13.

Now your light isn't just getting a steady, constant 5 volts. It's being controlled by the on/off delays programmed into pin 13.

You’re done! Other things to try:

- See the delay(); portions of your code? Try to get the light to blink faster. Maybe slower.
- Wire another light and resistor to another pin on your board. Can you make them blink at the same time? Can you make them blink opposite
- At your computer, load the fade example. Read the code and try building the circuit.