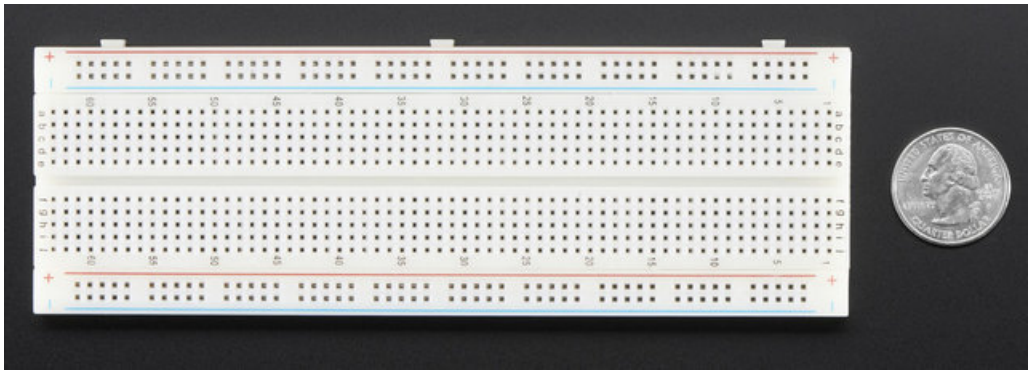
Breadboards

These "solder-less" breadboards are incredibly handy for building circuits. They are durable and reusable and have tons of work space. They not only hold your parts steady, a breadboard also has *internal wiring* to make connections super fast.

The most common type, the "Full Size" breadboard looks like this:

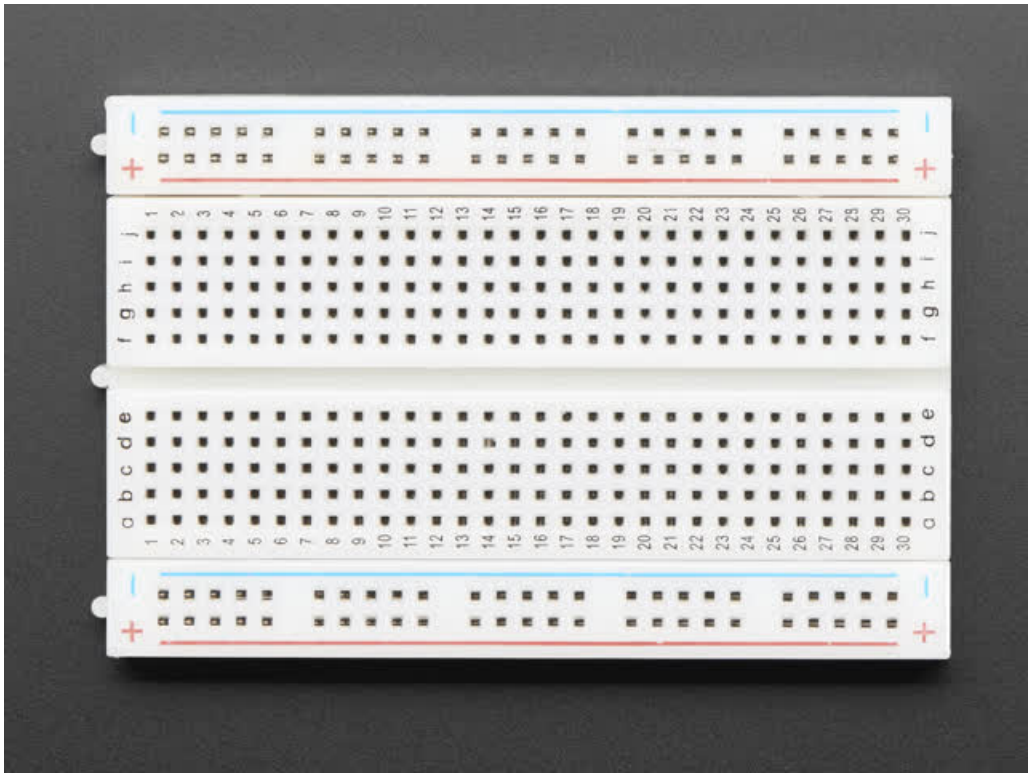


This dependable classic hasn't even changed that much since it's invention in 1971 (https://adafru.it/rdp)!

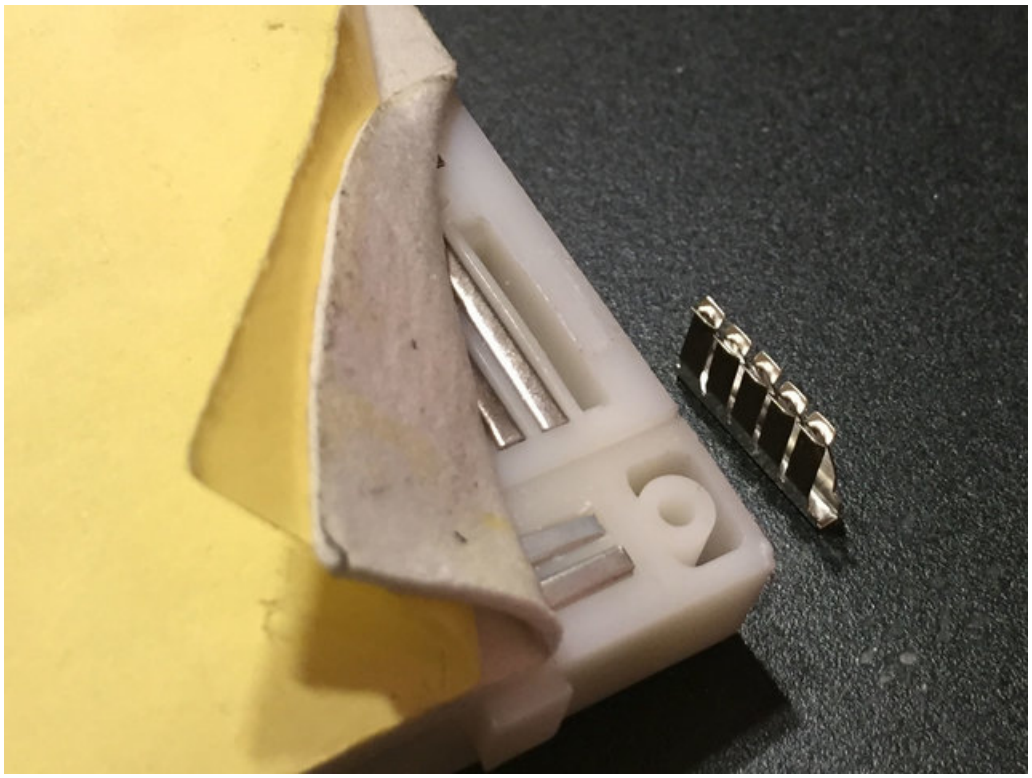
Basically, a chunk of plastic with a bunch of holes. However, something special is going on inside the breadboard! Although you can't see it, inside the breadboard are many strips of metal that connect the rows and columns together.

If you look on the back of your breadboard, there's a yellow waxy paper covering some sticky foam. If you were to peel back that foam you'd see dozens of these metal rows.

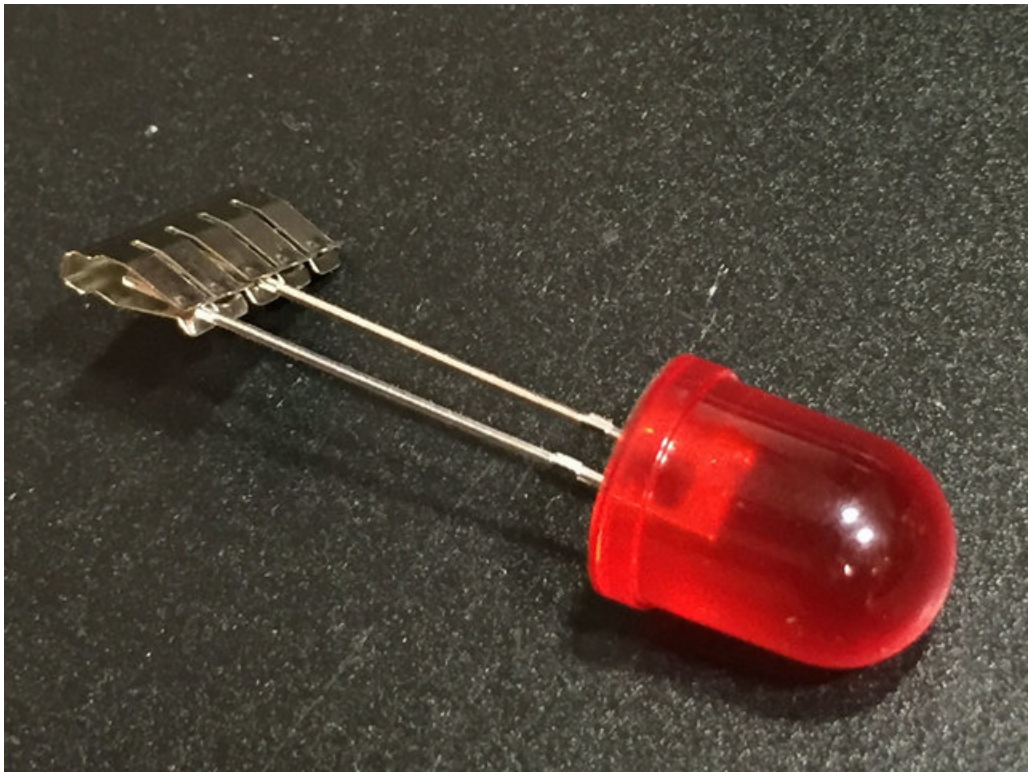
(Don't actually do this, you should keep the yellow paper on your breadboard, we'll sacrifice this one for some photos!)



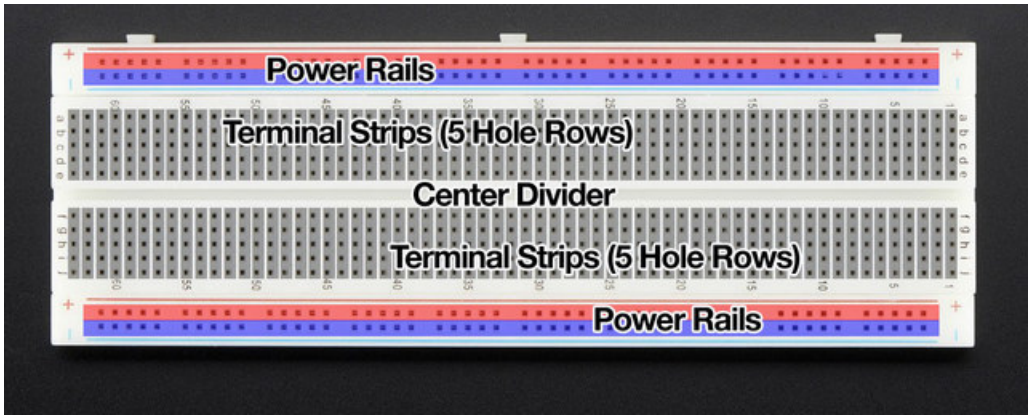
If you pulled the metal parts out with pliers (again, don't do this yourself!) You'd see each one is a metal clip with little teeth. The rows have 5 teeth - one for each hole on the top of the breadboard. (The power rails have 50 teeth)



These little teeth are great at gripping onto electronic parts. When a part is pushed into the breadboard, the clip pushes open and grabs onto the metal leg. Any other parts that are plugged into the other 4 teeth are thus electrically connected together



Just about every breadboard is made of three sections: Two sets of very long power rails and the large middle section that is full of those 5-hole-long terminal strips.



You put the components (buttons, LEDs, resistors, integrated circuits, etc) in the middle section, with each pin connected to the rows terminal strip. The power rails are long columns used to distribute the power and ground connections along the entire circuit.

As you build circuits you'll quickly find that each part usually needs a connection to power or ground, so having a *lot* of power/ground pins available will be very handy. To help you keep track of which rail is ground and which is power, there's a red (+) and blue (-) stripe down the sides of the rails. Just make super-sure you connect positive to (+) and ground to (-) or you're gonna have a bad time!

The curse of the flaky breadboard

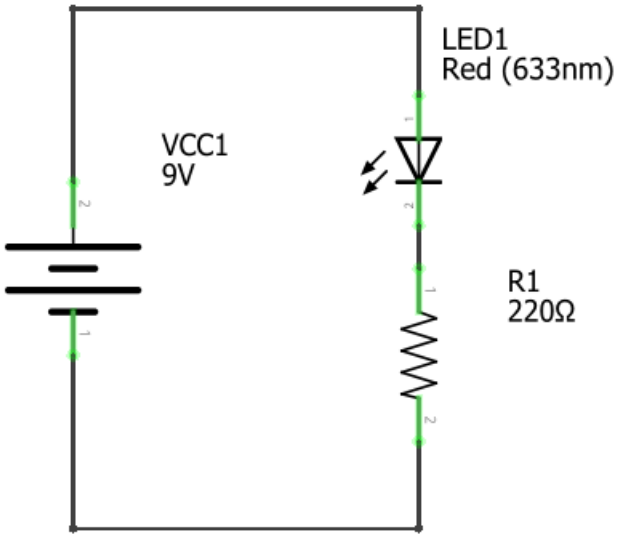
> Distressing as it may sound, solderless breadboards can be flaky, especially as they age. If you're having problems with your circuit, it could be that the little metal clips on the inside aren't working well. Try poking it with your finger, or moving it to a different section.

Each clip can handle at least a hundred plugs and unplugs before the springiness of the clip slowly weakens and eventually stops gripping so well. You'll know when the breadboard needs replacing because you wont feel the clip gripping onto the part when you press it in.

However, this takes *years* to happen. Even if you did have to replace it, breadboards are quite affordable. Most makers have a half dozen different sizes for projects, sometimes dedicating each one to a 'long term' project and keeping one for playing around.

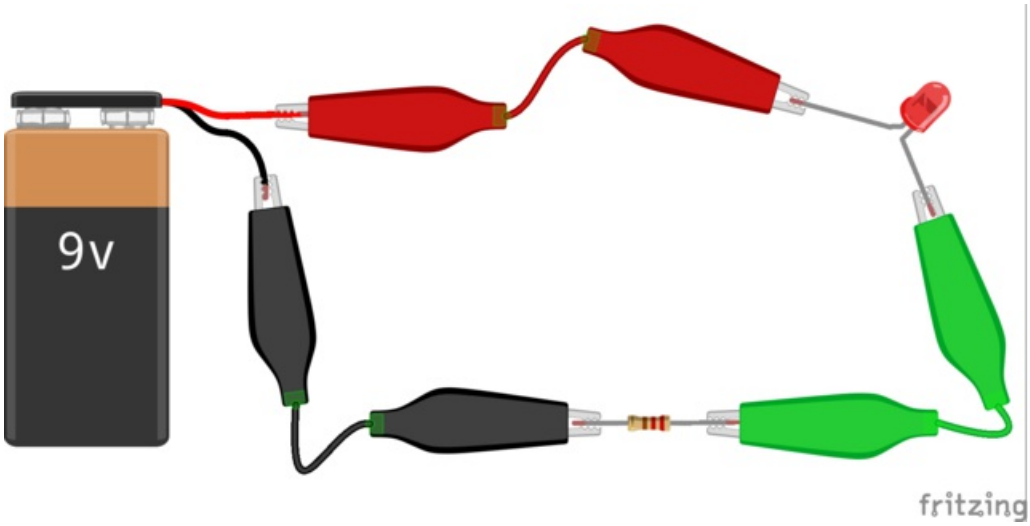
Breadboard Usage

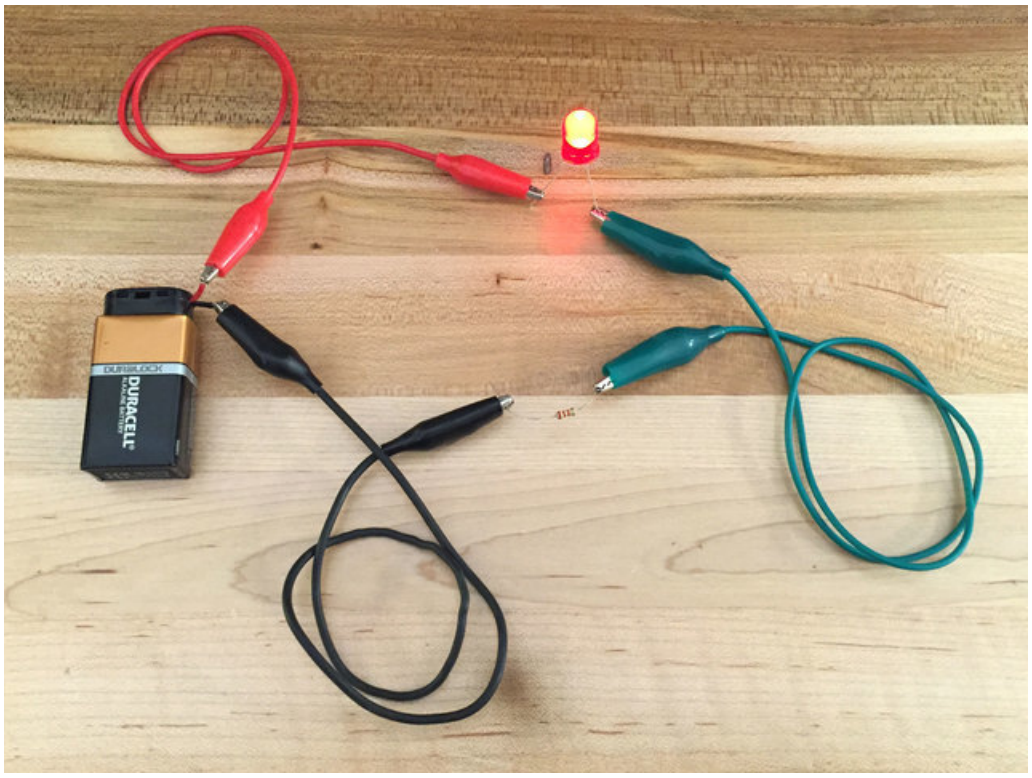
Lets say you want to do a very simple circuit, you just want to light up an LED using a battery pack. It's a simple hookup with only 3 parts. Here's the schematic:



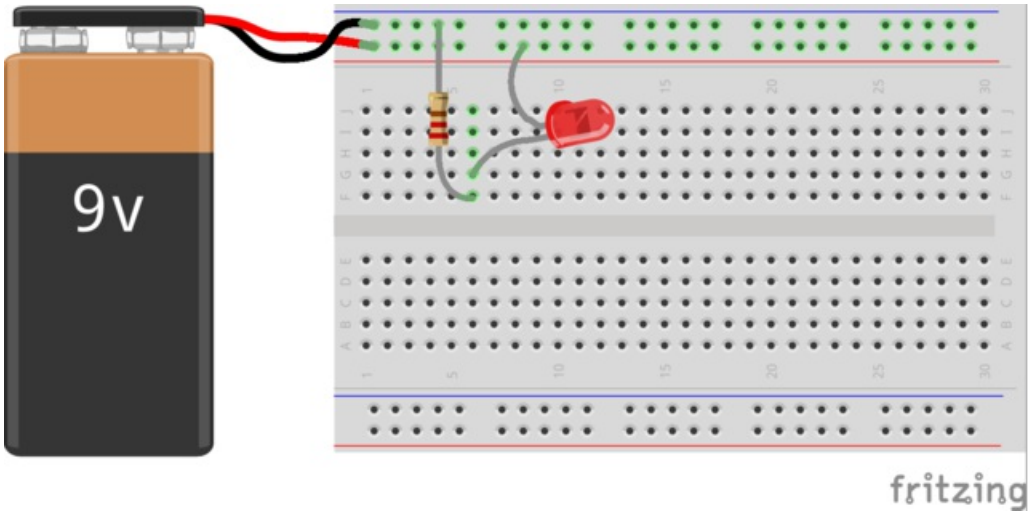
- Connect the battery positive (red) wire to the positive (longer) leg of the LED
- Connect the shorter leg of the LED to one side of the resistor
- Connect the other side of the resistor to the battery negative (black) wire.

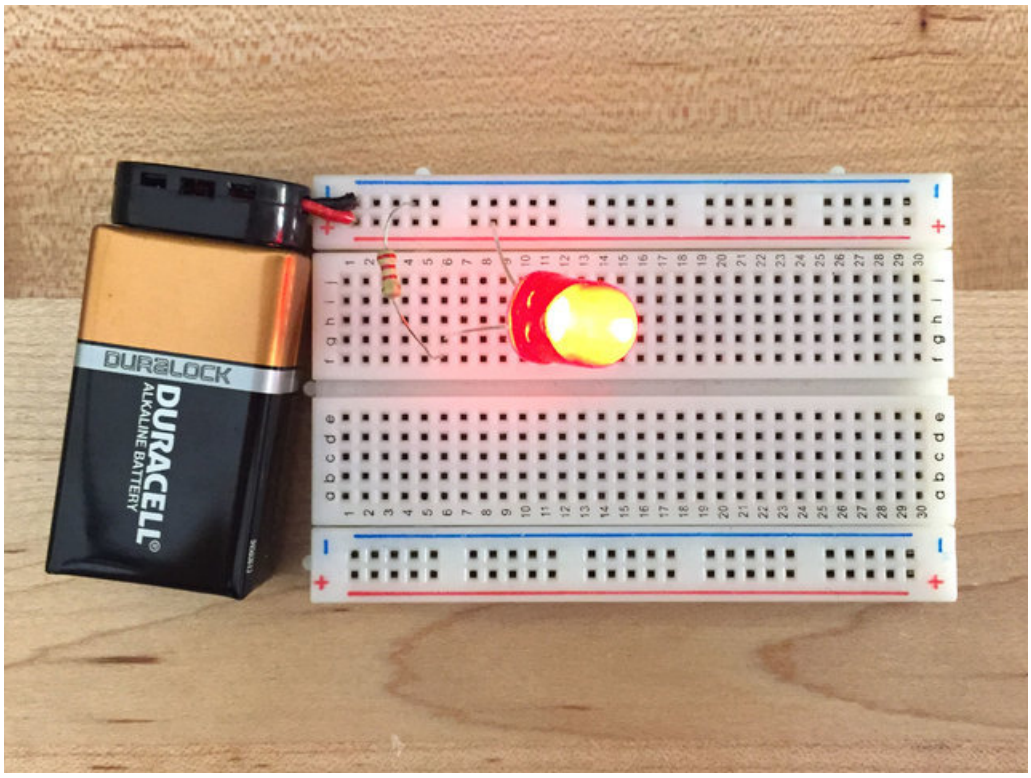
Despite having only three connections, wiring this up with alligator clips makes for a large and unwieldy tangle of wires





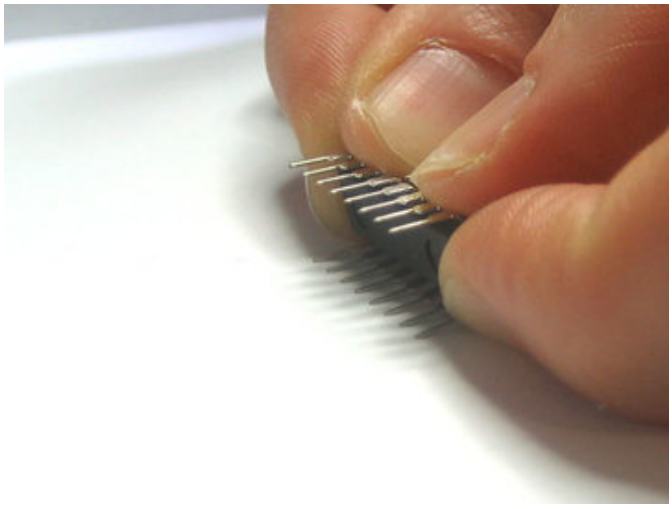
Compare to how neat and organized it is with a breadboard! No long wires, and its easy to swap in a different resistor or LED when you feel like it



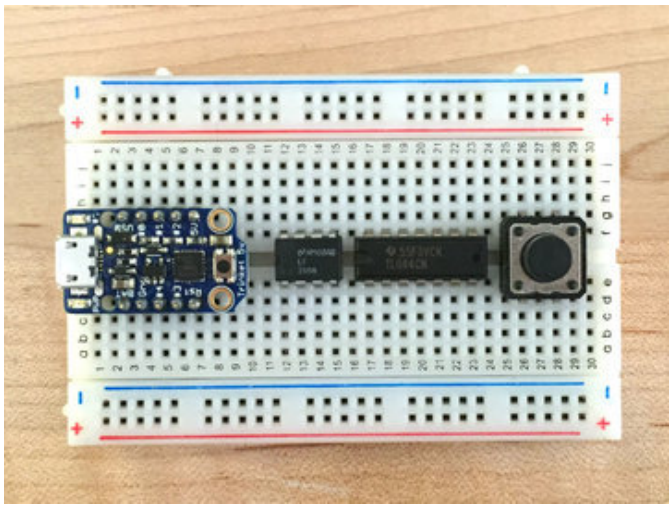


Adding DIPs and Modules

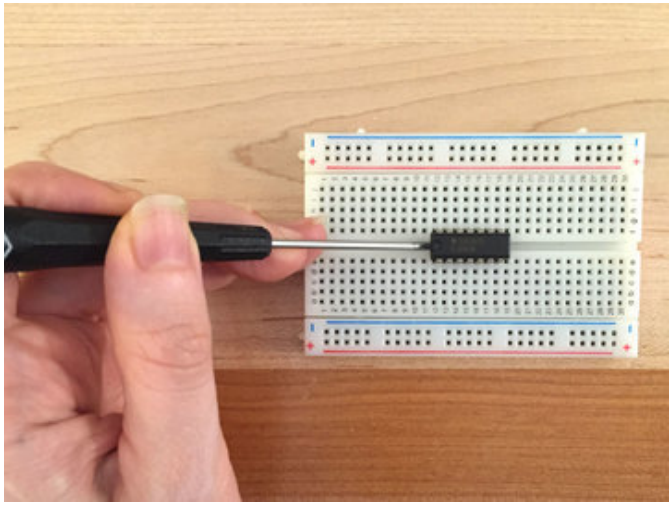
Wiring up a single LED is no problem, so lets continue and add more complex components. Parts like DIP (dual in-line pin) chips are a perfect match.



When new, the pins are not quite straight, they're bent out a little like an /--\ shape. You can carefully press the pins against a tabletop, and rock them forward together to bend into a |--| shape

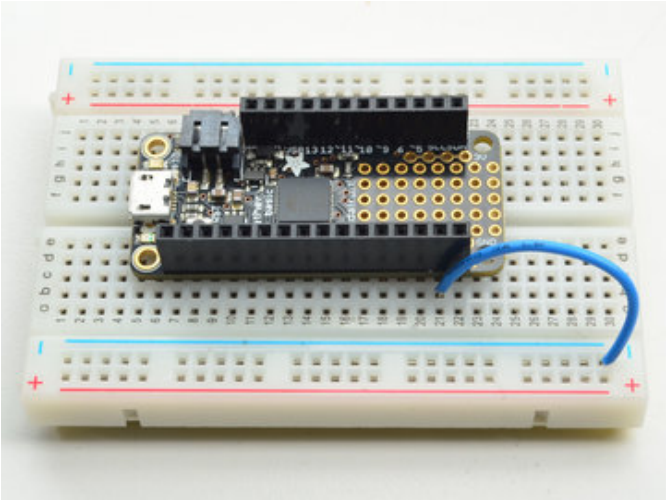


Then carefully press into the center of the breadboard. Watch out for bent pins!

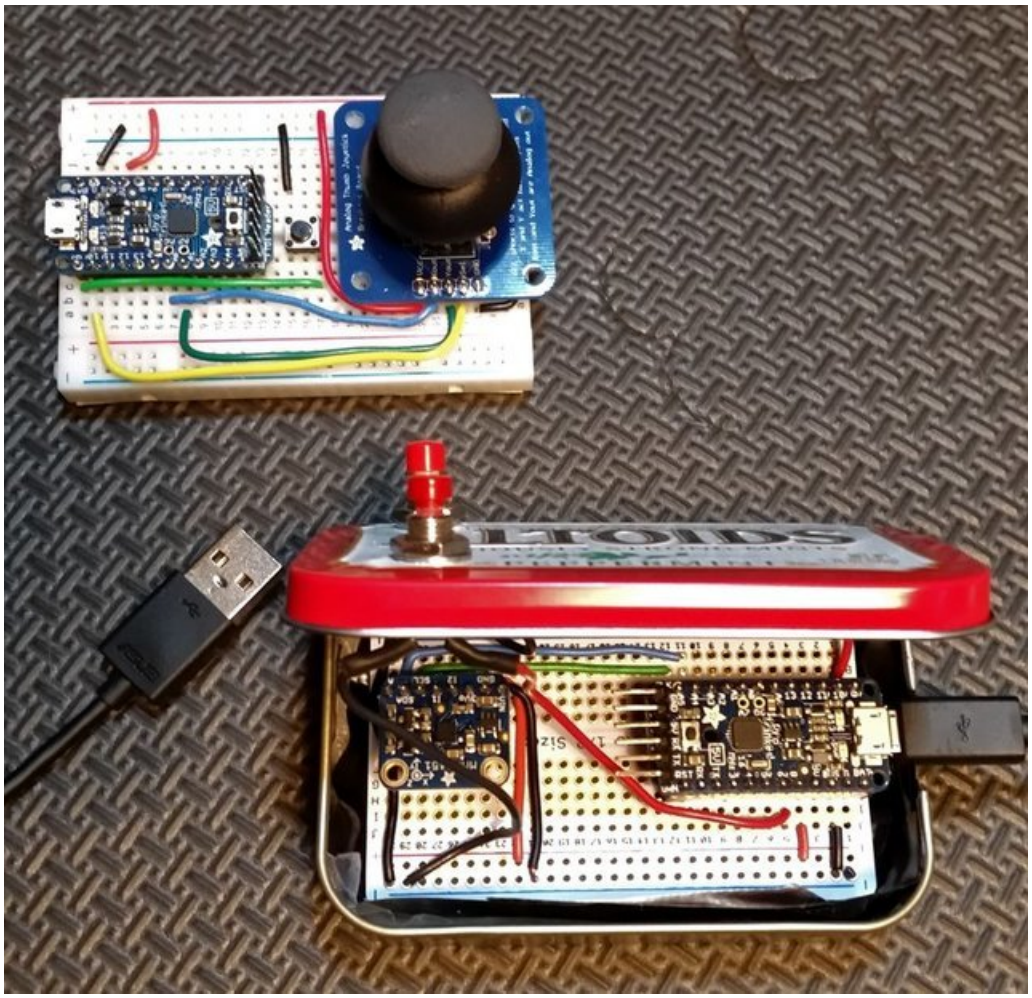


You can remove the chips easily by slipping a thin screwdriver or awl down the center ravine/divider and *carefully* prying upwards.

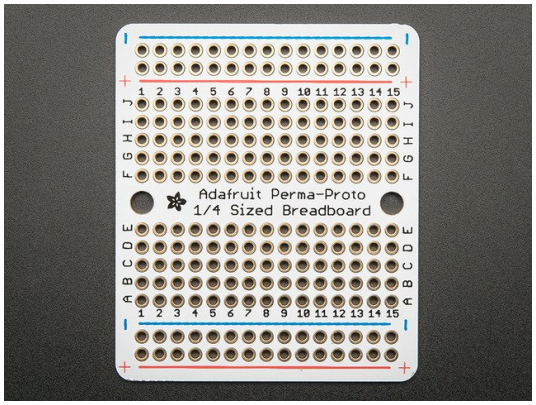
Pry from both sides if possible to keep the pins from bending by accident.



Plug in both ends into the breadboard as desired to make an electrical connection



We also have these in a few different other sizes and styles, like a 'quarter sized' one that is a bit larger than the tiny breadboard and comes with power rails:



Adafruit Perma-Proto Quarter-sized Breadboard PCB - Single

$2.95
IN STOCK

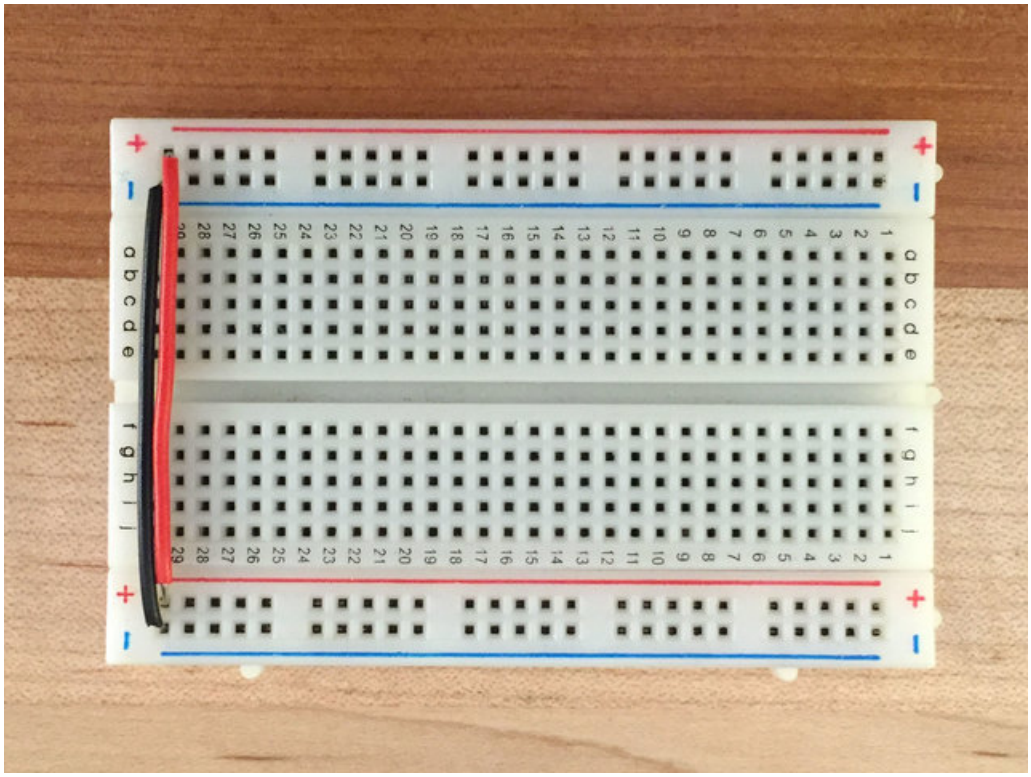
ADD TO CART

Full sized breadboard sized, huge with tons of space!

Breadboard Tips & Tricks

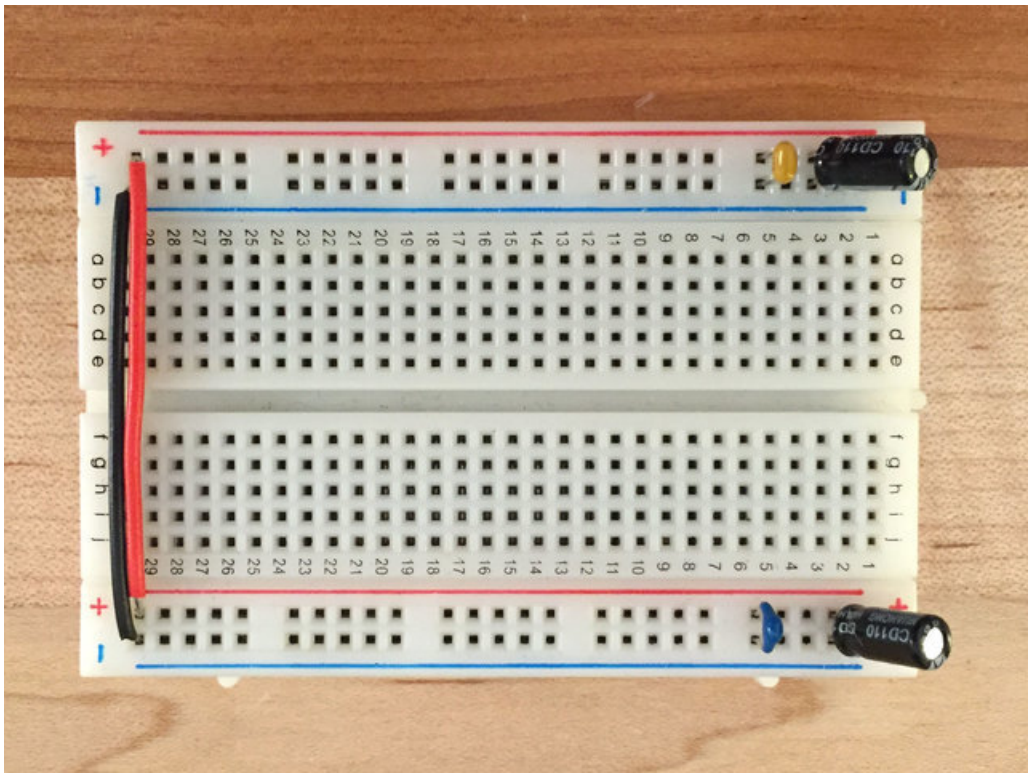
Connecting the two power rails

The two sets of rails are not internally connected. Since I almost always want at least the grounds connected, I like to use two solid core wires to make the two sides of rails carry the same voltages



Heck, I usually leave these on permanently between projects!

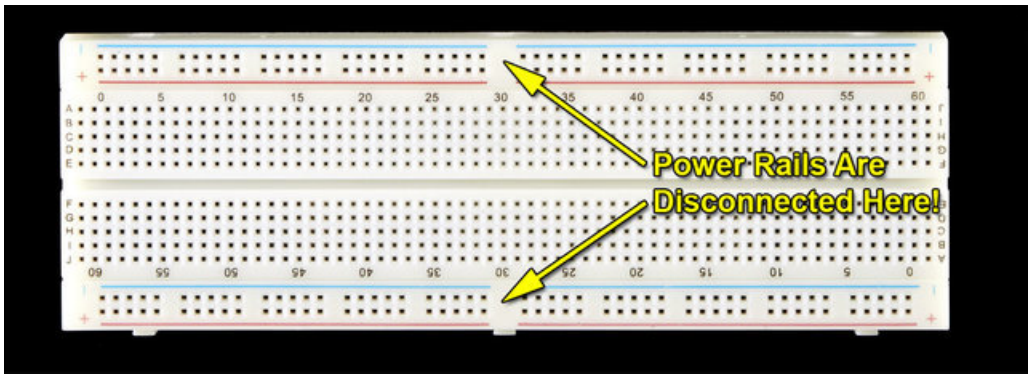
While you're at it, it's a good idea to add some capacitors to the rails. Electrolytic and ceramic capacitors are usually 2.5mm spacing so they fit right in. A 10-100uF electrolytic paired with a 0.1-1uF ceramic on either side will often be enough for most simple circuitry.



Watch Out For Split Rails!

Sometimes you'll get full size breadboards that do not have solid continuous rails. This can really trip up beginners because they are used to the ground strip being solid all the way down, but there's a gap!

Check the silkscreen of the breadboard, if the blue and red lines have a gap, you have a split rail



But some breadboards do not have the nice colored lines so you'll have to test with a multimeter or some other way to verify. Use little wires to jumper over the gap, if you want continuous conductivity

Using Fritzing!

We use Fritzing for our diagrams (https://adafru.it/rdB), which can make it very easy to plan out your breadboarding project without even picking up a wire cutter. It doesn't do simulation or anything, it's just for diagramming - but you can go from schematic to breadboard or the other way around and then also generate PCBs.

For complex projects, it can take a crazy tangle of wires and lets you clearly visualize all the connections!