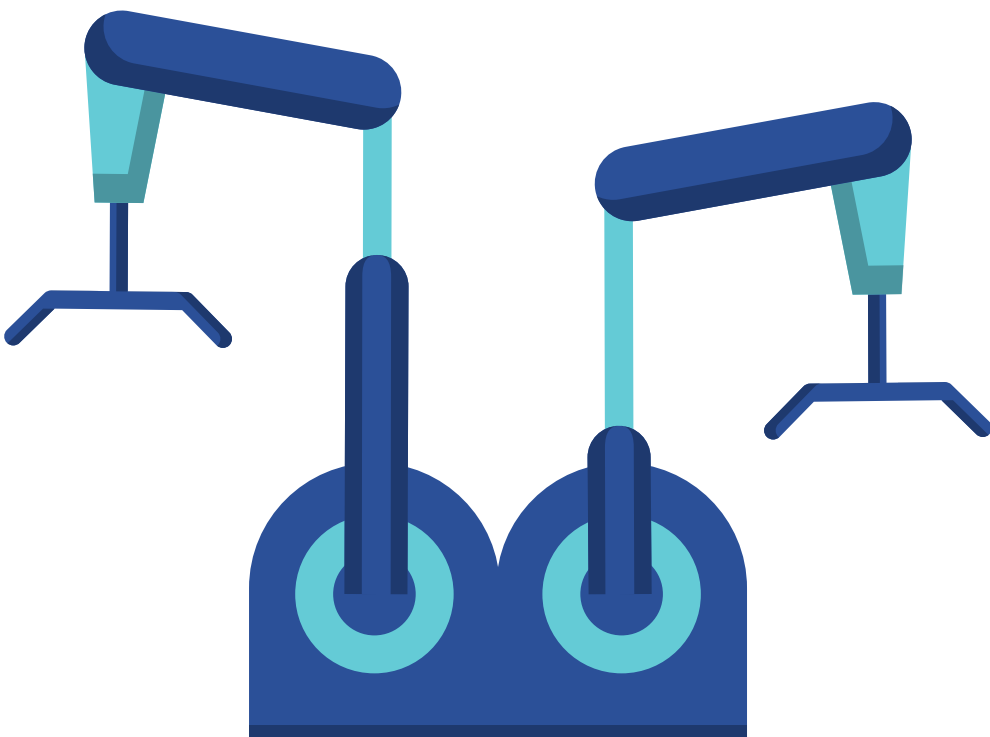
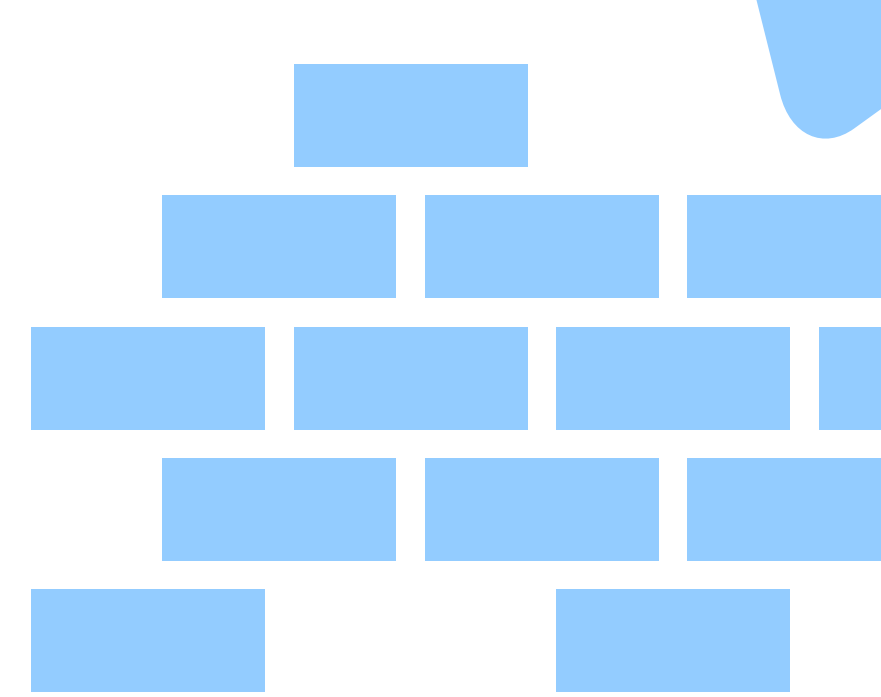


Intro to circuits

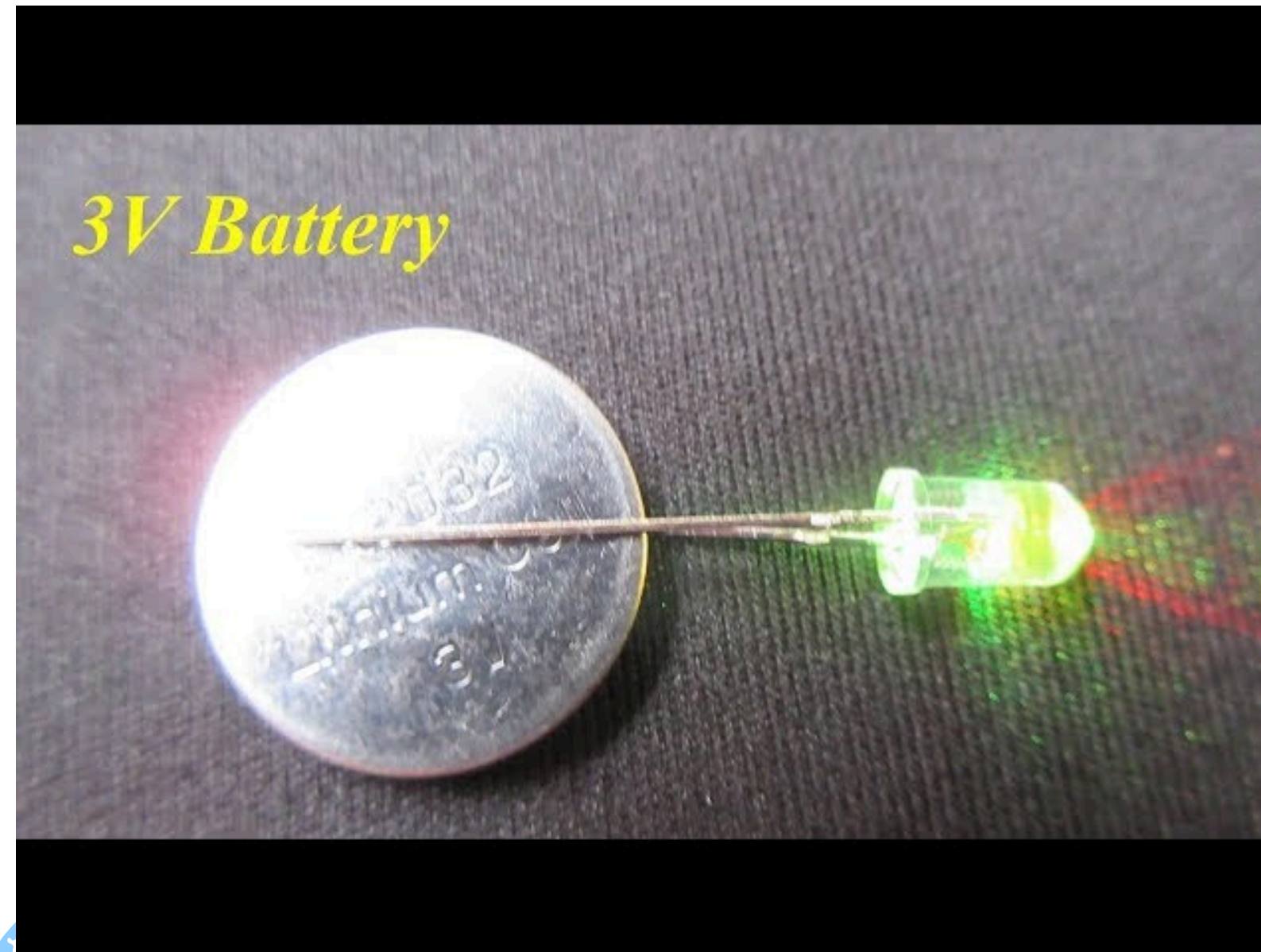


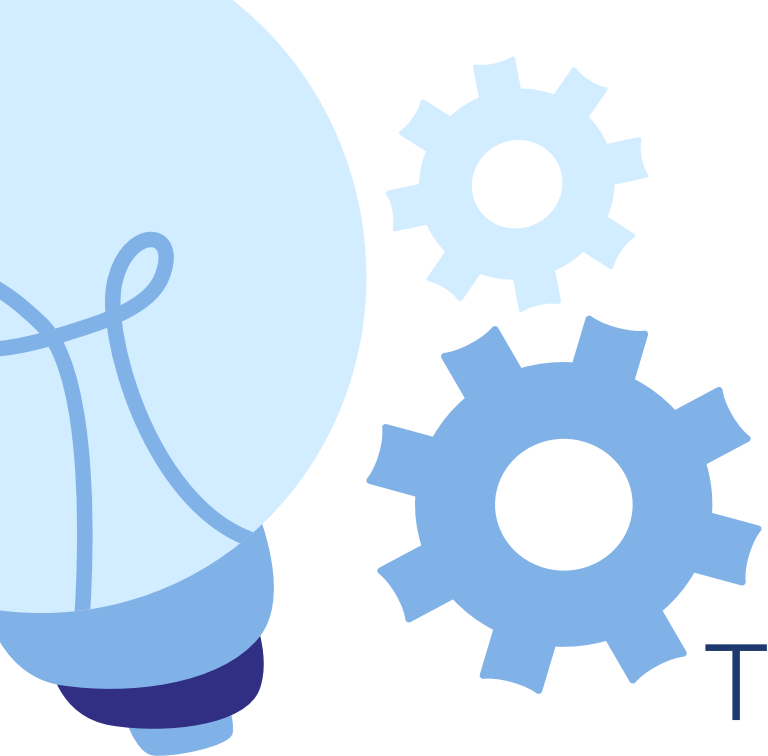
In TinkerCAD



LED light

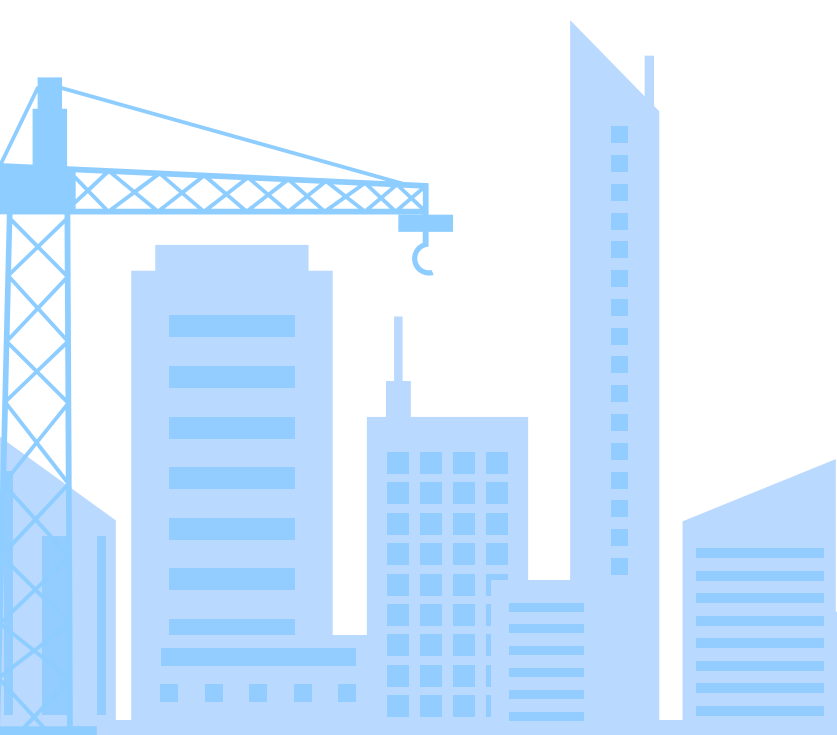
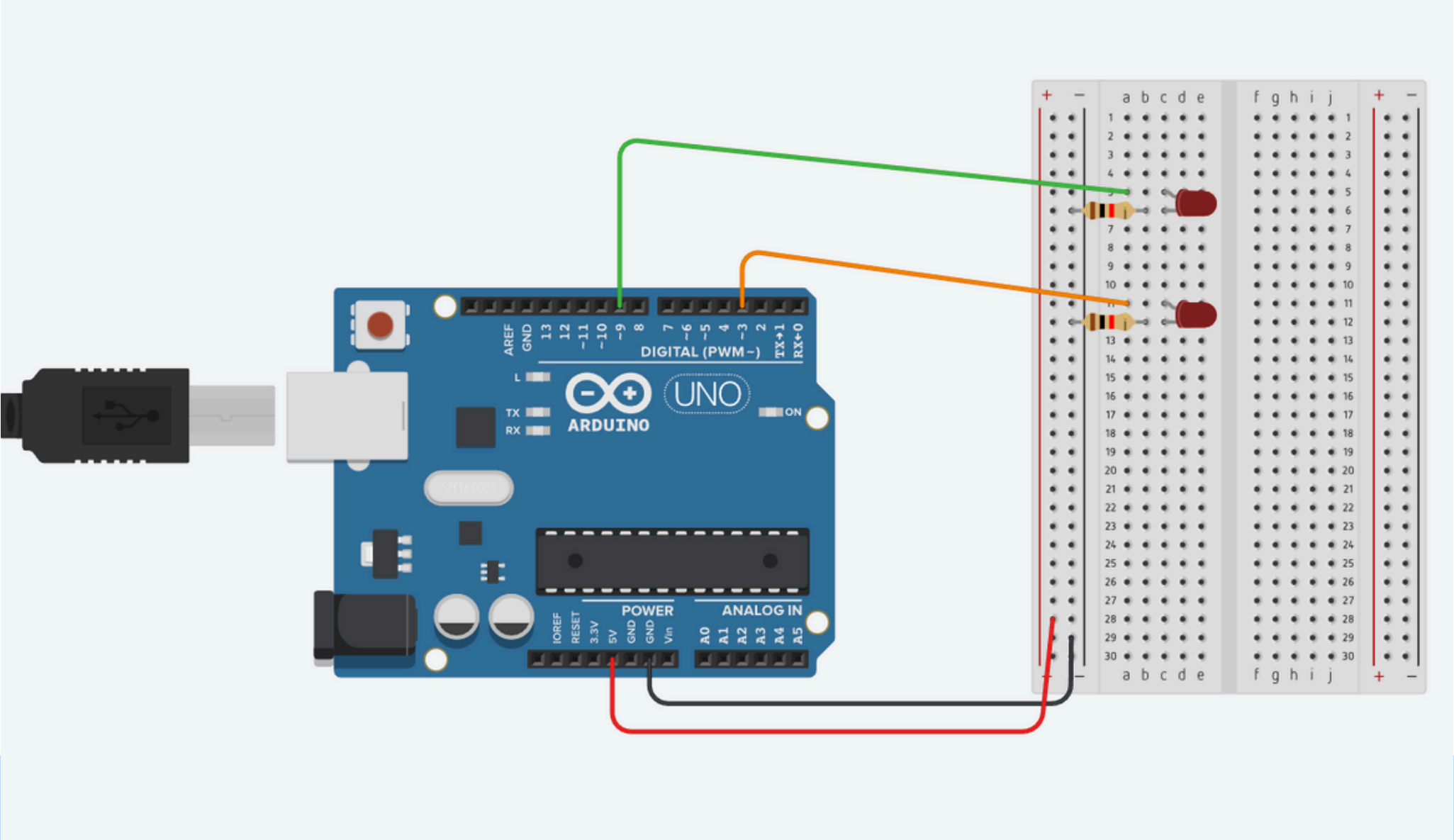
This is one simple way to turn on an LED (Light-Emitting Diode) light



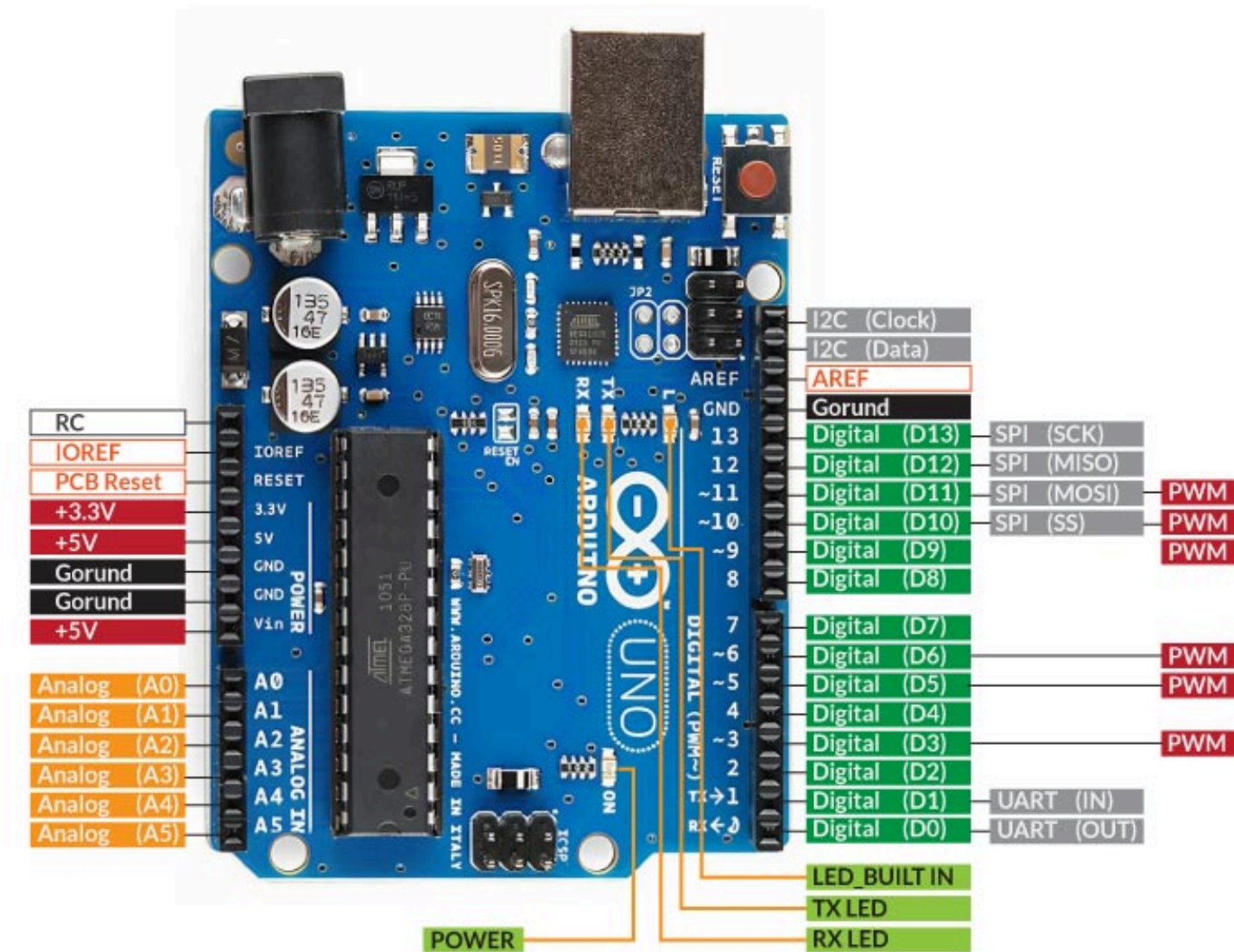
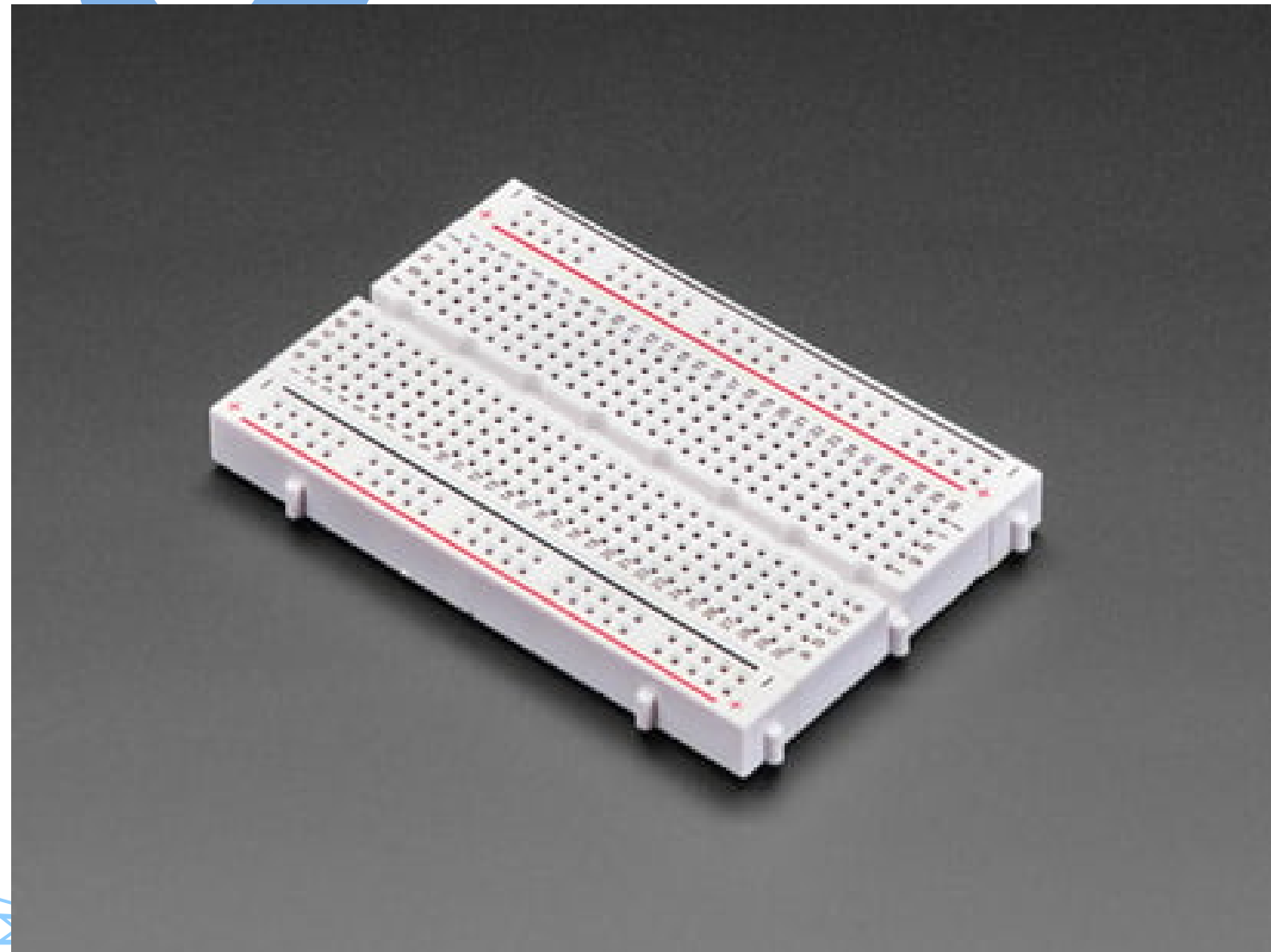


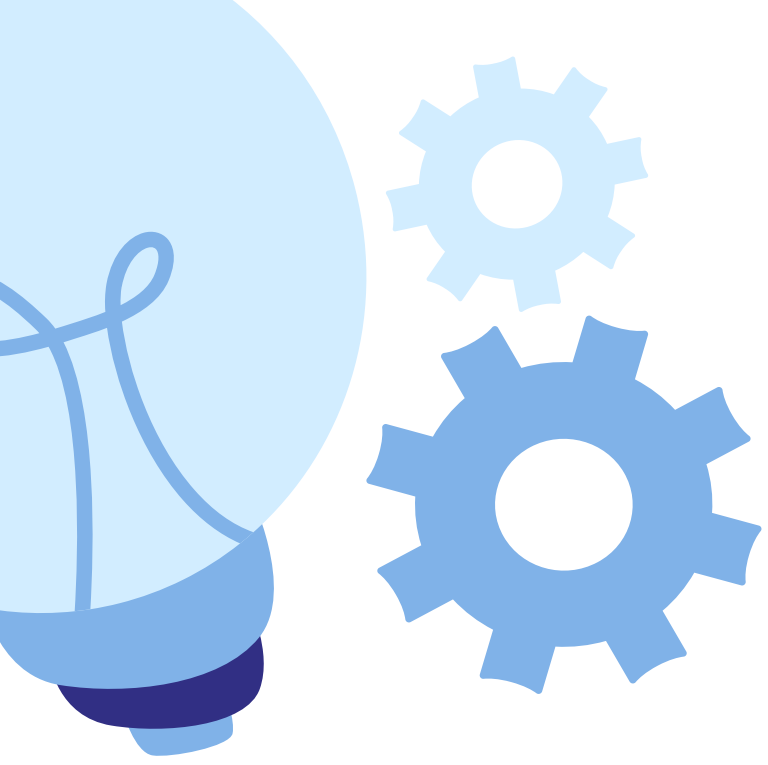
Activity

Today you will be creating a circuit on Tinkercad that makes 2 LEDs blink!



Materials

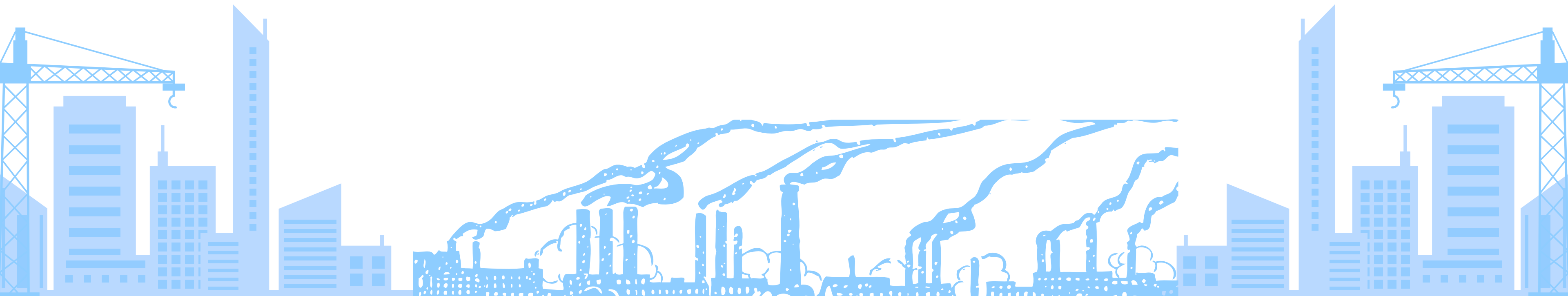




Figuring out Tinkercad



Today you will be using the online software Tinkercad to make your circuits. On Tinkercad you can make of 3D models and other projects.





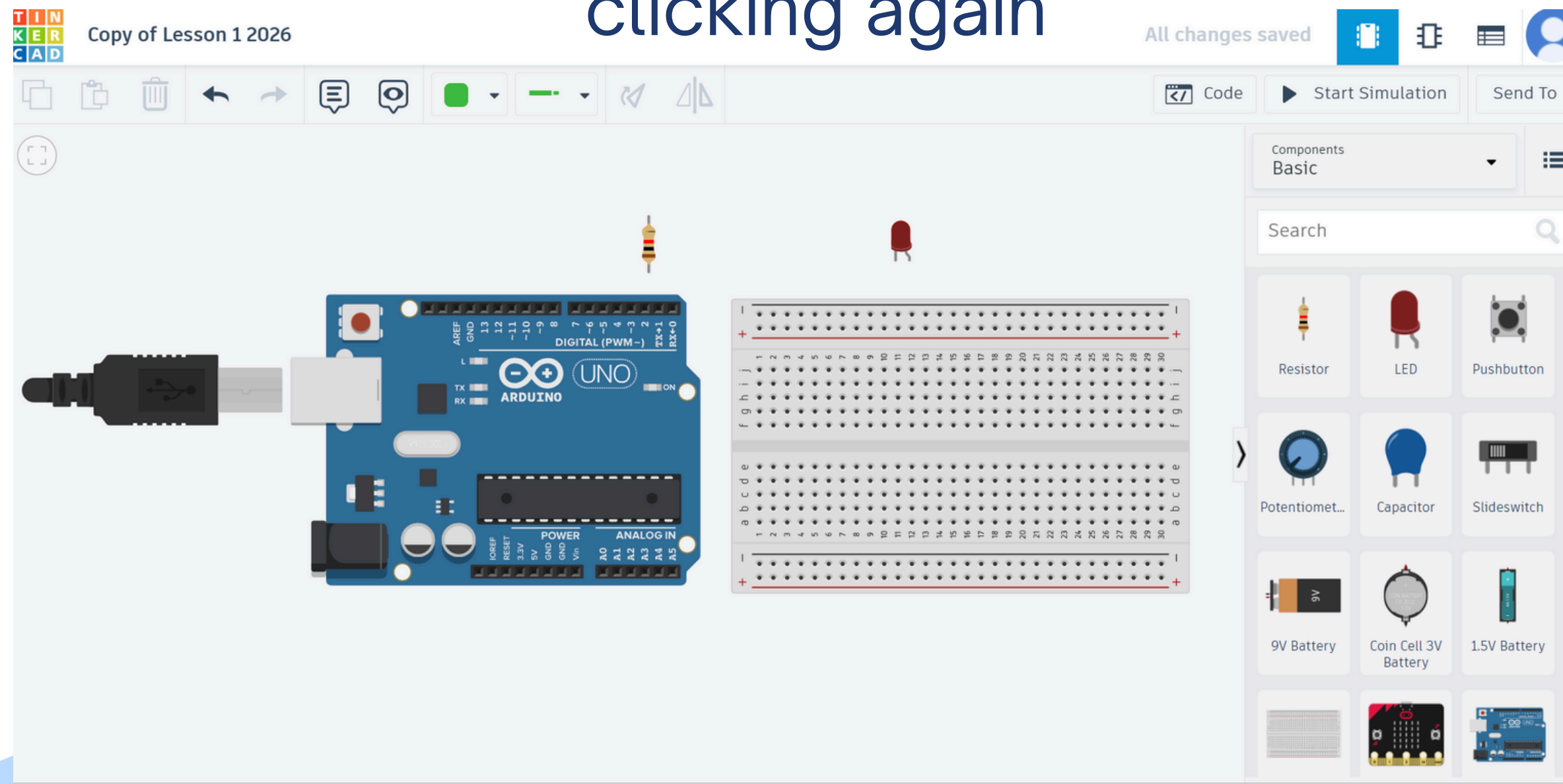
TinkerCAD controls

Try to find the following components:

- “Resistor”
- “LED” (not RGB)
- “Breadboard small”
- “Arduino UNO R3”

TinkerCAD controls

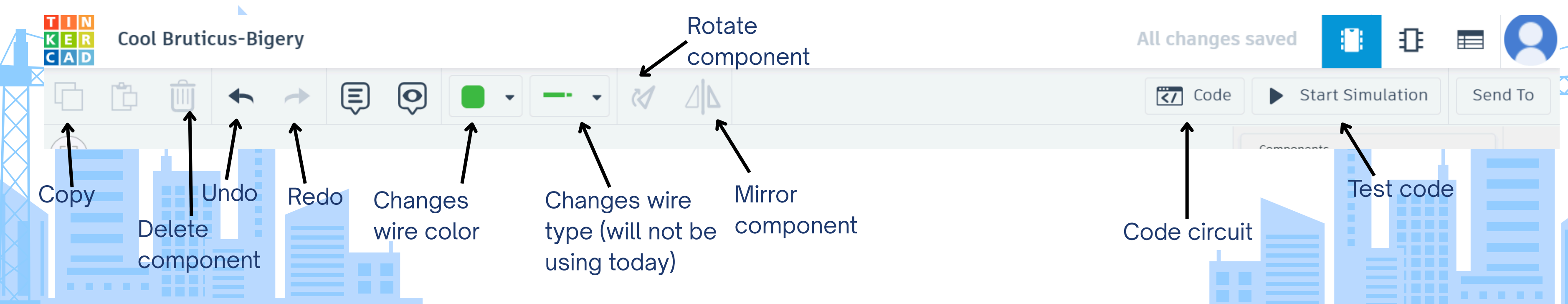
Now, drag all of your components onto the workspace by clicking them, bringing your mouse to the workspace, and clicking again



Workspace should look like this^

TinkerCAD controls

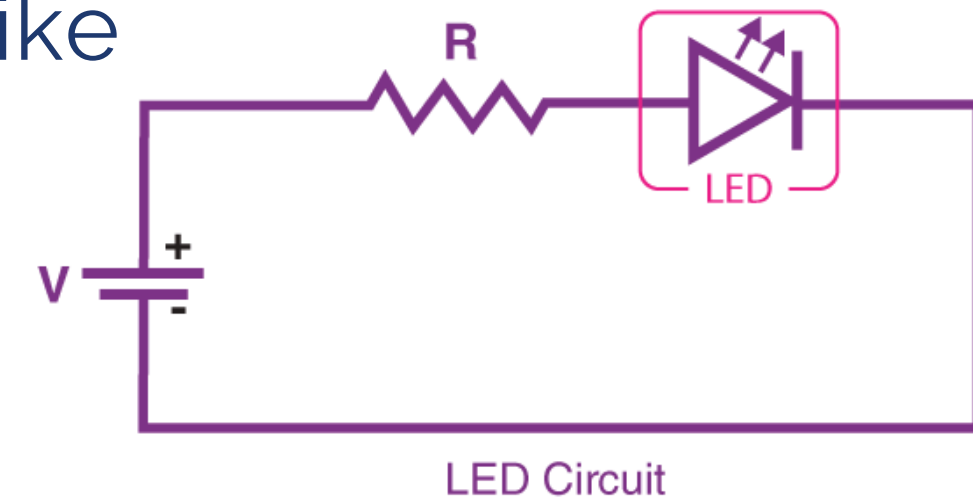
- Rotate components by clicking them and typing r
- Make wires by clicking a hole on the breadboard/arduino, bringing it where you want, and clicking it again. If you want to make it neater, you can click on the wire while its on blank space to make a turn
- Click on a wire and press backspace to delete it



How it works

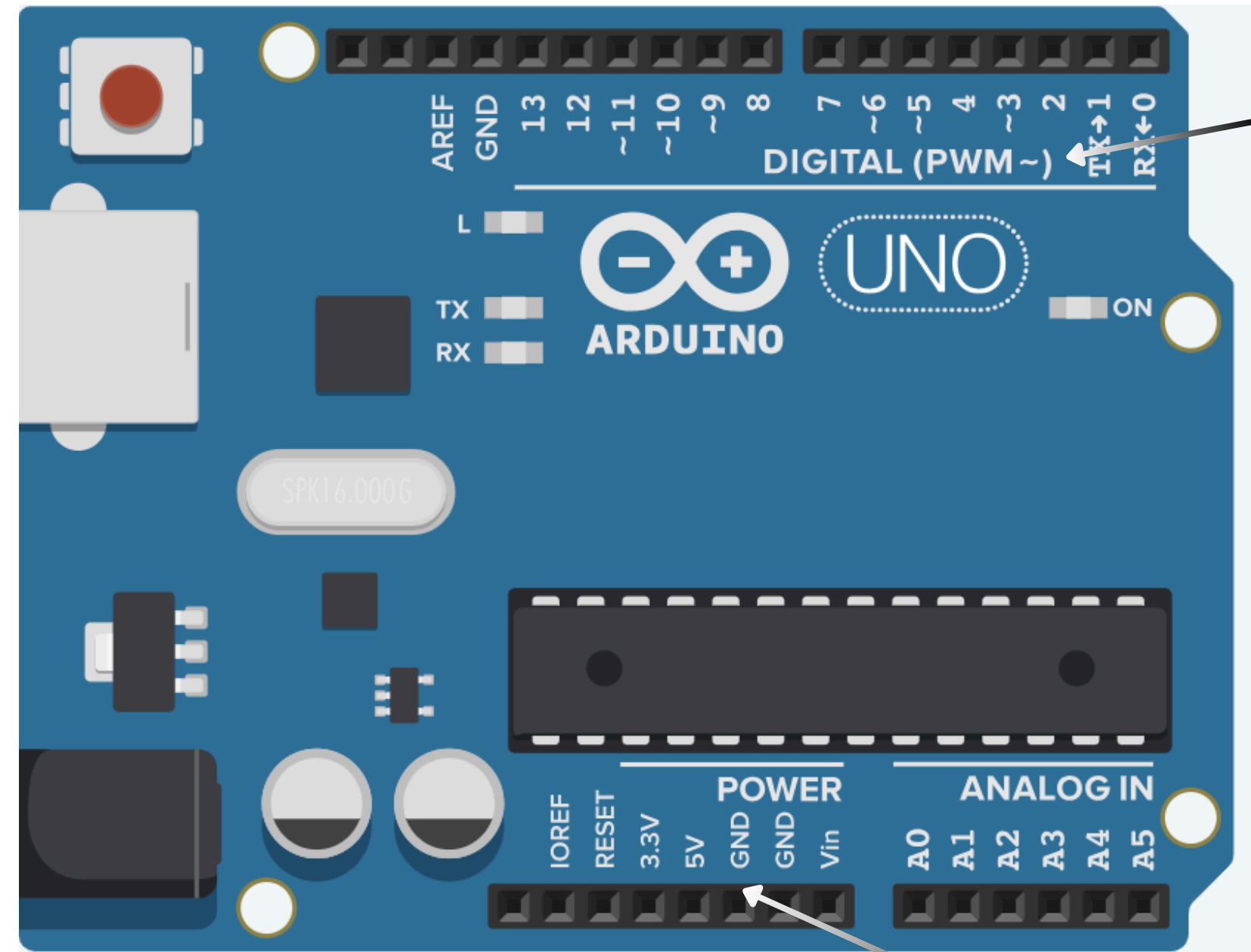
There are 2 sides of an LED (and other electronics like motors):

- An anode
- A cathode
- Energy flows from high to low (from the anode to the cathode)
- The difference in energy on each side is what makes the led light up
- If there is no energy difference, or if the energy is flowing from the cathode to the anode, the light will not turn on



Parts of Arduinos

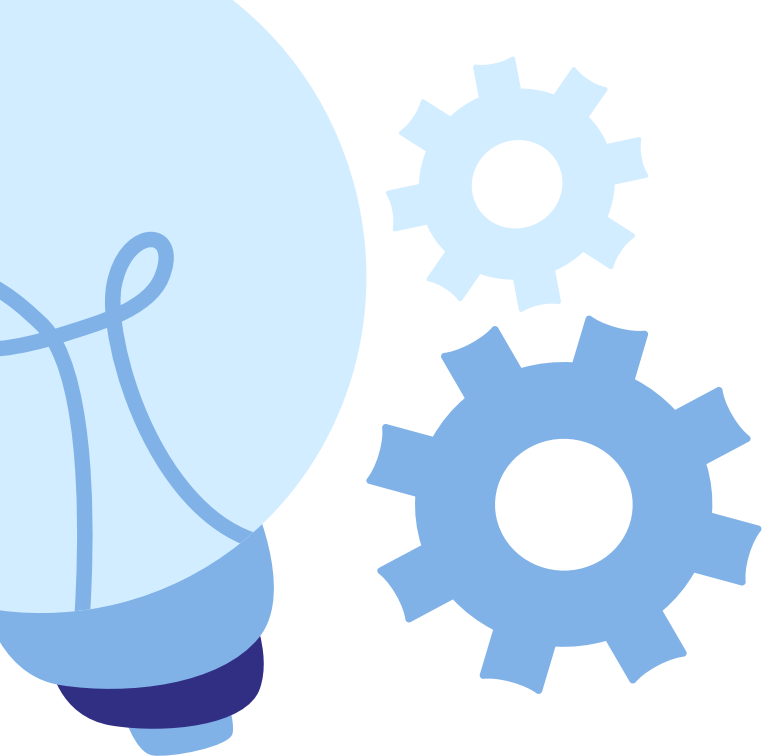
You will learn about new parts of Arduinos when you learn how to use them.



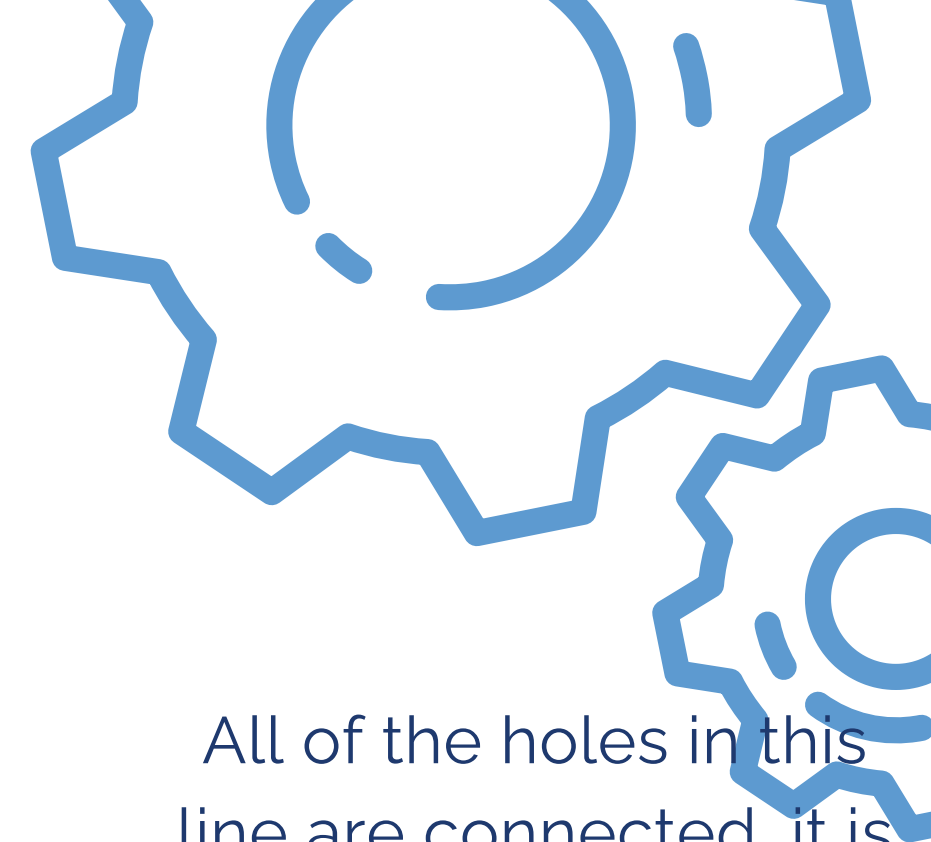
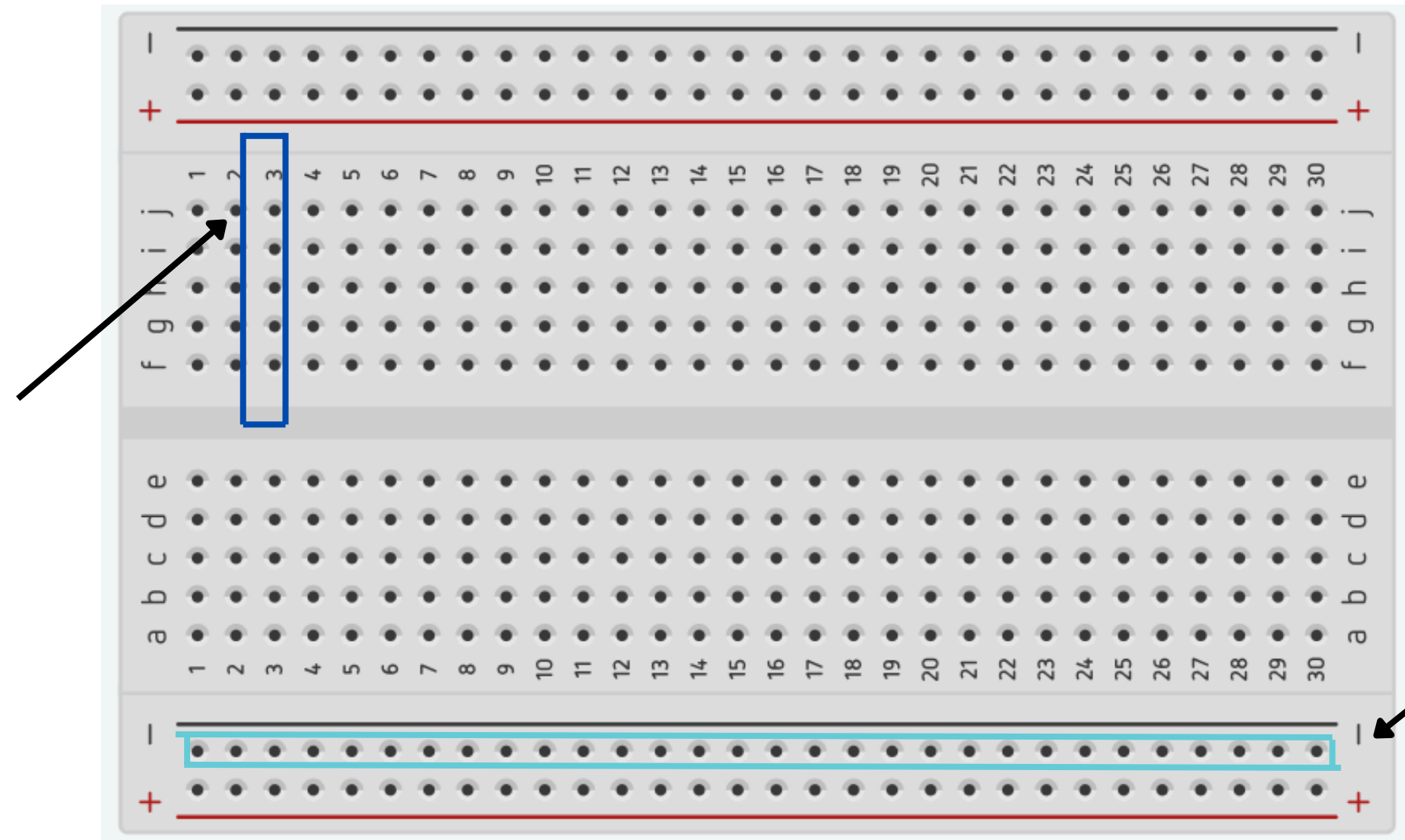
The digital pins can be assigned a voltage, serving as either the high or low charge

Ground will be your low charge

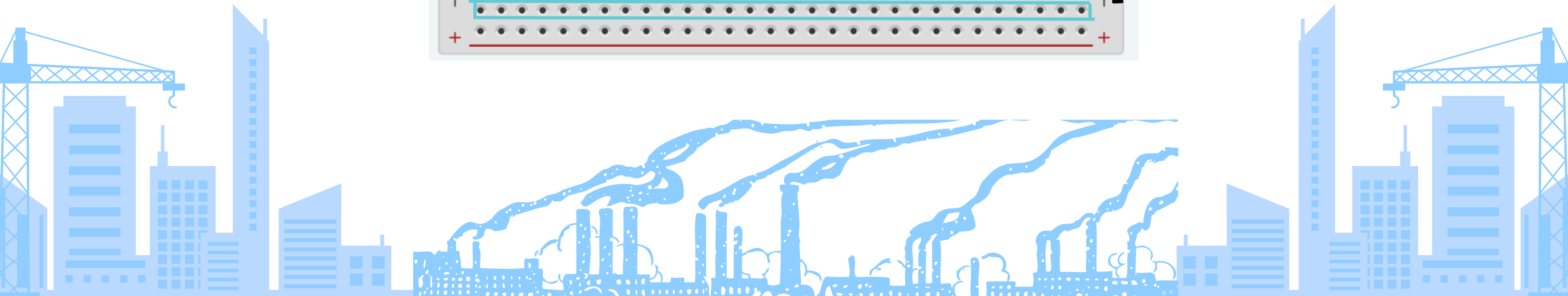
Parts of Breadboards



All of the holes in this line are connected, imagine that there is a wire under this line connecting them all (there kinda is)

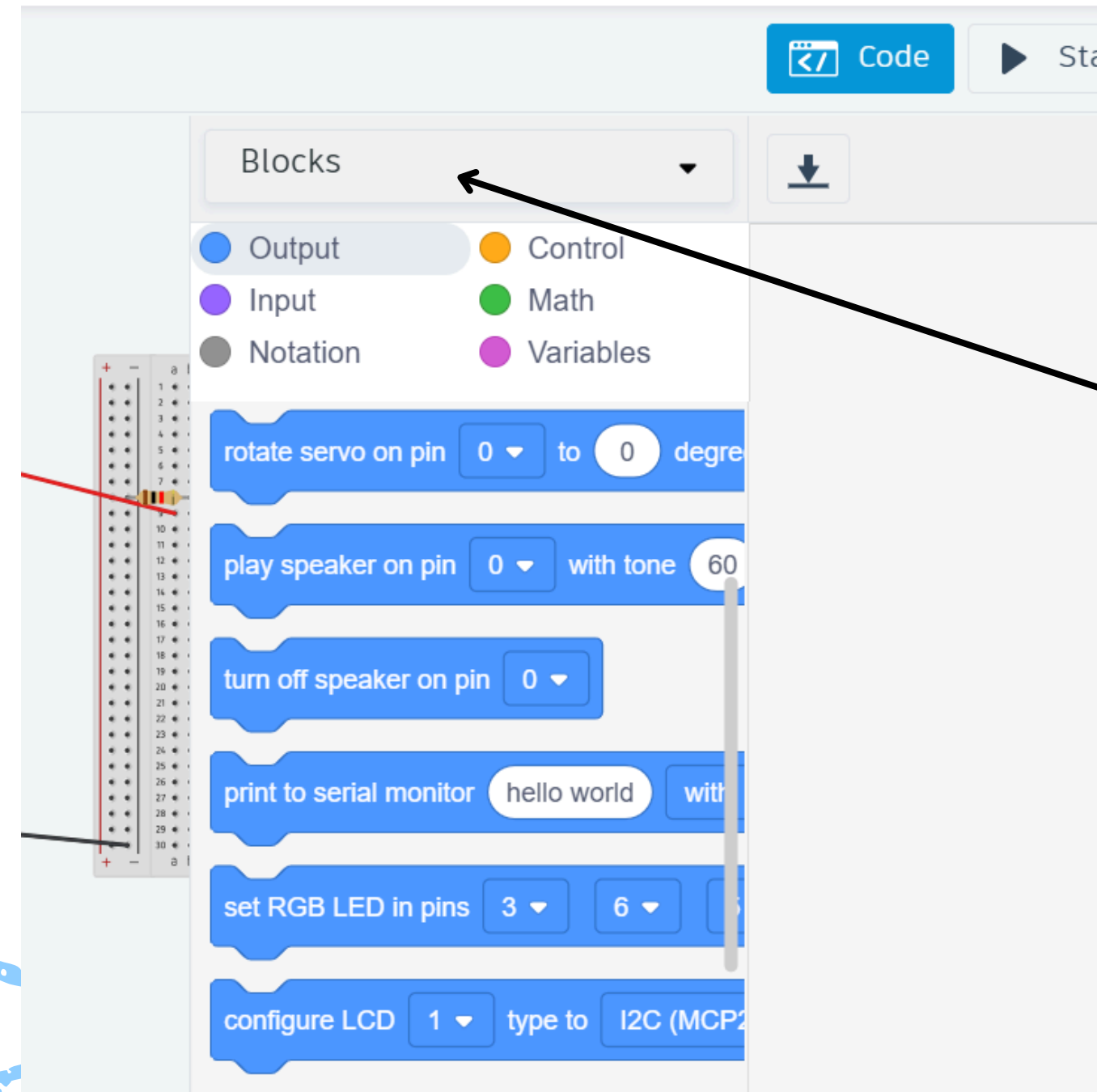


All of the holes in this line are connected, it is labeled just as a suggestion to help you remember which part of your circuit is negative



Code your circuit

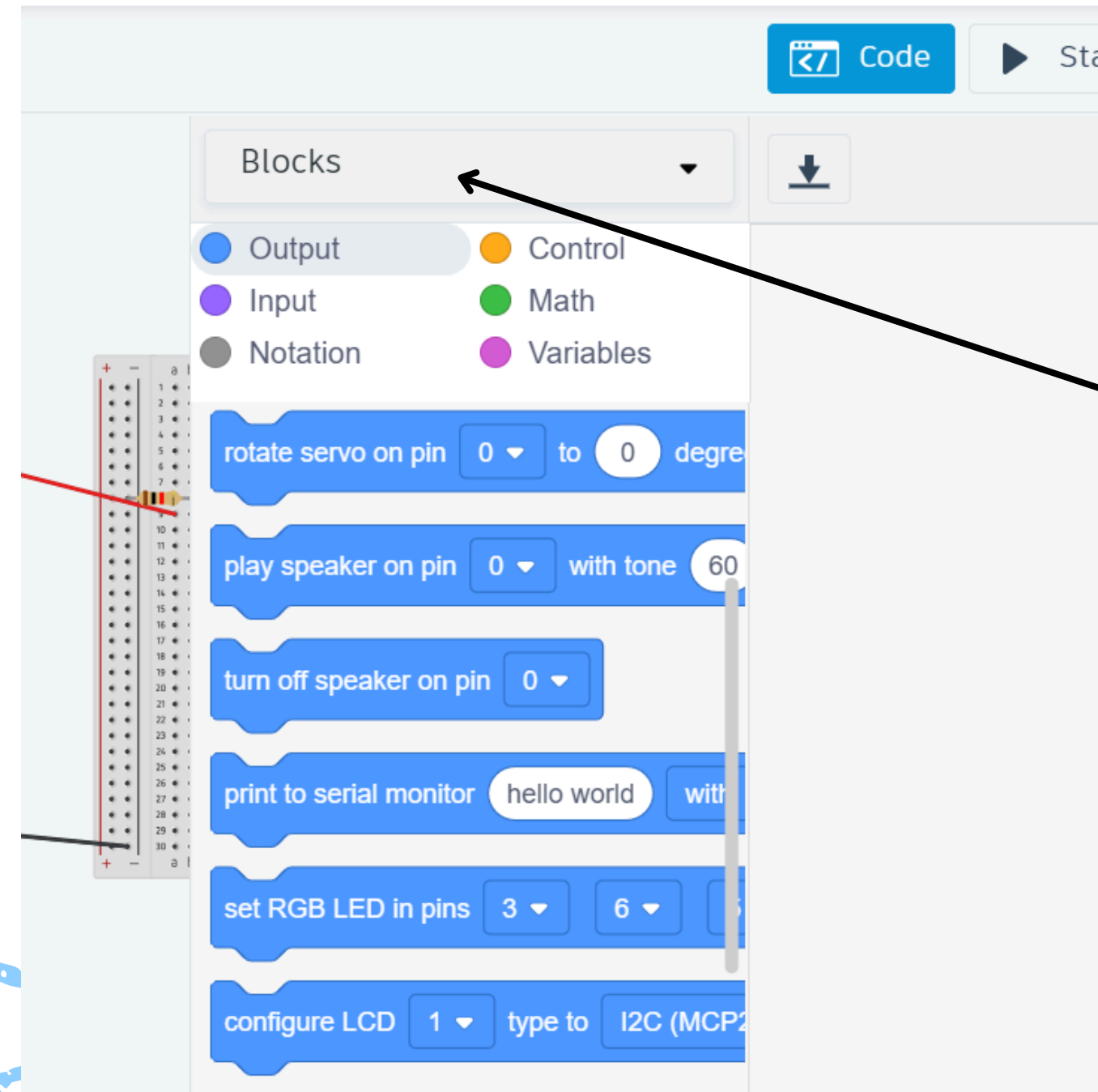
Today, you will be using block code, but if you want to see how your code looks in C++, select blocks and text on the dropdown menu



Change this

Code your circuit

Today, you will be using block code, but if you want to see how your code looks in C++, select blocks and text on the dropdown menu

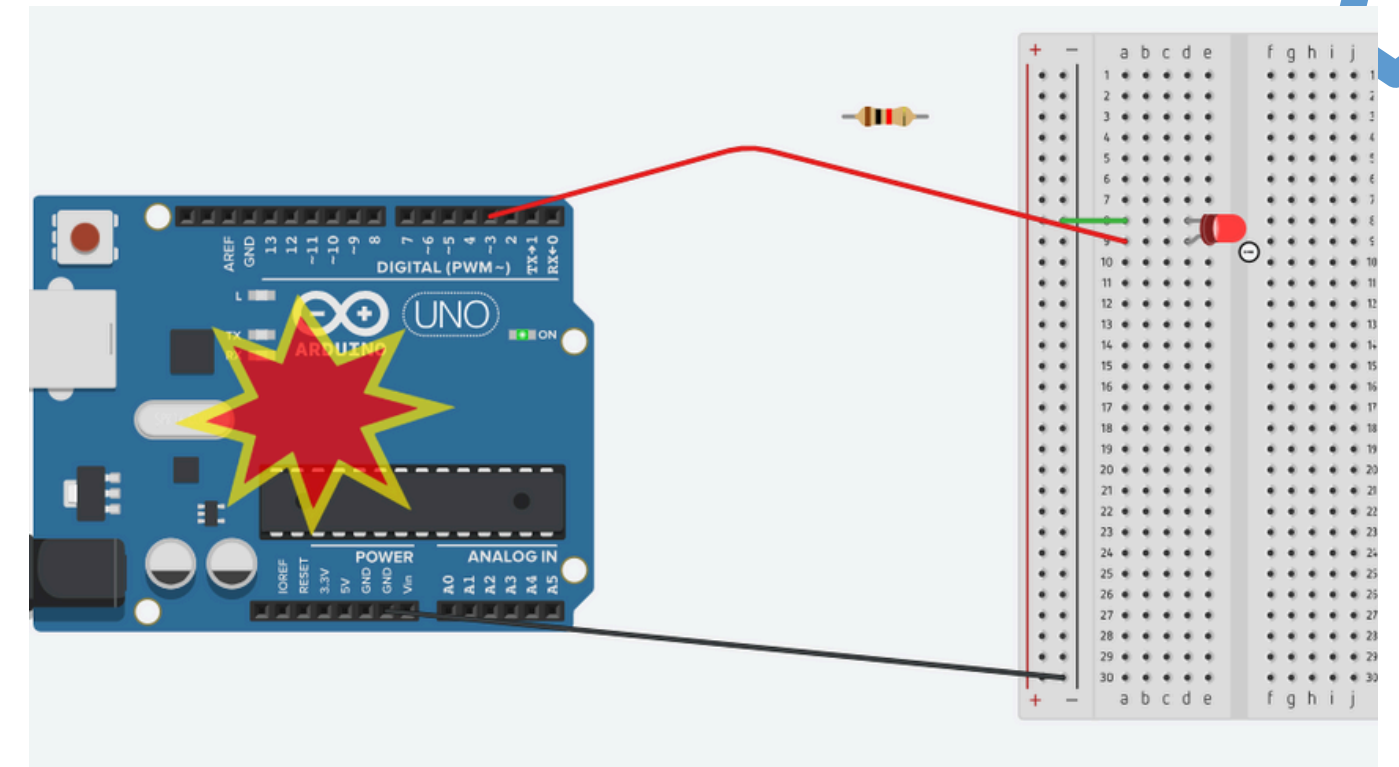


Change this

Resistor

Now make a circuit like the one that we just made, but without a resistor.

Why does that happen?
Let's see.

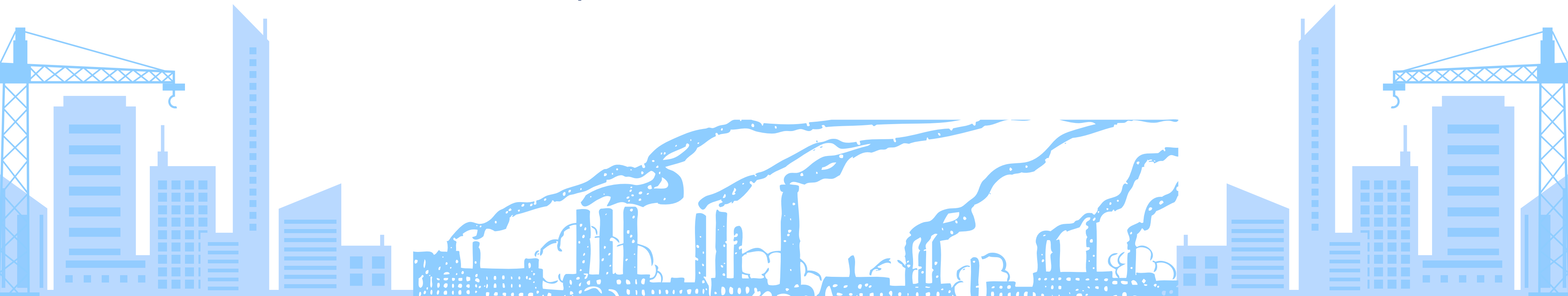




What do resistors do?

They lower the voltage flowing through a system!
It's dictated by Ohm's law $V = I \cdot R$ where I is the current and R is the resistance!

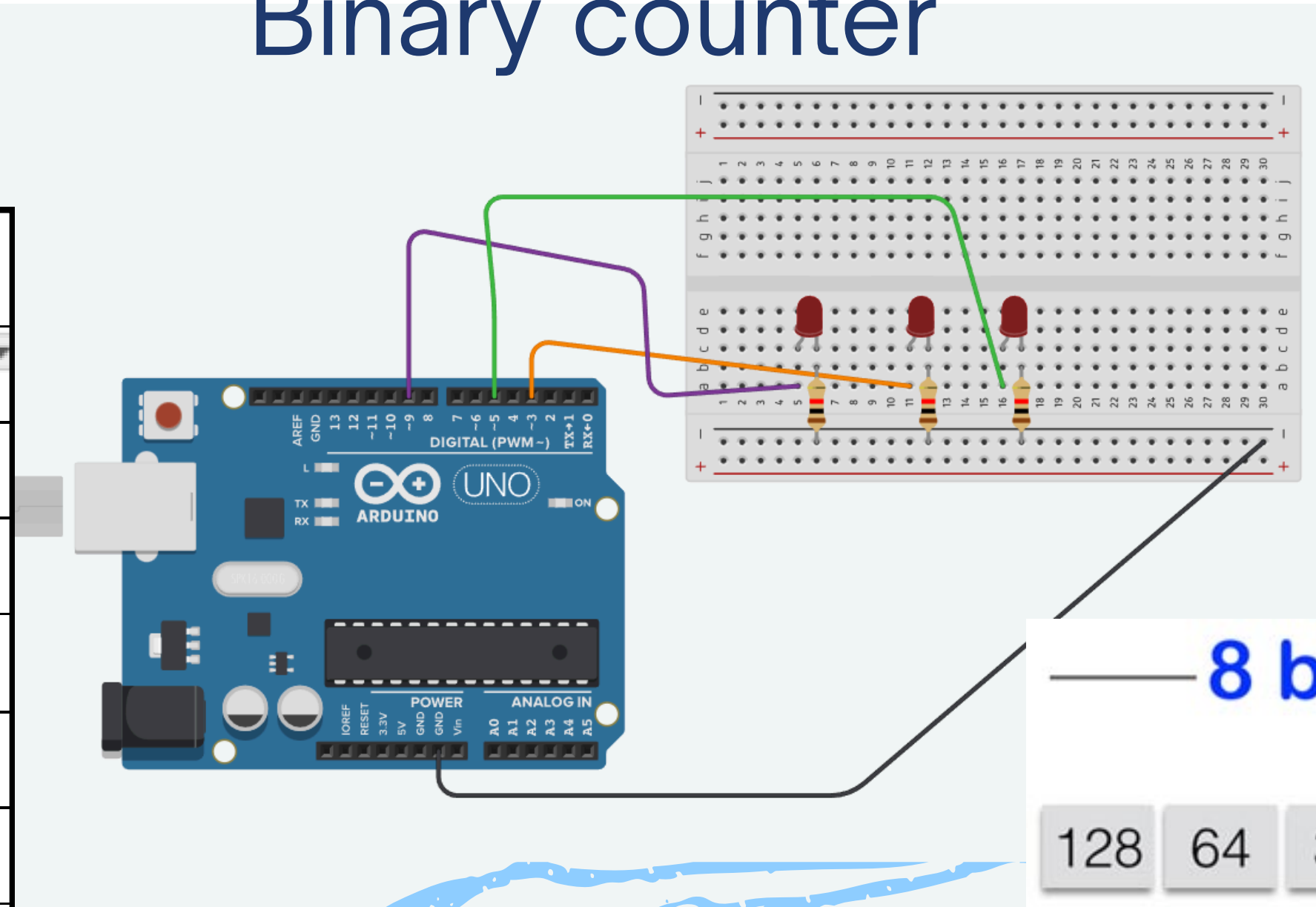
This allows components to not get too much power and burn out!



Tinkercad challenge

Binary counter

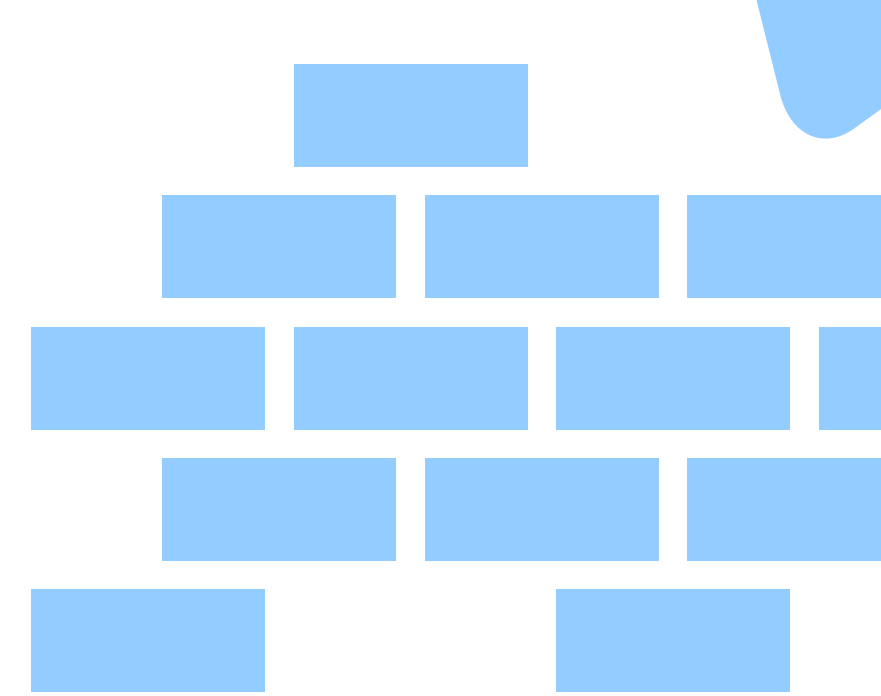
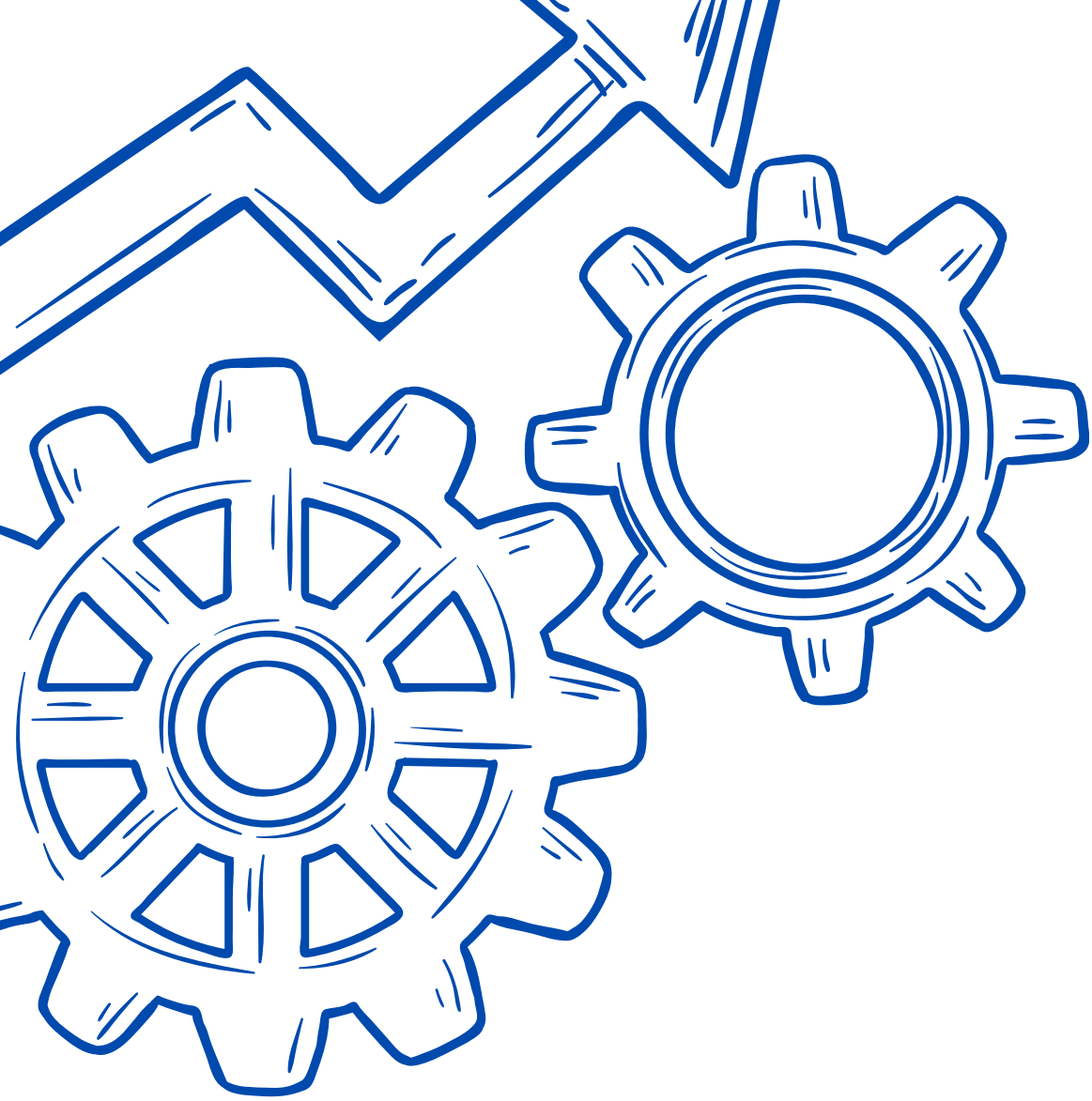
Decimal	Binary
1	001
2	010
3	011
4	100
5	101
6	110
7	111



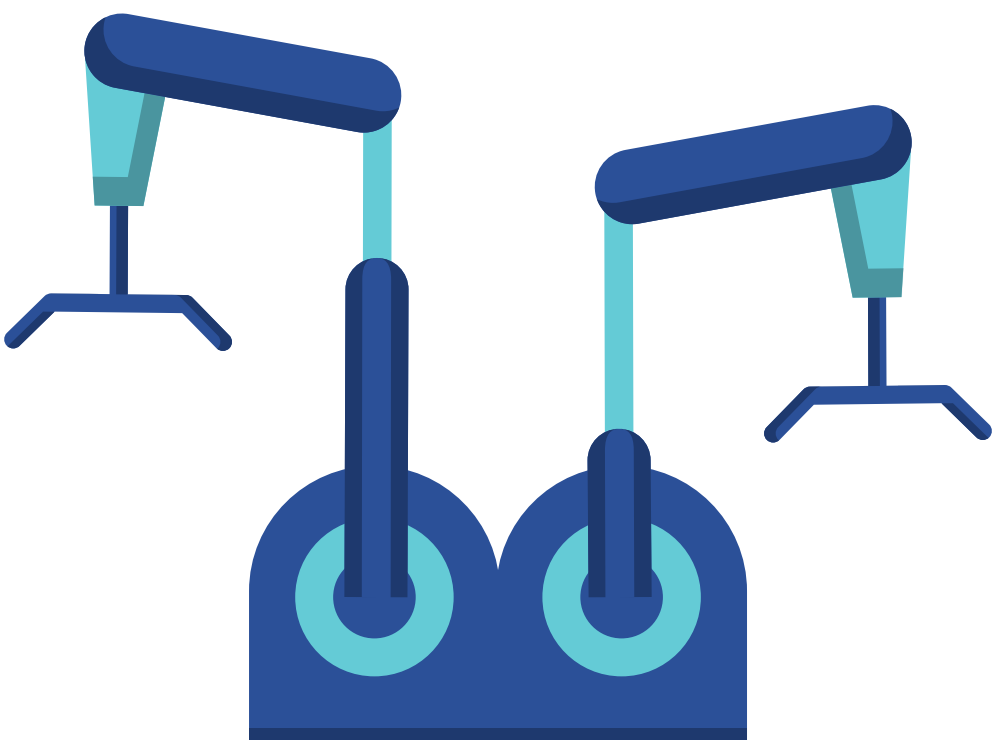
8 bit binary digit

128	64	32	16	8	4	2	1
0	1	0	1	1	1	0	1

$$64 + 16 + 8 + 4 + 1 = 93$$



***Thank
You***



Who are we?

We are members of Brooklyn Technical High school's robotics team: Team 334.

We compete in yearly robotics competitions. This was our robot last year:

