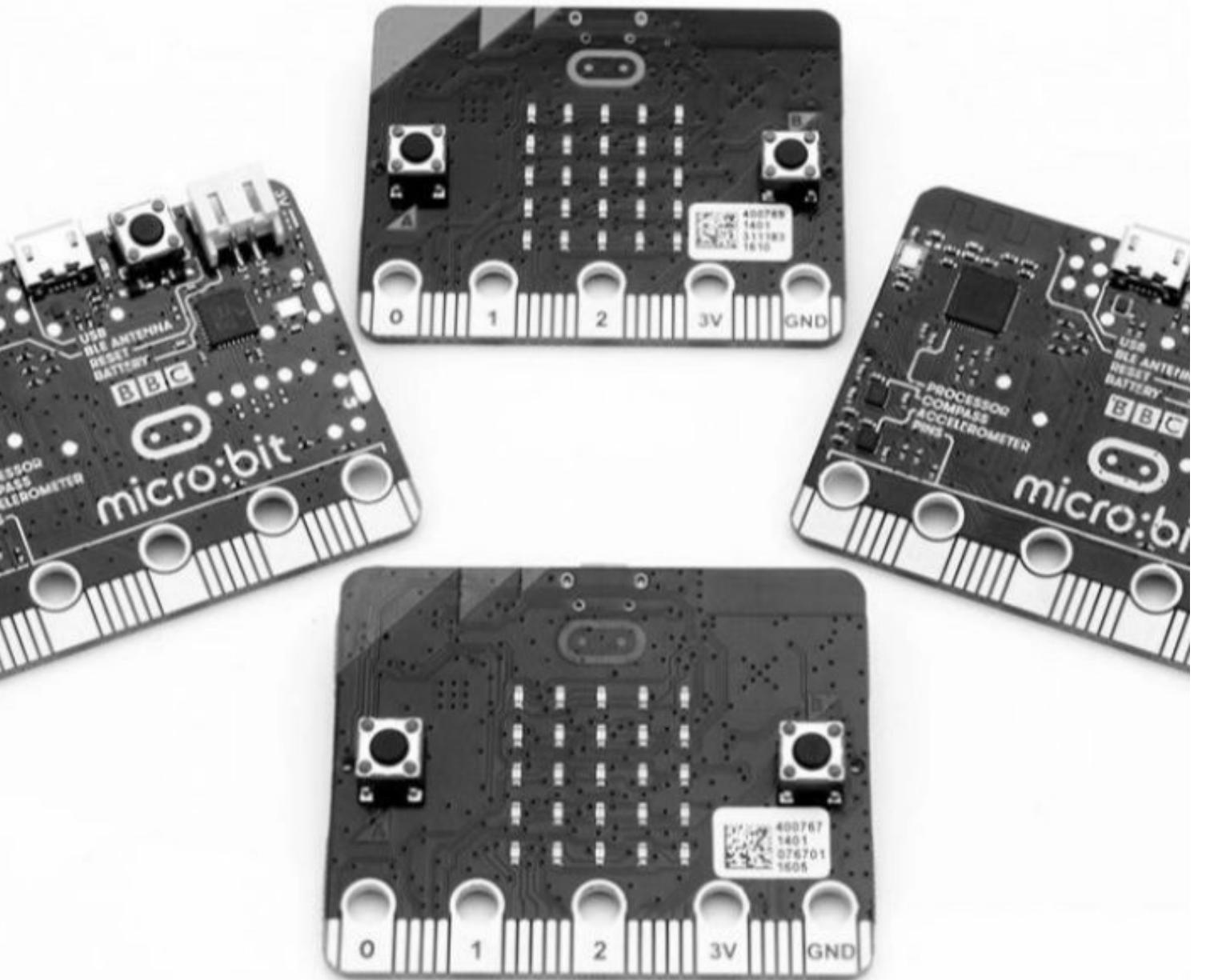


STUDIO DIGITAL



PaintBot

IDROPS

Valerio

Programma

Voormiddag

PaintBot making +
Micro:bit programming

Namiddag 1

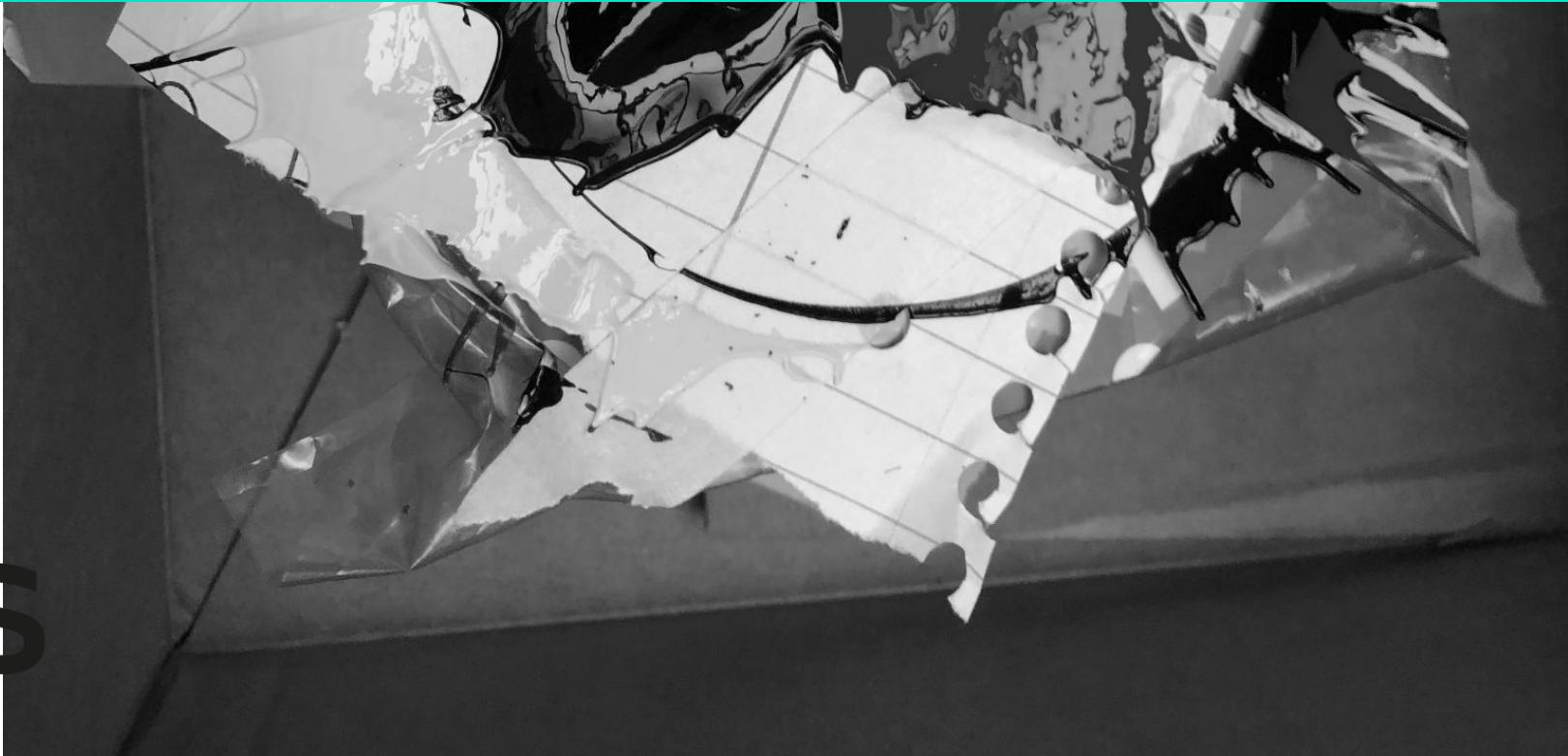
Electronics and artwork

Namiddag 2

Intro Inkscape

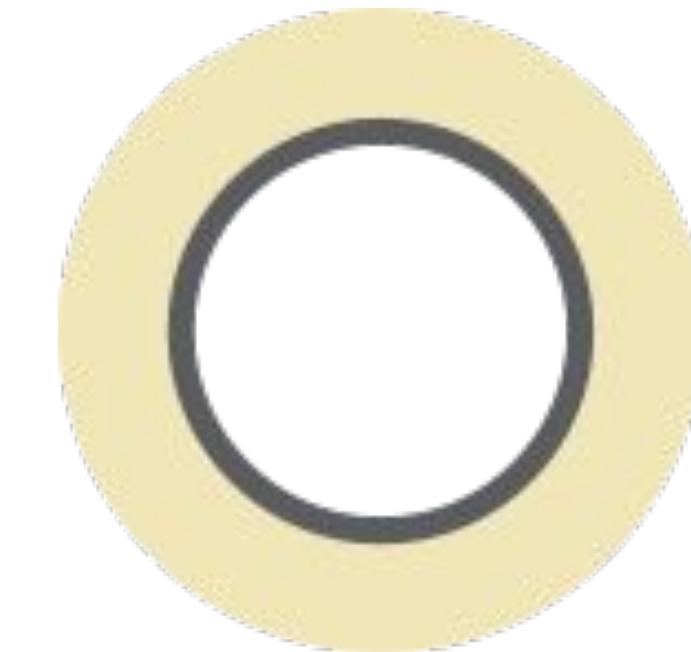
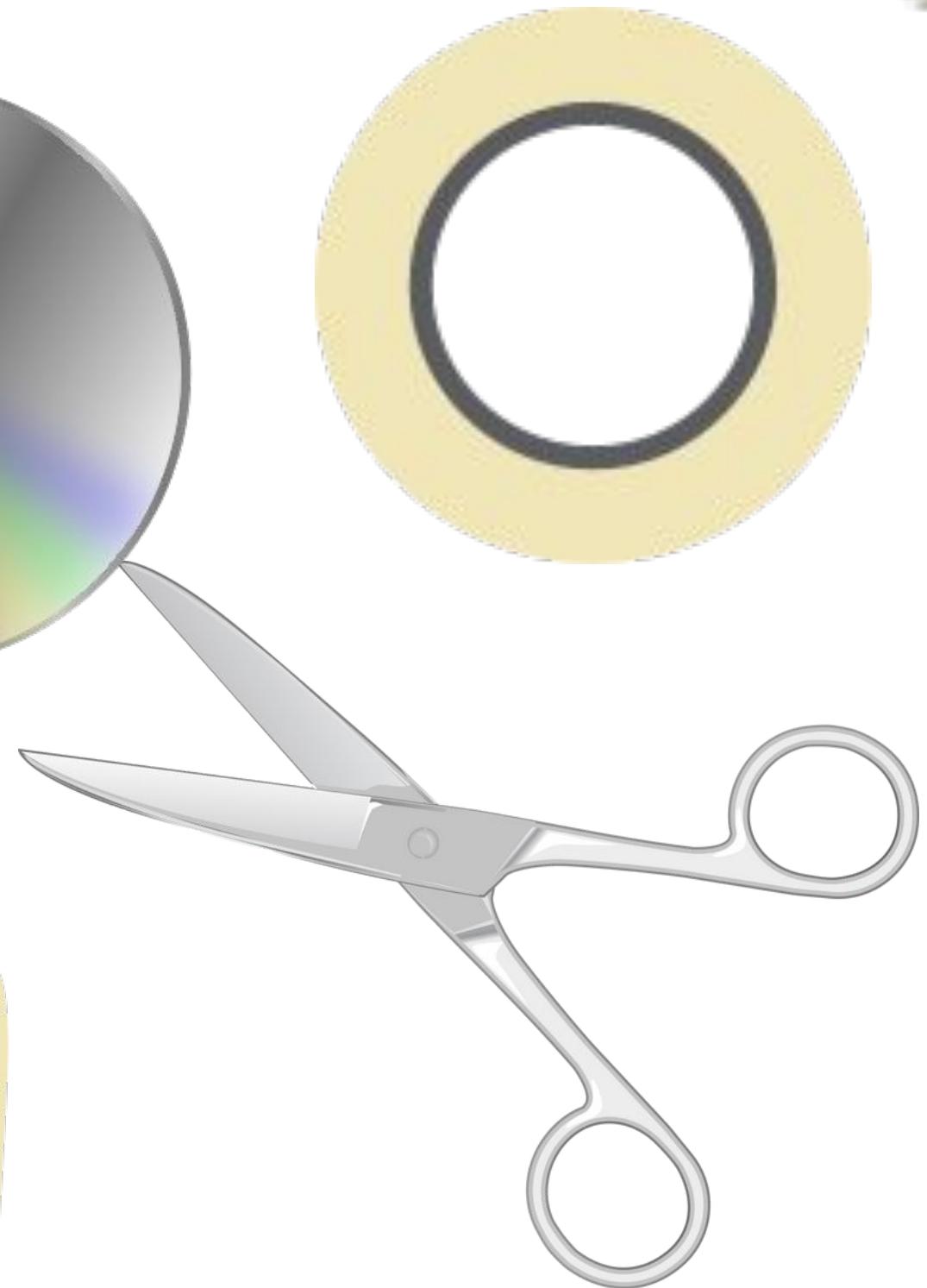
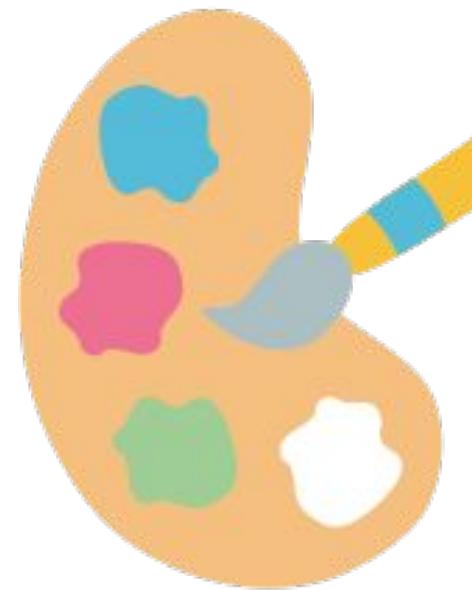


1. Make the PaintBot



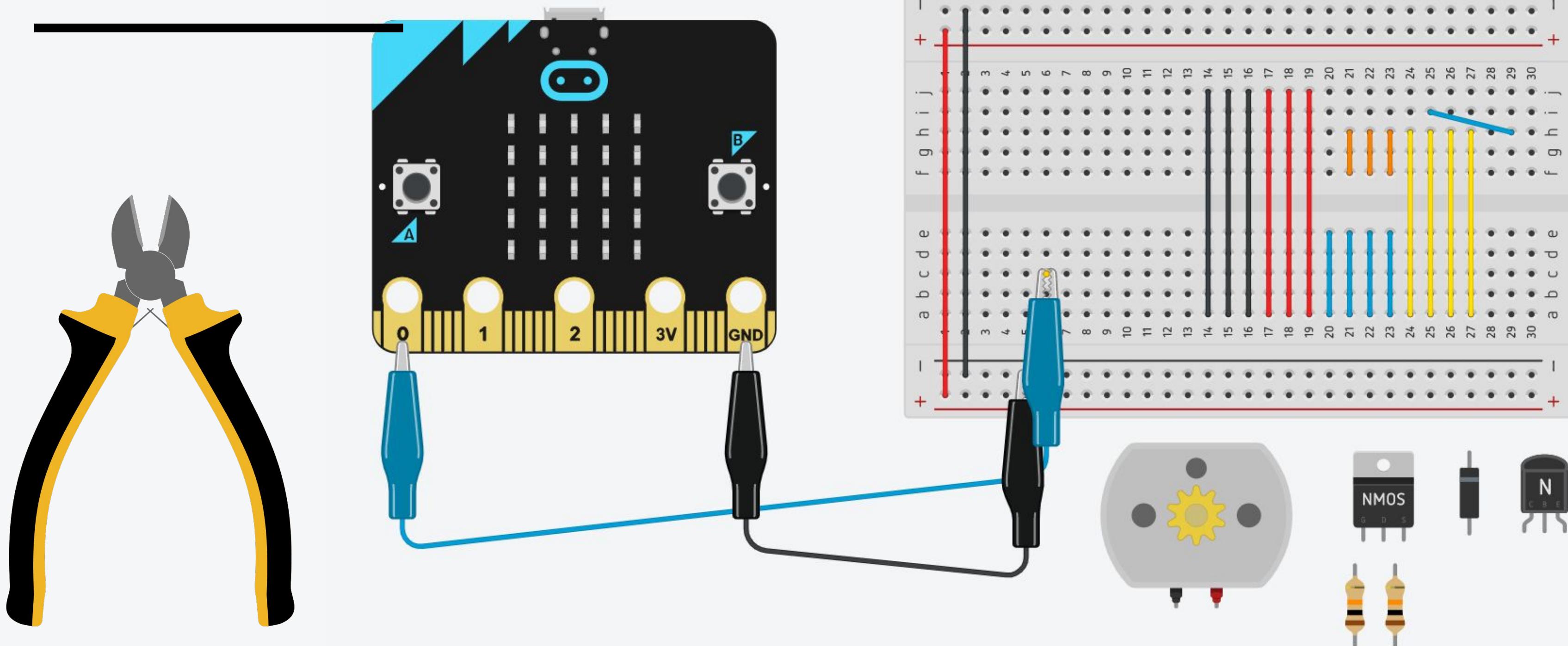
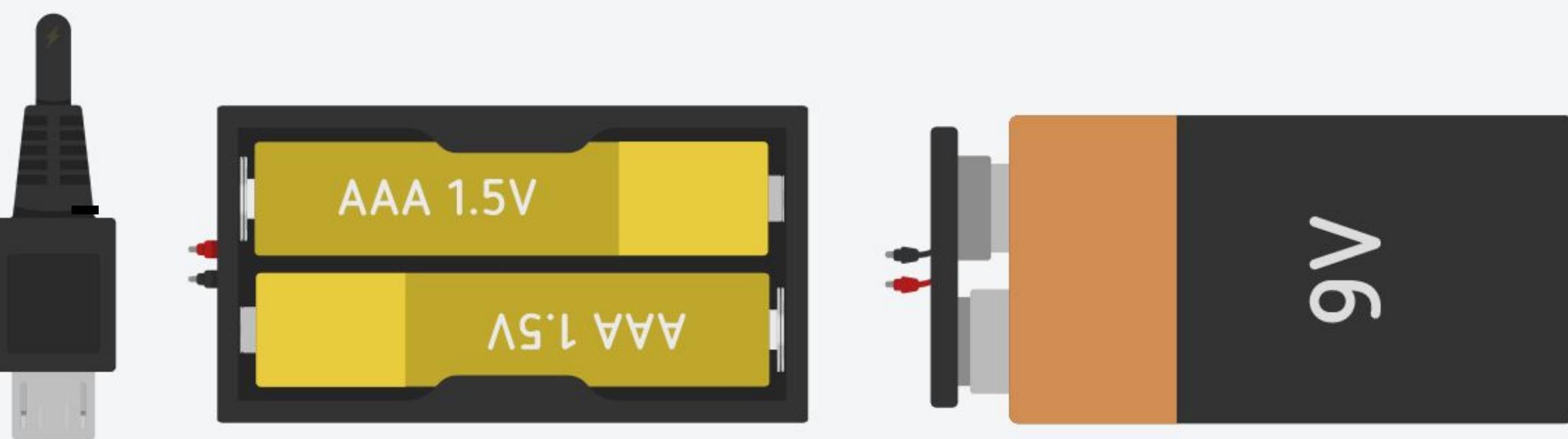
IDROPS

What you need? - Artwork

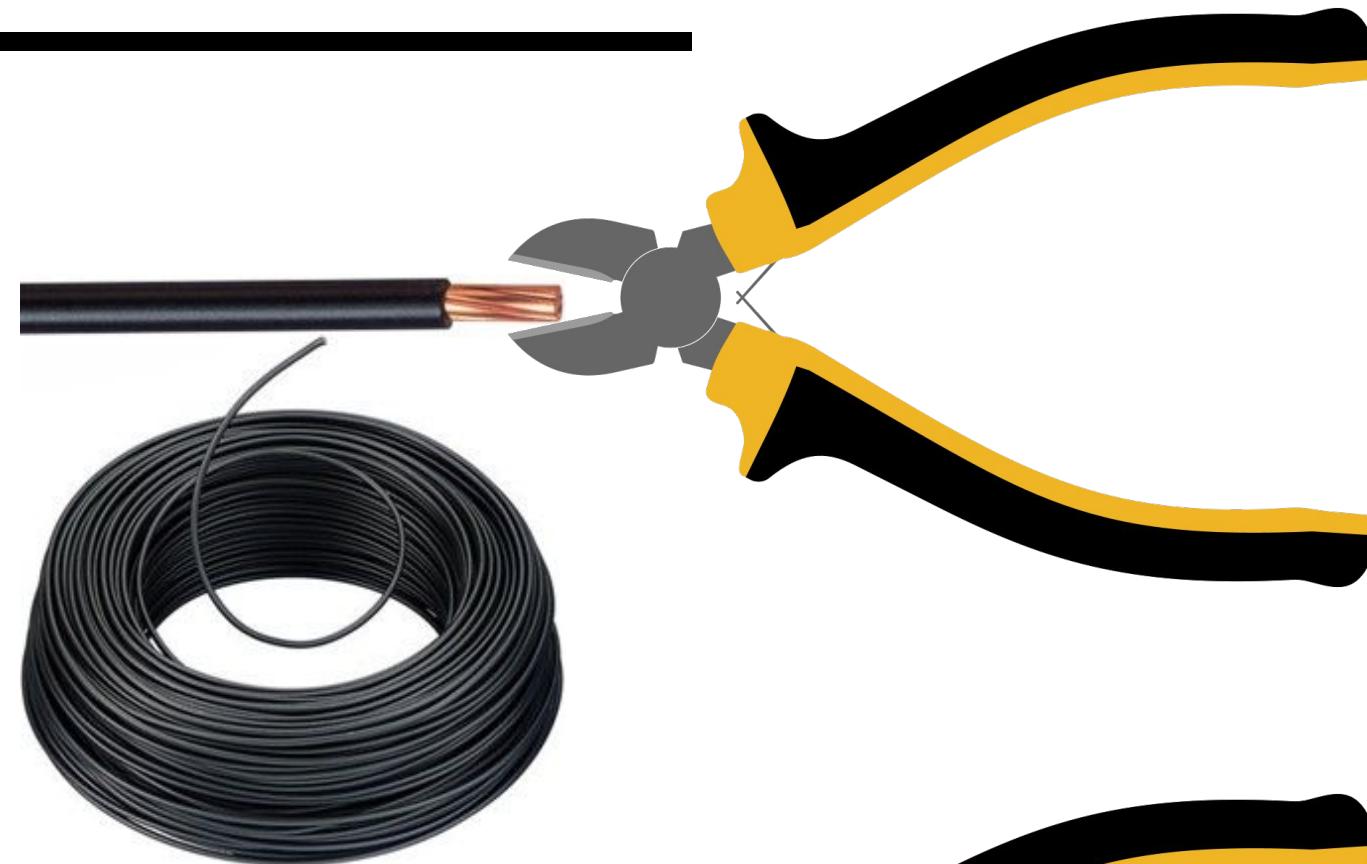


What you need?

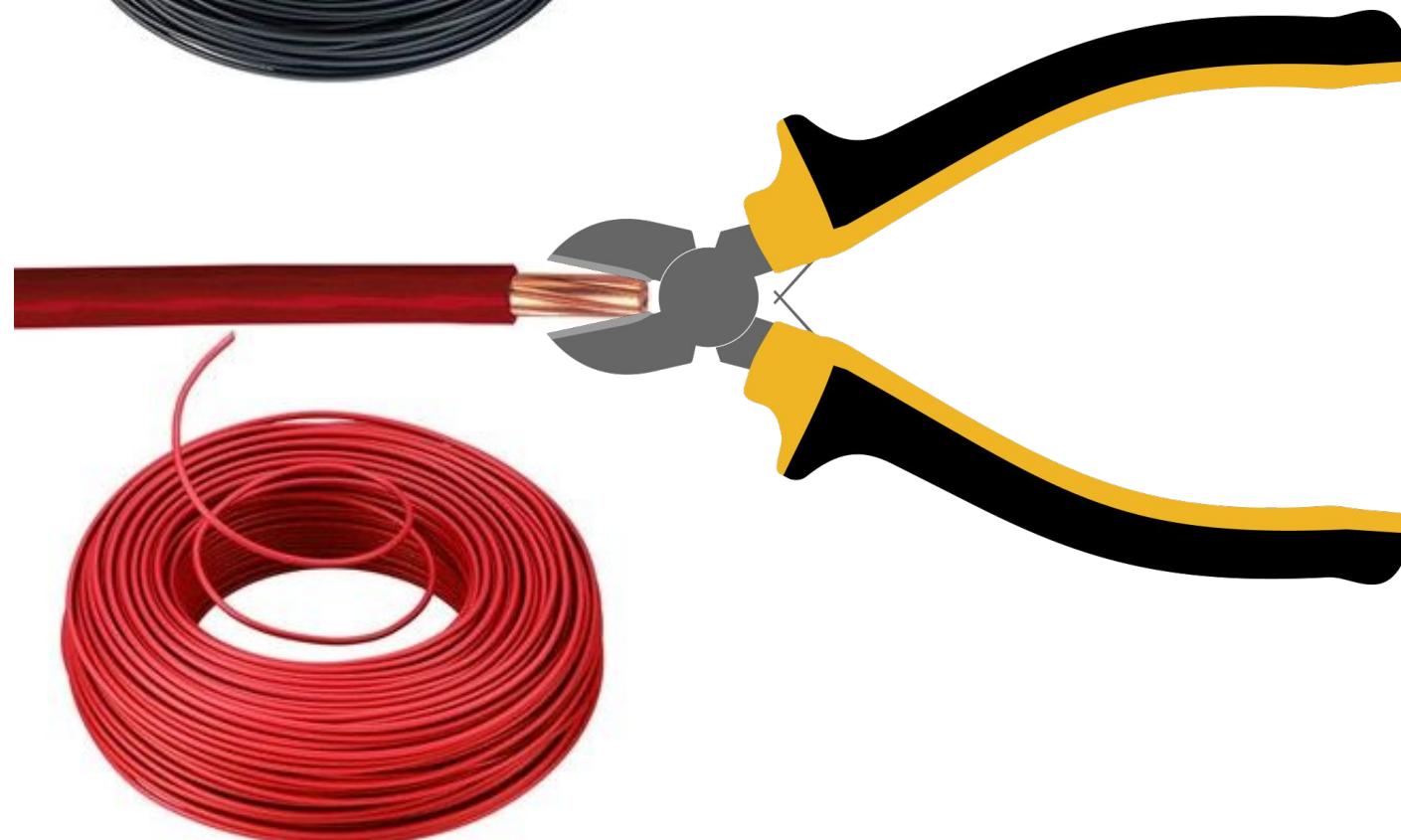
Electronics



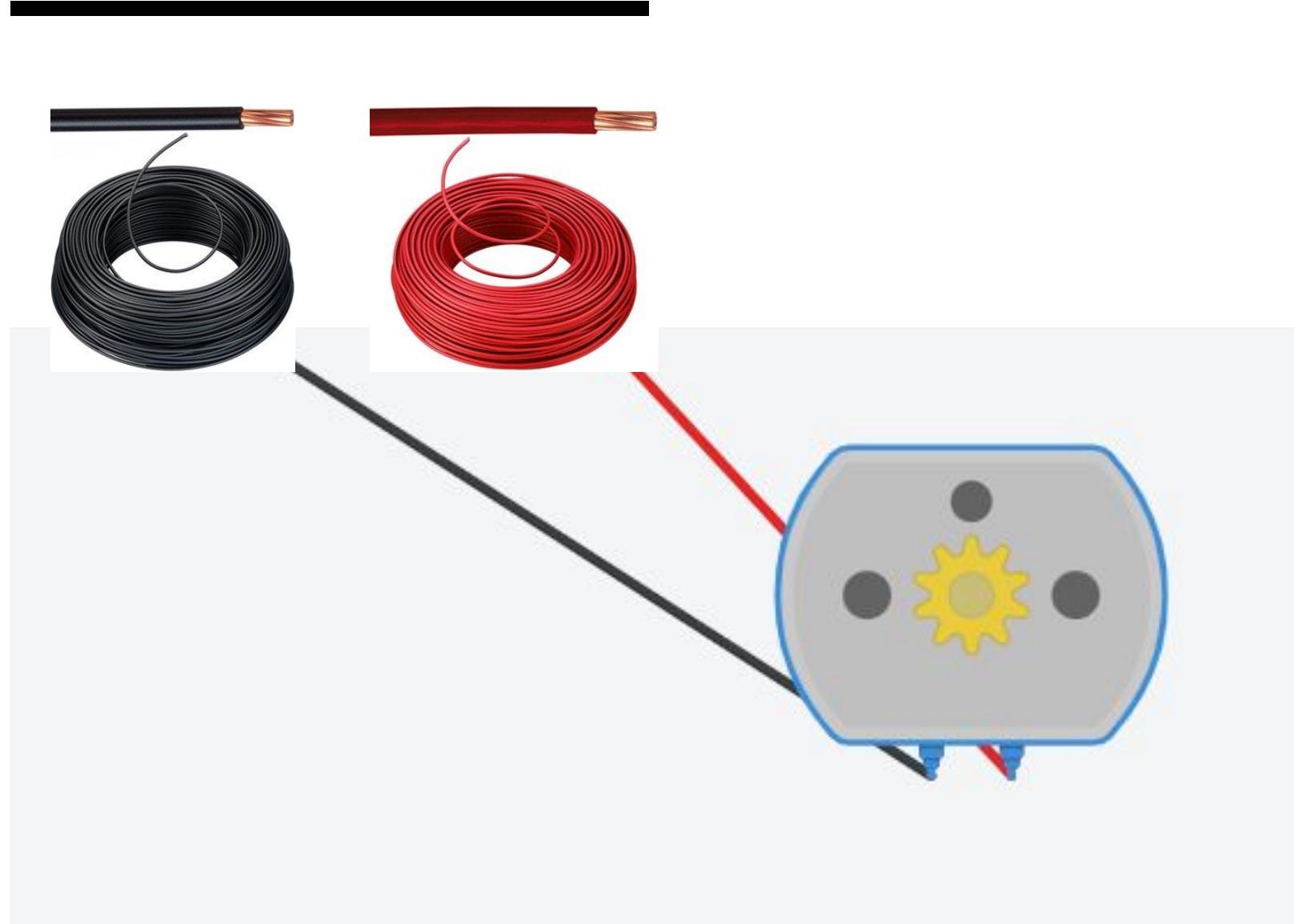
Step by step



Cut pieces of at least 30 cm.

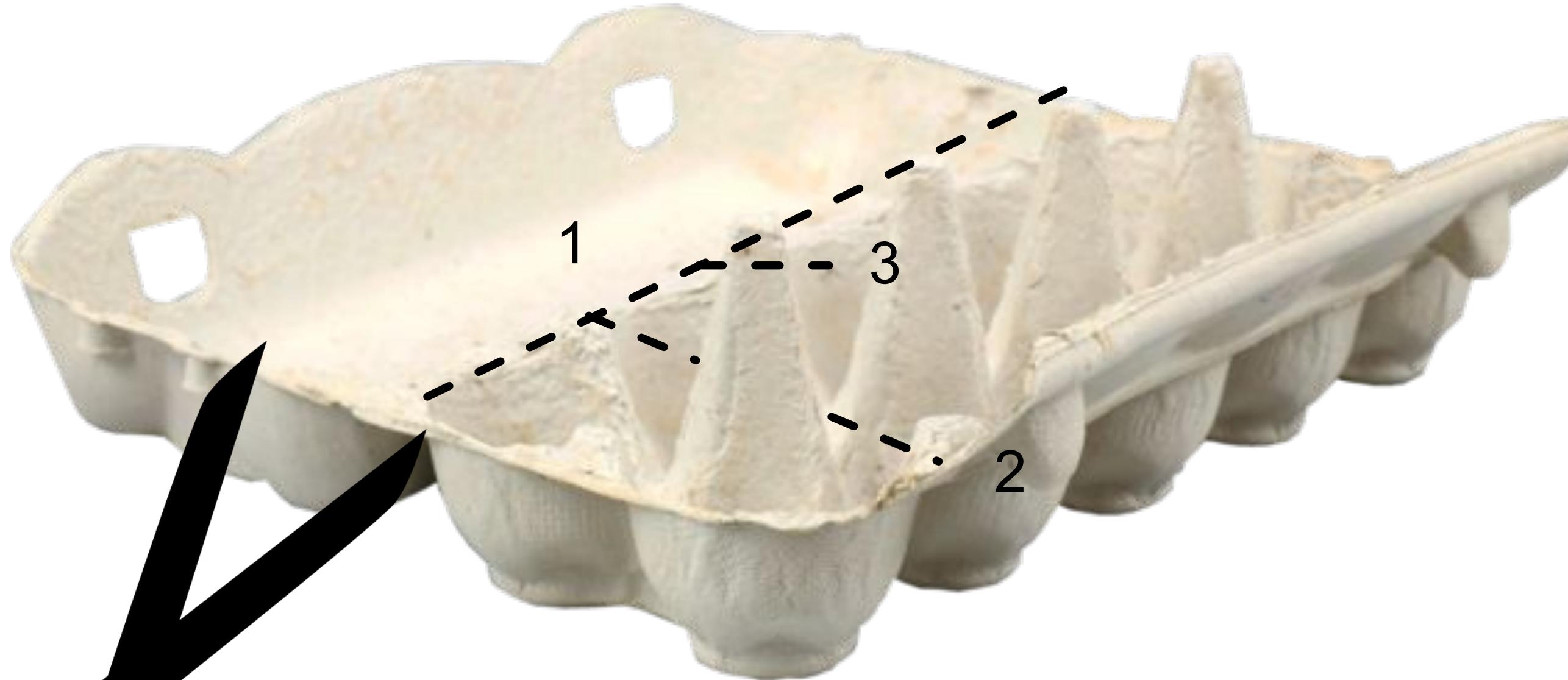


Cables for the motor



Connect the red and black wires to the motor.

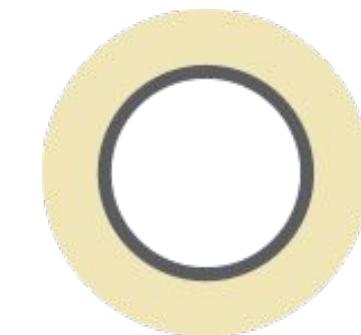
Motor support



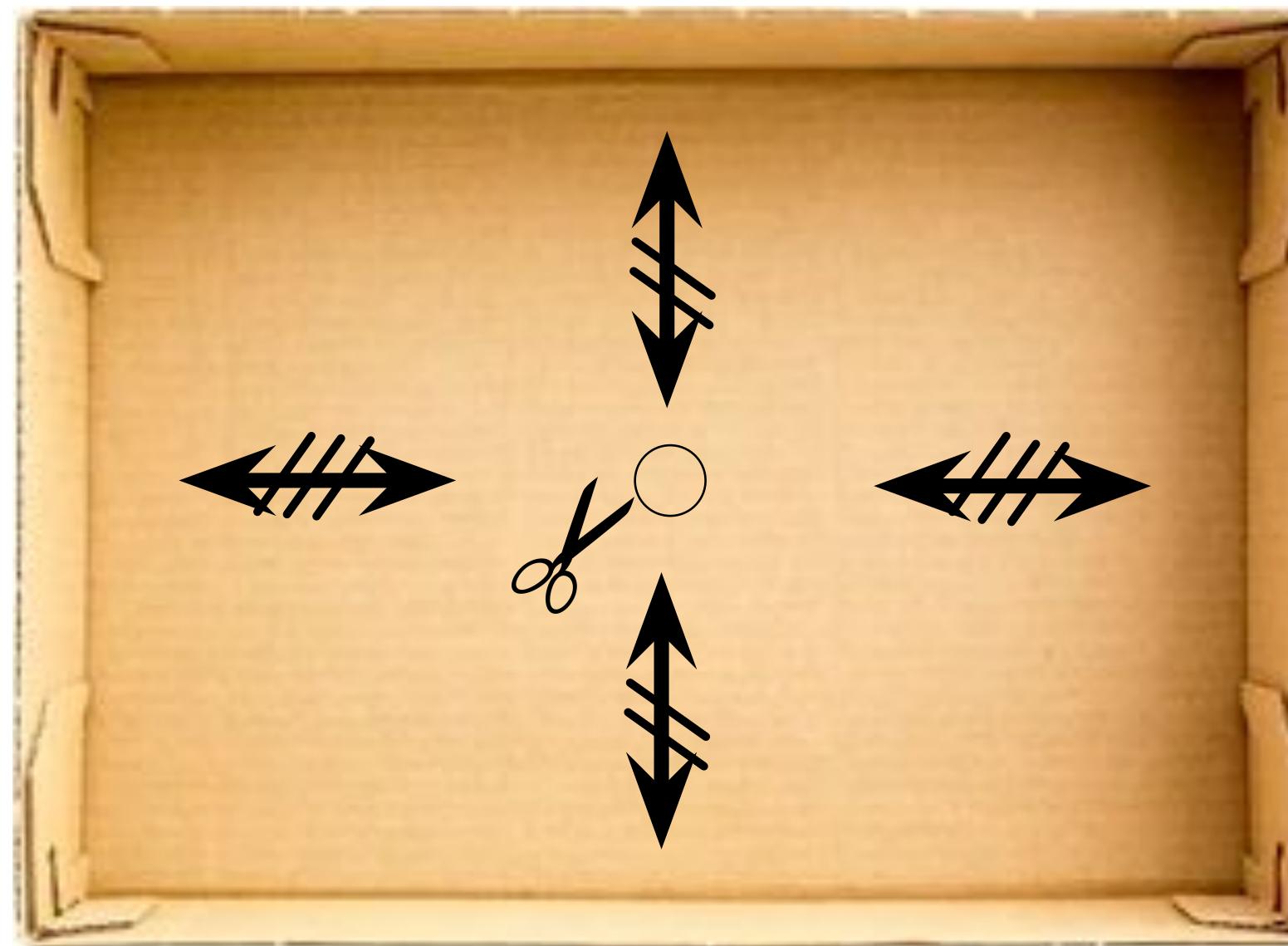
1. Remove the top
2. Cut between the towers
3. Cut a small part of the top of the tower.

Motor support

Insert the motor from under the tower. If the top is too small cut little by little until the motor fits in. Use glue to fix it



Box



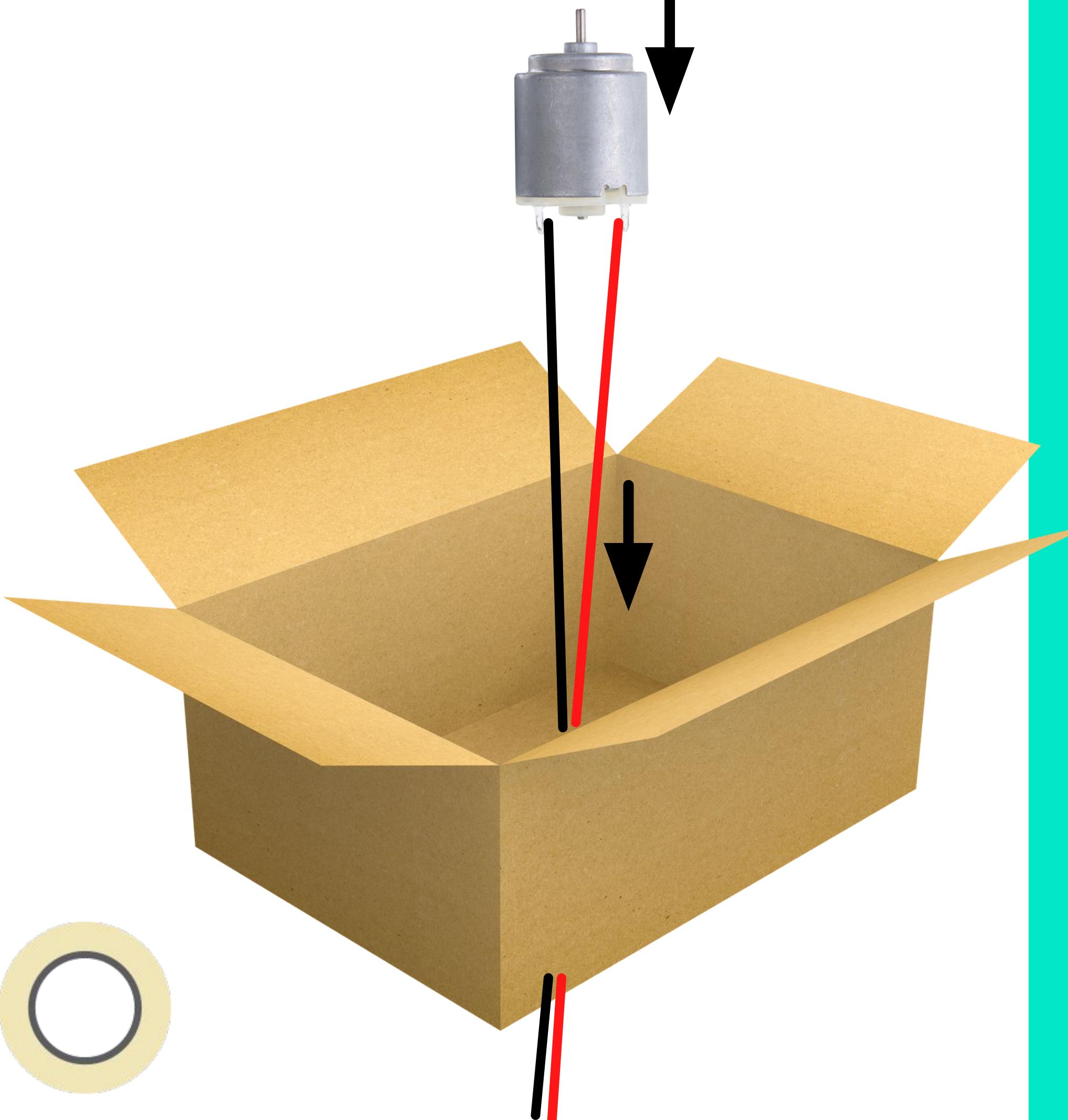
Make a small hole in the center of the box.

Box

Make a little hole in the middle of the cardboard box. Put the wires of the motor through the hole going from the inside of the box to the outside or bottom of the box. Place the egg carton holder on top of it.

Ensure that the egg carton holder is placed in the middle of the box and firmly attach it to the box. This is **very important** as it needs to withstand the force of the rotating motor.

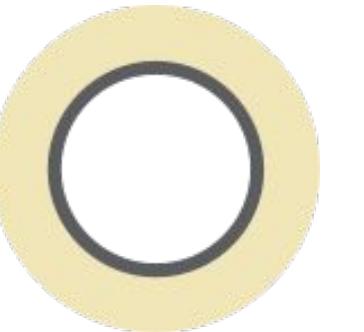
Place the egg carton holder on top of it.



Draaischijf

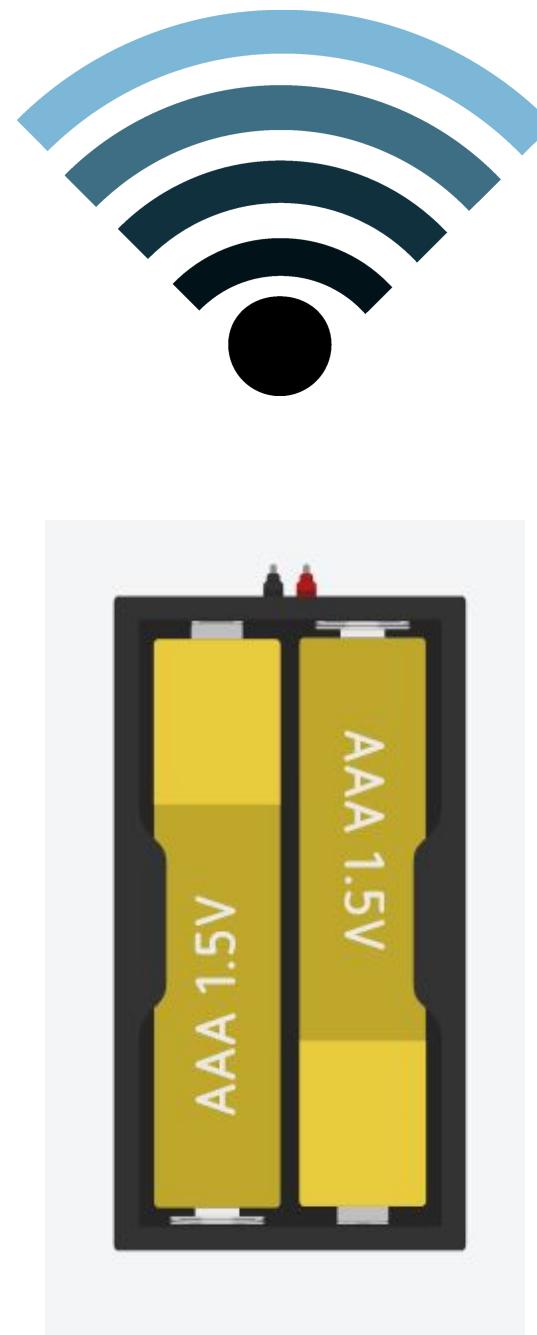
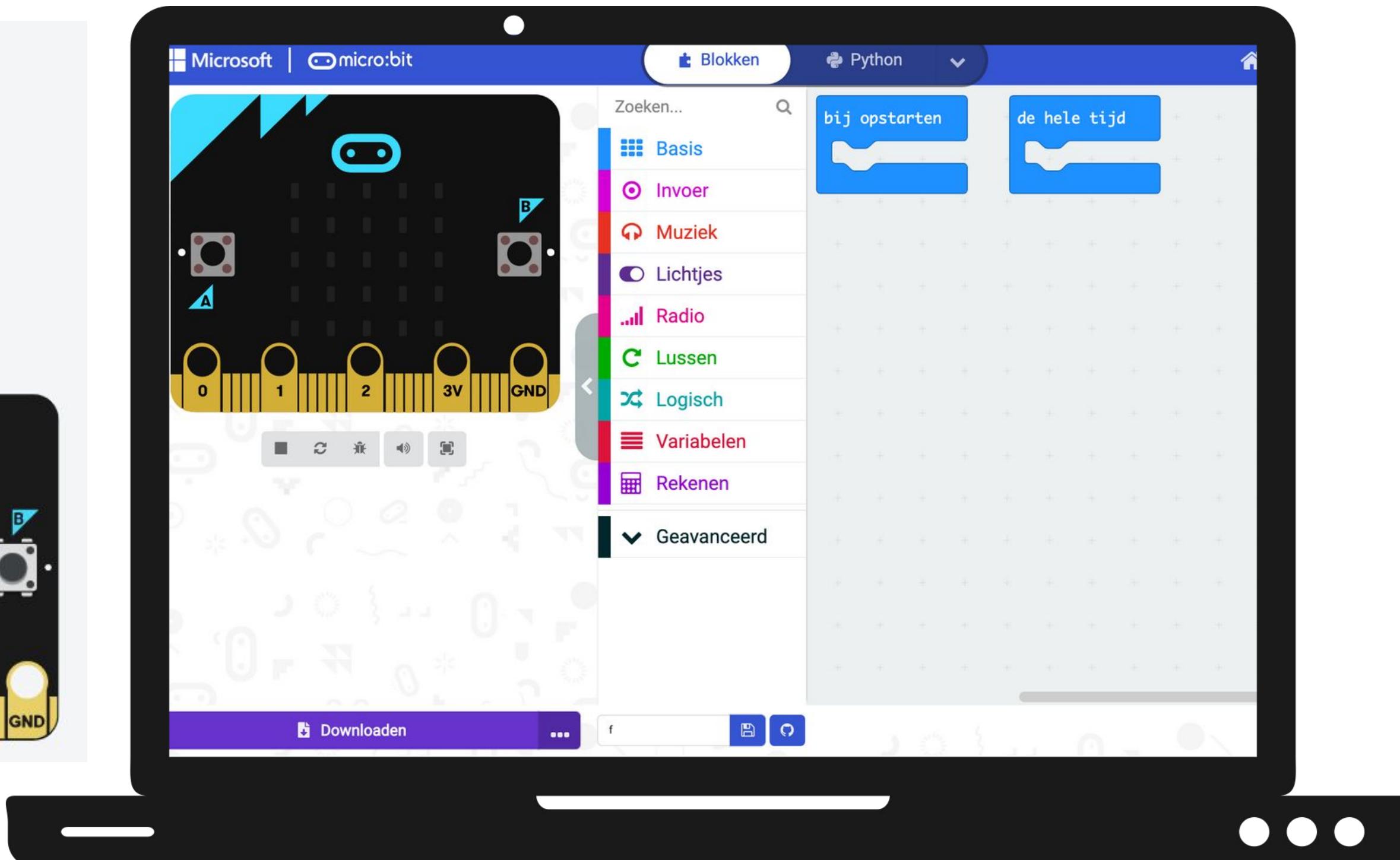
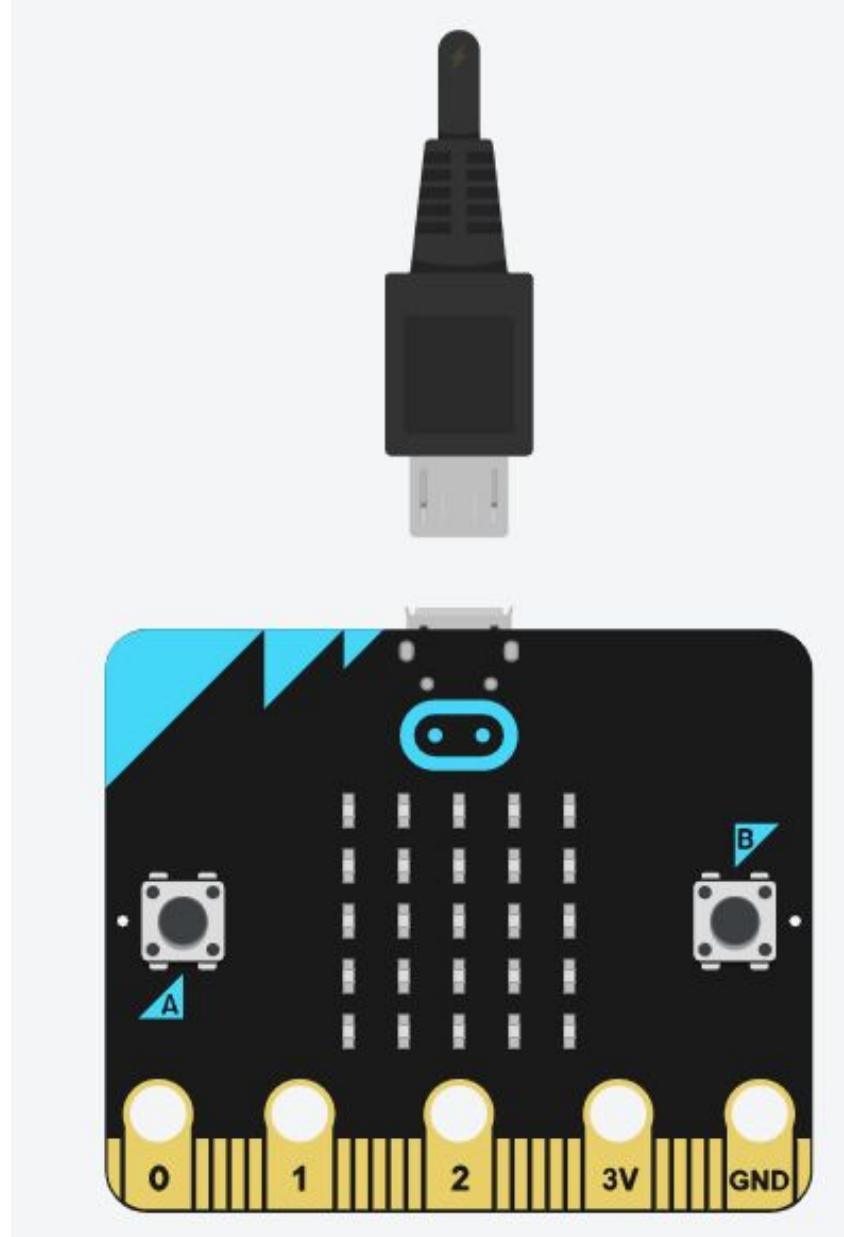
Put the connection part on top
of the motor

Make sure it is firmly attached .
Use glue if needed.



2. Micro:Bit programming

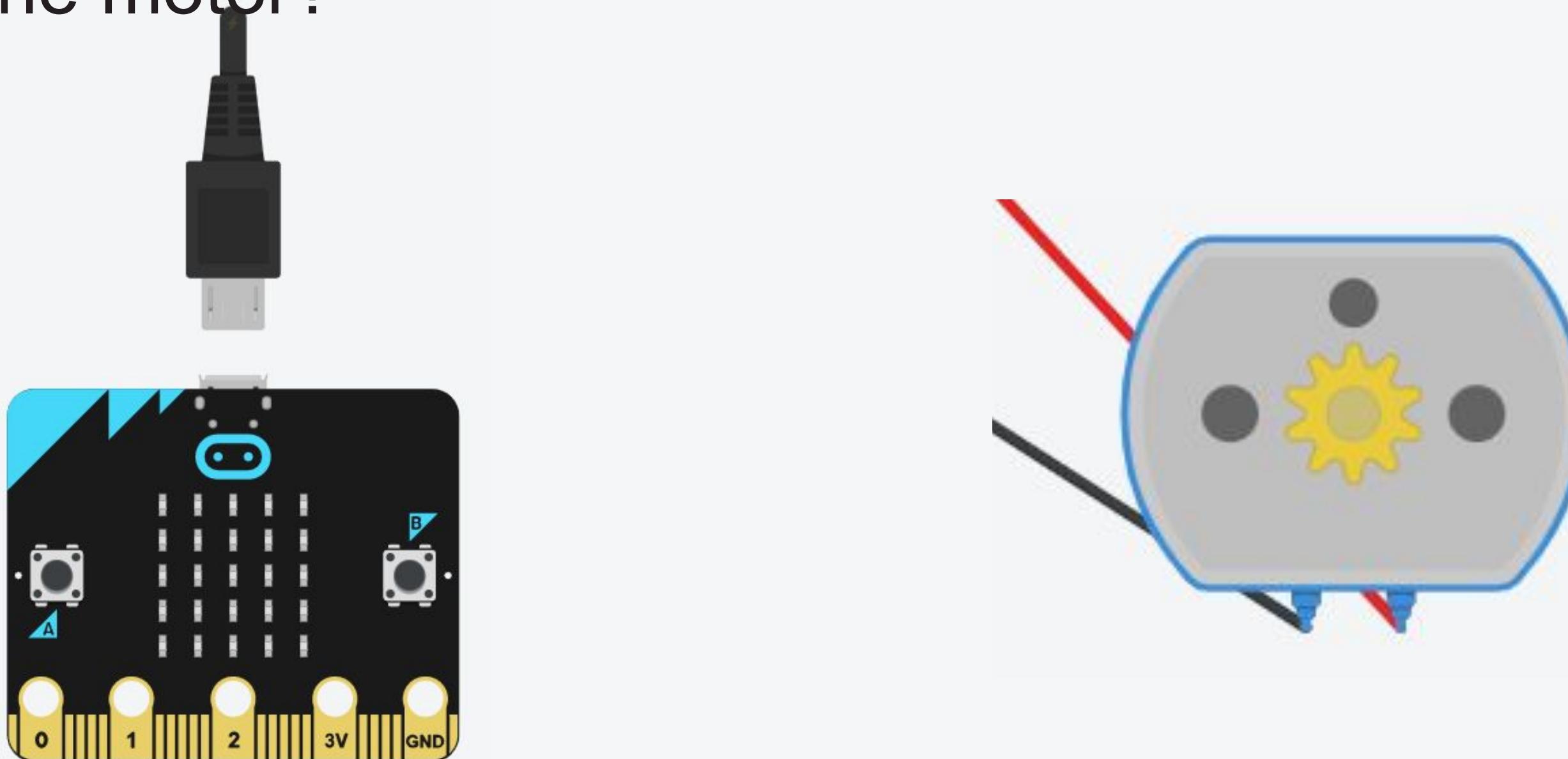
What you need?



makecode.microbit.org

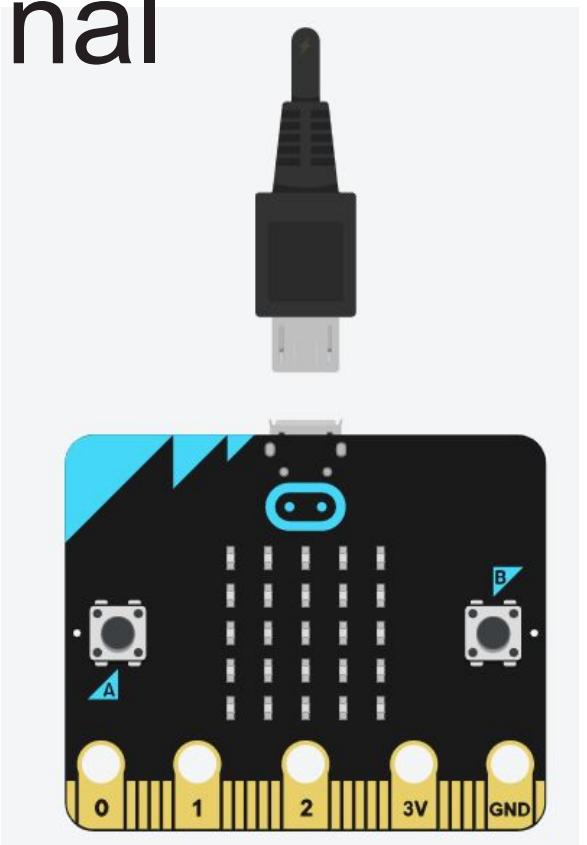
The program

How to make the Micro:Bit send signals to control the rotation speed of the motor?

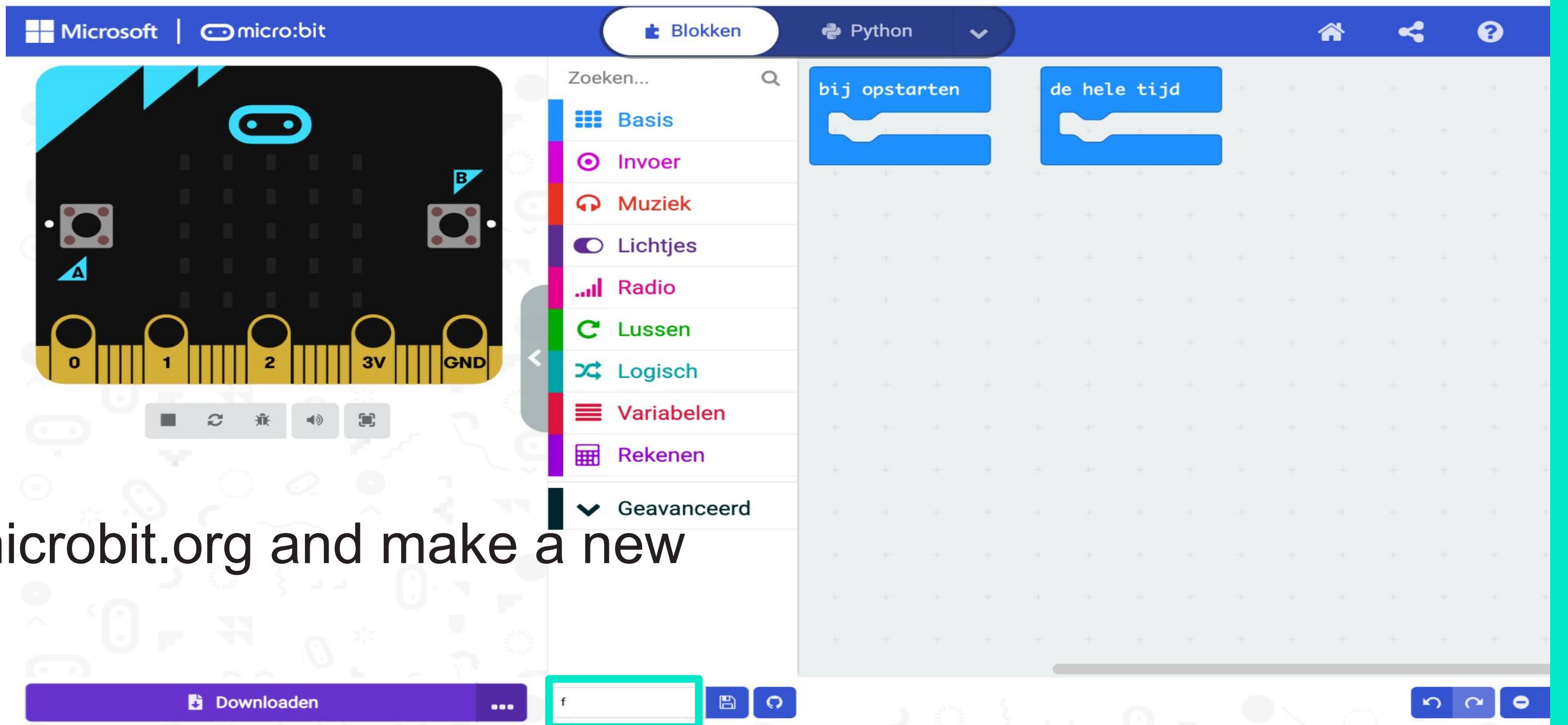


The program - algorithm

- Text “PaintBot” appears on start
- After pressing button A the PaintBot starts to spin
- The Micro:Bit sends electrical signals signalen (one number between 0 and 1023) via the analogue pin P0. This signal determines the rotational speed of the disc.
- Every cifer desappear after a second.



Step by step

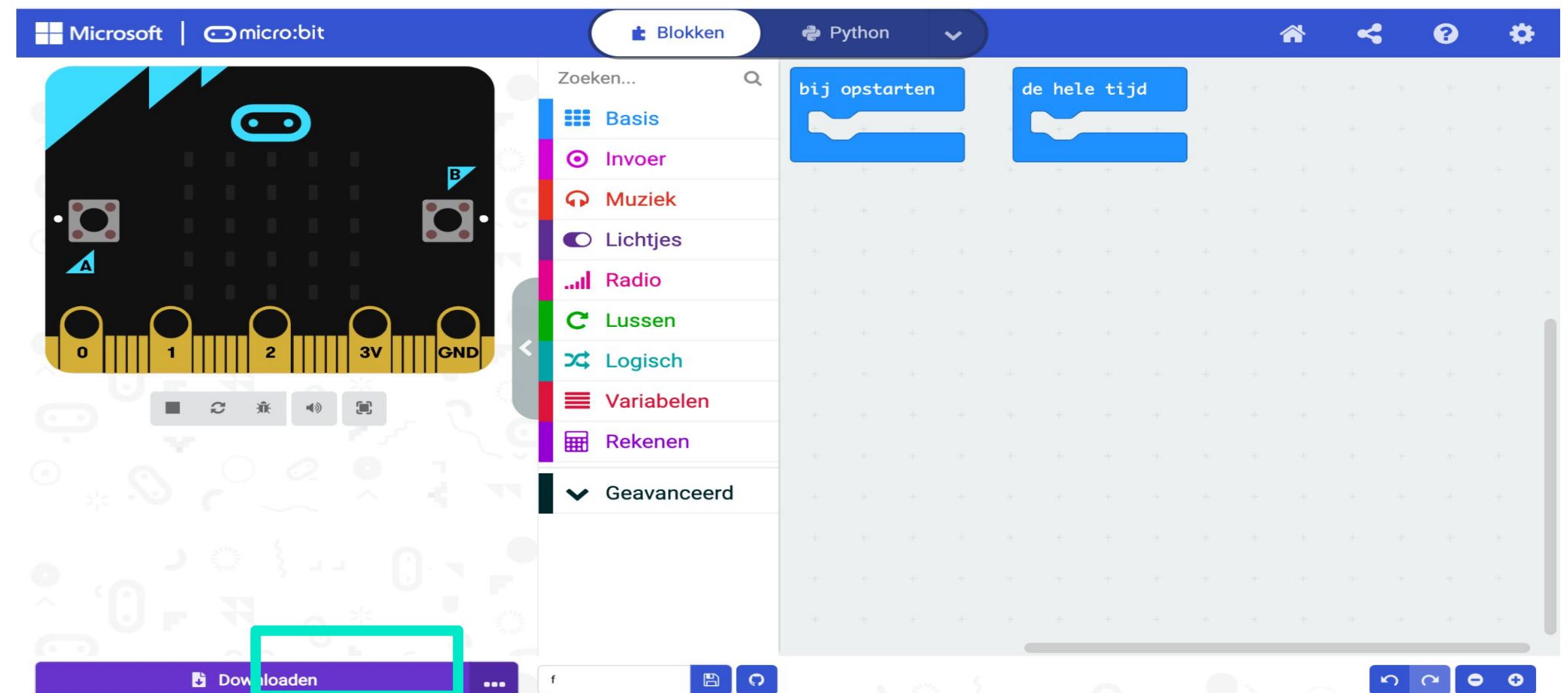


Go to microbit.org and make a new project

Tekst bij opstarten

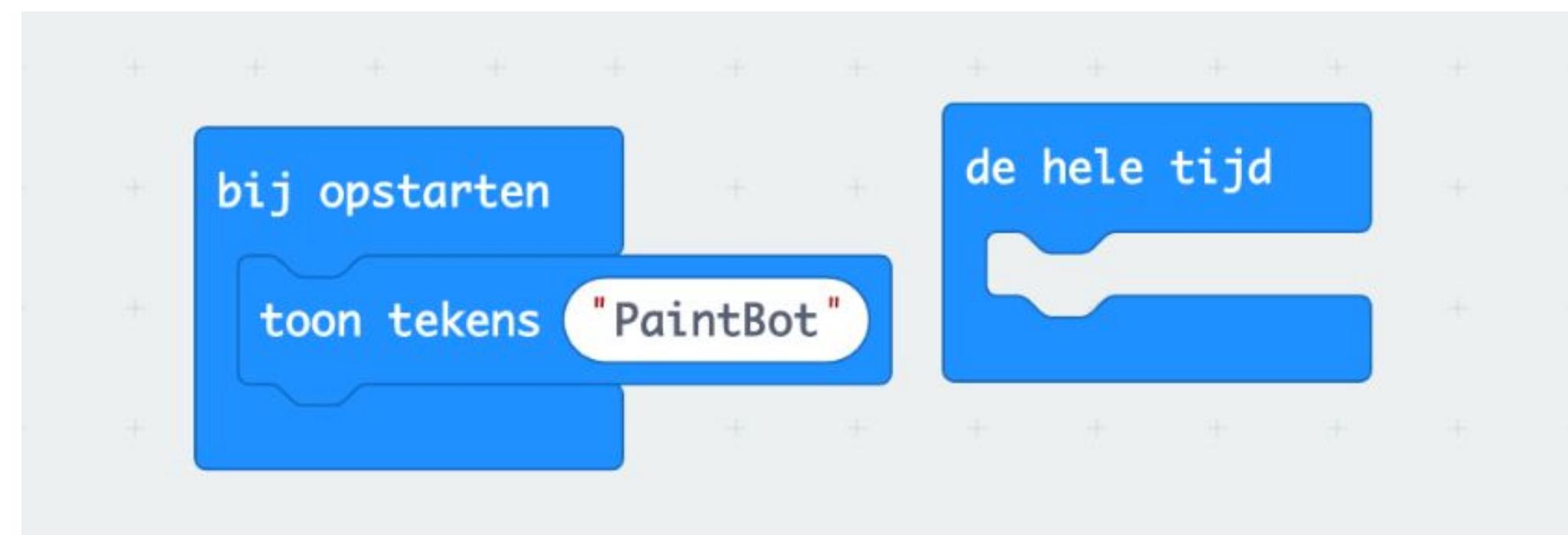
Make code:

Text “PaintBot” appears on start.



Text on start

Solution:

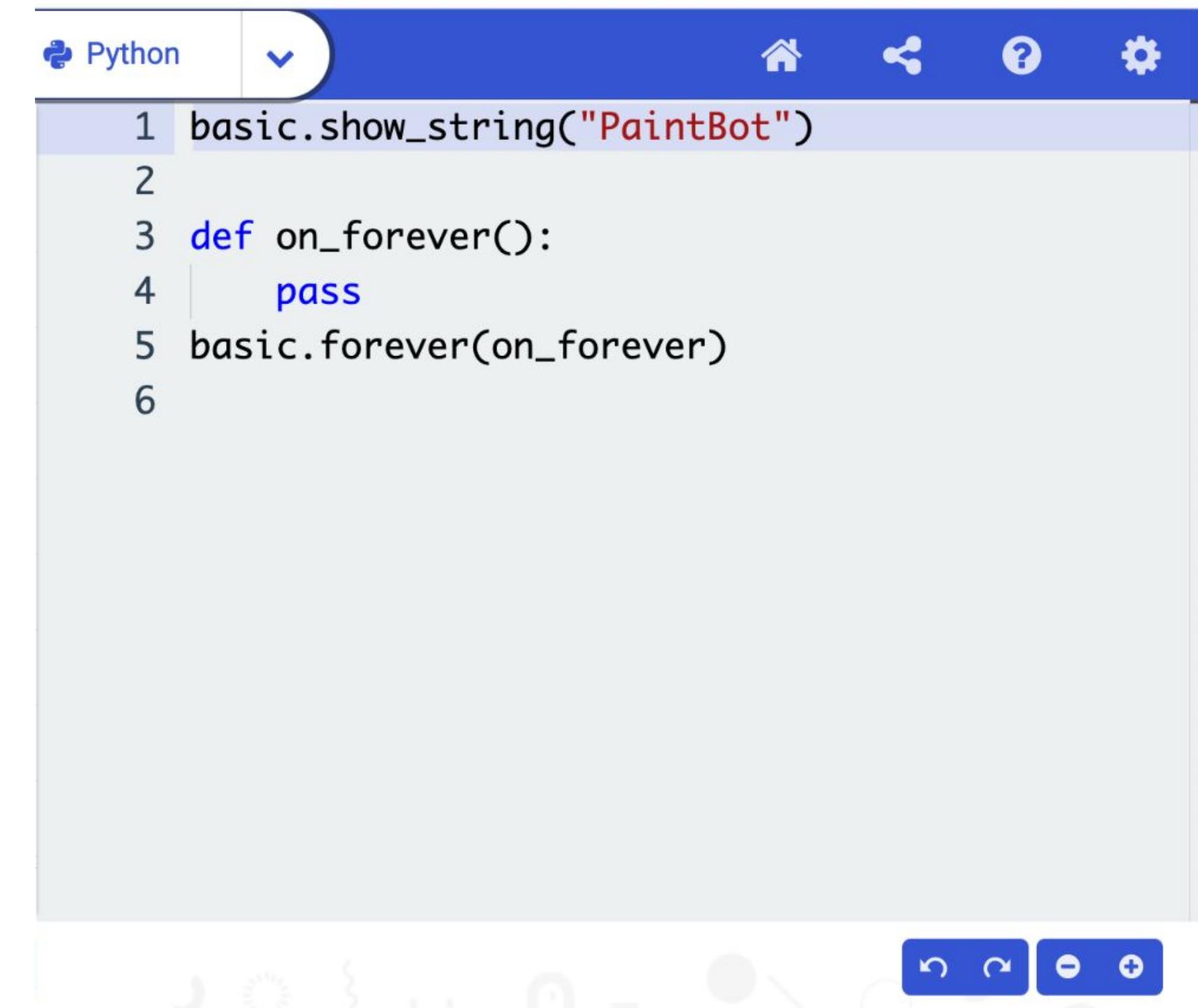


Numbers generator

Create a list of 20 elements
between 0 and 1023

Song = [1000,840, 350,...]

and copy paste the list



The image shows a Scratch script editor interface with a Python tab selected. The script consists of the following code:

```
1 basic.show_string("PaintBot")
2
3 def on_forever():
4     pass
5 basic.forever(on_forever)
6
```

The Python tab is highlighted with a blue background. The rest of the interface includes a toolbar with icons for home, share, help, and settings, and a bottom toolbar with icons for back, forward, clear stage, and add.

Numbers generator

Click on Blocks

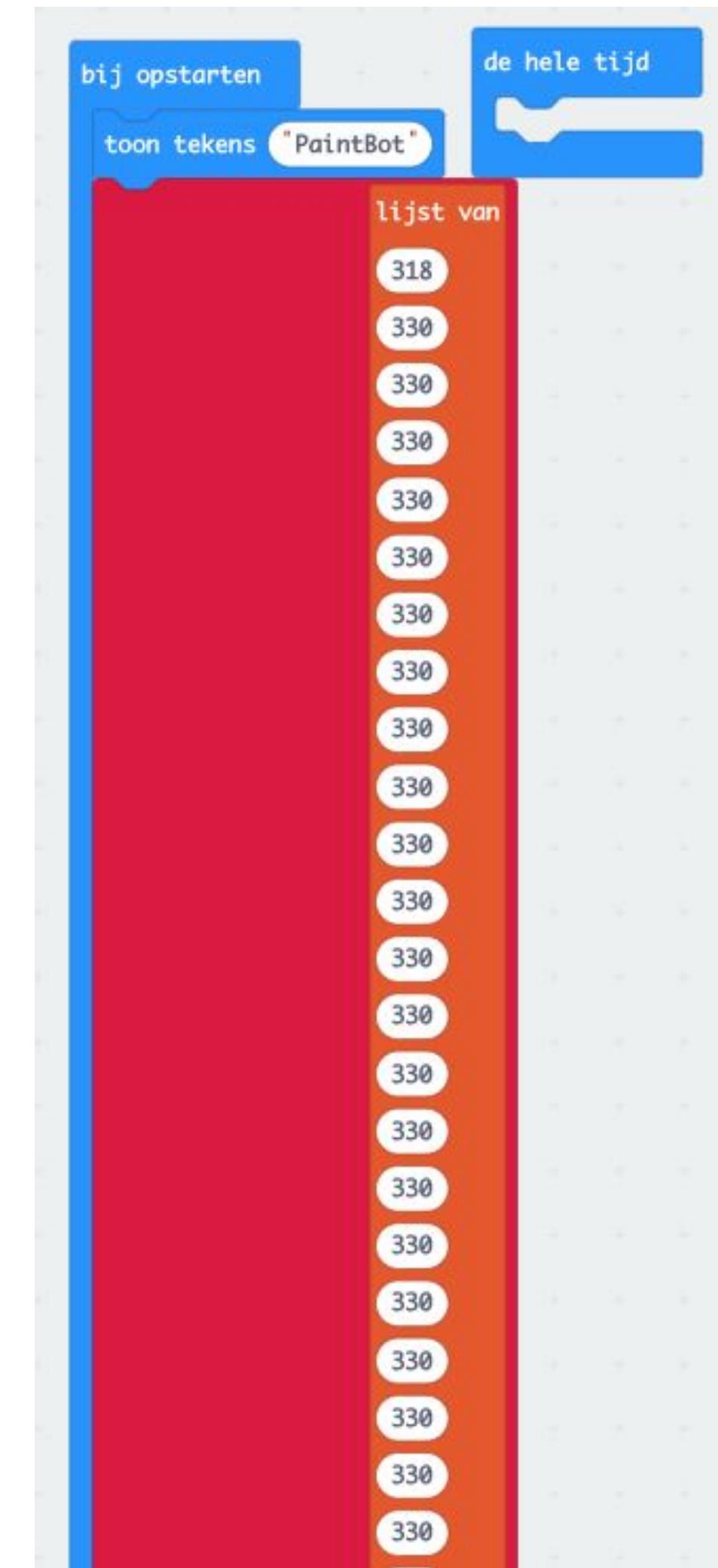
The image shows the Scratch interface with the 'Blocks' tab selected (highlighted with a red box). The script area contains the following Python code:

```
1 basic.show_string("PaintBot")
2 Song = [318,
3 330,
4 330,
5 330,
6 330,
7 330,
8 330,
9 330,
10 330,
11 330,
12 330,
13 330,
14 330,
15 330,
```

The 'Song' variable is defined as a list containing 15 elements, each set to 330. The first line of code, 'basic.show_string("PaintBot")', is also present.

Numbers list

Now you made a list



Full code

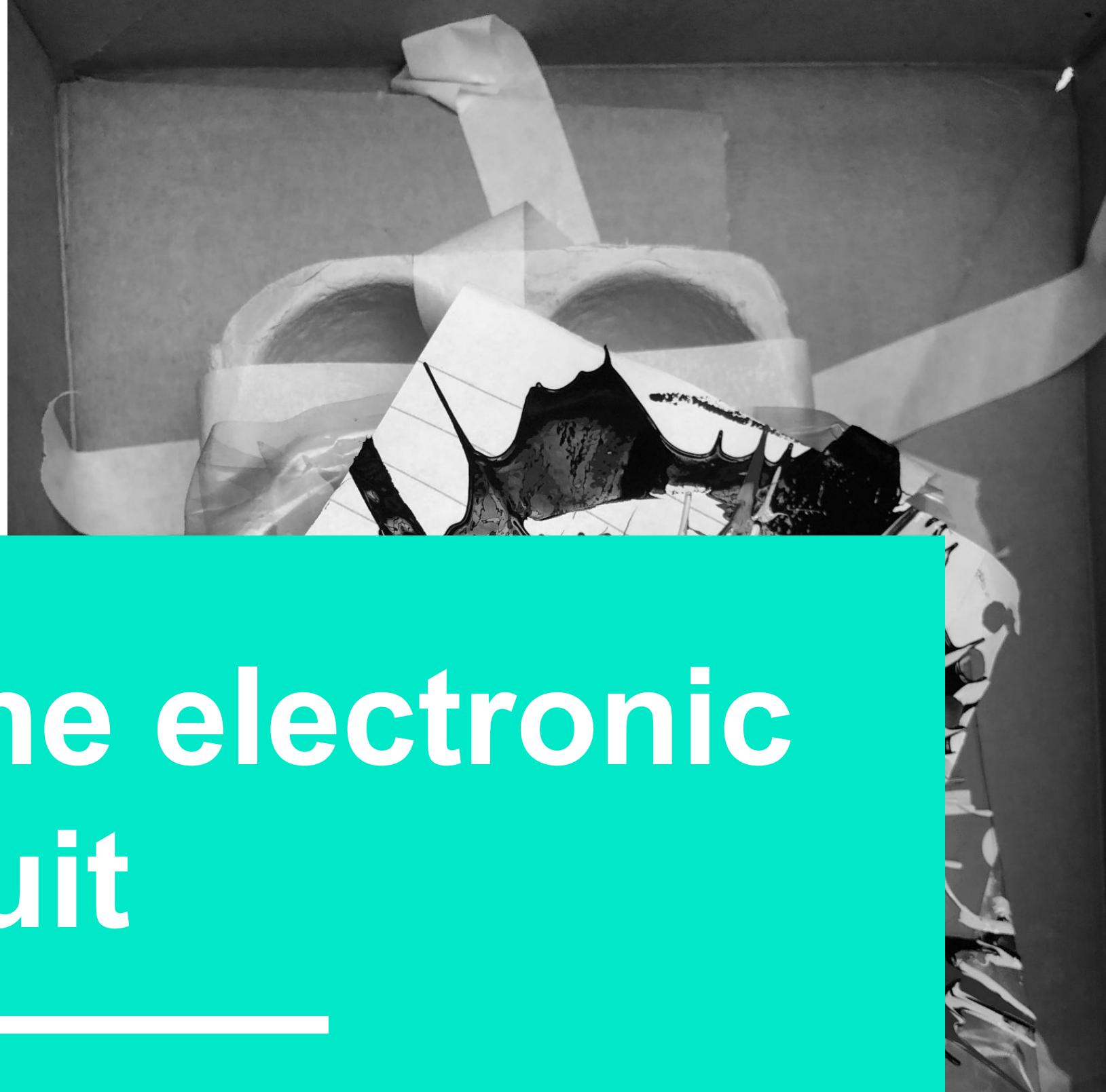
Solution:

Generated
numbers

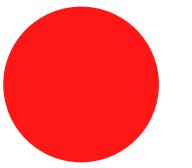
The Scratch script starts with an **on start** event. It begins by setting up an array named "song" with elements 20, 200, 600, 800, and 1023. The script then enters a **forever** loop. Inside the loop, it checks if button A is pressed. If true, it loops through each element in the "song" array, writing its value to pin P1 and pausing for 1000ms. If button B is pressed while this loop is running, it instead writes the value 1023 to pin P1.

```
on start
  [analog write pin P1 v to 1023]
  [set song v to (20, 200, 600, 800, 1023)]
  [array of song v]
  forever
    if [button A v is pressed] then
      [for element i v of song v
        do
          [analog write pin P1 v to (i v)]
          [pause (ms) 1000 v]
        ]
      ]
    else if [button B v is pressed] then
      [analog write pin P1 v to 1023]
    end
  end
end
```

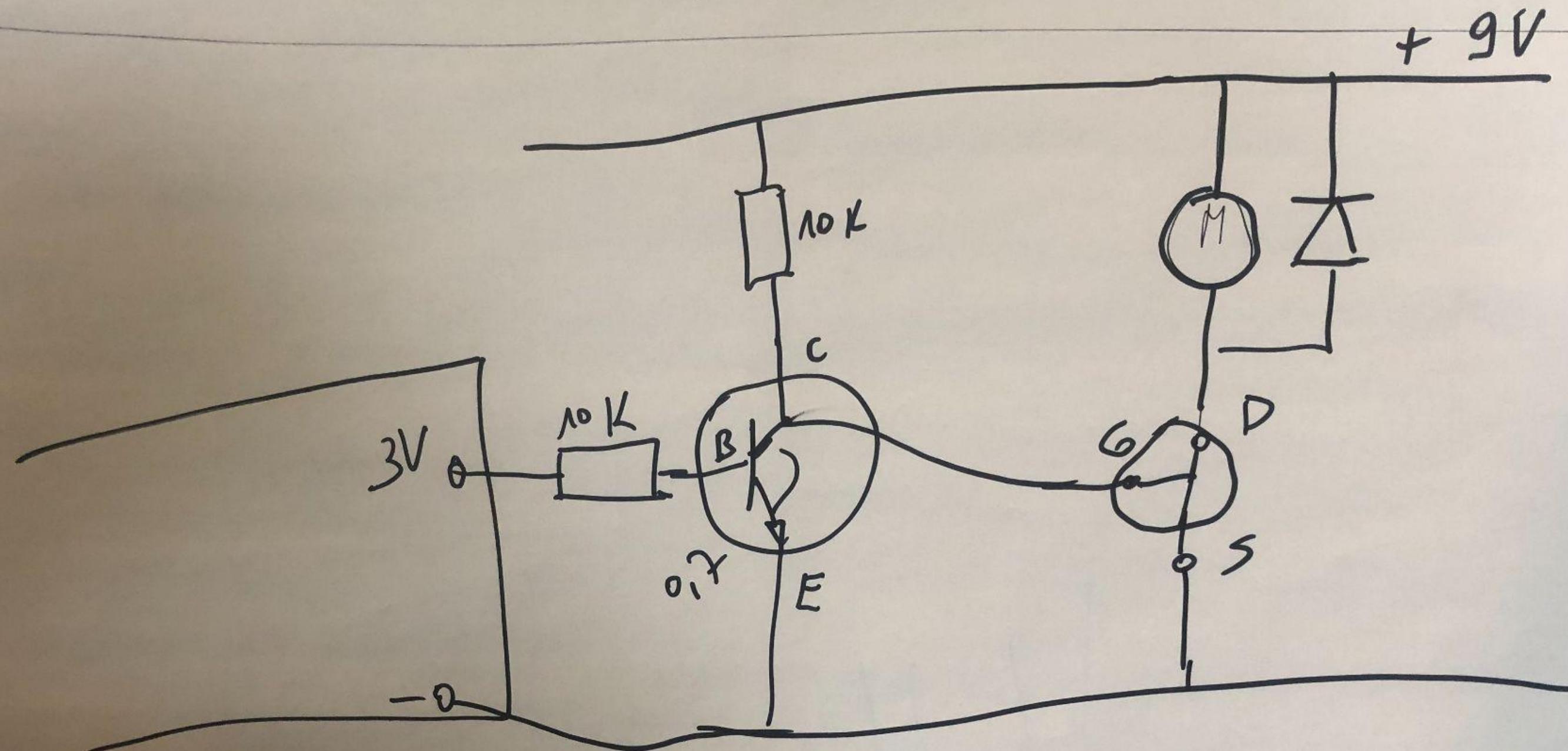
2. The electronic circuit



IMPORTANT

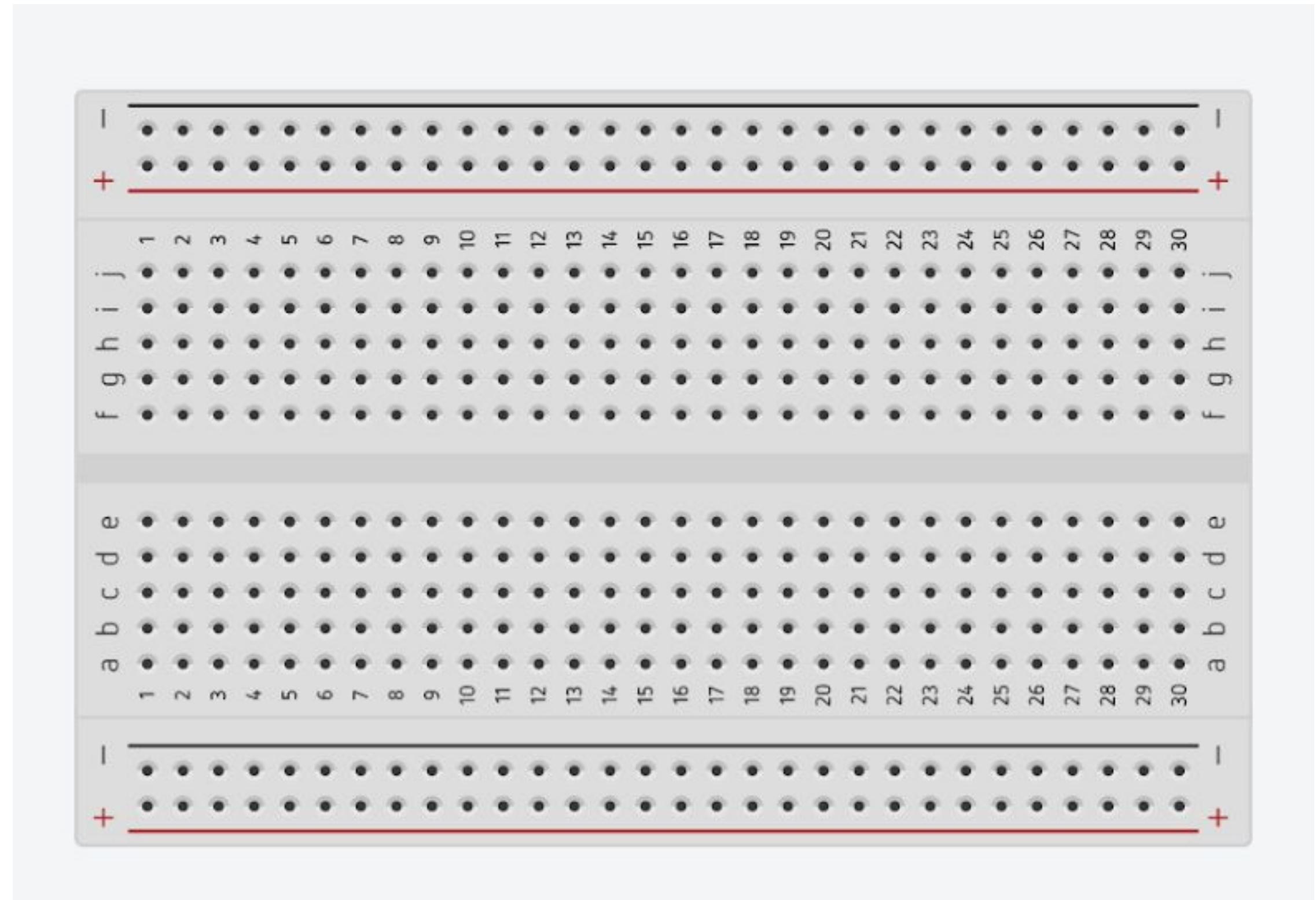


- It is very important that all steps are followed.
- Make or follow the sketch on thinkercad.
- Then make the real connections.
- **LET US CHECK BEFORE YOU CONNECT THE BATTERY.**



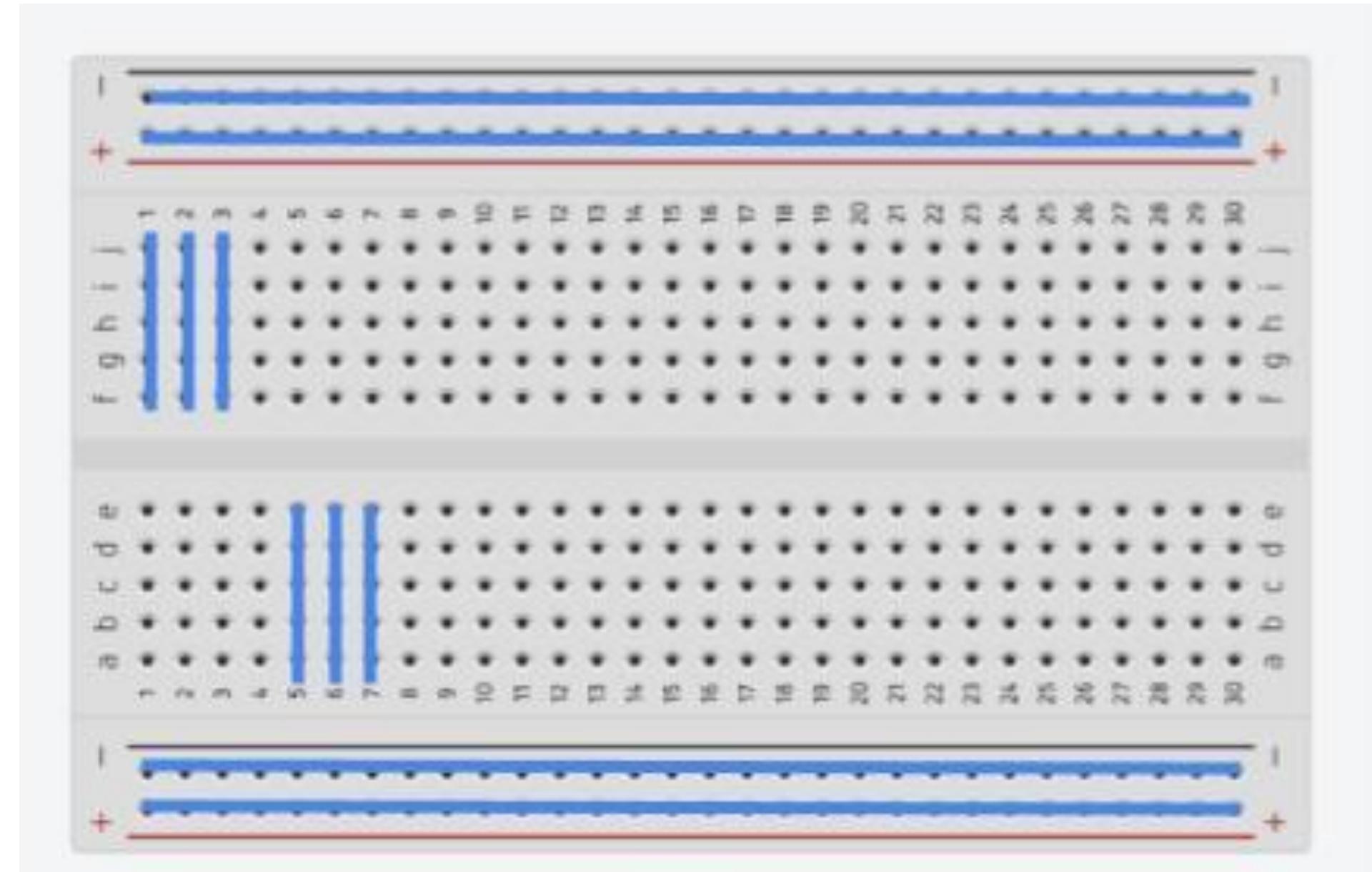
Breadboard

Lay the breadboard
on the table



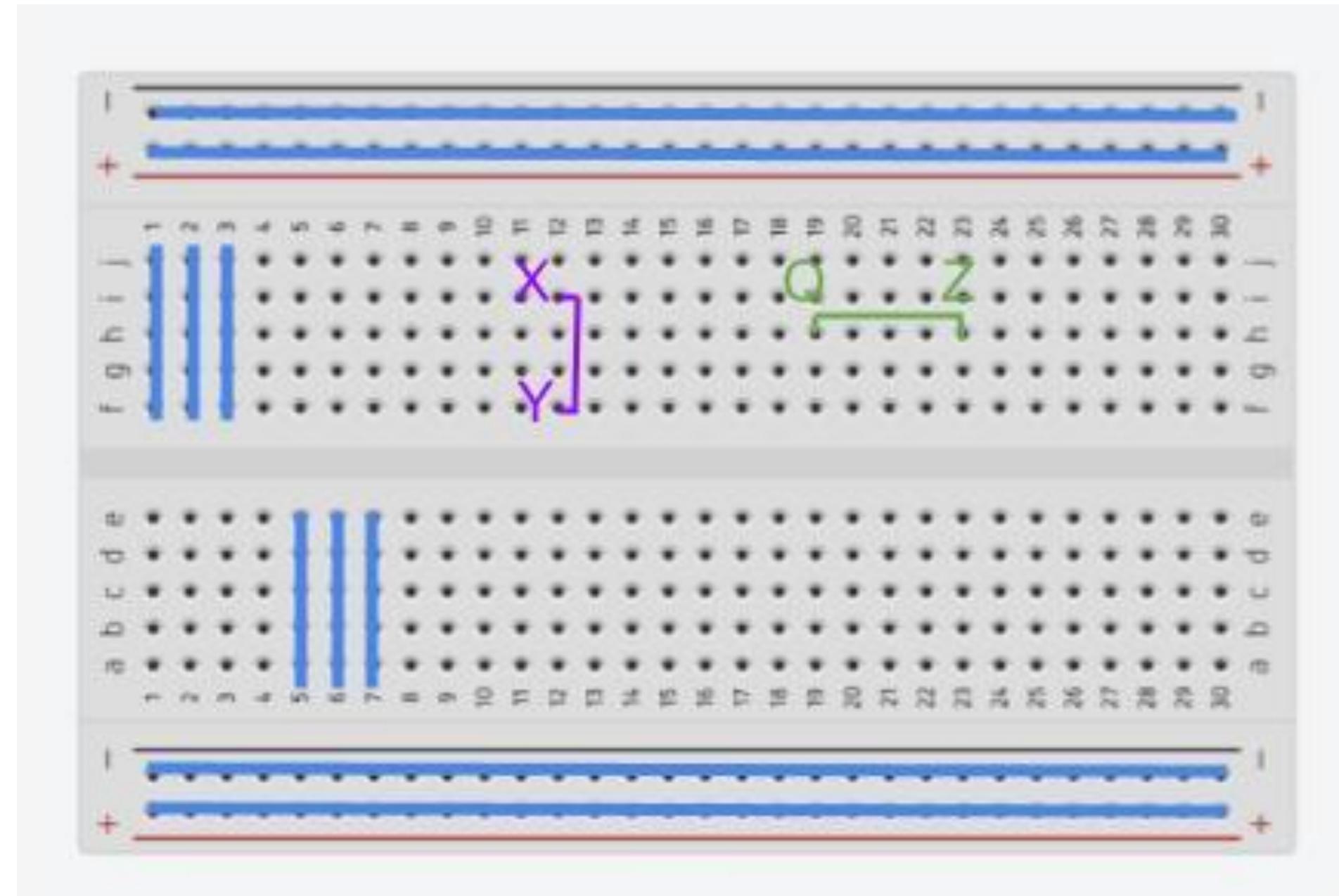
Breadboard

- Easy for prototyping
- the holes are connected



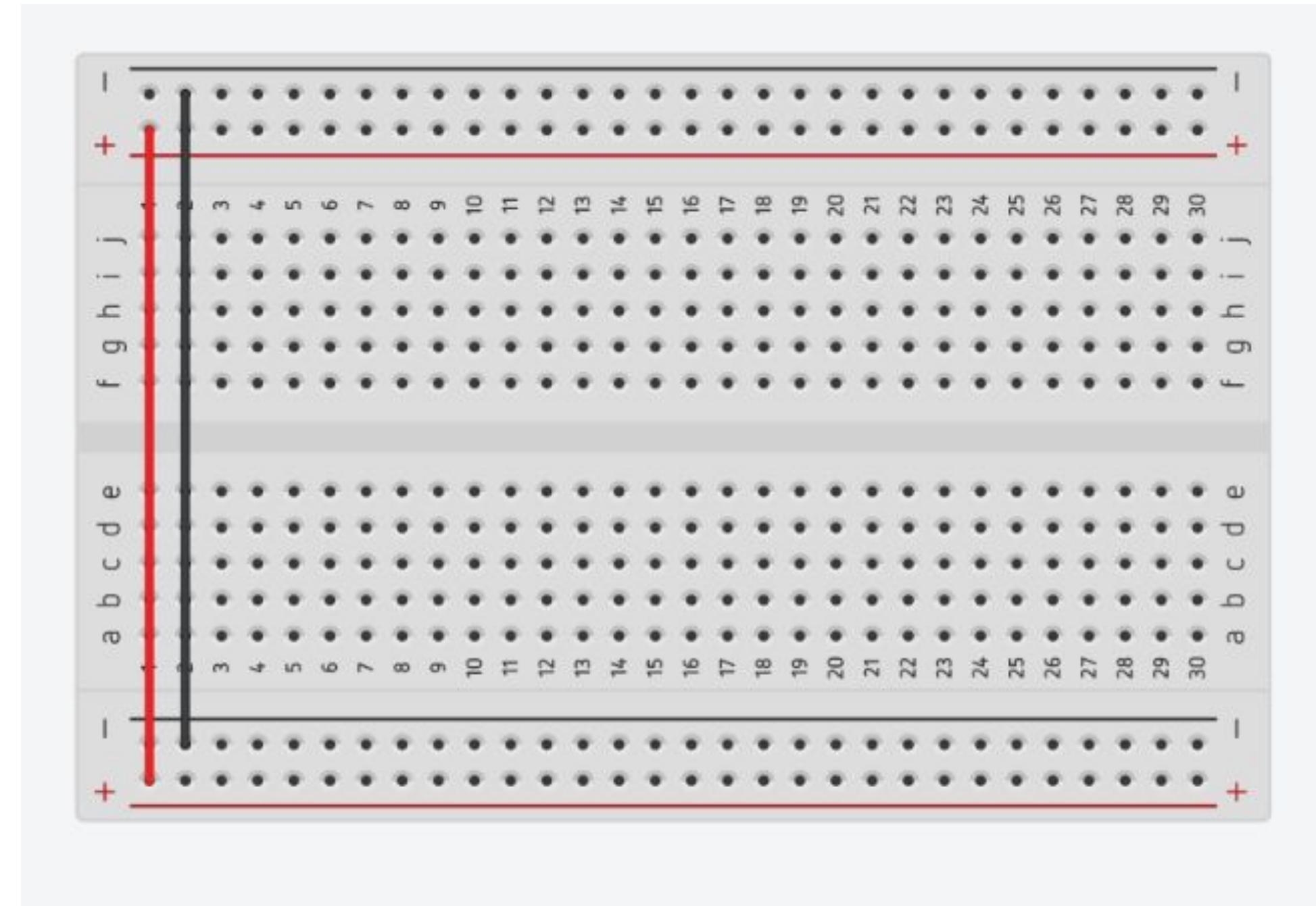
Breadboard

- Punt X en Y zijn al intern verbonden (zelfde blauwe lijn)
- Punt Q en Z zijn niet intern verbonden (andere blauwe lijn) en verbinden we met een draadje.



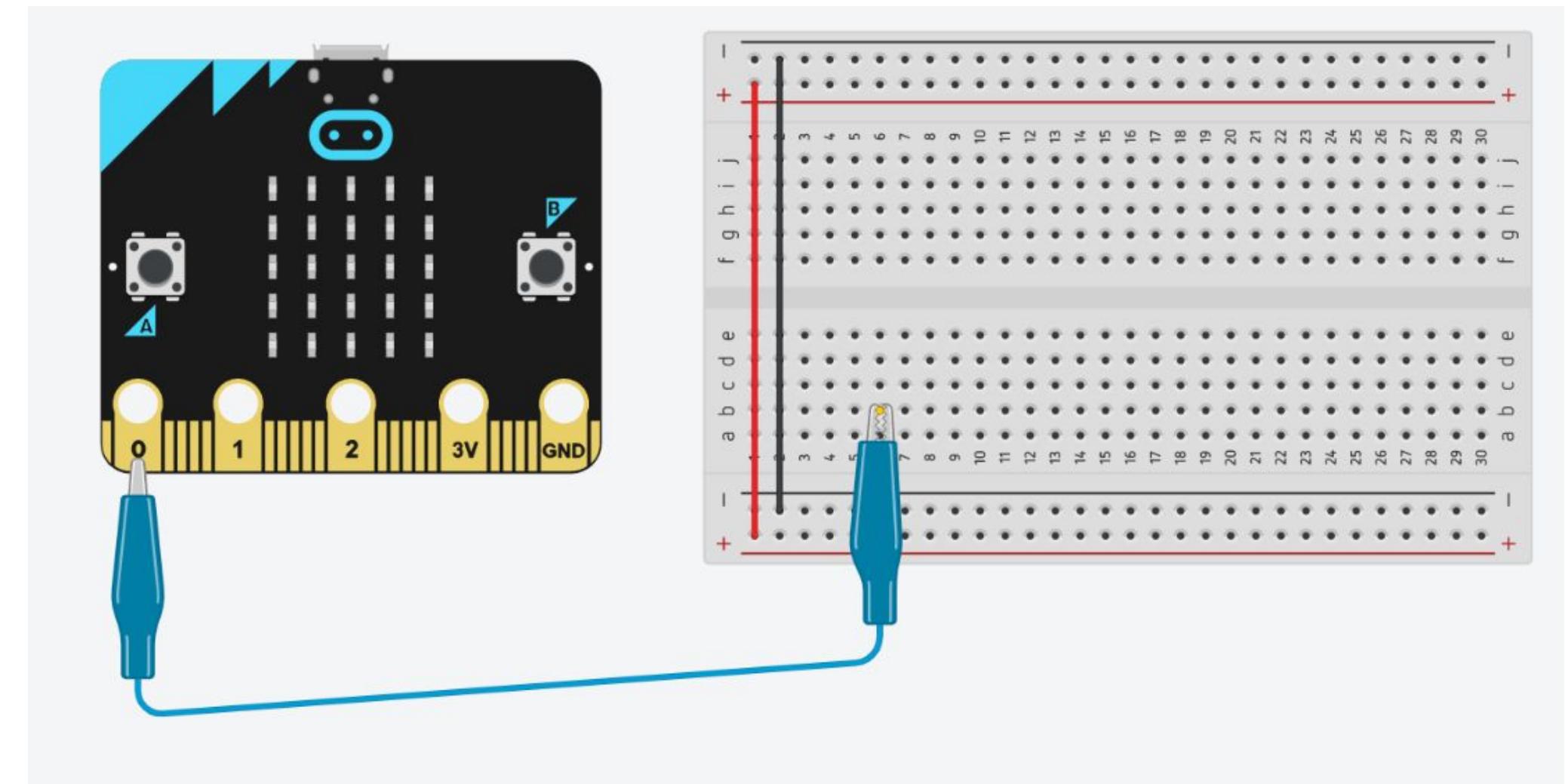
Connections

- Verbind de plus bovenaan met de plus onderaan (ROOD)
- Verbind de min bovenaan met de min onderaan (ZWART)

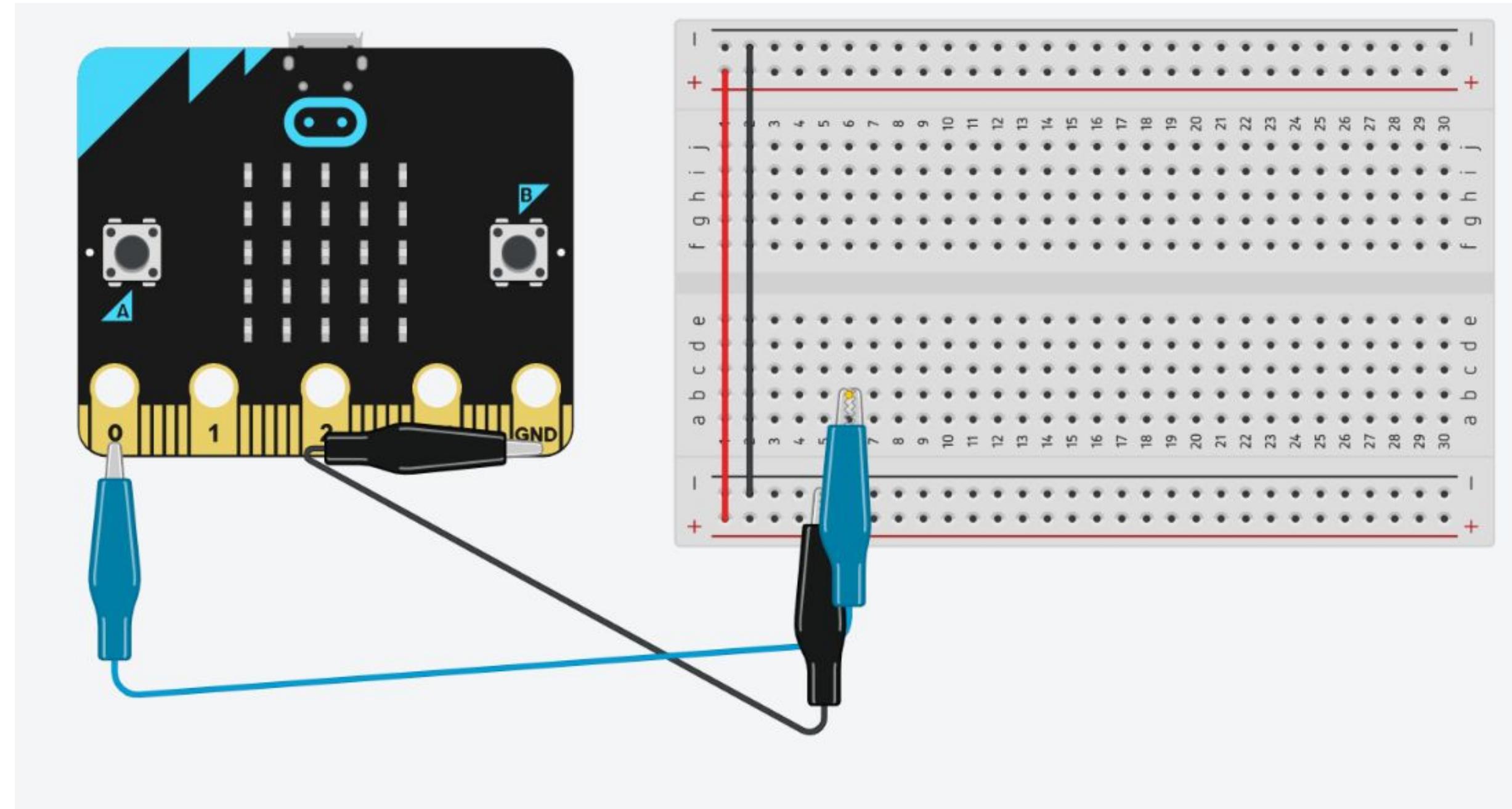


Connections

Verbind Pin 0 van de Micro:Bit met het breadboard. Gebruik een krokodillenklem en een stukje draad.

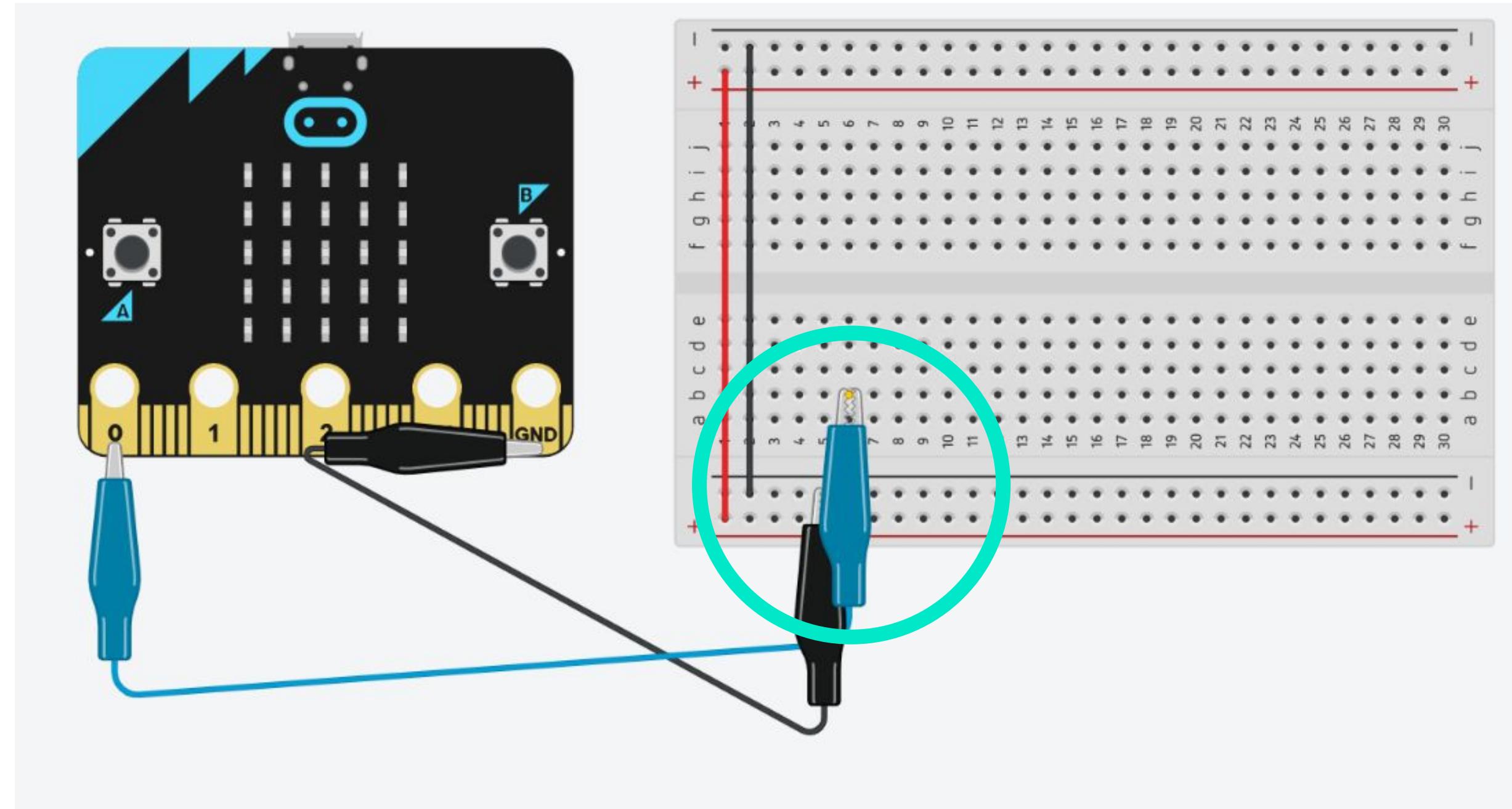


Connections



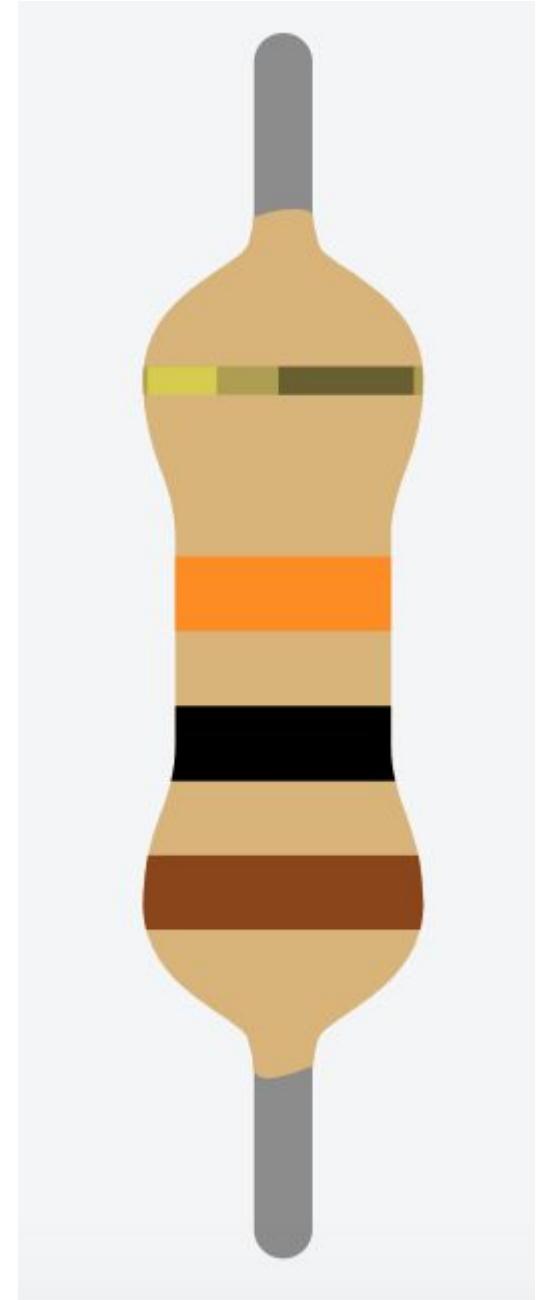
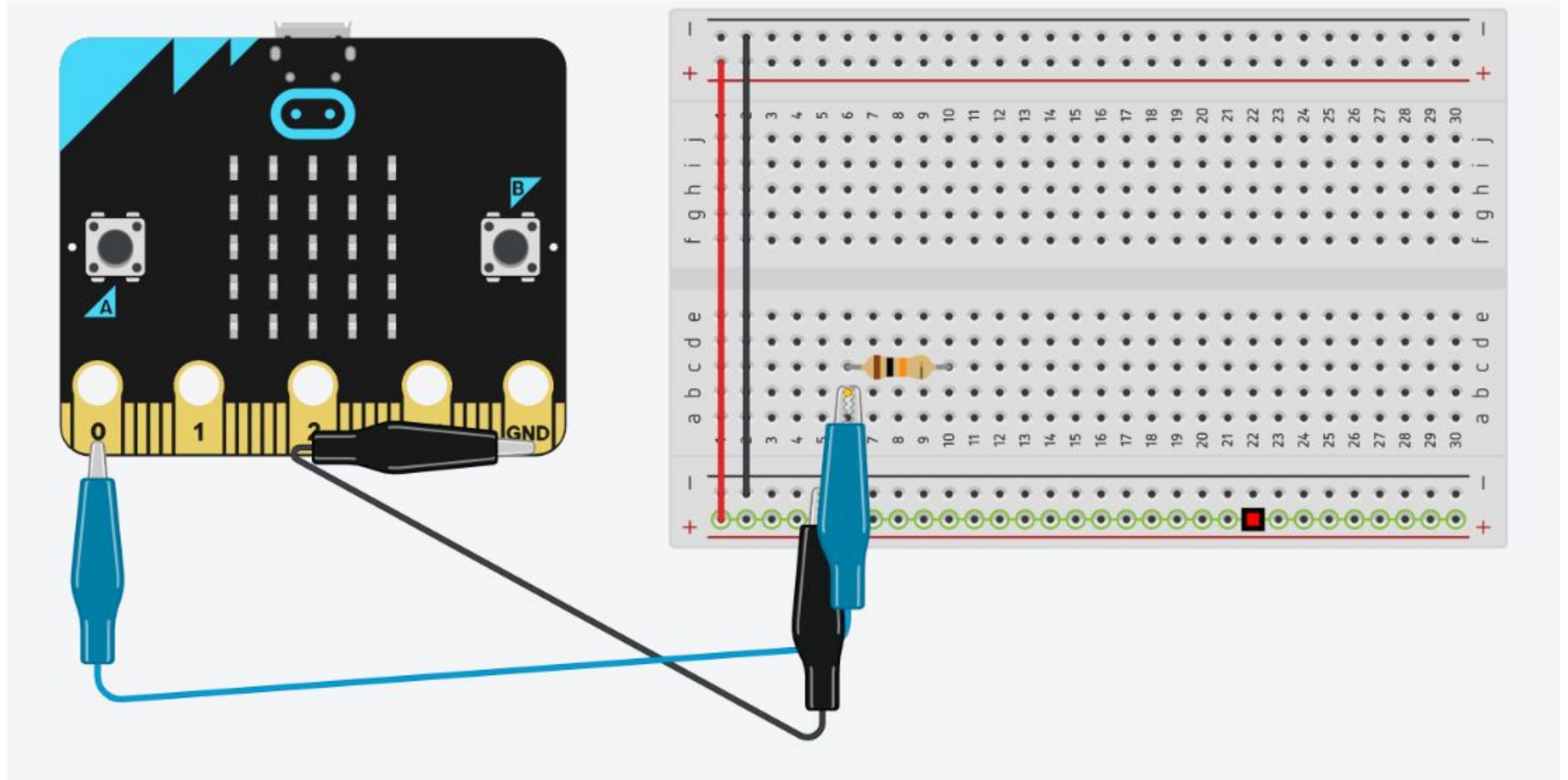
Verbind de ground (GND) van de Micro:Bit met de min van het breadboard.

Connections



Om het jezelf makkelijker te maken kan je de krokodillenklemmen in het breadboard nog even ontkoppelen.

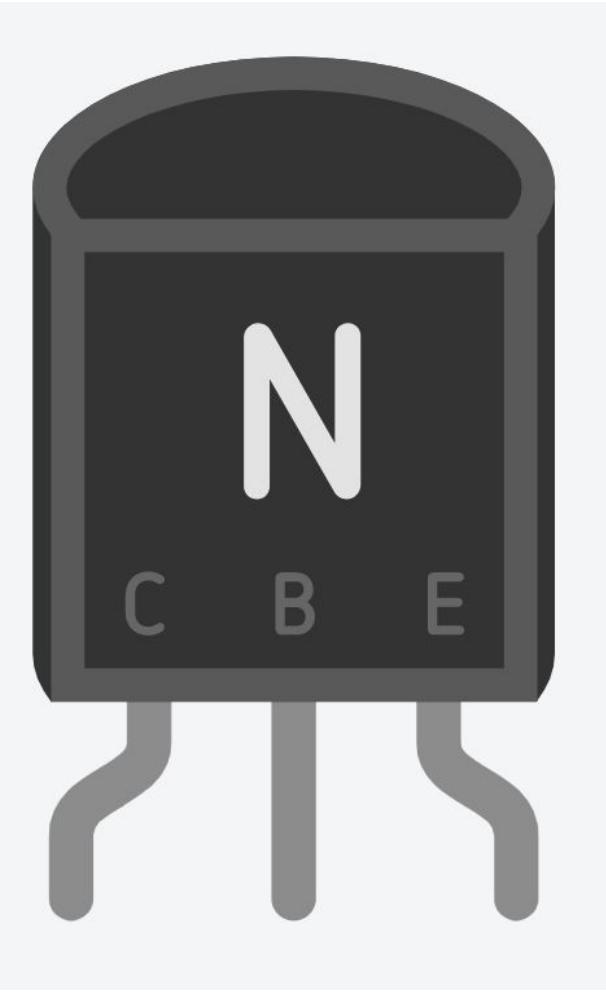
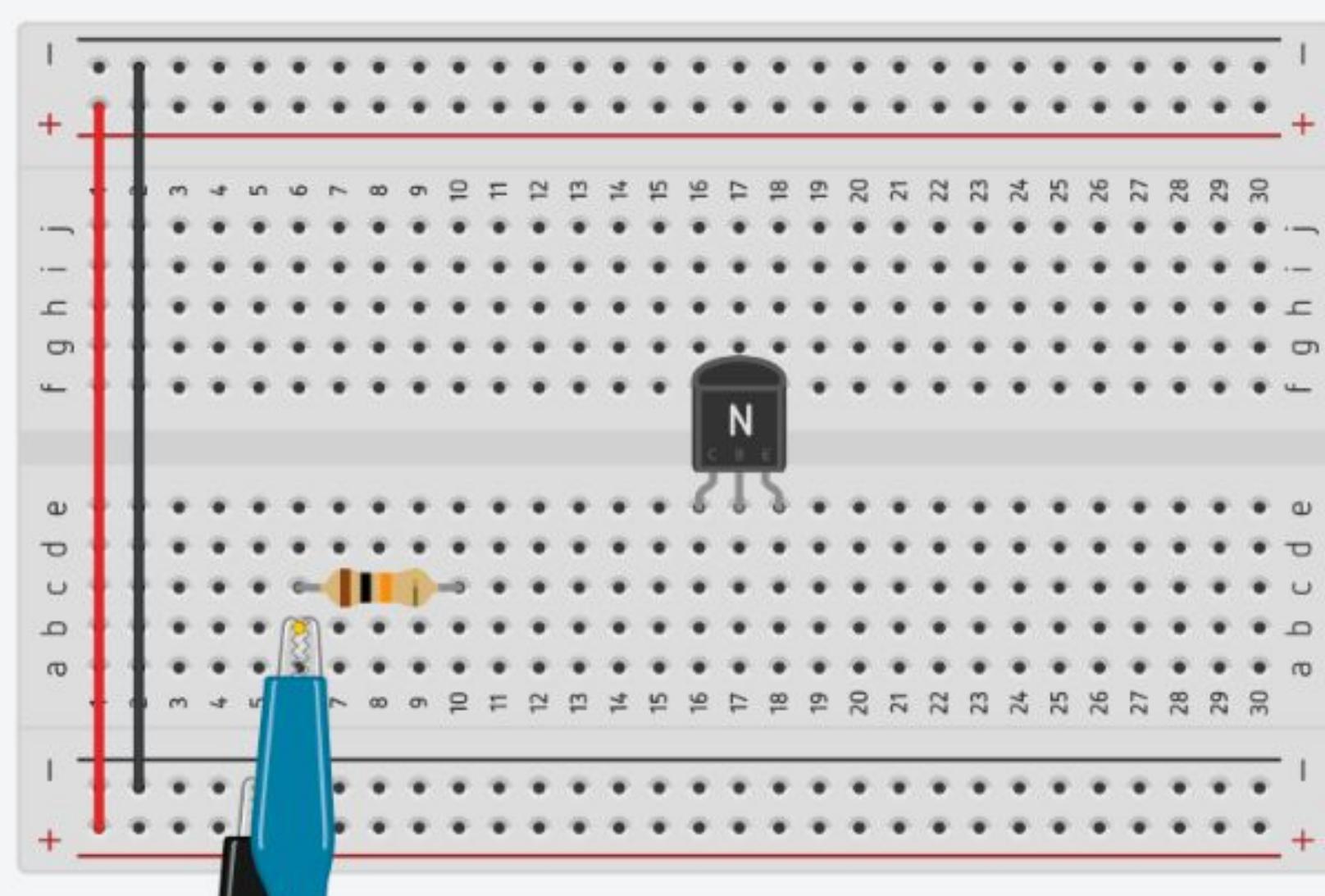
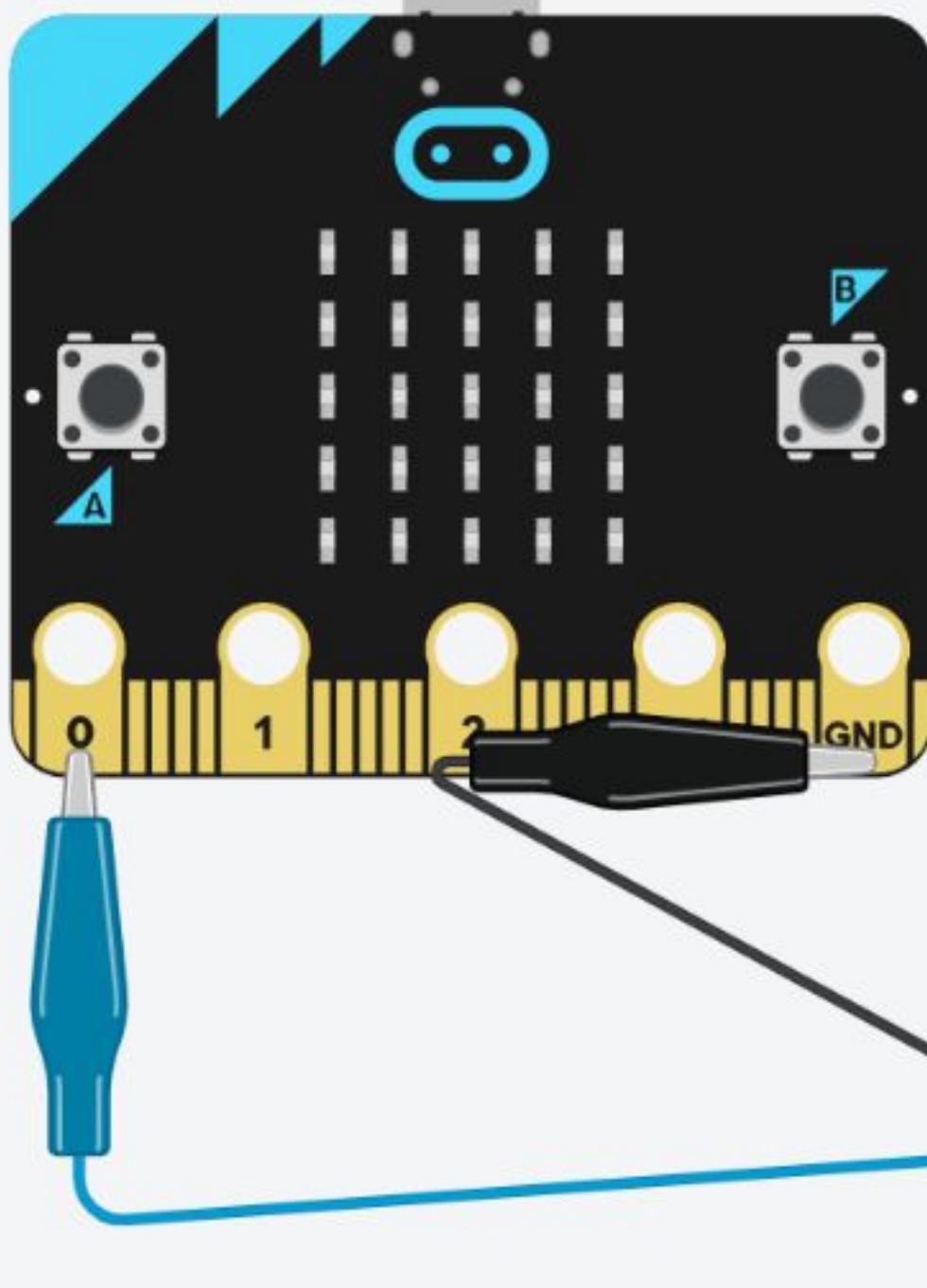
Connections



Plaats 1 been van de weerstand boven de verbinding met P0 het andere been een beetje verder in een vrije kolom.

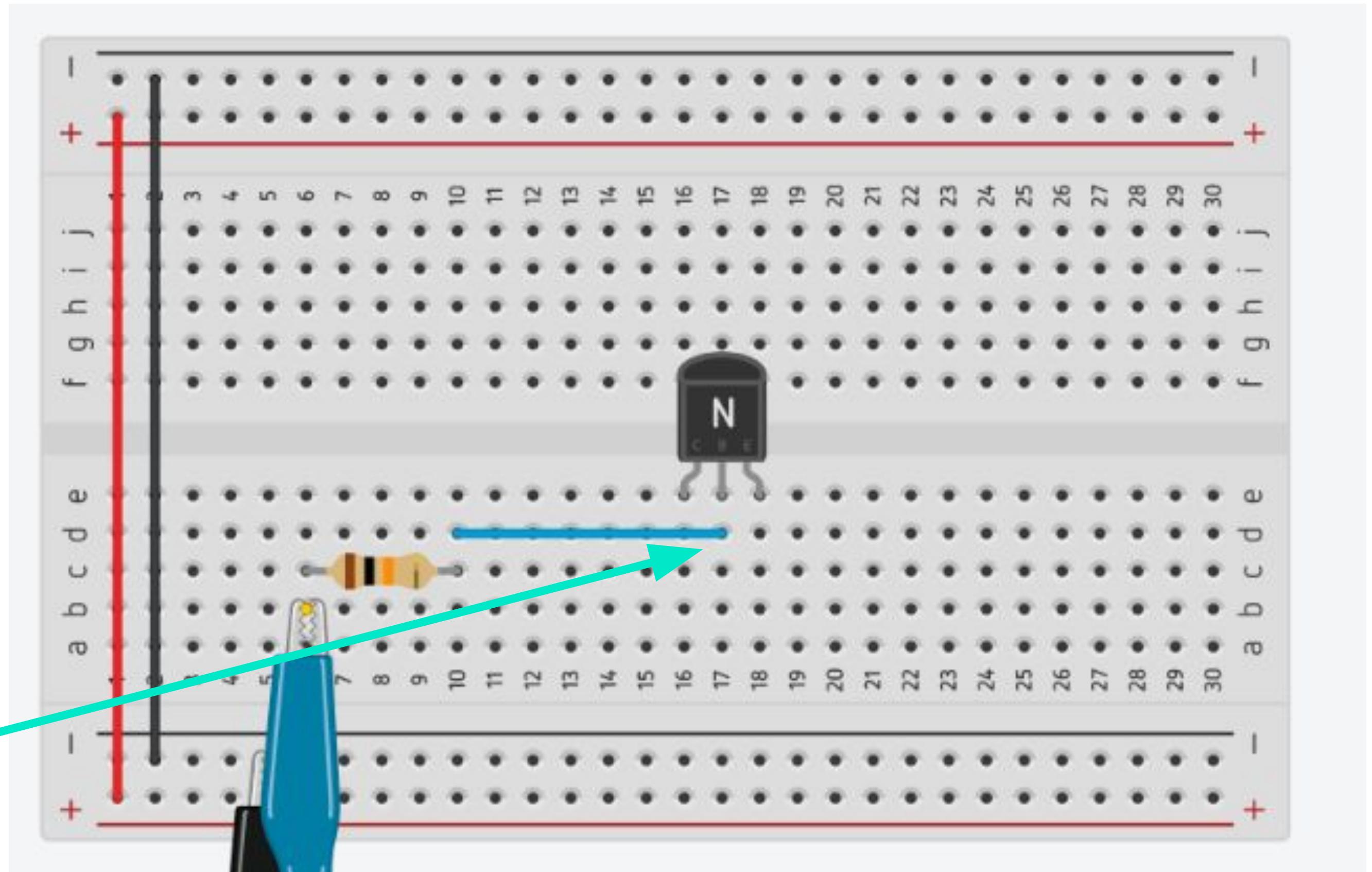
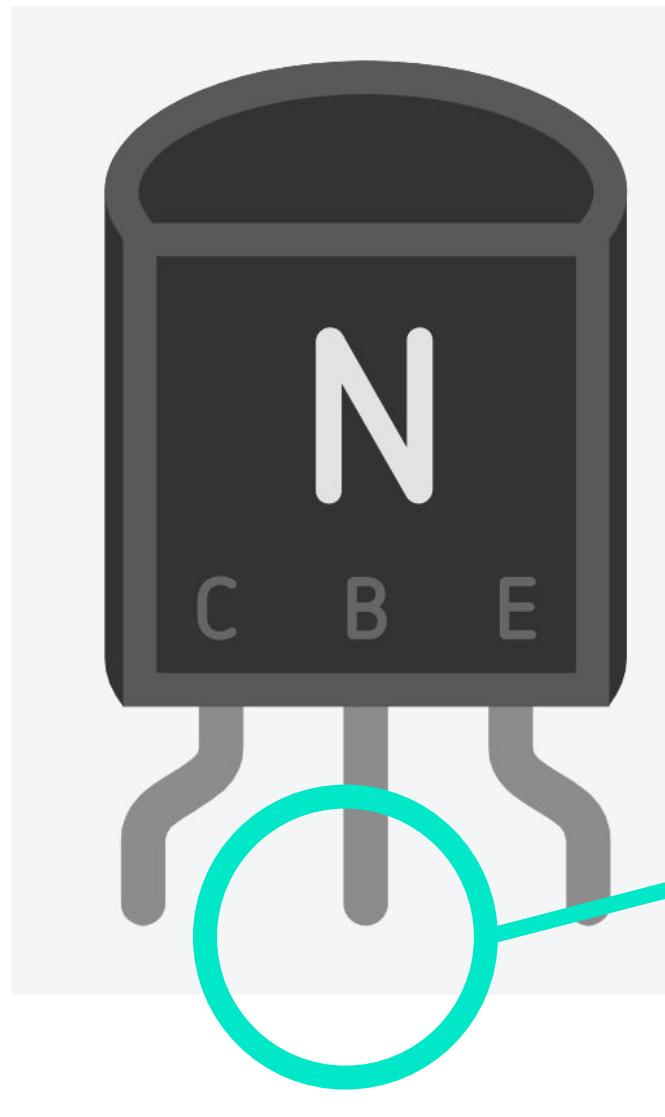
Connections

Plat stuk naar je toe.



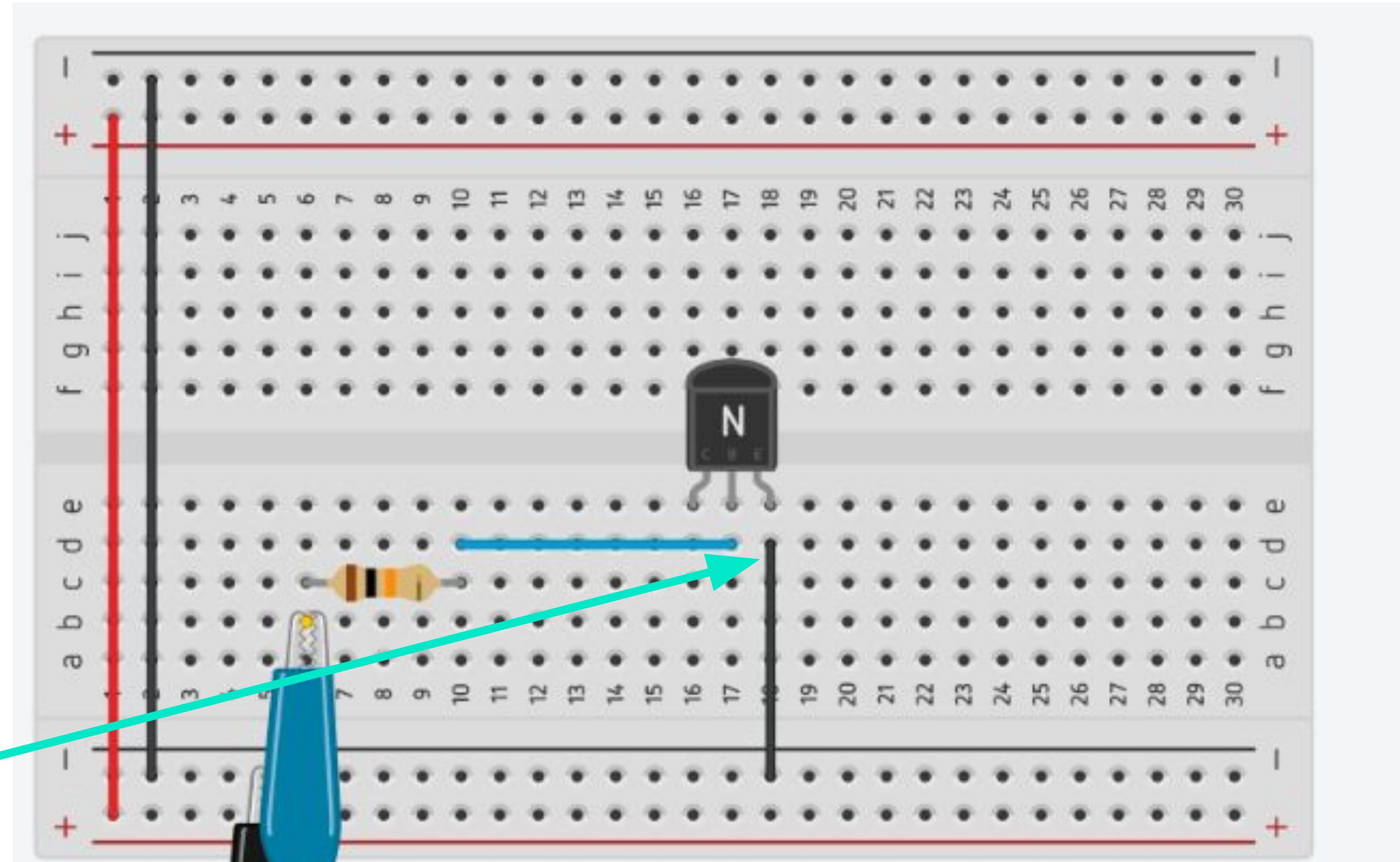
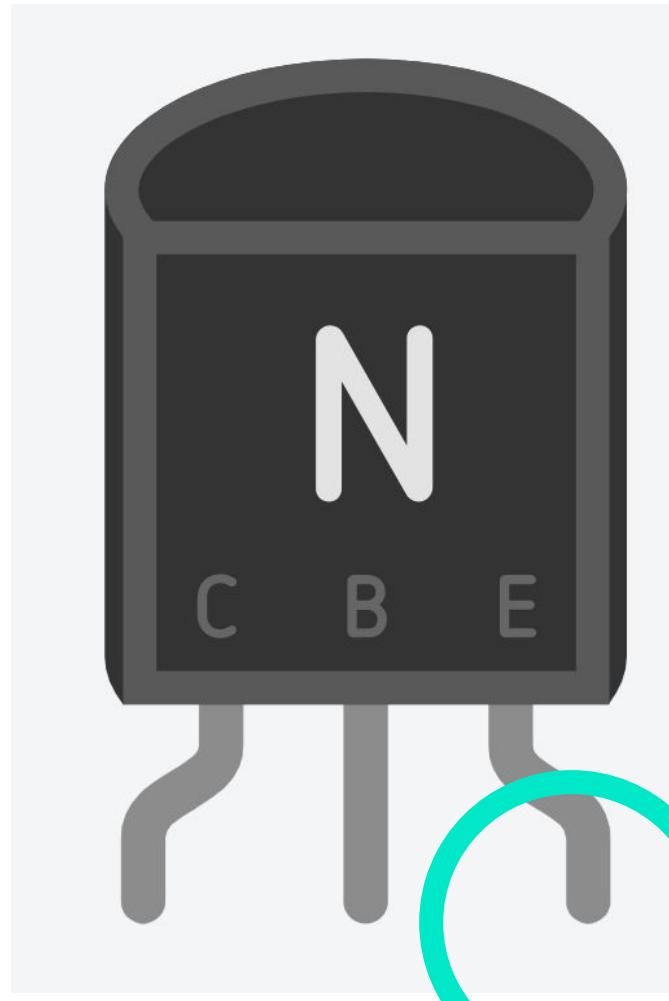
Connections

Middelste
beentje



Connections

Rechterbeen
naar de min

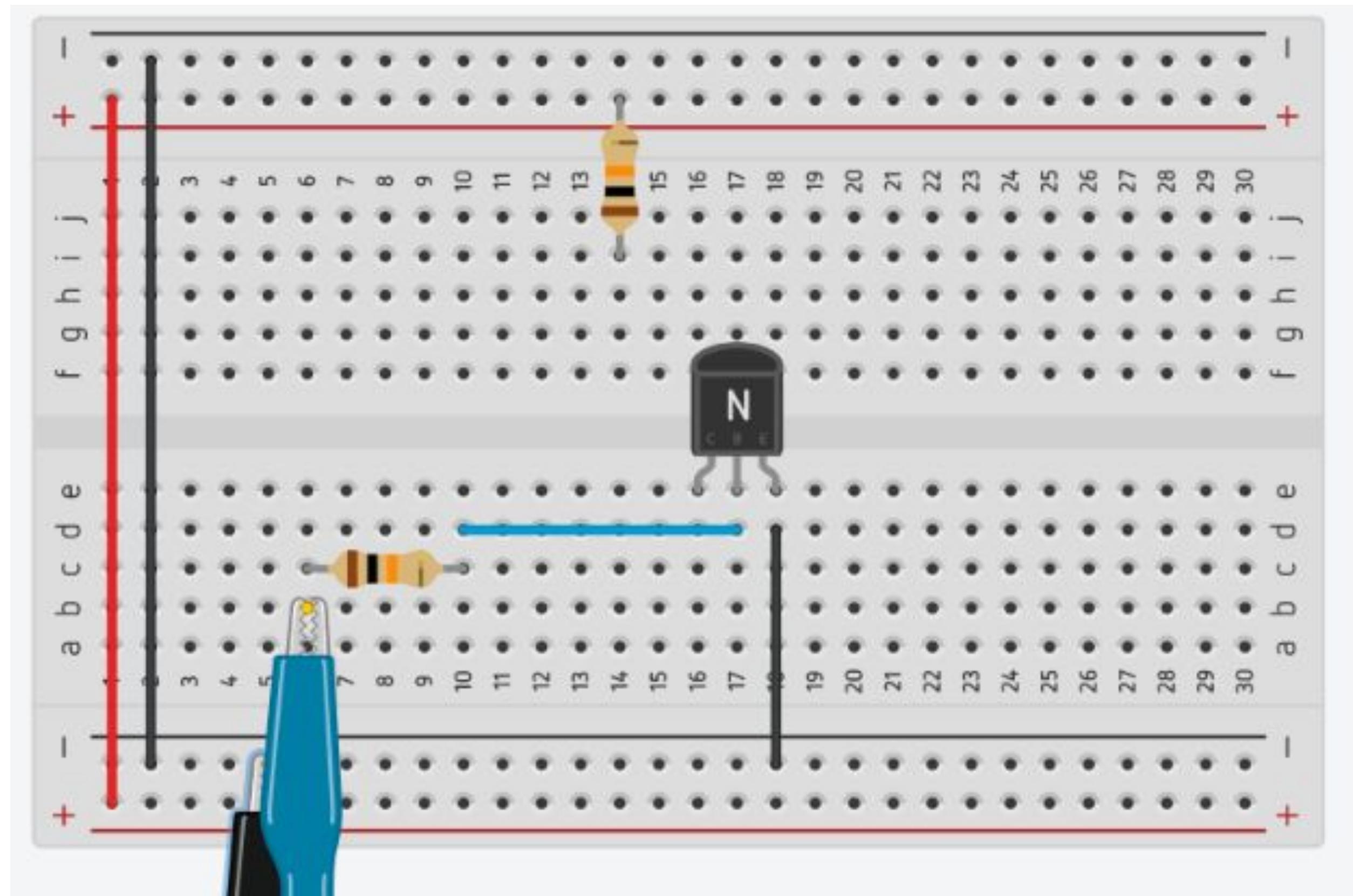


Connections

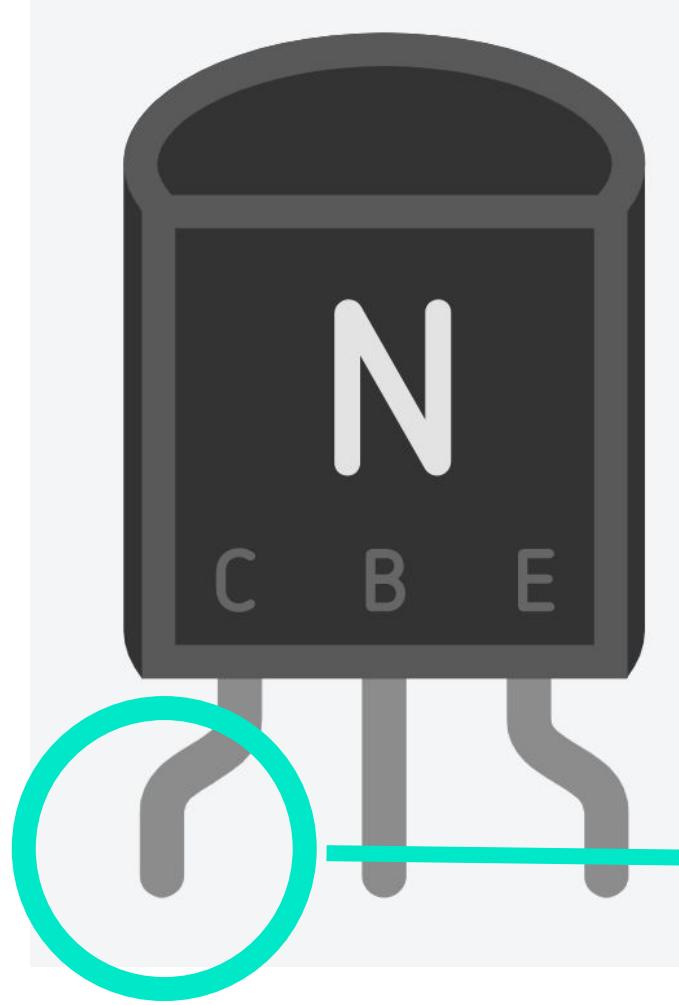
in de plus +



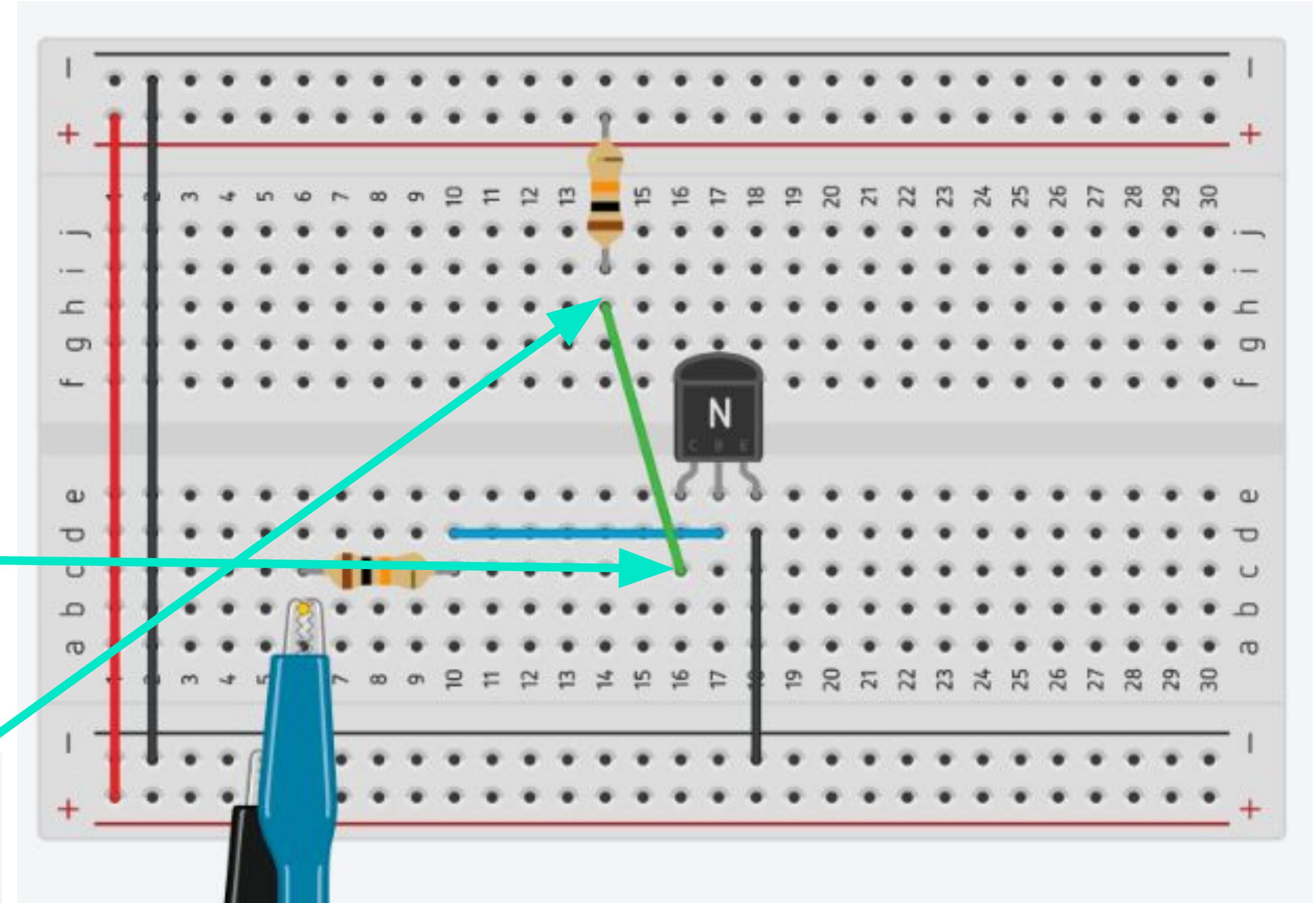
gaatje eronder



Connections

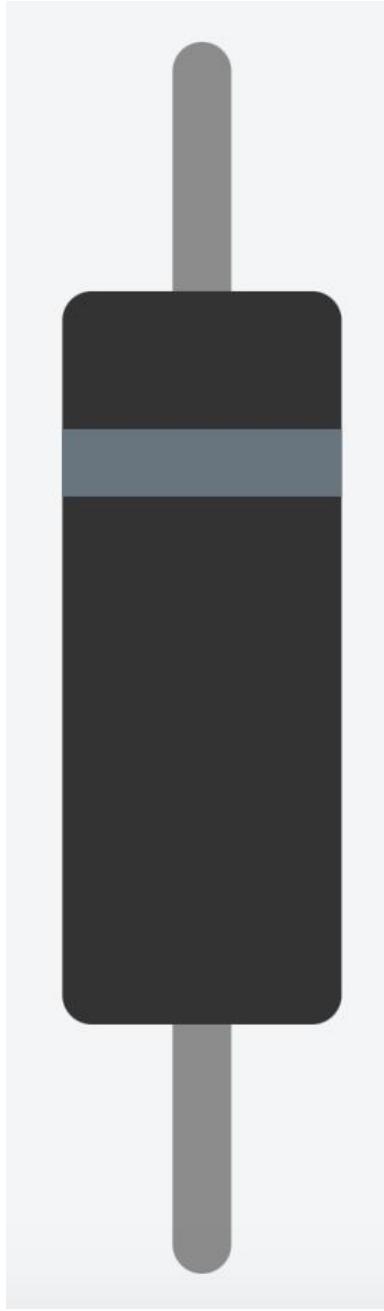


Linkerbeen
verbinden met
weerstand



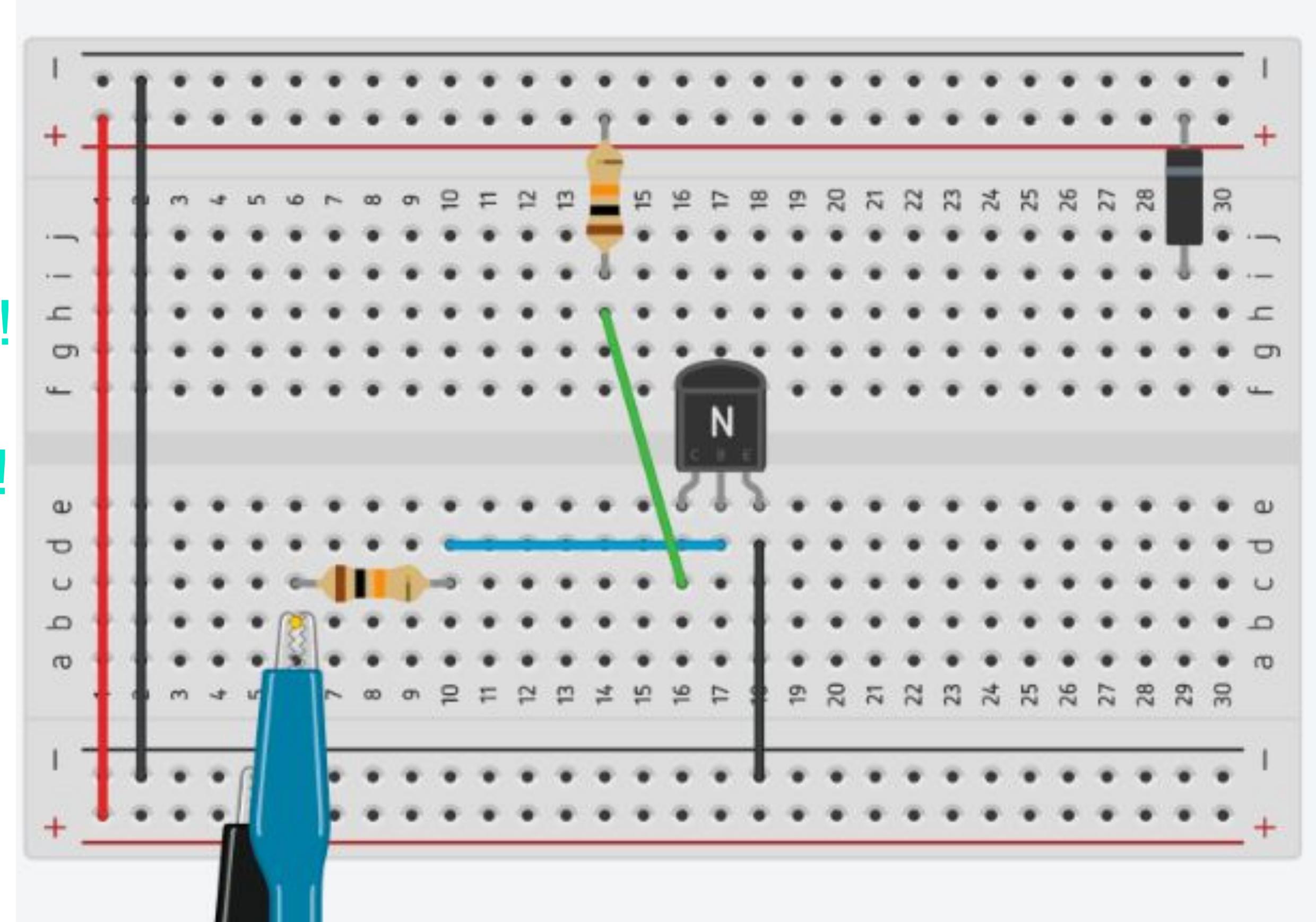
Connections

In de plus +

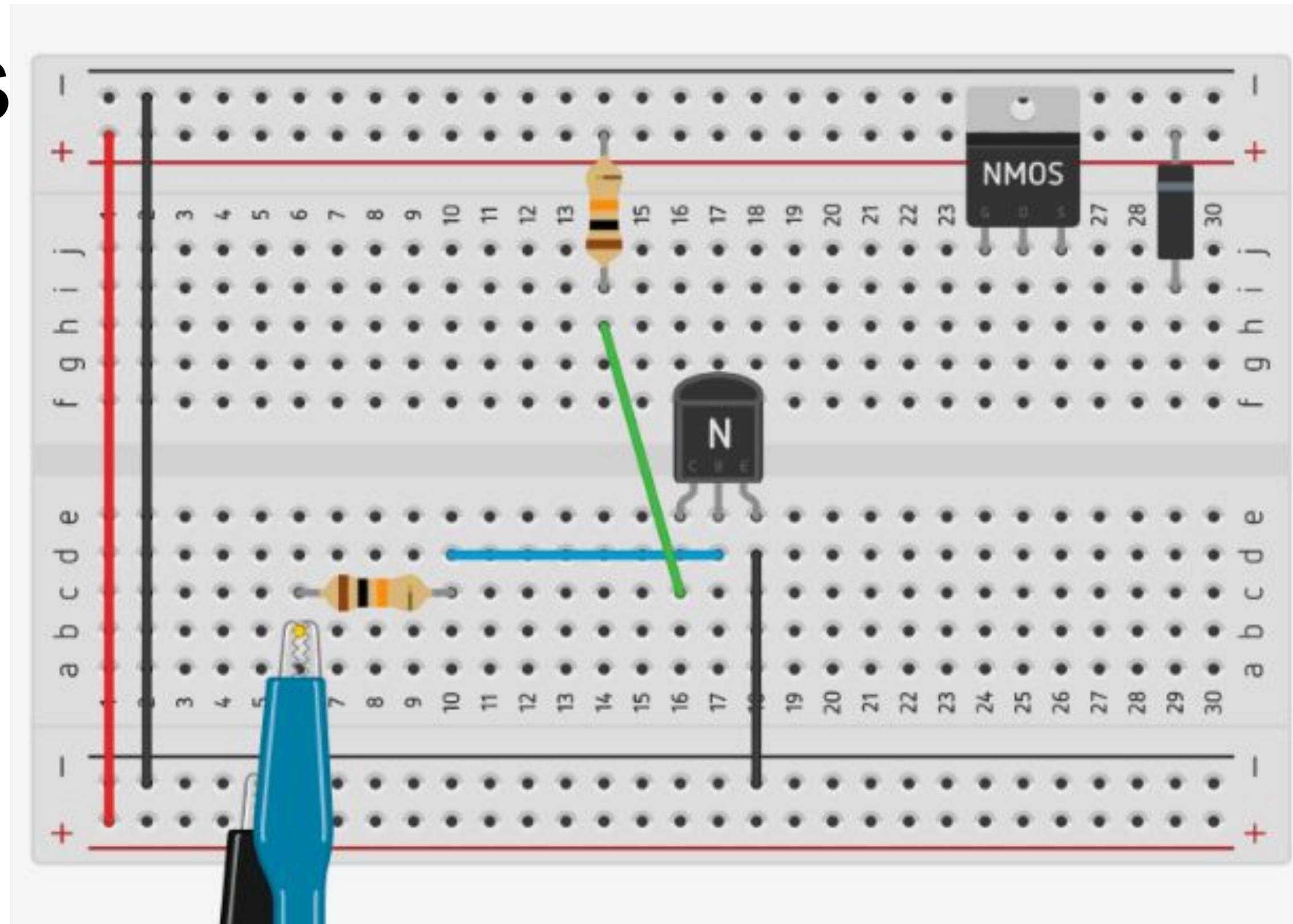
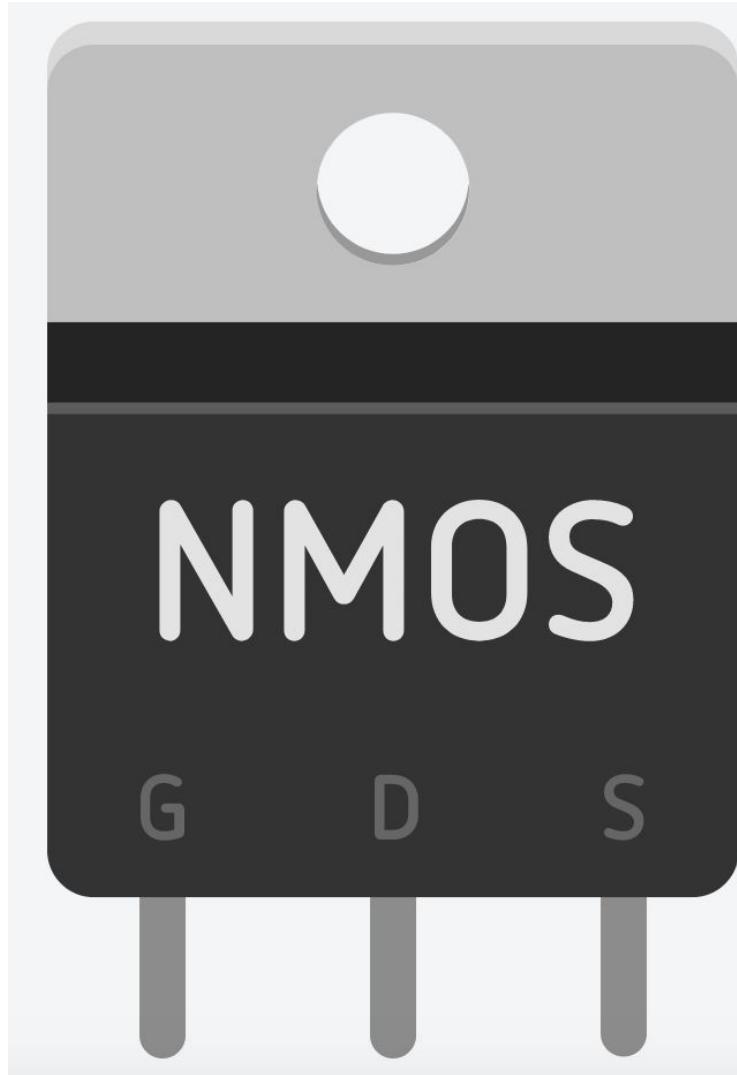


Let op!
Ring
boven!

Gaatje eronder

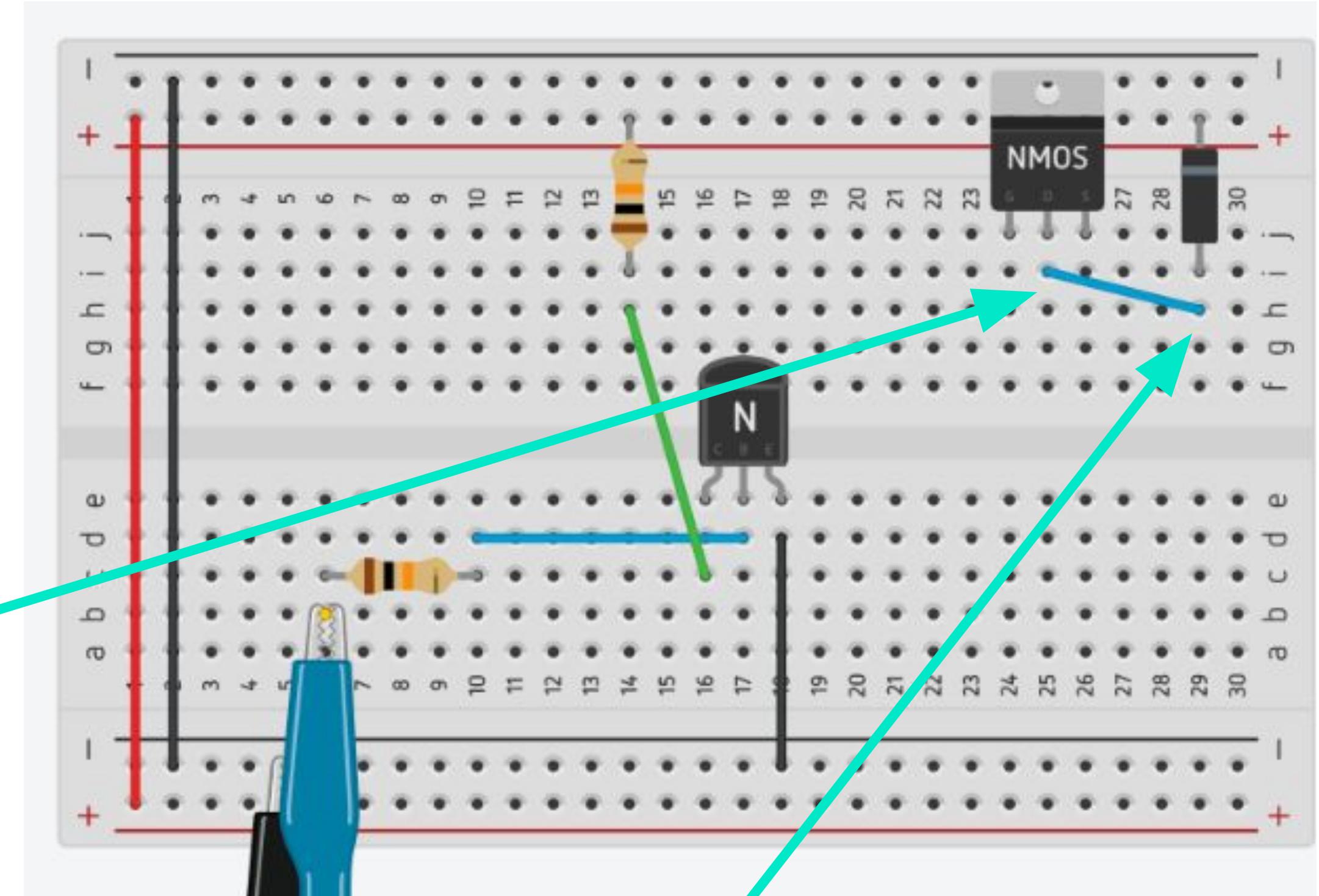
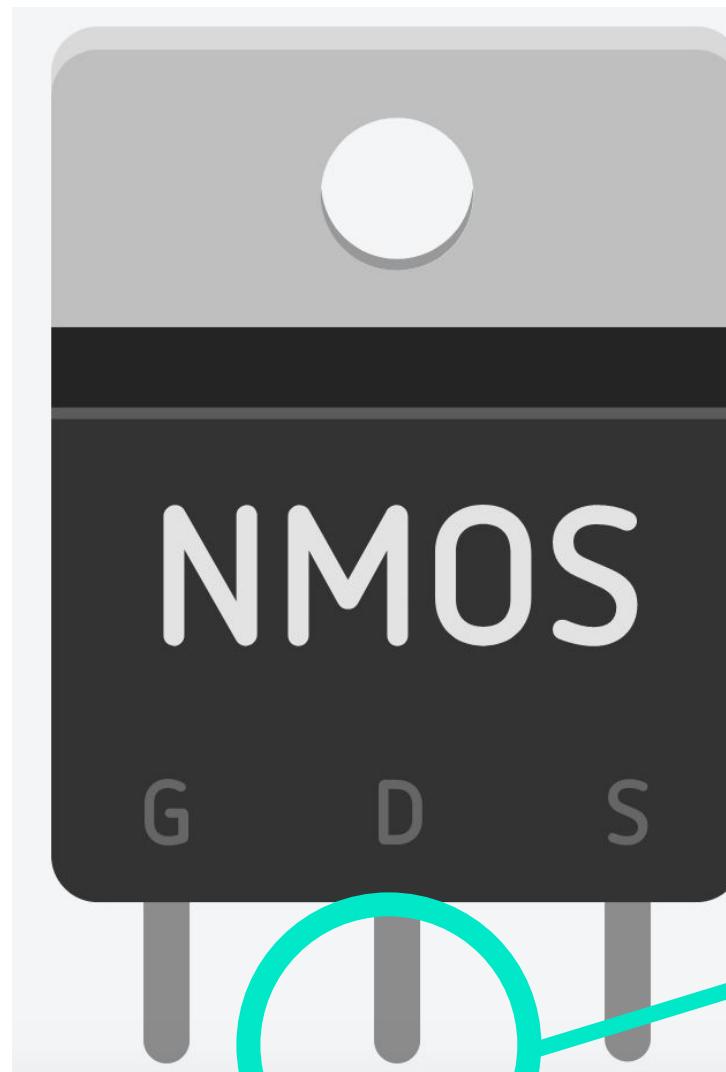


Connections



Plaats de MOSFET op de rij onder de plus.
Het metaal moet achteraan en het iets dikker zwart blokje moet vooraan uitsteken.

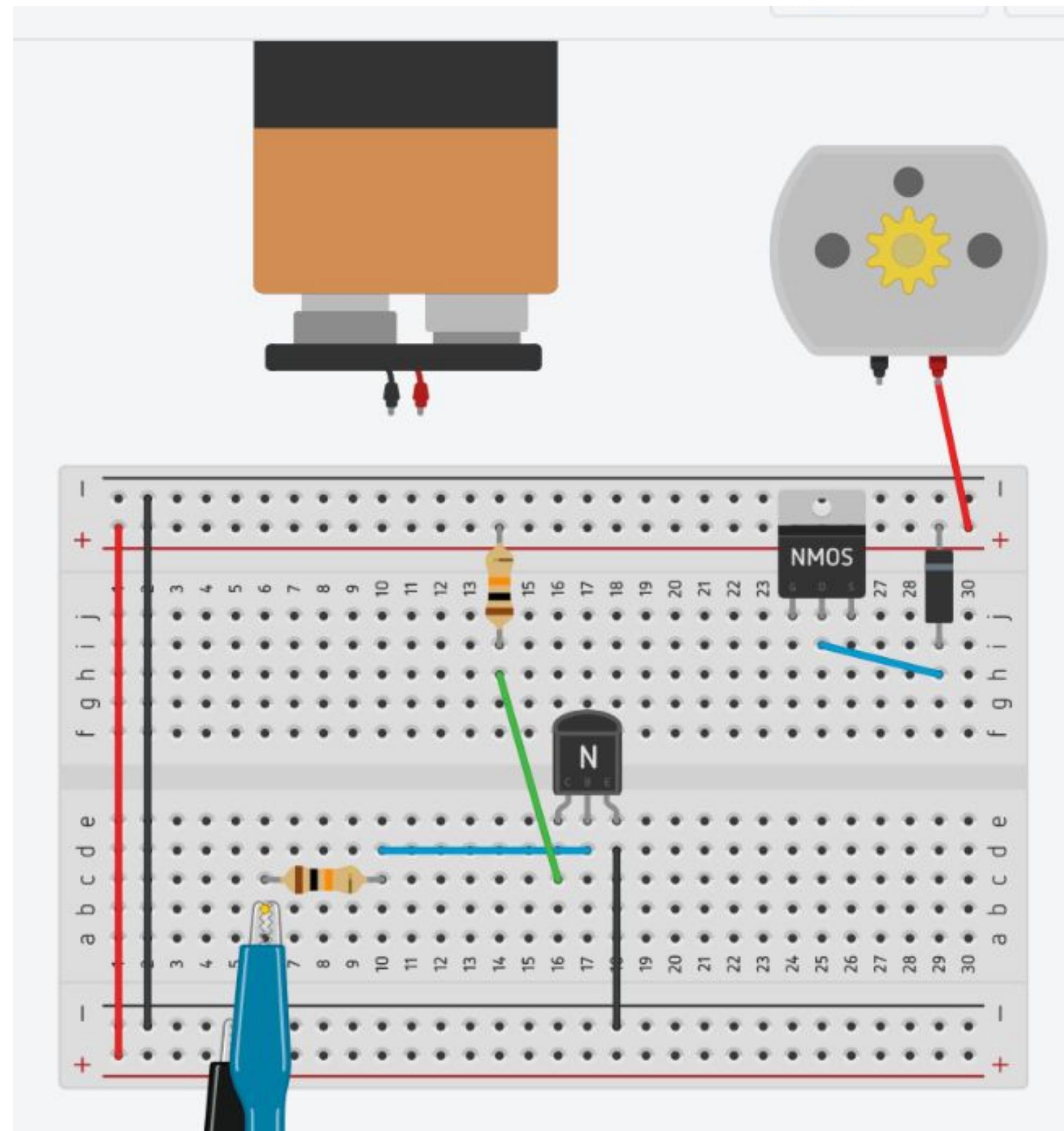
Connections



Verbind het middelste been met de diode.

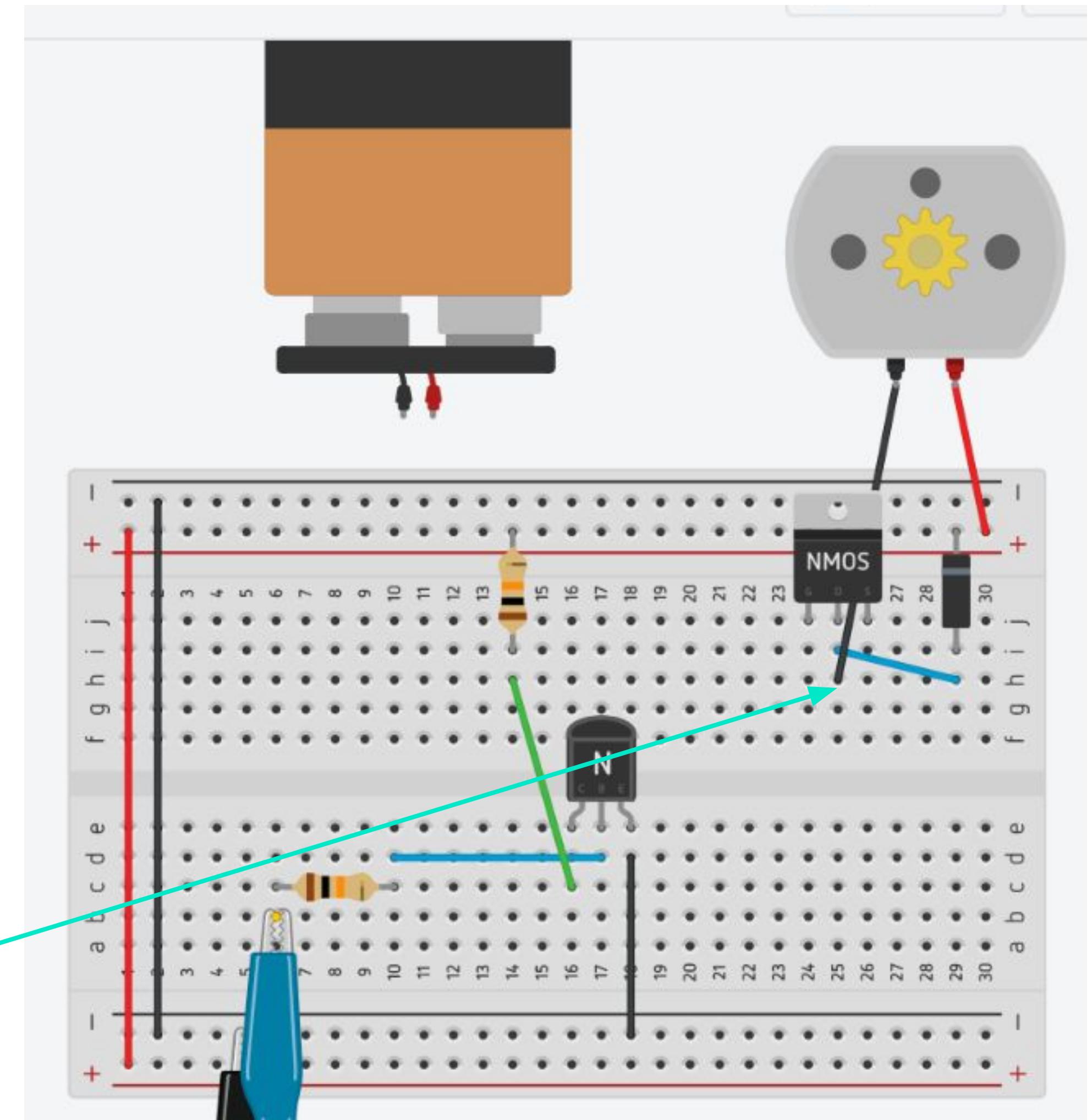
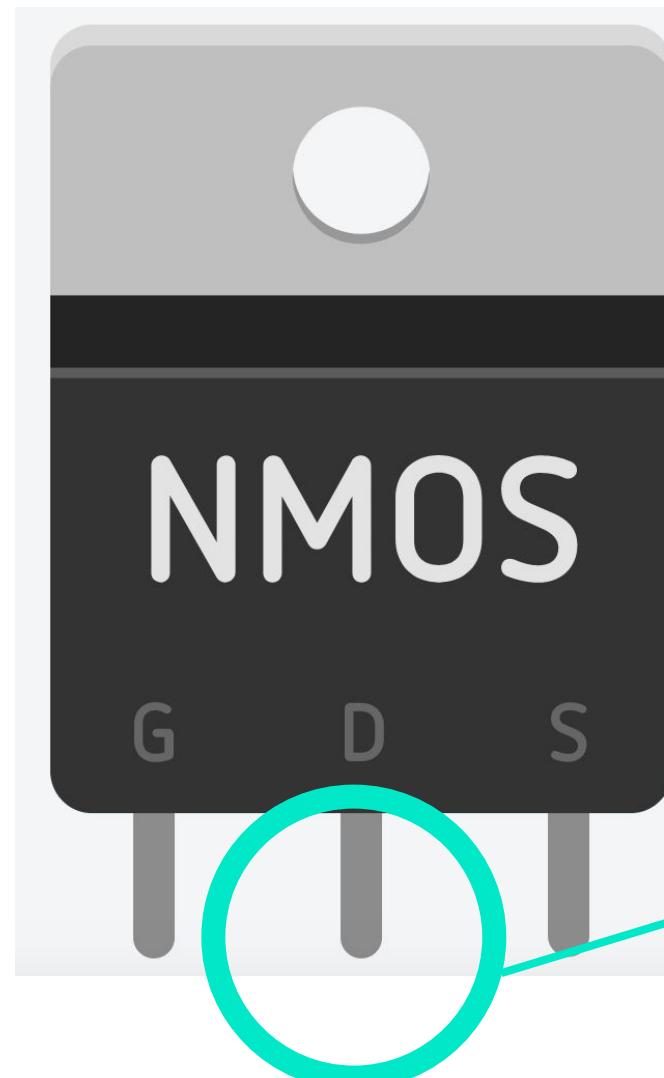
Connections

Rode draad van de motor naar de plus.

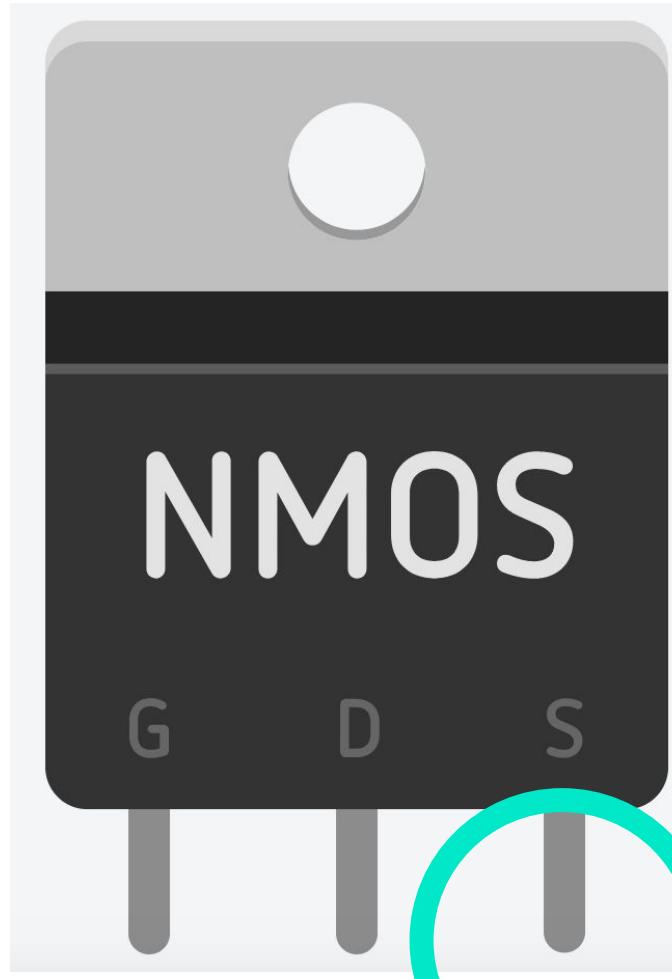


Connections

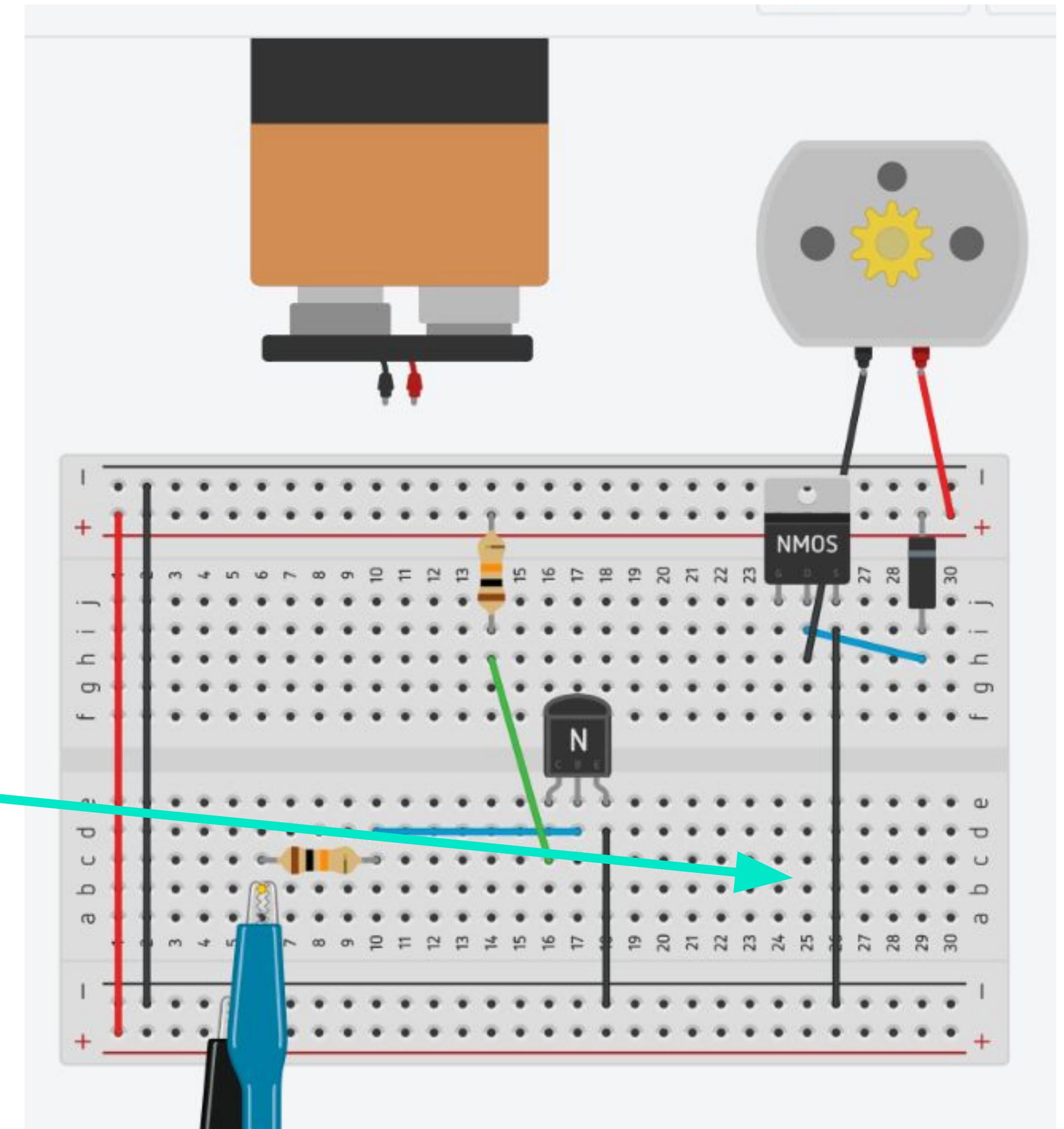
Zwarte draad van de motor naar middelste beentje.



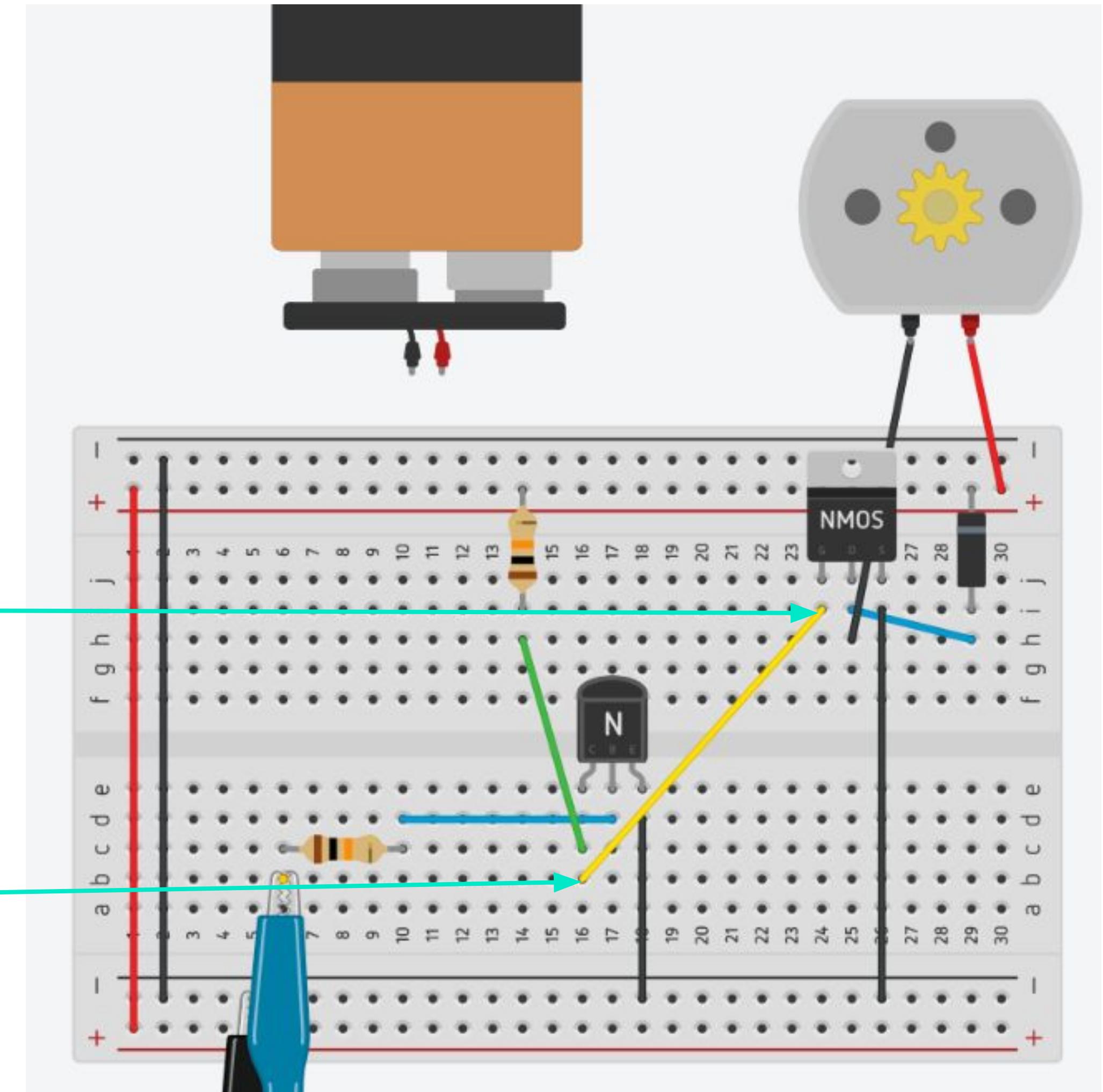
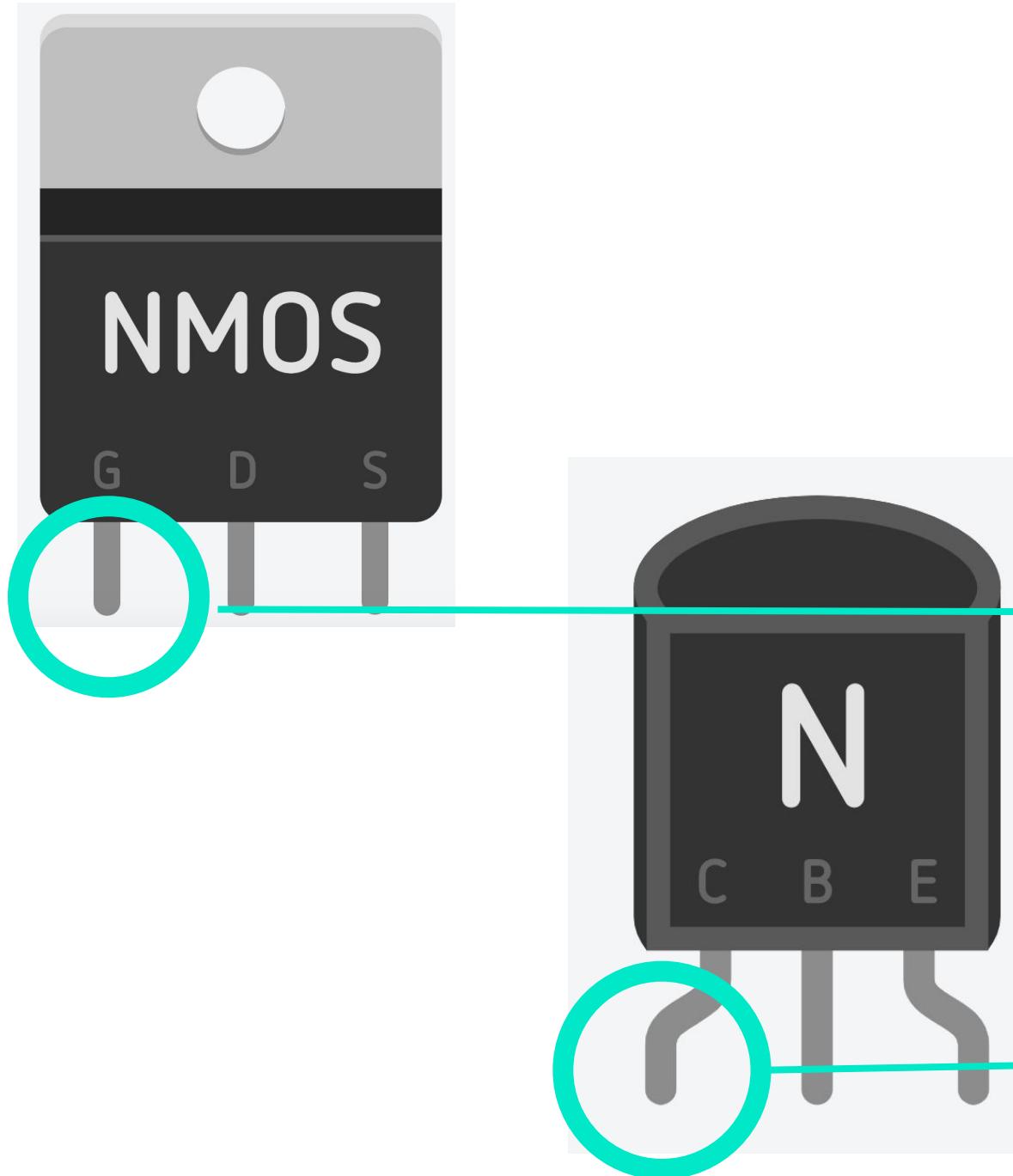
Connections



Rechterbeen naar de min

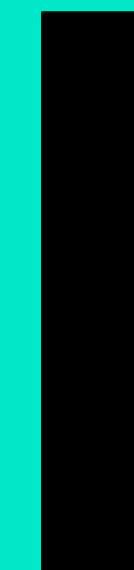


Connections



ATTENTION!

1. CHECK that everything is connected properly
2. Ask somebody to check it
3. Everything correct? go to next step



Now connect the 9V battery!!!

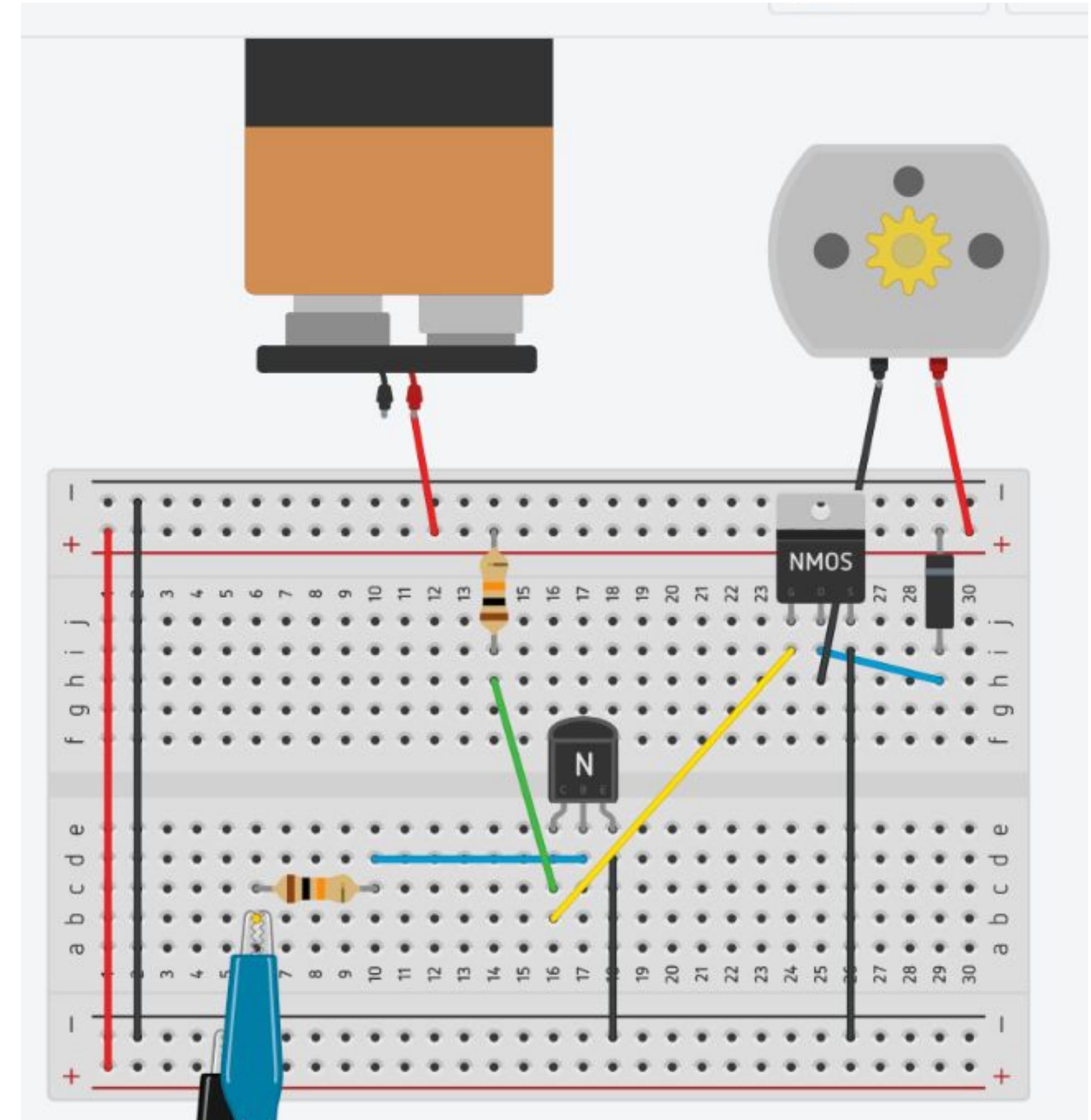


Schakeling

Doe de batterijclip op de batterij.

Verbind de positieve kant
(ROOD!) met de plus +

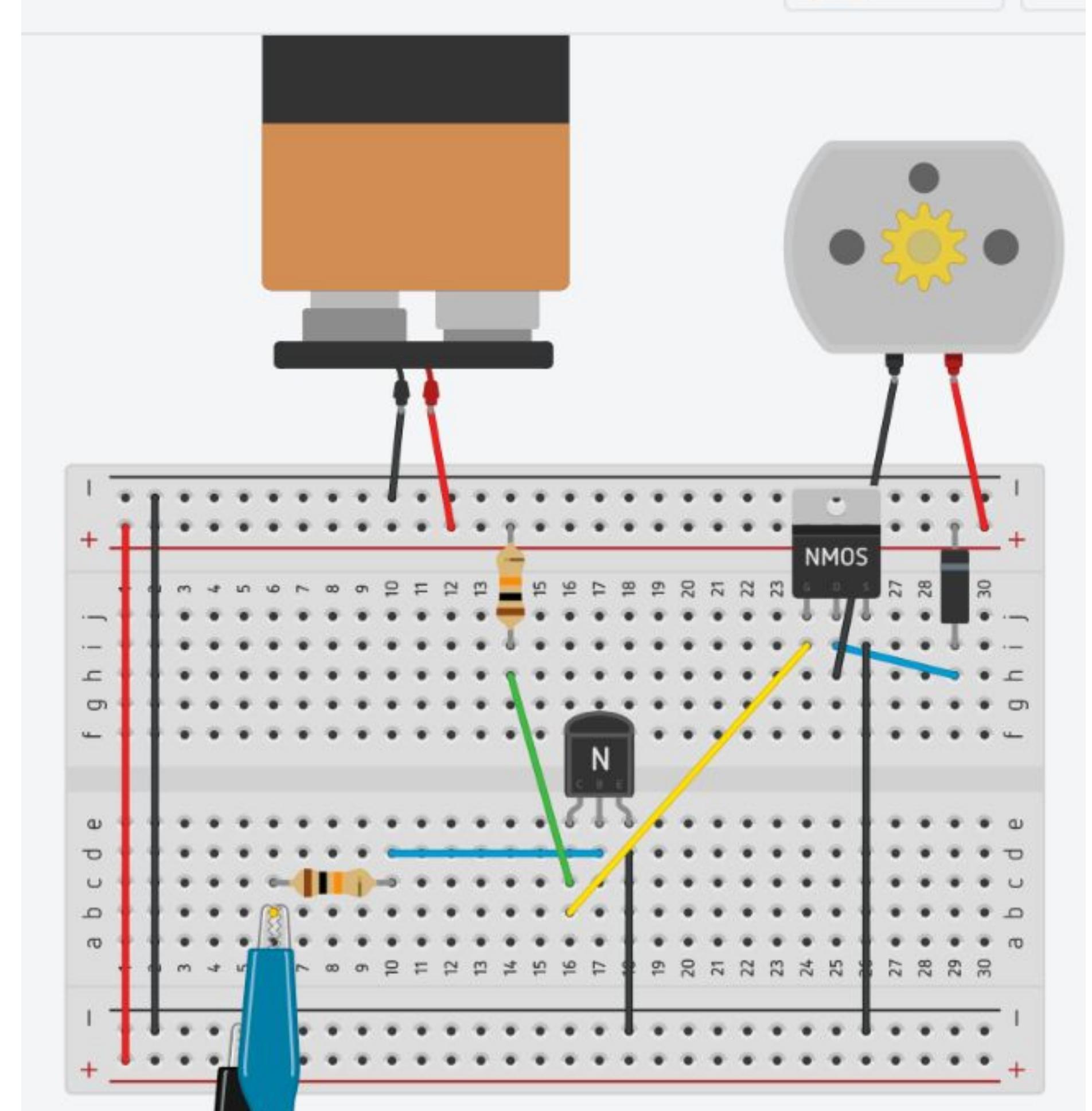
9V !



Schakeling

Verbind de negatieve kant van de batterij (ZWART!) met de min -

9V !



Schakeling

Als de krokodillenklemmen nog niet zijn vastgemaakt, mag je dat nu doen.

Sluit de batterij van de Micro:Bit aan.

Voilà, je PaintBot is klaar!

