



waag society

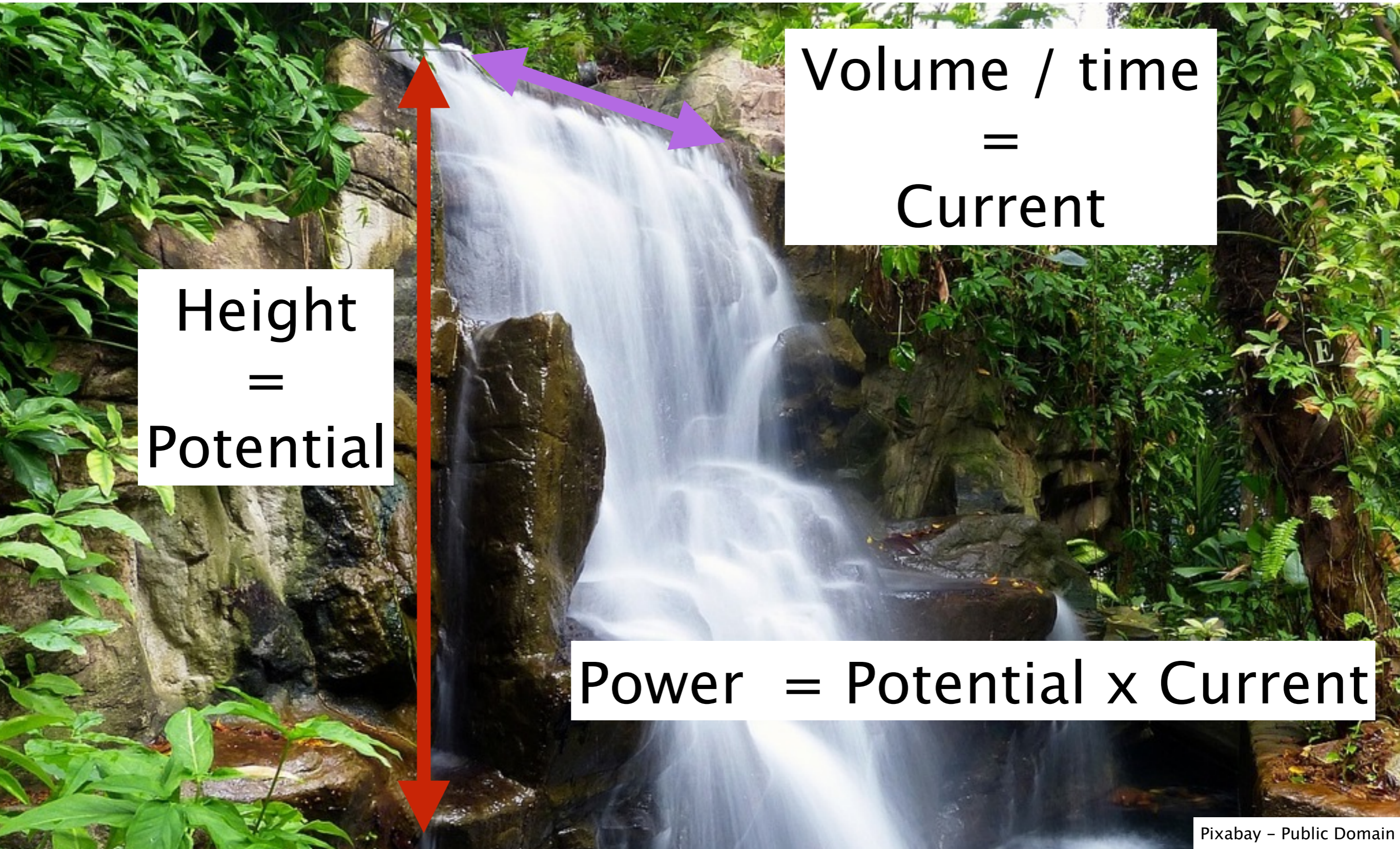
institute for art, science and technology



BioHack Academy Arduino & Soldering



Waterfall



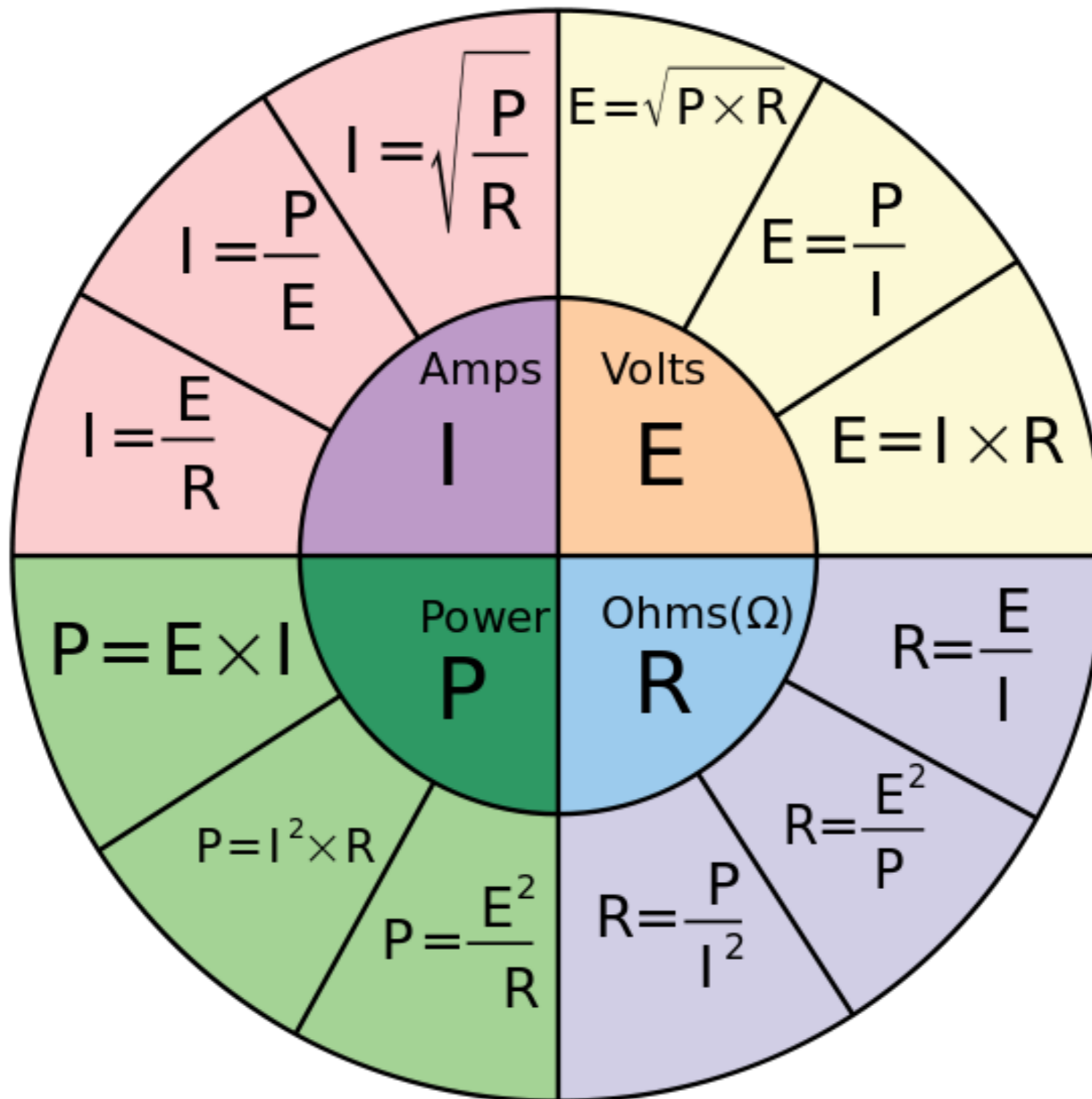
Volume / time
=
Current

Height
=
Potential

Power = Potential x Current



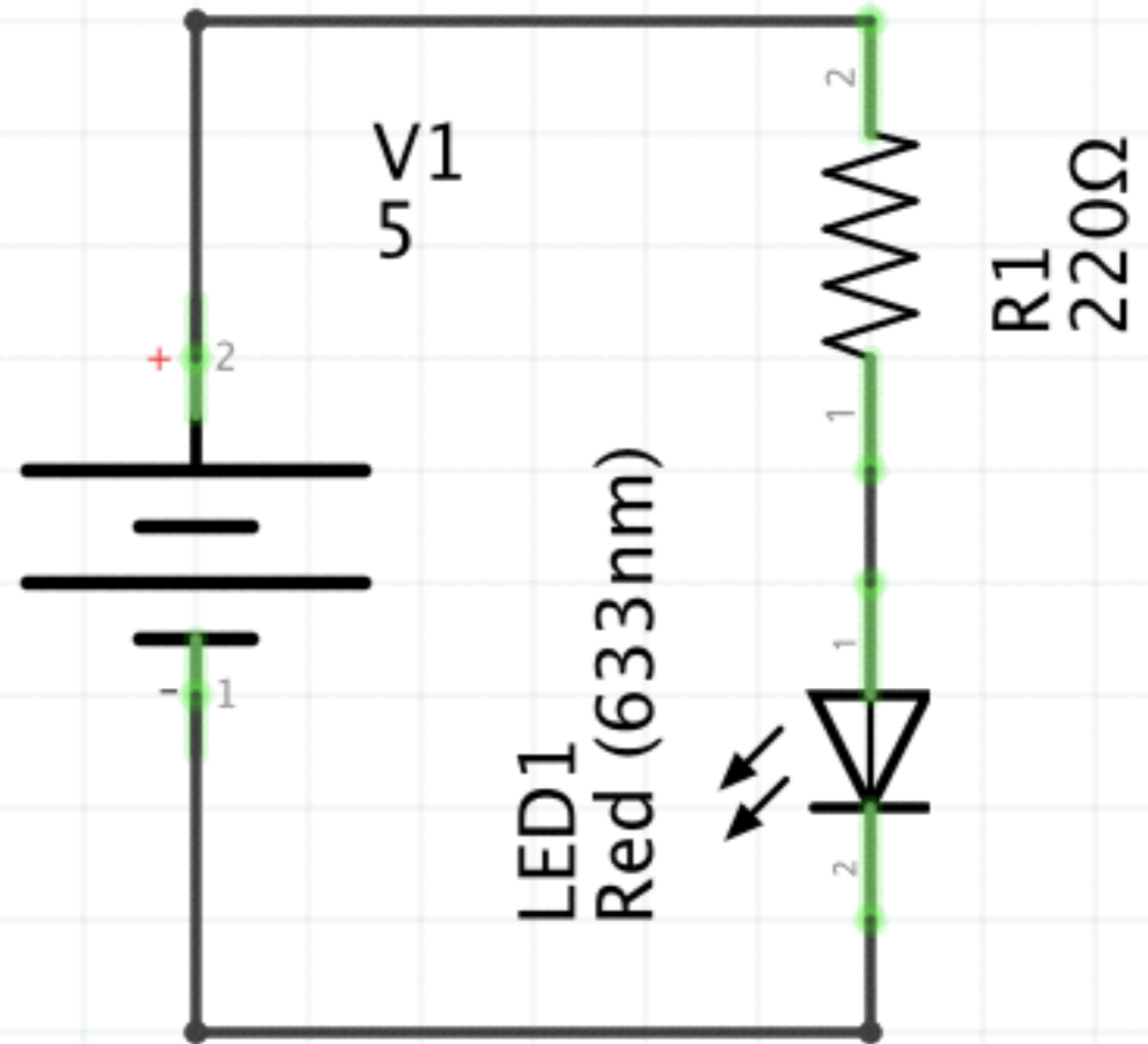
Ohm's Law





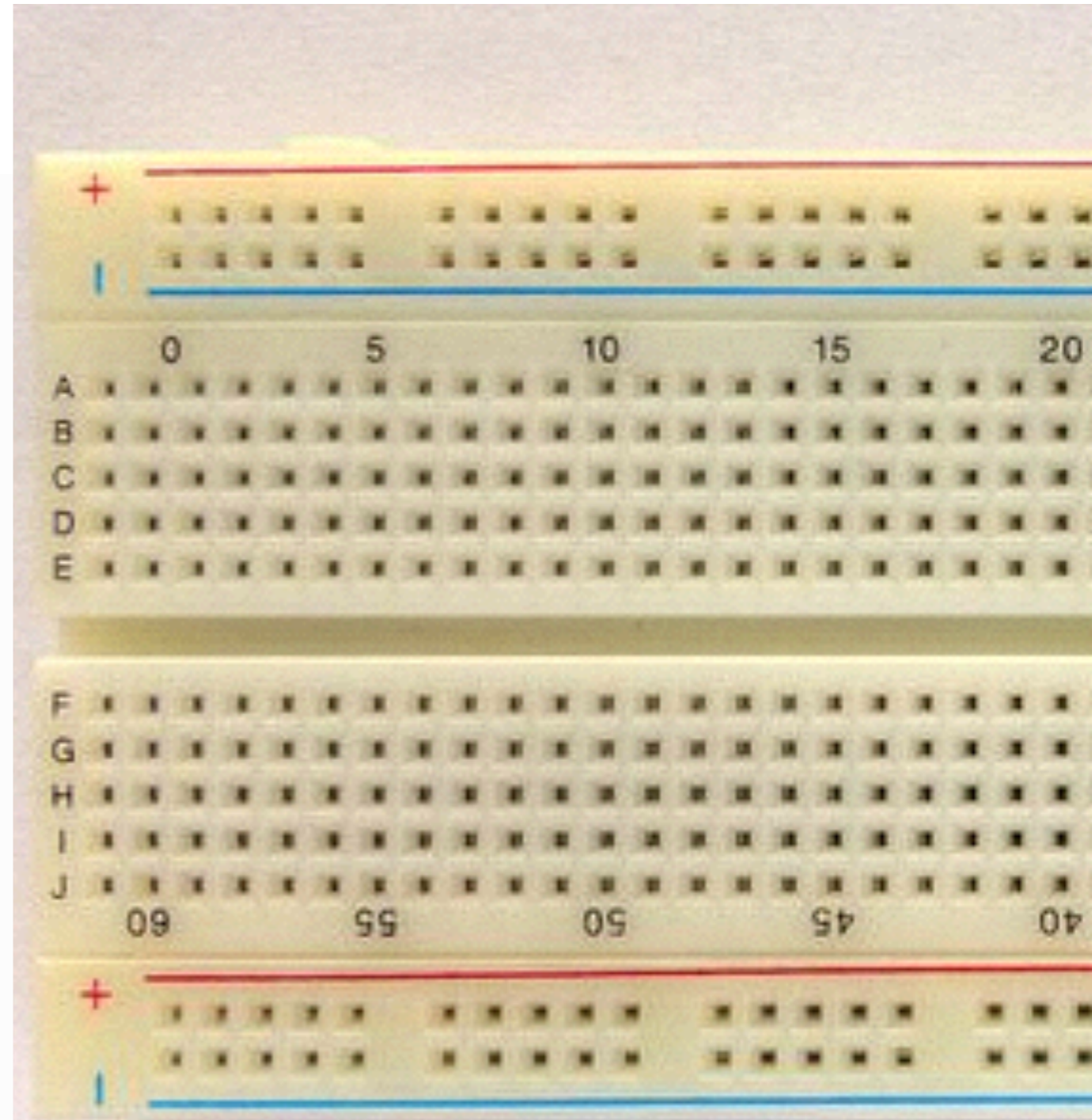
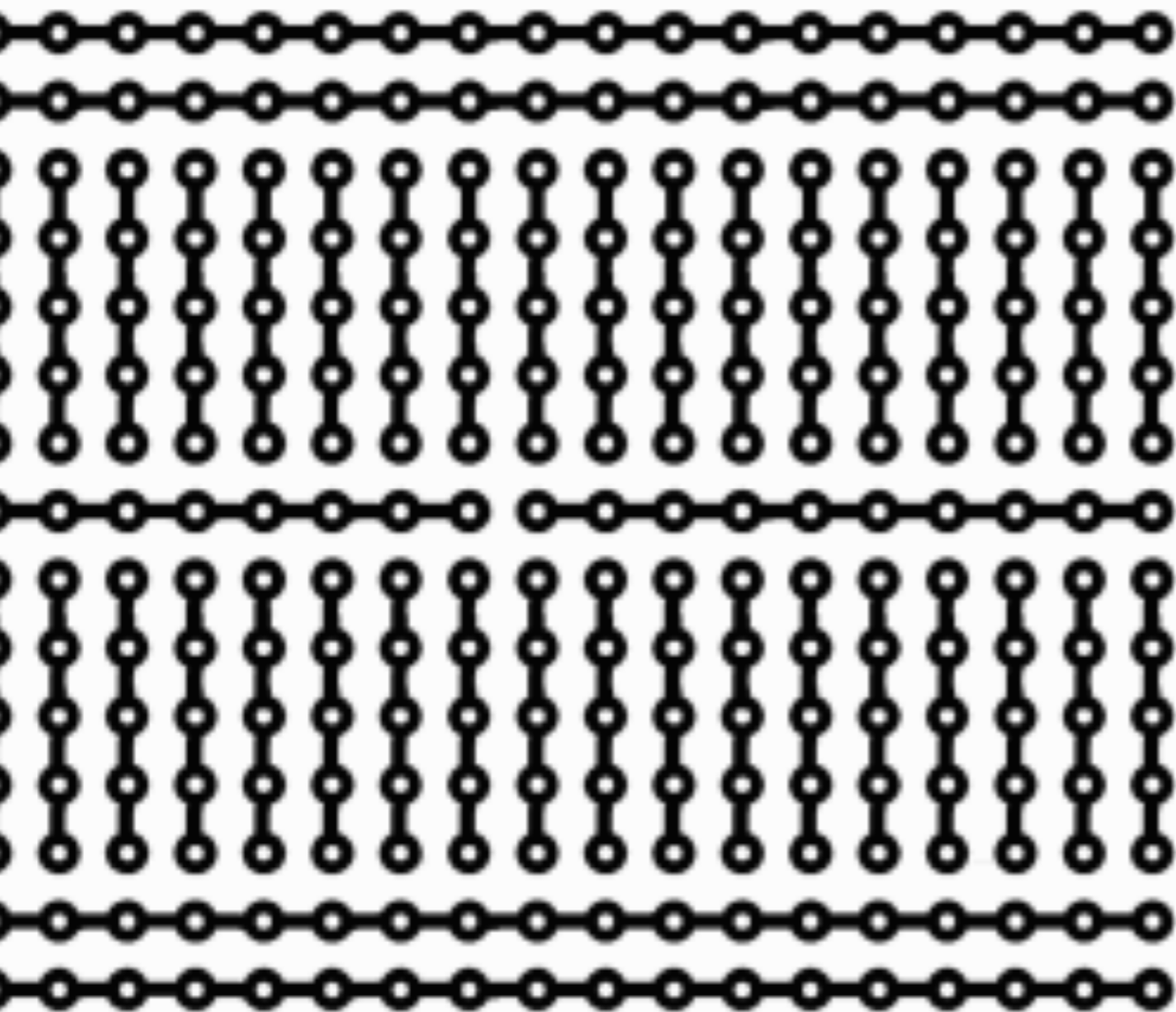
Limiting current

- Most components have a maximum current rating
- Typical LED:
 - Voltage drop: 1.8V
 - Max current: 20 mA
- If supply voltage is +5V
 - The voltage across R1 = $5 - 1.8 = 3.2\text{V}$
 - Dividing voltage by resistance gives current:
 - $3.2\text{ V} / 220\text{ ohm} = 0.015\text{ A} = 15\text{ mA}$
 - 15 mA is well below 20 mA



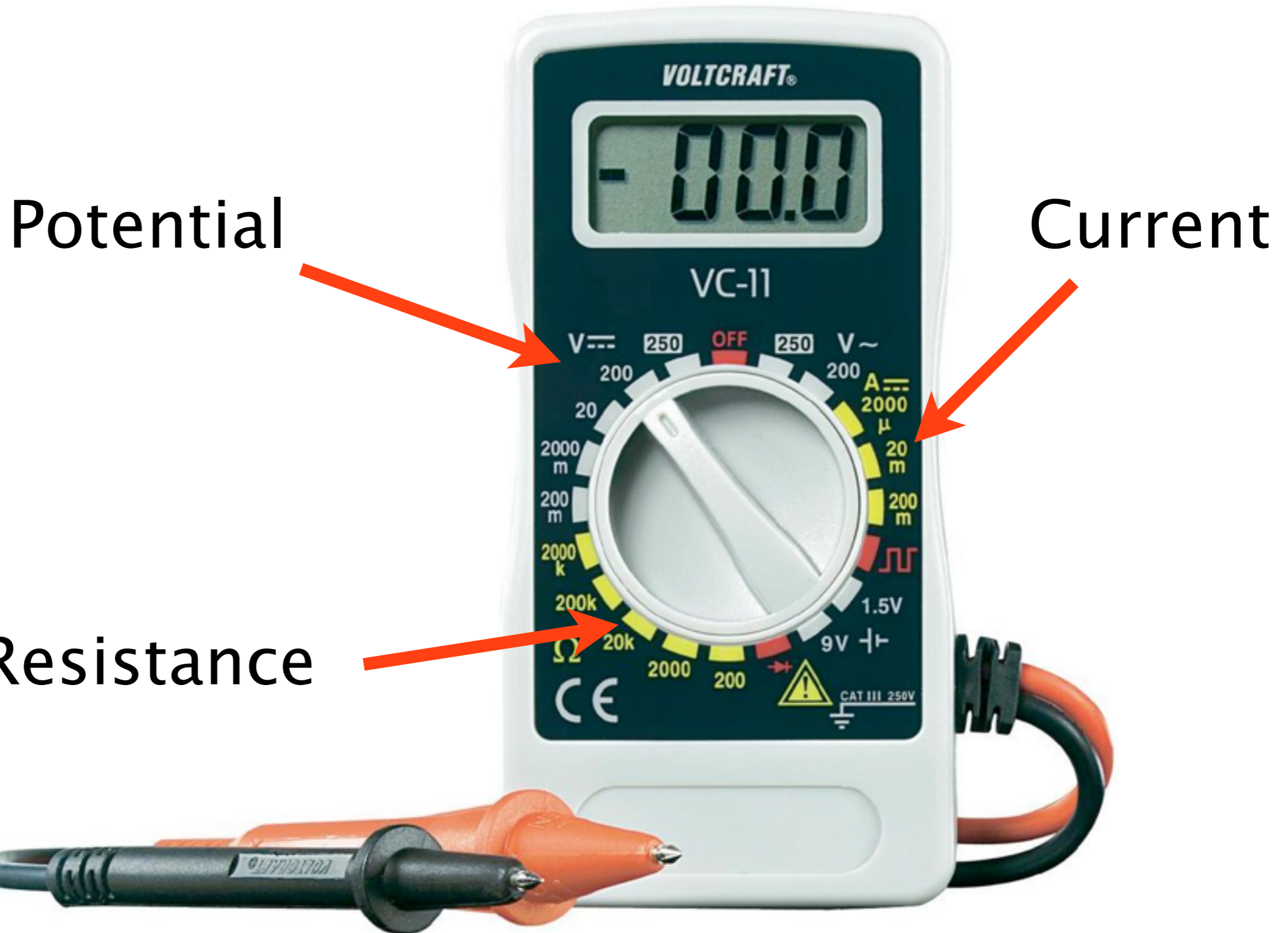


Breadboard





Measuring



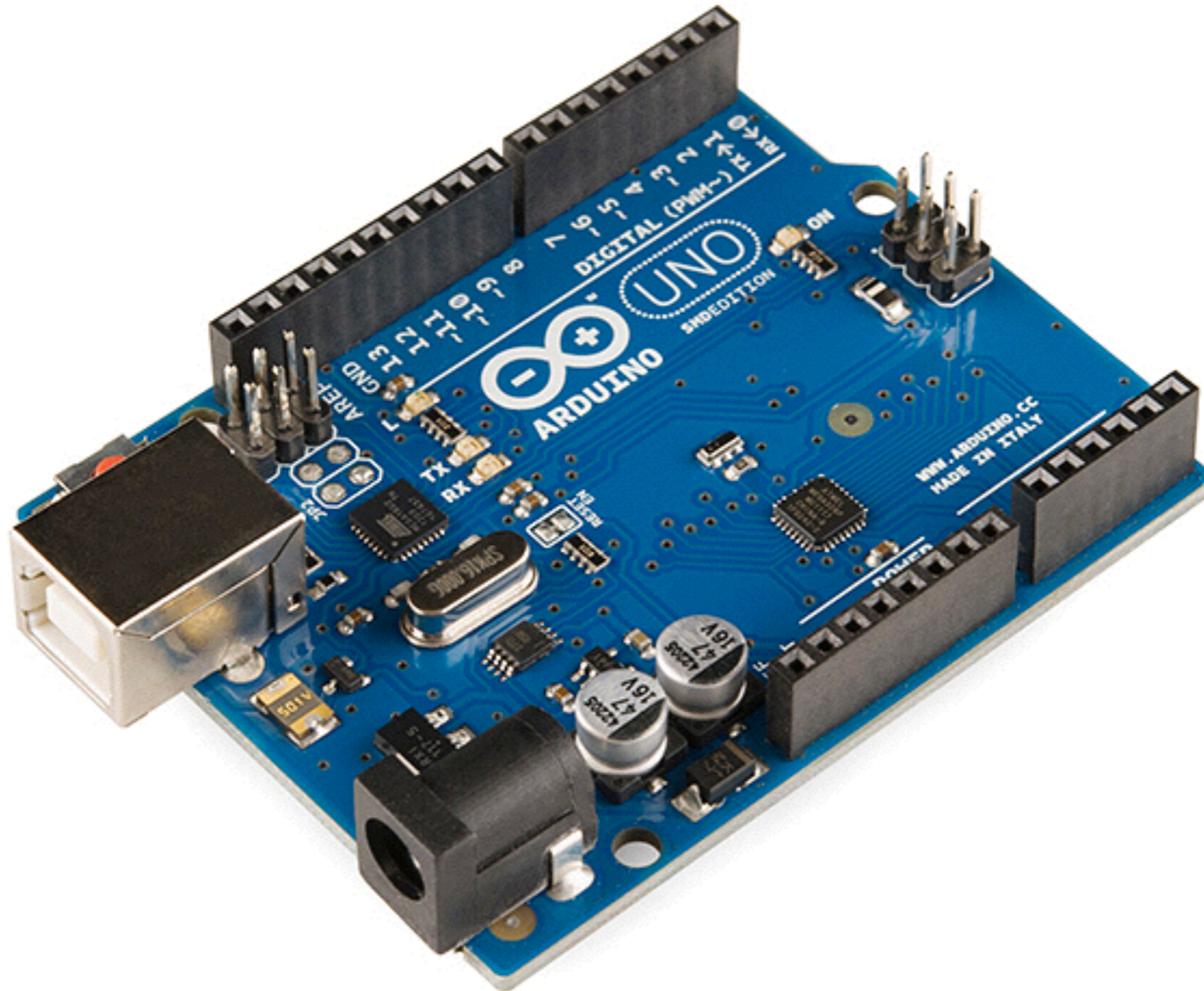
Potential

Current

Resistance

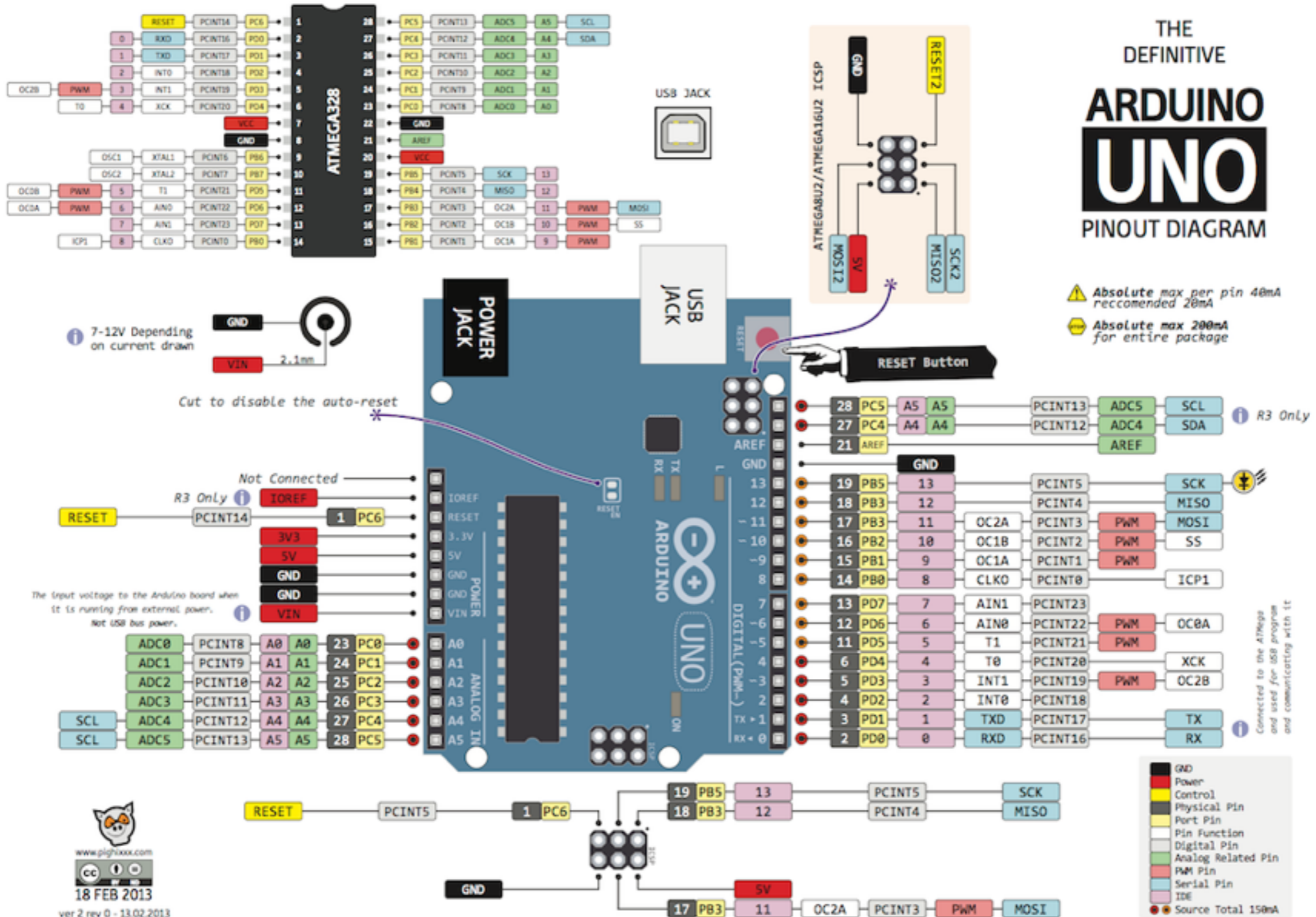


Arduino





Arduino is Open Source





Programming

- Arduino IDE
- Setup() function
- Loop() function

A screenshot of the Arduino IDE interface. The window title is "sketch_feb04a | Arduino 1.5.8". The main editor area shows the following code:

```
void setup() {  
  // put your setup code here, to run once:  
  
}  
  
void loop() {  
  // put your main code here, to run repeatedly:  
  
}
```

The IDE has a teal header bar with icons for check, run, file, upload, and download. A tab labeled "sketch_feb04a" is visible. At the bottom, there is a status bar showing "2" on the left and "Arduino Uno on /dev/cu.usbserial-AM01VCF6" on the right.



Programming

Blinking an LED

- pinMode()
- digitalWrite()
- delay()

```
Blink | Arduino 1.5.8
Blink
/*
 * Blink
 * Turns on an LED on for one second, then off for one second, repeatedly.
 *
 * Most Arduinos have an on-board LED you can control. On the Uno and
 * Leonardo, it is attached to digital pin 13. If you're unsure what
 * pin the on-board LED is connected to on your Arduino model, check
 * the documentation at http://arduino.cc
 *
 * This example code is in the public domain.
 *
 * modified 8 May 2014
 * by Scott Fitzgerald
 */

// the setup function runs once when you press reset or power the board
void setup() {
  // initialize digital pin 13 as an output.
  pinMode(13, OUTPUT);
}

// the loop function runs over and over again forever
void loop() {
  digitalWrite(13, HIGH); // turn the LED on (HIGH is the voltage level)
  delay(1000);            // wait for a second
  digitalWrite(13, LOW); // turn the LED off by making the voltage LOW
  delay(1000);           // wait for a second
}

16 Arduino Uno on /dev/cu.usbserial-AM01VCF6
```



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Soldering



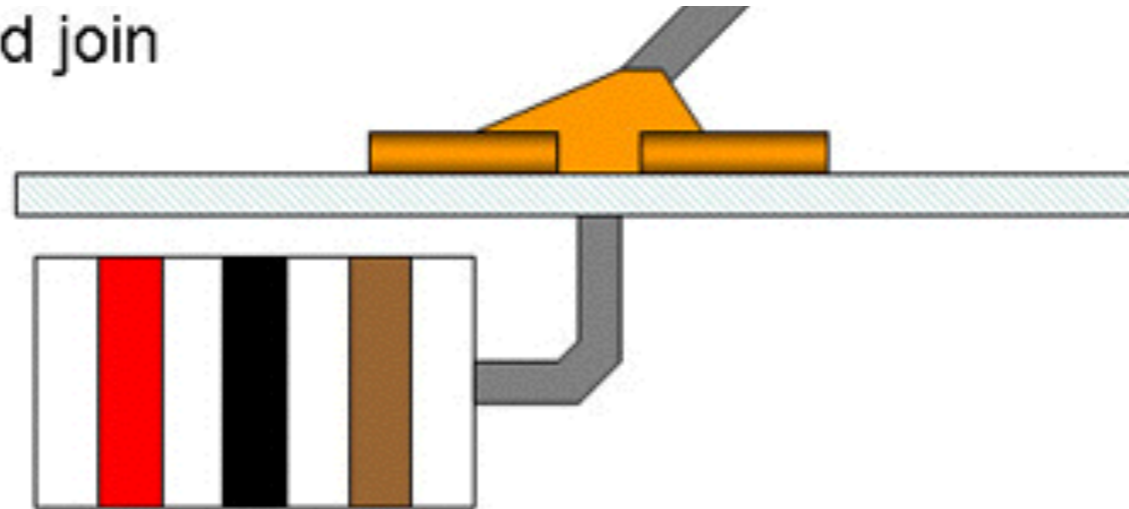
Soldering Iron – 350 C



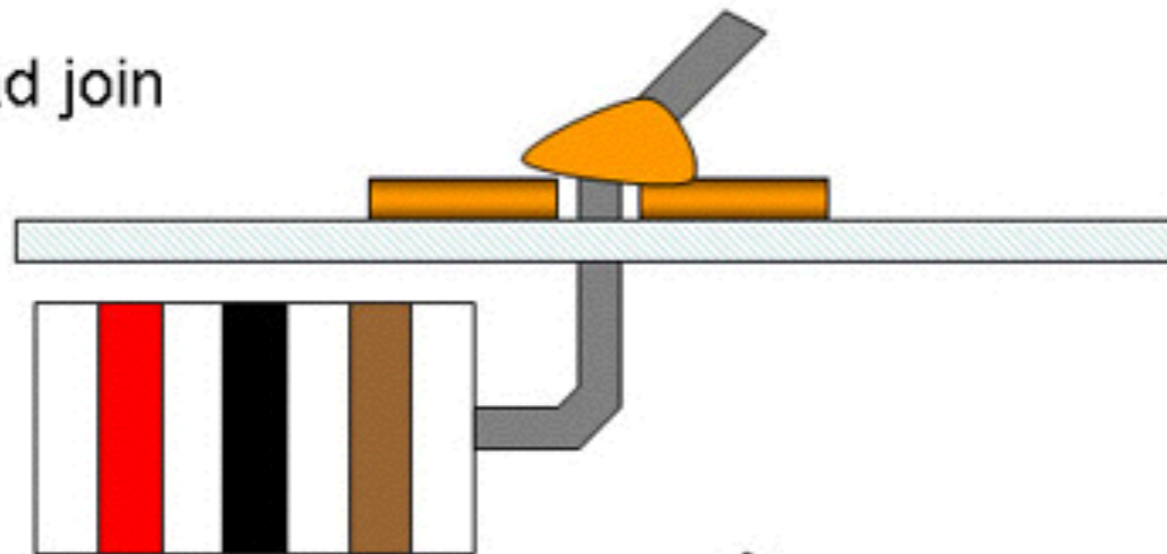


Soldering is easy

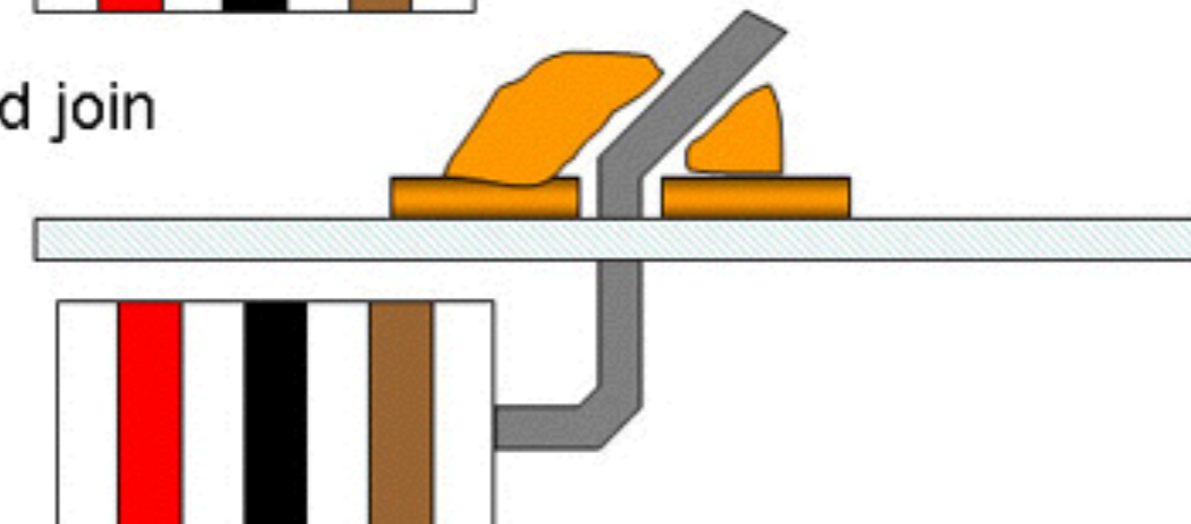
Good join



Bad join



Bad join





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Electrical Safety



Remember what your mother told you

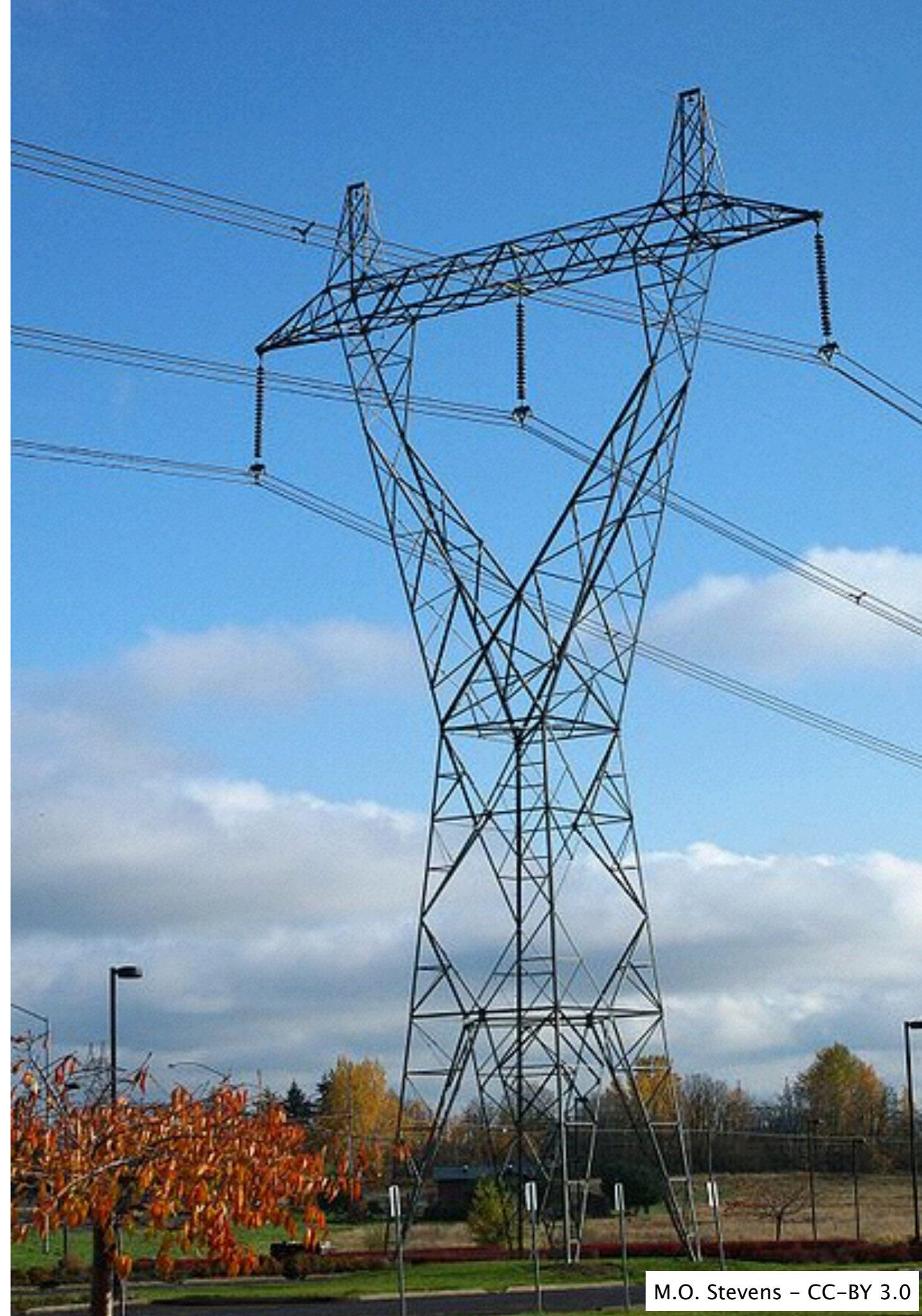


220 VOLTS



Dangers:

- High voltage
- Low resistance
=
- High Current
- Make use of isolation!
- Better safe than sorry!





some

rights

reserved