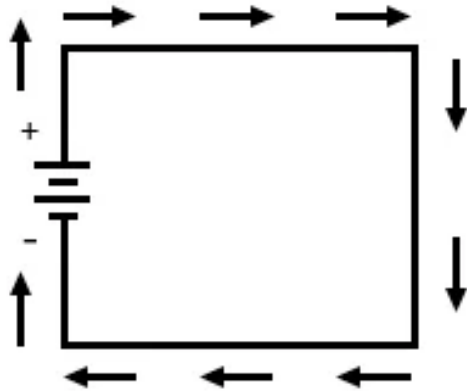# Intro to Electronics
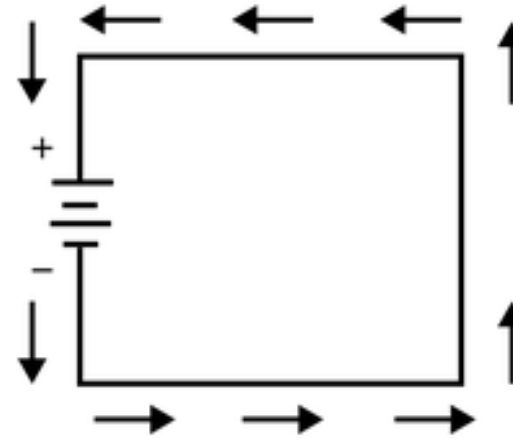
Conventional Flow Notation

Electric charge moves from the positive (surplus) side of the battery to the negative (deficiency) side.

Electron Flow Notation

Electron charge moves from the negative (surplus) side of the battery to the positive (deficiency) side.

How it's notated
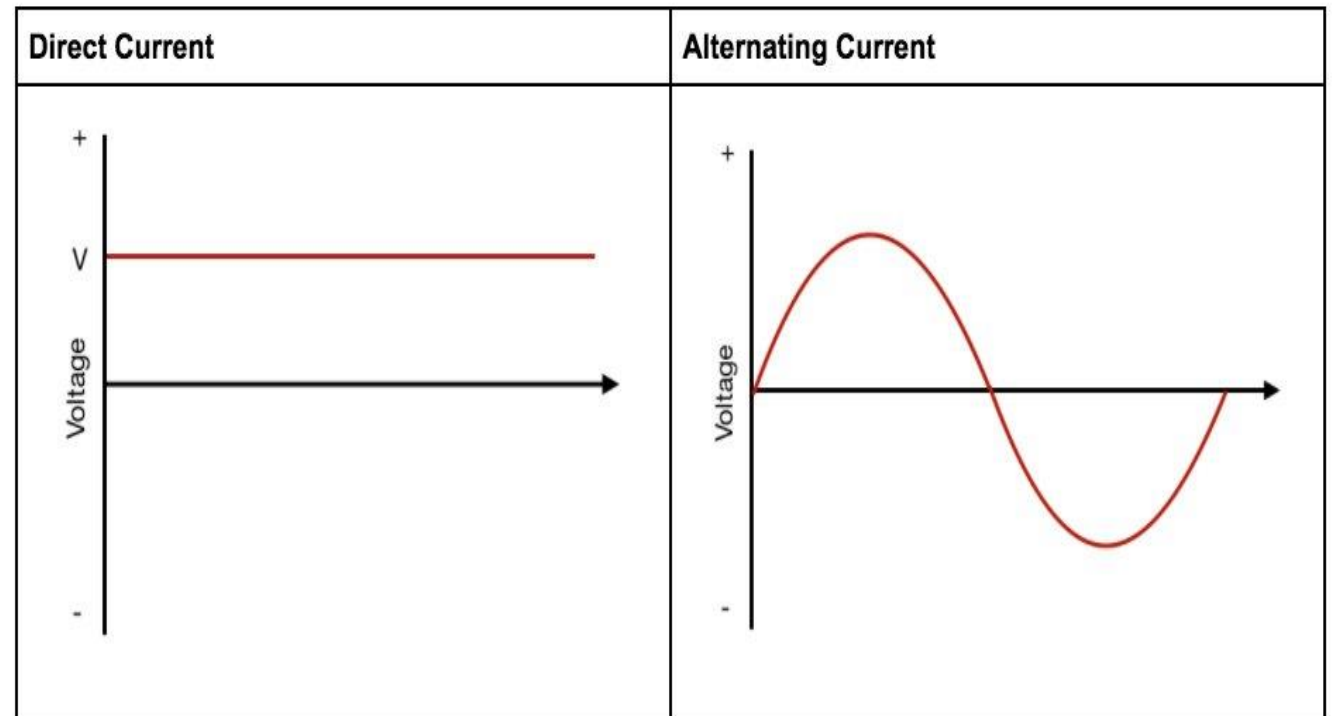
How it actually is

Electrons

https://www.allaboutcircuits.com/textbook/direct-current/chpt-1/conventional-versus-electron-flow/

AC / DC

Direct current for lower voltages and running circuit boards

Alternating for higher power: appliances, tube amps, etc.

Some circuits use a rectifier circuit to change AC to DC

Ohm's Law
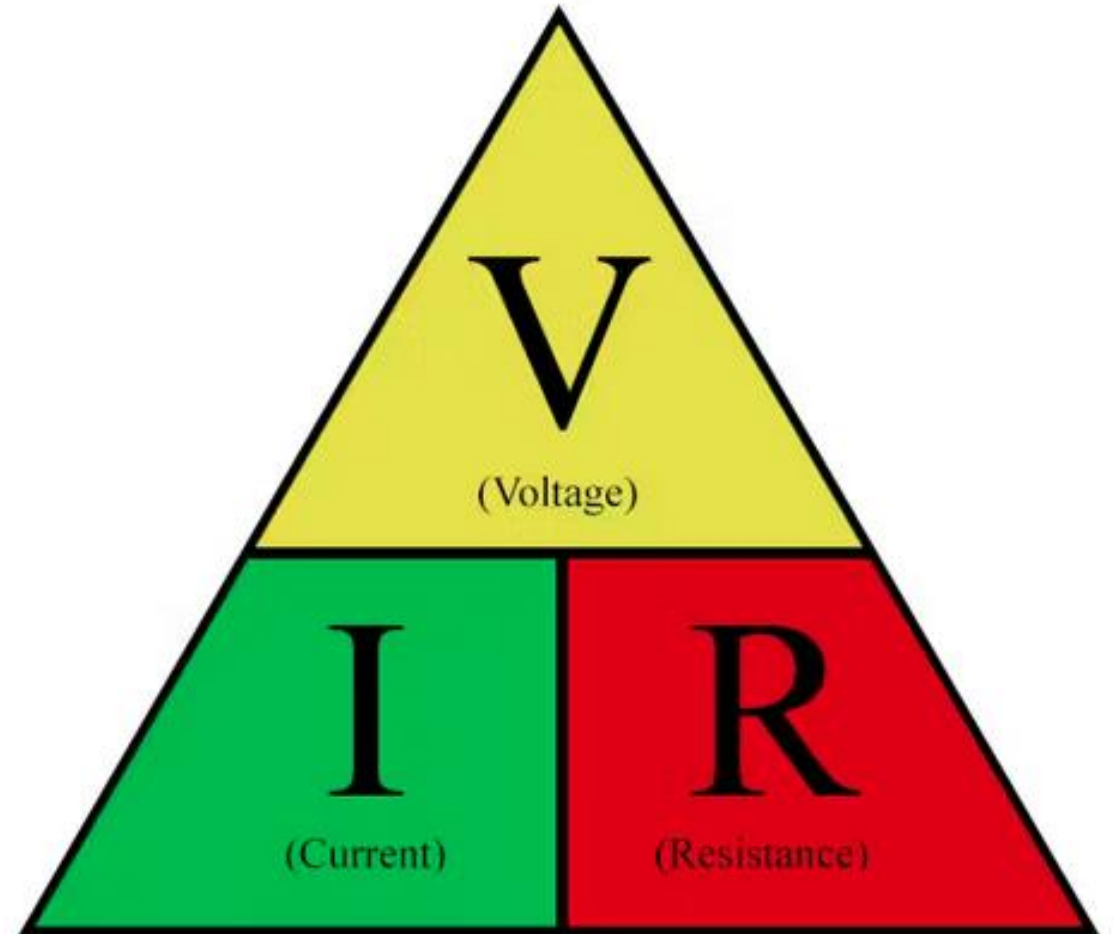
V = I*R

voltage = current * resistance

voltage = volts

current = amperes (amps)

resistance = ohms

Voltage is the pressure from an electrical circuit's power source that pushes charged electrons (current) through a conducting loop
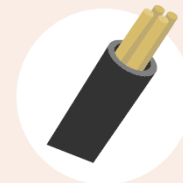
https://www.fluke.com/en-us/learn/blog/electrical/what-is-voltage

Conductors & Insulators

5 Electrical Conductors

silver   gold   copper   steel   sea water

5 Electrical Insulators
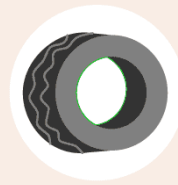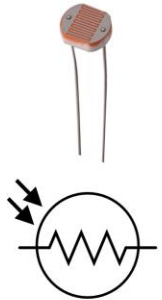
rubber   glass   oil   diamond   dry wood

ThoughtCo.

Resistor

Diode

Capacitors

Light Emitting Diode (LED)

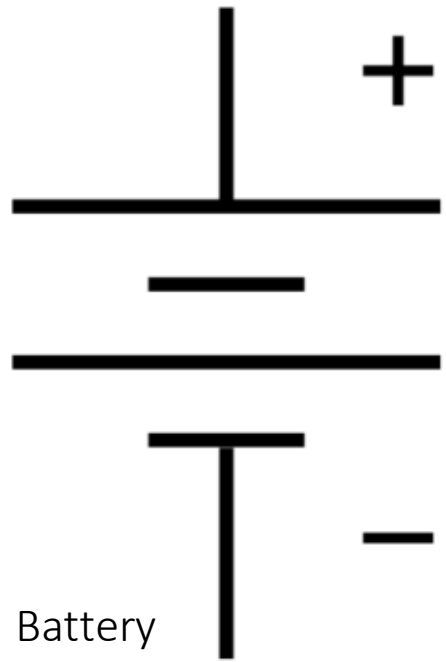| PHOTOCELL (light-dependent resistor) | RHEOSTAT (two-leg variable resistor) | FORCE-SENSITIVE RESISTOR (aka FSR; two-leg var resistor) | THERMISTOR RESISTOR (two-leg variable resistor) | ROTARY POTENTIOMETER (three-leg variable resistor) | SLIDE POTENTIOMETER (three-leg variable resistor) |

Some Electronics Parts
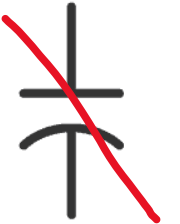(… are polarized, some are not)

Battery

Resistor (2 symbols)

diode

light emitting diode

Non-polarized Capacitor

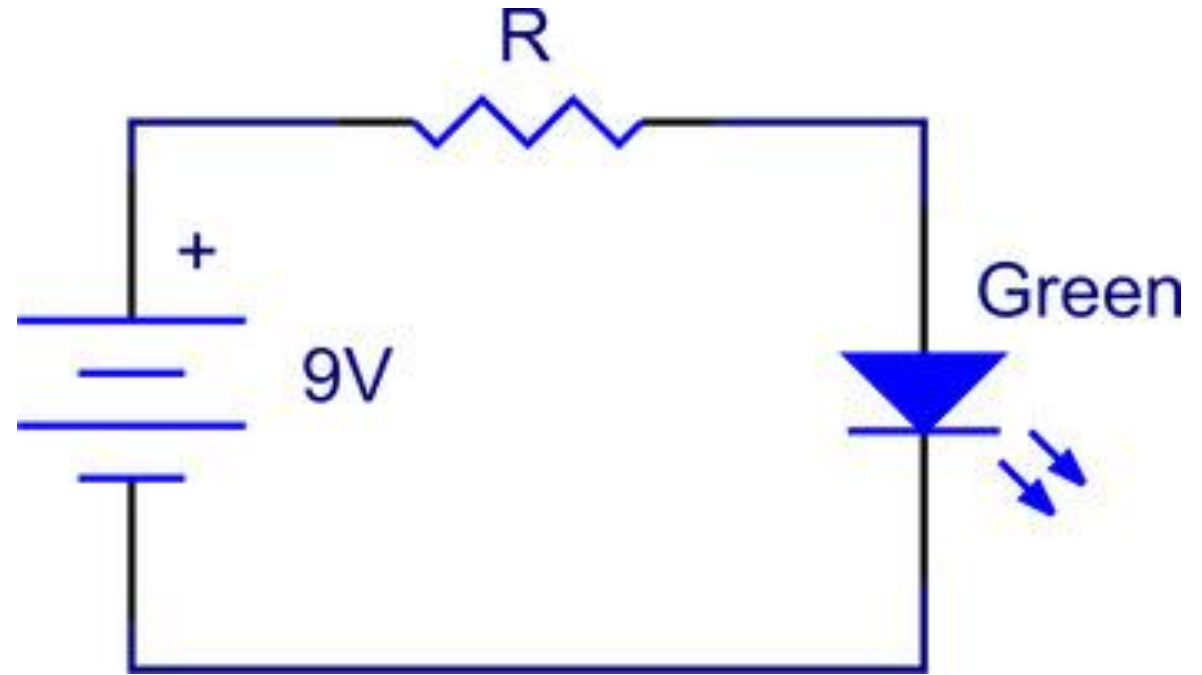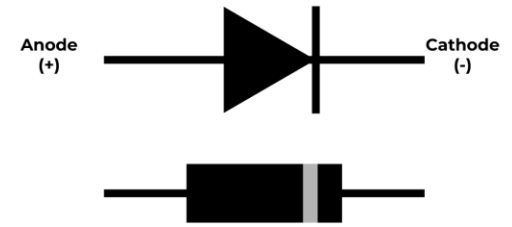Polarized Capacitor

Some Schematic Symbols

Ground

Schematics, In General

Hint:

Anode (+) ——▷|—— **Cathode (-)**

R

+
9V

Green

Tells you what is connected to what

But how to lay out the circuit on your breadboard is up to you

Series and Parallel

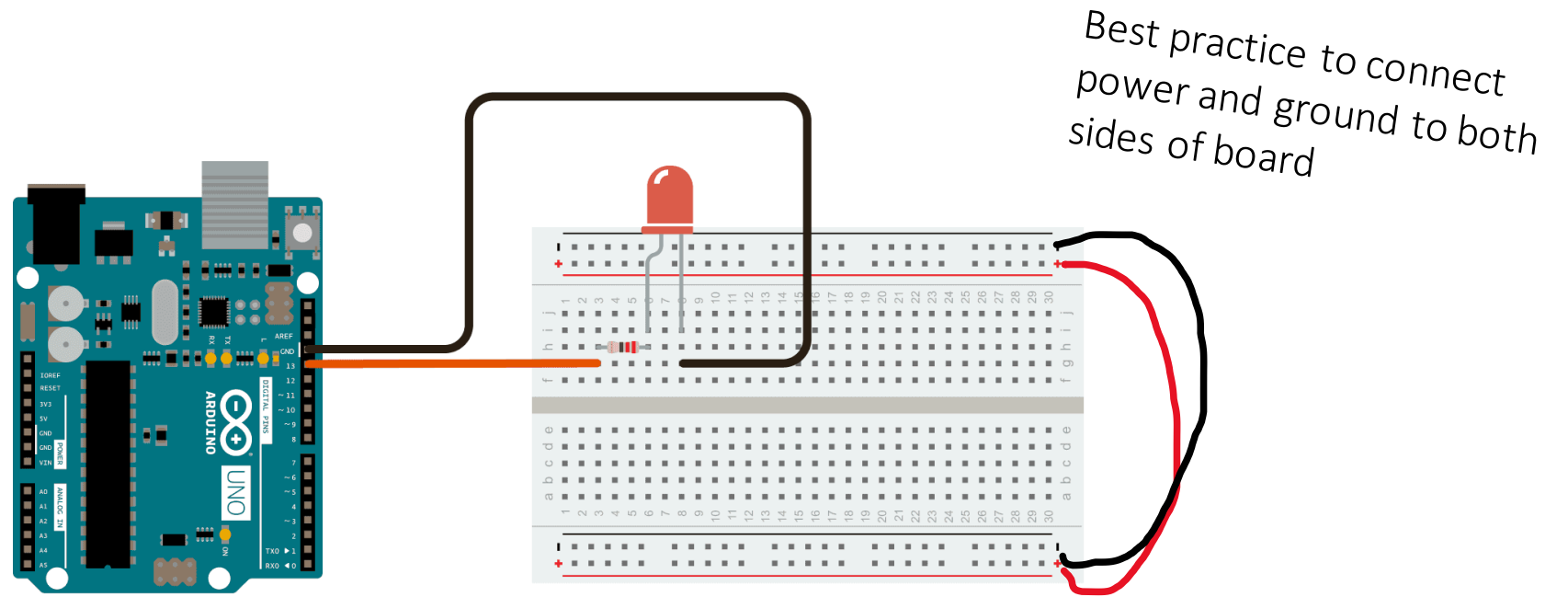Resistors: Series sums
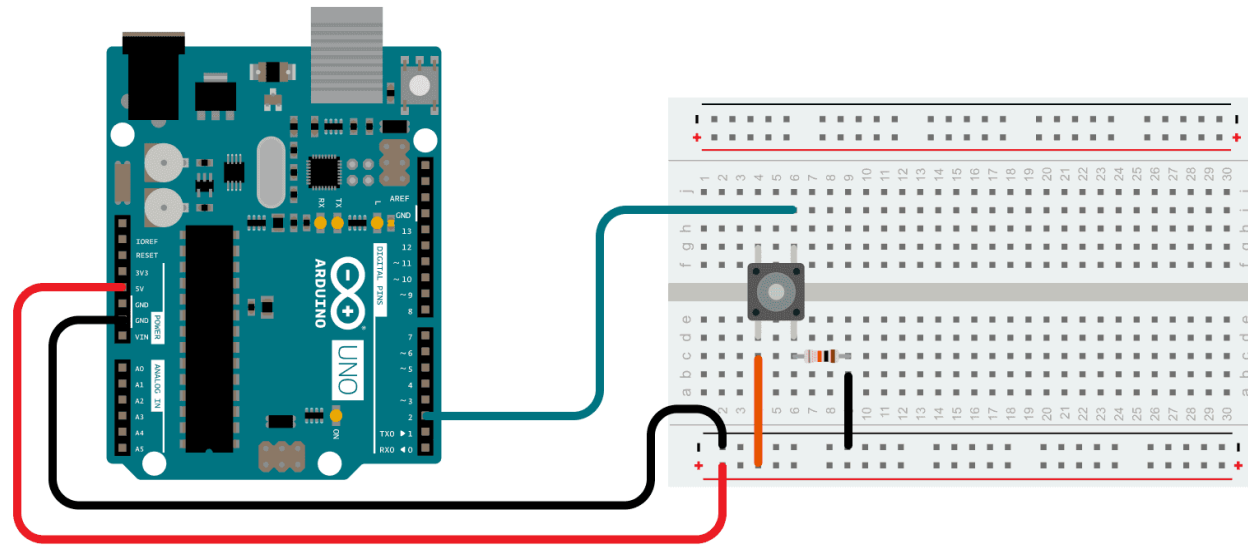
Capacitors: Parallel sums

Otherwise, it's:

https://learn.sparkfun.com/tutorials/capacitors/capacitors-in-seriesparallel
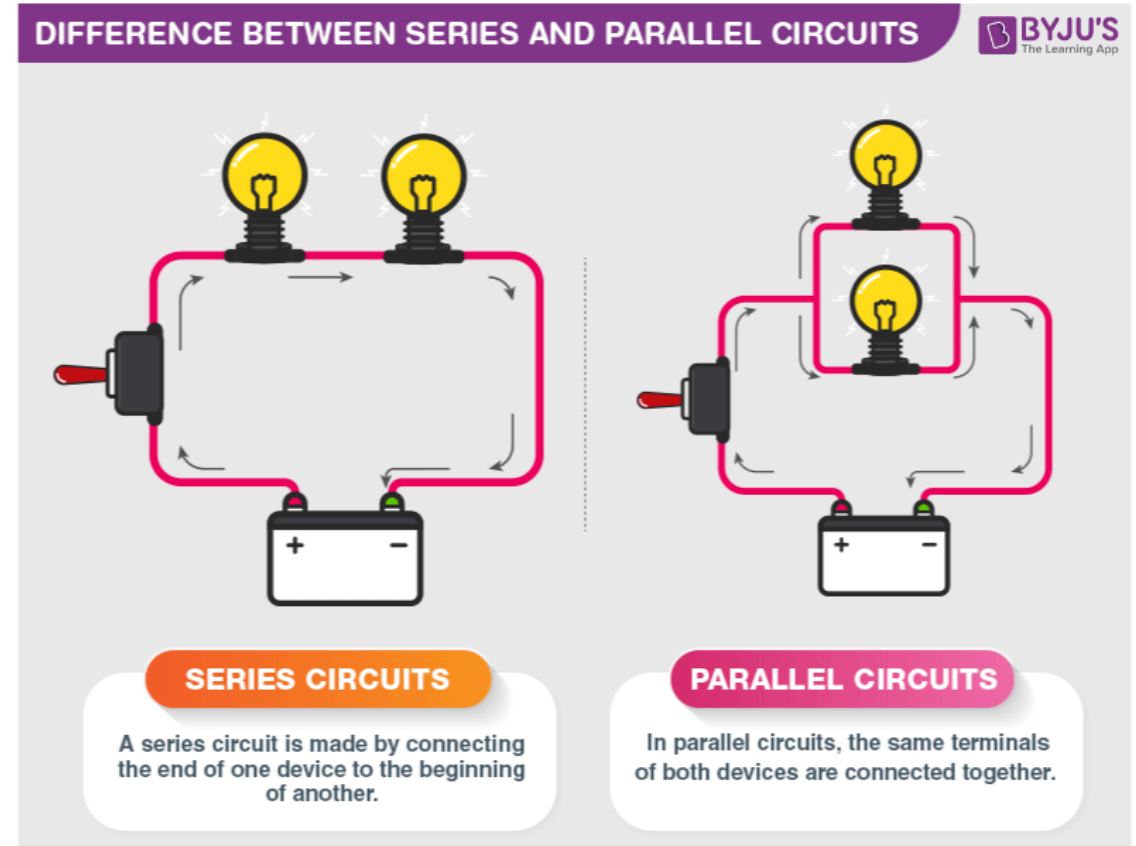
Arduino : Digital I/O

Buttons and on/off signals

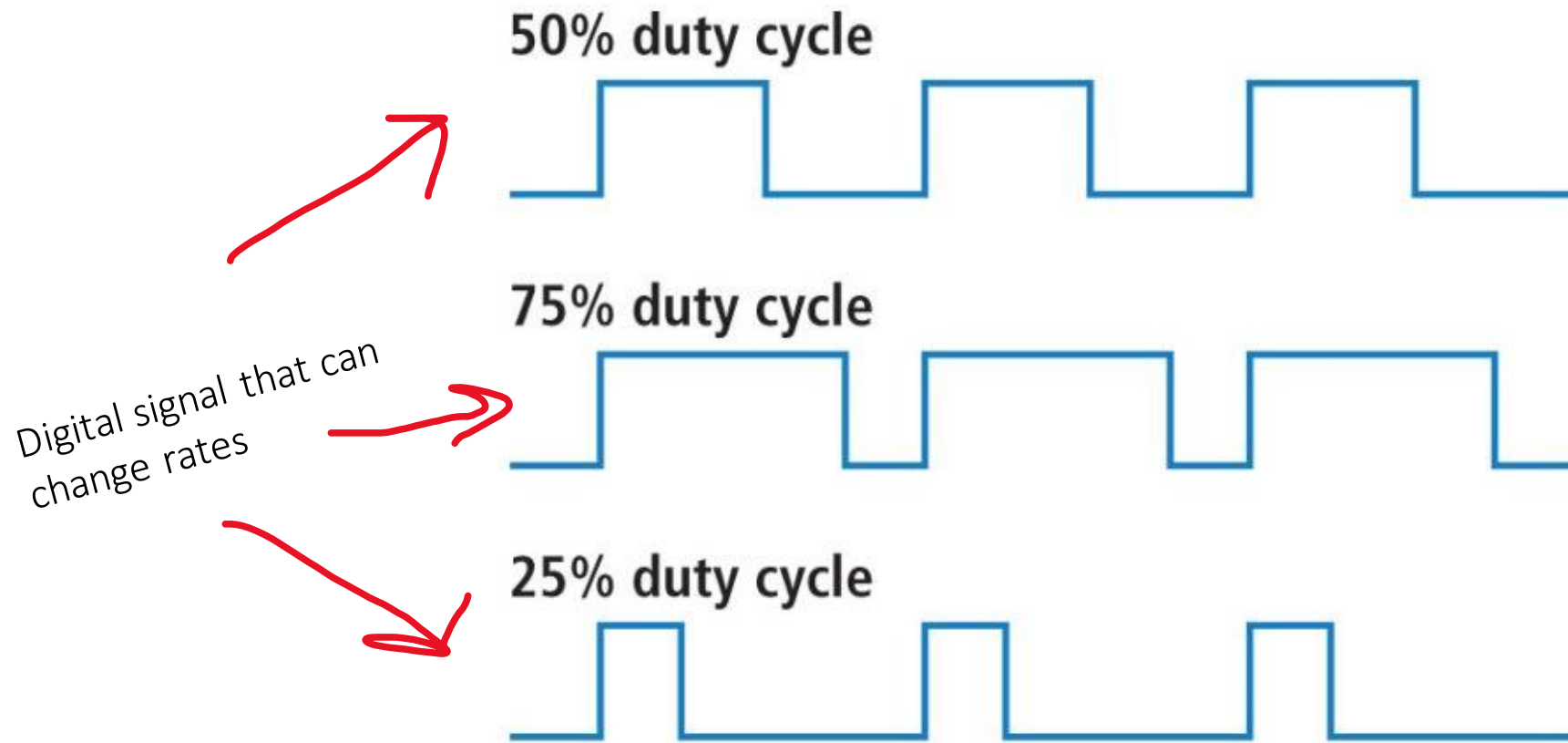Best practice to connect power and ground to both sides of board

Arduino LED Wiring

Arduino Button Wiring

Analog I/O and PWM

Serial read and mapping

50% duty cycle

75% duty cycle

Digital signal that can change rates

25% duty cycle

Pulse Width Modulation

PWM pin ~

ArduinoGetStarted.com

220 Ω

Analog read pin
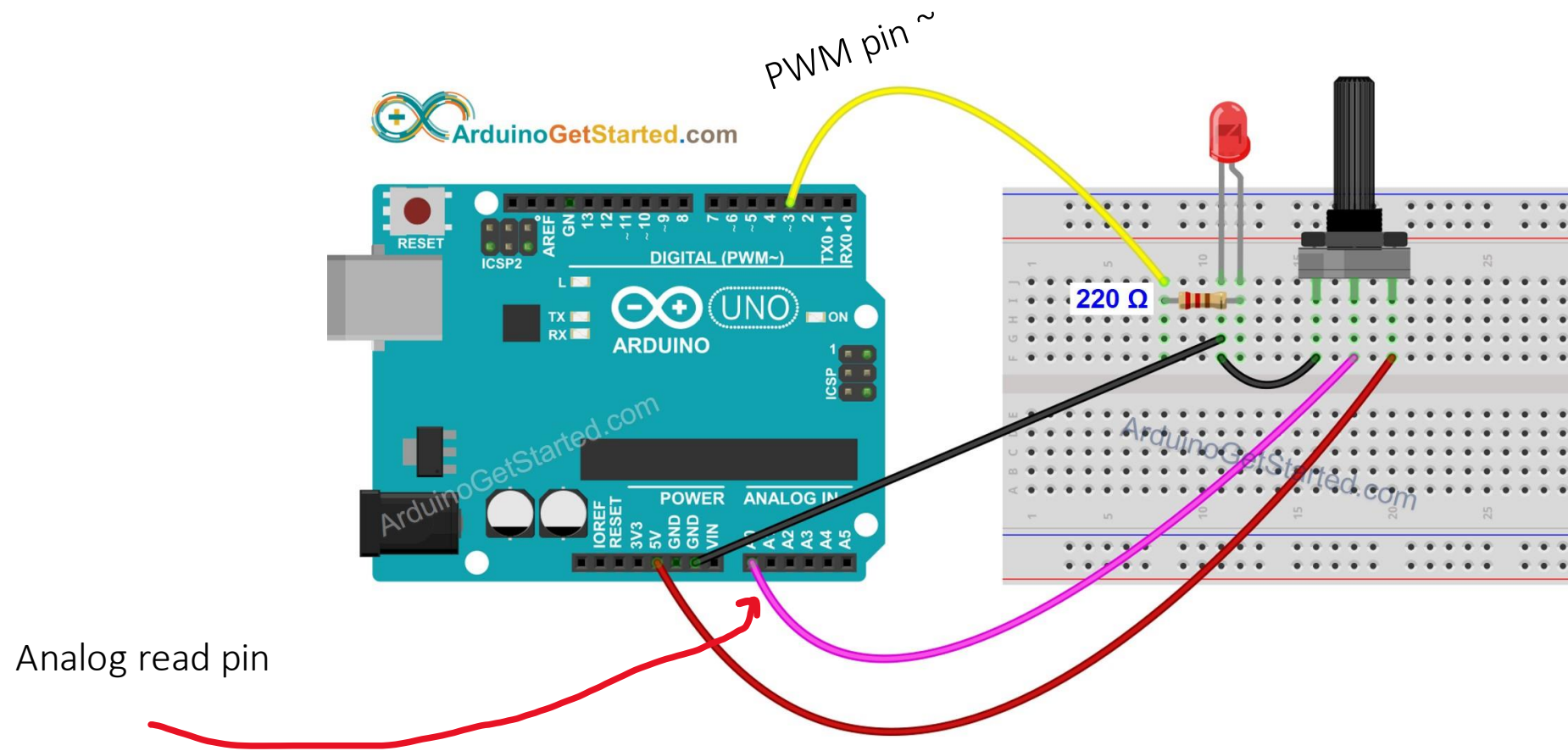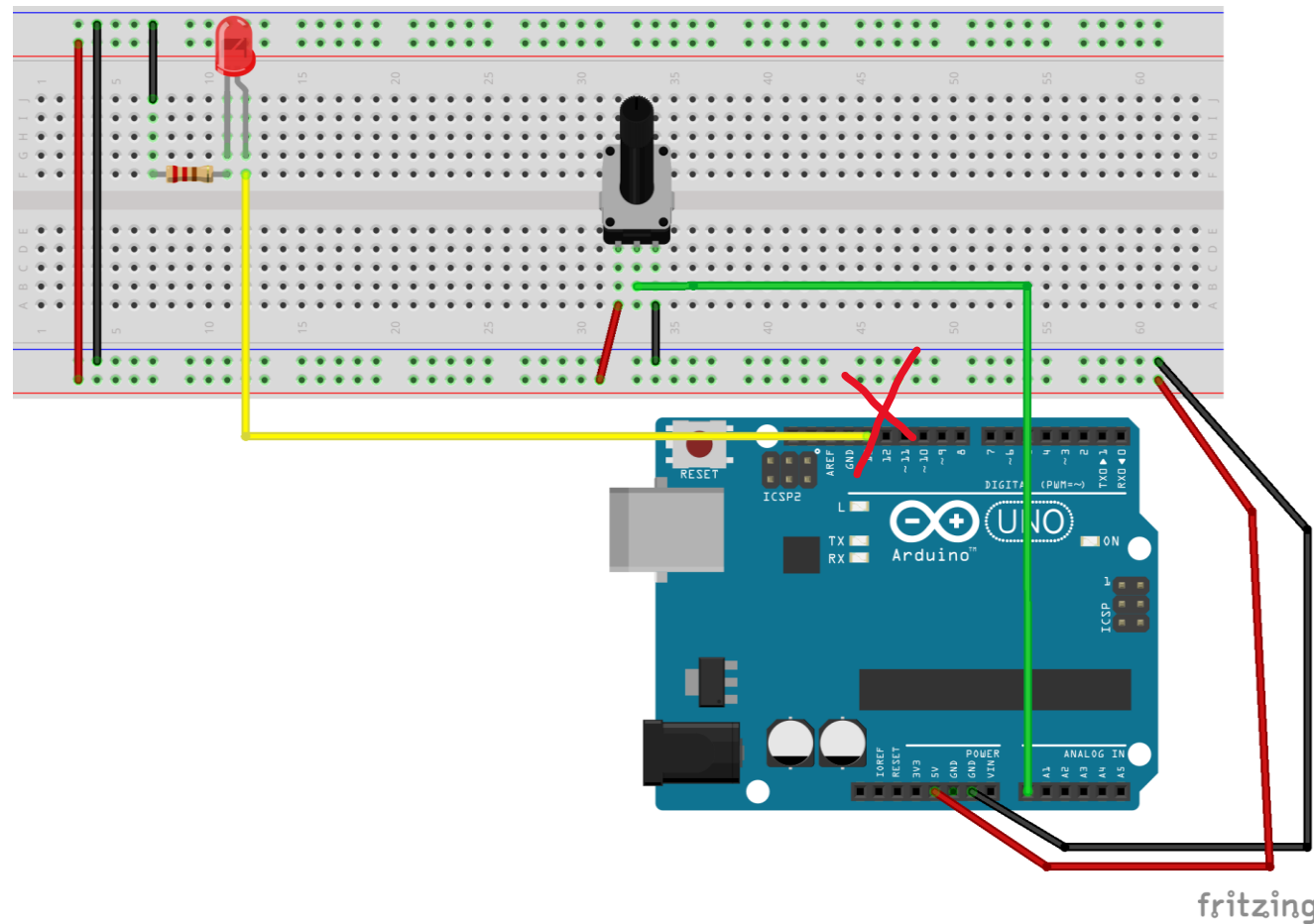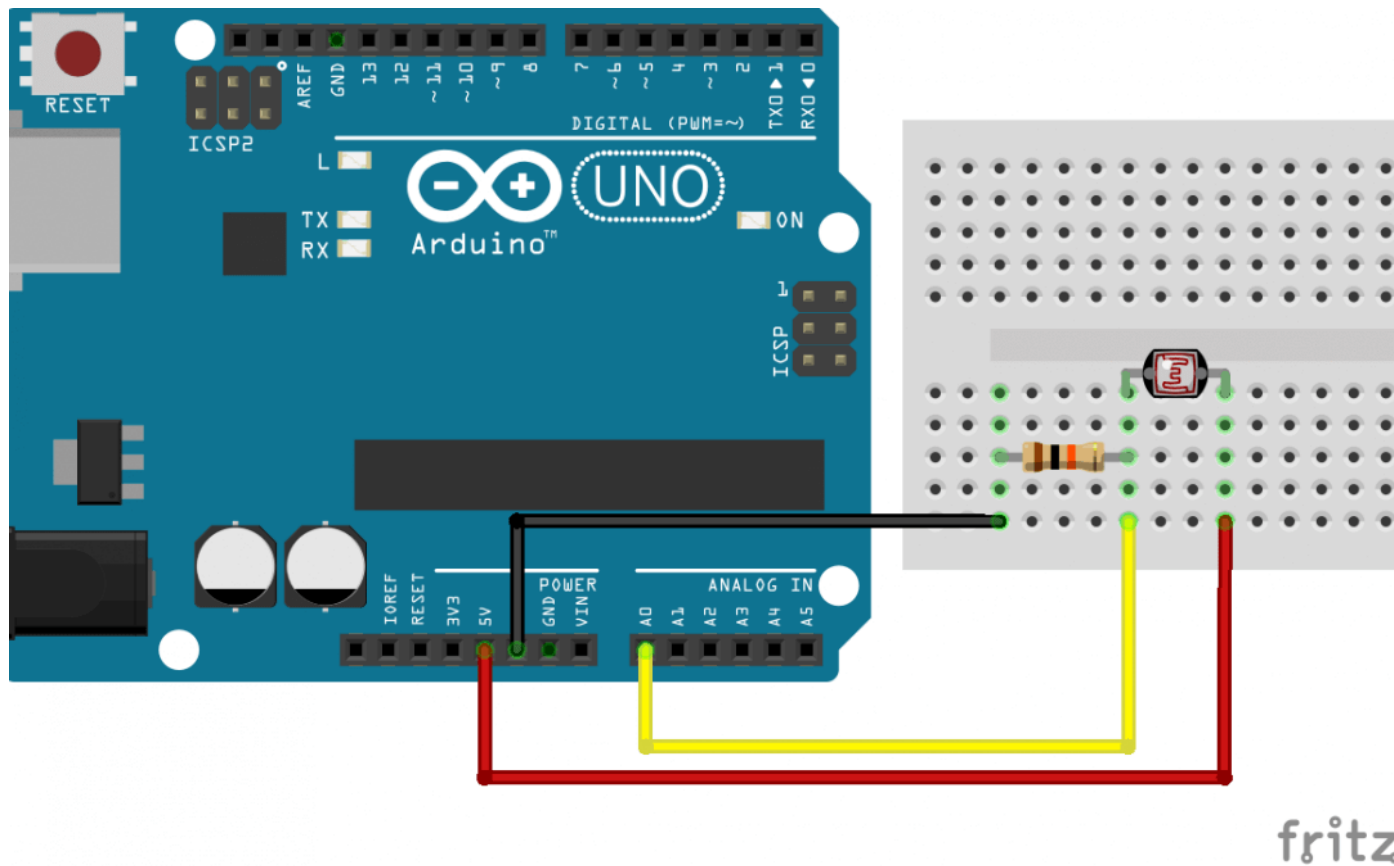
LED (PWM) and Knob (Analog)

Best practice to connect grounds to ground rail instead of to each other

Better Wiring, Pin 13 not PWM

fritzing

Create 3 pins to read middle pin

fritz

Light-dependent Resistor (Analog)