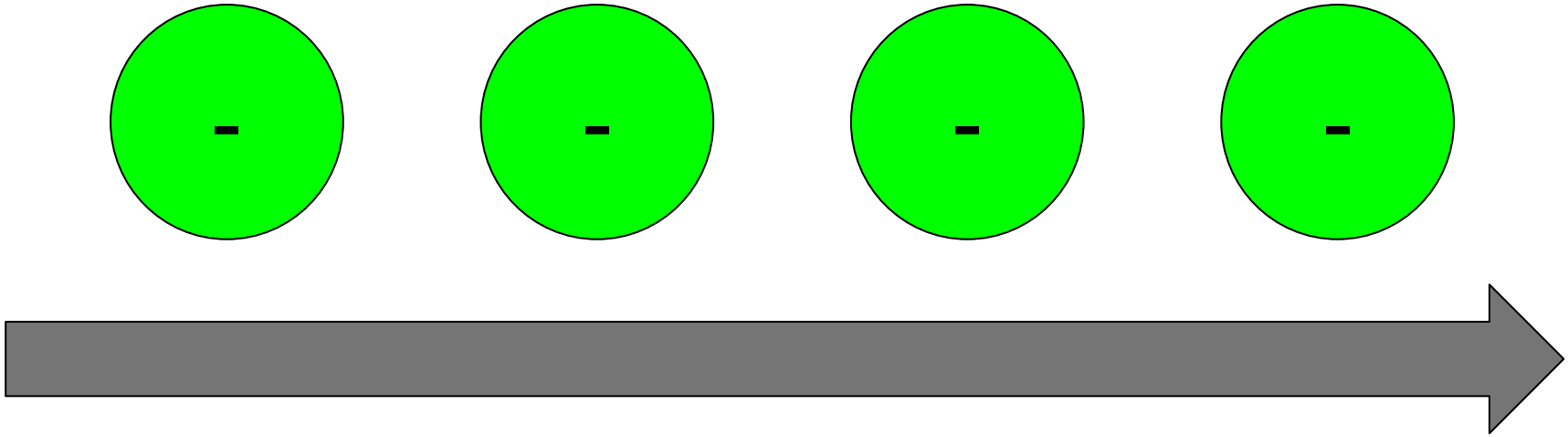
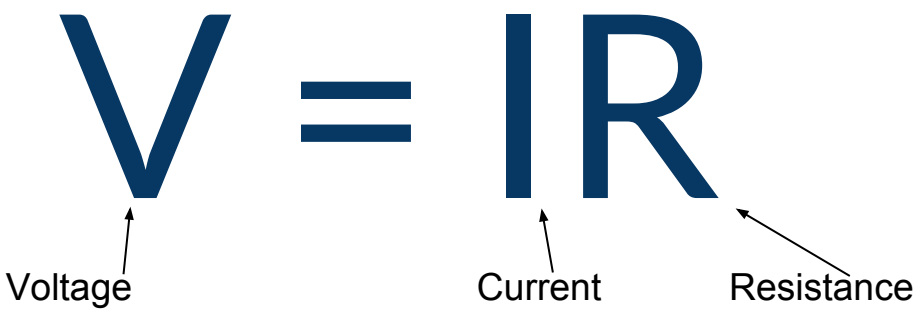
Introduction to Electronics

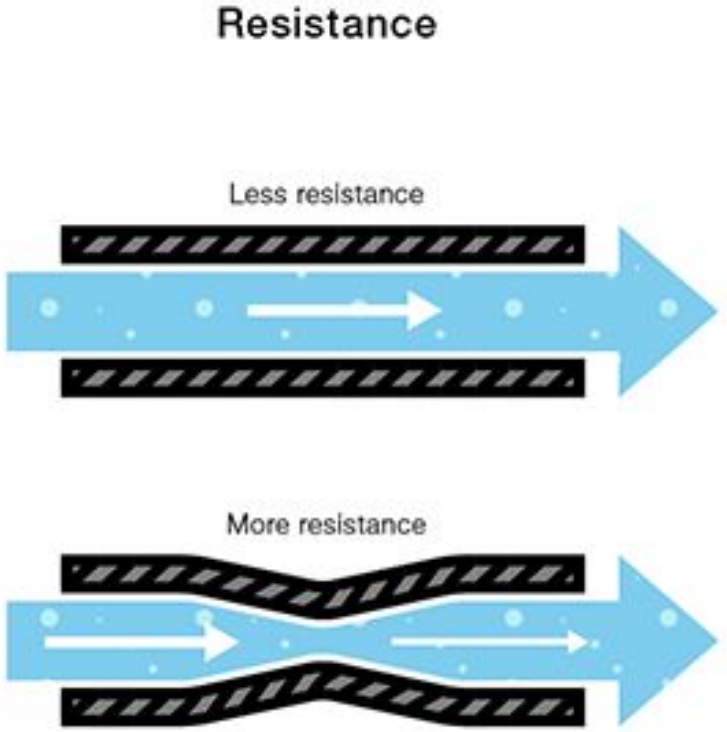
Circuits and Electricity



Ohm's Law or Your New Best Friend

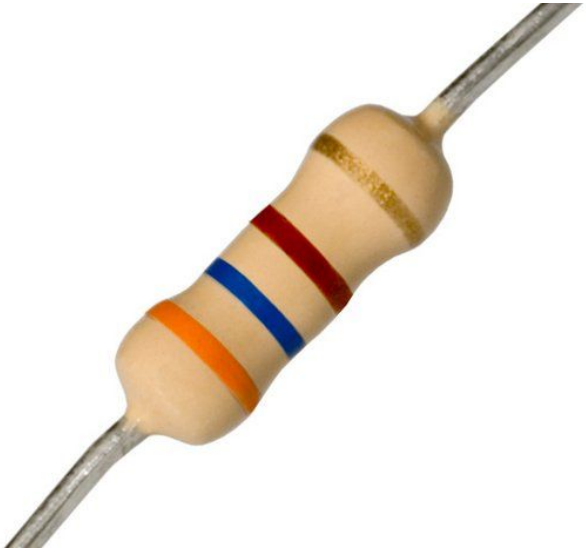


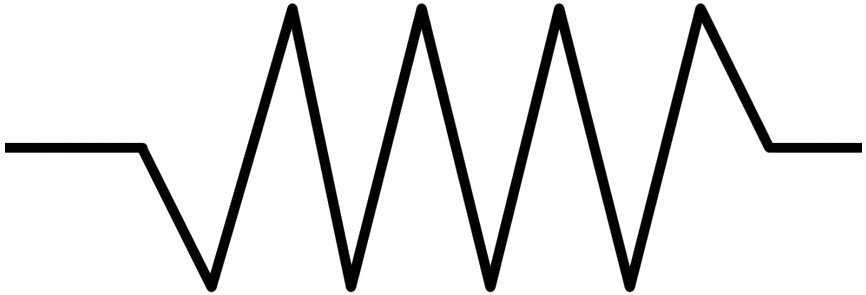
Resistance



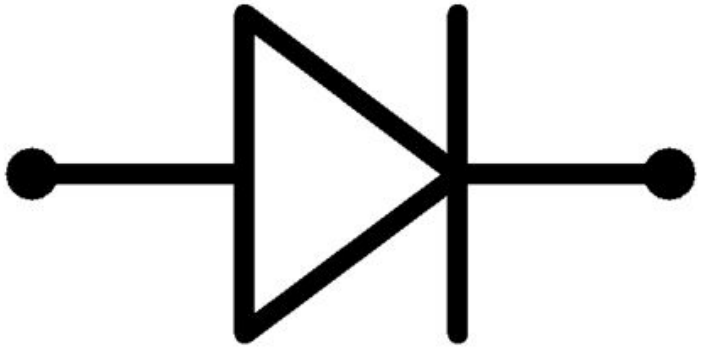
Water tank images from
SparkFun CC-BY-SA 4.0

Resistor

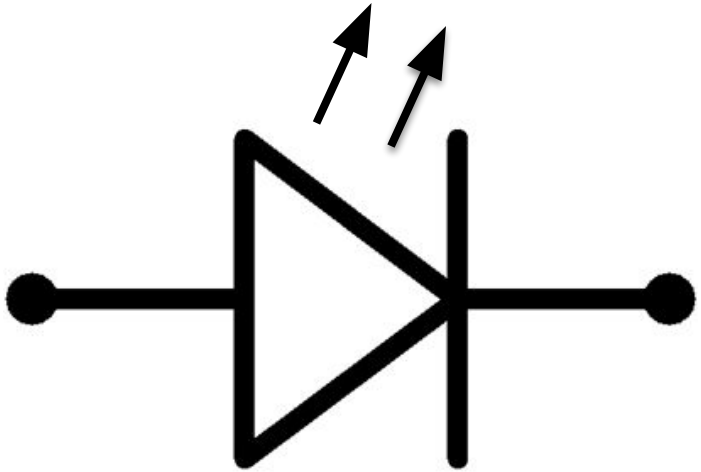




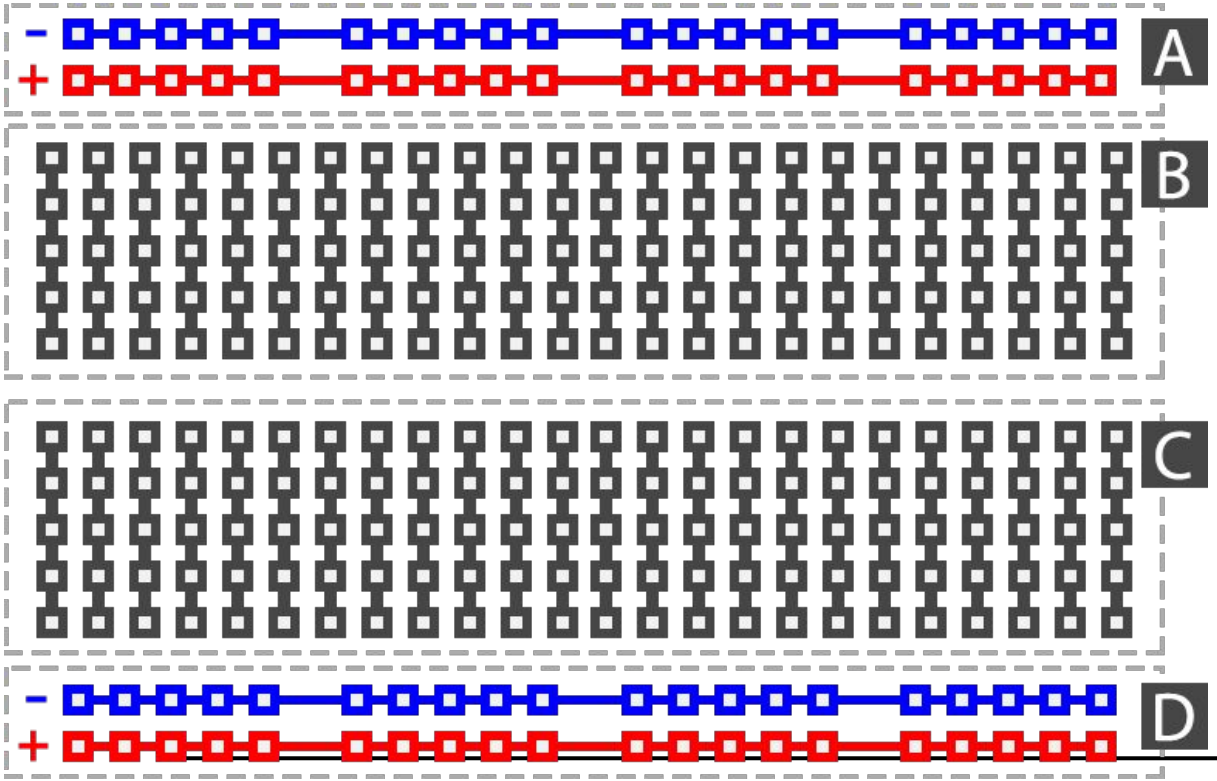
Diode



LED



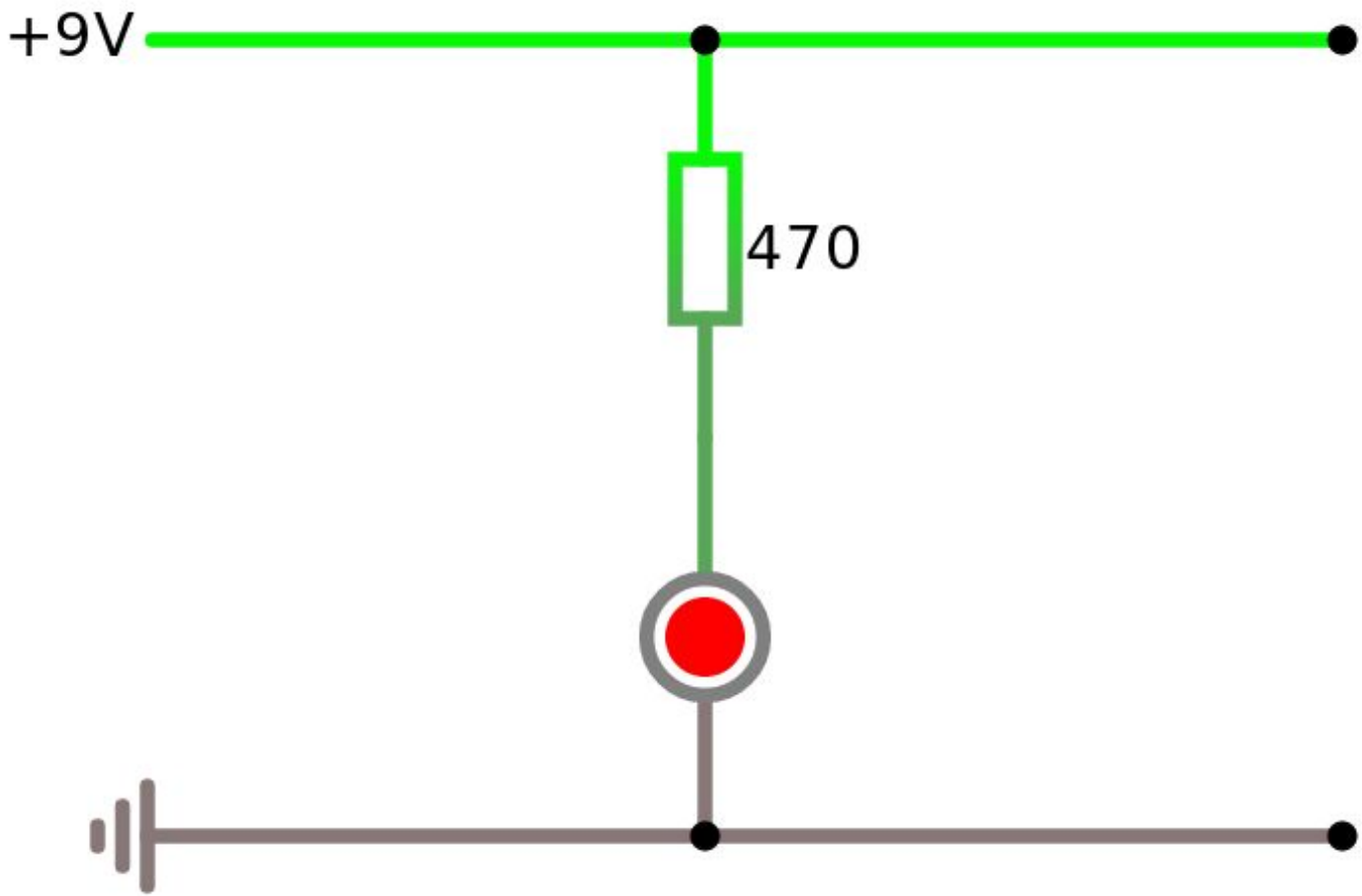
Breadboards

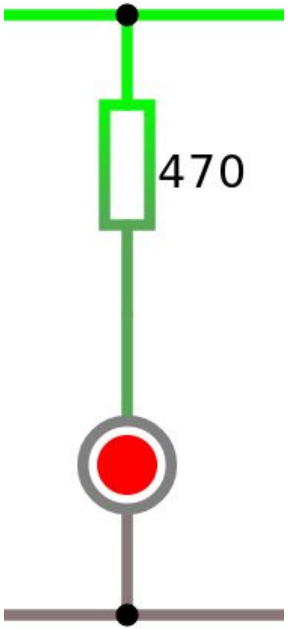


Circuit 1 - LED and resistor circuit

You will need:

- 1x 9V battery
- 1x battery clip
- 1x breadboard
- 1x 470ohm resistor
- 1x LED of any color
- jumper wires


+9V
470



9V across whole thing

2V across LED

9 - 2 = 7V across resistor

V = IR

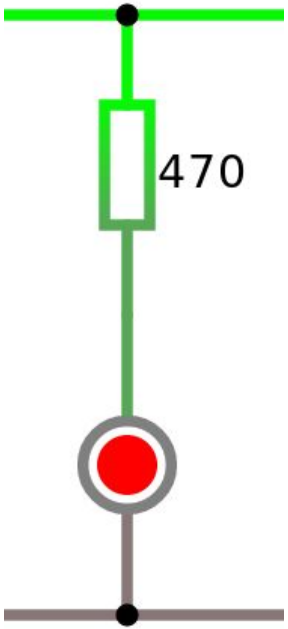
V = 7 I = 15mA

R = 466.6666666…..

Standard series of resistors

… 330, 390, 470, 560, 680…

Choose next one up



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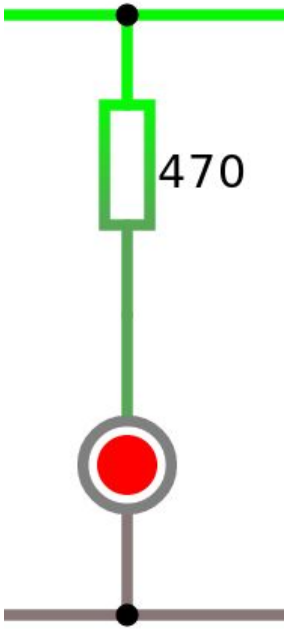

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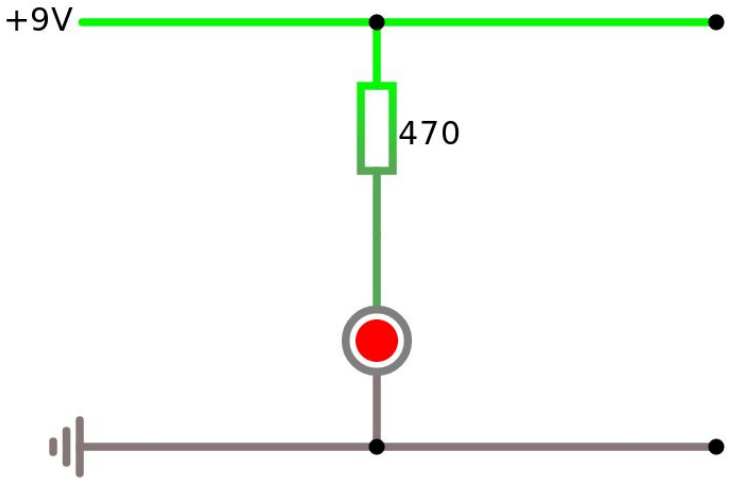
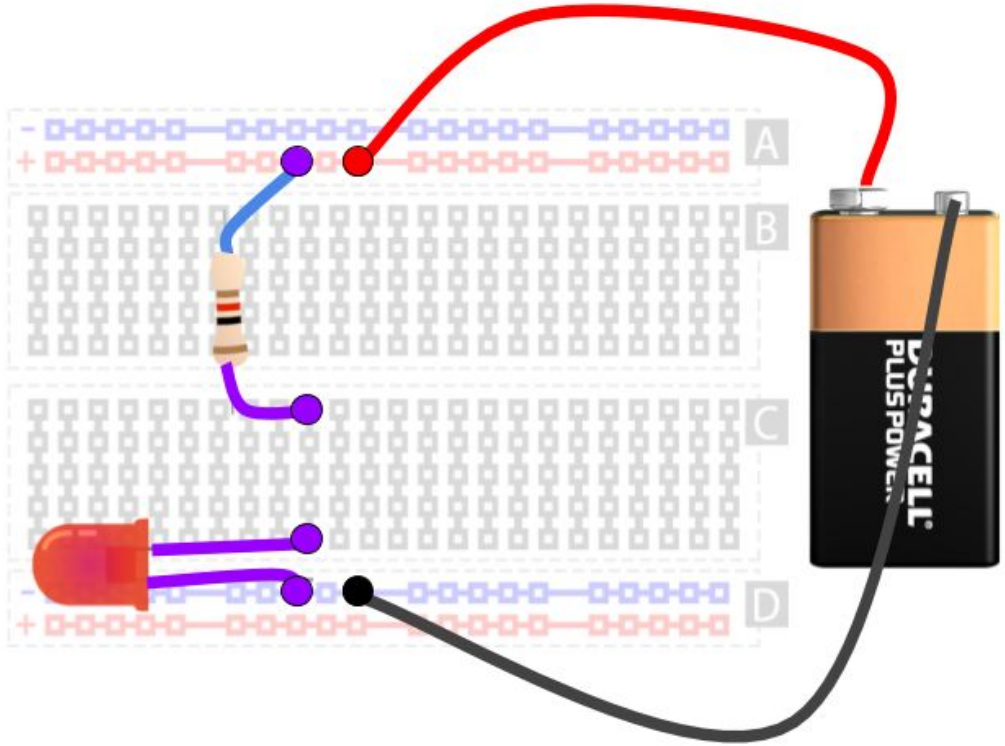
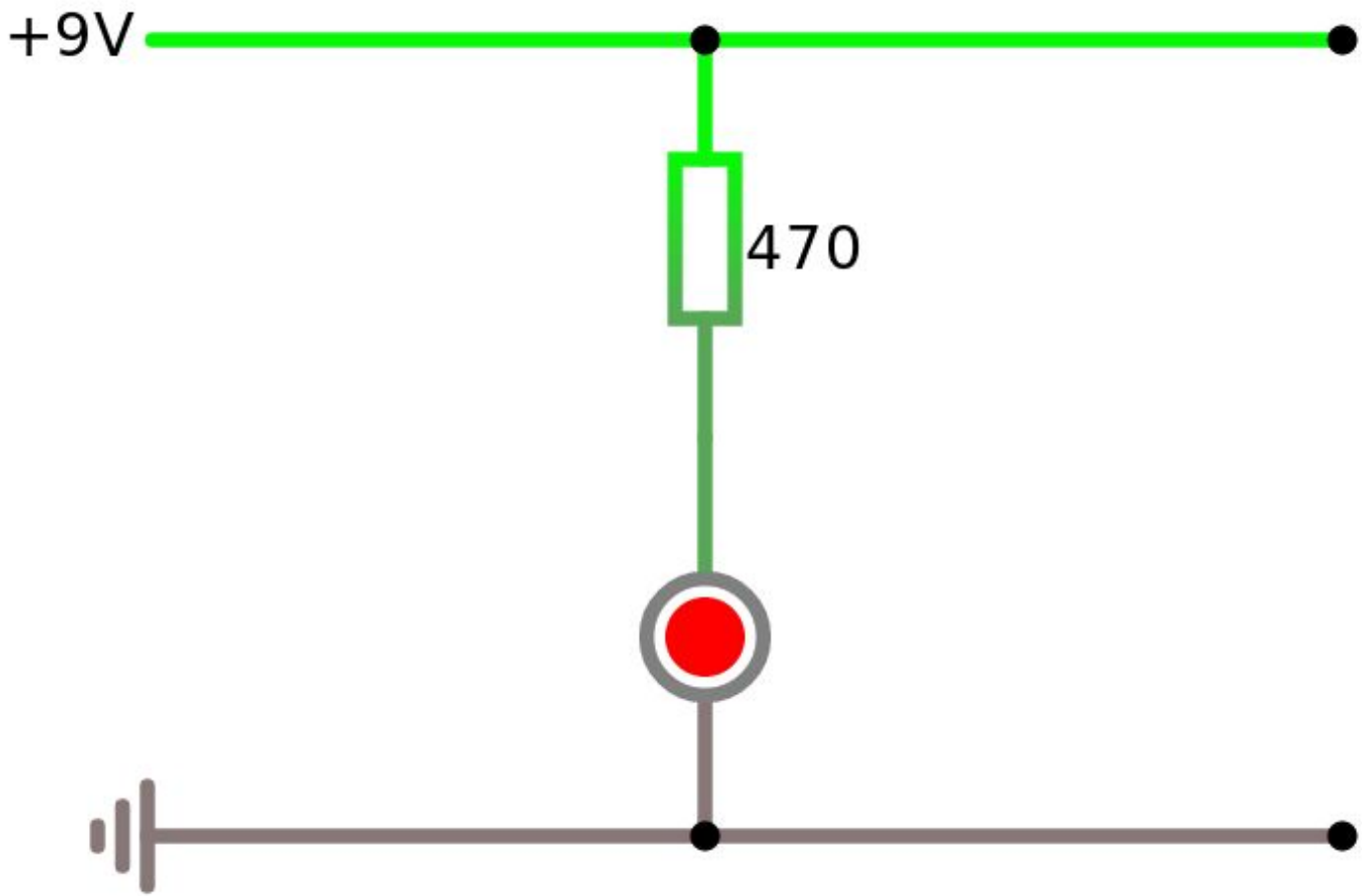
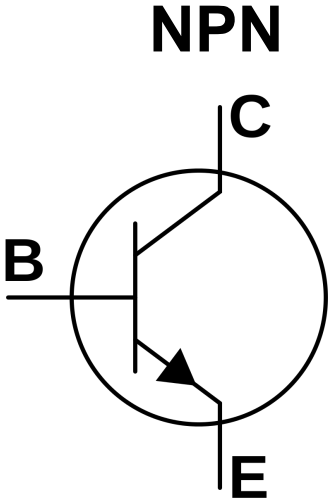
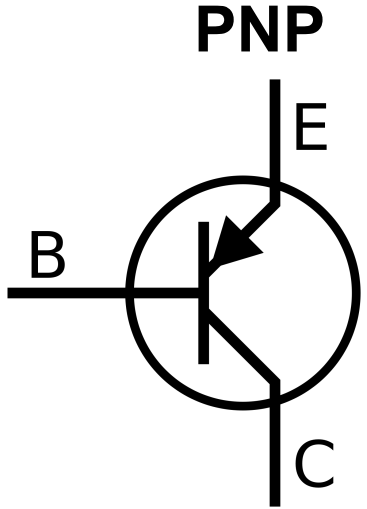

+9V
470


A
B
C
D


+9V
470

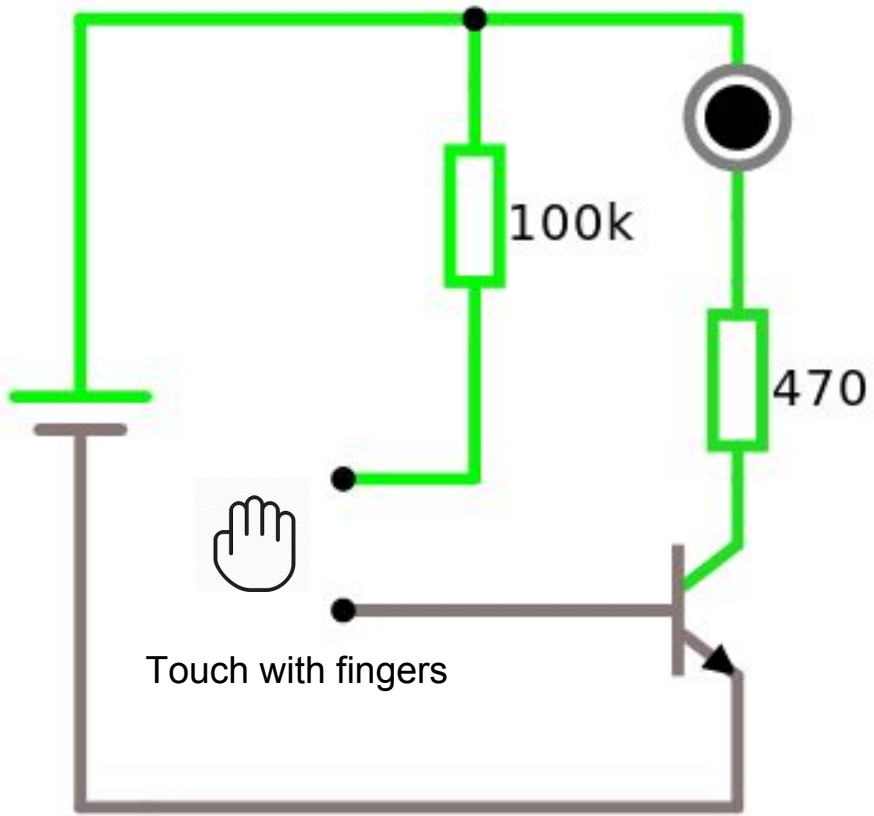
Transistors (NPN and PNP)



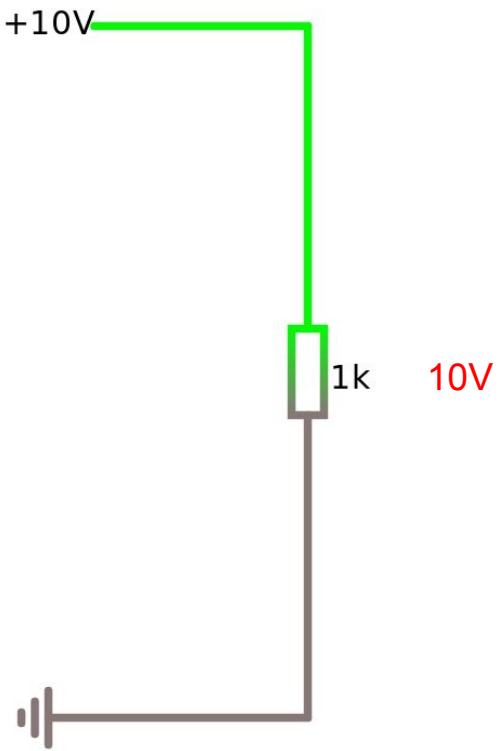


Circuit 2 - Touch Sensor

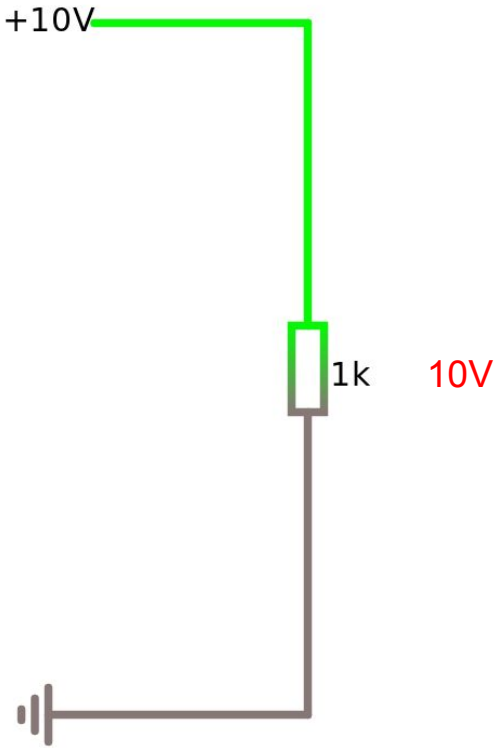
- 1x 9V battery
- 1x battery clip
- 1x breadboard
- 1x NPN transistor
- 1x 470 ohm resistor
- 1x 100 kohm resistor
- 1x LED of any color
- jumper wires

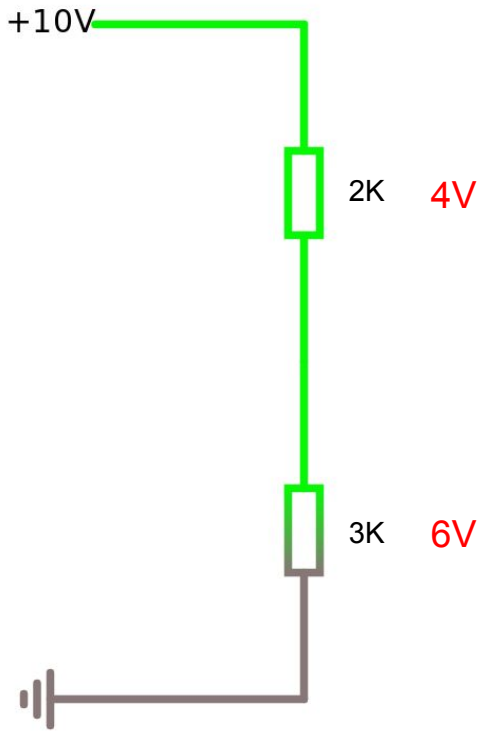

100k
470
Touch with fingers

Potential dividers

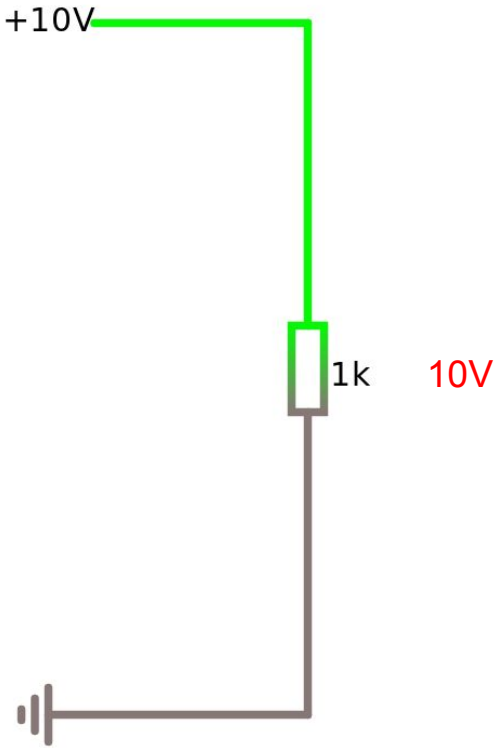


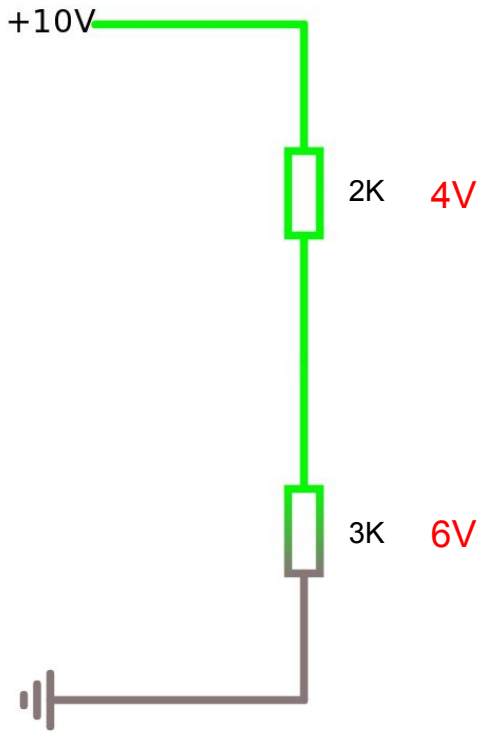
Potential dividers

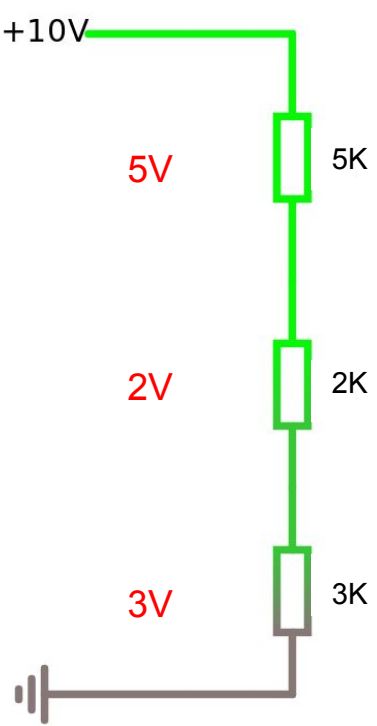




Potential dividers

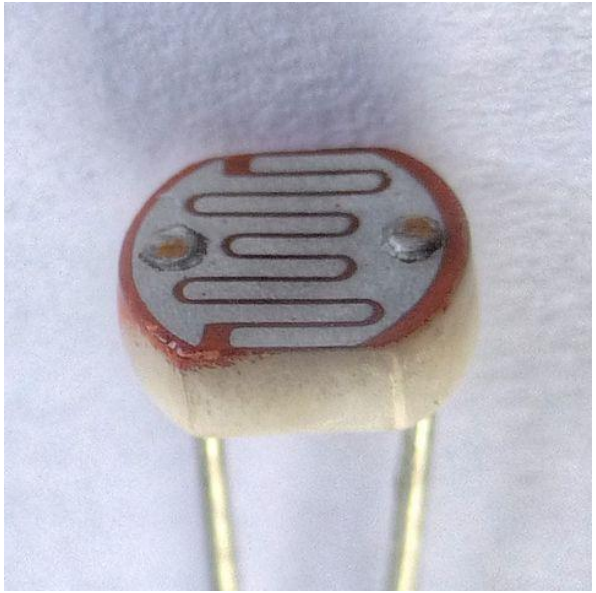


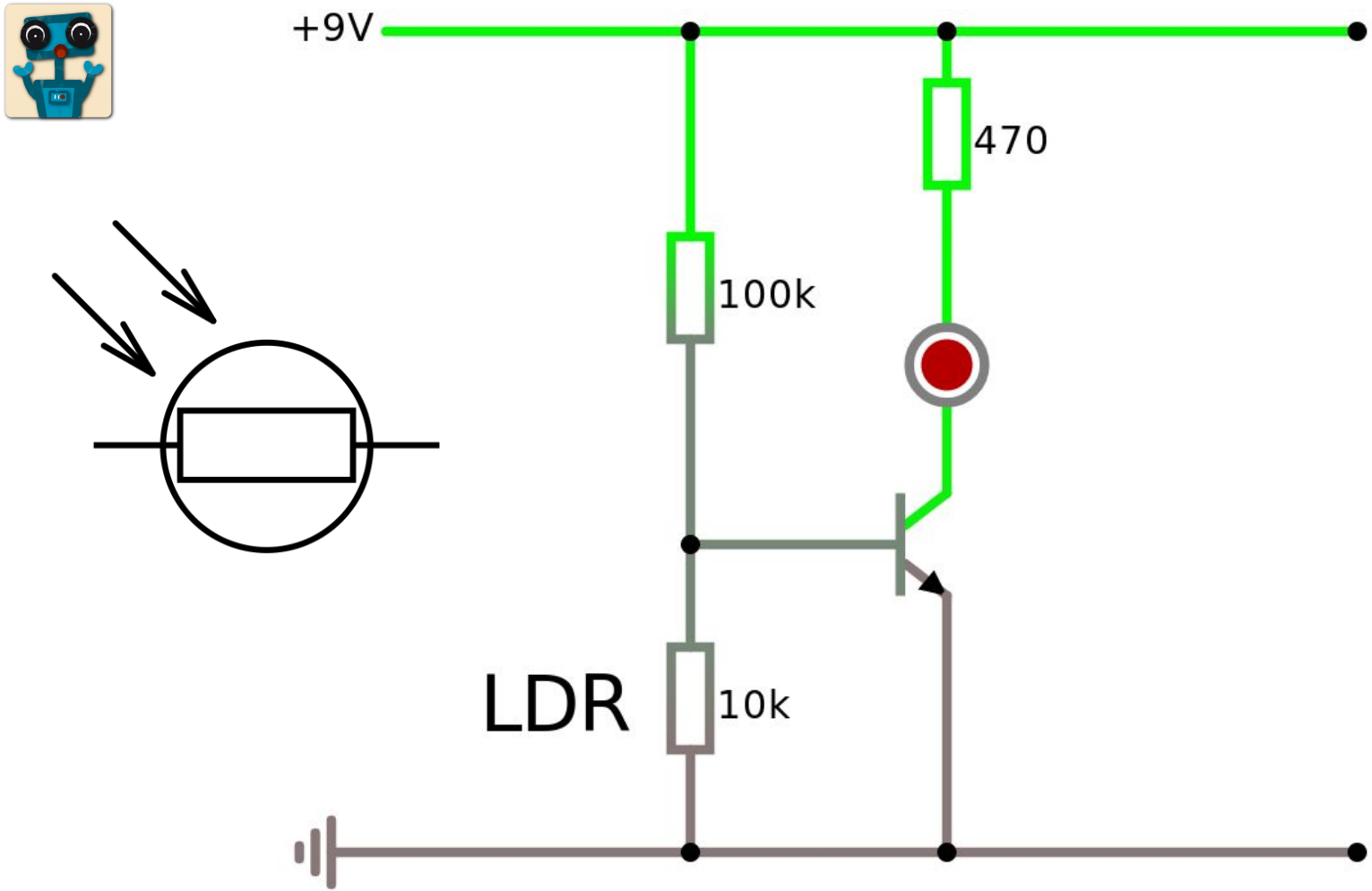




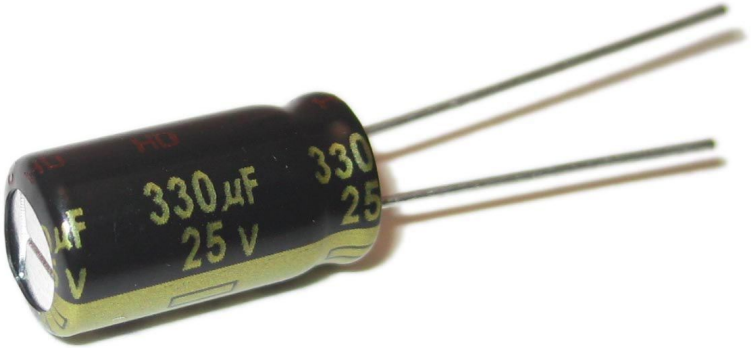
Circuit 4 - LDR

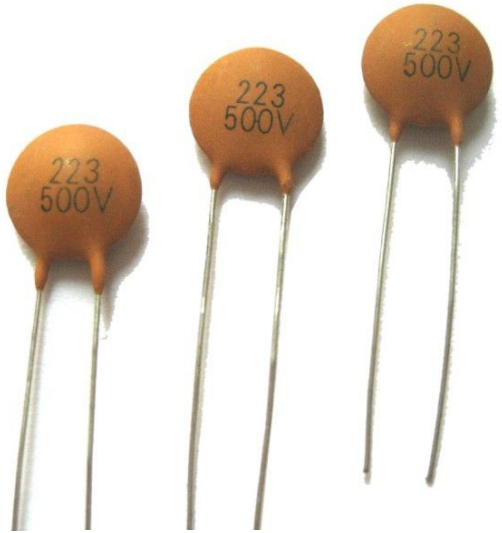
- 1x 9V battery
- 1x battery clip
- 1x breadboard
- 1x 470 ohm resistor
- 1x 100 kohm resistor
- 1x LDR
- 1x LED
- 1x NPN transistor
- jumper wires

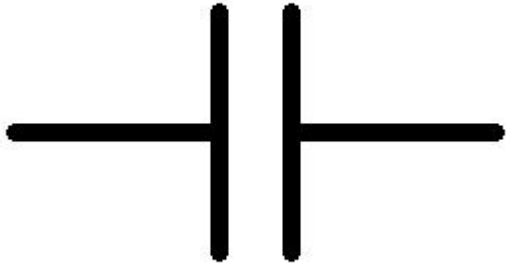



+9V
470
100k
LDR
10k

Capacitor

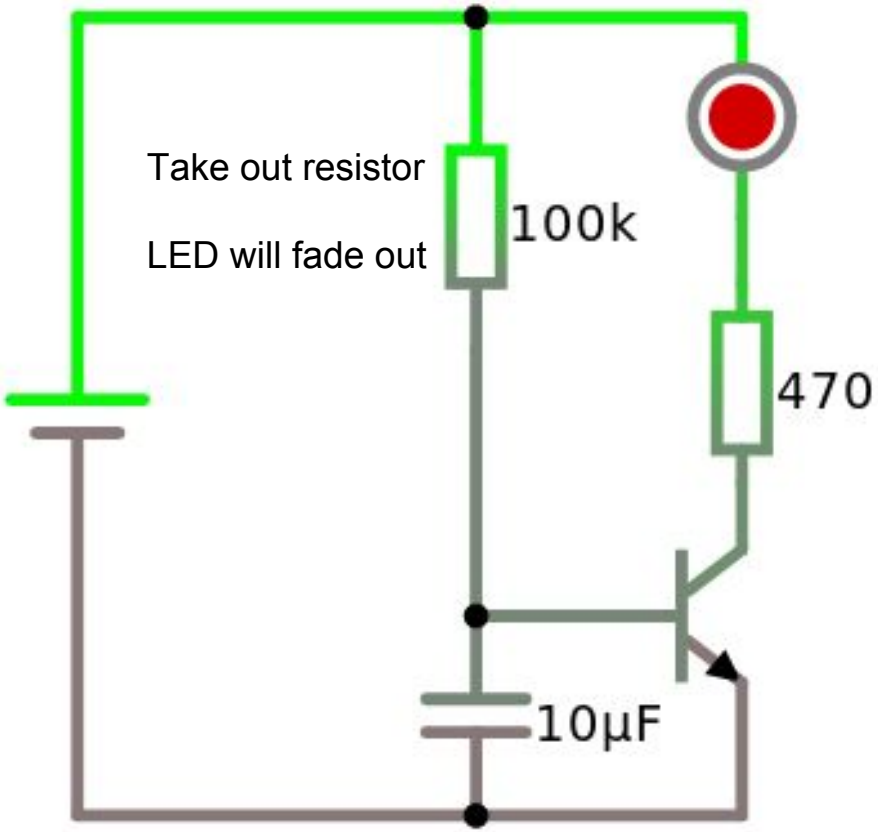






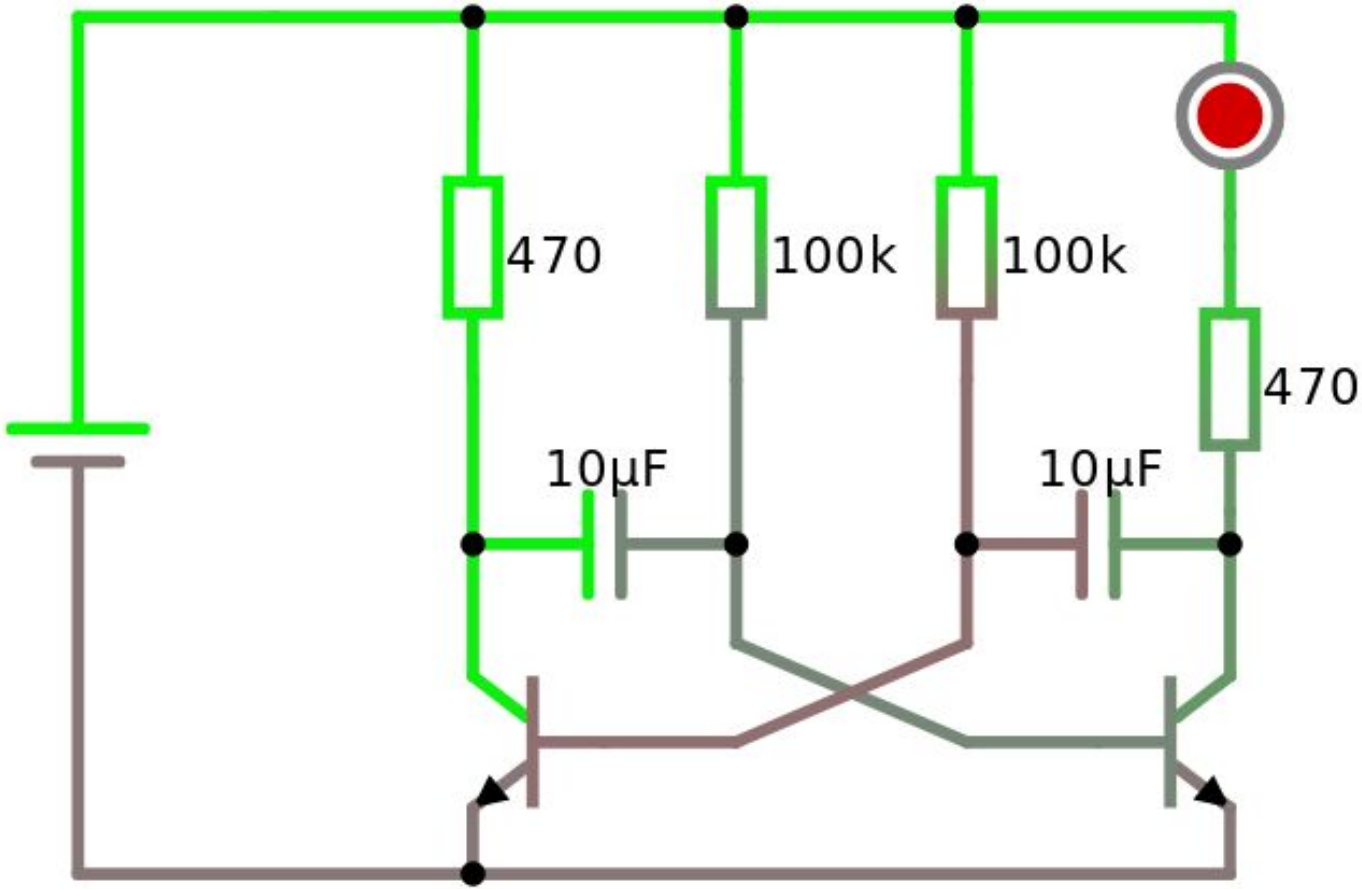
Circuit 5 - Capacitor demonstration

- 1x 9V battery
- 1x battery clip
- 1x breadboard
- 1x 470 ohm resistor
- 1x 100 uF capacitor
- 1x NPN transistor
- 1x LED of any color
- jumper wires


Take out resistor
LED will fade out
100k
470
10µF

Circuit 6 - blinking LED's

- 1x 9V battery
- 1x battery clip
- 1x breadboard
- 2x 1k ohm resistor
- 2x 100 kohm resistor
- 2x NPN transistor
- 2x 10uF capacitor
- 2x LED of any color
- jumper wires


470
100k
100k
470
10µF
10µF