

Basic Electric Circuits

“Paper Circuits”
“Continuity to Coding”

[Zoom Link](#)

EIU - GYO Program
December 07, 2023

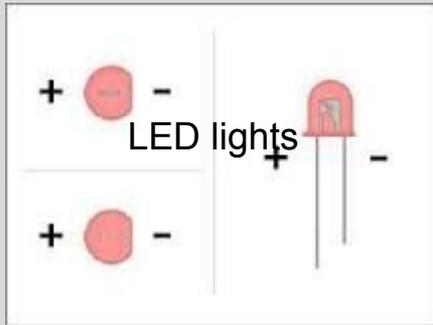
GOOGLE SLIDES

SLIDE

BASICS



Supplies



Coin Battery
Lithium 3V



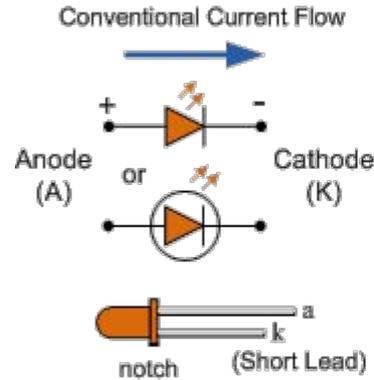
Power Source

Alkaline coin cell batteries have a nominal voltage of 1.5V. Lithium coin cell batteries, on the other hand, have a nominal voltage of 3V. Coin cell batteries come in a few different sizes, each with a specially coded name to indicate the size and chemistry.

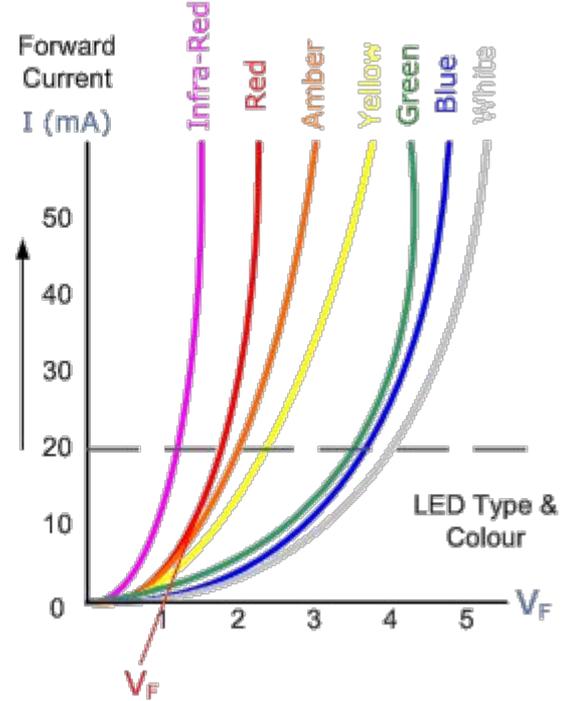
CR2032 batteries all nominally have a voltage of 3 to 3.6 volts.

LED color	Forward voltage
 Red	1.8 V
 Yellow	2.1V
 Green	2.2 V
 Blue	3.2 V
 White	3.2 V

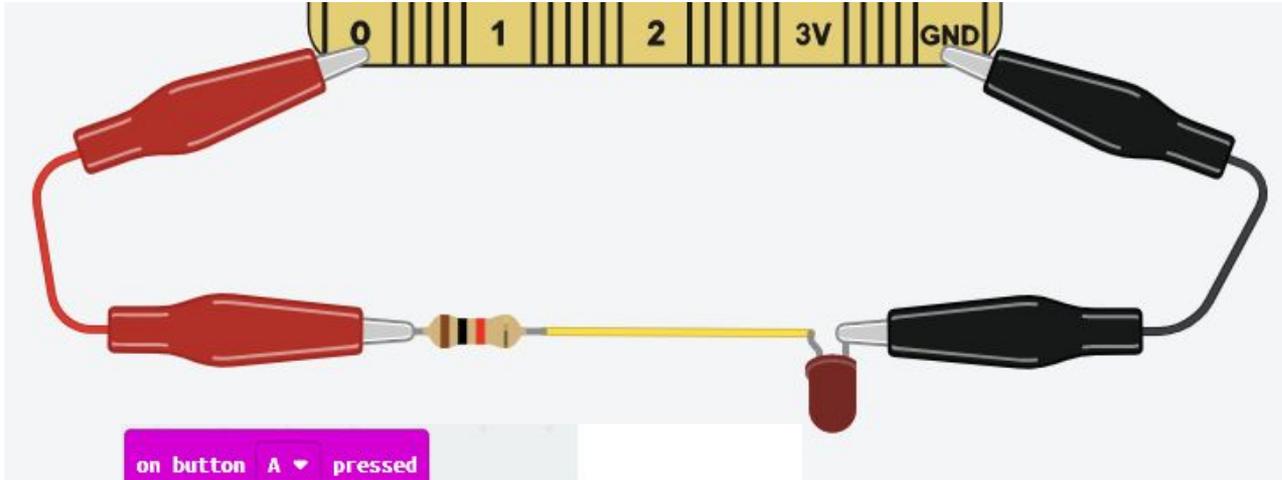
Typical LED Characteristics			
Semiconductor Material	Wavelength	Colour	V_F @ 20mA
GaAs	850-940nm	Infra-Red	1.2v
GaAsP	630-660nm	Red	1.8 v
GaAsP	605-620nm	Amber	2.0v
GaAsP:N	585-595nm	Yellow	2.2v
AlGaP	550-570nm	Green	3.5v
SiC	430-505nm	Blue	3.6v
GaInN	450nm	White	4.0v



LED and its I-V Characteristics



For instance at 5v you should probably use 220ohm resistors for most LEDs
Likewise 100ohm for 3.3v and 470ohm for 9v power sources



somanytech.com

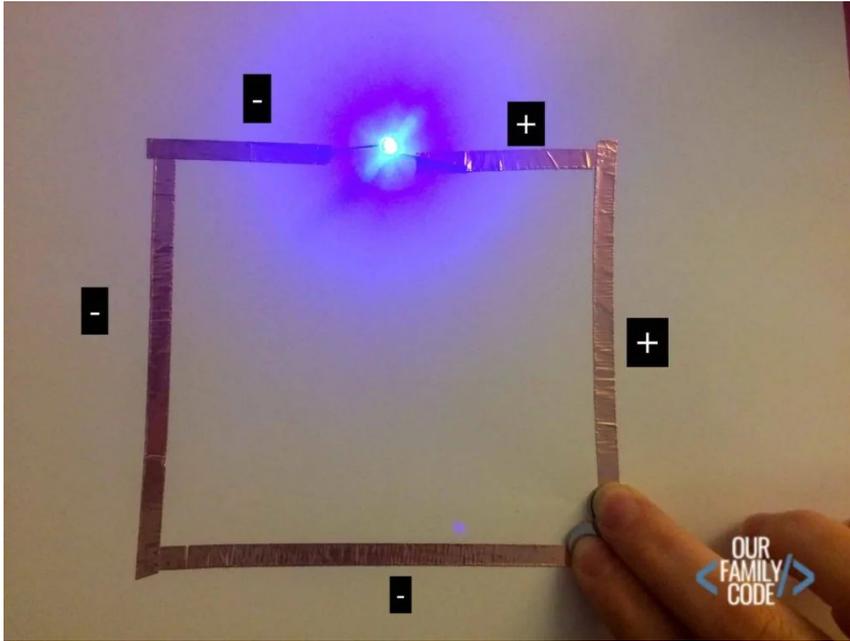
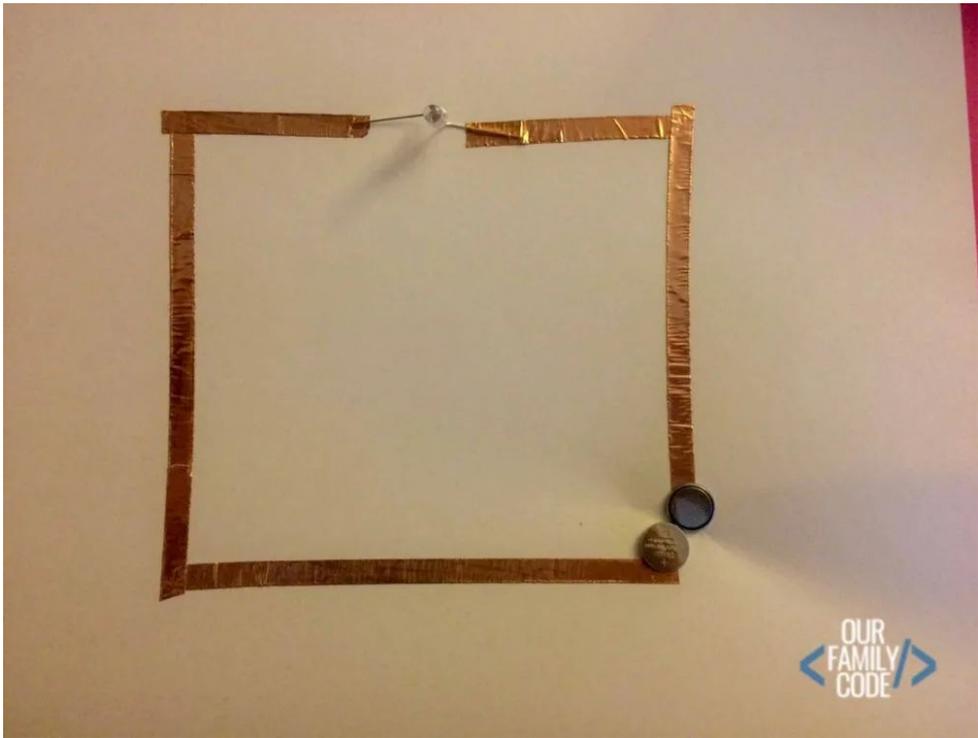
	1 st Digit	2 nd Digit	Multiplier
Black	0	0	x 1
Brown	1	1	x10
Red	2	2	x10 ²
Orange	3	3	x10 ³
Yellow	4	4	x10 ⁴
Green	5	5	x10 ⁵
Blue	6	6	x10 ⁶
Violet	7	7	x10 ⁷
Grey	8	8	x10 ⁸
White	9	9	x10 ⁹
Gold			x10 ⁻¹
Silver			x10 ⁻²

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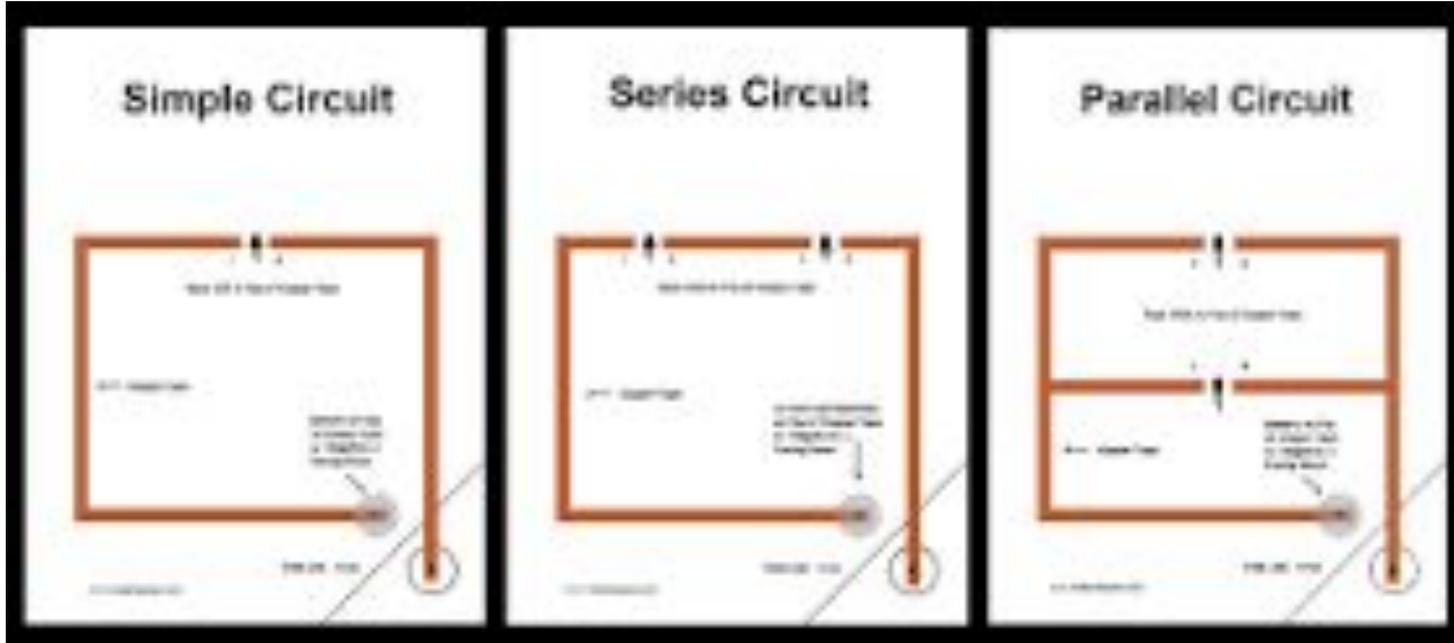
on button A pressed
  digital write pin P0 to 1  — LED lights up
on button B pressed
  digital write pin P0 to 0  — LED goes out
  
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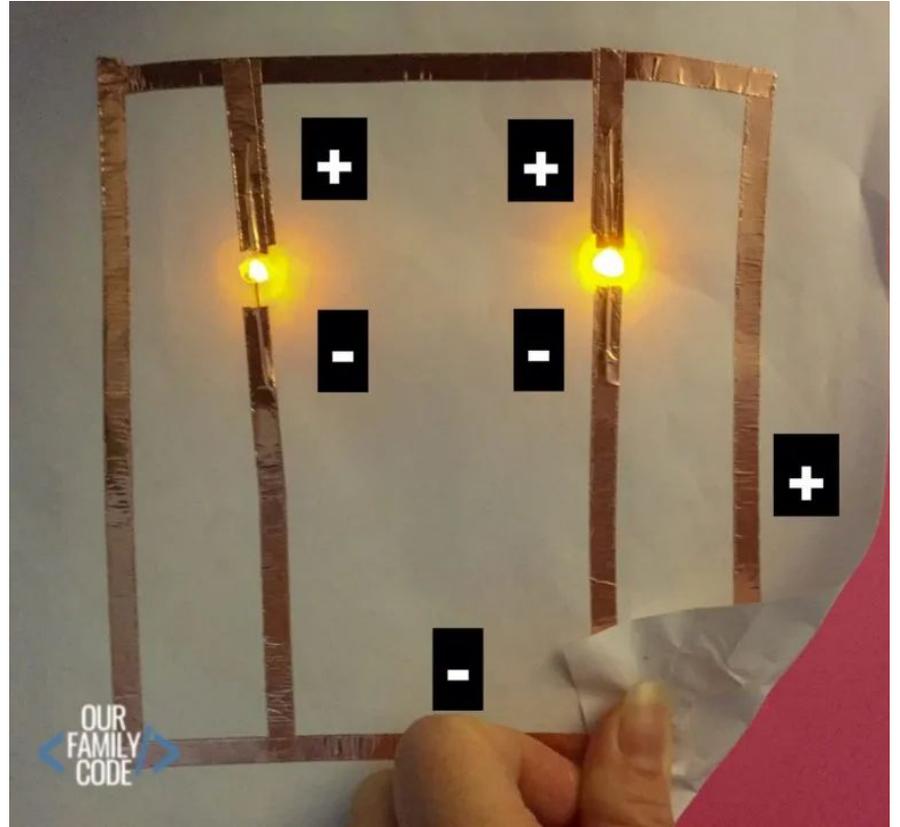
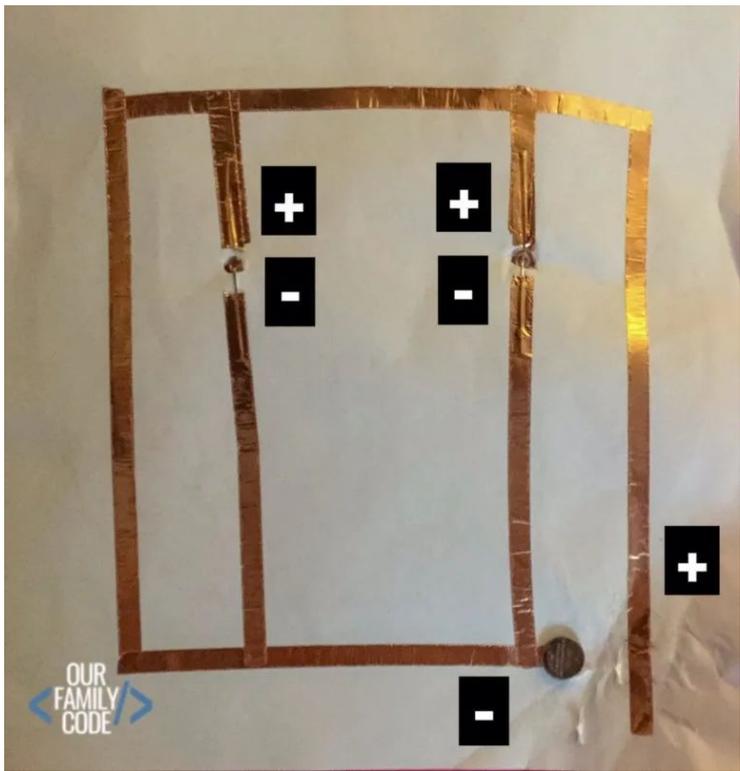


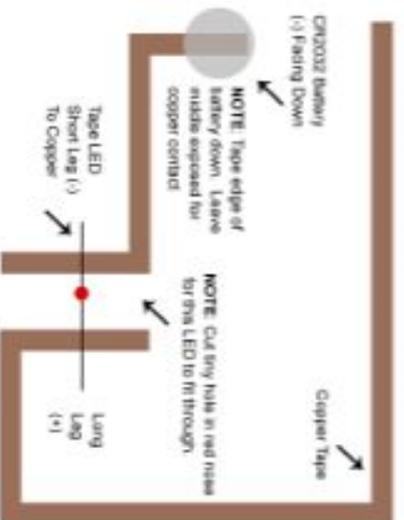
220 ohm



Paper Circuit – looks like a schematic







Christmas Cards

<https://www.makerspaces.com/wp-content/uploads/2018/12/Santa-animation.gif>

<https://www.makerspaces.com/wp-content/uploads/2017/12/tree-animation.gif>



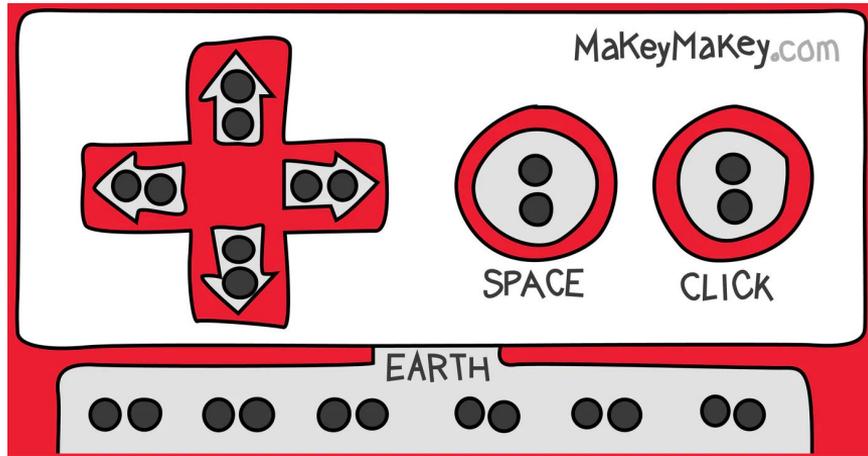
Paper Cube - lego block model for circuits

<https://thekidshouldseethis.com/post/paper-circuits-cubes-activity>



Ideas - Makey Makey Apps

<https://makeymakey.com/pages/plug-and-play-makey-makey-apps>



Microbit

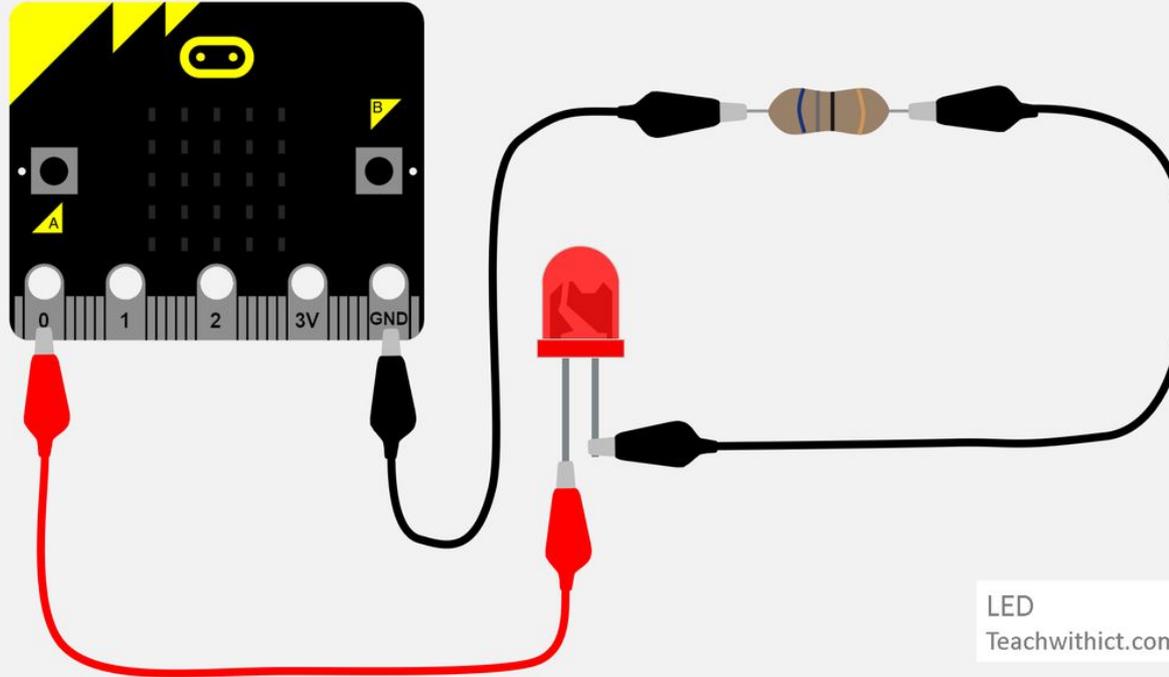
<https://support.microbit.org/support/solutions/articles/10000101863-connecting-an-led-to-the-micro-bit>

on button A pressed

digital write pin P0 to 1

on button B pressed

digital write pin P0 to 0



How To Guides

Starting Simple

<https://www.instructables.com/Paper-Circuits/>

Link to Manual

https://mrsgeeky.com/wp-content/uploads/2018/07/paper_circuits_for_makerspaces_1_-3.pdf

Reference and Resource Starter Set

Project Playbook

<https://www.learner.org/series/project-playbook-educator-edition/paper-circuits/>

Two Bit Circuit - walkthrough - <https://youtu.be/RSI-o2jk-C4>

How to run a P.C. Workshop

<http://www.renovatedlearning.com/2020/02/09/how-to-teach-a-paper-circuit-workshop/>

Tinkering Fundamentals

<https://www.coursera.org/lecture/tinkering-circuits/paper-circuits-SMjWo>

Q&A plus Wrap-up

