Electronics Engineering Eca

Block C Lesson 1

ECA options

- Returning students:
  - Continue working on your projects from last block
- New students:
  - Follow along and learn the basics
  - Start your projects in a future lesson

Electronics in daily life

- Personal Devices & Entertainment
    - Smartphones (touchscreens, cameras, batteries, processors).
    - Gaming consoles and PCs (graphics cards, controllers, VR headsets).
    - Wireless earbuds and Bluetooth speakers.
    - Smartwatches and fitness trackers.
- Transportation & Safety
    - Electric scooters, e-bikes, and modern cars with sensors.
    - GPS navigation in phones and vehicles.
    - Smart traffic lights and self-driving technology.
- Etc.

Format of modern day electronics

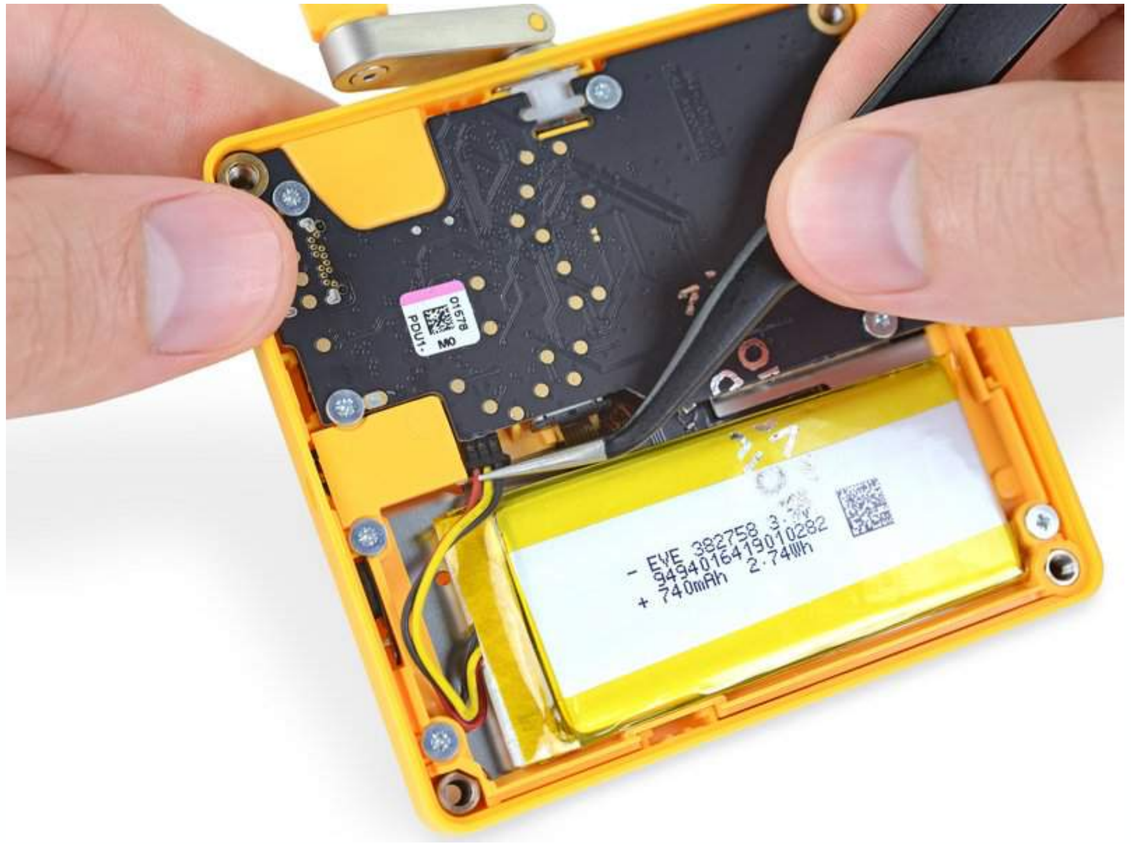
Example: Playdate handheld console released in 2021

Format of modern day electronics

- Outer enclosure
  - Keeps internal components secure, adds structural rigidity to the device

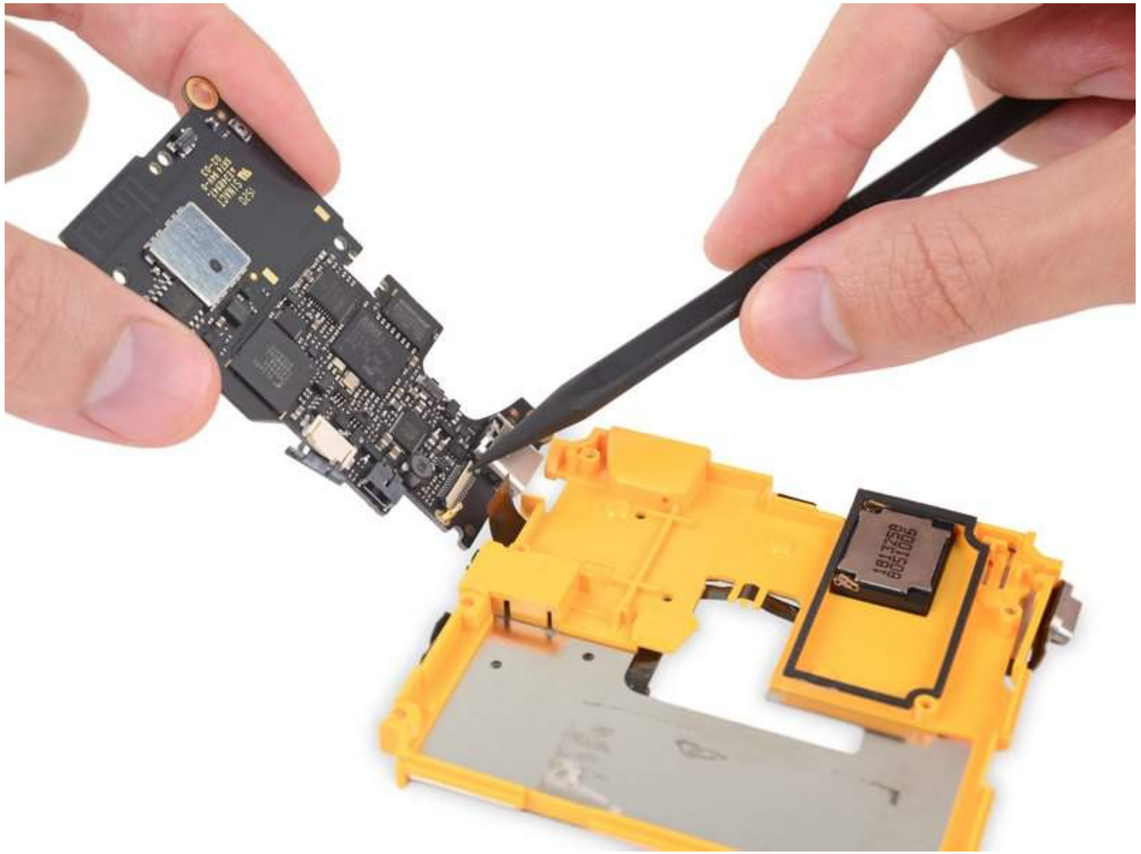
Format of modern day electronics

- Logic board (printed circuit boards)
  - Embedded wires within the logic board connect chips and other electrical components to one another
  - eg. batteries, displays, integrated circuits



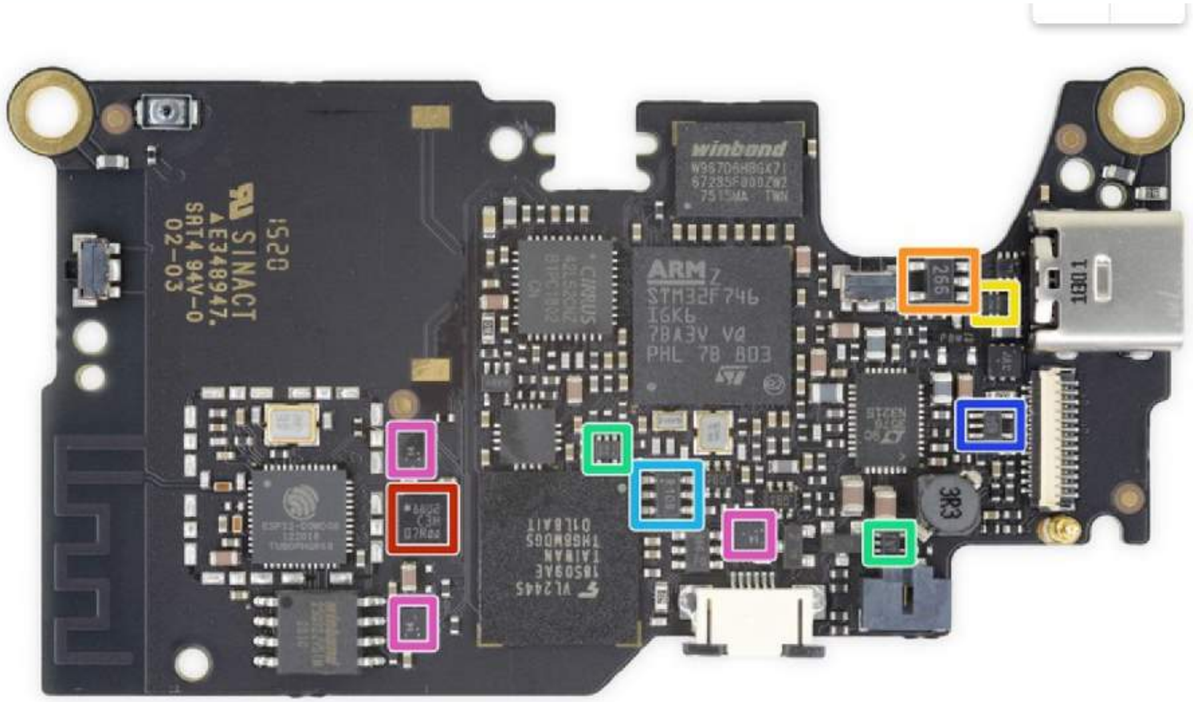
Format of modern day electronics

- Logic boards often use connectors to interface with bigger components, such as batteries or screens



Format of modern day electronics

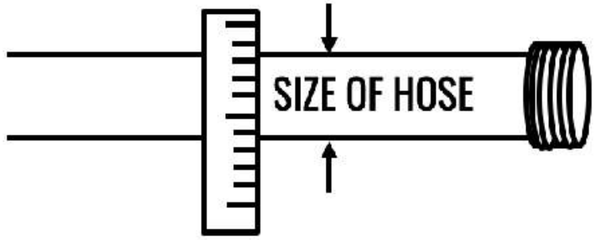
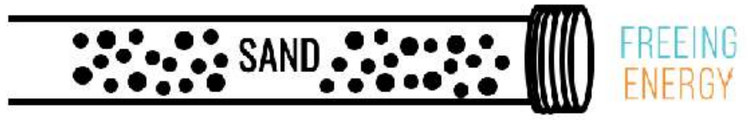
- Integrated circuits combine discrete components (transistors, resistors, capacitors etc.) into a simple, compact package. Specialized for a specific task



- STMicroelectronics LIS3DH 3-axis MEMS accelerometer
- Allegro MicroSystems A1266 Hall-effect switch
- ON Semiconductor FUSB301TMX USB Type-C controller
- Rohm BU4216FVE and BU4227FVE 1.6 V and 2.7 V voltage detector
- Texas Instruments REG710NA-5 60 mA buck-boost charge pump
- Microchip (formerly Micrel) MIC5365-3.3YC5 150 mA / 3.3 V LDO regulator
- NXP Semiconductor NTB0104 voltage level translator

What is a circuit - Water pipe analogy

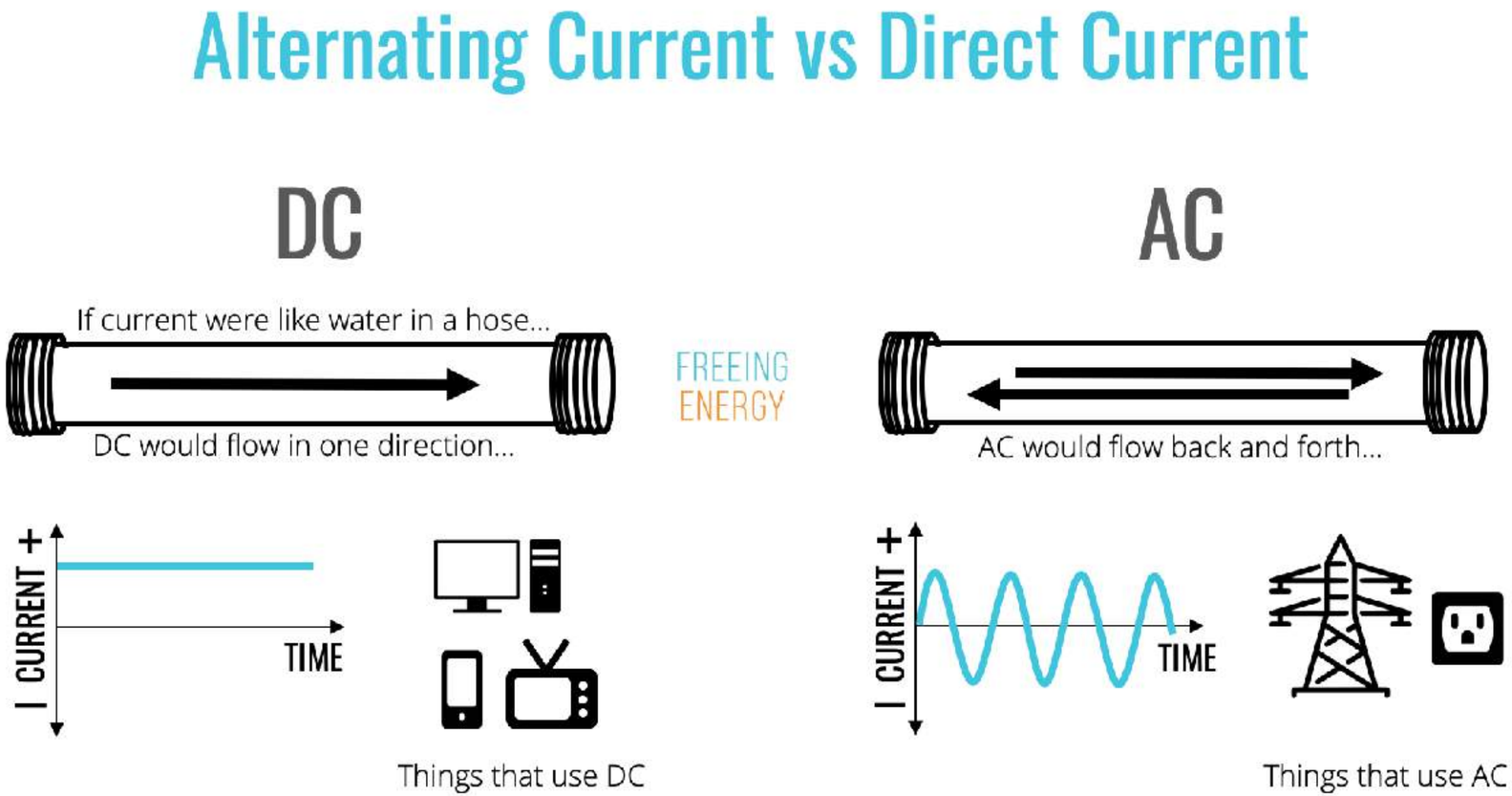
Electricity is like a water hose

Voltage	Volts (V)	
Current	Amps (A or I)	
Resistance	Ohms (R or Ω)	 FREEING ENERGY

https://www.freeingenergy.com/understanding-the-basics-of-electricity-by-thinking-of-it-as-water/

What is a circuit - Water pipe analogy

- We will be working with Direct current (DC) in this eca



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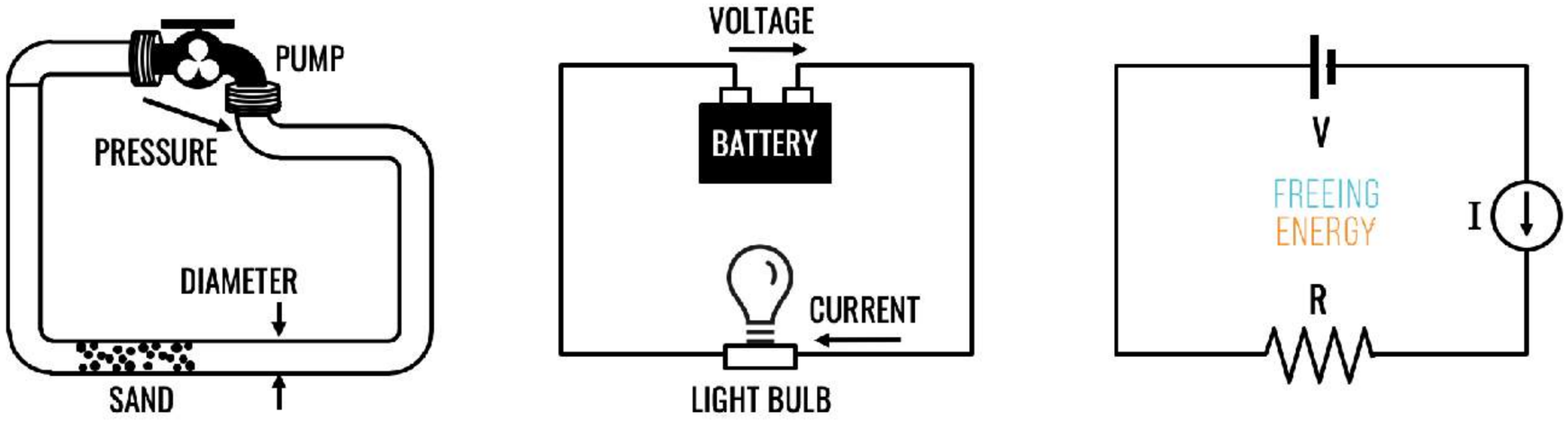
What is a circuit - Water pipe analogy

Voltage = Current x Resistance

(V = I x R)

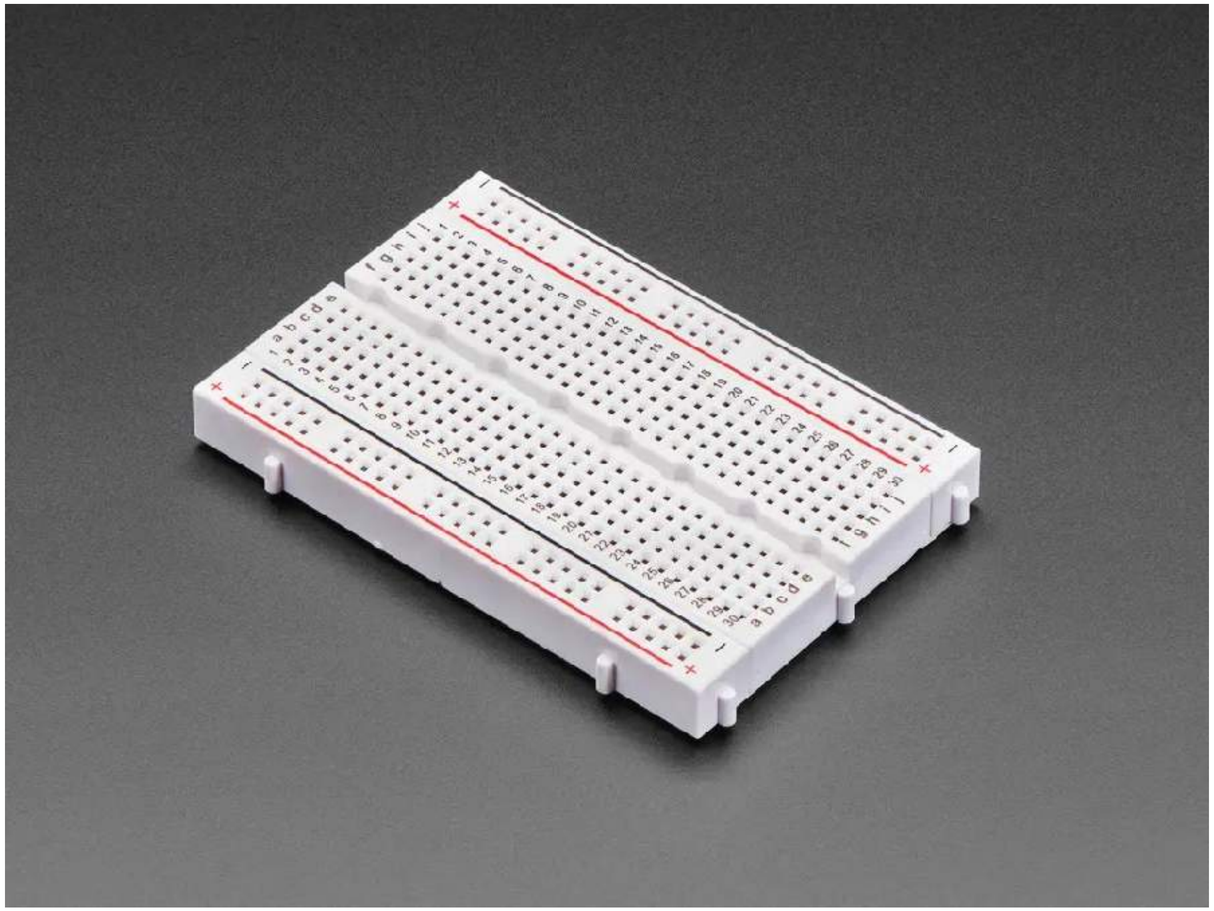
Water	Electricity	Circuit Diagram



https://www.freeingenergy.com/understanding-the-basics-of-electricity-by-thinking-of-it-as-water/

Creating your own circuits

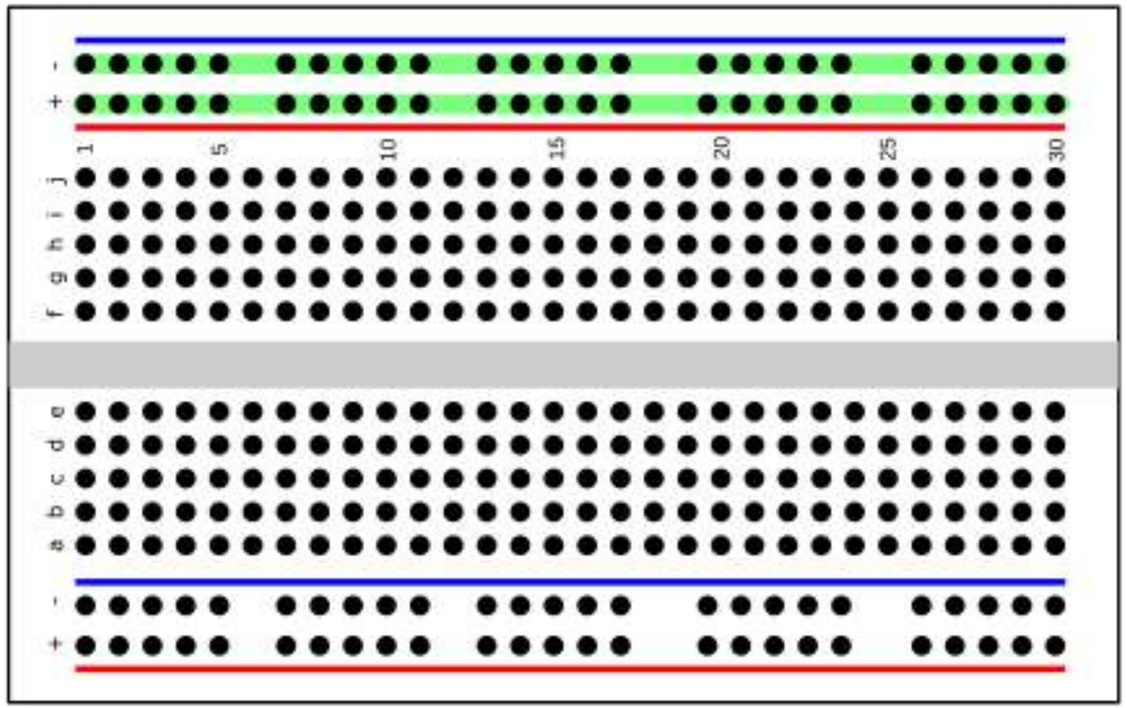
- Creating a printed circuit board requires alot of planning and refinement
- We will be using breadboards as it allows us to quickly prototype and test out connections



https://sfxpcb.com/how-to-use-a-breadboard-and-how-it-works/

Creating your own circuits

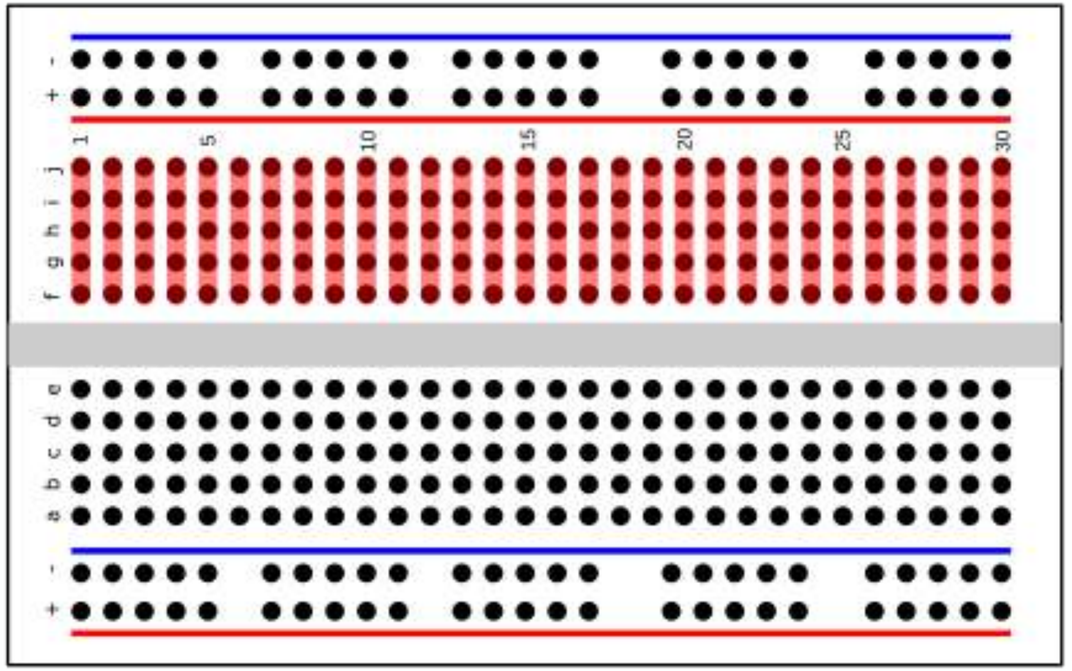
- Horizontal Connections
- first row and second row holes are internally connected horizontally to each other



https://circuitfever.com/how-to-use-a-breadboard

Creating your own circuits

- Vertical Connections
- Below the first two rows, there are five rows and each rows are vertically connected to each other internally.



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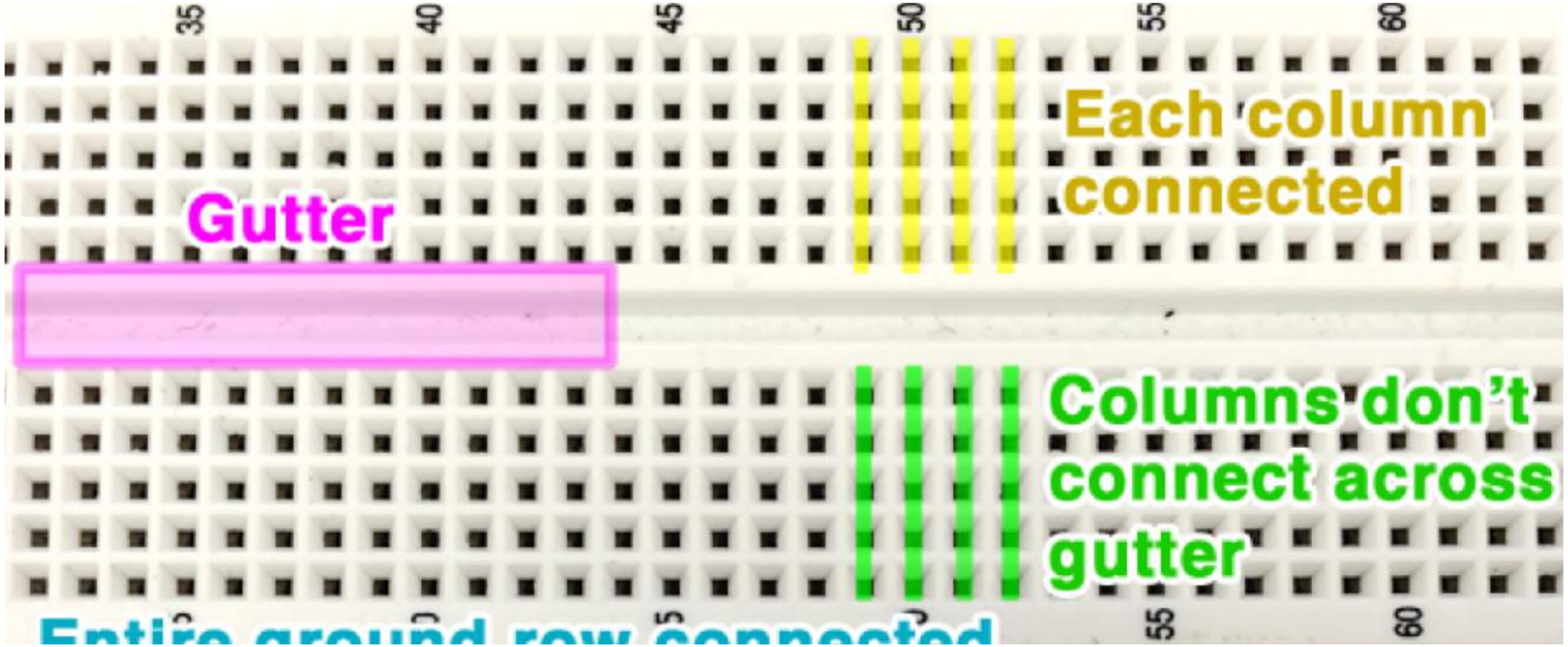
Using buttons



Using buttons

- Place buttons across the gutter