VISUAL SIGNALS

What is our GOAL for this CLASS?

In this class, we learned about the basic components of electronic systems- **current, voltage, resistors, LEDs**, and electrical circuits.

What did we ACHIEVE in the class TODAY?

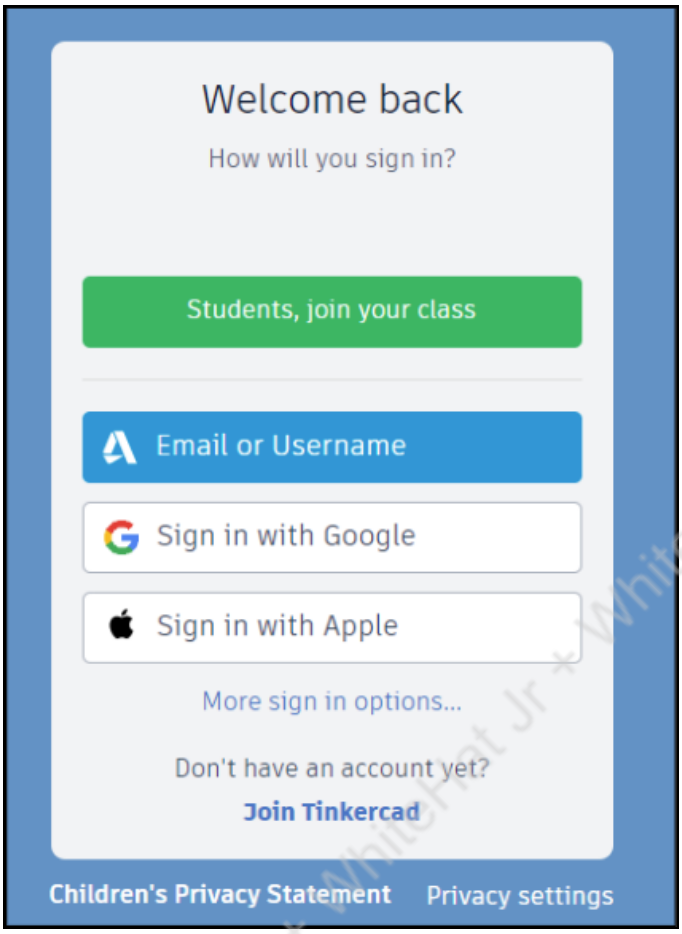
- We learned about the basics of electronic circuits.
- We learned about **Tinkercad**.
- We learned about **circuit design**.
- We learned about controlling an **LED** bulb with a **switch**.

Which CONCEPTS/ CODING BLOCKS did we cover today?

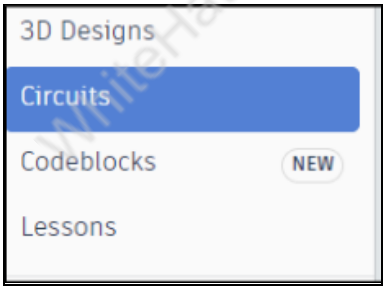
- We used **Tinkercad.**
- We used the **button**, **switch**, **resistor**, **LED**, and **push button** components.

How did we DO the activities?

1. **Tinkercad**:
    - Sign in to **Tinkercad** using any one of the given options:



- Click on **Circuits** at the **left** corner:

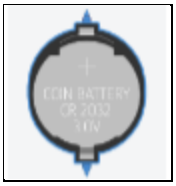


- Click on **Create new Circuit**:

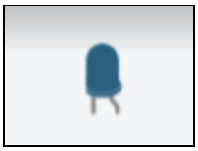
2. Design a circuit. Select the components from the right corner.

    - Select **Battery**: The battery has two ends, one positive (**anode**) and one

negative (**cathode**).

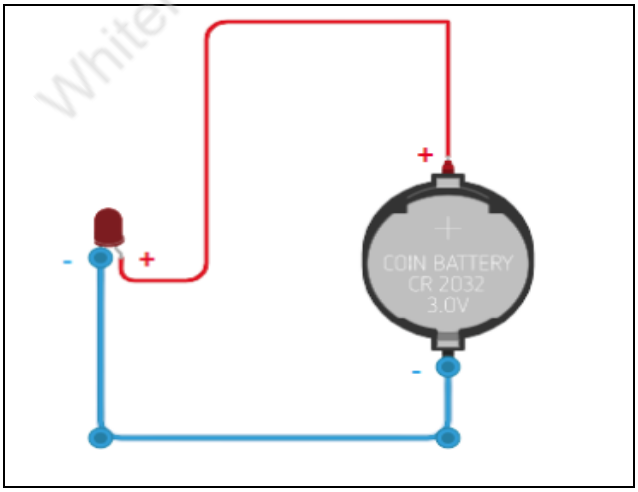


- Select **LED**: LEDs are used as indicators or as visual signals. An LED has two legs, one longer and one shorter.
  - The longer leg is **+ve** known as **anode**.
  - The shorter leg is **-ve** known as **cathode**.



3. **Connections for Circuit Diagram**

- **Color Scheme:**
  For **positive supply (+ve)** use **red** color.
  For **negative supply (-ve)** use **black/blue** color.
- Connect the positive terminal of the battery with the LED's +ve (anode) terminal. Click on the positive part of the battery and drag it to the positive part of the LED.
- Connect the negative terminal of the battery with LED's -ve (cathode) terminal. Click on the negative part of the battery and drag it to the negative part of the LED.

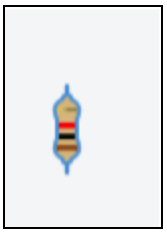


4. Click on simulation and see the output.

- **LED** will turn **on** and **off** when you **click** on the simulation button.

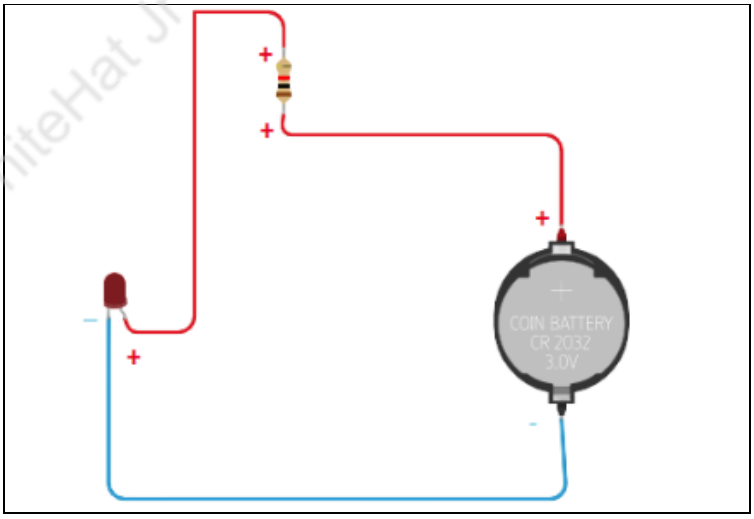
5. Add a **resistor** in a circuit to make it a **safe circuit**.

   - Select **Resistor.**



Color Scheme:

- For **positive supply**(+ve), VCC, use **red** color.
- For **negative supply** (-ve) GND,use **black/blue** color.
- Connect the positive terminal of the battery with one of the resistor's terminals. Click on the positive part of the battery and drag it to the resistor terminal.
- Connect another resistor terminal to the +ve (anode or longer leg) of the LED. Click on the resistor terminal and drag it to the +ve (anode or longer leg) of the LED.
- Connect the negative terminal of the battery with the LED's -ve (cathode) terminal. Click on the negative part of the battery and drag it to the negative part of the LED.

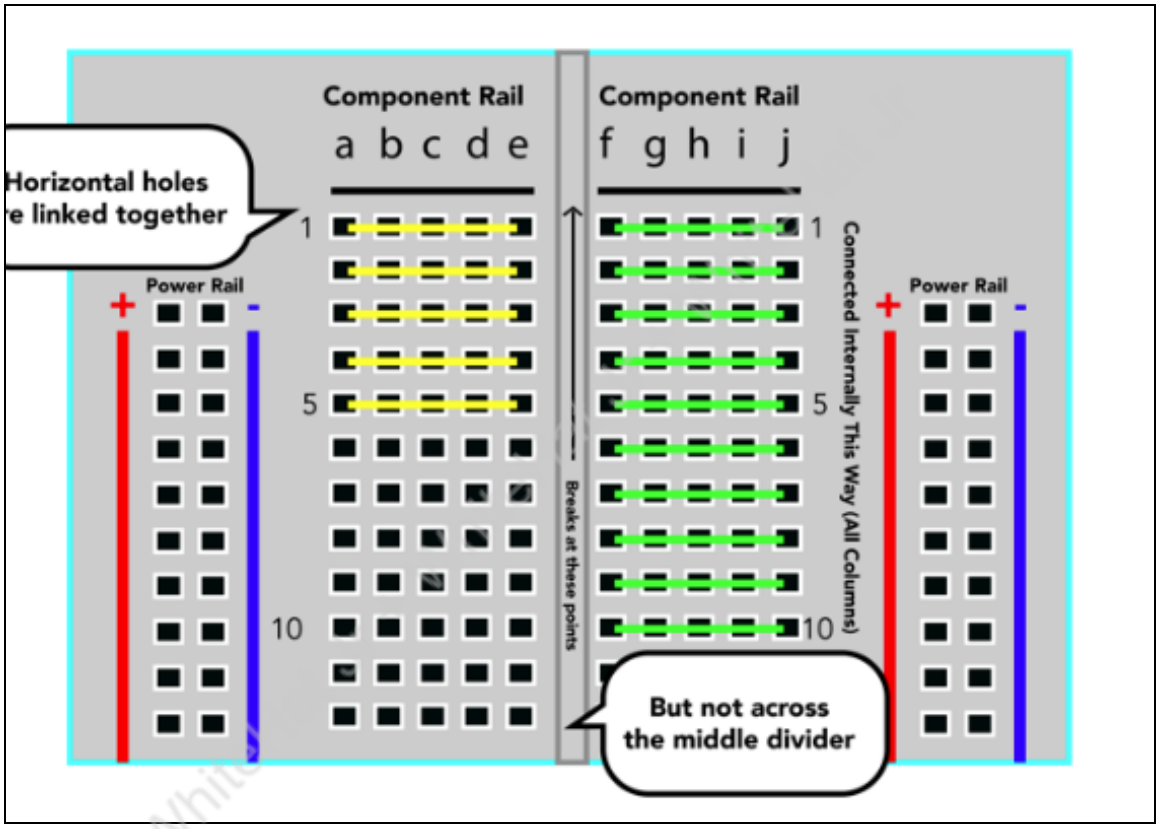


6. **Breadboards**:

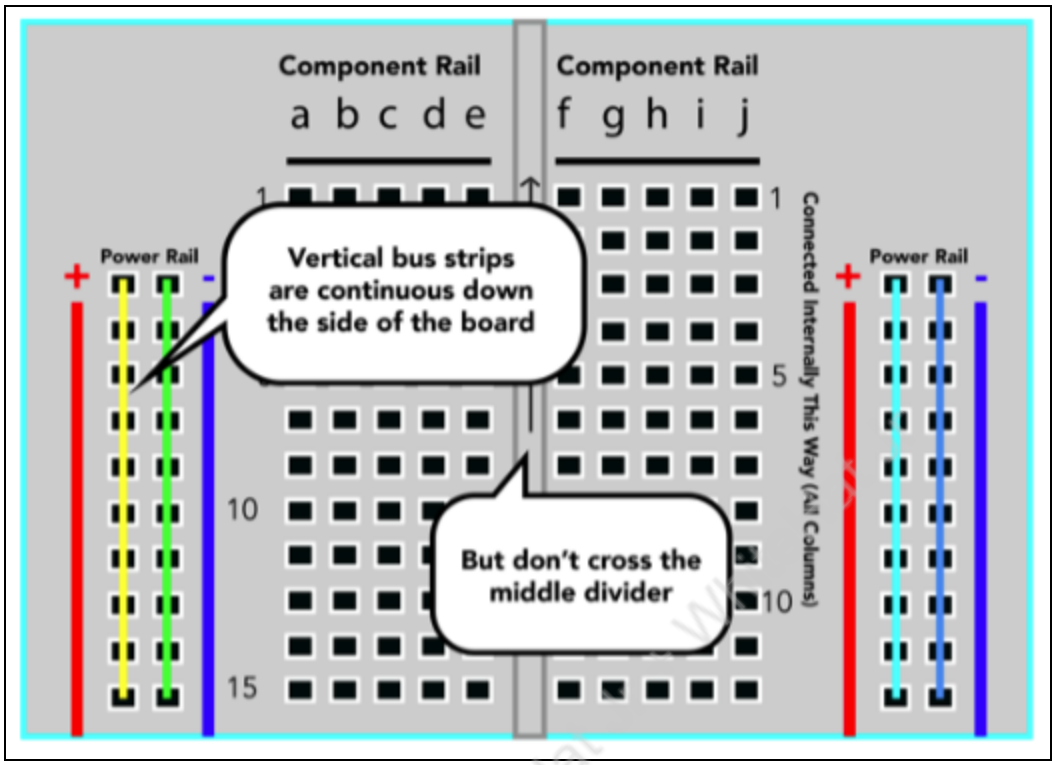
   - A **breadboard** is used to make up temporary circuits for testing or to try out an idea. It makes it easy to change connections and replace components. A

breadboard has many mounting holes.

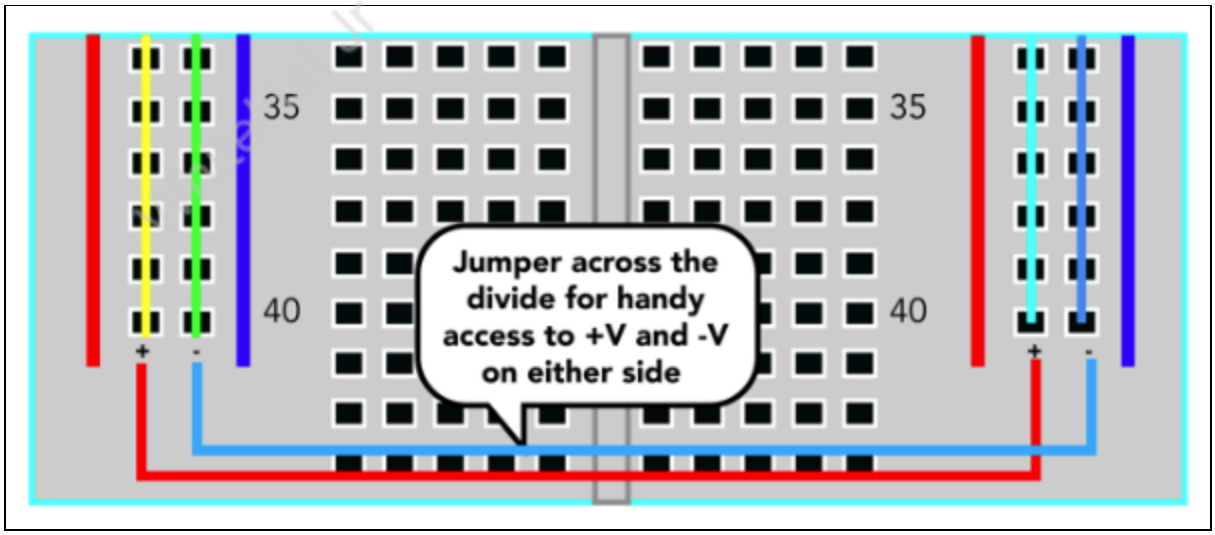
- **Component Rails**: Breadboards have numbers and letters marked on the various rows and columns. Letters on the breadboard are printed at the top and bottom that range from A to J that run horizontally. They are connected to each other internally.
- **Middle Divider**: The line between **abcde** and **fghij** is called the middle divider, which is used to mount four-leg components like controllers and push-buttons.



• **Power Rails**: **Red** (+ve) and **blue** (-ve) are called **power rails** that are used to provide supply to the breadboard.

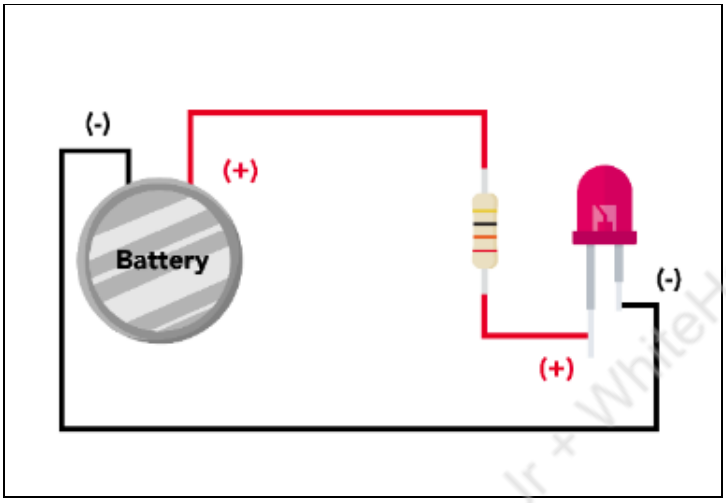


● **Jumper wires:** Jumper wires are simply wires with connector pins at each end, allowing them to be connected to two points without the need for soldering. Jumper wires are typically used with breadboards to access +ve and -ve on both sides.



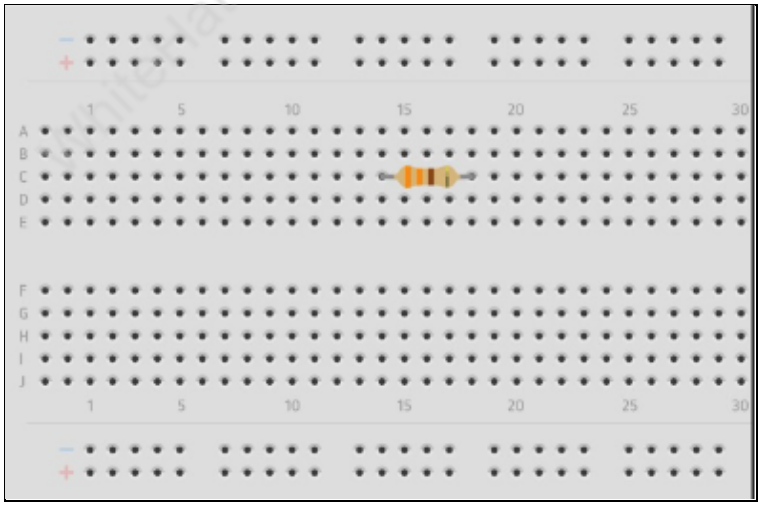
7. Make the LED blink on the breadboard:
    - Materials required:
        - 1 x Breadboard

- 1 x **Resistor**
- 1 x **LED**
- 1 x **battery** along with battery socket
- **Jumper Wire**: Use 3 jumper wires to jump from the breadboard to other components.



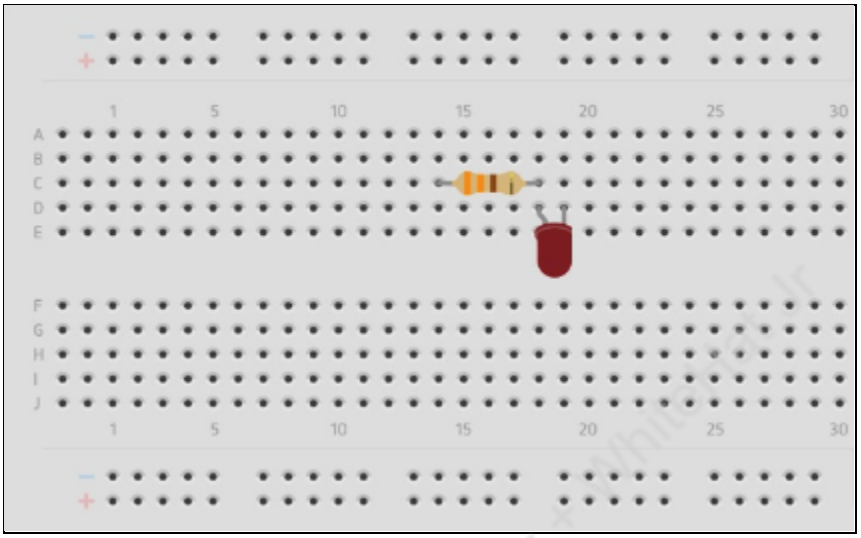
8. Build the circuit on a **breadboard.**

- **Insert the Resistor into the Breadboard:** Connect one of the resistor's ends directly with a positive supply of the top power rail. Another resistor terminal should go into a hole below the middle breaker of the breadboard. The resistor is not polarized so it does not matter which direction you insert it.

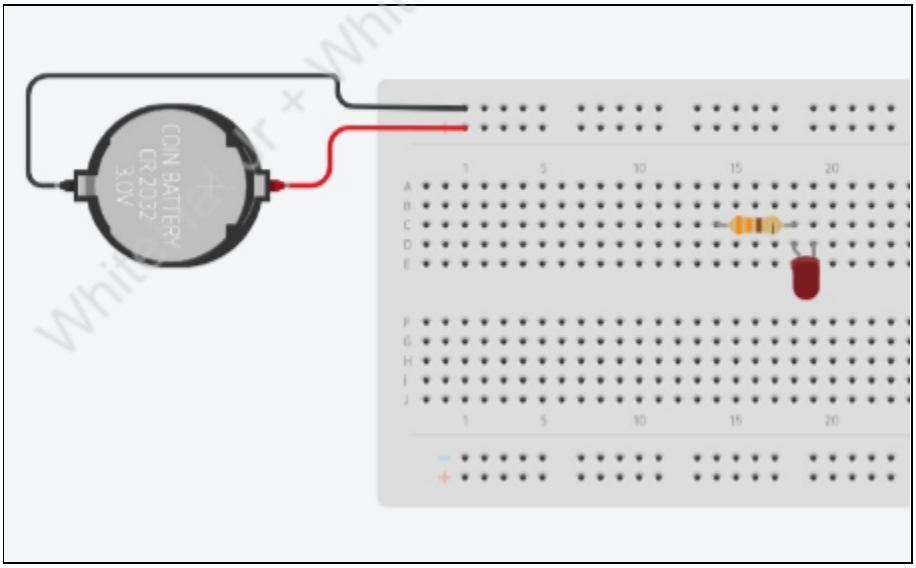


- **Insert the LED into the Breadboard:** Make sure that the longer lead (anode) of the LED is connected to just the bottom of the resistor (since they are

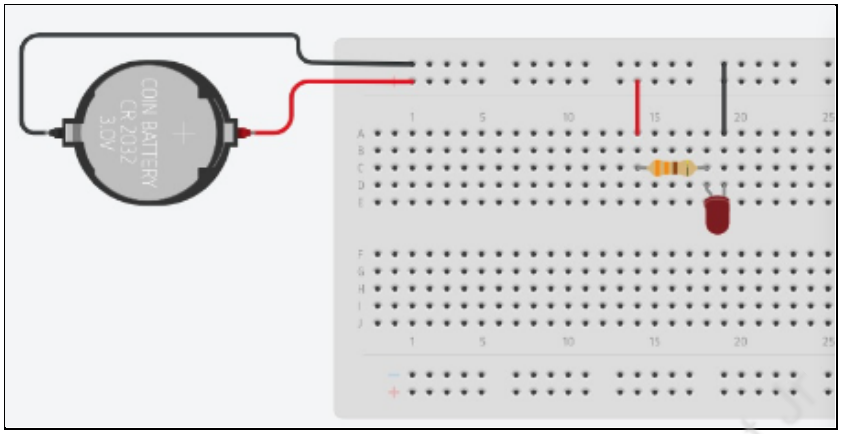
internally connected, the same +ve supply will flow) and the other end of the LED to another column to connect with -ve supply to make the circuit complete.



- **Insert the Battery into the Breadboard:** Plug the red (positive) wire of the battery clip into the +ve power rail of the breadboard. Plug the black (negative) wire of the battery clip into the +ve power rail of the breadboard.



- **Insert the Jumper Wire:** Now let's power up our electronic components. Insert a jumper wire connector into a hole directly above the resistor terminal and extend it to the +ve supply of the power rail. Insert a jumper wire connector into a hole directly above the LED (short leg or cathode) terminal and extend it to the till +ve supply of power rail. This will make the circuit complete.



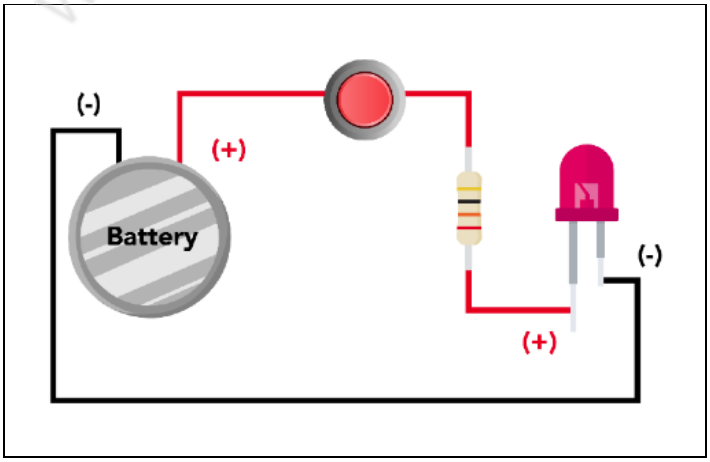
Now we can see the **LED** blink.

9. Compare a 330Ω resistor to a 10kΩ resistor:

- More current flows through the **330Ω** resistor with the smaller resistance, which causes the LED to light up more brightly.
- Less current flows through the **1KΩ** resistor with the larger resistance, which causes the LED light to be dim.
- When the LED starts blinking, change the resistance and check how resistance helps to control the current.

10. Add Push Button:

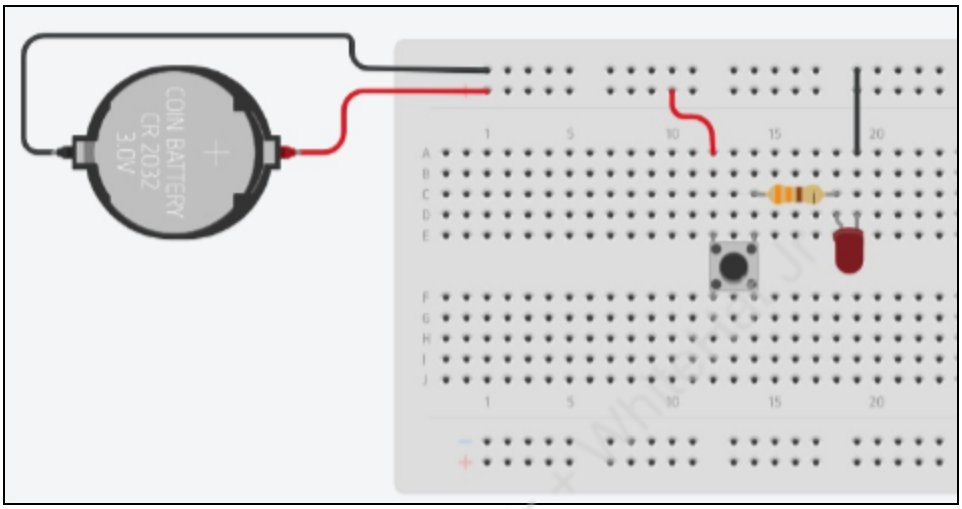
- A **Push Button** is a type of switch that works on a simple mechanism called "**Push-to-make**". Initially, it remains in an **off** state or normally **open** state but when it is pressed, it allows the current to pass through it, or, we can say that it makes the circuit complete when pressed. We need to do a little change in the circuit.



- Take a push-button switch and mount the push button. The push button has

four legs; mount two on one side and the other two on another side of the middle breaker.

- Connect one end of the push button to the +ve supply of the battery and another end of push button to the one terminal of the resistor.



Press the button and check the working of the circuit . When the button is pressed, it conducts current through it or makes the circuit. When the button is released it breaks the circuit and stops the flow of current.

What's NEXT?

In the next class, we will learn about **ESP32** microcontrollers and how to make patterns of light using an embedded programming language.

Expand Your Knowledge

To know more about **Tinkercad** click here