Red light blink using Coin Battery

Introduction

This is a beginner-level self-learning exercise done using Tinkercad, an online circuit simulation tool. The goal was to understand how a basic LED circuit works using a coin battery and a resistor.

What is Tinkercad?

Tinkercad is a free, browser-based platform developed by Autodesk that allows users to design and simulate electronic circuits without needing physical components. It is widely used by beginners to learn electronics in a safe and interactive environment.

Components Used

- Coin Cell Battery (CR2032) — 3V
- Red LED (Light Emitting Diode)
- Resistor — 100 Ohms

How the Circuit Works

The coin battery provides 3V to power the circuit. The current flows from the positive terminal of the battery, through the resistor, then through the LED, and back to the negative terminal. The resistor limits the current flowing through the LED to prevent it from burning out.

Why a Resistor is Needed

An LED cannot handle unlimited current. Without a resistor, too much current would flow through it and damage it. The resistor value is chosen based on the battery voltage and the LED's operating requirements. The formula used is:

R = (Supply Voltage − LED Voltage) ÷ LED Current

R = (3V − 2V) ÷ 0.010A = 100 Ohms

Coin Battery vs 9V Battery

Feature	Coin Battery (CR2032)	9V Battery
Voltage	3V	9V
Size	Very small	Medium
Current capacity	Low	Higher
Common use	Watches, calculators	General electronics
Resistor needed for LED	100 Ohms	470–560 Ohms

If a 9V battery is used instead, a higher resistor value is required to safely limit the current to the LED.

Key Learnings

- Understood how a basic LED circuit is built and simulated in Tinkercad.
- Learned the role of a resistor in protecting an LED.
- Understood the difference between a coin battery and a 9V battery.
- Learned how to calculate the resistor value based on voltage and current requirements.

Doubts - clarified

Coin Battery vs 9V Battery

The coin battery (CR2032) gives 3V while a 9V battery gives 9V. The main differences are size, voltage, and how much current they can supply. Coin batteries are small and provide very little current, while 9V batteries are larger and can power more components.

Why 100 Ohm Resistor?

The resistor is there to protect the LED. Without it, too much current would flow through the LED and burn it out. The value is calculated based on the battery voltage and how much current the LED needs.

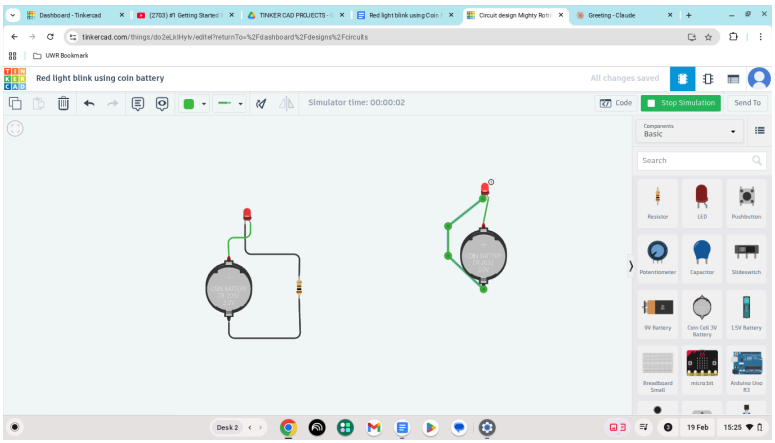
For a 3V coin battery with an LED (which typically needs about 2V), the math is roughly:

- Remaining voltage = 3V - 2V = 1V
- At 10mA (safe LED current): R = 1V ÷ 0.010A = 100 ohms

So 100 ohms works well for a 3V coin battery.

Why use a coin battery if 9V also works?

This is probably just for learning purposes — to understand how a simple LED circuit works with minimal components. In real life, coin batteries are used in small, low-power devices like watches or calculators where compactness matters. If you used a 9V battery, you'd need a **higher resistor value** (around 470–560 ohms) to safely limit the current to the LED, otherwise you risk burning it.



First image (with resistor) : Resistor decrease the flow of current and no burn

Second image (without resistor) : This means the LED could be getting too much current, which in a real physical circuit would burn out the LED quickly. In Tinkercad simulation it may still work, but in real life it would be a problem.

Conclusion

This exercise gave a clear understanding of basic circuit components and how they interact with each other. Tinkercad made it easy to visualize and simulate the circuit without any physical setup. This forms a strong foundation for learning more complex circuits in the future.