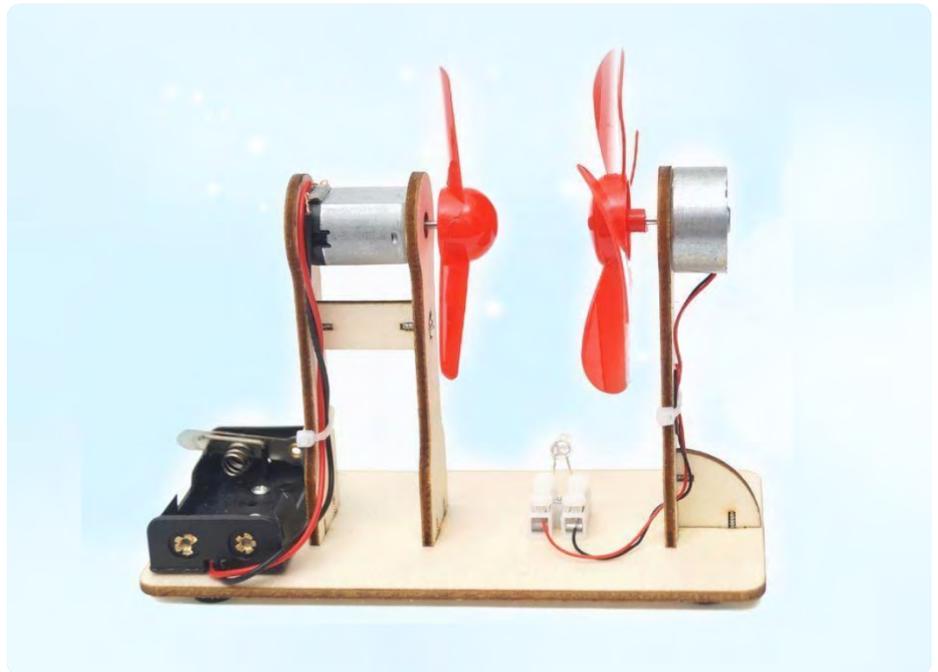


## Activity Guide

# Wind driven generator

Category: **STEAM**  
Topic: **Maker**  
Level: **Medium**  
Duration: **60 mins**



### Activity Description

Wind power generation refers to the conversion of wind kinetic energy into electrical energy. Wind energy is a clean, pollution-free renewable energy source that has been used by people for a long time, mainly through windmills to pump water and grind surfaces. Now, people are interested in how to use wind to generate electricity.

The use of wind power generation is very environmentally friendly, and with the availability of wind energy it is increasingly valued by countries around the world as a viable energy source.

### Learning Outcomes

- Learn about solar electricity and the transfer of electricity.
- Design thinking is required to create this Helicopter.
- Circuitry
- Conductivity

### 21<sup>st</sup>-Century Skills Developed

- **Collaboration**
- **Communication**
- **Creativity and Innovation**
- **Critical Thinking and Problem-Solving**

Collectively Creating  
Opportunity for Children,  
Young People and their  
Communities



# How to Use This Activity Guide

## For Educators

- The learning outcomes and competencies can help build programme plans, logic models, session and lesson plans
- The equipment list will help to materials and resources you need.
- Share with colleagues and volunteers to learn how to facilitate the activity.

## For Everyone

- Print out the guide, starting with the **Step-by-Step Instructions**, for young people to follow along. This allows you to focus on deepening their understanding and engagement with the activity.
- Use the **Glossary of Terms** to help build young people's technical and science vocabulary as they progress through the activity.

## Follow on Activity

- There is extra information for upskilling or more advanced activities



# Equipment

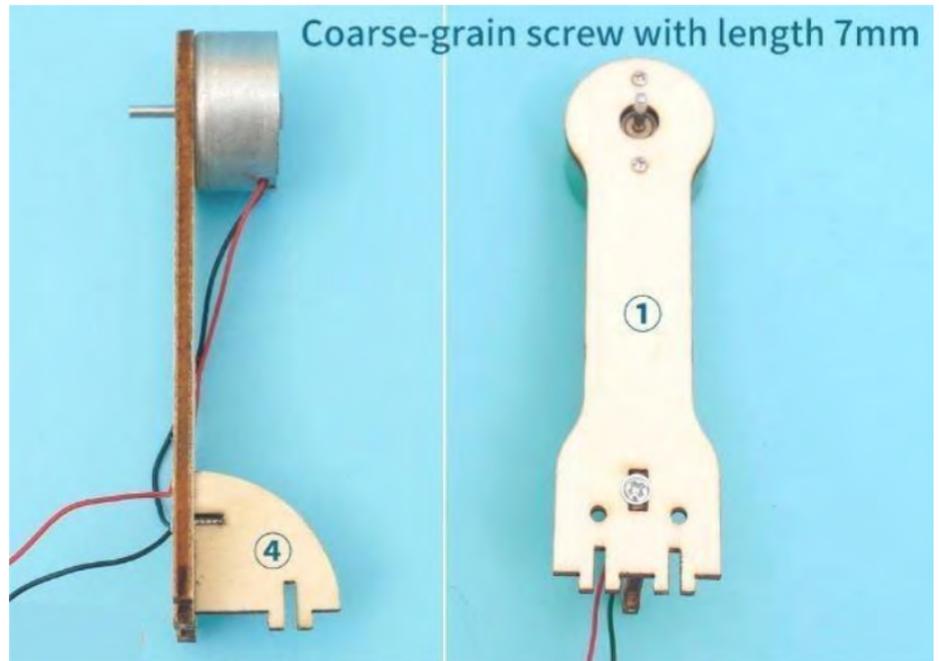
## Equipment

- Laptop/PC with speakers
- Arts & Crafts Materials
- A small Phillips head screwdriver
- 2 AA batteries
- Pair of scissors
- Ruler



**Step 3:**  
Assembly

Secure the #4 board onto the #1 board with a 7mm long screw



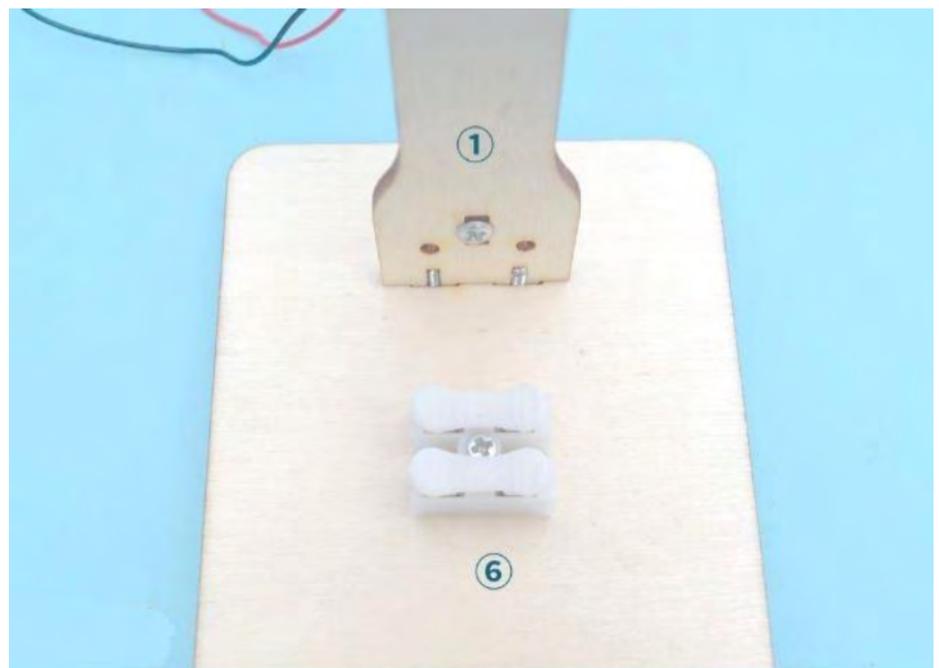
**Step 4:**

Install the motor bracket #1 on the bottom of the #6 board with a 7mm long screw



**Step 5:**

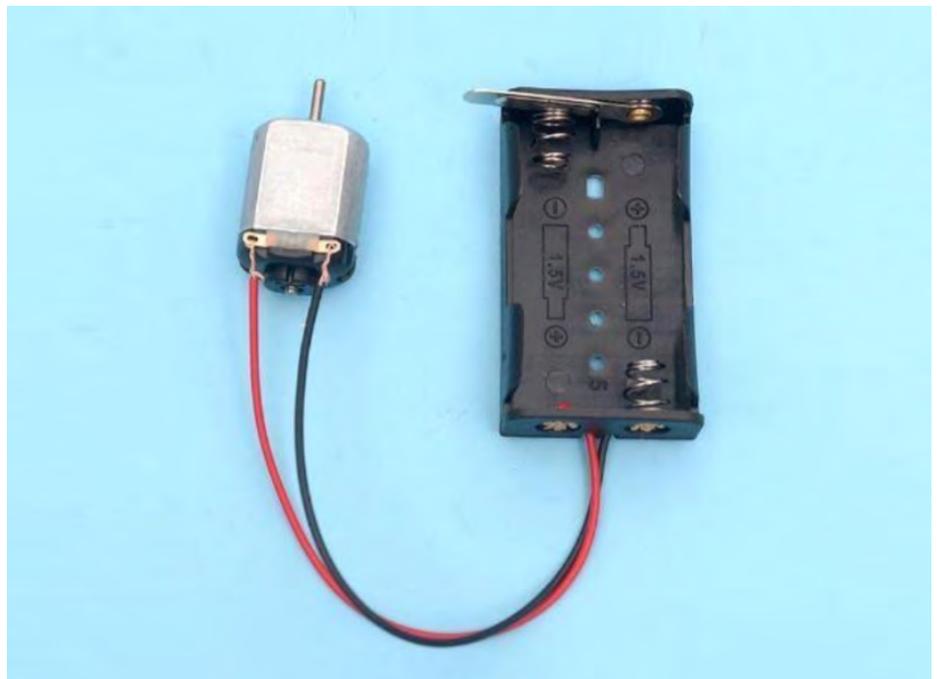
Use 10mm long screws to install the terminal on the #6 board.



### Step 6:

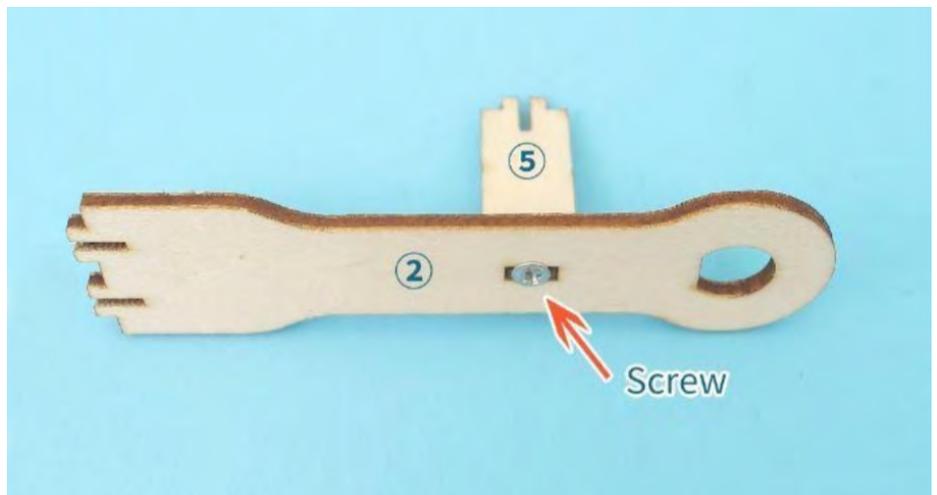
Connect the output line of the battery box to the motor, please refer to the photo for the wiring position of the red and black wires.

Wiring method: first twist the metal wire core into a spiral shape, then pass the wire core through the small hole of the motor wiring copper sheet, and twist 3-4 turns.



### Step 7:

Fix the #5 board and the #2 board with 7mm long screws.



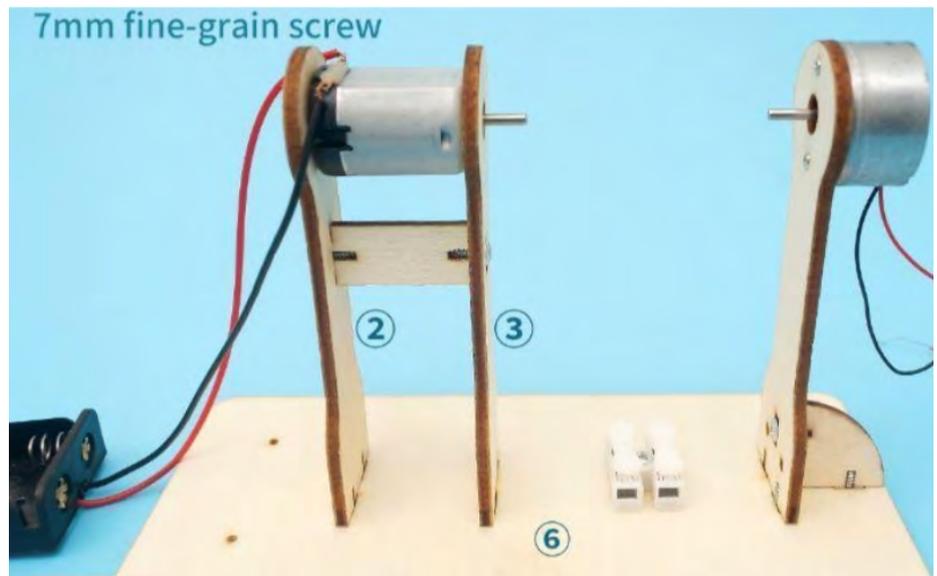
### Step 8:

First install the motor in the motor slots of board #3 and board #2, then fix the #5 board in between boards #2 and #3 with 7mm long screws.



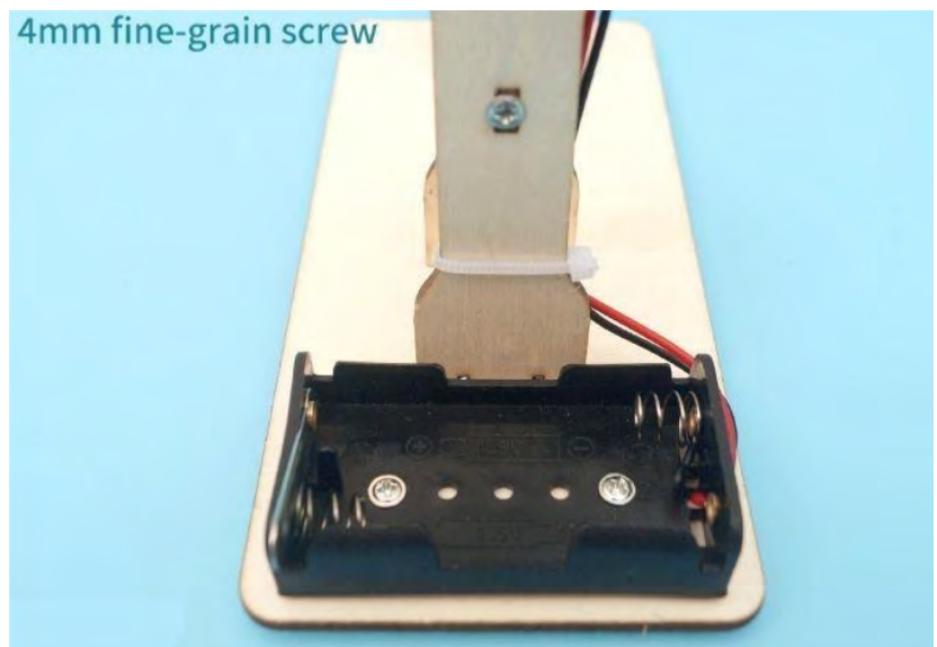
### Step 9:

See photo above. Install the motor bracket onto board #6 with a 7mm sized screw



### Step 10

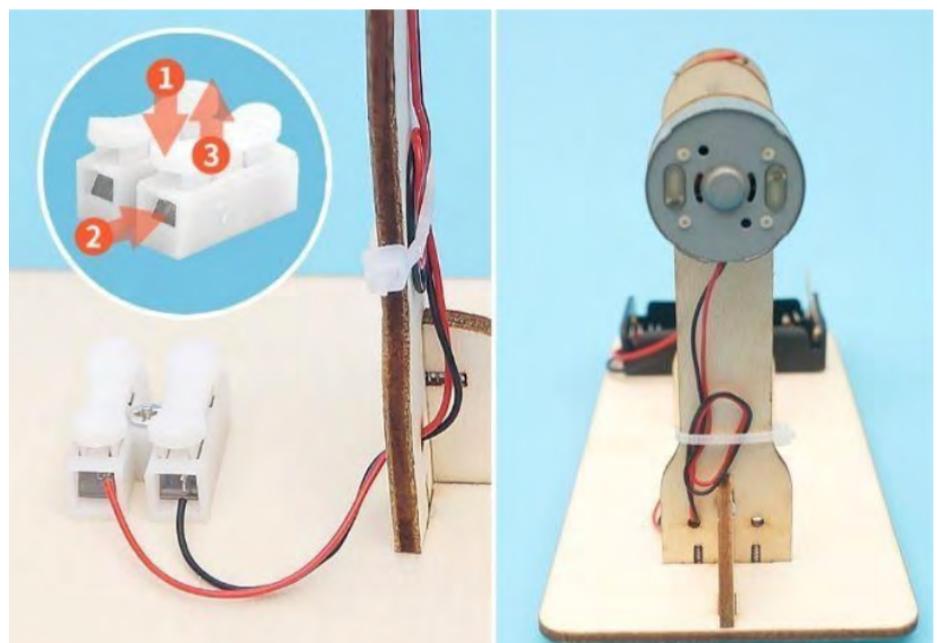
Install the battery box onto the base board #6 with 4mm long flat screws, and fix the wires with the cable ties.



### Step 11:

Pass the wire through the small hole marked 1 in the photo above. Then clamp the metal part of the cable to the connector, and then fix the wire with a cable tie.

How to use the connector: Firstly press one end of the buckle. Then insert the metal wire so it meets the metal inside the connector. Release the buckle, the metal will automatically meet and the connector wiring is then complete



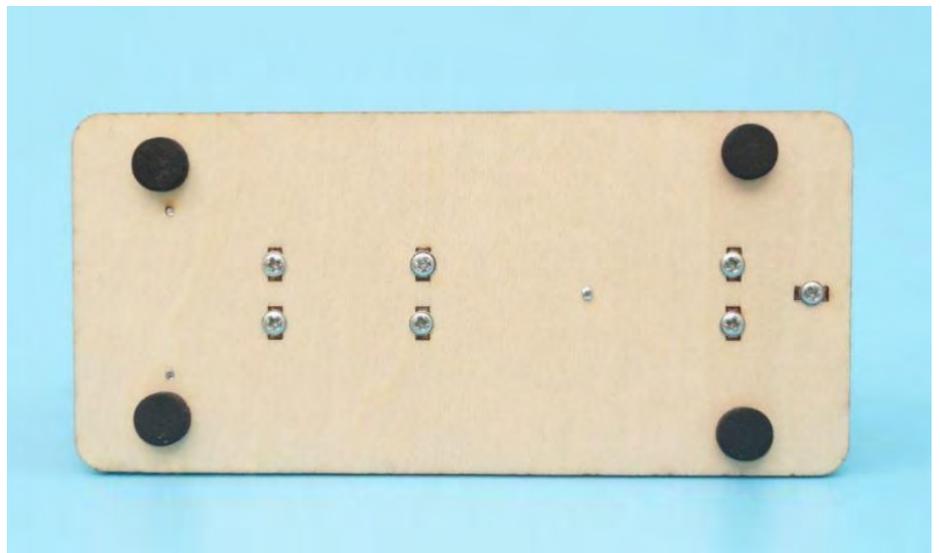
### Step 12:

Clamp the LED to the other end of the connector. Note that the long pins are connected to the black wire and the short pins are connected to the red wire.



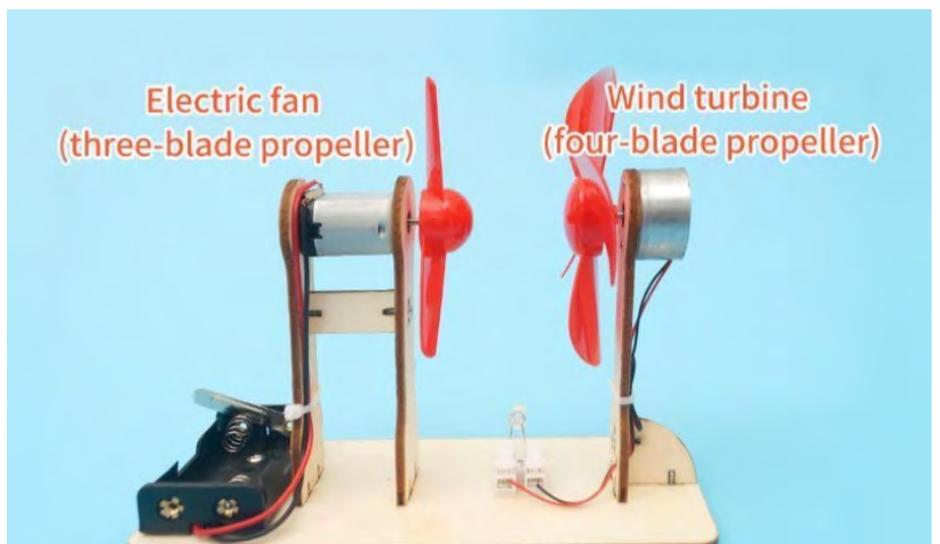
### Step 13:

First remove the adhesive protectors from the foam pads then attach the foam pads to the four corners of the bottom of the base board #6.



### Step 14:

Attach propellers and then your wind generator is complete.





## Potential Troubleshooting

### Issue 1: The fan does not rotate or the fan rotates but the generator fan does not rotate

1. If the fan does not rotate, the wire on the motor may not be connected properly
2. The fan blades of the generator do not rotate, the red and black wires of the fan motor may be connected in the wrong order, or the battery may be almost dead.

### Issue 2: The fan blades of the generator turn, but the lights are off.

1. A. Check whether the line on the white connector is stuck. Are the long and short pins of the bulb in the wrong way around?



## Science Tips

A wind turbine is a device that converts wind energy into electrical energy. It is mainly composed of blades, generators, mechanical parts and electrical parts. The working principle of the wind turbine is relatively simple. The wind wheel rotates under the action of wind force. It converts the kinetic energy of the wind into the mechanical energy of the wind wheel shaft. The generator is rotated by the wind turbine shaft to generate electricity. Broadly speaking, wind energy is also solar energy, so it can also be said that a wind turbine is a kind of solar energy. As a heat source, the generator uses the thermal energy as the working medium. Because the wind power generator is unstable, the output voltage is high and low. It must be rectified by the charger and then charge the storage battery, so that the electrical energy generated by the wind generator becomes chemical energy. Then use the inverter power supply with protection circuit to convert the chemical energy in the battery into 220V AC power to ensure stable use.



# Glossary of Terms

## **Battery** **(Button or Coin Cell)**

Button batteries, also referred to as coin cells, are circular non-rechargeable batteries. Due to their size they are used to power electronic devices. Standard domestic applications include watches, scales, remote controls and calculators. They can be found in greeting cards, and are used to power small LEDs or speakers within the card (RS Online).

## **Conductor**

Allows heat or electricity to pass through it.

## **LED**

Light emitting diode. LEDs have only two wires. One wire is the anode (positive) and another is the cathode (negative). The two wires have different names because LEDs only work in one direction and we need to keep track of which pin is which. One goes to the positive voltage and the other goes to the negative voltage. Electronic parts that only work in 'one direction like this are called Diodes, and that is what the last letter of LED stands for (Adafruit.com).

## **Polarity**

In physics, polarity is an attribute with two possible values - an electric charge can have either positive or negative polarity - a voltage or potential difference between two points of an electric circuit has a polarity, describing which of the two points has the higher electric potential.  
- a magnet has a polarity, in that it has two poles described as "north" and "south" pole.



### Battery type

Only use Zinc Chloride Cell batteries while using this kit.

## Warning! Battery Box:



1. The supply terminals are not to be short-circuited
2. Insert batteries with the correct polarity
3. Remove batteries when not in use
4. Do not use rechargeable batteries
5. Different types of batteries of new and old are not to be mixed
6. Only use Zinc Chloride Cell Batteries

# Battery Safety Warning

Batteries, such as the AA batteries used with this teaching kit, are a source of electrical energy and must be handled with care. To ensure your safety and the proper functioning of your STEM activities, please adhere to the following guidelines:



## Keep Away from Heat

Avoid exposing the battery to direct heat sources or prolonged sunlight, as excessive heat can affect its performance and safety.



## Avoid Short Circuits

Do not connect the battery box terminals to each other, as this can cause the battery and wire to become extremely hot. Always use the designated connectors and components. Always use the provided connectors, wires, or components as intended.



## Polarity

Ensure that you insert the battery with the correct polarity, aligning the positive (+) and negative (-) terminals accordingly.



## Dispose of Properly

When your battery is no longer in use, dispose of it in accordance with your local regulations and guidelines for battery recycling.



## Inspect for Damage

Before use, carefully inspect the battery for any visible damage, such as leaks, dents, or corrosion. Do not use a damaged battery.



## Adult Supervision

Always have an adult supervise your use of batteries and electrical components.