ScienceCube

Brightness of a Bulb Depending on Battery Connection

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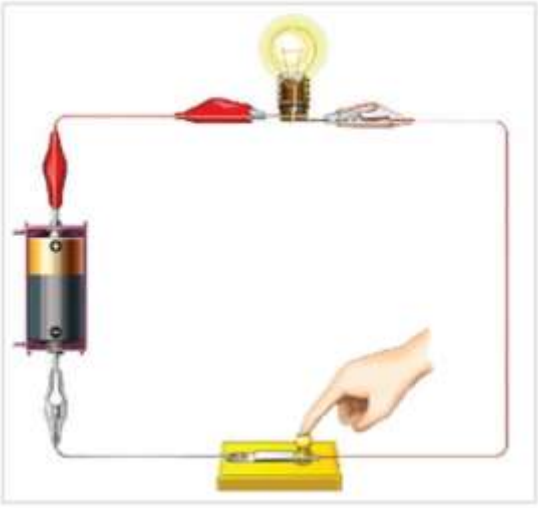
1. **You can measure the brightness of a bulb as the number of batteries increases and explain the relationship.**
2. **You can measure and compare the brightness of a bulb with batteries connected in series and parallel, respectively.,**

Fundamental Concept

1. Electric Circuit

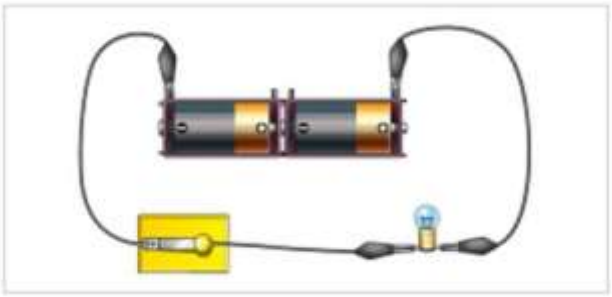
An electric circuit refers to the connection of various electrical components, such as batteries, bulbs, and wires, allowing electricity to flow.



2. Comparison of Bulb Brightness Depending on Battery Connection Method

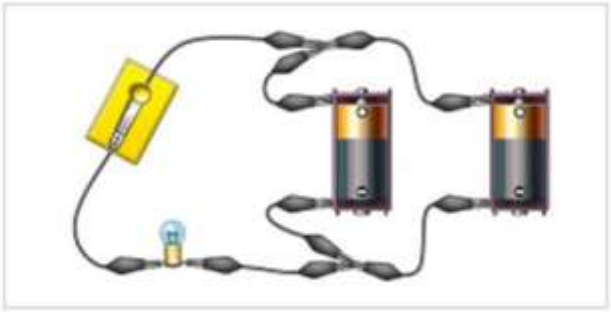
1) Series Connection of Batteries

In an electric circuit, a series connection involves connecting two or more batteries with opposite poles facing each other, allowing the current to flow.



2) Parallel Connection of Batteries

In an electric circuit, a parallel connection involves connecting two or more batteries with the same poles facing each other, allowing the current to flow.



Experiment

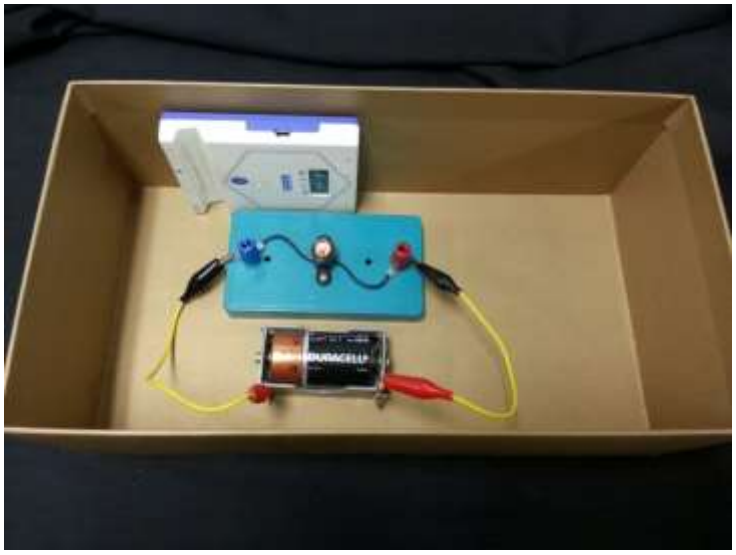
Materials Needed

Smart Sensor Box, Science# Program (Smart Device), Three 1.5V Batteries, Battery Holder,

Bulb (with socket), Two Alligator Clip Wires, Box, Cellophane Tape

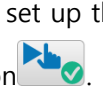
Preparation of Experimental Setup

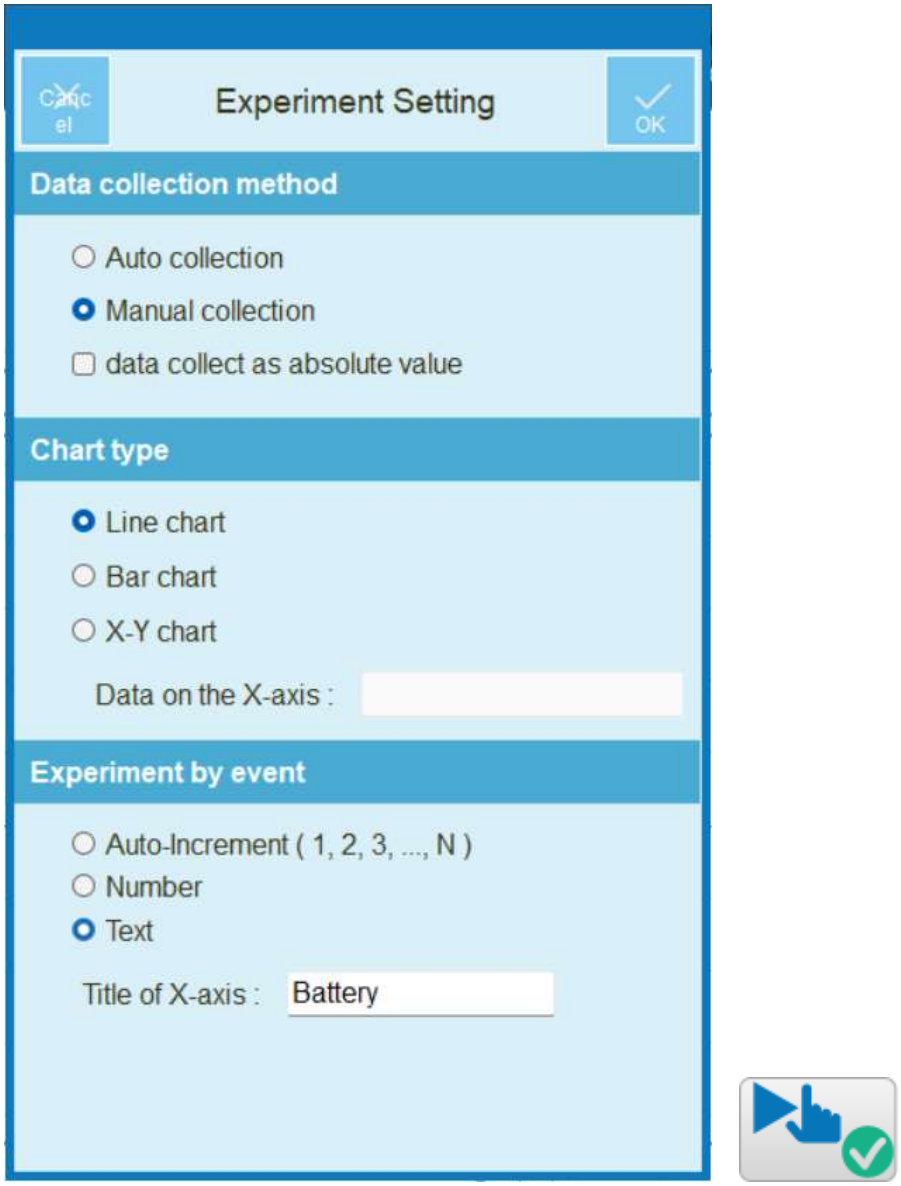
1. Connect one battery and the bulb using alligator clip wires to form a closed circuit, as shown in the diagram.
2. Place the entire circuit inside the box and secure the bulb with cellophane tape so that its position does not change.
3. Turn on the Smart Sensor Box and place it inside the box with the circuit. Close the lid and ensure the light sensor of the Smart Sensor Box faces the bulb directly and is horizontal..



Interface Setup

1.  Launch the Science# program.
2. Connect the Smart Sensor Box to the Science# program.
3. Click 

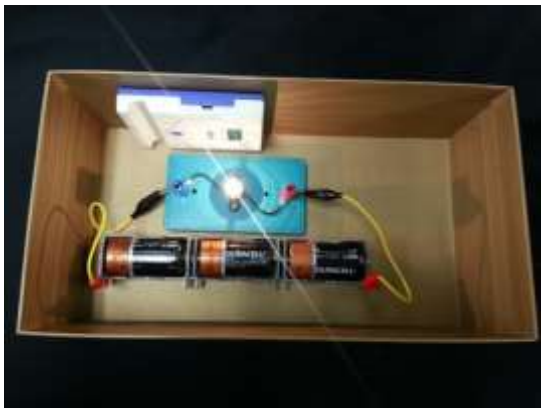
to activate the light sensor.
4. Click  to set up the experimental environment as shown below, or use the automatic setting option  .



Data Collection

[Experiment 1] Brightness of the Bulb Depending on the Number of Batteries

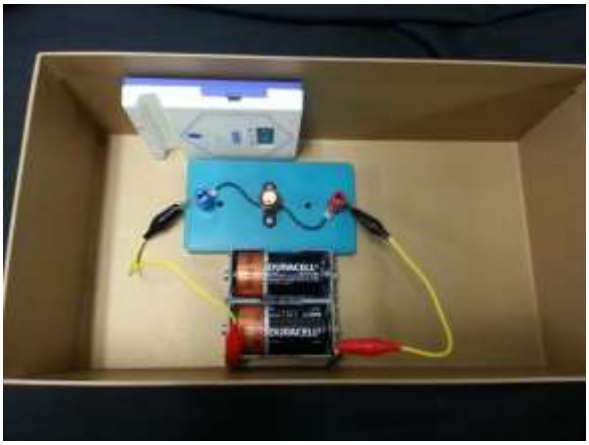
1. Click  and then click  to measure the brightness of the bulb, and enter '1 Battery' in the text input window.
2. Open the lid and increase the number of series-connected batteries to two and then three, measuring the brightness of the bulb each time. Record the number of batteries. (To measure the pure brightness of the bulb, close the lid and conduct the experiment.)

3. Click  to end the experiment..

[Experiment 2] Series/Parallel Connection of Batteries

1. Connect two batteries in series to form a closed circuit, as shown in the diagram, place it inside the box, and close the lid.
2. Open a new chart, click  , measure the brightness of the bulb, and enter 'Series Connection' in the text input window  .
3. Change the connection of the batteries to parallel, measure the brightness of the bulb again, and enter 'Parallel Connection.'
4. Click  to end the experiment..

Data Analysis

Recording Data

1. Measure the brightness of the bulb while increasing the number of series-connected batteries up to three, represent the values in a bar graph, and fill in the table below..

Number of Batteries	1개	2개	3개
Brightness (lux)			

2. Measure the brightness of the bulb with two batteries connected in series and parallel, represent the values in a bar graph, and fill in the table below..

Connection Method	Series Connection	Parallel Connection
Brightness (lux)		

3. Arrange the symbols A to C in order of bulb brightness using inequality signs..

A	B	C
Battery 1	2 Series Connection	2 Parallel Connection

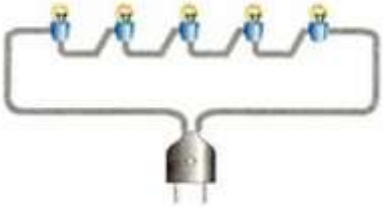
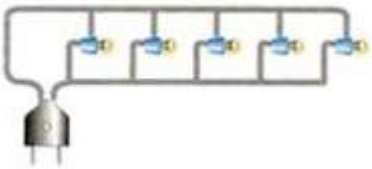
Data Application

1. Describe how the brightness of the bulb changed as the number of series-connected batteries increased and explain the reason.

2. List the advantages and disadvantages of connecting two batteries in series or parallel..

Comparison	Series Connection	Parallel Connection
Advantages		
Disadvantages		

3. Indicate the correct method of connecting bulbs for a Christmas tree by marking the appropriate picture with an O..

Picture		
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