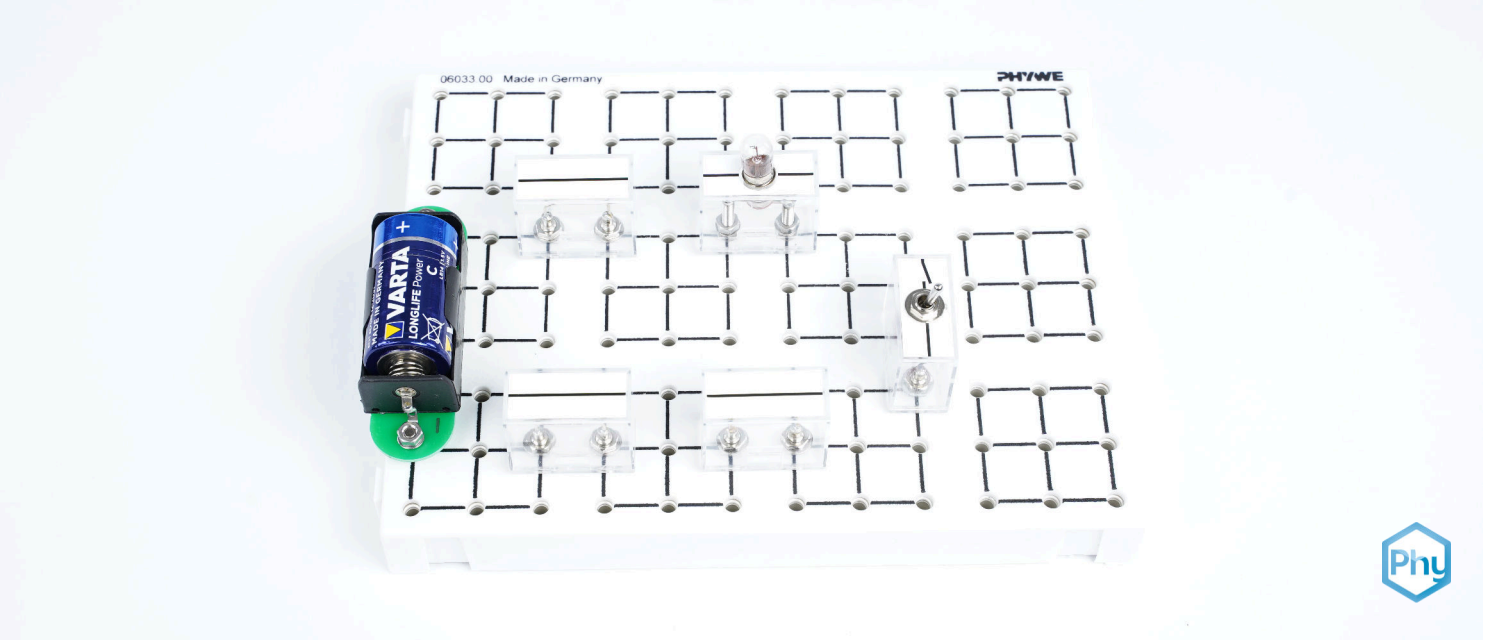
The simple circuit



Physics > Electricity & Magnetism > Simple circuits, resistors & capacitors

Difficulty level	Group size	Preparation time	Execution time
easy	2	10 minutes	20 minutes

This content can also be found online at:

https://www.curriculab.de/c/685268d0cc5322000241ed79

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Teacher information

Application

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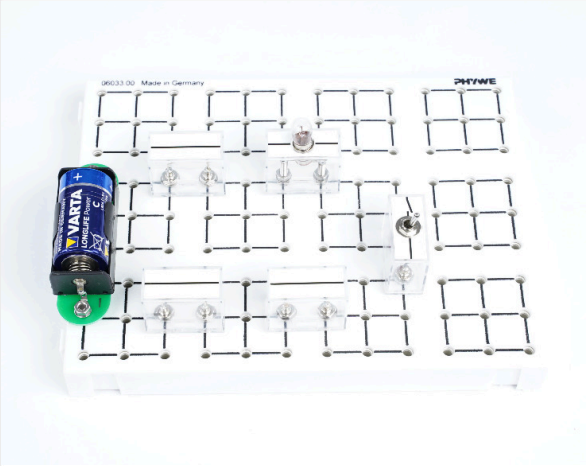

Setup

Our modern life is fundamentally based on electrical circuits of all kinds. It is hard to imagine any area of life without electrical devices. In these devices, various small electrical parts are connected in so-called circuits, which can become as complicated as you like. In this experiment, students are asked to look at the simplest of all circuits to get a first introduction to electronics.

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Other teacher information (1/2)

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Prior knowledge

The students should know the circuit symbols of a power source, a light bulb and a switch.

Principle

The simple circuit consists of a power source, a light bulb and a switch. By setting up the experiment and varying the individual parts, they learn how to read the corresponding circuit diagram and what function the individual parts fulfil.

Other teacher information (2/2)

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Learning objective

Through the experiment, the students should learn to read a basic circuit diagram and use it to set up an experiment. In addition, it should become clear that a current only flows through a closed circuit and that a circuit diagram enables various realisations.

Tasks

The students should first build the circuit according to the illustrations. Then they should try out how the light bulb can be controlled with the switch.

Then vary the structure of the circuit (swap the poles, swap the lamp and switch, replace a conductor component with a cable) and write down the results.

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Safety instructions

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The general instructions for safe experimentation in science lessons apply to this experiment.

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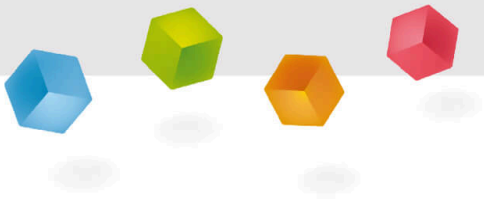

Student information

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Motivation

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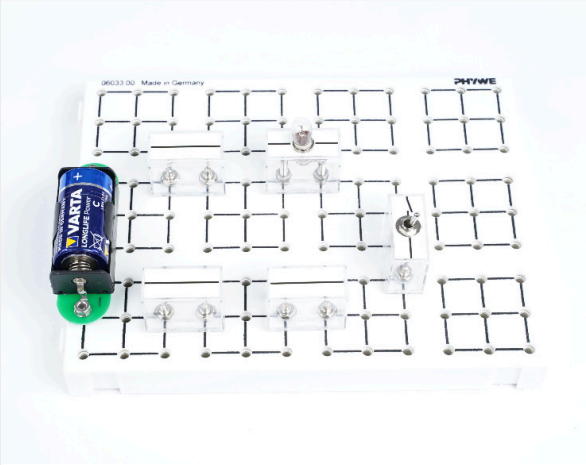

Setup

It would be hard to imagine our everyday lives without electrical circuits. In almost all areas, we use devices in which small components are connected to each other in so-called circuits. These circuits can be very different and also quite complicated. In this experiment, you will learn about the simplest circuit - as a first step into the world of electronics.

Tasks

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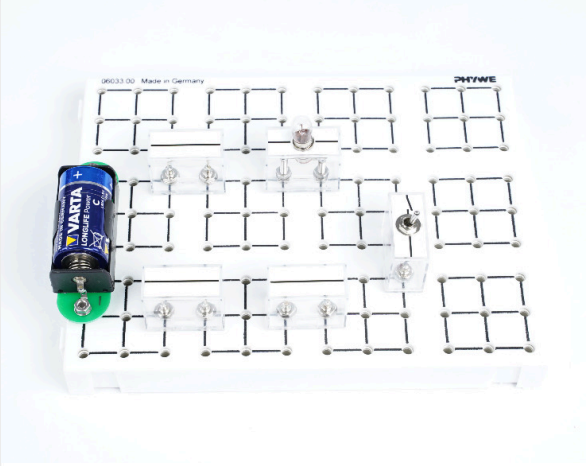

Setup

1. Build the circuit diagram according to the illustrations.
2. Open and close the switch, note the observations.
3. Vary the circuit in different ways and note down the observations (swapping the poles, swapping the lamp and switch, replacing a conductor component with a cable).

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Equipment

Position	Material	Item No.	Quantity
1	Plug-in board, for 4 mm plugs	06033-00	1
2	on-off switch, G1	39139-00	1
3	Wire building block, housing G1	39120-00	3
4	Lampholder E10, case G1	17049-00	1
5	Battery holder	39115-01	1
6	Connecting cord,19 A,25cm, red	07313-01	1
7	Battery Type C 1.5 V - Pack of 2 pieces	07400-00	1
8	Filament lamps 4V/0.08A, E10, 10	06154-03	1

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Setup (1/2)

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- **Pegboard**: It contains a system of sockets that are internally connected by wires, as indicated by the lines on the top of the board. The sockets are designed to accommodate the pins of electronic components during experiments.
- **Off switch**: This switch is used to open or interrupt the circuit.
- **Lamp socket**: The light bulb is screwed into this socket.
- **Connecting cable**: It consists of a wire protected by an insulating layer to prevent contact.
- **Connector module**: A short wire with plugs on both ends, used to conveniently connect sockets on the pegboard instead of using a longer connecting cable.
- **Battery**: You're probably already familiar with this. It is the source of electric current in the circuit (later on, you'll understand why it's also referred to as a voltage source).

Setup (2/2)

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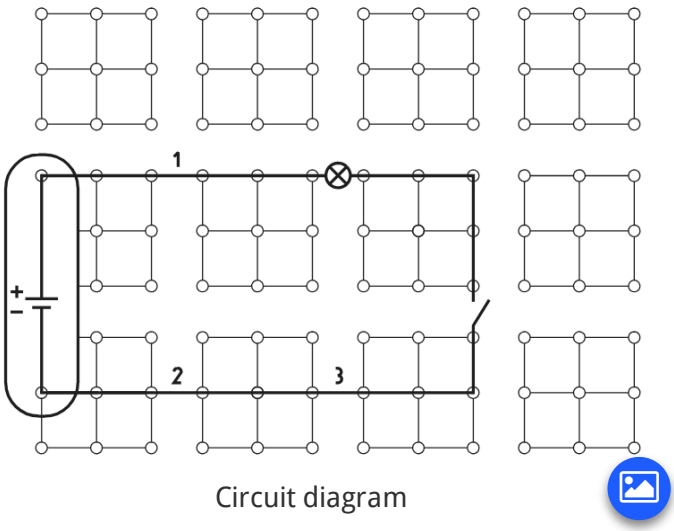

Circuit diagram

- Set up the experiment as shown in the circuit diagram on the left. The individual components are shown symbolically.
- The numbers 1 to 3 indicate the points at which the circuit components should be connected. The switch should first be open so that no current flows through it.
- If you press the blue button, a photo of the experiment set up will also appear to help you.

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Procedure (1/3)

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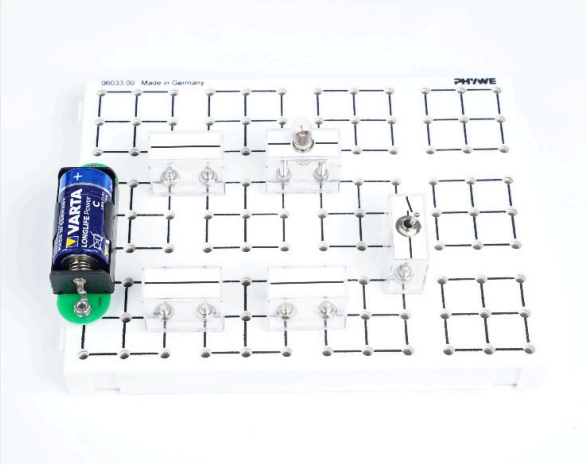

Setup

- Close and open the switch several times while observing the light bulb.
- Note the observations under observation 1.

Procedure (2/3)

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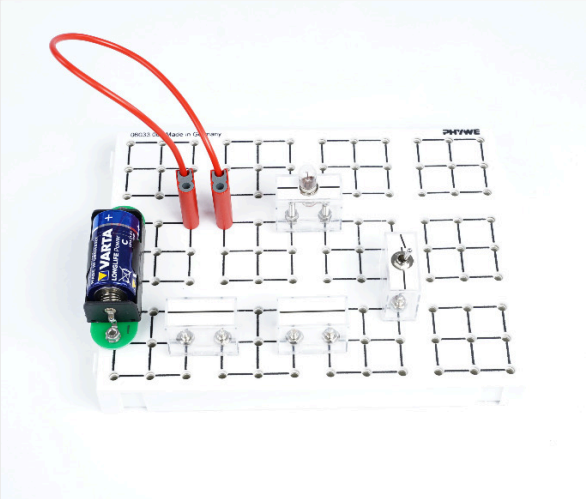

Setup for second part of the experiment

- Replace one of the cable modules with the connecting cable and operate the switch again.
- Observe the light bulb and make a note of your observations under observation 2.

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Procedure (3/3)

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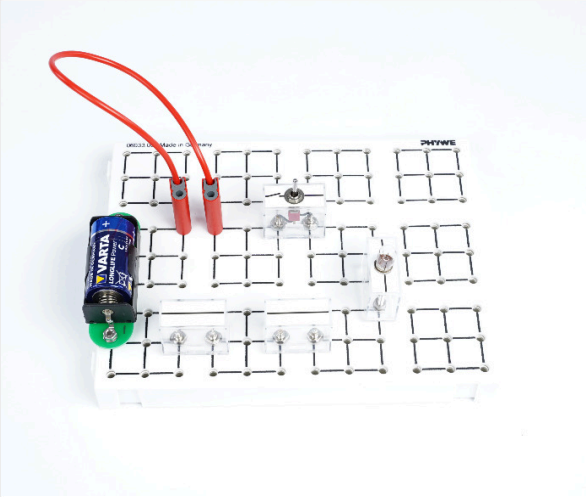

Setup for third part of the experiment

- Swap the positions of the switch and the light bulb. Then use the switch to turn the current flow on and off.
- Next, reverse the polarity of the battery by reconnecting the battery holder with the poles swapped. Again, use the switch to turn the current on and off.
- Observe whether the brightness of the light bulb changes.
- Record your findings under Observations 3.

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Report

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Observation 1

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Note down your observations from experiment part 1

Observation 2

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Note down your observations from experiment part 2

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Observation 3

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Note down your observations from experiment part 3

Task (1/3)

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How did you recognise that current was flowing during the experiment?

- The light bulb has gone dark
- The light bulb has lit up
- The switch has flipped

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Task (2/3)

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What follows from the observations?

- [ ] The cable modules can be replaced by cables as required. However, cable modules are easier to install and are therefore preferred.
- [ ] To control the lamp, the switch must be positioned in front of the lamp. If the lamp is positioned in front of the switch, it is always supplied with power.
- [ ] Although line modules can be replaced by cables, this results in a different circuit diagram.
- [ ] In the simple circuit, it does not matter where the switch is located. It follows that the current only flows if the circuit is not interrupted anywhere.

Check

Task (3/3)

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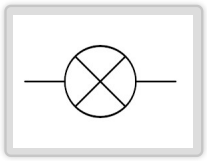
Which components do the circuit symbols belong to?

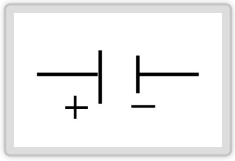
Light bulb

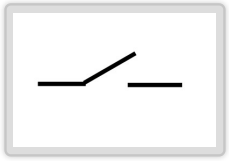
Switches



Connecting cable

Battery (with polarity)





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Slide	Score / Total
Slide 19: When does the current flow during the experiment?	0/1
Slide 20: What follows from the observations?	0/2
Slide 21: Which components do the circuit symbols belong to?	0/4

Total amount 0 / 7

Solutions | Repeat | Export text

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