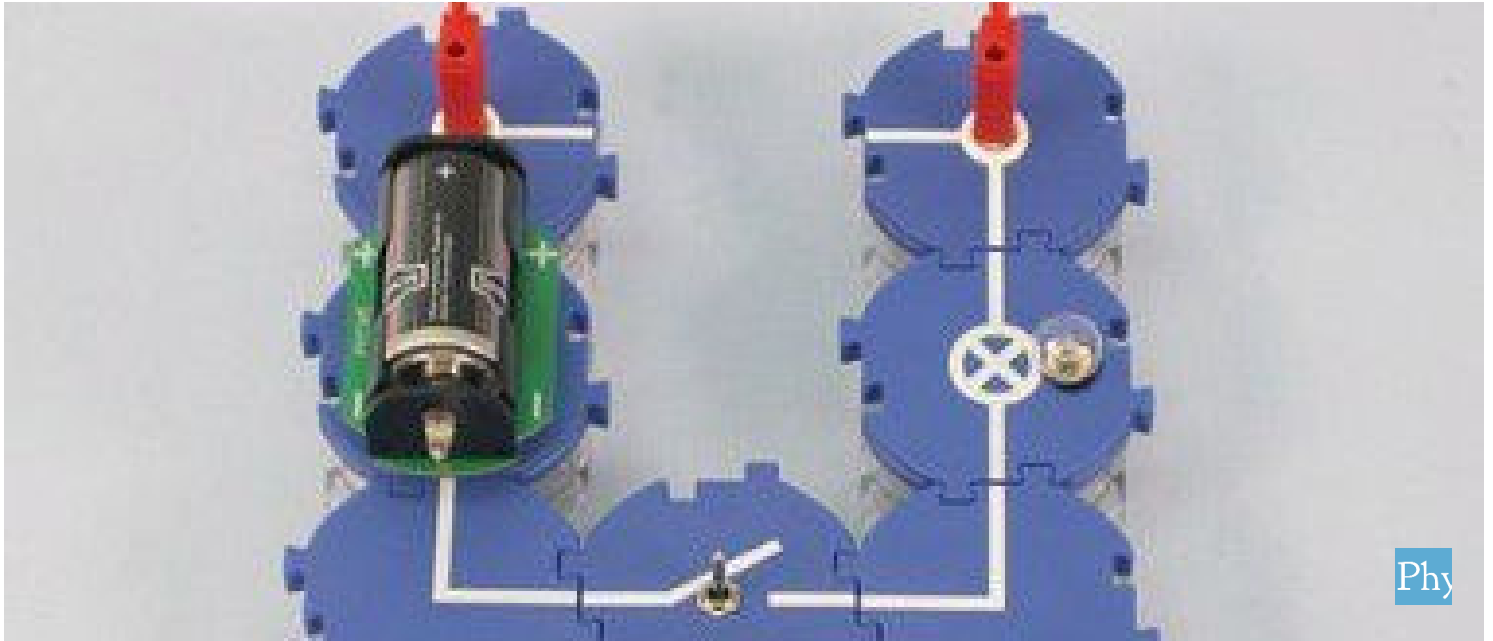


The simple electrical circuit



Physics

Electricity & Magnetism

Simple circuits, resistors & capacitors



Difficulty level

easy



Group size

2



Preparation time

10 minutes



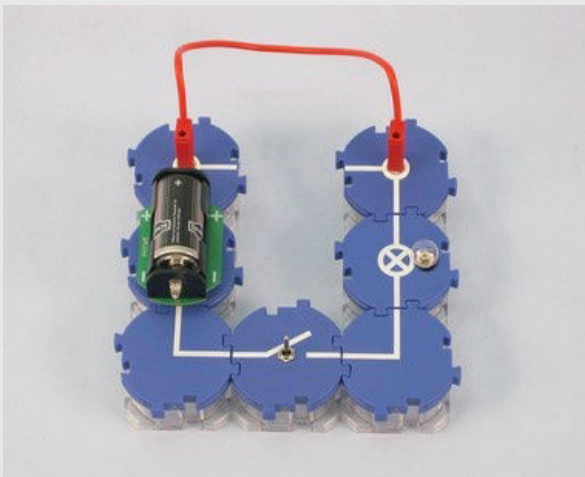
Execution time

10 minutes

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Teacher information

Application

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Experiment set-up

The simple electric circuit is the basis in electrical engineering. The experiment shows the basis for every consumer.

Without a circuit, no lamp can light up. In this case, a battery is used as the voltage source and a light bulb as the load.

Other teacher information (1/2)

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Prior knowledge



Students should know what purpose power cables serve and that electricity is used to power light bulbs.

Scientific principle



If an electric circuit is closed, charge carriers move to effect a charge balance. The electrical energy thus available can be used to convert electricity into light and heat, e.g. by means of an incandescent lamp.

The line components have the same function as a connecting line. The function of the line component and the angle with socket can be seen when the course of the connecting wires in the component is observed.

Other teacher information (2/2)

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Learning objective



The students should first realize that an electric current can only flow in a closed circuit. The simplest of all circuits is used for this purpose. They should be able to memorize the used components or parts and their circuit symbols and their function and be able to build circuits according to circuit diagrams or to reproduce experimental setups by means of circuit diagrams.

Tasks



The students should build an electrical circuit with a light bulb. The individual components and their functions are examined.

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

Motivation

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Light bulb

How does the lamp actually work at your home?

No matter whether it is an incandescent lamp, halogen spotlight, fluorescent tube or LED: In order for the light to come on, an electric circuit must be closed. In this experiment, you will learn exactly what this means and which electrical components are required for this.

Tasks

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What does a simple electric circuit consist of?

Build an electrical circuit with a light bulb and a battery, like a flashlight.

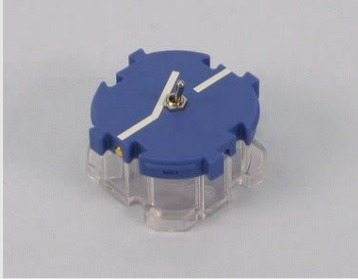
Investigate what the individual components do and how they interact.

Equipment

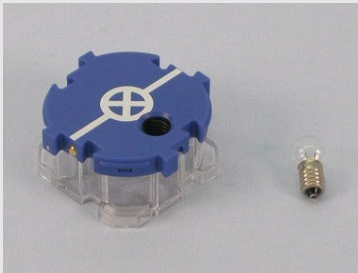
Position	Material	Item No.	Quantity
1	Straight connector module, SB	05601-01	1
2	Angled connector module, SB	05601-02	2
3	Interrupted connector module with sockets, SB	05601-04	1
4	Angled connector module with socket, SB	05601-12	2
5	On-off switch module, SB	05602-01	1
6	Socket module for incandescent lamp E10, SB	05604-00	1
7	Battery holder module (C type), SB	05605-00	1
8	Connecting cord, 32 A, 250 mm, red	07360-01	1
9	Battery cell, 1.5 V, baby size, type C	07922-01	1
10	Filament lamps 1.5V/0.15A,E10,10 pieces	06150-03	1

Set-up (1/4)

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Off switch: It can be used to close or break the circuit.



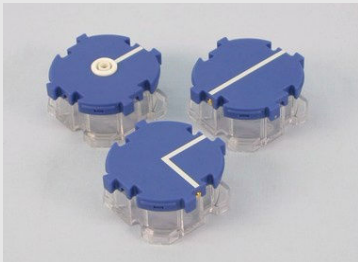
Lamp socket: The bulb is to be screwed into this.

Set-up (2/4)

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Connecting line: It consists of metal wires protected against contact by an insulating layer and has a plug at each end.



Line modules: They consist of short wires between the side contacts or between a side contact and a socket on the module.

Set-up (3/4)

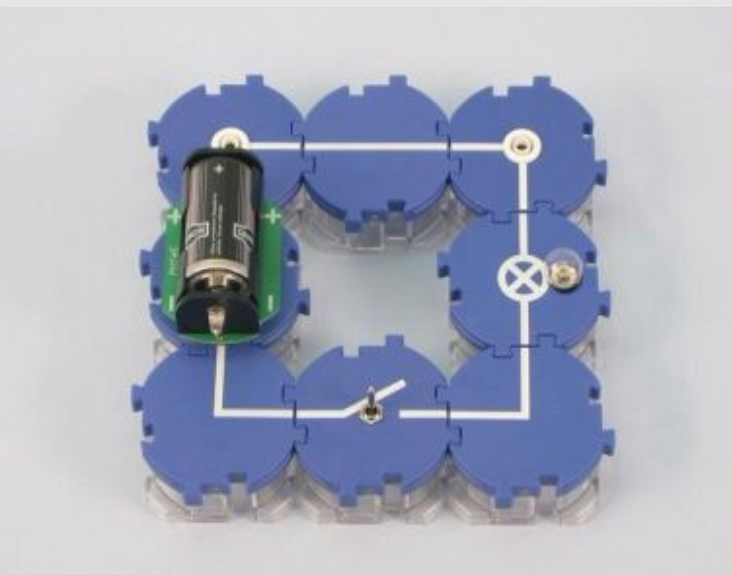
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Batteries are yours I'm sure you're familiar with it. Electricity' (more precisely: electrical energy) can be stored in it. It therefore serves as the source of the electric current that is to flow in the circuit. It is often used in mobile devices such as flashlights and the like. Later you will understand why it is called a voltage source.

Set-up (4/4)

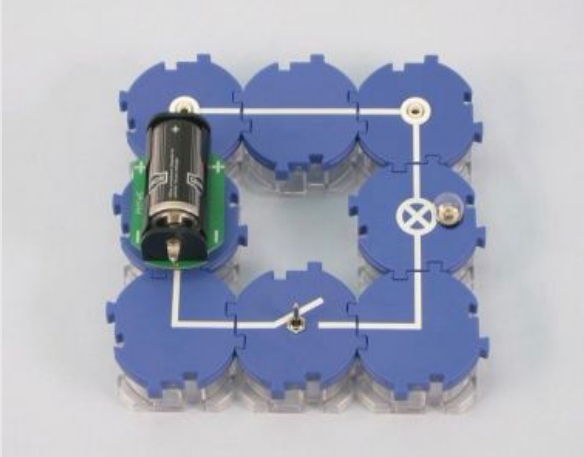
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Set up the experiment as shown in the adjacent figure. The switch is initially open.

Procedure (1/3)

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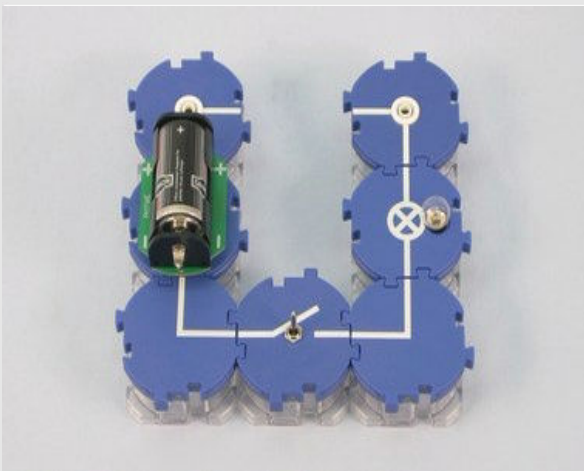


Test setup A

- Close and open the switch several times by moving the small lever back and forth. Watch the light bulb.
- Now exchange the switch and the bulb and open and close the circuit again a few times using the switch, while you continue to observe the bulb.
- Lastly, also swap the poles of the battery by replugging the battery holder and observe whether the behaviour of the bulb now changes when it is switched on and off again.

Procedure (2/3)

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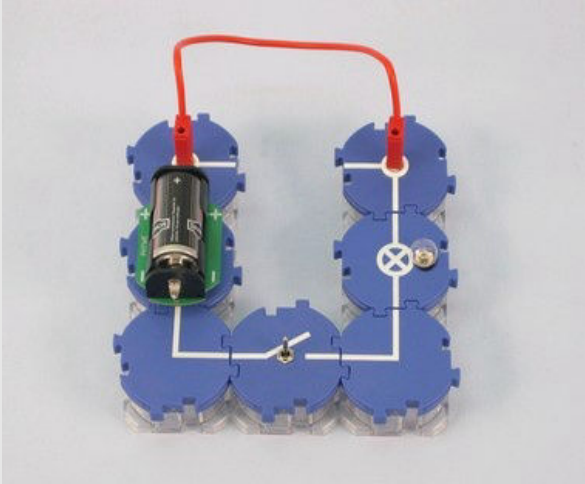


Test setup B

- Change the experiment according to the adjacent figure by removing the straight line block.
- Now press the switch again several times and observe the behaviour of the bulb.

Procedure (3/3)

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Test setup C

- Then bridge the missing component with a connecting cable. The cable is simply plugged into the two upper sockets.
- Now watch the light bulb again, while you open and close the switch several times again.

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Report

Task 1

Which components belong to the simple electric circuit?

 Connection line Coil Capacitor Power source Consumer (e.g. a lamp) Check

For the battery, one contact must be connected to the negative pole and one contact to the positive pole for the lamp to light up.

 True Wrong Check

Task 2

What is the function of the switch in an electric circuit?

 It opens and closes the circuit. The switch is a so-called consumer in the circuit It generates electricity when closed and charges when open. Check

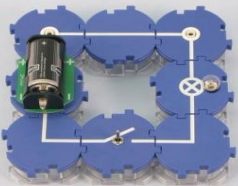
Task 3

How could you tell that an electric current was flowing?

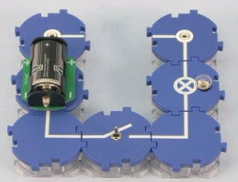
- When the lamp lights up, an electric current flows.
- When the lamp is not lit, an electric current flows.
- When the switch is closed, an electric current flows.

✓ Check

Task 4



Test setup A



Test setup B

In which test set-up does the lamp light up when the switch is closed?

A

B

✓ Check

Slide	Score/Total
Slide 18: Multiple tasks	0/4
Slide 19: Task of the switch	0/1
Slide 20: Characteristic for current flow	0/1
Slide 21: Comparison of the test setups	0/1

Total amount

 Solutions Repeat