

A1.1 The lamp should light up!



You would like to go camping with your friends this weekend. In addition to a tent, sleeping bag, and air mattress, you would like to take along a flashlight for nighttime, of course. Unfortunately, when you check whether your flashlight works, the lamp doesn't light up.



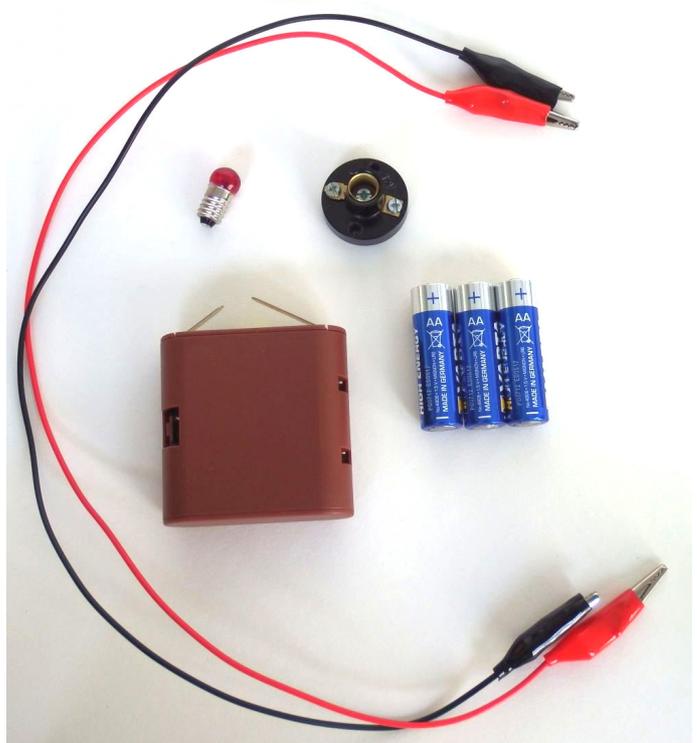
How can you get the incandescent lamp in your flashlight to light up again?



Write down your ideas and guesses:

You need the following for the experiment:

- 3 batteries
- 1 battery holder
- 2 cables with alligator clips
- 1 incandescent lamp (3.5 volts)
- 1 incandescent lamp socket



Required materials.

**How to set up the experiment:**

Lay out all the materials as shown in the photo.

1. Look closely at the battery holder: It has two metal strips on top. These are the terminals. We also call them “poles.”
2. Look closely at the lamp socket: It has two terminal screws or two terminal strips.

**How to conduct the experiment:**

Tip: If you are having trouble getting the lamp to light up, go get the sheet “Do you need help?”

1. Place the batteries in the battery holder.
Make sure you insert the batteries in the correct direction.
2. Screw the lamp into the lamp socket.
3. Connect the battery holder and lamp socket using the cables.
4. Trace all the connections with your finger. What do you notice?

**Write down your observations:**

What problems did you have before you got the lamp to light up?
How did you solve them?

This caused problems:

This is how I solved the problem:

**Evaluate your observations:**

Describe the path of the current. Fill in the blanks in the text using the following terms:

battery holder – battery holder – cable – cable – circuit – lamp – lamp – pole – pole.

The current flows from one _____ of the _____ to the _____ via the _____. Then the current flows through the _____ and to the other _____ of the _____ via the other _____.

This is called a closed _____.

**Doing further research:**

1. Replace the incandescent lamp with an LED.
2. Test which LED leg (the shorter or the longer leg) you have to connect to the battery holder's positive pole so that the LED lights up.
3. What similarities or differences do you notice?
How do you rate the brightness compared to the incandescent lamp?



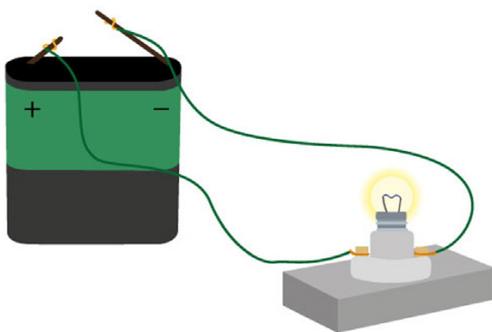
Sketch a diagram of your electrical circuit.

1. First look at the graphic symbols that are used in technology for the components of an electrical circuit.

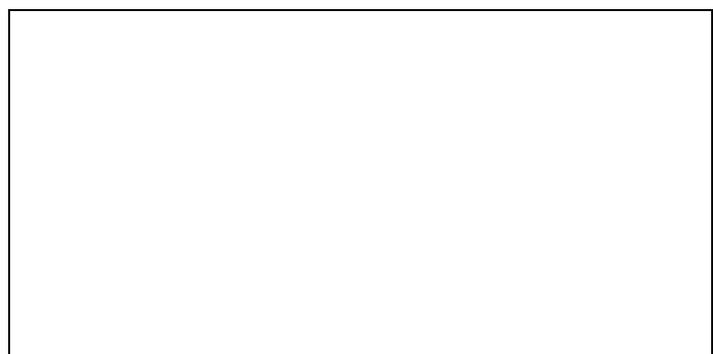
Switch element	Graphic symbol	Description
		The graphic symbol for any type of battery.
		The graphic symbol for an incandescent lamp (also with socket).
		The graphic symbol for a cable is a straight line.

Tips:

2. Draw the cables only as straight lines with square corners (no curves).
3. You do not need to draw how your cables are attached to the terminals.
4. Also, do not draw any other details that are not important to whether the circuit works (for example, the color of the cable).



Example of a circuit.



What the sketched circuit diagram looks like.

Consider the following: What could you change in your real circuit without having to sketch a new circuit diagram?



What is your opinion?

Hugo frequently quarrels with his older sister. She thinks she always knows better only because she is older. Hugo's sister is often the last one in the bathroom in the morning and frequently leaves the light on. Their mother has often told her that she shouldn't do that because it is important to save electricity. As Hugo is walking to the bus to ride to school, he sees that the light in the bathroom is still on.

Think about it: What would you do in Hugo's place?
