**Light a bulb**

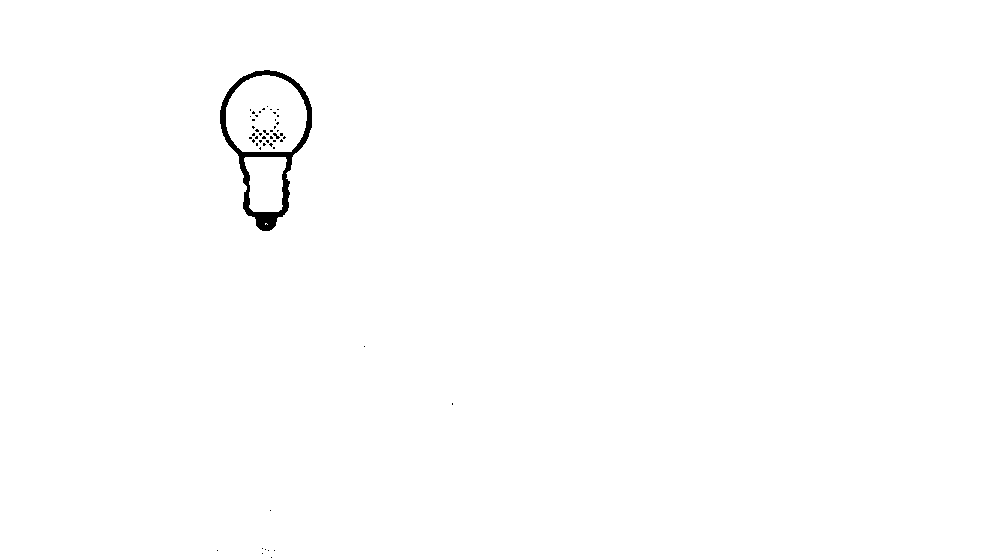
Do you *really* know how to light a bulb?

**Circuit 1**

**Apparatus**

* 1.5 V battery
* 1.25 V bulb
* one connecting lead

**1.5V**



2.5V

**+ -**

**Procedure**

Light the bulb with just one wire and a battery?

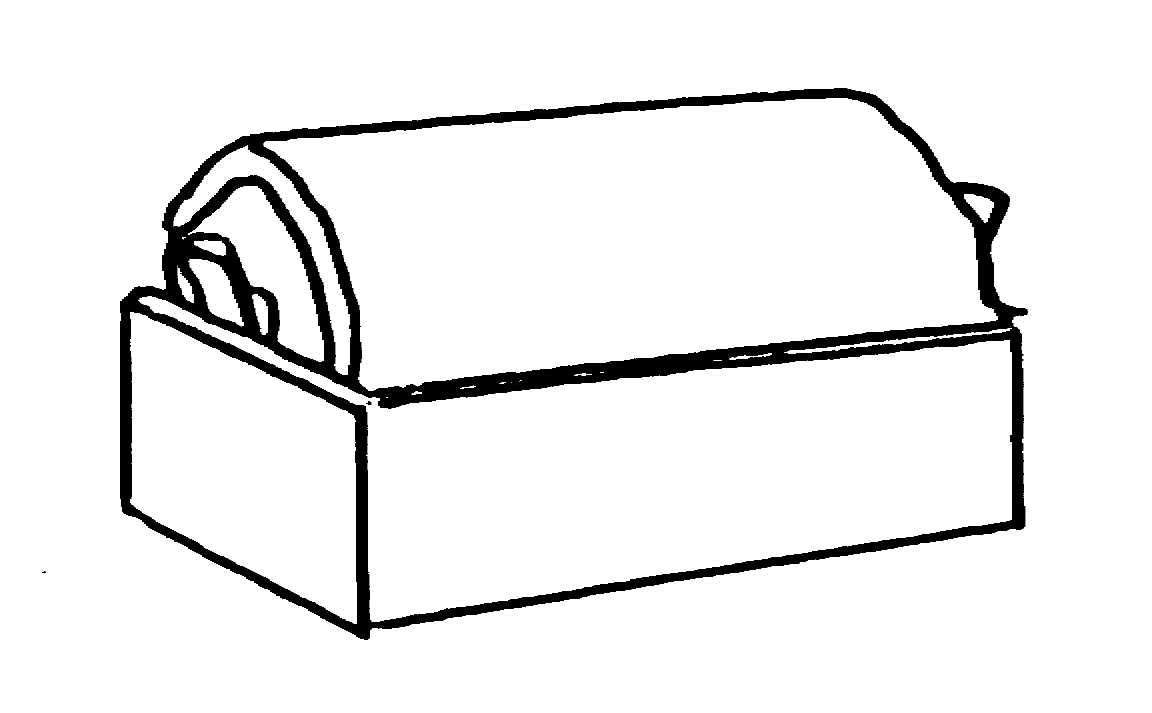
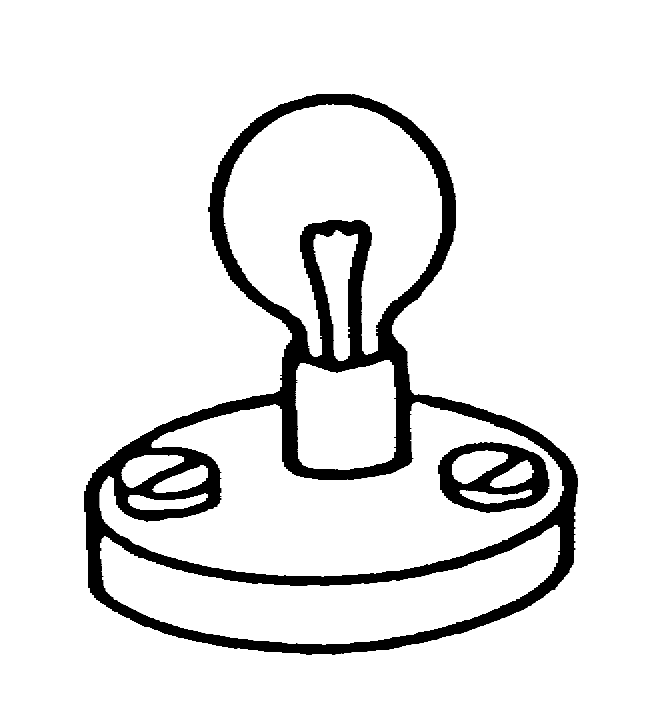
Draw a picture to show what you did.

**Circuit 2**

**Apparatus**

* 1.5 V battery in a battery holder
* 1.25 V bulb in a bulb holder
* two connecting leads

**+ -**



**Procedure**

* Light the bulb again and trace the path through the bulb and the battery.

**To answer**

* How does the battery holder connect the wires to the ends of the battery?
* How does the bulb holder connect the wires to the metal connections on the bulb?

*Physics > Big idea PEM: Electricity and magnetism > Topic PEM1: Simple electric circuits > Key concept PEM1.1 Making circuits*

|  |
| --- |
| **Response activity** |
| **Light a bulb** |

**Overview**

|  |  |
| --- | --- |
| Learning focus: | An electric circuit is a closed conducting loop containing a battery. |
| Observable learning outcome: | * Describe how a simple circuit can be used to test for faulty components, and trace the circuit through components to identify breaks in the conducting loop |
| Activity type: | Response, application and practice, practical investigation |
| Key words: | electric circuit, connection, filament, current |

This activity can help develop students’ understanding by addressing the sticking-points revealed by the following diagnostic question:

* Diagnostic question: Bulb in a circuit

**What does the research say?**

Building complete circuits is an idea that many students have seen earlier in their learning, but if this is their first experience of electric circuit work in a new school then unfamiliar equipment and surroundings will impair their ability to recall what they know (Solomon, 2000). Familiarisation with new equipment is an important part of this task.

When given a bulb, battery (not in holders) and a connecting wire, many 8-12 year olds, and many older students too, cannot make the bulb light up (Shipstone, 1985). These students typically treat the bulb as a *one-terminal sink* and connect the wire only one connection point. Usually the one on the end of the bulb.

Whilst most students can identify a complete circuit from a picture or a circuit diagram (Gott, 1984), this activity develops understanding of how current needs to flow *through* the components as well as through the wires, and supports the scientific model for the conservation of current.

Being able to build a circuit successfully is essential if students are to use electric circuits to develop their understanding of electricity.

**Ways to use this activity**

This practical activity gives students the opportunity to practise applying their understanding and to clarify their thinking through discussion. To support this, students should complete the practical in pairs or small groups.

Firstly, students build a simple circuit to light a lamp without using any component holders. Some groups will complete this quickly and some will take a long time. Asking those who are struggling to examine the filament carefully, and to notice that the ends attach internally to the side and the bottom of the bulb, often helps them to make the connection.

Drawing this circuit out and then repeating with the bulb and battery in holders reinforces the learning.

This is a good place to (re)introduce circuit diagrams as a convenient and clear shorthand for drawing circuits.

**Equipment**

For each student/pair/group:

* 1.5 V battery
* 1.25 V bulb
* 2 connecting leads
* Battery holder
* Bulb holder

**Technician notes**

Electric circuit components and connecting wires are often damaged and this can get in the way of the practical work. It is particularly important for this activity that all the components are working.

It is good practice to have components checked regularly, and to have a system for collecting in damaged components as they are found.

**Health and safety**

**Mains electricity:** students should be reminded that wires should never be pushed into electrical sockets. It should be made clear to them that mains supply can kill.

If there are students in your class who are at risk of ignoring this advice, then it is advisable to turn off the power to the electrical sockets in your room.

Practical work should be carried out in accordance with local health and safety requirements, guidance from manufacturers and suppliers, and guidance available from CLEAPSS.

**Expected answers**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  |  |

**Acknowledgments**

Developed by Peter Fairhurst (UYSEG).

**References**

Gott, R. (1984). *Electricity at age 15: a report on the performance of pupils at age 15 on questions in electricity*. London: Dept. of Education and Science, Welsh Office, Dept. of Education for Northern Ireland.

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