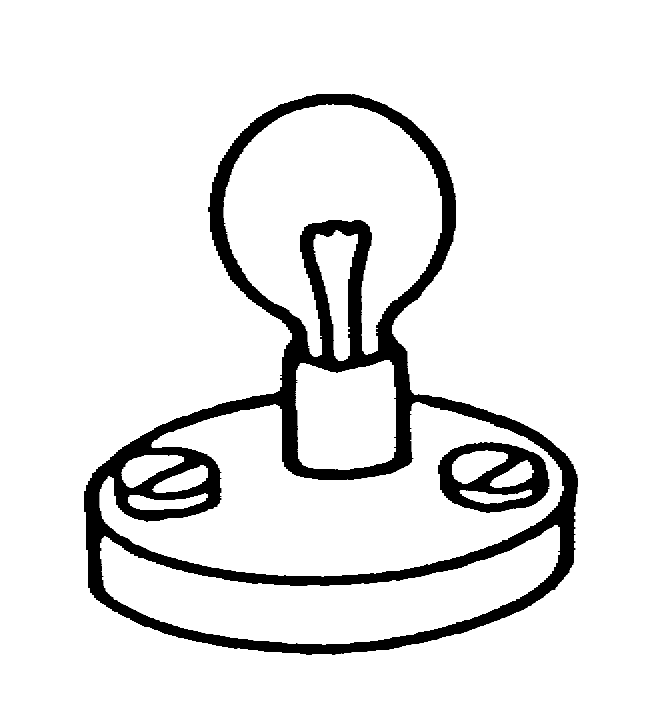
**Circuit symbols**

You can draw a neat circuit diagram quickly if you use circuit symbols.

1. A bulb

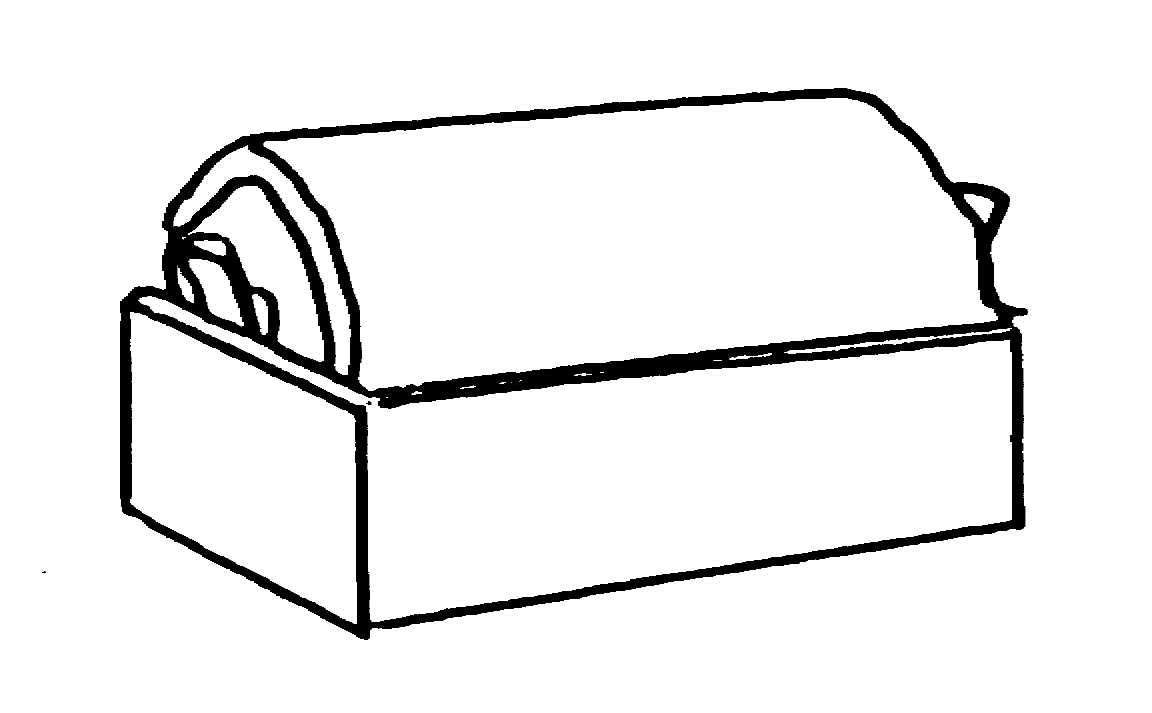


* 1. What is the circuit symbol for a bulb?

Put a tick (✓) in the box next to the correct answer.

|  |  |  |
| --- | --- | --- |
| **A** |  |  |
|  |  |  |
| **B** |  |  |
|  |  |  |
| **C** |  |  |
|  |  |  |
| **D** |  |  |

2. A battery



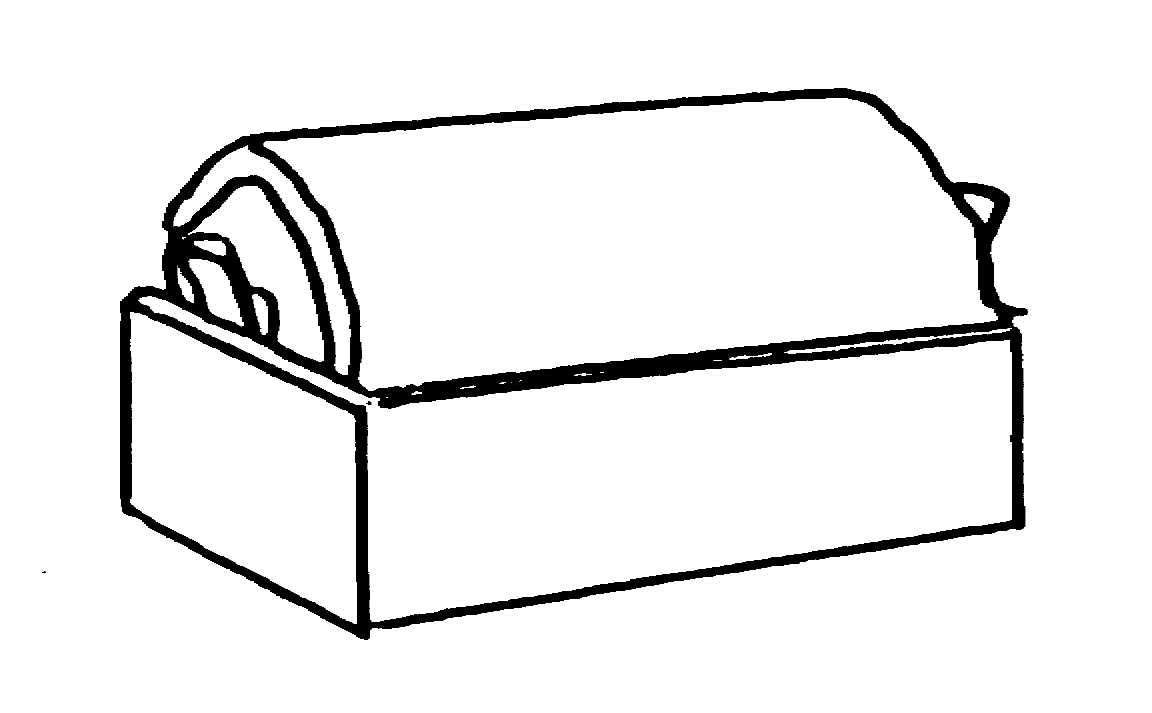
+

1. What is the circuit symbol for a battery?

Put a tick (✓) in the box next to the correct answer.

|  |  |  |
| --- | --- | --- |
| **A** |  |  |
|  |  |  |
| **B** |  |  |
|  |  |  |
| **C** |  |  |
|  |  |  |
| **D** |  |  |

3. Another battery



+

1. What is the circuit symbol for this battery?

Put a tick (✓) in the box next to the correct answer.

|  |  |  |
| --- | --- | --- |
| **A** |  |  |
|  |  |  |
| **B** |  |  |
|  |  |  |
| **C** |  |  |
|  |  |  |
| **D** |  |  |

4. An ammeter

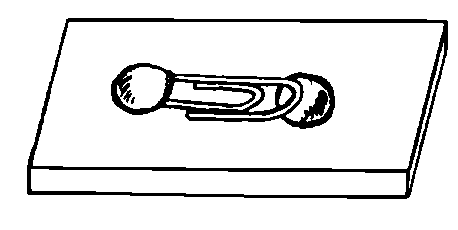
00.42

1. What is the circuit symbol for an ammeter?

Put a tick (✓) in the box next to the correct answer.

|  |  |  |
| --- | --- | --- |
| **A** |  |  |
|  |  |  |
| **B** |  |  |
|  |  |  |
| **C** |  |  |
|  |  |  |
| **D** |  |  |

5. A switch



1. What is the circuit symbol for a switch?

Put a tick (✓) in the box next to the correct answer.

|  |  |  |
| --- | --- | --- |
| **A** |  |  |
|  |  |  |
| **B** |  |  |
|  |  |  |
| **C** |  |  |
|  |  |  |
| **D** |  |  |

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

|  |
| --- |
| **Diagnostic question** |
| **Circuit symbols** |

**Overview**

|  |  |
| --- | --- |
| Learning focus: | Electric circuits are represented using circuit symbols and specific circuit diagram conventions |
| Observable learning outcome: | * Identify components from their circuit symbols, and draw the circuit symbol for common components |
| Question type: | Diagnostic, simple multiple choice |
| Key words: | circuit symbol, bulb, battery, ammeter, voltmeter, motor |

|  |  |
| --- | --- |
| **P** | **PRIOR UNDERSTANDING**  This diagnostic question probes understanding of ideas that are usually taught at age 5-11, to aid transition from earlier stages of learning. |

**What does the research say?**

Gott (1984) notes that most students are competent in recognising circuit symbols and using circuit diagrams to answer questions, but difficulties arise whenever students translate a circuit diagram into a real circuit and vice-versa.

**Ways to use this question**

Students should complete the question individually. This could be a pencil and paper exercise, or you could use an electronic ‘voting system’ or mini white boards and the PowerPoint presentation.

The answers to the question will show you whether students understood the concept sufficiently well to apply it correctly.

If there is a range of answers, you may choose to respond through structured class discussion. Ask one student to explain why they gave the answer they did; ask another student to explain why they agree with them; ask another to explain why they disagree, and so on. This sort of discussion gives students the opportunity to explore their thinking and for you to really understand their learning needs.

*Differentiation*

You may choose to read the questions to the class, so that everyone can focus on the science. In some situations it may be more appropriate for a teaching assistant to read for one or two students.

**Expected answers**

1A, 2D, 3A, 4D, 5C

**How to respond - what next?**

A good response to finding a misunderstanding, could be to teach the idea to the class and then give the students an activity in which they can practise using the concept so that they can consolidate their understanding. Responses often work best when the activities involve paired or small group discussions, which encourage social construction of new ideas through dialogue.

In questions 1, 2 and 3, students who are choosing the symbol looking like the component might choose option C.

In questions 2 and 3 it matters which way the battery goes. At this stage it is enough to say the battery pushes the electric current in one direction; we don’t want to put batteries into a circuit so they push against each other, so direction is important.

Question 4 should be obvious because there is usually, as in this case, a clue on the ammeter as to its symbol. Students often use ammeters and voltmeters interchangeably and it is useful to make this distinction clear. It is also possible to label ammeters because the same symbol is used around the world.

In question 5 the switch is closed which means there is a continuous conduction path through it. Students could trace this path through the switch. It is worth emphasising how the switch ‘closes’ the circuit so the current can flow. This is the opposite meaning to some common uses of the word ‘close’.

If students have misunderstandings about identifying the circuit symbols for common components, then it is worth spending some time playing learning games to memorise them so that circuit diagrams are easier to follow. For example, show students a component and they draw its circuit symbol on a mini-whiteboard; or show them a symbol and they select the component. It is worth quickly repeating this every lesson until all the class are secure in their recall; repetition over time is effective at making this learning longer term.

**Acknowledgments**

Developed by Peter Fairhurst (UYSEG).

Images: Some images from EPSE

**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.