



# Conductors and insulators

## Lesson 3

### Overview

Using what they already know about simple circuits and what is needed to make them work, pupils learn about the properties of conductors and insulators.

### Learning outcomes

We will be able to:

- explain how to 'fix' a broken circuit
- describe the properties of conductors and insulators
- identify the best materials to conduct electricity



### Starter activity

#### Slide No.

Recap on lesson 2's learning about circuits by showing the two circuits on the slide. Which one will light the bulb? Why?

(If required, show the circuits drawn using electrical symbols on slide 4 as a reminder. The symbols for motor and buzzer are also included).

Click on the slide to remind pupils that for an electrical circuit to work it must be **complete** or **unbroken**.

### Core activities

#### Slide No.

In pairs or small groups, ask pupils to build a circuit that will either light a bulb, move a motor or work a buzzer – they can choose which, but they should demonstrate that they understand how to make a complete circuit.

For pupils working at home, or if there are limited or no resources available, use Worksheet 1 to cut out the components of an electrical circuit and ask pupils to put them together in different formations to discuss whether or not these are likely to work.

#### Resources

Resources used to create circuits, same as lesson 2: wires, cells (batteries), crocodile clips, bulbs, buzzers, motors

Worksheet 1: Electrical symbols to build a circuit if working at home, or if resources are limited.

Additional resources: BBC Teach 'Circuits' video  
<https://www.bbc.co.uk/programmes/p0128qd0>





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### Slide No.

Ask pupils to 'break' their circuit somewhere (e.g. by removing a wire). Explain that they are going to experiment to see which materials are best at fixing a circuit. Ask them to investigate the effects of the materials in front of them and record what happens for each one.

#### What do they find out?

Challenge them to work out if there is a pattern to the materials which work best to fix the circuit. If they can, they may be able to predict which materials will work or not.

If pupils are using the worksheet images to create their circuits, they will need to predict what will happen if they 'break' the circuit by taking one component away.

#### Resources

A selection of different materials and resources. There should be a good range of both conductors and insulators e.g. paper clips; ruler; rubber; small plastic ruler; teaspoon; elastic band; tin foil; feather; buttons; pencil; pencil sharpener; wool etc.  
Worksheet 2: Will it fix the circuit?

### Slide No.

When groups have finished their experimenting, discuss the findings as a class using question such as:

- What did you find out?
- Were your predictions correct?
- Which materials worked best/were the worst?
- Did you discover a pattern?

Introduce the terms Conductor and Insulator, and their definitions on the slide. Together, make two lists on the board of materials pupils used for their experiment which were conductors, and materials which were insulators. If time, do the experiment again to test whether the lists are correct.

Extend understanding with questions such as those below, encouraging pupils to use scientific vocabulary:

- Which kinds of material is the best conductor? (Metals)
- Why are plugs made from plastic? (Plastic is an insulator)
- Why aren't wires made from wool? (Wool doesn't conduct electricity)
- Why are exposed wires covered with plastic casing? (Plastic is an insulator so means wires are safe)
- Is water a conductor or an insulator? (Water is a conductor - they will need to think about their learning about safety around electricity from Lesson 1)
- Why do you think people get an electric shock if they touch an exposed wire? (We are conductors)

#### Resources

Worksheet 3: Conductor or insulator?





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### Plenary

Slide No. 

Recap on learning from the lesson with a quiz – click on the slide to reveal a question.

As an extension, ask pupils to find everyday objects at home which could be conductors or insulators. See who can find the most unusual or unexpected conductor or insulator (they could bring these into school for testing).

*Note: Pupils' original mindmaps from Lesson 1 can also be returned to here for pupils to add any additional knowledge using a different coloured pen/pencil.*

