

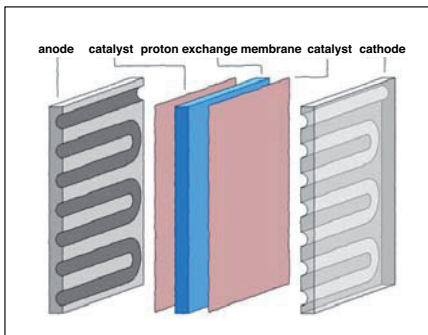
Exercise 1

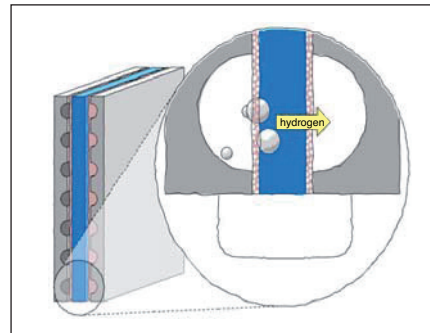
Watch the animation and answer the questions.

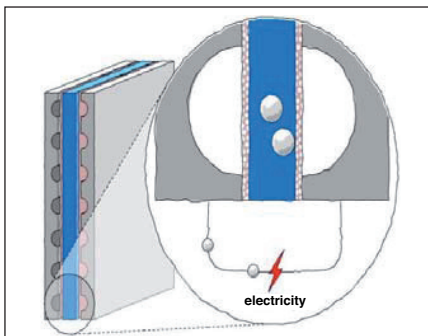
1. Complete the gaps: A fuel cell turns \_\_\_\_\_ (a) and \_\_\_\_\_ (b) into \_\_\_\_\_ (c) and \_\_\_\_\_ (d).
2. What happens to the hydrogen atoms in a fuel cell?
3. How is electricity produced?
4. What is produced when the oxygen, hydrogen and used electrons stick together?
5. A fuel cell only produces a tiny amount of electricity. How can we use fuel cells to power a large vehicle?

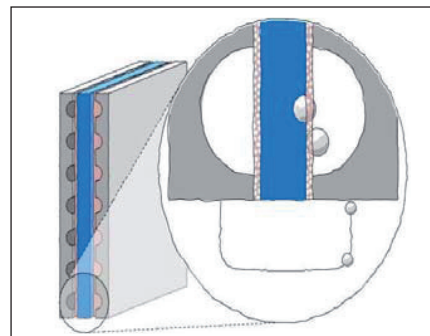
Exercise 2

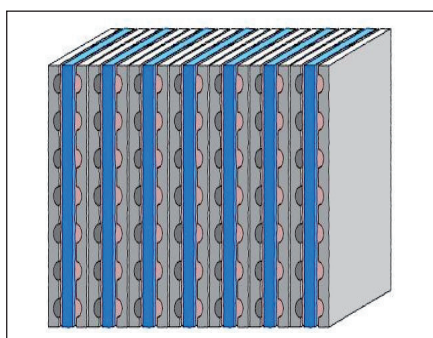
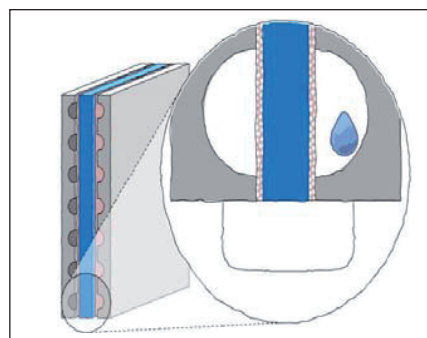
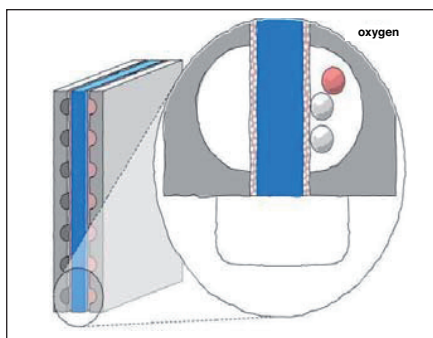
Write the number of each caption (1-7) next to the correct picture, to complete the sequence.











1. Meanwhile, the electrons flow down some wires and out of the fuel cell. This is electricity.
2. Although each fuel cell only produces a tiny amount of electricity, when several are stacked together they can power something as large as a car or a bus.
3. The process starts with hydrogen atoms on one side of the fuel cell getting pushed through a metal powder, which pulls the electrons off the hydrogen atoms. The hydrogen then goes through to the other side of the fuel cell.
4. Oxygen atoms are waiting on this side of the fuel cell.
5. When the electricity has been used, the electrons flow back into the other side of the fuel cell.
6. The oxygen and hydrogen – and the used electrons – stick together to make water.
7. A fuel cell is designed to turn oxygen and hydrogen into electricity and water.

## Exercise 3

Complete the gaps, using the correct form of the verbs in the box.

star    go through    be    turn    flow down    stick    produce    pull    flow back

A fuel cell is designed to \_\_\_\_\_ (1) oxygen and hydrogen into electricity and water. The process \_\_\_\_\_ (2) with hydrogen atoms on one side of the fuel cell getting pushed through a metal powder, which \_\_\_\_\_ (3) the electrons off the hydrogen atoms. The hydrogen then \_\_\_\_\_ (4) to the other side of the fuel cell. Meanwhile, the electrons \_\_\_\_\_ (5) some wires and out of the fuel cell. This is electricity. When the electricity has been used, the electrons \_\_\_\_\_ (6) into the other side of the fuel cell. Oxygen atoms are waiting on this side of the fuel cell. The oxygen and hydrogen – and the used electrons – \_\_\_\_\_ (7) together to make water. Although each fuel cell only \_\_\_\_\_ (8) a tiny amount of electricity, when several \_\_\_\_\_ (9) stacked together they can power something as large as a car or a bus.

## Objectives

**Science**

Students learn how fuel cells turn oxygen and hydrogen into electricity and water.

**Language**

Skills: Speaking, listening, reading, writing

Grammar: Present simple tense

Vocabulary: Nouns: *fuel cell, oxygen, hydrogen, electricity, atoms, metal, powder, electrons, wires*

Verbs: *turn into, flow, stick together, produce, stack together, power*

**Activities**

Activities	Language skills
Students say what they know about how fuel cells work	Speaking; vocabulary; present simple tense
They watch the animation and answer some questions about how fuel cells work	Listening; reading; writing; vocabulary; present simple tense
They match captions with a set of diagrams	Reading; vocabulary
They do a gap-filling activity	Reading; writing; vocabulary; present simple tense
(Groups only:) They give an oral commentary on the animation	Speaking; vocabulary; present simple tense

## Procedure

**With the whole class**

(Typical situation: whole class watching the presentation and animation on an interactive whiteboard or projector.)

- 1 [Slide 1] Introduce the topic. Ask the class to say what they know about fuel cells and how they work. Introduce some key vocabulary (see above) but do not go into detail. Ask the class to look at the questions in exercise 1 on the worksheet. They can try to answer them, but do not give correct answers at this point.
- 2 [Slides 2 and 3] Play the animation. Tell the students to watch and listen specifically for the answers to the questions in exercise 1 on the worksheet. (They can make notes if they wish.)
- 3 Students work in pairs and check their answers to exercise 1 on the worksheet. Monitor and help. When students have finished, check answers with the whole class. (See answer key.)
- 4 [Slide 4] Students continue to work in pairs and do exercise 2 on the worksheet: they match the captions with the correct picture. Monitor and help. Check answers with the whole class (see answer key) or play the animation again so that students can check their answers. Ask questions to check that students have understood the whole process.

5 Tell students not to look at exercise 2 while they do the next exercise. Students work individually and do exercise 3 on the worksheet: they complete the gaps. Students check their answers in pairs or groups. Then check the answers with the whole class. (See answer key.)

### With groups (one group studies fuel cells and then presents it to the class)

(Typical situation: students arranged in groups around computers eg, in a language lab)

- 1 [Slide 1] Students work in their group and talk about fuel cells. They look at exercise 1 on the worksheet and try to answer the questions. They can do this in English or their first language.
- 2 [Slides 2 and 3] Students play the animation, watching and listening specifically for the answers to the questions in exercise 1 on the worksheet. (They can make notes if they wish.)
- 3 Students work in pairs and check their answers to exercise 1 on the worksheet. When they have finished, they can check their answers with the answer key.
- 4 [Slide 4] The group does exercise 2 on the worksheet: they match the captions with the correct picture. Afterwards, they can check their answers with the answer key or replay the animation.
- 5 Tell students not to look at exercise 2 while they do the next exercise. Students work individually and do exercise 3 on the worksheet: they complete the gaps. Students check their answers in their group. Then they use the answer key.
- 6 [Slide 5] The group gets ready to give an oral commentary on the animation: they may like to rehearse it once or twice. Play the animation without sound; students give the commentary.

**Fuel cells****Worksheet answer key****Exercise 1**

1. a) oxygen/hydrogen   b) hydrogen/oxygen   c) electricity/water   d) water/electricity
2. They are pushed through a metal powder, which pulls the electrons off.
3. The electrons from the hydrogen atoms flow down some wires and out of the fuel cell.
4. Water.
5. By stacking them together.

**Exercise 2**

7	3
1	5
4	6
2	

**Exercise 3**

1. turn
2. starts
3. pulls
4. goes through
5. flow down
6. flow back
7. stick
8. produces
9. are