one stop clil

Explanations: Science by Keith Kelly

AGE: Teenagers
LEVEL: Intermediate
TIME NEEDED: Approx. 90 minutes
OBJECTIVES: to learn about electric circuits; to do a prediction quiz and a reading; to complete a table demonstrating the components and symbols of an electric circuit in groups; to take part in a whole-class discussion; to write a multiple-choice test for a classmate; to complete exercises practising language related to asking questions and giving explanations
KEY SKILLS: reading, speaking, writing, listening
MATERIALS: one copy of the worksheet per student; one set of the electric circuit cut-out cards per group of three or four students; an electric circuit or photograph of an electric circuit

Content focus
Electric circuits

Warm-Up: 2-3 minutes
Activity 1: 5-7 minutes
Activity 2: 15 minutes
Activity 3: 15 minutes
Activity 4: 15 minutes
Activity 5: 20 minutes

WARM-UP

1. Show students an electric circuit and ask them to tell you what it is. Ask them if they know the parts of a circuit. Encourage them to tell you the component parts of the circuit that they know.

Tip: Bring a photograph of an electric circuit to class to show students if you don't have an actual circuit available.

ACTIVITY 1

2. Hand out the worksheets and get students to read through the quiz. Then put them in pairs to answer the questions. Encourage them to guess the answers if they are unsure.

3. Allow students to check and compare answers with other pairs, but don't give any feedback at this stage.

Students will have the chance to check their answers following Activity 2.

Key
1. A; 2. B; 3. A; 4. A; 5. B

ACTIVITY 2

4. On the board, draw the outline of the table in which the electric circuit cut-out cards are arranged, adding the *Component*, *Symbol* and *Notes* headings across the top of the table. Down the left column, write in the nine component names.

5. Put students into small groups of three or four and hand out a set of the cut up *component* (green, 1-9), *symbol* (A-I) and *notes* (black, 10-18) cards and their respective headings to each group. Instruct students to lay out the three headings in a row and then to place the nine *component* cards down the left column in the same order as you have written them on the board.

6. Explain to the groups that they are going to match the *symbol* and *notes* cards with the correct *component* cards to complete the table.

7. When they have finished, each group should check their completed table with another group. Then discuss the completed table as a whole class to double-check the answers.

8. Now give students the chance to check their quiz answers from Activity 1 against the completed table.

Key
Refer to the completed table in the 'Cut-out cards' section on the last page of this lesson plan.

ACTIVITY 3

9. Get students to complete the paragraph with the words in the box. They can use a dictionary to check the meaning of the words if necessary.

10. Students read the text that follows to check their answers.

Key
1. flow; 2. freely; 3. through; 4. increase; 5. hindrance; 6. reduce

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ACTIVITY 4

11. Ask students to read the different types of questions on electric current, voltage and resistance in the left column of each table. Then get them to copy the sentences in the right column of the tables into their books and complete the sentences with the aid of the text in Activity 3.

12. Students can check their answers with a partner.

Key (sample answers)
1. ... in simple circuits the cell or battery serves as the 'pump' which pushes the electrons around the circuit.
2. ... 'I', and the 'ampere' or 'amp', abbreviated to the symbol 'A'.
3. … in parallel to the appliance or component in the circuit across which it will measure the voltage. The negative terminal of the voltmeter should also connect to the wires coming from the negative terminal of the battery, and the positive terminal to the positive terminal of the battery.
4. ... the hindrance to the flow of current through an electric circuit.
5. ... an ammeter.
6. ... 'V'.
7. ... materials with high resistance, such as the alloys constantan, nichrome and manganin.
8. ... the positive side of the ammeter must be connected to wires coming from the positive terminal of the battery (or cell), and the negative side must be connected to wires that go to the negative terminal of the battery.
9. ... the greater the force (voltage), the greater the number of electrons passing through the circuit in one second will be.

ACTIVITY 5

13. Ask students to choose a topic they have studied in science. They are going to write a test using the three types of questions presented in Activity 4. Get students to write six questions, two for each of the question types.

Tip: Depending on time, you may prefer to give this task as homework.

Note: Refer students to Your CLIL: Explanations: Science for more ideas on writing questions and giving explanations.

14. When they have written their test, instruct students to swap the test with a partner for them to complete. Students then hand back their completed test to their partner for them to check the answers.

Language focus
Questions and explanations

Activity 1: 5-10 minutes
Activity 2: 5-10 minutes
Activity 3: 15 minutes

Get students practising language linked to asking questions and giving explanations by reading the Your CLIL: Explanations: Science article.

ACTIVITY 1

Get students to match the phrases in the left-hand column with the question and statement halves in the right-hand column to make questions and statements used for asking for explanations.

Key
1. c; 2. f; 3. b; 4. e; 5. a; 6. d

ACTIVITY 2

Get students to complete the sentences explaining a process or how to do something by choosing a correct word or phrase in the box.

Key
1. so that; 2. finally; 3. Step 1; 4. if; 5. when

ACTIVITY 3

Get students to read the sentences and fill in the gaps with words used for statements as questions. Students then complete the crossword with the words. All the words appear in the Your CLIL: Explanations: Science article, although some may be in a different form. The first letters are given as prompts.

Key
Across – 3. identify; 5. show; 11. example;13. describe; 14. choose
Down – 1. define; 2. state; 4. demonstrate; 6. agree; 7. explain; 8. decide; 9. details; 10. prove; 12. reasons

WORKSHEET

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YOUR CLIL WORKSHEET

Content focus
Electric circuits

ACTIVITY 1

Do the quiz in pairs and choose the correct answers. Guess if you are unsure.

1. Which component in an electric circuit controls the amount of current passing through it?
   A. a resistor
   B. a voltmeter
2. What is the driving force called which pushes electrons around an electric circuit?
   A. conductive force
   B. electromotive force
3. Describe the role of a transformer in an electric circuit.
   A. It increases or decreases the voltage of electric current passing through a circuit.
   B. It can change the electrical energy to other forms of energy.
4. What happens to a bulb when an electric current passes through it?
   A. It gives out heat and light.
   B. It breaks the flow of current around the circuit.
5. How does a fuse help protect electrical appliances?
   A. It splits up the supply of electric current and lowers the amount travelling within a circuit.
   B. It has a thin metal wire that melts to break the circuit if too much electric current passes through.

ACTIVITY 2

In small groups, match the component cards (green, 1-9) with the correct symbol cards (A-I) and notes cards (black, 1-9) to complete the table about electric circuits.

Check your answers with another group to see if you have the same results.

Finally, check your quiz answers from Activity 1 with the text in the completed table.

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ACTIVITY 3

Complete the paragraph with the words in the box.

hindrance	freely	flow	increase	through	reduce

We speak of the (1) _____ of electrons, and electrons can move (2) _____ in certain materials. Electrons flow (3) _____ a circuit, and with a larger voltage, we can (4) _____ the flow. If there is a (5) _____ to the flow, we can (6) _____ the flow of electrons in the circuit.

Now read the text below to check your answers.

Electric current is the flow of electrons through an electric circuit. In electric circuits all the components and connecting wires are made from materials containing electrons that are free to flow. In simple circuits the cell or battery serves as the 'pump' which pushes the electrons around the circuit. Each cell or battery has two ends or terminals, a positive terminal (shown by a + sign) and a negative terminal (sometimes marked with a – sign). When the cell or battery is connected in the circuit, the electrons are pushed through the circuit. The electrons flow from the negative terminal of the battery, through the external circuit and back towards the positive terminal of the battery.

The rate at which a current (electrons) flows through a circuit can be measured using an ammeter. The symbol for electric current is *I*. The unit of current is the ampere or amp, abbreviated to the symbol *A*. An ammeter has a positive terminal and a negative terminal. When you connect an ammeter in a circuit, the positive side of the ammeter must be connected to wires coming from the positive terminal of the battery (or cell), and the negative side must be connected to wires that go to the negative terminal of the battery.

Voltage is the force that pushes electrons through the electric circuit. The greater the force (voltage), the greater the number of electrons passing through the circuit in one second will be. That is, a larger voltage will increase the flow of electrons (current) through the circuit. The change in voltage between any two points in a circuit is called the potential difference between those points. The potential difference or voltage can be measured using a voltmeter. The voltmeter must always be connected in parallel to the appliance or component in the circuit across which it will measure the voltage. The negative terminal of the voltmeter should also connect to the wires coming from the negative terminal of the battery, and the positive terminal of the voltmeter to the positive terminal of the battery. The unit of voltage is the volt, which has the symbol *V*.

Resistance is the hindrance to the flow of current through an electric circuit. Therefore, the resistance in the circuit will determine the amount of current passing through it. Resistors are devices that are placed in circuits to deliberately reduce the flow of current through the circuit. The symbol for resistance is *R* and the unit is the ohm (Ω). Materials with high resistance, such as the alloys constantan, nichrome and manganin, are commonly used to make resistors. There are two types of resistors, those with a fixed resistance and those with variable resistance, which are also known as variable resistors or rheostats.

Adapted from *CXC Integrated Science* by Tania Chung-Harris, pp.285-6 © Macmillan Caribbean 2005

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ACTIVITY 4

Read the questions in the left-hand columns of the tables. Then complete the sentences in the right-hand columns to answer the different types of questions about electric current, voltage and resistance. Use the text in Activity 3 to help you.

question word + verb + object of question	
1. Why is the power source often referred to as an electric pump?	The power source is often referred to as an electric pump because …
2. What are the symbol and unit for current?	The symbol and unit for current are …
3. How should a voltmeter be connected in an electric circuit?	A voltmeter should be connected in an electric circuit …
4. What is electrical resistance?	Electrical resistance is …

Note: *Which*, and sometimes *what*, questions follow the original sentence structure.

question word + object of question + verb	
5. Which instrument is used to measure the amount of electric current passing through a circuit?	The instrument which is used to measure the amount of electric current passing through a circuit is …
6. Which symbol is used to denote voltage?	The symbol used to denote voltage is …
7. What types of materials are commonly used to make resistors?	The types of materials commonly used to make resistors are …

instruction + question word + object of statement	
8. Describe how you would connect an ammeter in series with a battery.	When you connect an ammeter in series with a battery in a circuit, …
9. Explain why a larger current passes through a circuit when the voltage is high.	A larger current passes through a circuit when the voltage is high because …

ACTIVITY 5

Choose a topic you have studied in science. Write a test using the three types of questions presented in Activity 4. Write six questions, two for each question type.

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Language focus
Questions and explanations

ACTIVITY 1

Match the phrases on the left with the question and statement halves on the right to make questions and statements used for asking for explanations.

1. Can you explain …
2. Why is it that …
3. I don't understand …
4. What does it mean …
5. Please explain where …
6. I don't know how to …

a. … the axle and fulcrum of a wheel are situated.
b. … why parasites are known as heterotroph feeders.
c. … how woollen clothing keeps people warm?
d. … describe the basic structure of the soap molecule.
e. … when friction can be a nuisance?
f. … light travels in a straight line?

ACTIVITY 2

Complete the sentences with the correct word or phrase from the box.

finally	Step 1	when	so that	if

1. Tilt the jar _____ the water moistens all the paper placed in it.
2. Rocks are gradually broken down by weathering until _____ they become soil.
3. _____: Find the momentum before the collision of the two trucks.
4. _____ one end of a metal rod is placed in a flame, after a while the entire metal rod becomes hot.
5. The bimetallic strip is bent so that there is a break in contact _____ the refrigerator is at the right temperature.

ACTIVITY 3

Complete the sentences with the missing words used for statements as questions. Then complete the crossword with the words. The first letters have been given for you.

Across

3. I_____ the stains that are best removed with (a) water and (b) organic solvents.
5. Using a flow chart, s_____ the energy conversions that take place when a battery operated torch is switched on.

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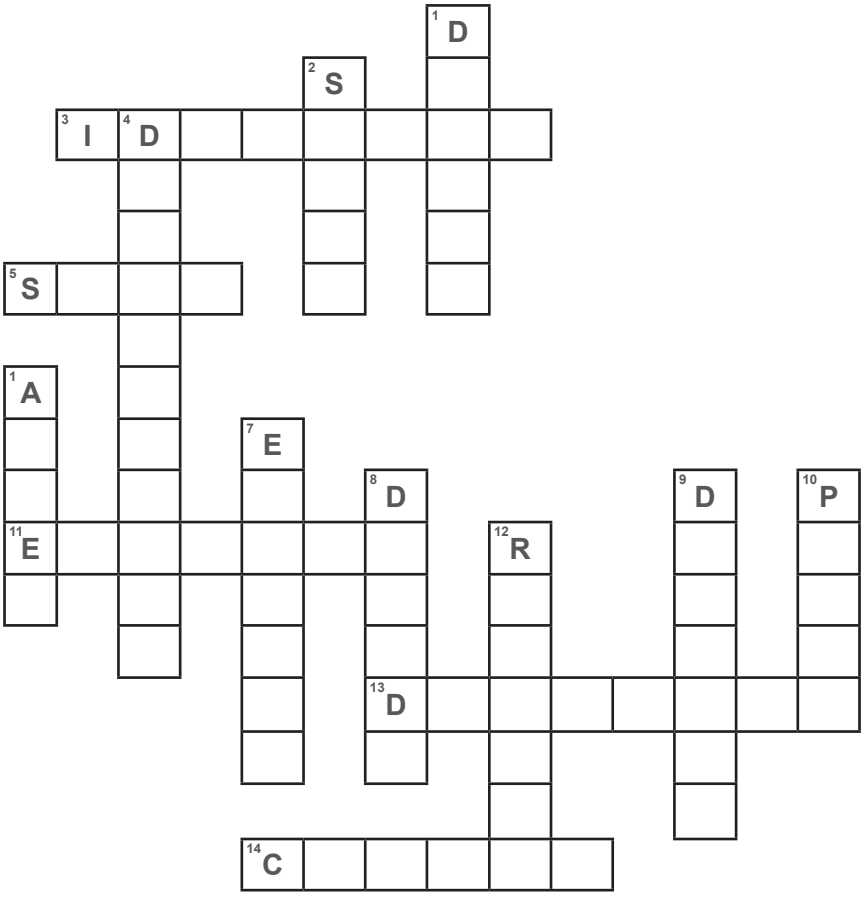
11. Give an e_____ of an endothermic and an ectothermic animal.
13. D_____ the different contributions that living organisms make to the fertility of soil.
14. C_____ resistors so that when the variable resistor is set to 0, the current in the electric circuit is about 1*A*.

Down

1. D_____ the terms acid, base and salt.
2. Name the fluids and s_____ their location in the eye.
4. D _____ what happens during breathing using a model of the respiratory system.
6. Do you a_____ with the statement?
7. E_____ how you can raise a load through a great height, up an inclined plane, using a small effort.
8. Use the law of conservation of energy to d_____ what will happen to the balls in the experiment.
9. Explain your answer giving d_____ of what happens at each stage of the process.
10. Give an explanation of how you can p_____ that light travels in a straight line.
12. Give three r_____ for the trend in population size in the years given.



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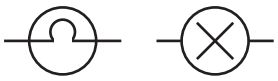
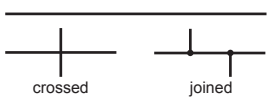
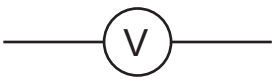
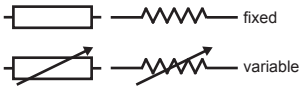
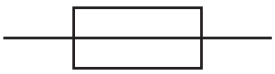
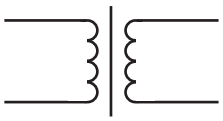
AN ELECTRIC CIRCUIT

component	symbol	notes
1 cell (one) and battery (more than one cell)	H 	4 Produce the electromotive force which pushes the electrons around the circuit. The long line is the positive terminal and the short line is the negative terminal.
2 bulb	D 	9 Gives out heat and light when the electric current passes. The second symbol represents a bulb in a holder.
3 switch	A 	2 Used to turn the electric current on and off.
4 connecting wires	I 	1 Usually made of copper which is a good conductor, and insulated with plastic. Wires that connect different parts of a circuit are often marked with a dot where they join, to distinguish them from wires that cross without joining.
5 ammeter	B 	6 Measures the rate of flow of the electric current passing through the circuit or part of the circuit.
6 voltmeter	G 	8 Measures the ability of the battery to push electrons through the circuit (voltage).
7 resistor	F 	3 Limits or controls the amount of electric current passing through the circuit.
8 fuse	C 	7 Consists of a thin metal wire that melts to break the circuit if too much electric current passes through. Helps protect electrical applications.
9 transformer	E 	5 Increases or decreases the voltage of the electric current passing through the circuit.