SCIENCE 5/6 UNIT – SWITCHED ON

week	Activity	Procedure	Concepts/explanations	Outcomes	Materials
1	Simple circuits	1. Discuss currents and that when current flows from a power source through a bulb and back to itself, it is a closed circuit. 2. Demonstrate a simple open and closed circuit by having the children act it out, for eg. One child is a battery, one is a light bulb, the rest join hands from both sides of the battery to the light bulb. One child can let go of a hand to demonstrate a broken (open) circuit. 3. Give out equipment and worksheet "Simple Circuits" and have children make different types of simple circuits.	A simple circuit is the most basic closed circuit. A current is the flow of electrical charges / energy.	A complete circuit is needed for an electrical device to work.	Light bulbs, 9V batteries Wires Worksheet- Primary Science E (RIC Publications, Circuits and Conductors Unit), Simple Circuits
2	Conductors and Insulators	1. Write the definitions for conductors and insulators onto glossary page. 2. Demonstrate to the class the type of simple circuit they will have to make to test if materials are conductors or insulators. 3. In pairs children collect materials, make the circuit and begin testing a range of materials from spoons, to paper clips to pegs. 4. Children refer to worksheet "Conductor or Insulator", test materials and complete worksheet. 5. As a class discuss the results and write a general conclusion about conductors or insulators.	Generally metals are conductors and woods and plastics are insulators.	Devise fair tests. Devise a test that will support or disprove a prediction. A complete circuit is needed for an electrical device to work.	Light bulbs, 9V batteries Wires Alligator clips to connect the wires to the tested materials. A RANGE OF EVERYDAY THINGS/MATERIALS Worksheet – Primary Science E – "Conductor or Insulator"
3	Switches	1. Make a simple circuit attached to a bulb and ask children what's wrong with this type of circuit. (power will eventually run out) 2. Discuss how we can solve the problem. (by making a switch) 3. Give the children 2 tasks. One is to make a switch out of a paper clip, and the other is to make an	Switches control the flow of electricity in a circuit. In a circuit, when a switch is open, a gap occurs and so the flow of electricity stops.	Devise fair tests. Devise a test that will support or disprove a prediction.	Light bulbs, 9V batteries Wires Paper clips Other conducting materials Worksheet from -

		effective simple switch out of any conducting material. 4. Complete the worksheet.			Primary Science E, RIC Publications, Circuits and Conductors, Switches
4	An electric Magnet + Batteries	1. Discuss magnetism and what types of materials are magnetic (some metals, including iron) 2. Demonstrate a magnet and ask if it's possible to turn a magnet on or off? 3. Give out worksheet and have children follow the procedure of making an electro magnet by coiling wire around a nail. 4. Test its strength by seeing how many paper clips it can pick up. 5. Vary experiment by changing battery, wire length, or size of nail and test and record the results on worksheet.	When electrical current flows through a wire it creates a magnetic field. These fields can magnetise any metals which contain iron (nail)	A complete circuit is needed for an electrical device to work. Devise a test that will support or disprove a prediction.	50cm insulated wire Assorted nails 9v battery Paper clips Worksheet from – Hands-on Science, An Electric Magnet (RIC publications)
5	Design a game using an electrical Circuit	1. Discuss with children what games they could make using a closed circuit and a buzzer or bulb. 2. Children choose from an array of materials and begin to make, formulating possible rules of the game as they go. 3. Name the game and then test it on others to see if it is an interesting and/or challenging game. Possible ideas are "Operation" – creating a wire figure with wire pieces to be picked up and out of the figure, if these pieces touch the side, a light turns on or a buzzer sounds. A buzzer to be used as part of a board Game	Assessment Activity – applying what they've learnt about circuits	Show the relationship between the process of investigation and the process of design and make. Justify the combination of materials and techniques in relation to the properties required for specific end uses. Exhibit self direction in their own learning. Gain satisfaction in their efforts to investigate, to design, make and use technology. Use appropriate equipment and tools to carry out a particular task, understand the technology involved to present ideas	Batteries Wire Bulbs and/or buzzers Children choose any materials they want from a vast range including cardboard boxes, scrap materials, wire and other metallic objects.

6	Design and Make – series of circuits in a mini house.	1. Discuss how various closed and series circuits could be used in a model house. 2. Children draw a diagram of their ideas then collect the appropriate materials to begin building it. 3. Assemble the circuits onto the mini house and add to the realism by furnishing the house etc.	Assessment Activity – applying what they've learnt about circuits	Show the relationship between the process of investigation and the process of design and make. Justify the combination of materials and techniques in relation to the properties required for specific end uses. Exhibit self direction in their own learning. Gain satisfaction in their efforts to investigate, to design, make and use technology. Use appropriate equipment and tools to carry out a particular task, understand the technology involved to present ideas	Batteries Wire Bulbs and/or buzzers Children choose any materials they want from a vast range including cardboard boxes, scrap materials, wire and other metallic objects.
7	As above – continue making mini house				
8	Assessment test	Assessment test based on all of the above concepts.			
9	Review test	As a class group review the test and children correct with coloured pen any incorrect answers.			

Simple Circuits

1. (a) Draw an **open circuit.**

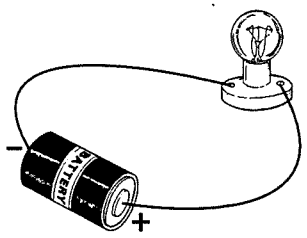
(b) Draw a **closed circuit.**

2. Build the following circuits and write down your observations.

key

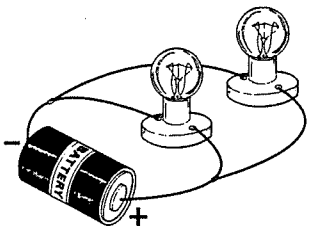
battery wire bulb

a *Simple Circuit*



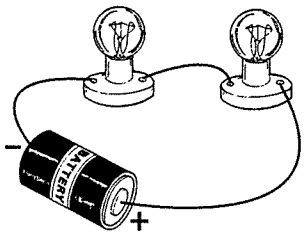
Observation

b *Parallel Circuit*



Observation

c *Series Circuit*



Observation

3. Suggest uses for each type of circuit.

Simple	Parallel	Series

Conductor or Insulator?

1. Test the items in front of you for conductivity. Choose five items of your own to test.

Object	Material	Prediction		Result	
		Conductor	Insulator	Conductor	Insulator
Paperclip					
Pencil					
Foil					
Eraser					
Rock					
Ice cube					
Scissors					
Peg					

2. (a) Why are conductors used ? _____

_____

_____

_____

(b) Give an example of a conductor. _____

3. (a) Why are insulators used? _____

_____

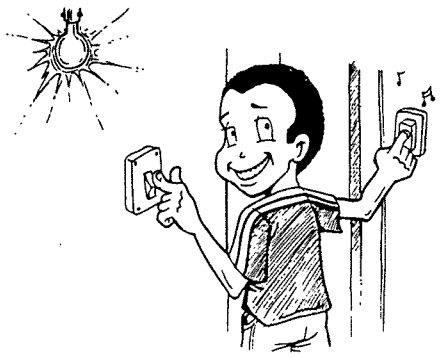
_____

_____

(b) Give an example of an insulator. _____

Switches

1. Name five electrical items with switches.



1. _____ 2. _____

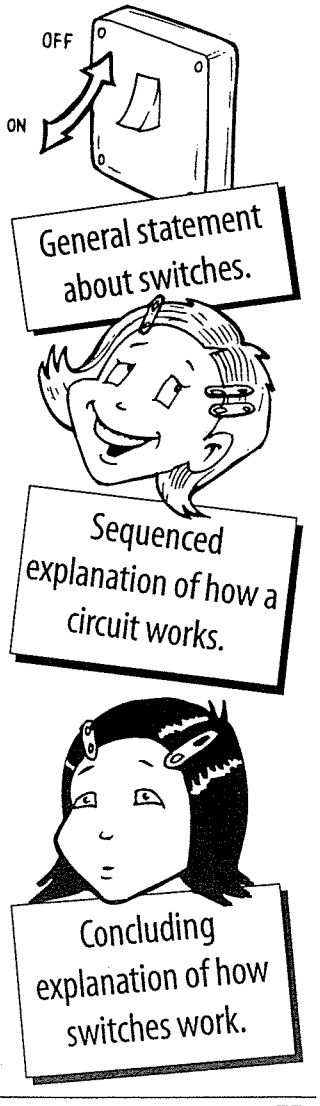
3. _____ 4. _____

5. _____

2. Make a switch for your circuit using the materials provided. Draw and label your circuit.

3. Complete the following explanation.

How Switches Work



An electric magnet

• Energy and change • Energy and change • Energy and change • Energy and change •

Indicator: Makes and tests an electromagnet.

Materials

- For each group of students: 50-cm length of insulated wire with both ends bared; assorted nails; AA battery; battery holder (or electrical tape); paperclips; extra wire (wires with alligator clips attached can also be used).

Motivate

- Remind students how an electrical circuit is created (see page 26).
- Discuss with students magnetism and what types of materials are magnetic. (some metals, including iron) Demonstrate different types of magnets, then ask students if they think it is possible for a magnet to be turned on and off.

Experience

- Organise the students into groups and distribute the materials. Students follow worksheet to make their first electromagnet. When they understand how it works, students can experiment with different materials. They can try the three suggestions on the page plus one variable of their own choosing; e.g. a tighter coil, a looser coil, shorter wire, a thinner nail. The paperclips should be linked together by magnetism to test the strength of their electromagnets.

Safety notes:

- Take time to discuss the dangers of mains electricity. All work and equipment for this activity should be supervised as even low-voltage batteries have the capacity to burn or start a fire.
- Warn students that if the battery becomes hot while conducting this experiment, they should disconnect the circuit (particularly if electrical tape is being used in place of a battery holder).

- When the students are happy with their final electromagnet design, a class challenge can be held. The features of the winning design(s) should be discussed before the students answer the final question on the page.

Explain

- Explain to students that when an electric current flows through a wire, it creates a magnetic field. This field can magnetise any metals which contain iron (such as a nail). The magnetic field in this experiment is concentrated because the wire is coiled around the nail.

In 1820, Danish physicist Hans Ørsted was the first person to note that an electric current creates a magnetic field.

Most electromagnets are made by coiling wire around an iron core. Electromagnets only remain magnetic while the electric current is flowing. Electromagnets are widely used in devices like doorbells, electric guitars, motors and generators and are used in industry for moving scrap iron and steel.

Apply

- Have the students compare the strength of their electromagnet with that of other household magnets.

Review and reflect

- Write a science procedure for making and testing an electromagnet and display it as a poster.

An electric magnet

Task: To make an electromagnet using an electric circuit.

An electromagnet is a special type of magnet. It only became a magnet through electricity. How? When an electric current flows through a wire, it creates a magnetic field. If the wire is attached to a piece of metal containing iron, the metal becomes magnetic when the electric current is flowing through it.

You will need

50-cm length of insulated wire with both ends bared

assorted nails

AA battery

battery holder

paperclips

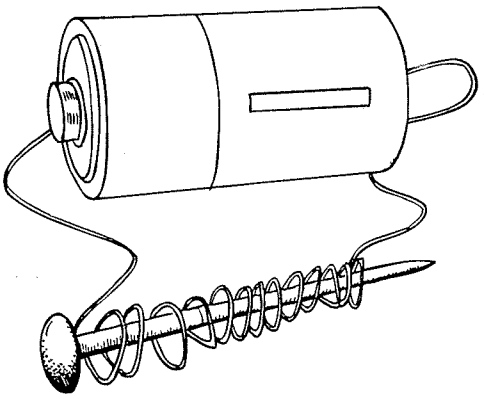
What to do

Try making and testing your own electromagnet.

(a) Coil the wire firmly around the nail, leaving about 10 cm free at both ends.

(b) Use the loose ends of the wire and the battery to create a closed circuit. The nail should have turned into an electromagnet!

(c) Try out your electromagnet. How many paperclips can it pick up? _____



Electromagnet challenge!

1. With your group, try making the strongest electromagnet you can by changing some of its features. Here are some suggestions you could consider:

   a longer nail *a thicker nail* *longer wire*

   Try four different things. Make sure you only try one change at a time! Each time, write how many paperclips your new electromagnet design picks up.

Change made to original	Number of paperclips

2. Draw and label your electromagnet that collected the most paperclips.

3. Test your best electromagnet against those of other groups. The winning electromagnet picked up _____ paperclips. On the back of this sheet, explain why you think this design was the winner.

Science Test · Switched On

1. The flow of electricity through wires is called an electrical _____.

2. What is a conductor? _____.

3. Name 3 materials that conduct electricity:

a) _____ b) _____ c) _____

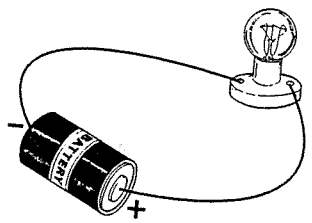
4. A material that doesn't conduct electricity is called an _____.

5. Name 3 materials that <u>don't</u> conduct electricity:

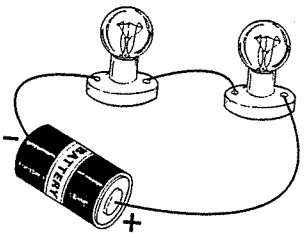
a) _____ b) _____ c) _____

6. Name this type of circuit:

a) _____



b) _____



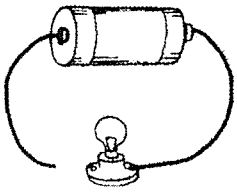
7. How can you turn an iron nail into a magnet? _____

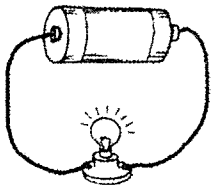
_____

_____

8. What type of magnet is this called? _____

9. Which picture is a <u>closed circuit</u> and <u>open circuit</u>?





10. Explain how switches work: _____

_____

_____

11. Using these materials draw a diagram of how you would make a switch for this light bulb to turn on/off.