

Helpful Inventions

Overview

Introductory Activity circa 1-2 periods

Main Activity circa 2-3 periods

Conclusion circa 1 period

Activity covers English, Science, ICT and History



1860 – Isaac Singer builds the first commercially successful sewing machine

The application of science has changed lives dramatically throughout history and continues to be vital both to the world's prosperity and health. An exciting field of knowledge, science should arouse curiosity, introduce understanding of scientific method and stimulate discussion about the ethics, uses and abuses of modern experimentation, invention and discovery.

It is assumed that this work will complement practical work on electric circuits. In this activity pupils will consider the electrical inventions that they may take for granted, how and when they were introduced and the uses and dangers of electricity.

Resource List

What on Earth? Wallbook of Science

What on Earth? Wallbook of Science Introductory Presentation

What on Earth Happened? See page 339 for ‘Edison’ and ‘Electricity’

PUPIL SHEET 12.1 ELECTRICITY IN THE HOME

PUPIL SHEET 12.2 INVENTION TIMELINE

PUPIL SHEET 12.3 CHOOSING THE FACTS

PUPIL SHEET 12.4 POWERLESS

Access to the internet (Optional)

Rolls of plain wallpaper



1887 – Emile Berliner invents the gramophone, using discs instead of cylinders

1974 – Art Fry dreams up the Post-it note after experimenting with a colleague's new adhesive thought to be too weak to have any practical use. It is launched as the Press 'n Peel three years later

Learning Aims and Objectives

In this activity pupils will:

- identify some of the uses and dangers of electricity
- find out about the key scientists credited with inventing electricity
- consider life without electricity.



Introductory Activity

1. If you have not done so before, you might like to begin by watching the *What on Earth? Wallbook of Science Introductory Presentation* as a class. This will establish the context for the activity. You can find this at www.whatonearthbooks.com/wonderboxscience
2. As a class brainstorm all the electrical objects in the classroom. Make a list on the board. Consider which ones run on mains and which on batteries. Ask pupils to complete **PUPIL SHEET 12.1 ELECTRICITY IN THE HOME** adding 3-10 objects that use electricity to each room. This could be in the form of a list, drawings or pictures cut from magazines. You might want to enlarge and copy this outline onto A3.
3. Read the article, “Prolific inventor makes light work” on the reverse of the *Wallbook of Science*. Discuss how life would have been different when there was no electricity. Think about school, home and other essential services, such as health.
4. If there is time pupils could go back to their house drawings and highlight the five things they would most miss and say how life would be different without them. For example, electric light – days would seem shorter and it would be harder to read in the evening.

Main Activity

5. Explain that electricity is a relatively recent invention although very basic experiments have been documented from the mid 18thC on. In small groups, ask pupils to open the *Wallbook* and find:

1745 - A foiled-lined glass jar capable of storing static electricity is invented independently by two scientists working in the German city of Leyden. Ewald Georg von Kleist and Pieter van Musschenbroek's Leyden Jars permit the first practical experiments with electricity to take place. It becomes fashionable in some quarters to give electric shocks to servants and children as a form of punishment.

6. Ask pairs of pupils to imagine that they have been hired by an electricity company to design a timeline, for schools, showing the development of electricity. This timeline should also provide illustrations of electrical inventions that have benefited humankind and a series of guidelines (warnings) on the safe use of electricity. **PUPIL SHEET 12.2 INVENTION TIMELINE** provides the brief and a suggested structure.

1745 – It became fashionable in some quarters to give electric shocks to servants and children as a form of punishment



7. The pairs should begin their research by looking for references to electricity on the *Wallbook* and jotting down what they consider to be important moments. These can be researched further using books and the internet.

8. Once the information has been gathered, ask them to plan the middle (history) section of their timeline. They should think about the scale they will use for the timeline, how much text they need to include and what illustrations will be needed. Give each pair 1.5-2m of wallpaper so that they can pencil in dates and key events.

9. The remaining two sections of the frieze: the uses and the hazards of electricity could be allocated, one to each partner.

Conclusion

10. Display the friezes around the classroom and along the corridor.
11. Finish with a quiz to see which facts have stuck most firmly in the pupils' minds. To do this, ask them to list (or tell a partner) the five most memorable things they have learned about the development of electricity.

Support Activities

Younger pupils, or those who need more support, could refer to **PUPIL SHEET 12.3 CHOOSING THE FACTS**. This provides a whole series of historical events, uses and dangers of electricity. Pupils select the five they consider most important of each and use them to create their frieze.

Extension Activities

Older pupils, and those who benefit from additional challenge, could create a script and video recording for a news programme focusing on the week without electricity. They should think about what the anchor person would say, who might be interviewed as an expert and what live footage, from around the country, to include. **PUPIL SHEET 12.4 POWERLESS** provides instructions.

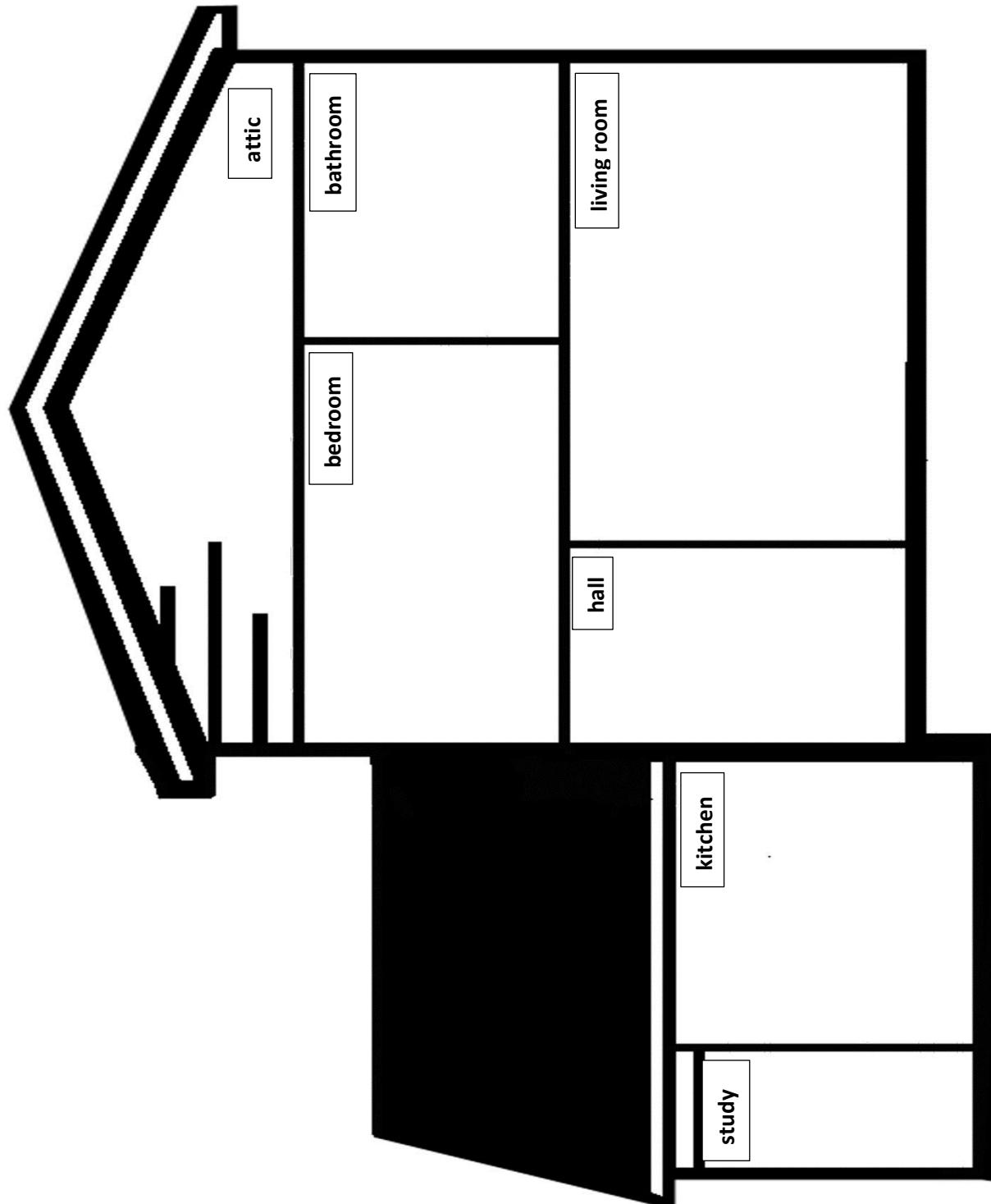
1783 – The Montgolfier brothers build a hot-air balloon. The flight reaches 450 meters and lasts 8 minutes





Electricity in the Home

For each room in the house list or draw 3-10 objects that use electricity. When you have finished, go back and highlight, circle or underline the one thing in each room you feel you must have.



Invention Timeline

You and your partner have been hired by an electricity company to design a frieze about electricity for use in schools. It should include three panels:

- an illustrated timeline showing the main events in the development of electricity
- illustrations and brief descriptions of electrical inventions that have benefited humankind
- a series of guidelines (or warnings) on the safe use of electricity.

A section of your frieze might therefore look something like the extract below.



<p>Humphry Davy, an English scientist, made the first electric light in 1800. When he connected wires to his battery and a piece of carbon, the carbon glowed, producing light. In 1860, another English scientist, Sir Joseph Wilson Swan, improved on Davy's invention by making a more practical, longer-lasting electric light. He demonstrated his new electric lamps in 1878. At roughly the same time, Thomas Edison an American inventor was experimenting with thousands of different filaments to find just the right materials to glow well and be long-lasting. He eventually produced a bulb that could glow for over 1500 hours.</p>			
<p>Coloumb, French phycisist, studies the attraction and repulsion of forces between charged particles. Coloumb's law lays one of the foundations for the science of electro-magnetism.</p> <p>1785</p>	<p>Allesandro Volta invents a battery that is capable of producing a steady flow of electricity around a circuit. His 'voltaic pile' comprises a stack of disks made from brine soaked paper, zinc and copper.</p> <p>1800</p>	<p>English physicist Michael Faraday shows how an electric current can rotate a magnet and how electricity can be induced by moving a wire through a magnetic field.</p> <p>1820</p>	<p>Thomas Edison opens the first urban electricity system. By 1884 it connects as many as 10,164 lamps to 508 customers in New York.</p> <p>1882</p>
<p>Never handle a power Plug with wet hands</p>	<p>Do not fly a kite near or under power lines</p>		

Choosing the Facts

Look at the following lists and decide which you think are the **five** most important under each heading. Circle or underline these.

Create a chart with a timeline in the middle. Put **the events you have chosen for the timeline** in order starting with the earliest and ending with the most recent.

Try to put the inventions in date order too.

The warnings can be in any order.

Add pictures and symbols to make your work attractive.

Key Inventions			
television	battery	light bulb	electric train
heart monitor	toaster	Hairdryer	vacuum cleaner
mobile phone	computer	Radio	Calculator
pace maker	Car	electric heating	hearing aid
Events for the timeline			
1745 – Invention of the Leyden Jar: a foiled-lined glass jar that can store static electricity. These jars allow the first practical experiments with electricity.	1837- American inventor Samuel Morse conducts the first successful experiment in America with a single-wire electrical recording telegraph.	1951 - The first electricity to be produced from an atomic power station comes online at the National Reactor Station at Arco in America.	1973 - American inventor Dr Martin Cooper leads the team from Motorola that develops the first mobile phone.
1876 - Canadian inventor Alexander Graham Bell patents a working telephone. His system converts sound into electrical signals and back again.	1816 - Francis Ronalds sets up first workable telegraph using an electrostatic generator applied to eight miles of wire arranged around his garden.	1970 - the first electronic digital wristwatch is made by John Bergey of Pulsar, inspired by the 1968 Sci-Fi film 2001: A Space Odyssey.	1837 - Charles Wheatstone and Sir William Fothergill Cooke install the first commercial electric telegraph for the Great Western Railway.
1841 - Scottish inventor Alexander	1857 - The first cable under the	1752 - American Benjamin Franklin	1901 - British engineer Hubert

Bain patents the first electric clock and develops a basic fax machine.	Atlantic ocean is laid by American Cyrus Field using an insulating rubber-like substance.	flies a kite in a thunderstorm that conducts electric charge.	Booth invents the first powered vacuum cleaner.
1991 - The UK's first Wind Farm opens in Cornwall. Its 10 turbines can generate 4 megawatts of electricity.	1820s - English physicist Michael Faraday shows how an electric current can rotate a magnet.	1925 - Scottish engineer John Logie Baird demonstrates TV for the first time at the Selfridges department store in London.	1800 - Allesandro Volta invents the battery that is capable of producing a steady flow of electricity around a circuit.
1936 - The first public service TV transmissions are broadcast by the BBC from Alexandra Palace.	1827 - German physicist Geroge Ohm realises that the amount of current flowing around an electric circuit depends on what material the wire is made of, its length, its voltage and temperature.	1958 - American engineers Jack Kilby and Robert Noyce produce the first integrated circuits (micro-chip).	1926 - American inventor Charles Strite launches the first domestic pop-up toaster

Warnings

Do not mess with faulty electrical appliances	Never shelter under trees when there is an electrical storm	Switch off the power before changing a light bulb	Do not use, or touch, damaged electrical cord
Do not put too many plugs into one socket	Never take electrical equipment into the bathroom	Do not fly a kite under, or near, electrical cables	Switch off the power before removing a plug from the socket
Do not poke a sharp object into a toaster to remove the bread	Never play with power plugs	Do not play on railway lines	Never put anything metal into an electric socket
Don't touch a light bulb that has been on: it gets very hot	Keep water and drinks away from electricity	Never touch anything electrical with wet hands	Unplug electrical items after you have turned them off

Powerless

Imagine that the country has been without electricity for a whole week and more power cuts are threatened. Write the script for a news programme that is broadcast on the night when the power has gone back on. Remember this may be temporary.

When you have written and rehearsed your script, ask your teacher to video record it for you.

Some elements that you might like to include:

The newsreader in the studio to introduce the story, provide links between the separate parts and a summary at the end

An interview with an expert – maybe someone who works for a power company or someone from a university

Comments from politicians from different parties – this may be shown as a panel discussion



Live footage from around the country – you could include clips from during the crisis that were taken with battery powered video cameras (but remember this will not be able to be recharged); interviews with ordinary people saying how their lives were disrupted.

Try to watch the news coverage of a national event to give you other ideas.