

# ACE SCIENCE HOMEWORK TASKS WITH LEARNING LADDERS

Below is a brief introduction to the three Science Homework Task books in the series plus their contents.

It is often hard to set 'meaningful' homework tasks as it usually takes a lot of planning. These tasks have been developed to do just that: provide a range of extended homework projects from which students can get a much wider experience. We have found that many students relish the chance to 'do a project' and have a real feeling of pride with their work when they hand it in.

The key features of the ACE Science Homework Tasks:

- Extend learning outside the classroom.
- Encourage the use of science in 'real life' situations.
- Encourage independent learning.
- Encourage improvements in literacy, numeracy and ICT.
- Fit with the new 2014 KS3 Science Curriculum.
- Develop skills in working scientifically.
- Excellent preparation for Key Stage 4 assessment tasks.
- Allow parents to see not only how their children are being assessed but also the improvements in their work.

## Cross-curricular opportunities

We feel that these projects could be easily adapted for such ventures and so have added some suggested links in the Teacher Notes. These tasks can be a starting point for this and we would be interested to know how people adapt and use these tasks for this part of the new Key Stage 3.

## How to use these tasks

Each task is a simple open-ended task that assesses knowledge and understanding of a significant concept from the new Science National Curriculum. The tasks should be photocopied with the task sheet and the ACE Learning Ladder back-to-back or side-to-side. Teachers and learners can use the ACE Learning Ladder to guide their response to the task.

Each task is available in three level ranges: Establishing, Confident and Advanced. This allows you to differentiate appropriately.

This book contains four types of task:

- Projects
- Making and Presenting
- Mini Investigations
- Critical Thinking.

General information on how to use each task is given on 'General Guide' sheets and specific information relating to each task is given in each task's 'Teacher Notes'.

# ACE SCIENCE KS3 SCIENCE

## HOMEWORK TASKS PHYSICS

### CONTENTS

#### 1 Projects

##### Tasks

- 1 History of electricity
- 2 Energy escape!
- 3 Static and sparks!
- 4 Faces in forces
- 5 Genius glasses
- 6 Seeing through space
- 7 Working with waves
- 8 Staying scientific

##### Topic Links

Current electricity  
Energy  
Static electricity  
Forces  
Light waves  
Light waves, Space physics  
Energy and waves  
Any

#### 2 Making and Presenting

- 1 Seeing the seasons
- 2 Solar shoeboxes
- 3 Electrical storyboards
- 4 Heated houses
- 5 Barmy birdmen
- 6 Science timeline
- 7 Scientific scriptwriting
- 8 Scintillating science!

Space physics  
Space physics  
Calculation of fuel uses and costs in the domestic context, Current electricity, Energy in matter  
Energy  
Motion and forces  
Any  
Any  
Any

#### 3 Mini Investigations

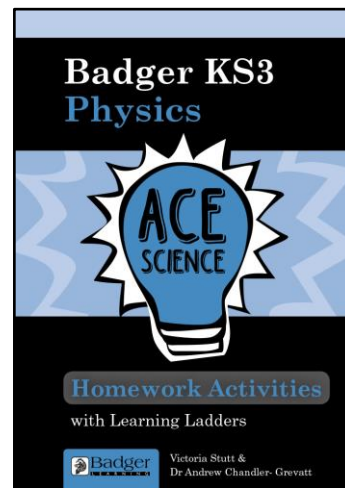
- 1 Fruit batteries
- 2 Frictional forces
- 3 Looking at light
- 4 Solar energy
- 5 Space from earth
- 6 Shifting stars
- 7 My scientific investigation
- 8 My peer review

Current electricity  
Motion and forces  
Light waves  
Energy  
Space physics  
Space physics  
Any  
Any

#### 4 Critical Thinking

- 1 Power politics
- 2 Scientific spending
- 3 Shampoo statistics
- 4 The future of science
- 5 Science on TV
- 6 Science in newspapers

Calculation of fuel uses and costs in the domestic context, Current electricity, Energy in matter  
Any  
Any  
Any  
Any  
Any



# 1

## PROJECT 1: TEACHER NOTES

# HISTORY OF ELECTRICITY

### NATIONAL CURRICULUM LINKS

#### CURRENT ELECTRICITY

- electric current, measured in amperes, in circuits, series and parallel circuits, currents add where branches meet and current as flow of charge
- potential difference, measured in volts, battery and bulb ratings; resistance, measured in ohms, as the ratio of potential difference (p.d.) to current
- differences in resistance between conducting and insulating components (quantitative).

#### WORKING SCIENTIFICALLY

Scientific attitudes

Analysis and evaluation

#### CROSS-CURRICULAR OPPORTUNITIES INCLUDE:

- English – genres of writing and creative writing
- citizenship – knowledge and understanding of the world. Gender issues
- history – timelines, secondary evidence
- ICT – internet searching, word processing, use of PowerPoint.

### TIME

Three homework sessions of between 30 and 60 minutes each.

### ASSESSMENT, FEEDBACK AND IMPROVEMENT

Assessing these tasks should not be arduous. Rather than assigning an absolute grade, you should focus on how each student can improve. To ensure that this task is formative, students should be given the opportunity to improve their work based on the teacher's targets or through peer and self-assessment.

### GUIDANCE FOR CONFIDENT (C)

Students working with confidence will use the key terms correctly within their project.

We find that reading through the project using these additional prompts helps to assess the task.

# 1

## PROJECT 1: TASK SHEET (ESTABLISHING) HISTORY OF ELECTRICITY

The discovery of electricity has changed the world. These are some people who tried to find out more about electricity. Use information sources to find out more about them and make a timeline about the major discoveries of electricity.

*William Gilbert, Alessandro Volta, Luigi Galvani, Charles Coulomb, André-Marie Ampère, Georg Ohm, Michael Faraday, Hans Oersted*

Your teacher will tell you when to do each section.  
Use the ACE Learning Ladder to help reach your target.  
Try to use your own words throughout the project.

### SECTION 1: RESEARCH ABOUT ELECTRICAL SCIENTISTS

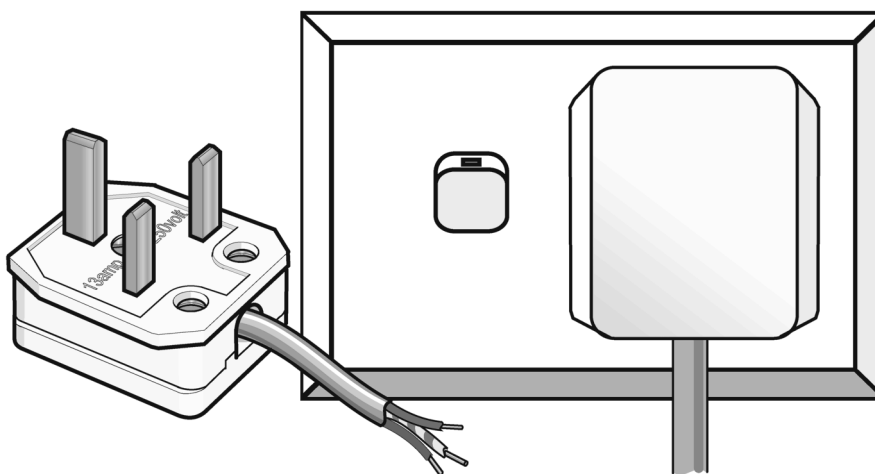
- Use the library and the internet to find out about the scientists who discovered electricity.
- Find out the main findings each scientist made and add this to a timeline.
- Select images that would help people understand the key events in your timeline.
- Describe how you went about doing your search.

### SECTION 2: TIMELINE OF ELECTRICAL DISCOVERIES

- Design a timeline that includes the information and images you have found.
- Identify and describe important events.
- Select suitable images for your timeline.

### SECTION 3: IMPACT OF ELECTRICITY ON CIVILIZATION

- What were the beliefs and understanding of electricity before it was discovered and used?
- What are the advantages and disadvantages of the discovery of electricity?
- Why is it that only men were involved in the discovery of electricity? How are things different now?



Use the Good Project Guide sheet for tips on internet safety, research and literacy.

# 1

## PROJECT 1: TASK SHEET (CONFIDENT)

# HISTORY OF ELECTRICITY

The discovery of electricity has changed the world. These are some people who tried to find out more about electricity. Use information sources to find out more about them and make a timeline about the major discoveries of electricity.

*William Gilbert, Alessandro Volta, Luigi Galvani, Charles Coulomb, André-Marie Ampère, Georg Ohm, Michael Faraday, Hans Oersted*

Your teacher will tell you when to do each section.

Use the ACE Learning Ladder to help reach your target.

Try to use your own words throughout the project.

### SECTION 1: RESEARCH ABOUT ELECTRICAL SCIENTISTS

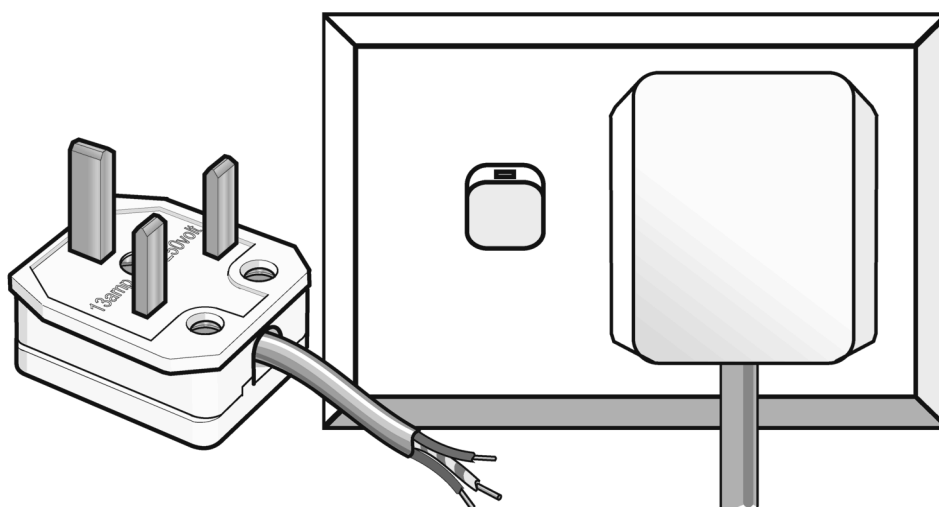
- Use the library and the internet to find out about the scientists who discovered electricity.
- Select useful information about each scientist to add to a timeline.
- Select suitable images for your timeline.
- Describe how you went about doing your search.

### SECTION 2: TIMELINE OF ELECTRICAL DISCOVERIES

- Design a timeline that includes the information you have found.
- Identify and describe important events.
- Select suitable images for your timeline.

### SECTION 3: IMPACT OF ELECTRICITY ON CIVILIZATION

- What were the beliefs and understanding of electricity before it was discovered and used?
- What are the advantages and disadvantages of the discovery of electricity?
- Why is it that only men were involved in the discovery of electricity? How are things different now?



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# 1

## PROJECT 1: TASK SHEET (ADVANCED)

# HISTORY OF ELECTRICITY

The discovery of electricity has changed the world. These are some people who tried to find out more about electricity. Use information sources to find out more about them and make a timeline about the major discoveries of electricity.

*William Gilbert, Alessandro Volta, Luigi Galvani, Charles Coulomb, André-Marie Ampère, Georg Ohm, Michael Faraday, Hans Oersted*

Your teacher will tell you when to do each section.

Use the ACE Learning Ladder to help reach your target.

Try to use your own words throughout the project.

The sections for your project are as follows:

### SECTION 1: RESEARCH ABOUT ELECTRICAL SCIENTISTS

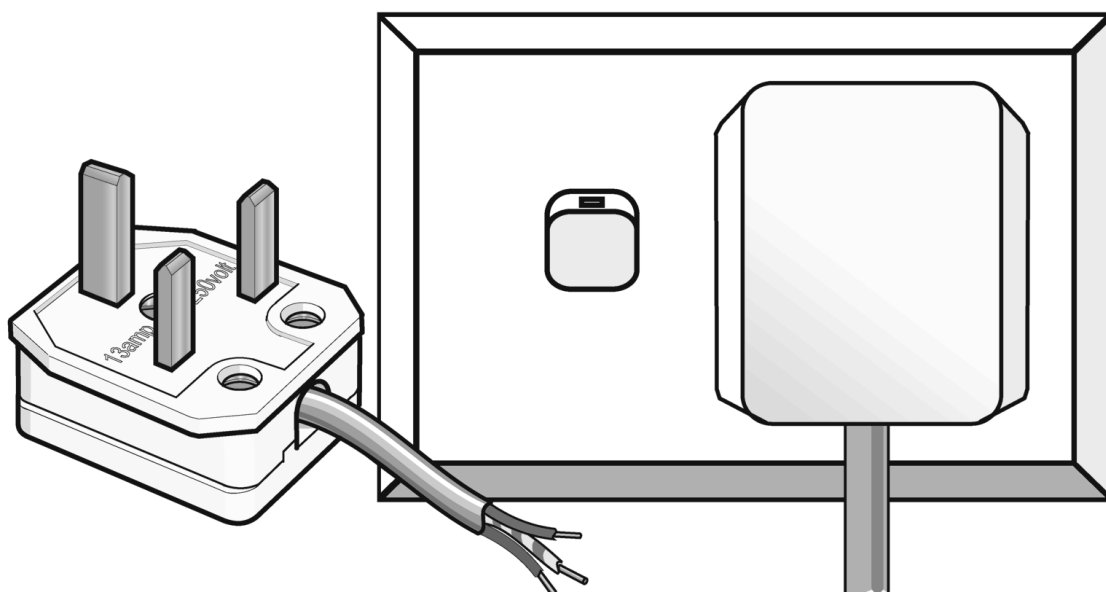
Find relevant information and images and explain how you conducted your search.

### SECTION 2: TIMELINE OF ELECTRICAL DISCOVERIES

Design a timeline that explains important events and discoveries and include images.

### SECTION 3: IMPACT OF ELECTRICITY ON CIVILIZATION

How has electricity changed the world – for better or worse? Has the world of science changed as understanding of electricity changed?



Use the Good Project Guide sheet for tips on internet safety, research and literacy.

# 1

## PROJECT 1: ACE LEARNING LADDER

# HISTORY OF ELECTRICITY

### ACE LEARNING LADDER

Assessment Check	The types of things you can do:
Advanced	<ul style="list-style-type: none"> <li>• Make a detailed timeline, drawing on detailed scientific knowledge and understanding.</li> <li>• Explain why scientists were interested in electricity and how their work built upon or challenged earlier understanding.</li> <li>• Explain the key discoveries made and how these came about, describing, in detail, investigations carried out.</li> <li>• Explain any unintended consequences that have arisen through the discovery of electricity and how our understanding may progress in the future.</li> <li>• Evaluate the significance of each scientist's findings.</li> <li>• Use a range of scientific words, symbols and units accurately.</li> </ul>
Confident	<ul style="list-style-type: none"> <li>• Make a timeline, drawing on scientific knowledge and understanding.</li> <li>• Explain why scientists were interested in electricity.</li> <li>• Explain the key discoveries made and how these came about.</li> <li>• Explain how discoveries about electricity have impacted on society as a whole, negatively or positively.</li> <li>• Explain how you researched the issue.</li> <li>• Use a range of appropriate scientific words, symbols and units.</li> </ul>
Establishing	<ul style="list-style-type: none"> <li>• Make a simple timeline, drawing on some scientific knowledge and understanding.</li> <li>• Describe the key discoveries on your timeline.</li> <li>• Identify the scientists responsible for each discovery.</li> <li>• List some advantages and disadvantages of the discovery of electricity.</li> <li>• State some uses of electricity.</li> <li>• Explain how you researched the issue.</li> <li>• Use some appropriate scientific words, symbols and units.</li> </ul>