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(For Upper Primary)

A Pacemaker Pack

Exciting Electrics

*Activities to Extend Talented Students in
the Regular Classroom*

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Email: info@readyed.com.au Website: www.readyed.com.au

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Contents

TEACHERS' NOTES	Pages 4, 5
STUDENT RECORD SHEET	Page 6
ELECTRICITY - TURN ON THE FACTS	Page 7
HOME POWER	Page 8
PLAYING FAVOURITES	Page 9
ECSTATIC ABOUT STATIC	Page 10
STATIC FANATIC	Page 11
A STATIC STATE	Page 12
IS LIGHTNING FRIGHTENING OR EXCITING?	Page 13
POWER TO THE PEOPLE	Page 14
POWER POINTS	Page 15
THE GOOD, THE BAD AND THE UGLY	Page 16
CONCERNS AND CONGRATS	Page 17
PLUG IT IN	Page 18
ELECTRIC LIGHT - FROM EDISON TO NEON	Page 19
CHEAT SHEET - THE ELECTRIC LIGHT STORY	Page 20
DON'T TOUCH	Page 21
DR SPARK	Page 22
POWER WORDS	Page 23
LET'S GET STARTED	Page 24
SWITCHEROO	Page 25
THE SCIENTIFIC TOUCH	Page 26
DRAWING CIRCUITS	Page 27
CONDUCTORS AND INSULATORS	Page 28
RECORDING YOUR RESULTS	Page 29
INVENTION STATION	Page 30
BE WISE AND ADVERTISE	Page 31
NERVES OF STEEL OR FUMBLY FINGERS?	Page 32
THE ULTIMATE LIE DETECTOR	Page 33
QUIZMASTER	Page 34
EXTRA ELECTRICAL CHALLENGES	Page 35
ELECTRICAL HALL OF FAME	Page 36
OUR ELECTRICAL WORLD	Page 37
IDEAS FOR BRIGHT SPARKS	Pages 38, 39
GLOSSARY	Page 40
ANSWERS	Pages 41 - 43

Teachers' Notes

This fully revised series was initially devised as a means of providing extension for students within the regular classroom, whilst catering for the needs of the teacher and providing materials that were designed along educationally sound lines.

Although the content and layout for the revised series has been completely updated, the principles behind the series remain the same, using **CONTENT LEVELS** as a basis for categorising activities. The key to this approach, which we term the appropriate curriculum model, is that students are presented with activities appropriate to their levels of understanding of the content together with their mastery of the requisite higher-order thinking processes. The levels are an adaptation of Bloom's Taxonomy of Educational Objectives, still a widely accepted and valued model of education.

Below are the Content Levels and Indicators used in this book:



Content Level 1

What it means

FINDING OUT: Recalling data, showing understanding through restating or extending ideas.

What the student does

Answers factual questions, interprets information, describes or illustrates events.



Content Level 2

What it means

USING INFORMATION: Using information in a new situation through extending or breaking down concepts being studied.

What the student does

Problem solving based on knowledge gained. Making assumptions.



Content Level 3

What it means

CREATING / EVALUATING: Putting together ideas to develop new products, making judgements based on new information.

What the student does

Puts forward theories or original ideas and designs, forms and states opinions on theories.

Moving Through the Content Levels

It is important that higher-order activities such as those at Content Level 3 are underpinned with a solid base of knowledge – the tasks and activities aligned with Levels 1 and 2 are designed to establish and expand this. It should never be assumed that students have the requisite content knowledge, but be prepared to advance students quickly to higher-level activities if they demonstrate a sound understanding of the facts and concepts presented in Levels 1 and 2.

In considering the structure of this material, it is envisaged that in the heterogeneous classroom situation, the series can be implemented as follows:

Child Ability Level

Interpretation

→ Above Average _____ Emphasis on Level 2/3

→ Average _____ Emphasis on Level 2

→ Below Average _____ Emphasis on Level 1

Many pages contain activities from more than one level. In this case, the **TIME** taken on each part will change focus, according to the outline above.

Teachers' Notes

Using the Pacemaker Packs in the Classroom

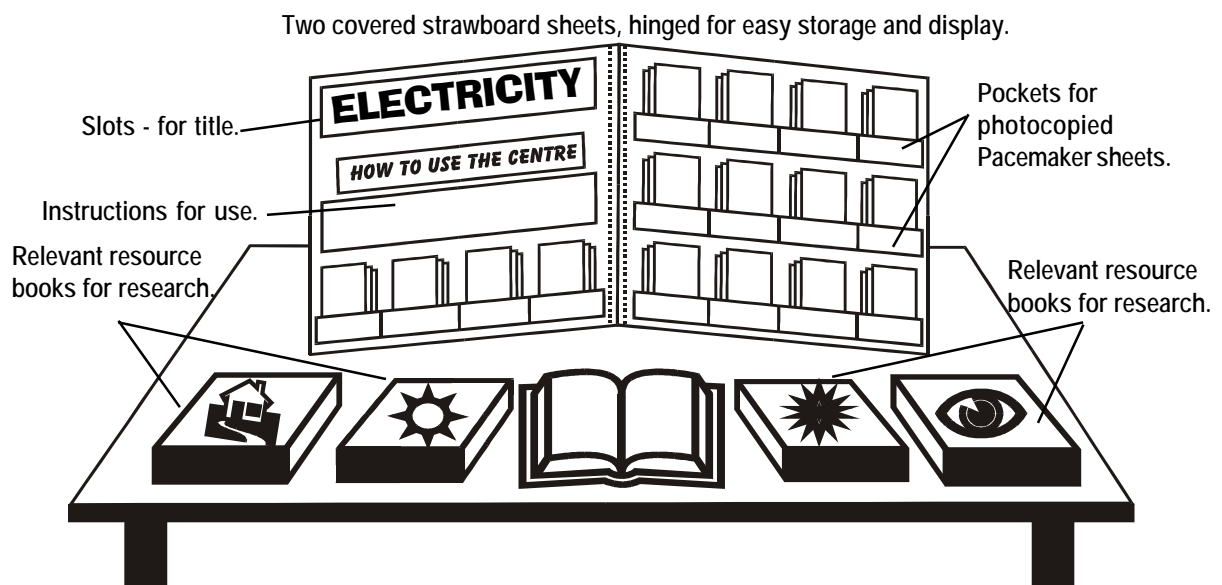
✳ **Promote interest in the theme – set up a classroom learning centre that may contain:**

- Books and posters;
- Models and artefacts;
- CD-ROMS;
- Art supplies and plenty of writing and drawing paper;
- A “theme” table with items brought by students from home.

✳ **Decide on the approach to the theme that suits you and your students best:**

- Teacher - directed with the whole class completing teacher-assigned sheets at a specified time (teacher records progress).
- Student - directed with students working through materials at their own pace at a specified time (student records progress).
- As an interest-based approach with students working from a selection of photocopied worksheets at their own pace (student monitored and recorded).
- As supplementary materials to a unit of study.

You may wish to use this series as a Learning Centre, with photocopied sheets displayed in pockets that students can select from, perhaps set up like this:



Before commencing, talk over the activities contained in the book with your class. Encourage students to broaden their thinking to suit the open-ended nature of the upper - level activities, helping them to understand that there is not “one correct answer”.

Outline a procedure for the activities:

- How will students store and present their completed worksheets? (In a file, a booklet, a plastic sleeve.)
- How can students work on the contents? (Individually, in pairs, in small groups.)
- From where can further research sources be obtained?
- What people or organisations might be able to help?
- How and when will the sheets be available?

Home Power

Name: _____



In your own words, describe **electricity**:

It's hard to describe something that is invisible – you most probably described what electricity **DOES**. Use the four concepts below to connect up the household appliances. Draw an electrical cord between the appliance and what the electricity produces. There may be more than one answer for some! Use different colours for each picture.

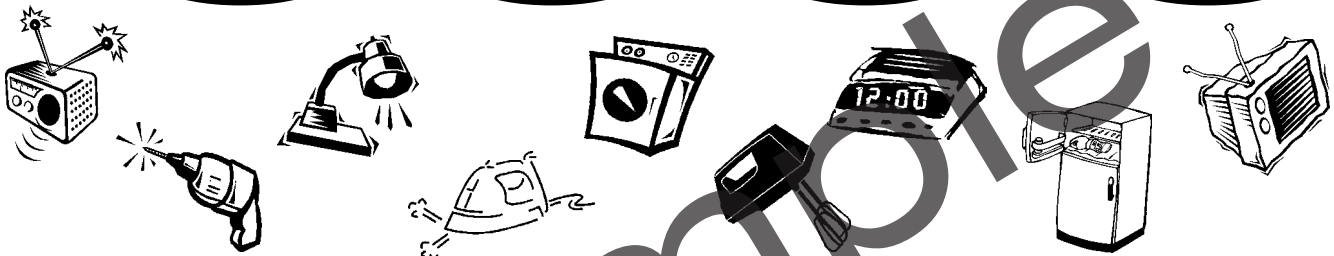
Electricity produces...

LIGHT

HEAT

SOUND

MOVEMENT



Do a house-count – how many electrical appliances can you find in your house?

- | | |
|--|--|
| <input type="checkbox"/> Lights/Lamps | <input type="checkbox"/> Heating/Cooling |
| <input type="checkbox"/> Cooking/Food Preparation | <input type="checkbox"/> Entertainment |
| <input type="checkbox"/> Communication | <input type="checkbox"/> Laundry |
| <input type="checkbox"/> Other (please list) _____ | |
| <input type="checkbox"/> TOTAL | |

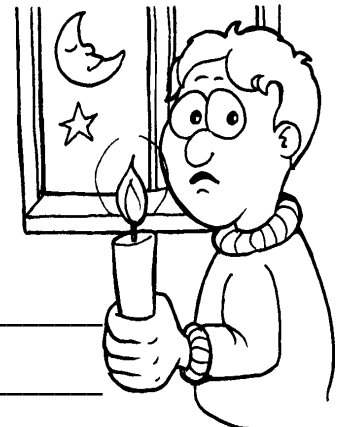


Write three things that you miss the most when there is a power failure:

- ① _____
- ② _____
- ③ _____



If the power was out for a week, how would your family cope?



Related Outcome: Students describe their understanding of electricity and apply it to common household appliances.
Subject Area: Science - Energy and Change.

Power Points

✧ Read the points below so that you are geared up to make some informed opinions about Australian power sources:

Biomass is the organic matter of plants and animals, such as off-cuts and sawdust of wood, and manure of animals. The burning of the biomass releases carbon dioxide and energy. The theory behind the use of biomass is that unused plant and animal matter would decay naturally, so as long as the source is sustainable (it will not run out), then it is appropriate to use. A disadvantage is that it takes a lot of matter to produce the level of energy required. One example of biomass in Australia is the burning of sugar cane waste to produce electricity. Although biomass electricity is a good way of getting rid of wastes in a useful way, the burning process can still release some greenhouse gases.

Solar Energy uses the sun as its source. Solar cells collect the sunlight and convert it into electricity. With the sun being ever-present in our lives, it is a good way to produce power without producing any pollutant gases. Although expensive to make, solar panels usually require little upkeep. They are quiet and can be used at the site where the electricity is required, reducing the costs for cabling long distances in remote areas. Unfortunately a storage system is required for when sunlight is not available.

Wind Energy harnesses its power by using huge windmills in areas of high wind to power turbines that produce electricity. The use of wind as a power source does not produce any pollution, but the large windmills can produce vibrations. Also the windmills can be very expensive to make and run. It can be unreliable as not many places have wind blowing all the time. Some people are worried about the ugly appearance of the windmills whilst others are concerned about birds flying into their path.



Hydroelectricity uses movement of water in dams to spin turbines that produce electricity. This needs to be done in mountainous areas of high rainfall to make sure that the dams can be kept full. The building of dams can be very expensive and can cause flooding as the natural flow of rivers is stemmed. This can damage the wildlife living in or near the rivers. The advantage is that no harmful gases are produced.

Tidal/Wave Energy uses the movement of water to generate power. It uses similar principles to hydroelectricity and may require the building of dams to “capture” the tidal flow. This system is pollution-free but many of the same problems to Hydroelectricity occur, such as damage to the wildlife and shorelines. These systems would also be expensive to build.



Coal, Gas and Nuclear Energy use fossil fuels and other sources that are non-renewable. Because they have formed in the earth over millions of years, it would be very difficult to replace these sources once they have run out.

Coal has been produced by decomposing plants over millions of years. Although a cheaper way of producing electricity, the large production of carbon dioxide can contribute to the greenhouse effect. Gas that is trapped between rock in our earth can be used in stoves, home heating and hot water systems.

Nuclear Energy uses a mineral called uranium to change atoms and produce energy. This method of power production is considered very dangerous by many people as the process causes radiation that is harmful to people and the environment.

Plug it in

Name: _____

You are the rides designer at a Science Fair, and you have decided to create a ride that gives riders the sense of how electricity gets from the start to the end of its journey.

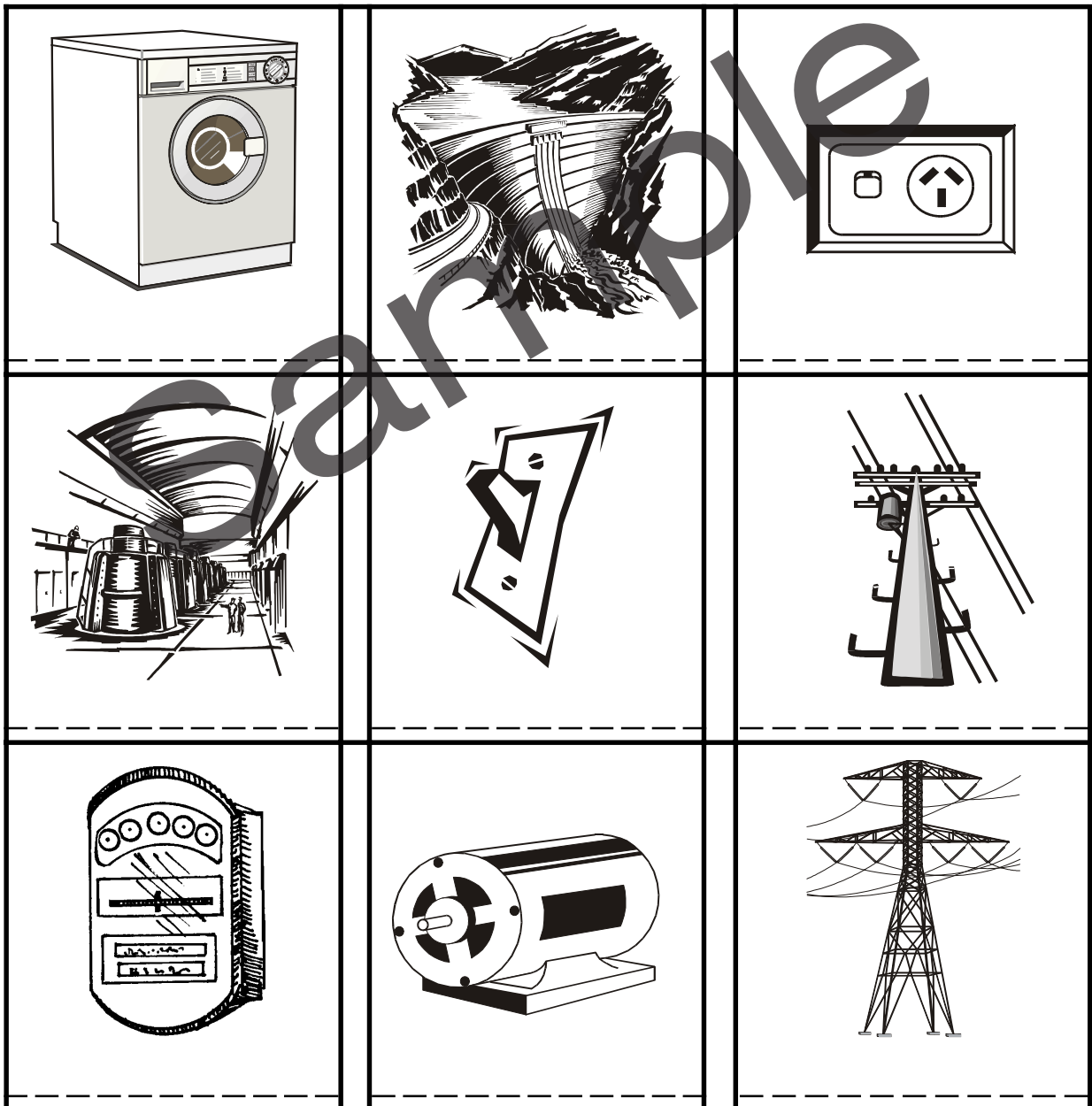


Firstly you need to place the correct words underneath the pictures, then decide what order they need to go in for the correct sequence. You may wish to cut the pictures out and glue them on a separate sheet.



Then, work out a way that each stage can be incorporated into a roller coaster ride. Draw this on a large sheet of paper and use lots of colour. You may even like to use some recycled materials to create a 3-D effect. Have fun!!

- Wall plug • Fuel source • Mains switch • Pylons
- Transformer • Electrical appliance • Power station • Electricity meter
- Power poles (may be underground cables)



Related Outcome: Students will demonstrate understanding of electricity flow in a creative design context.
Subject Areas: Science - Energy and Change; Technology - Design Process.