



# It's electrifying! – Stage 3

Physical World Strand

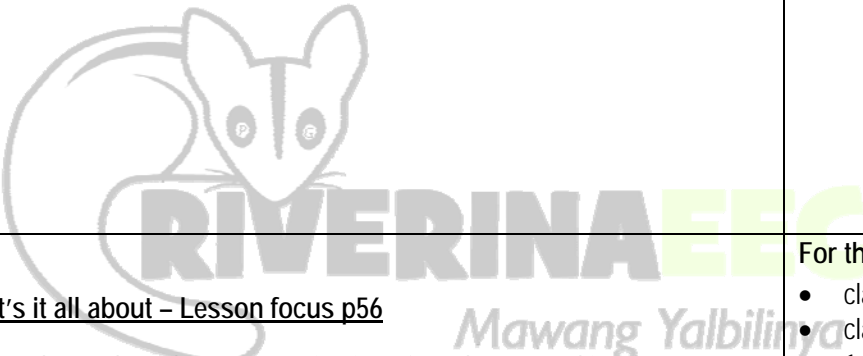
Term	1	2	3	4	Weeks	1	2	3	4	5	6	7	8	9	10	11
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Outcome	Lesson Sequence – Overview	Resources	Word Wall
<p>ST3-8PW-ST explains how energy is transformed from one form to another</p> <ul style="list-style-type: none"> <li>identify evidence that shows that a battery is working</li> <li>explain their existing ideas of how a battery works</li> <li>describe how they think a battery-operated device works</li> <li>explain their existing ideas of how a torch works</li> <li>explain what they know about how electric circuits work.</li> </ul> <p>ST3-1WS-S plans and conducts scientific investigations to answer testable questions, and collects and summarises data to communicate conclusions</p> <ul style="list-style-type: none"> <li>record information and ideas about battery-operated devices</li> <li>represent what they think they know about how a torch</li> </ul>	<p><b>Lesson 1</b> <u>What makes it go? – Lesson focus p 13</u></p> <ul style="list-style-type: none"> <li>To capture students' interest and find out what they think they know about how electrical circuits provide a means of transferring and transforming electrical energy.</li> <li>To elicit students' questions about how electric circuits work.</li> </ul> <p><u>Students:</u></p> <ul style="list-style-type: none"> <li><i>observe and record information about the working of different battery-operated devices</i></li> <li><i>draw a cutaway diagram of how they think a torch works</i></li> <li><i>share and discuss observations.</i></li> </ul>	<p><b>For the class</b></p> <ul style="list-style-type: none"> <li>class science journal</li> <li>class science chat-board</li> <li>team roles chart</li> <li>team skills chart</li> <li>3 or 4 torches</li> <li>collection of battery-operated devices (eg, toy, music player, doorbell, handheld computer game, mobile phone, walkie-talkies, megaphone)</li> <li>large sheets of paper for class science chat-board (see 'Preparation')</li> </ul> <p><b>For each team</b></p> <ul style="list-style-type: none"> <li>role wristbands or badges for Director, Manager and Speaker</li> <li>each team member's science journal</li> </ul>	<p><i>amps</i></p> <p><i>battery</i></p> <p><i>bulb</i></p> <p><i>charge</i></p> <p><i>chemical</i></p> <p><i>circuit</i></p> <p><i>contact</i></p> <p><i>cords</i></p> <p><i>current</i></p> <p><i>device</i></p> <p><i>diagram</i></p> <p><i>electrical</i></p> <p><i>electricity</i></p> <p><i>electrode</i></p> <p><i>electrons</i></p>

<p>works in a cutaway diagram</p> <ul style="list-style-type: none"> <li>contribute to the class science chat-board to represent their understanding of how electric circuits work, including further questions to investigate.</li> </ul>			<p>energy equipment explanation fair test filament</p>
<p>ST3-8PW-ST explains how energy is transformed from one form to another</p> <ul style="list-style-type: none"> <li>make predictions about circuits that will light a light bulb</li> <li>construct and test circuits and record their observations</li> <li>compare their representations of circuits.</li> </ul> <p>ST3-1WS-S plans and conducts scientific investigations to answer testable questions, and collects and summarises data to communicate conclusions</p> <ul style="list-style-type: none"> <li>record predictions, observations and explanations about circuits</li> <li>use writing, drawing and modelling to clarify ideas about designs of circuits</li> </ul>	<p><b>Lesson 2</b> <u>Light up my life – Lesson focus p20</u></p> <ul style="list-style-type: none"> <li>To provide students with hands-on, shared experiences of constructing and representing electric circuits.</li> </ul> <p><u>Students:</u></p> <ul style="list-style-type: none"> <li><i>construct and test circuits</i></li> <li><i>represent a functioning circuit.</i></li> </ul> 	<p><b>For the class</b></p> <ul style="list-style-type: none"> <li>class science journal</li> <li>class science chat-board</li> <li>team roles chart</li> <li>team skills chart</li> <li>1 enlarged copy of 'PROE record: Lighting up my life' (Resource sheet 1)</li> <li>stripping pliers or knife</li> <li>spare light bulbs and batteries for replacements, if necessary</li> </ul> <p><b>For each team</b></p> <ul style="list-style-type: none"> <li>role wristbands or badges for Director, Manager and Speaker</li> <li>each team member's science journal</li> <li>1 copy of 'PROE record: Lighting up my life' (Resource sheet 1) per team member</li> <li>1 battery (size C or D)</li> <li>1 light bulb (1.5 V)</li> <li>2 pieces of insulated wire (15 cm long), with ends stripped of insulation; or folded foil wires (see 'Folded foil wires',</li> </ul>	<p>flow heat insulation investigation journal metal motor negative observation path plugs positive power</p>

<ul style="list-style-type: none"> <li>represent a circuit diagram using circuit symbols.</li> </ul>		Resource sheet 2 and 'Preparation') <ul style="list-style-type: none"> <li><i>optional</i>: 1 copy of 'Folded foil wires' (Resource sheet 2)</li> </ul>	<i>resistance</i> <i>science</i>
<p>ST3-8PW-ST explains how energy is transformed from one form to another</p> <ul style="list-style-type: none"> <li>describe the structure of a light bulb</li> <li>label the parts of a light bulb</li> <li>explain the function of each part of a light bulb.</li> </ul> <p>ST3-1WS-S plans and conducts scientific investigations to answer testable questions, and collects and summarises data to communicate conclusions</p> <ul style="list-style-type: none"> <li>create a labelled diagram of a light bulb</li> <li>interpret a factual text about light bulbs</li> <li>use oral language to represent scientific ideas about electrical energy</li> <li>contribute to the construction of a class diagram of how a light bulb works.</li> </ul>	<h3>Lesson 3</h3> <p><u>Light bulb explorers- Lesson focus p 32</u></p> <ul style="list-style-type: none"> <li>To provide students with hands-on, shared experiences of the structure of a light bulb.</li> </ul> <p><u>Students:</u></p> <ul style="list-style-type: none"> <li><i>draw a light bulb from memory</i></li> <li><i>draw a light bulb from observation</i></li> <li><i>read about and complete a labelled diagram of a light bulb.</i></li> </ul> 	<p><b>For the class</b></p> <ul style="list-style-type: none"> <li>class science journal</li> <li>class science chat-board</li> <li>team roles chart</li> <li>team skills chart</li> <li><i>optional</i>: collection of light bulbs of different sizes and shapes</li> <li>1 enlarged copy of 'Inside a light bulb' (Resource sheet 3)</li> <li>dictionaries (eg, hardcopy or online)</li> </ul> <p><b>For each team</b></p> <ul style="list-style-type: none"> <li>role wristbands or badges for Director, Manager and Speaker</li> <li>each team member's science journal</li> <li>1 light bulb (eg, 1.5 V bulb)</li> <li>1 magnifying glass or hand lens</li> <li>1 copy of 'Inside a light bulb' (Resource sheet 3) for each team member</li> </ul>	<i>switch</i> <i>symbols</i> <i>terminal</i> <i>transform</i> <i>tungsten</i> <i>Volta</i> <i>voltage</i> <i>wire</i>
<p>ST3-1WS-S plans and conducts scientific investigations to answer testable questions, and collects</p>	<h3>Lesson 4</h3> <p><u>Alessandro Volta: Battery maker – Lesson focus p39</u></p>	<p><b>For the class</b></p> <ul style="list-style-type: none"> <li>class science journal</li> <li>class science chat-board</li> </ul>	

<p><b>and summarises data to communicate conclusions</b></p> <ul style="list-style-type: none"> <li>• identify some ways that scientists think and work</li> <li>• understand that scientific explanations develop historically through the contribution of ideas from many scientists</li> <li>• understand that scientific explanations are revised as new evidence emerges.</li> <li>• discuss how scientific knowledge develops</li> </ul>	<ul style="list-style-type: none"> <li>• To provide students with hands-on, shared experiences of exploring the role of Alessandro Volta in the development of the first battery.</li> </ul> <p><b><u>Students:</u></b></p> <ul style="list-style-type: none"> <li>• <i>read and discuss a biography of Alessandro Volta</i></li> <li>• <i>discuss the way scientists develop and change their ideas</i></li> <li>• <i>represent their ideas about the biography.</i></li> </ul>	<ul style="list-style-type: none"> <li>• collection of batteries of different sizes and voltages (eg, 1.5 V battery, watch battery, large torch battery such as a D size)</li> <li>• 1 enlarged copy of 'Alessandro Volta: Battery maker' (Resource sheet 4)</li> </ul> <p><b>For each student</b></p> <ul style="list-style-type: none"> <li>• science journal</li> <li>• 1 copy of 'Alessandro Volta: Battery maker' (Resource sheet 4)</li> <li>• <i>optional:</i> 1 copy of 'Chronological list: Alessandro Volta' (Resource sheet 5)</li> </ul>	
<p>ST3-8PW-ST explains how energy is transformed from one form to another</p> <ul style="list-style-type: none"> <li>• describe the components of a complete circuit</li> <li>• identify the source of electrical energy in a circuit</li> <li>• explain the role of electrons in carrying electrical energy around a circuit</li> <li>• explain that electrical energy is changed into light energy by the bulb.</li> </ul> <p>ST3-1WS-S plans and conducts scientific investigations</p>	<p><b>Lesson 5</b> <b><u>Enacting electrons – Lesson focus p49</u></b></p> <ul style="list-style-type: none"> <li>• To support students to represent and explain their understanding of electric circuits, and to introduce current scientific views.</li> </ul> <p><b><u>Students:</u></b></p> <ul style="list-style-type: none"> <li>• <i>participate in a whole-class role-play of an electric circuit</i></li> <li>• <i>discuss the role of the components of an electric circuit</i></li> <li>• <i>represent their understanding using a circuit diagram.</i></li> </ul>	<p><b>For the class</b></p> <ul style="list-style-type: none"> <li>• class science journal</li> <li>• class science chat-board</li> <li>• 1 decorated container (eg, a bucket decorated with tinsel, cellophane or crepe paper) for the 'bulb'</li> <li>• 50–60 (twice as many as the number of students) packets of energy (eg, pegs, counters)</li> </ul> <p><b>For each student</b></p> <ul style="list-style-type: none"> <li>• science journal</li> </ul>	

<p>to answer testable questions, and collects and summarises data to communicate conclusions</p> <ul style="list-style-type: none"> <li>• show understanding of how a circuit works through participation in a role-play and discussion</li> <li>• represent their understanding through drawing an annotated diagram of a circuit</li> <li>• use scientific vocabulary appropriately in writing and talking.</li> </ul>			
<p>ST3-8PW-ST explains how energy is transformed from one form to another</p> <ul style="list-style-type: none"> <li>• formulate a question and make predictions about whether or not various materials will conduct an electric current</li> <li>• conduct fair tests of materials to see if they are conductors or insulators</li> <li>• identify and describe the types of materials that are conductors and insulators</li> </ul>	<p><b>Lesson 6</b>  <u>Problem solvers – what’s it all about – Lesson focus p56</u></p> <ul style="list-style-type: none"> <li>• To support students to plan and conduct an investigation of conductors and insulators.</li> </ul> <p><b>Students:</b></p> <ul style="list-style-type: none"> <li>• <i>formulate a question for investigation</i></li> <li>• <i>construct a circuit and test their question for investigation</i></li> <li>• <i>observe, record and share results</i></li> <li>• <i>discuss materials that conduct electrical energy.</i></li> </ul>	<p><b>For the class</b></p> <ul style="list-style-type: none"> <li>• class science journal</li> <li>• class science chat-board</li> <li>• 1 enlarged copy of ‘Lab notes: What’s this all about?’ (Resource sheet 6)</li> <li>• 1 enlarged copy of ‘Problem solvers: Investigation planner’ (Resource sheet 7)</li> <li>• team roles chart</li> <li>• team skills chart</li> </ul> <p><b>For each team</b></p> <ul style="list-style-type: none"> <li>• role wristbands or badges for Director, Manager and Speaker</li> <li>• each team member’s science journal</li> </ul>	

- provide evidence to support their description.
- ST3-1WS-S**  
**plans and conducts scientific investigations to answer testable questions, and collects and summarises data to communicate conclusions**
- plan, conduct and represent a fair test to decide if materials are conductors or insulators
  - summarise their findings about materials investigated
  - participate in cooperative learning teams and class discussion.



**RIVERINA EEC**

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- 1 copy of 'Lab notes: What's this all about?' (Resource sheet 6)
- 1 copy of 'Problem solvers: Investigation planner' (Resource sheet 7) per team member

**'Essentials for the investigation':**

- 1 battery (size C or D)
- 1 light bulb (1.5 V)
- 2 pieces of insulated wire (15 cm long), with ends stripped of insulation; or folded foil wires (see 'Folded foil wires', Resource sheet 2 and 'Preparation')
- self-adhesive tape
- 1 clothes peg
- 1 piece A4 card

**1 'Scientists' materials box' containing:**

- wood (eg, popsticks, toothpicks)
- plastic (eg, straws, plastic cutlery)
- rubber (eg, balloons, rubber bands)
- metal (eg, paperclips, cutlery)
- paper and/or cardboard
- pencils (sharpened at both ends)
- gardening wire or twist-ties
- insulated copper wire with the ends stripped

ST3-8PW-ST  
explains how energy is transformed from one form to another

- construct two types of electrical switch
- explain how switches are used to control the flow of electrical energy around a circuit.

ST3-1WS-S  
plans and conducts scientific investigations to answer testable questions, and collects and summarises data to communicate conclusions

- interpret a procedural text to construct two types of electrical switch
- represent their understanding of how switches control the flow of electrical energy in a circuit using a circuit diagram
- develop scientific vocabulary about switches.

## Lesson 7

### Switched on – Lesson focus p66

- To support students to plan and conduct an investigation of the function of switches in an electric circuit.

#### Students:

- *discuss the role of switches in an electric circuit*
- *create a circuit diagram including the switch symbol.*



#### For the class

- class science journal
- class science chat-board
- 1 enlarged copy of 'Making switches' (Resource sheet 8)
- collection of battery-operated devices from Lesson 1
- team roles chart
- team skills chart

#### For each team

- role wristbands or badges for Director, Manager and Speaker
- each team member's science journal
- 1 copy of 'Making switches' (Resource sheet 8)
- 1 battery (1.5 V)
- 1 light bulb (1.5 V)
- *optional:* light bulb holder and battery holder
- *optional:* a small electric buzzer or motor for the bulb
- 3 pieces of insulated wire (15 cm long), with ends stripped of insulation; or folded foil wires (see 'Folded foil wires', Resource sheet 2 and 'Preparation')

#### Electrical switch 1

- 1 piece of A4 card
- 1 metal paperclip
- 2 metal split pins or thumbtacks
- self-adhesive tape

		<p><b>Electrical switch 2</b></p> <ul style="list-style-type: none"> <li>• 3 corrugated-card squares (10 cm x 10 cm)</li> <li>• aluminium foil A4 sheet</li> </ul>	
<p><b>ST3-8PW-ST</b> explains how energy is transformed from one form to another</p> <ul style="list-style-type: none"> <li>• describe a circuit in terms of components that form a continuous path for the flow of electrons</li> <li>• describe how energy is transferred within an electric circuit</li> <li>• explain the characteristics of conductors and insulators in terms of categories of materials.</li> </ul> <p><b>ST3-1WS-S</b> plans and conducts scientific investigations to answer testable questions, and collects and summarises data to communicate conclusions</p> <ul style="list-style-type: none"> <li>• make a labelled model to represent how an electric circuit works</li> <li>• make a presentation to communicate their</li> </ul>	<p><b>Lesson 8</b> <b><u>Bright sparks: Sharing what we know</u></b></p> <ul style="list-style-type: none"> <li>• To provide opportunities for students to represent what they know about how electrical circuits provide a means of transferring and transforming electrical energy, and to reflect on their learning during the unit.</li> </ul> <p><b><u>Students:</u></b></p> <ul style="list-style-type: none"> <li>• <i>participate in a word loop activity</i></li> <li>• <i>work in collaborative learning teams to prepare a model of a torch</i></li> <li>• <i>prepare a description that communicates the main ideas of their model and how an electric circuit works</i></li> <li>• <i>share models and descriptions with an audience</i></li> <li>• <i>reflect on their learning during the unit.</i></li> </ul>	<p><b>For the class</b></p> <ul style="list-style-type: none"> <li>• class science journal</li> <li>• class science chat-board</li> <li>• team roles chart</li> <li>• team skills chart</li> <li>• 'It's electrifying Word loop cards' (Resource sheet 9)</li> <li>• 1 large sheet of paper for affinity diagram</li> </ul> <p><b>For each team</b></p> <ul style="list-style-type: none"> <li>• role wristbands or badges for Director, Manager and Speaker</li> <li>• each team member's science journal</li> <li>• <i>optional:</i> 1 copy of 'Torch template' (Resource sheet 10)</li> <li>• 1 battery (1.5 V)</li> <li>• 1 bulb (1.5 V)</li> <li>• <i>optional:</i> 1 sheet of cellophane</li> <li>• <i>optional:</i> light bulb holder and battery holder</li> <li>• 3 pieces of insulated wire (15 cm long), with ends stripped of insulation; or folded foil wires (see 'Folded foil wires',</li> </ul>	



<p>understanding of electric circuits</p> <ul style="list-style-type: none"> <li>• use a checklist to reflect on their learning in the unit</li> <li>• list, group and label ideas about their learning in the unit.</li> </ul>		<p>Resource sheet 2 and 'Preparation')</p> <ul style="list-style-type: none"> <li>• 1 metal paperclip</li> <li>• 2 metal split pins or thumbtacks</li> <li>• self-adhesive tape</li> <li>• materials for circuit description (see Lesson step 2)</li> <li>• 1 copy of 'Bright sparks: Reflecting on my learning' (Resource sheet 11) per team member</li> <li>• several self-adhesive notes per team member</li> </ul>	
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