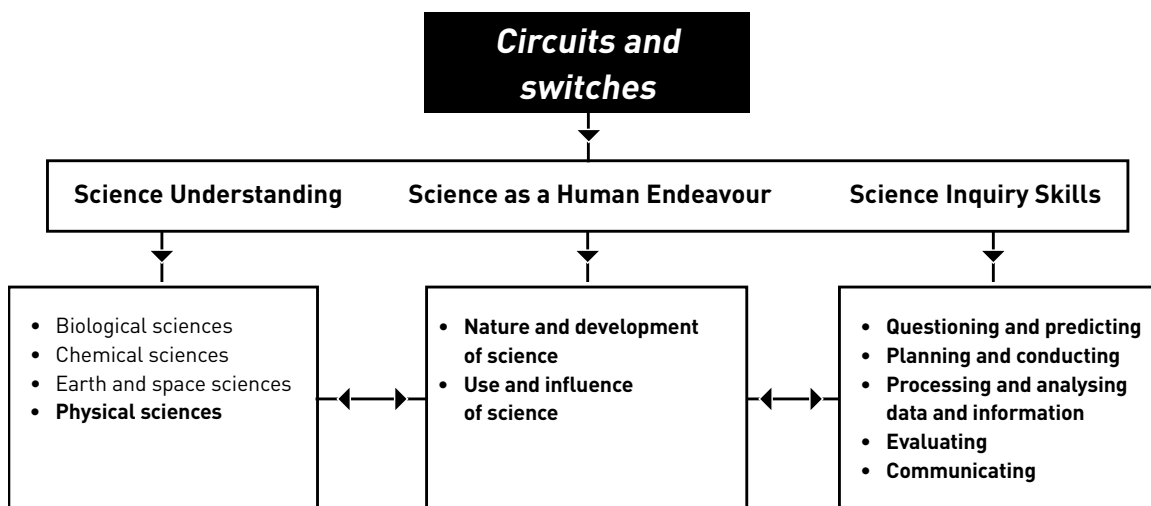


# Circuits and switches—Alignment with the Australian Curriculum

*Circuits and switches* is written to align to the Year 6 level of the Australian Curriculum Science. The interrelationship between the three strands—Science Understanding, Science as a Human Endeavour and Science Inquiry Skills—and their sub-strands at this year level is shown below. Sub-strands covered in this unit are in bold.



All the terms in this diagram are sourced from the Australian Curriculum (aside from the title).

## Curriculum focus

The Australian Curriculum: Science is described by year level, but provides advice across four year groupings on the nature of learners. Each year grouping has a relevant curriculum focus.

Curriculum focus Years 3–6	Incorporation in <i>Circuits and switches</i>
<p><b>Recognising questions that can be investigated scientifically and investigating them</b></p>	<p>Students generate inquiry questions about electrical circuits and their components. They discuss and formulate plans of action to answer these questions, including completing scientific investigations and generating new claims based on evidence to answer their questions. Investigations include building a simple electric circuit and conducting a fair test about the electrical conductivity of materials.</p>

## Year 6 Achievement Standard

The Australian Curriculum: Science Year 6 achievement standard indicates the quality of learning that students should demonstrate by the end of Year 6.

**By the end of Year 6, students** compare and classify different types of observable changes to materials. They **analyse requirements for the transfer of electricity and describe how energy can be transformed from one form to another when generating electricity**. They explain how natural events cause rapid change to Earth's surface. They describe and predict the effect of environmental changes on individual living things. **Students explain how scientific knowledge helps us to solve problems and inform decisions and identify historical and cultural contributions.**

**Students follow procedures to develop investigable questions and design investigations into simple cause-and-effect relationships. They identify variables to be changed and measured and describe potential safety risks when planning methods. They collect, organise and interpret their data, identifying where improvements to their methods or research could improve the data. They describe and analyse relationships in data using appropriate representations and construct multimodal texts to communicate ideas, methods and findings.**

The sections relevant to *Circuits and switches* are bolded above. By the end of the unit, teachers will be able to make evidence-based judgments on whether the students are achieving below, at or above the achievement standard for the sections bolded above.

## Circuits and switches—Australian Curriculum: Science

*Circuits and switches* embeds all three strands of the Australian Curriculum: Science. For ease of reference, the table below outlines the sub-strands covered in *Circuits and switches*, the content descriptions for Year 6 and their aligned lessons.

Strand	Sub-strand	Code	Year 6 content descriptions	Lessons
<b>Science Understanding</b>	<b>Physical Sciences</b>	ACSSU097	Electrical energy can be transferred and transformed in electrical circuits and can be generated from a range of sources	1–8
<b>Science as a Human Endeavour</b>	<b>Nature and development of science</b>	ACSHE098	Science involves testing predictions by gathering data and using evidence to develop explanations of events and phenomena and reflects historical and cultural contributions	2–5
	<b>Use and influence of science</b>	ACSHE100	Scientific knowledge is used to solve problems and inform personal and community decisions	3, 5
<b>Science Inquiry Skills</b>	<b>Questioning and predicting</b>	AC SIS232	With guidance, pose clarifying questions and make predictions about scientific investigations	2–7
	<b>Planning and conducting</b>	AC SIS103	Identify, plan and apply the elements of scientific investigations to answer questions and solve problems using equipment and materials safely and identifying potential risks	3, 7
		AC SIS104	Decide variables to be changed and measured in fair tests, and observe measure and record data with accuracy using digital technologies as appropriate	3, 7
	<b>Processing and analysing data and information</b>	AC SIS107	Construct and use a range of representations, including tables and graphs, to represent and describe observations, patterns or relationships in data using digital technologies as appropriate	1–8
		AC SIS221	Compare data with predictions and use as evidence in developing explanations	3, 7
	<b>Evaluating</b>	AC SIS108	Reflect on and suggest improvements to scientific investigations	7
	<b>Communicating</b>	AC SIS110	Communicate ideas, explanations and processes using scientific representations in a variety of ways, including multimodal texts	1–8

 All the material in the first four columns of this table is sourced from the Australian Curriculum.

## Overarching ideas

In the Australian Curriculum: Science, six overarching ideas support the coherence and developmental sequence of science knowledge within and across year levels.

In *Circuits and switches* these overarching ideas are represented by:

Overarching idea	Incorporation in <i>Circuits and switches</i>
<b>Patterns, order and organisation</b>	Students explore, describe and sequence the components of an electric circuit to allow electrons to flow. They investigate what happens to a circuit when different materials are inserted and group the materials as insulators or conductors based on the patterns in their findings.
<b>Form and function</b>	Students investigate the form and function of batteries and switches. They explore how modifications to the form of an electrical circuit affect its ability to function.
<b>Stability and change</b>	Students explore how the transformation of energy—in particular electrical energy—creates change in the world around them.
<b>Scale and measurement</b>	Students identify volts as the unit of measurement for the amount of ‘push’ a battery provides to the electrons in a circuit. They use an appropriate scale in their labelled diagrams to show the relative size of objects in their representations.
<b>Matter and energy</b>	Students investigate the transformation of energy from chemical reactions in batteries to electrical energy. This energy is transferred along the wires of the electric circuit to devices such as light bulbs that transform it into other energy types, such as light and heat.
<b>Systems</b>	Students investigate closed electrical circuits as systems providing a pathway for the continuous flow of electrons. They represent their understanding of electric circuit systems and the interdependence of its various components.

## General capabilities





The skills, behaviours and attributes that students need to succeed in life and work in the 21st century have been identified in the Australian Curriculum as general capabilities.


There are seven general capabilities and they are embedded throughout the units.

For further information see: [www.australiancurriculum.edu.au](http://www.australiancurriculum.edu.au)

For examples of our unit-specific general capabilities information see the next page.

## Circuits and switches—Australian Curriculum general capabilities

General capabilities	Australian Curriculum description	<i>Circuits and switches</i> examples
<b>Literacy</b>	<p>Literacy knowledge specific to the study of science develops along with scientific understanding and skills.</p> <p>Primary <b>Connections</b> learning activities explicitly introduce literacy focuses and provide students with the opportunity to use them as they think about, reason and represent their understanding of science.</p>	<p>In <i>Circuits and switches</i> the literacy focuses are:</p> <ul style="list-style-type: none"> <li>• science journals</li> <li>• cutaway diagrams</li> <li>• TWLH charts</li> <li>• word walls</li> <li>• glossaries</li> <li>• circuit diagrams</li> <li>• biographies</li> <li>• factual texts</li> <li>• analogies</li> <li>• ideas maps</li> <li>• annotated diagrams</li> <li>• procedural texts.</li> </ul>
 <b>Numeracy</b>	<p>Elements of numeracy are particularly evident in Science Inquiry Skills. These include practical measurement and the collection, representation and interpretation of data.</p>	<p>Students:</p> <ul style="list-style-type: none"> <li>• collect, represent and interpret data through tables and diagrams.</li> </ul>
<b>Information and communication technology (ICT) competence</b>	<p>ICT competence is particularly evident in Science Inquiry Skills. Students use digital technologies to investigate, create, communicate, and share ideas and results.</p>	<p>Students are given optional opportunities to:</p> <ul style="list-style-type: none"> <li>• use interactive resource technology to view, record and discuss information.</li> </ul>
 <b>Critical and creative thinking</b>	<p>Students develop critical and creative thinking as they speculate and solve problems through investigations, make evidence-based decisions, and analyse and evaluate information sources to draw conclusions. They develop creative questions and suggest novel solutions.</p>	<p>Students:</p> <ul style="list-style-type: none"> <li>• use reasoning to develop questions for inquiry</li> <li>• formulate, pose and respond to questions about electrical circuits</li> <li>• give reasons to justify their responses to questions.</li> </ul>
<b>Ethical behaviour</b>	<p>Students develop ethical behaviour as they explore principles and guidelines in gathering evidence and consider the implications of their investigations on others and the environment.</p>	<p>Students:</p> <ul style="list-style-type: none"> <li>• ask questions of others, respecting each other's point of view.</li> </ul>
 <b>Personal and social competence</b>	<p>Students develop personal and social competence as they learn to work effectively in teams, develop collaborative methods of inquiry, work safely, and use their scientific knowledge to make informed choices.</p>	<p>Students:</p> <ul style="list-style-type: none"> <li>• work collaboratively in teams</li> <li>• conduct a role-play appropriately</li> <li>• follow procedural texts for working safely</li> <li>• participate in discussions.</li> </ul>
 <b>Intercultural understanding</b>	<p>Intercultural understanding is particularly evident in Science as a Human Endeavour. Students learn about the influence of people from a variety of cultures on the development of scientific understanding.</p>	<ul style="list-style-type: none"> <li>• Cultural perspectives opportunities are highlighted.</li> <li>• Important contributions made to science by people from a range of cultures are highlighted.</li> </ul>

 All the material in the first two columns of this table is sourced from the Australian Curriculum.

## Cross-curriculum priorities

There are three cross-curriculum priorities identified by the Australian Curriculum:

- Aboriginal and Torres Strait Islander histories and cultures
- Asia and Australia's engagement with Asia
- Sustainability.

Two of these are embedded within *Circuits and switches*, as described below.



## Aboriginal and Torres Strait Islander histories and cultures

The PrimaryConnections Indigenous perspectives framework supports teachers' implementation of Aboriginal and Torres Strait Islander histories and cultures in science. The framework can be accessed at: [www.primaryconnections.org.au](http://www.primaryconnections.org.au)

*Circuits and switches* focuses on the Western science method of making evidence-based claims about energy, its sources (both renewable and non-renewable), and the way electrical energy is transferred between objects and transformed from one form to another.

Indigenous cultures might have different explanations for understanding energy, its sources and observed effects.

PrimaryConnections recommends working with Aboriginal and Torres Strait Islander community members to access local and relevant cultural perspectives. Protocols for engaging with Aboriginal and Torres Strait Islander community members are provided in state and territory education guidelines. Links to these are provided on the PrimaryConnections website.

## Sustainability

In *Circuits and switches* students discuss sources of electrical energy and investigate the ways electrical energy can be transferred and transformed in an electric circuit to operate devices that are useful to humans. This provides opportunities for students to develop an understanding that electrical energy used to make everyday devices work is produced from many different energy sources, and that some of these energy sources are renewable while others are non-renewable.

Students also develop an understanding that energy is neither created nor destroyed; that it can be stored and transformed to other forms of energy; that the amount of energy required to operate components such as light bulbs in a simple circuit varies; and that energy flow can be changed by using materials that help or prevent the flow of electrons. This can assist students to develop knowledge, skills and values for making decisions about individual and community actions that contribute to sustainable patterns of use of the Earth's energy resources.

## Circuits and switches—Australian Curriculum: English

Strand	Sub-strand	Code	Year 6 content descriptions	Lessons
Language	Expressing and developing ideas	ACELA1524	Identify and explain how analytical images like figures, tables, diagrams, maps and graphs contribute to our understanding of verbal information in factual and persuasive texts	3, 5
	Phonics and word knowledge	ACELA1526	Understand how to use knowledge of known words, word origins including some Latin and Greek roots, base words, prefixes, suffixes, letter patterns and spelling generalisations to spell new words including technical words	1–8
Literacy	Interacting with others	ACELY1709	Participate in and contribute to discussions, clarifying and interrogating ideas, developing and supporting arguments, sharing and evaluating information, experiences and opinions	1–8
	Interpreting, analysing, evaluating	ACELY1712	Select, navigate and read texts for a range of purposes, applying appropriate text processing strategies and interpreting structural features, for example table of contents, glossary, chapters, headings and subheadings	5
		ACELY1713	Use comprehension strategies to interpret and analyse information and ideas, comparing content from a variety of textual sources including media and digital texts	5

 All the material in the first four columns of this table is sourced from the Australian Curriculum.

## Circuits and switches—Australian Curriculum: Mathematics

Strand	Sub-strand	Code	Year 6 content descriptions	Lessons
Statistics and Probability	Data representation and interpretation	ACMSP147	Interpret and compare a range of data displays, including side-by-side column graphs for two categorical variables	3, 4
		ACMSP148	Interpret secondary data presented in digital media and elsewhere	5

 All the material in the first four columns of this table is sourced from the Australian Curriculum.

## ***Circuits and switches—Australian Curriculum: Design and Technologies***

<b>Strand</b>	<b>Code</b>	<b>Year 6 content descriptions</b>	<b>Lessons</b>
<b>Knowledge and Understanding</b>	ACTDEK020	Investigate how electrical energy can control movement, sound or light in a designed product or system	1–8
	ACTDEK023	Investigate characteristics and properties of a range of materials, systems, components, tools and equipment and evaluate the impact of their use	3–4, 6–8
<b>Processes and Production Skills</b>	ACTDEP024	Critique needs or opportunities for designing, and investigate materials, components, tools, equipment and processes to achieve intended designed solutions	8
	ACTDEP025	Generate, develop and communicate design ideas and processes for audiences using appropriate technical terms and graphical representation techniques	7, 8
	ACTDEP026	Select appropriate materials, components, tools, equipment and techniques and apply safe procedures to make designed solutions	8
	ACTDEP027	Negotiate criteria for success that include sustainability to evaluate design ideas, processes and solutions	7
	ACTDEP028	Develop project plans that include consideration of resources when making designed solutions individually and collaboratively	7

 All the material in the first four columns of this table is sourced from the Australian Curriculum.

(Note: Design and Technologies Curriculum available for use: awaiting final endorsement)