

## Marvellous micro-organisms—Alignment with the Australian Curriculum

*Marvellous micro-organisms* is written to align to the Year 6 level of the Australian Curriculum: Science. The Science Understanding, Science Inquiry Skills, and Science as a Human Endeavour strands are interrelated and embedded throughout the unit (see page xi for further details). This unit focuses on the Biological sciences sub-strand.

<b>Year 6 Science Understanding for the Biological Sciences:</b>	<b>The growth and survival of living things are affected by the physical conditions of their environment (ACSSU094)</b>
Incorporation in <i>Marvellous micro-organisms</i> :	Students plan and conduct investigations of the conditions that affect the growth of yeast and mould. Students devise testable questions using dependent and independent variables.

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

### 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 *Marvellous micro-organisms* are bolded above. By the end of the unit, teachers will be able to make evidence-based judgements on whether the students are achieving below, at or above the achievement standard for the sections bolded above.

## ***Marvellous micro-organisms*—Australian Curriculum Key ideas**

In the Australian Curriculum: Science, there are six key ideas that represent key aspects of a scientific view of the world and bridge knowledge and understanding across the disciplines of science. The below table explains how these are represented in *Marvellous micro-organisms*.

<b>Overarching idea</b>	<b>Incorporation in <i>Marvellous micro-organisms</i></b>
<b>Patterns, order and organisation</b>	Students identify micro-organisms as living things that grow and multiply in favourable conditions and identify patterns of growth through the collection and representation of data.
<b>Form and function</b>	Students explore how the microscopic form of micro-organisms helps them to break down and recycle dead plant and animal material. They discuss the function of micro-organisms in medicine and food production.
<b>Stability and change</b>	Students explore the growth of mould spores and investigate the conditions that encourage the growth of food mould.
<b>Scale and measurement</b>	Students explore living things on a microscopic scale, such as yeast, mould and bacteria.
<b>Matter and energy</b>	Students explore the role of yeast in making bread rise and the conditions needed for yeast to be active. They explain how yeast makes bread lighter by making a gas in the dough.
<b>Systems</b>	Students describe the relationship within a system by describing the role of yeast in the bread-making process by using a flow chart.

## Marvellous micro-organisms—Australian Curriculum: Science

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

Strand	Sub-strand	Code	Year 6 content descriptions	Lessons
<b>Science Understanding (SU)</b>	<b>Biological sciences</b>	ACSSU094	The growth and survival of living things are affected by the physical conditions of their environment	1, 2, 3, 4, 5, 8
<b>Science as a Human Endeavour (SHE)</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	1, 3, 6 - 8
	<b>Use and influence of science</b>	ACSHE100	Scientific knowledge is used to solve problems and inform personal and community decisions	1, 5 - 7
<b>Science Inquiry Skills (SIS)</b>	<b>Questioning and predicting</b>	AC SIS232	With guidance, pose clarifying questions and make predictions about scientific investigations	2, 3, 6
	<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	2 - 4, 6
		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, 6
	<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	3, 6
		AC SIS221	Compare data with predictions and use as evidence in developing explanations	3, 5, 6
	<b>Evaluating</b>	AC SIS108	Reflect on and suggest improvements to scientific investigations	6
	<b>Communicating</b>	AC SIS110	Communicate ideas, explanations and processes using scientific representations in a variety of ways, including multi-modal texts	1, 3, 5, 8

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

### 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.

## Marvellous micro-organisms—Australian Curriculum general capabilities

General capabilities	Australian Curriculum description	<i>Marvellous micro-organisms</i> examples
<b>Literacy</b>	<p>Literacy knowledge specific to the study of science develops along with scientific understanding and skills.</p> <p>PrimaryConnections 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>Marvellous micro-organisms</i> the literacy focuses are:</p> <ul style="list-style-type: none"> <li>• word wall</li> <li>• science journal</li> <li>• table</li> <li>• TWLH chart</li> <li>• flow chart</li> <li>• factual recount</li> <li>• procedural text</li> <li>• summary</li> <li>• labelled diagram</li> <li>• information report text.</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>• use measurement (quantity, time, temperature and area)</li> <li>• use measurement equipment appropriately (cup measures, teaspoon measure, thermometer, ruler and timer)</li> <li>• record accurate daily measurements</li> <li>• graph measurement results.</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 a digital microscope to view mould</li> <li>• use computer programs to design a flow chart</li> <li>• use the internet to find further information</li> <li>• use a digital camera to record findings.</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 investigations</li> <li>• formulate, pose and respond to questions</li> <li>• consider different ways to think about living things that they cannot see</li> <li>• develop evidence-based claims about the growth of yeast and mould.</li> </ul>
<b>Ethical behaviour</b>	<p>Students develop ethical behaviour as they explore ethical principles and guidelines in gathering evidence and consider the ethical implications of their investigations on others and the environment.</p>	<p>Students:</p> <ul style="list-style-type: none"> <li>• ask questions 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 cooperatively in teams</li> <li>• participate in discussions</li> <li>• follow safety guidelines and suggest reasons for safety rules</li> <li>• use their understanding about the conditions for mould growth to consider food decay and its prevention.</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 where relevant.</li> <li>• Important contributions made to science by people from a range of cultures are highlighted where relevant.</li> </ul>

## Alignment with the Australian Curriculum: English and Mathematics

Strand	Sub-strand	Code	Year 6 content description	Lessons
<b>English– Language</b>	<b>Language variation and change</b>	ACELA1515	Understand that different social and geographical dialects or accents are used in Australia in addition to Standard Australian English	1–8
	<b>Language for interaction</b>	ACELA1517	Understand the uses of objective and subjective language and bias	1, 2, 3, 4, 5, 7, 8
	<b>Expressing and developing ideas</b>	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	1, 2, 3, 4, 5, 6, 7
	<b>Phonics and word knowledge</b>	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, 2, 3, 4, 5, 6, 7, 8
<b>English– Literacy</b>	<b>Interacting with others</b>	ACELY1709	Participate in and contribute to discussions, clarifying and interrogating ideas, developing and supporting arguments, sharing and evaluating information, experiences and opinions	1, 3, 5, 6, 8
		ACELY1816	Use interaction skills, varying conventions of spoken interactions such as voice volume, tone, pitch and pace, according to group size, formality of interaction and needs and expertise of the audience	2, 3, 5, 6, 8
		ACELY1710	Plan, rehearse and deliver presentations, selecting and sequencing appropriate content and multimodal elements for defined audiences and purposes, making appropriate choices for modality and emphasis	8
	<b>Interpreting, analysing, evaluating</b>	ACELY1711	Analyse how text structures and language features work together to meet the purpose of a text	1, 8
		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	1, 7
		ACELY1713	Use comprehension strategies to interpret and analyse information and ideas, comparing content from a variety of textual sources including media and digital texts	1, 6, 7
	<b>Creating texts</b>	ACELY1714	Plan, draft and publish imaginative, informative and persuasive texts, choosing and experimenting with text structures, language features, images and digital resources appropriate to purpose and audience	6, 8
		ACELY1717	Use a range of software, including word processing programs, learning new functions as required to create texts	1, 5, 8

Strand	Sub-strand	Code	Year 6 content description	Lessons
<b>Mathematics– Measurement and Geometry</b>	<b>Using units of measurement</b>	ACMMG136	Convert between common metric units of length, mass and capacity	2
		ACMMG137	Solve problems involving the comparison of lengths and areas using appropriate units	6
		ACMMG138	Connect volume and capacity and their units of measurement	2
<b>Mathematics– Statistics and Probability</b>	<b>Data representation and interpretation</b>	ACMSP147	Interpret and compare a range of data displays, including side-by-side column graphs for two categorical variables	1, 5, 6

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## 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.

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



## Aboriginal and Torres Strait Islander histories and cultures

The Primary**Connections** 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)

*Marvellous micro-organisms* focuses on the Western science way of making evidence-based claims about micro-organisms and their impact on people and the environment.

Aboriginal and Torres Strait Islander Peoples might have other explanations for the existence of micro-organisms and how they can be both beneficial and harmful.

Indigenous knowledge encompasses dealing with disease and ways of cooking that are different to the Western understandings depicted in *Marvellous micro-organisms*.

**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

The *Marvellous micro-organisms* unit provides opportunities for students to develop an understanding of how the growth of some living things can be impacted by environmental conditions, including changes due to human impact. This can assist them 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 natural resources.

In *Marvellous micro-organisms* students consider their social environment when they explore the social impact of scientific discoveries. They learn about research into penicillin and the impact it had on the recovery of sick people in post World War II society. They also explore their ecological and economic environments when they read about the history of the microscope from its humble beginnings as a hobby to a common scientific tool in the world's laboratories, providing scientists with valuable information that has changed our understanding of ecology.