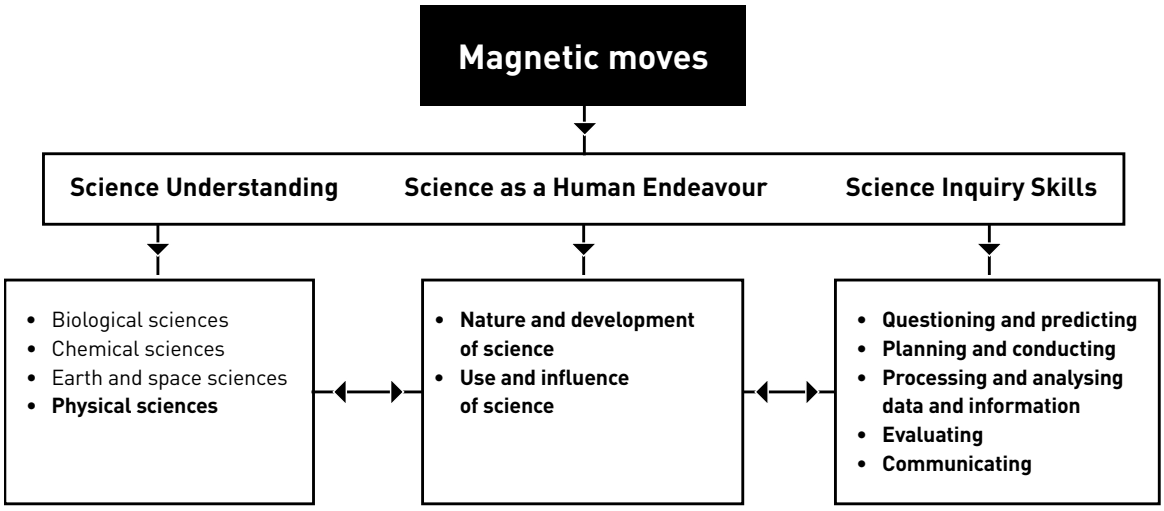
Magnetic moves—Alignment with the Australian Curriculum

Magnetic moves is written to align to the Year 4 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.



AC 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 *Magnetic moves*
Recognising questions that can be investigated scientifically and investigating them	Students formulate investigable questions and make predictions to investigate the forces that are exerted by magnets on other objects. They make claims with supporting evidence and represent their understanding in a variety of ways.

Year 4 Achievement Standard

The Australian Curriculum: Science Year 4 achievement standard indicates the quality of learning that students should demonstrate by the end of Year 4.

> By the end of Year 4, students apply the observable properties of materials to explain how objects and materials can be used. **They use contact and non-contact forces to describe interactions between objects.** They discuss how natural and human processes cause changes to the Earth's surface. They describe relationships that assist the survival of living things and sequence key stages in the life cycle of a plant or animal. **They identify when science is used to ask questions and make predictions.** They describe situations where science understanding can influence their own and others' actions.
>
> **Students follow instructions to identify investigable questions about familiar contexts and predict likely outcomes from investigations. They discuss ways to conduct investigations and safely use equipment to make and record observations. They use provided tables and simple column graphs to organise their data and identify patterns in data. Students suggest explanations for observations and compare their findings with their predictions. They suggest reasons why their methods were fair or not. They complete simple reports to communicate their methods and findings.**

The sections relevant to *Magnetic moves* 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. To assist teachers in making these judgements, assessment rubrics and work samples are provided in Appendix 8.

Magnetic moves—Australian Curriculum: Science

This *Magnetic moves* unit embeds all three strands of the Australian Curriculum: Science. The table below lists sub-strands and their content for Year 4. This unit is designed to be taught in conjunction with other Year 4 units to cover the full range of the Australian Curriculum: Science content for Year 4.

For ease of assessment the table below outlines the sub-strands, the content descriptions for Year 4 and the aligned lessons.

Strand	Sub-strand	Code	Year 4 content descriptions	Lessons
Science Understanding	**Physical Sciences**	ACSSU076	Forces can be exerted by one object on another through direct contact or from a distance	1–8
Science as a Human Endeavour	**Nature and development of science**	ACSHE061	Science involves making predictions and describing patterns and relationships	1–8
	Use and influence of science	ACSHE062	Science knowledge helps people to understand the effect of their actions	1–8
Science Inquiry Skills	**Questioning and predicting**	ACSIS064	With guidance, identify questions in familiar contexts that can be investigated scientifically and predict what might happen based on prior knowledge	1–5, 7
	Planning and conducting	ACSIS065	Suggest ways to plan and conduct investigations to find answers to questions	2–5, 7
		ACSIS066	Safely use appropriate materials, tools or equipment to make and record observations, using formal measurements and digital technologies as appropriate	2–5, 7
	Processing and analysing data and information	ACSIS068	Use a range of methods including tables and simple column graphs to represent data and to identify patterns and trends	2–5, 7
		ACSIS216	Compare results with predictions, suggesting possible reasons for findings	2–5
	Evaluating	ACSIS069	Reflect on the investigation; including whether a test was fair or not	2–5, 7, 8
	Communicating	ACSIS071	Represent and communicate ideas and findings in a variety of ways, such as diagrams, physical representations and simple reports	1–8

AC 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 *Magnetic moves*, these overarching ideas are represented by:

Overarching idea	Incorporation in *Magnetic moves*
Patterns, order and organisation	Students recognise and group materials that are attracted to magnets or not. They discern differences in strengths of magnets and discuss what factors can be used to identify strong magnets.
Form and function	Students explore how the form of the magnet can affect its strength and the nature of the magnetic field it produces.
Stability and change	Students recognise that some magnets produce constant magnetic fields that objects, including other magnets, react to in predictable patterns depending on the material they are made of.
Scale and measurement	Students measure the strength of a magnet by measuring the distance from which it attracts objects. They use formal measurements and describe their results. Students explore how to represent their understanding of different-sized forces using scaled arrows.
Matter and energy	Students explore how magnetic material can exert a force on iron objects, and other magnets, that can cause them to move (kinetic energy).
Systems	Students identify and describe simple systems of forces acting on objects and explain them with force-arrow diagrams.

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

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

Magnetic moves—Australian Curriculum general capabilities

General capabilities	Australian Curriculum description	*Magnetic moves* examples
Literacy	Literacy knowledge specific to the study of science develops along with scientific understanding and skills. Primary**Connections** 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.	In *Magnetic moves* the literacy focuses are: • science journals • TWLH charts • word walls • tables • force-arrow diagrams • procedural texts • labelled diagrams • annotated drawings • factual texts • ideas maps.
Numeracy	Elements of numeracy are particularly evident in Science Inquiry Skills. These include practical measurement and the collection, representation and interpretation of data.	Students: • Collect data and record information on the distance of the magnetic field of a magnet and the strength of different sized and shaped magnets.
Information and communication technology (ICT) competence	ICT competence is particularly evident in Science Inquiry Skills. Students use digital technologies to investigate, create, communicate, and share ideas and results.	Students are given optional opportunities to: • Use interactive resource technology to view, record and discuss information. • Use digital technologies to assist in their investigations.
Critical and creative thinking	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.	Students: • Formulate, pose and respond to questions • Consider different ways of thinking • Develop evidence-based claims.
Ethical behaviour	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.	Students: • Ask questions of others respecting each other's point of view.
Personal and social competence	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.	Students: • work collaboratively in teams • listen to and follow instructions to safely complete investigations • participate in discussions.
Intercultural understanding	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.	• 'Cultural perspectives' opportunities are highlighted. • Important contributions made to science by people from a range of cultures are highlighted.

AC 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 *Magnetic moves*, as described below.

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

Magnetic moves focuses on the Western science way of making evidence-based claims about how objects are subjected to forces in their environment, including magnetic forces, friction, gravity and air resistance, and how the sum of those forces can be used to explain changes in the movement or form of objects.

Aboriginal and Torres Strait Islander Peoples might have other explanations for their observations of objects changing speed, direction or form. This is particularly true of the claims about forces that act at a distance, such as gravity and magnetic forces, as they are not tangible in themselves (e.g. they cannot be seen or touched). They are working theories based on the predictable behaviour of objects.

Primary**Connections** 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 Primary**Connections** website.

Sustainability

The *Magnetic moves* unit provides opportunities for students to develop an understanding of how forces act upon objects on Earth, including direct forces, such as pushes and pulls, as well as forces which act at a distance such as gravity. Through investigating how the available surface area of an object affects the amount of friction an object experiences, students describe how well designed machines are more efficient. Students also experience the effect of gels on reducing friction. This can assist them to develop knowledge, skills and values for making decisions about individual and community actions that contribute to sustainable and conservative patterns of energy use, for example, keeping machinery well oiled to reduce friction and therefore wear and tear, and maintain efficiency.

Magnetic moves—Australian Curriculum: English

Strand	Sub-strand	Code	Year 4 content descriptions	Lessons
Language	**Language for interaction**	ACELA1488	Understand that social interactions influence the way people engage with ideas and respond to others for example when exploring and clarifying the ideas of others, summarising students' own views and reporting them to a larger group	1–8
	Expressing and developing ideas	ACELA1498	Incorporate new vocabulary from a range of sources into students' own texts including vocabulary encountered in research	1–8
Literacy	**Interacting with others**	ACELY1688	Use interaction skills such as acknowledging another's point of view and linking students' response to the topic, using familiar and new vocabulary and a range of vocal effects such as tone, pace, pitch and volume to speak clearly and coherently	1–8
		ACELY1689	Plan, rehearse and deliver presentations incorporating learned content and taking into account particular purposes and audiences	8

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

Magnetic moves—Australian Curriculum: Mathematics

Strand	Sub-strand	Code	Year 4 content descriptions	Lessons
Measurement and Geometry	**Using units of measurement**	ACMMG084	Use scaled instruments to measure and compare lengths, masses, capacities and temperatures	2, 4
Statistics and Probability	**Data representation and interpretation**	ACMSP096	Construct suitable data displays, with and without the use of digital technologies, from given or collected data. Include tables, column graphs and picture graphs where one picture can represent many data values	2–4

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

Magnetic moves—Australian Curriculum: Design and Technologies

Strand	Code	Year 4 content descriptions	Lessons
Knowledge and understanding	ACTDEK010	Recognise the role of people in design and technologies occupations and explore factors, including sustainability that impact on the design of products, services and environments to meet community needs	2, 4
	ACTDEK011	Investigate how forces and the properties of materials affect the behaviour of a product or system	1–5
	ACTDEK013	Investigate the suitability of materials, systems, components, tools and equipment for a range of purposes	1–5
Processes and production skills	ACTDEP014	Critique needs or opportunities for designing and explore and test a variety of materials, components, tools and equipment and the techniques needed to produce designed solutions	7
	ACTDEP015	Generate, develop, and communicate design ideas and decisions using appropriate technical terms and graphical representation techniques	7
	ACTDEP016	Select and use materials, components, tools and equipment using safe work practices to make designed solutions	7
	ACTDEP017	Evaluate design ideas, processes and solutions based on criteria for success developed with guidance and including care for the environment	8
	ACTDEP018	Plan a sequence of production steps when making designed solutions individually and collaboratively	7

AC All the material in this table is sourced from the Australian Curriculum.

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