Year 7 unit overview — Australian Curriculum: Science

Source: Australian Curriculum, Assessment and Reporting Authority (ACARA), *Australian Curriculum v3.0: Science for Foundation–10* <www.australiancurriculum.edu.au/Science/Curriculum/F-10>.

| School name | Unit title | Duration of unit |
| --- | --- | --- |
| Our School | Sensational seasons and heavenly bodies | One term |

| Unit outline |
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| Students investigate relationships between the Earth, sun and moon systems and use models to predict and explain events. They make accurate observations and conduct research to analyse relationships between celestial objects and explore and explain these relationships through increasingly complex representations. They: * relate changes on Earth, such as day and night and the seasons to Earth’s rotation and its orbit around the sun
* investigate what causes seasons and how they differ depending on the tilt of the axis and the orbit of the planet
* explore and compare the seasons on Earth with the seasons of another planet
* compare times for the rotation of Earth, the sun and moon, and the times for the orbits of Earth and the moon
* model the relative movements of Earth, the sun and moon
* investigate and explain the phases of the moon, and solar and lunar eclipses.

Questions that shape the inquiry include: * What causes seasons?
* How are seasons different on the other planets?
* How did the planets and moon form and how are they kept in orbit?
* What did people used to think caused the phases of the moon and how can we explain them scientifically?
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| Identify curriculum |
| Content descriptions to be taught | General capabilities and cross‑curriculum priorities |
| Science Understanding | Science as a Human Endeavour | Science Inquiry Skills |
| **Earth and space sciences*** Predictable phenomena on Earth, including seasons and eclipses, are caused by the relative positions of the sun, Earth and the moon [(ACSSU115)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACSSU115)

**Physical sciences*** Earth’s gravity pulls objects towards the centre of the Earth Earth’s gravity pulls objects towards the centre of the Earth [(ACSSU118)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACSSU118)
 | Nature and development of science* Scientific knowledge changes as new evidence becomes available, and some scientific discoveries have significantly changed people’s understanding of the world [(ACSHE119)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACSHE119)

Use and influence of science* People use understanding and skills from across the disciplines of science in their occupations [(ACSHE224)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACSHE224)
 | Processing and analysing data and information* Construct and use a range of representations, including graphs, keys and models to represent and analyse patterns or relationships, including using digital technologies as appropriate [(ACSIS129)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACSIS129)
* Summarise data, from students’ own investigations and secondary sources, and use scientific understanding to identify relationships and draw conclusions [(ACSIS130)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACSIS130)

Evaluating* Reflect on the method used to investigate a question or solve a problem, including evaluating the quality of the data collected, and identify improvements to the method [(ACSIS131)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACSIS131)

Communicating* Communicate ideas, findings and solutions to problems using scientific language and representations using digital technologies as appropriate [(ACSIS133)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACSIS133)
 | Description: gc_literacy **Literacy*** Use appropriate scientific language specific to the topic.

**Description: gc_numeracy Numeracy*** Create tables and charts to display information and find patterns.
* Calculate degrees of tilt and temperature variation.

**Description: gc_ict ICT capability*** Use a range of digital technologies to assist with investigating the concepts.
* Use simulations and animations to investigate models.

**Description: gc_critical Critical and creative thinking*** Use thinking skills to complete group activities and open-ended tasks.

**Description: gc_personal_social Personal and social capability*** Work together to participate in learning experiences.

 **Aboriginal and Torres Strait Islander histories and cultures*** Research moon myths and culture, including Aboriginal and Torres Strait Islander Dreaming stories.
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| Identify curriculum |
| Achievement standard |
| By the end of Year 7, students describe techniques to separate pure substances from mixtures. They represent and predict the effects of unbalanced [forces](http://www.australiancurriculum.edu.au/Glossary?a=S&t=forces), including Earth’s gravity, on motion. They explain how the relative positions of the Earth, sun and moon affect phenomena on Earth. They [analyse](http://www.australiancurriculum.edu.au/Glossary?a=S&t=analyse) how the [sustainable](http://www.australiancurriculum.edu.au/Glossary?a=S&t=sustainable) use of resources depends on the way they are formed and cycle through Earth [systems](http://www.australiancurriculum.edu.au/Glossary?a=S&t=systems). They predict the effect of environmental changes on feeding [relationships](http://www.australiancurriculum.edu.au/Glossary?a=S&t=relationships) and [classify](http://www.australiancurriculum.edu.au/Glossary?a=S&t=classify) and organise diverse organisms based on [observable](http://www.australiancurriculum.edu.au/Glossary?a=S&t=observable) differences. Students describe situations where scientific knowledge from different science disciplines has been used to solve a real-world problem. They explain how the solution was viewed by, and impacted on, different groups in society.Students identify questions that can be investigated scientifically. They plan fair experimental methods, identifying [variables](http://www.australiancurriculum.edu.au/Glossary?a=S&t=variables) to be changed and measured. They select equipment that improves fairness and accuracy and describe how they considered safety. Students draw on [evidence](http://www.australiancurriculum.edu.au/Glossary?a=S&t=evidence) to support their [conclusions](http://www.australiancurriculum.edu.au/Glossary?a=S&t=conclusions). They summarise [data](http://www.australiancurriculum.edu.au/Glossary?a=S&t=data) from different sources, describe [trends](http://www.australiancurriculum.edu.au/Glossary?a=S&t=trends) and refer to the quality of their [data](http://www.australiancurriculum.edu.au/Glossary?a=S&t=data) when suggesting improvements to their methods. They communicate their ideas, methods and findings using [scientific language](http://www.australiancurriculum.edu.au/Glossary?a=S&t=scientific+language) and appropriate representations. |
| Relevant prior curriculum | Curriculum working towards |
| In the Australian Curriculum: Science at Year 5Science UnderstandingEarth and space sciences* The Earth is part of a [system](http://www.australiancurriculum.edu.au/Glossary?a=S&t=system) of planets orbiting around a star (the sun).

In the Australian Curriculum: Science at Year 6Science as a Human EndeavourNature and development of science* Science involves testing predictions by gathering [data](http://www.australiancurriculum.edu.au/Glossary?a=S&t=data) and using [evidence](http://www.australiancurriculum.edu.au/Glossary?a=S&t=evidence) to develop explanations of events and phenomena.
* Important contributions to the advancement of science have been made by people from a range of cultures.

Use and influence of science* Scientific understandings, discoveries and inventions are used to solve problems that directly affect peoples’ lives.
* Scientific knowledge is used to inform personal and community decisions.

Science Inquiry SkillsQuestioning and predicting* With guidance, pose questions to clarify practical problems or inform a scientific investigation, and predict what the findings of an investigation might be.

Planning and conducting* With guidance, plan appropriate investigation methods to answer questions or solve problems.
* Decide which variable should be changed and measured in fair tests and accurately observe, measure and record data, using digital technologies as appropriate.
* Use equipment and materials safely, identifying potential risks.

Processing and analysing data and information* 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.
* Compare data with predictions and use as evidence in developing explanations.

Evaluating* Suggest improvements to the methods used to investigate a question or solve a problem.

Communicating* Communicate ideas, explanations and processes in a variety of ways, including multi-modal texts.
 | In the Australian Curriculum: Science at Year 10Science UnderstandingEarth and space sciences* The universe contains features including galaxies, stars and solar systems and the Big Bang theory can be used to explain the origin the universe. (Students next engage with Science Understanding related to the solar system in Year 10).

In the Australian Curriculum: Science at Year 8Science as a Human Endeavour* The content descriptions for Science as a Human Endeavour are the same for Year 7 and Year 8.

Science Inquiry Skills* The content descriptions for Science Inquiry Skills are the same for Year 7 and Year 8.
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| Bridging content |
| Both the **Australian Curriculum: Science at Year 7** and the **Year 7 Essential Learning: Earth and beyond** address gravitational attraction.There is part of a **Year 3 Essential Learning: Earth and beyond** that maps to the **Australian Curriculum: Science at Year 7**.Programs need to ensure the following content is taught in Year 7:* The causes of predictable phenomena on Earth, including seasons and eclipses.
* The depth of treatment of this concept will need to increase to ensure appropriate coverage and development of skills for Year 7 students.
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| Links to other learning areas |
| **In the Australian Curriculum: Mathematics at Year 7*** Express one quantity as a fraction of another, with and without the use of digital technologies.

**In the Australian Curriculum: English at Year 7*** Identify and explore ideas and viewpoints about events, issues and characters represented in texts drawn from different historical, social and cultural contexts.
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| Assessment | Make judgments |
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| Describe the assessment | Assessment date | Teachers gather evidence to make judgments about the following characteristics of student work:**Understanding*** description and identification of scientific facts, ideas, concepts, and phenomena
* use of science knowledge to generate solutions and explanations.

**Skills*** identification of questions and problems that can be investigated scientifically
* construction of models to identify and describe patterns and relationships and draw conclusions
* evaluation of claims with links to science knowledge
* communication using appropriate scientific language and representations.

For further advice and guidelines on constructing guides to making judgments refer to the Learning area standard descriptors: [www.qsa.qld.edu.au](http://www.qsa.qld.edu.au) |
| Students are given opportunities to demonstrate their knowledge, skills and understanding through both formative and summative assessment. The assessment is collated in student folios and allows for ongoing feedback to students on their learning.Year 7 teachers make decisions about the length of time required to complete the tasks and the conditions under which the assessment is to be conducted.The teaching and learning experiences throughout the term provide opportunities for students to develop the understanding and skills required to complete these assessments. As students engage with these learning experiences the teacher can provide feedback on specific skills.**Research: Report (Written)**Students complete an investigation to compare the seasons on Earth with the seasons of another planet (excluding Uranus). The investigation report should address and explain: * orbit around the sun
* tilt of the planet and how this relates to the intensity of sunlight hitting the planet
* length and description of winter and summer
* why seasons on the chosen planet and Earth change in predictable patterns.

Suggested conditions:* 100–300 words
* open.
 | Weeks 4–5 |
| **Collection of work (Written)**Collection of responses based on the QSA Assessment Bank packages:* *Why does the moon change shape?*
* *Why do the seasons change?*
* *2009 Year 6 Science QCAT.*

Suggested conditions:* 100–400 words
* open/supervised.
 | Week 9 |

| Teaching and learning | Supportive learning environment |
| --- | --- |
| Teaching strategies and learning experiences | Adjustments for needs of learners | Resources |
| This unit overview has been developed using the 5E inquiry model for teaching and learning science. The 5E model follows a sequence of:* Engage — begin with a lesson that captures students’ interest through an activity or question.
* Explore — organise hands-on activities where students explore a concept or skill.
* Explain — guide students to develop explanations for the experience after they have explored a concept or skill.
* Elaborate — encourage students to apply what they have learnt to a new situation.
* Evaluate — provide an opportunity for students to review and reflect on their learning.

Seasons of the Earth and other planetsEngage* Set the context of the unit using display books, posters, and astronomy models.
* Invite the local astronomy club to organise an astronomy night to observe the rings of Saturn or the moons of Jupiter with telescopes.
* Consider how gravity keeps planets in orbit around the sun and the role it played in the formation of the solar system over 4.5 billion years ago.
* Think, Pair, Share — ask students to write down what they think they know about seasons. Provide appropriate prompt words or phrases.
* Create a class concept map titled *What we think we know about seasons*. (Tick off ideas as they are verified by research during the unit. Cross out ideas as they are proven to be incorrect by research during the unit, and put the correct information up on display.)
* Create a glossary of relevant terms, to be added to as the unit progresses.

Explore* Explore a model of the seasons on Earth using online interactives (see Resources: Web).
* Complete questions on the inclination angles of planets.

Explain* Investigate one chosen early astronomer’s work on developing our understanding of the sun, Earth and planets.
* Model how seasons work using a tilted globe of Earth, a strong light source and four chairs. Students are given time to develop a way of showing how Earth and the sun interact during the four seasons.
* Discuss the intensity of the sun’s light during winter and summer, relate to the model of the angle of the sun’s rays during the seasons.
* Conduct an angle of light demonstration:
* Tape two 1-metre rulers to a torch so that the torch is between the metre rulers at the top and with the light beam facing down. The metre rulers will form a V with the point at the top.
* Stand the two 1-metre rulers upright with the light shining down.
* Move the 1-metre rulers so that the angle of the torch goes from vertical to the ground to less than 90°. The beam of light is more dispersed as the angle moves lower, and more intense with the light directly above.
* Investigate to find the tilt, rotation and the orbit of Uranus. Predict what the seasons might be like on Uranus, and provide reasons for answers (see Resources: Web).

Elaborate* Work on the assessment task where students compare the seasons on Earth with the seasons of another planet (excluding Uranus).

Evaluate* Explain why seasons on all the planets change in predictable patterns.
* Report the explanations to someone not in in the class (e.g. a parent, carer, other student or sibling).
 | Section 6 of the *Disability Standards for Education* (The Standards for Curriculum Development, Accreditation and Delivery) state that education providers, including class teachers, must take reasonable steps to ensure a course/program is designed to allow any student to participate and experience success in learning. The *Disability Standards for Education 2005* (Cwlth) is available from: <www.ag.gov.au> select Human rights and anti-discrimination > Disability standards for education. | **Web*** planetarium software or mobile applications such as:
* Stellarium: [www.stellarium.org](http://www.stellarium.org/)
* Google Sky: [www.google.com/sky](http://www.google.com/sky/)
* GoSkyWatch: [http://www.gosoftworks.com/ GoSkyWatch/GoSkyWatch.html](http://www.gosoftworks.com/GoSkyWatch/GoSkyWatch.html)
* Google Sky Map: [www.google.com/mobile/skymap/](http://www.google.com/mobile/skymap/)
* online interactives such as:
* SEPUP: <http://www.sepuplhs.org/middle/iaes/students/simulations/sepup_seasons_interactive.html>
* UNL: [http://astro.unl.edu/naap/motion1/ animations/seasons\_ecliptic.html](http://astro.unl.edu/naap/motion1/animations/seasons_ecliptic.html)
* tilt, rotation and orbit of Uranus resource such as Enchanted Learning: [http://www.enchantedlearning.com/ subjects/astronomy/planets/uranus](http://www.enchantedlearning.com/%20subjects/astronomy/planets/uranus)

**Print*** posters
* worksheets
* word wall

**Equipment*** astronomy models
* telescope
* globe of the Earth
* light source
* metre rulers
* torch
* balls

**Safety equipment*** completed risk assessment for activities that use light sources that become hot
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| Phases of the moonEngage* Set the context of the unit using display books, posters, and astronomy models.
* Think, Pair, Share — ask students to write down what they think they know about the phases of the moon. Provide appropriate prompt words or phrases.
* Create a word wall of relevant terms, to be added to as the unit progresses. Terms would include: revolve, rotate, reflect, phase, gibbous, crescent, waxing, waning, full moon, half moon, new moon, direction, cycle, horizon, orientation, orbit.

**Explore*** Investigate the causes of day and night, and the phases of the moon through practical activities, demonstrations or simulations.
* Consider how gravity keeps the moon in orbit around Earth and the role it played in the formation of the Earth–Moon system.
* Construct a simple “homemade” refractor telescope (see Resources: Web).
* Use the home-made refractor telescope to observe the moon. Ensure students **do not** use the telescope to observe the sun.
* Record observations of the phases of the moon over a month and respond to weekly focus questions.
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| **Explain*** Collect and record moon facts and figures including size, distance from Earth, gravity, that the moon reflects light from the sun and orbits Earth on a 5° angle.
* Learn moon myths and culture, including Aboriginal and Torres Strait Islander Dreaming stories, and other cultural references to the moon in music, songs, books, traditional and folk stories and religions. Record these and their impact in the science journal.
* Model and explain the dynamic interplay between Earth, the sun and moon which causes the phases of the moon using a student, a lamp and a large ball.

Elaborate* Work on the assessment task based on the Assessment Bank item *2009 Year Science QCAT*

EvaluateModel the dynamic interplay between Earth, the sun and moon which causes solar and lunar eclipses, using a student, a lamp and a large ball. |  |  |

| Use feedback |
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| Ways to monitor learning and assessment | Teachers collaboratively plan the teaching, learning and assessment to meet the needs of all learners.Before the assessment, teachers discuss task-specific descriptors of the quality of student performance. Teachers individually mark all student responses, applying the shared understanding achieved through this calibration process. |
| Feedback to students | Teachers plan opportunities through the teaching strategies and learning experiences of the unit. Teachers provide ongoing feedback and encouragement to students on their strengths and areas for improvement. Through particular learning experiences students can reflect on and discuss with their teachers and peers what they are able to do well and what they need to do to improve. |
| Reflection on the unit plan | At the conclusion of the unit, all teachers who have been involved in planning, teaching, learning and assessment come together to reflect on the successes and challenges of the unit. They come with their personal reflections through answers to the following questions:* What worked well in this unit?
* What was a stumbling block?
* How would you refine it?
* What trends and gaps in learning have you identified?
* How will you build on these learning experiences next term and beyond?
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