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|  | Australian Curriculum Year 7 Science sample assessment ׀ Teacher guidelines  Why do the seasons change? |

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| Assessment description | Category |
| Using secondary sources, students research how the regular movement of the Earth around the sun creates seasonal patterns and global climates that have been evident throughout time. | Written |
| Technique |
| Research |
| Context for assessment | Alignment |
| Humans have used predictable changes in the seasons throughout history to measure time, predict the weather and plan events.  This assessment builds on students’ knowledge of the Earth’s place in the solar system from the  Year 5 Earth and space sciences and provides them with the opportunity to demonstrate knowledge and understanding of the relative positions and movements of the sun and Earth that create various patterns in time and space.  Teachers could use one of the model observations in Section 1 as a scaffolded teaching and learning experience and an opportunity to provide students with informal feedback prior to them engaging in research to complete Sections 2 and 3 more independently. | *Australian Curriculum v7.0,* Year 7 Science Australian Curriculum content and achievement standard ACARA — Australian Curriculum, Assessment and Reporting Authority[www.australiancurriculum.edu.au](http://www.australiancurriculum.edu.au/)  Year 7 Science standard elaborations available at:  [www.qcaa.qld.edu.au/downloads/p\_10/ac\_sci\_yr7\_se.docx](https://www.qcaa.qld.edu.au/downloads/p_10/ac_sci_yr7_se..docx) |
| Connections |
| This assessment can be used with the QCAA Australian Curriculum resource titled *Year 7 plan — Australian Curriculum: Science* exemplaravailable at:  [www.qcaa.qld.edu.au/downloads/p\_10/ac\_science\_yr7\_plan.doc](http://www.qcaa.qld.edu.au/downloads/p_10/ac_science_yr7_plan.doc) |
| Definitions |
| **Model:** A representation that describes, simplifies, clarifies or provides an explanation of the workings, structure or relationships within an object, system or idea.  **Primary and secondary sources:** In Science, a primary source is information created by the person or persons directly involved in a study or observing an event. A secondary source is information that has been compiled from primary sources by a person or persons not directly involved in the original study or event, e.g. texts found on websites, magazines or textbooks. |
| In this assessment | |
| Teacher guidelines  Student booklet  Task-specific standards — continua  Task-specific standards — matrix  Sample response  Assessment resource: Reliability checklist | |

# Teacher guidelines

## Identify curriculum

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| Content descriptions to be taught | | | |
| 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) | **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) | | **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](http://www.australiancurriculum.edu.au/Glossary?a=S&t=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)   **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) |
| General capabilities (GCs) and cross‑curriculum priorities (CCPs)  This assessment may provide opportunities to engage with the following GCs and CCPs. Refer also to the Resources tab on the Year 7 Science curriculum and assessment page: [www.qcaa.qld.edu.au/yr7-science-resources.html](http://www.qcaa.qld.edu.au/yr7-science-resources.html) | | | |
| Literacy  ICT capability | | Critical and creative thinking  Aboriginal and Torres Strait Islander histories and cultures | |
| Achievement standard  This assessment provides opportunities for students to demonstrate the following highlighted aspects. | | | |
| By the end of Year 7, students describe techniques to separate pure substances from mixtures. They represent and predict the effects of unbalanced 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 how the sustainable use of resources depends on the way they are formed and cycle through Earth systems. They predict the effect of environmental changes on feeding relationships and classify and organise diverse organisms based on 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 to be changed and measured. They select equipment that improves fairness and accuracy and describe how they considered safety. Students draw on evidence to support their conclusions. They summarise data from different sources, describe trends and refer to the quality of their data when suggesting improvements to their methods. They communicate their ideas, methods and findings using scientific language and appropriate representations. | | | |
| Source: ACARA, The Australian Curriculum v7.0, [www.australiancurriculum.edu.au](http://www.australiancurriculum.edu.au). | | | |

## Sequence learning

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| Suggested learning experiences |
| This assessment leads on from the learning experiences outlined in the QCAA’s *Year 7 Science Year level plan*. The knowledge, understanding and skills in the Year level plan will prepare students to engage in this assessment:   * See *Year 7 plan — Science exemplar*  [www.qcaa.qld.edu.au/downloads/p\_10/ac\_science\_yr7\_plan.doc](http://www.qcaa.qld.edu.au/downloads/p_10/ac_science_yr7_plan.doc) |
| Adjustments for needs of learners |
| To make adjustments, teachers refer to learning area content aligned to the child’s chronological age, personalise learning by emphasising alternate levels of content, general capabilities or cross‑curriculum priorities in relation to the chronological age learning area content. The emphasis placed on each area is informed by the student’s current level of learning and their strengths, goals and interests. Advice on the process of curriculum adjustment for all students and in particular for those with disability, gifted and talented or for whom English is an additional language or dialect are addressed in *Australian Curriculum — Student Diversity* materials.  For information to support students with diverse learning needs, see:   * Queensland Curriculum and Assessment Authority materials for supporting children with diverse learning needs [www.qcaa.qld.edu.au/10188.html](http://www.qcaa.qld.edu.au/10188.html) * Australian Curriculum Student Diversity [www.australiancurriculum.edu.au/StudentDiversity/Student-diversity-advice](http://www.australiancurriculum.edu.au/StudentDiversity/Student-diversity-advice) * The *Melbourne Declaration on Educational Goals for Young Australians* [www.curriculum.edu.au/mceecdya/melbourne\_declaration,25979.html](http://www.curriculum.edu.au/mceecdya/melbourne_declaration,25979.html) * The *Disability Standards for Education* [www.ag.gov.au](http://www.ag.gov.au). |
| Resources |
| Online — websites teachers may find useful   * University of Nebraska-Lincoln, *Daylight hours explorer* <http://astro.unl.edu/classaction/animations/coordsmotion/daylighthoursexplorer.html> * Climate-Charts.com World climates, *Daylight/time of day chart for Cairns* [www.climate-charts.com/Locations/a/AU94287000310110.php](http://www.climate-charts.com/Locations/a/AU94287000310110.php%20) * Department of Sustainability, Environment, Water, Population and Communities: Australian Antarctic Division, *Environment/Weather* [www.antarctica.gov.au/about-antarctica/environment/weather/sunlight-hours](http://www.antarctica.gov.au/about-antarctica/environment/weather/sunlight-hours) * BBC Science, *Earth/TV clips* [www.bbc.co.uk/science/space/solarsystem/sun\_and\_planets/earth](http://www.bbc.co.uk/science/space/solarsystem/sun_and_planets/earth) * Teachers Domain, *Earth in motion: the seasons* [www.teachersdomain.org/resource/ess05.sci.ess.eiu.seasonsgame](http://www.teachersdomain.org/resource/ess05.sci.ess.eiu.seasonsgame) * University of Tennessee, *Seasons in the Northern Hemisphere*   <http://csep10.phys.utk.edu/astr161/lect/time/seasons.html>   * Bureau of Meteorology, *Indigenous Seasonal descriptions* [www.bom.gov.au/iwk/climate\_culture/Indig\_seasons.shtml](http://www.bom.gov.au/iwk/climate_culture/Indig_seasons.shtml) * Bureau of Meteorology, *Indigenous weather knowledge* [www.bom.gov.au/iwk](http://www.bom.gov.au/iwk/) * Mirima Council, *Miriwoong Seasonal Calendar* [www.mirima.org.au/calendar](http://www.mirima.org.au/calendar/) * CSIRO, Gooniyandi Seasons calendar [www.csiro.au/resources/Gooniyandi-Seasons-Calendar](http://www.csiro.au/resources/Gooniyandi-Seasons-Calendar) |

## Develop assessment

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| Preparing for the assessment |
| Learning experiences in preparation for the assessment could include:  Revising key concepts   * Revise from Year 5 that the Earth is part of a system of planets orbiting around a star (the sun).   Exploring the solar system and seasons   * Create a glossary or word wall of scientific language related to Earth and space sciences. * Create and use models of the solar system to: * show the relative positions and movement of the sun, Earth and moon * identify patterns of motion and describe the timeframes over which they occur * discuss the purpose, features and limitations of models in representing real objects and processes. * Investigate Indigenous weather knowledge and seasonal models that differ from the Western four-seasons model, including Indigenous seasonal descriptions and the wet/dry seasonal calendar common in the tropics. (Note that for the purpose of this assessment, the four-seasons model is useful because it enables students to consider the Earth’s orientation at four positions in its orbit around the sun). * Investigate natural phenomena such as lunar and solar eclipses, seasons and phases of the moon. * Compare times for the rotation of Earth, the sun and moon, and compare the times for the orbits of Earth and the moon. * Model the relative movements of the Earth, sun and moon and how natural phenomena such as solar and lunar eclipses and phases of the moon occur. * Explain why different regions of the Earth experience different seasonal conditions.   Developing research skills   * Identify credible sources of information using a reliability checklist or other criteria. Critically judge the quality of resources and acknowledge them using the conventions of a bibliography. * Develop research and summarising skills. * Practice organising information in logical ways. * Use labelled and annotated diagrams to explain scientific concepts and phenomena. * Develop explanations and draw conclusions and use evidence to support claims. |

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| Implementing | |
| Section 1. Creating a model to explain observations | |
| Student role   * Read Section 1 in the *Student booklet.* * Discuss the observations of the Earth made by the students. * Talk about how the observations may have been made and whether you have made similar observations. * Discuss the sun, Earth, moon model made by the students. * Talk about how the model is similar and different from any models you have seen or used. | Teacher role   * Allocate approximately 1 hour for this section of the assessment. * Using your knowledge of students’ personalities and abilities, place students in small groups. * Read each of the observations and features of the model to the students. * Allow them to discuss the observations and the model in relation to their own experiences. * Facilitate class discussions about similarities between the model and own experience * Negotiate with each student the choice of an appropriate scenario in a text suitable for close study. * Encourage students to select a text/section of a text, situation and characters that suits their interests and abilities and fits well with the purpose of the task, and to share it with others (e.g. teacher, classmates, friends) so that they become familiar with it and can explain why they have chosen it. |
| Section 2. Developing scientific explanations | |
| Student role   * Read the instructions for Section 2 in the *Student booklet.* * Conduct research to collect relevant information. * Discuss how judgments will be made about your work and the valued features of the assessment. Clarify with your teacher any questions you may have about the process. * Plan how you will organise your notes and keep a record of the resources accessed. * Construct a table with the headings: observation, scientific explanation, relevant features of the model, pattern and representation. * Access the reliability checklist or other criteria to ensure your use quality resources. * Set goals for the time available for research. * Discuss your plan with your teacher and begin your research. | Teacher role   * Allocate approximately 2 hours for students to research. * Read the instructions and ensure each student understands the requirements. * Provide the task-specific standards for this assessment and check for understanding of the valued features. * Provide the reliability checklist (or alternative) and how it is to be completed. * Discuss with each student their research plan. * Nominate a checkpoint stage where students discuss the progress towards the assessment. |
| Section 3. Drawing a conclusion | |
| Student role   * Read the instructions for Section 3 in the *Student booklet.* * Discuss the features of a conclusion and the importance of providing supporting evidence. * Use your knowledge, research, model and identified patterns to draw a conclusion and answer the question. * Review and edit your work against the task-specific standards and check for appropriate use of scientific language. | Teacher role   * Allocate approximately 1 hour for this section of the assessment. * When the research phase is complete discuss the structure of a conclusion and the importance of supporting evidence. * Read the conclusion question and encourage students to consider the ‘bigger picture’ when developing their response. |

## Make judgments

When making judgments about the evidence in student responses to this assessment, teachers are advised to use the task-specific standards provided. The development of these task-specific standards has been informed by the Queensland Year 7 standard elaborations. See [www.qcaa.qld.edu.au/downloads/p\_10/ac\_sci\_yr7\_se.docx](http://www.qcaa.qld.edu.au/downloads/p_10/ac_sci_yr7_se..docx)

### The Queensland standard elaborations for Science

The Queensland Year 7 standard elaborations for Science are a resource to assist teachers to make consistent and comparable evidence-based A to E (or the Early Years equivalent) judgments. They should be used in conjunction with the Australian Curriculum achievement standard and content descriptions for the relevant year level.

The Queensland Science standard elaborations provide a basis for judging *how well* students have demonstrated what they know, understand and can do using the Australian Curriculum achievement standard.

The Australian Curriculum achievement standards dimensions of Understanding and Skills are used to organise the Queensland Science standard elaborations.

The valued features of Science drawn from the achievement standard and the content descriptions for Understanding dimension and Skills dimension are organised as:

* Science understanding
* Science as a human endeavour
* Questioning and predicting
* Planning and conducting
* Processing and analysing data and information & Evaluating
* Communicating.

#### Task-specific standards

Task-specific standards give teachers:

* a tool for directly matching the evidence of learning in the response to the standards
* a focal point for discussing students’ responses
* a tool to help provide feedback to students.

Task-specific standards are not a checklist; rather they are a guide that:

* highlights the valued features that are being targeted in the assessment and the qualities that will inform the overall judgment
* specifies particular *targeted aspects* of the curriculum content and achievement standard
* aligns the valued feature, task-specific descriptor and assessment
* allows teachers to make consistent and comparable on-balance judgments about student work by matching the qualities of student responses with the descriptors
* clarifies the curriculum expectations for learning at each of the five grades (A–E or the Early Years equivalent)
* shows the connections between what students are expected to know and do, and how their responses will be judged and the qualities that will inform the overall judgment
* supports evidence-based discussions to help students gain a better understanding of how they can critique their own responses and achievements, and identify the qualities needed to improve
* encourages and provides the basis for conversations among teachers, students and parents/carers about the quality of student work and curriculum expectations and related standards.

#### Task-specific valued features

Task-specific valued features are the discrete aspects of the valued features of Science targeted in a particular assessment and incorporated into the task-specific standards for that assessment. They are selected from the Queensland Science standard elaborations valued features drawn from the Australian Curriculum achievement standard and content descriptions.

##### Task-specific valued features for this assessment

The following table identifies the valued features for this assessment and makes explicit the understandings and skills that students will have the opportunity to demonstrate. This ensures that the alignment between what is taught, what is assessed and what is reported is clear.

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| Australian Curriculum achievement standard dimensions | Queensland standard elaborations valued features | Task-specific valued features |
| **Understanding dimension** | Science understanding | * Explanation of how the relative positions of the Earth, sun and moon affect phenomena on Earth (including day length, climate zones, seasons and eclipses) * Description of observable patterns and timeframes   **Section 2** |
| **Skills dimension** | Processing and analysing data and information & Evaluating | Drawing on evidence to support a conclusion about the predictability of observations on Earth  **Section 3** |
| Communicating | Communication using scientific language  **Sections 2 and 3** |

The task-specific standards for this assessment are provided in two models using the same task-specific valued features:

* a matrix
* a continua.

#### Matrix and continua

Task-specific standards can be prepared as a matrix or continua. Both the continua and the matrix:

* use the Queensland standard elaborations to develop task-specific descriptors to convey expected qualities in student work — A to E (or the Early Years equivalent)
* highlight the same valued features from the Queensland standard elaborations that are being targeted in the assessment and the qualities that will inform the overall judgment
* incorporate the same task-specific valued features, i.e. make explicit the particular understanding/skills that students have the opportunity to demonstrate for each selected valued feature
* provide a tool for directly matching the evidence of learning in the student response to the standards to make an on-balance judgment about achievement
* assist teachers to make consistent and comparable evidence-based A to E (or the Early Years equivalent) judgments.

##### Matrix

The matrix model of task-specific standards uses the structure of the Queensland standard elaborations to organise the task-specific valued features and standards A to E (or the Early Years equivalent). The task-specific descriptors of the standard described in the matrix model use the same degrees of quality described in the Queensland standard elaborations.

Teachers make a judgment about the task-specific descriptor in the A to E (or the Early Years equivalent) cell of the matrix that best matches the evidence in the student responses in order to make an on-balance judgment about how well the pattern of evidence meets the standard.

The matrix is a tool for making both overall on-balance judgments and analytic judgments about the assessment. Achievement in each valued feature of the Queensland standard elaboration targeted in the assessment can be recorded and feedback can be provided on the task-specific valued features.

##### Continua

The continua model of task-specific standards uses the dimensions of the Australian Curriculum achievement standard to organise task-specific valued features and standards as a number of reference points represented progressively along an A to E (or Early Years equivalent) continuum. The task-specific valued features at each point are described holistically. The task-specific descriptors of the standard use the relevant degrees of quality described in the Queensland standard elaborations.

Teachers determine a position along each continuum that best matches the evidence in the student responses to make an on-balance judgment about achievement on the task.

The continua model is a tool for making an overall on-balance judgment about the assessment and for providing feedback on task-specific valued features.

## Use feedback

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| Feedback to students | Evaluate the information gathered from the assessment to inform teaching and learning strategies. Focus feedback on the student’s personal progress and the next steps in the learning journey.  The task-specific standards for this assessment can be used as a basis for providing feedback to students.  Offer feedback that:   * maximises students’ opportunities to succeed in the assessment by providing feedback on: * making a claim about the problem or observation * providing evidence for the claim from your research or investigation * providing reasoning that links the evidence to the claim * determining the reliability of sources * supporting conclusions with evidence * involves students in the process by providing opportunities to ask follow-up questions * focuses on each student’s personal progress relative to previous achievements * identifies the characteristics of a high quality response that aligns with the descriptors in the task-specific standards. |
| Resources | Hattie, J and Timperley, H 2007 ‘The Power of Feedback’, *Review of Educational Research*, Vol. 77, No.1 pp. 81–112.  For guidance on providing feedback, see the professional development packages titled:   * *About feedback* [www.qcaa.qld.edu.au/downloads/p\_10/as\_feedback\_about.docx](http://www.qcaa.qld.edu.au/downloads/p_10/as_feedback_about.docx) * *Seeking and providing feedback* [www.qcaa.qld.edu.au/downloads/p\_10/as\_feedback\_provide.docx](http://www.qcaa.qld.edu.au/downloads/p_10/as_feedback_provide.docx) * *The Roadmap: Dimensions of Teaching and Learning, Teaching and Learning Branch, Education Queensland, 2011,* <http://education.qld.gov.au/curriculum/framework/p-12/docs/curriculum-planning-p-10.pdf> |