Year 3 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 | Hot stuff | One term |

| Unit outline |
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| Students observe heat and develop their understanding of energy flow through a simple system. Science knowledge helps people to understand the effects of their actions and how use of heat energy may contribute to sustainable practices. Students develop understanding of the concept of heat in a physical sciences context, specifically heat energy, its production and movement from one object to another. Students develop understanding of how heat can be produced in many ways and can move from one object to another in the context of creating a solar oven. Questions that shape the inquiry include: * What is heat?
* How is heat produced?
* How does heat move from one object to another?
* How can we harness heat from the sun for useful purposes and to help us to be more sustainable?
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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 |
| Physical sciences* Heat can be produced in many ways and can move from one object to another [(ACSSU049)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACSSU049)
 | Nature and development of science* Science involves making predictions and describing patterns and relationships [(ACSHE050)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACSHE050)

Use and influence of science* Science knowledge helps people to understand the effect of their actions [(ACSHE051)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACSHE051)
 | Questioning and predicting* With guidance, identify questions in [familiar](file:///F%3A%5CUSB%5CAustralian%20Curriculum%20website%5Cwww.australiancurriculum.edu.au%5CGlossary8a1b.html?a=S&t=familiar) contexts that can be investigated scientifically and predict what might happen based on prior knowledge [(ACSIS053)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACSIS053)

Planning and conducting* Suggest ways to plan and conduct investigations to find answers to questions [(ACSIS054)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACSIS054)
* Safely use appropriate materials, [tools](file:///F%3A%5CUSB%5CAustralian%20Curriculum%20website%5Cwww.australiancurriculum.edu.au%5CGlossaryd68d.html?a=S&t=tools) or equipment to make and record observations, using formal measurements and [digital technologies](file:///F%3A%5CUSB%5CAustralian%20Curriculum%20website%5Cwww.australiancurriculum.edu.au%5CGlossary4733.html?a=S&t=digital+technologies) as appropriate [(ACSIS055)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACSIS055)

Processing and analysing data and information* Use a range of methods including tables and simple column graphs to represent [data](file:///F%3A%5CUSB%5CAustralian%20Curriculum%20website%5Cwww.australiancurriculum.edu.au%5CGlossary25f8.html?a=S&t=data) and to identify patterns and trends [(ACSIS057)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACSIS057)
* Compare results with predictions, suggesting possible reasons for findings [(ACSIS215)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACSIS215)

Evaluating* [Reflect on](file:///F%3A%5CUSB%5CAustralian%20Curriculum%20website%5Cwww.australiancurriculum.edu.au%5CGlossary3d9e.html?a=S&t=Reflect+on) the [investigation](file:///F%3A%5CUSB%5CAustralian%20Curriculum%20website%5Cwww.australiancurriculum.edu.au%5CGlossaryef74.html?a=S&t=investigation), including whether a test was fair or not [(ACSIS058)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACSIS058)

Communicating* Represent and communicate ideas and findings in a variety of ways such as diagrams, physical representations and simple reports [(ACSIS060)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACSIS060)
 | Description: gc_literacy Literacy* Communicate ideas using labelled diagrams

Description: gc_numeracy Numeracy* Make measurements
* Analyse data to identify patterns
* Construct column graphs to represent data

Description: gc_ict ICT capability* Use data loggers to gather experimental data

Description: gc_critical Critical and creative thinking* Use thinking skills to complete group activities and plan investigations

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

Description: Description: gc_ethical Ethical behaviour* Reflect on the consequences of decisions

 Aboriginal and Torres Strait Islander histories and cultures* Demonstrate alternative ways of knowing and sharing

Description: cc_sust Sustainability* Develop an appreciation of the need for more sustainable patterns of living
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| Achievement standard |
| By the end of Year 3, students use their understanding of the movement of the Earth, [materials](http://www.australiancurriculum.edu.au/Glossary?a=S&t=materials) and the behaviour of heat to suggest explanations for everyday observations They describe features common to living things. They describe how they can use science [investigations](http://www.australiancurriculum.edu.au/Glossary?a=S&t=investigations) to respond to questions and identify where people use science knowledge in their lives.Students use their experiences to pose questions and predict the outcomes of [investigations](http://www.australiancurriculum.edu.au/Glossary?a=S&t=investigations). They make formal measurements and follow procedures to collect and present observations in a way that helps to answer the [investigation](http://www.australiancurriculum.edu.au/Glossary?a=S&t=investigation) questions. Students suggest possible reasons for their findings. They describe how safety and fairness were considered in their [investigations](http://www.australiancurriculum.edu.au/Glossary?a=S&t=investigations). They use diagrams and other representations to communicate their ideas. |
| Relevant prior curriculum | Curriculum working towards |
| In the Australian Curriculum: Science at Years 1 and 2Science as a Human EndeavourNature and development of science * Science involves asking questions about, and describing changes in, objects and events.

Use and influence of science* People use science in their daily lives, including when caring for their [environment](http://www.australiancurriculum.edu.au/Glossary?a=S&t=environment) and living things.

Science Inquiry SkillsQuestioning and predicting* Respond to and pose questions, and make predictions about [familiar](file:///F%3A%5CUSB%5CAustralian%20Curriculum%20website%5Cwww.australiancurriculum.edu.au%5CGlossary8a1b.html?a=S&t=familiar) objects and events.

Planning and conducting* Participate in different types of guided investigations to explore and answer questions, such as manipulating materials, testing ideas, and accessing information sources.
* Use informal measurements in the collection and recording of observations, with the assistance of [digital technologies](file:///F%3A%5CUSB%5CAustralian%20Curriculum%20website%5Cwww.australiancurriculum.edu.au%5CGlossary4733.html?a=S&t=digital+technologies) as appropriate.

Processing and analysing data and information* Use a range of methods to sort information, including drawings and provided tables.
* Through discussion, compare observations with predictions.

Evaluating* Compare observations with those of others.

Communicating* Represent and communicate observations and ideas in a variety of ways such as oral and written language, drawing and role play.
 | In the Australian Curriculum: Science at Year 6Science Understanding* Energy from a variety of sources can be used to generate electricity.

(Students next engage with Science Understanding focused on the concept of energy in Year 6.)In the Australian Curriculum: Science at Year 4Science as a Human Endeavour* The content descriptions for Science as a Human Endeavour are the same for Year 3 and Year 4.

Science Inquiry Skills* The content descriptions for Science Inquiry Skills are the same for Year 3 and Year 4.
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| Bridging content |
| The **Australian Curriculum: Science at Year 3** focuses on producing and transferring a single type of energy, i.e. heat. This differs from the **Year 3 Essential Learning: Energy and change** that focuses on the concept of applications of different forms of energy. |
| Links to other learning areas |
| In the Australian Curriculum: Mathematics at Year 3* Fluency: using familiar metric units.
* Problem Solving: planning methods of [data](http://www.australiancurriculum.edu.au/Glossary?a=M&t=data) collection and representation.
* Reasoning: interpreting the results of [data](http://www.australiancurriculum.edu.au/Glossary?a=M&t=data) collections and [data](http://www.australiancurriculum.edu.au/Glossary?a=M&t=data) displays.

In the Australian Curriculum: English at Year 3* Listen to and contribute to conversations and discussions to share information and ideas and negotiate in collaborative situations.
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| Assessment | Make judgments |
| --- | --- |
| Describe the assessment | Assessment date | Teachers gather evidence to make judgments about the following characteristics of student work:**Understanding*** description and identification of scientific information and concepts
* use of science knowledge to generate solutions and explanations
* identification of the use of science

**Skills*** identification of questions for investigation and making plausible predictions
* description of safety and fairness in investigations
* safe use of materials, tools and equipment, following procedures, to make observations
* identification of patterns and trends in data and observations, making comparisons with predictions
* communication and representation of ideas, methods, observations and findings.

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 3 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.Throughout the unit, teachers collect student work and collate it in the students’ folios. Students follow procedural texts throughout the unit. **Experimental investigation: Scientific report (Written)**Under the guidance of the teacher, students suggest ways to plan an investigation to answer the question: Does the size of a piece of food affect how quickly it cooks?Students:* predict which will cook faster — the whole potato or the potato cut into bite-sized pieces
* safely use the solar ovens constructed in class to conduct the experiment
* record observations, record temperature increases and represent them in a column graph
* compare observations with predictions
* use results to suggest a possible relationship between the size of the piece of potato and the rate of heating
* represent learning through labelled diagrams
* discuss applications of the principles of the solar oven in everyday lives.

Celebrate completion of the solar oven by inviting other classes to a celebration day. Students use solar ovens and share their learning.Suggested conditions:* 75–150 words
* open.
 | During the second half of term |

| Teaching and learning | Supportive learning environment |
| --- | --- |
| Teaching strategies and learning experiences | Adjustments for needs of learners | Resources |
| With guidance, students discuss and learn how to:* identify questions that can be investigated
* make predictions
* suggest ways to plan investigations that are examples of fair tests
* safely use materials
* record observations using a range of methods
* compare observations with predictions
* communicate ideas and explanations.

Students will use relevant questions from resources, worksheets and other stimulus, as appropriate, with a focus on describing events using appropriate scientific language. Learning experiences could include:* compiling a word wall of terms including: heat, heat transfer, heat absorption, heat production, sources of heat, sustainable
* giving students the opportunity to contribute to the inquiry questions
* making science journal entries
* completing matching activities and cloze exercises
* class discussions
* conducting simple structured investigations.

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.

**Engage*** Ask students: Rub your hands together for 10 seconds and place them on your face. What do you feel? Now rub them together for 30 seconds and place them on your face. What do you feel?
* Brainstorm: What is heat? Where does heat come from? Why is heat important? What is Earth’s major source of heat? How can you create heat?
* Establish students’ current knowledge by having them consider: What do I know? What do I want to know? Students add this to their science journal.
* Discuss and distribute a home heat audit where students gather pictures representing all of the heat sources in their home.

Explore* Collate the home audit as a class pictograph.
* Discuss the results with students and compare human-made heat sources with the sun. Ask students to describe how heat is transferred from the sun. Question students about heat transfer from the sun, e.g. When do we obtain heat from the sun? Are there times in the day when the sun is hotter? Students complete a science journal entry about heat sources.
* Answer the question: Can heat move? Compare different materials for heat transference and absorption properties. The sun can be used as a heat source. Different materials could include aluminium foil, cardboard, plastic lids, a cup of water, polystyrene, piece of fabric.
* Explore the relationship between colour and heat absorption by comparing different coloured boxes of the same size (black, white, green, red) that have been placed in the sun.
* Discuss understanding related to everyday experiences, i.e. different coloured shirts in the sun, different coloured cars in the sun, materials used for keeping food or drinks cold or hot.

Explain* Conduct teacher-led demonstrations to explain the conduction of heat in solids and convection of heat in liquids.
* Draw a flow chart to illustrate how heat moves through solids and liquids.
* Review and explore prior activities. Summarise heat sources and how heat is produced.
* View multimedia resources to explain the conduction of heat.

Elaborate* Construct solar ovens to investigate heat energy. The solar oven can be made of thick cardboard. Students choose the best materials to cover the cardboard and the best colour to paint the cardboard based on the material’s and paint’s ability to reflect and absorb heat.
* Build solar ovens based on different design principles. Have one oven as a control and discuss the importance of fair tests.
* Cook with the oven on a sunny day. (Consider safety issues, such as heat — use oven gloves, and glare — use sunglasses.) Foods that could be cooked in the solar oven include popcorn or baked beans. (Check students’ medical records for allergies.)
* Compare the rate of melting of chocolate or butter to the rate of heating water. Temperatures can be taken every five minutes and recorded in a data table and displayed in a column graph.

Evaluate* Draw and label a cut-away diagram of the solar oven. Students reflect on their choice of products for the solar oven and evaluate the effectiveness of these products.
* Identify patterns in the column graph.
* Discuss how to make a block of chocolate or butter melt more quickly (whole block versus block broken into pieces).
* **Extend:** Students propose ways to improve the solar ovens, e.g. changing materials or shapes.
* **Extend:** Students propose other factors that could affect cooking time such as the amount of sunlight at the time, air [temperature](http://en.wikipedia.org/wiki/Temperature) and wind. (Food cooks faster in the two hours before and after the local solar [noon](http://en.wikipedia.org/wiki/Noon) than it does in either the early morning or the late afternoon.
* Discuss answers to the question: What are the advantages and disadvantages of using the sun to cook via a solar oven?
* Discuss as a class the wider uses of solar ovens as a source of heat. Because a solar oven uses no fuel and costs nothing to run, humanitarian organisations are promoting their use worldwide to help slow [deforestation](http://en.wikipedia.org/wiki/Deforestation) and [desertification](http://en.wikipedia.org/wiki/Desertification), caused by using wood as fuel for cooking. Solar ovens are a form of [outdoor cooking](http://en.wikipedia.org/wiki/Outdoor_cooking) and are often used in situations where minimal fuel consumption is important, or the danger of accidental fires is high.
 | 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* websites for factsheets, interactive worksheets
* websites for videos on building a solar oven or to help students visualise conduction and convection

Print * worksheets
* word wall

Equipment* digital thermometers or data loggers, heat lamp, stop watch
* materials for the “explore” phase: assorted materials that reflect and absorb heat, e.g. white and black cardboard, fabrics, wood, metal
* materials for the “elaborate” phase: black saucepan, aluminium foil, shoe box, black paint
* materials for the “explain” phase: glass, water, food colouring, candle, butter knife

Safety equipment* sunglasses, oven gloves
* completed risk assessment
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| 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 solar oven 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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