

National Aboriginal and Torres Strait Islander Curricula Project

Astronomy

The National Aboriginal and Torres Strait Islander Curricula Project aims to empower *all* teachers to integrate Aboriginal and Torres Strait Islander perspectives into their classroom practice. This resource will assist teachers to implement the [Australian Curriculum](#). Bringing to life the [Aboriginal and Torres Strait Islander Histories and Cultures Cross-Curriculum Priority](#) in their classroom.

“It is our hope that this work will support teachers to include Aboriginal and Torres Strait Islander curriculum content in their classrooms — normalising inclusion — so it is seen as an integral element of their curriculum delivery.”
Professor Marcia Langton AM, Curricula Project Chair

Primary

1. English
2. Mathematics
3. Science
4. Humanities and Social Sciences
5. The Arts
6. Technologies
7. Health and Physical Education

Note: This project is an Australian Government funded initiative delivered by the University of Melbourne through the Indigenous Studies Unit. The material within these resources includes the views, opinions and representations of third parties, and do not necessarily represent the views of the Australian Government. They are provided for consultation purposes and stakeholders are welcomed to provide feedback, including any potential concerns on copyright.

Primary — English — Year 5

Summary

This guide focuses on how Aboriginal and Torres Strait Islander cultures transfer their intricate knowledge of reading the sky and landscape.

Achievement Standard

This guide assists in meeting the following aspects of the achievement standard for Year 5 English: “understand how language features, images and vocabulary influence interpretations of characters, settings and events” and “describe how events, characters and settings in texts are depicted and explain their own responses to them”.

Content Description

Identify aspects of literary texts that convey details or information about particular social, cultural and historical contexts. (ACELT1608).

Background

“We sing the map.”— Bill Yidumduma Harney, Wardaman Elder.

In Aboriginal and Torres Strait Islander cultures there is a relationship between astronomy, geography, economies, spiritualities and cultural transmission across groups and generations. It is said that everything on the land is reflected in the sky. The features of the sky and land are interpreted for information purposes, e.g. to explain about tides and for practical applications, e.g. predicting animal behaviour as a food source or as a navigational tool. Oral traditions such as songs, stories, dance and art communicate this knowledge to maintain cultures. The spectrum of messages range from symbolic to complex Song Series (Song Lines). These are songs which travel across the landscape vast distances, each group contributing their own ‘verse’, which tells how to relate to each other and the land, for example trade routes and ceremonies.

Norris and Harney, 2014, <http://www.atnf.csiro.au/people/Ray.Norris/papers/n315.pdf>

Resources

Stories and Activities that all link the Cultural Astronomy of the Kamilaroi and Euahlayi Peoples and Their Neighbours - Star Stories of the Dreaming <http://education.abc.net.au/res/pdf/indigenous-astronomy-guide.pdf>
 Dreaming Stories Videos, includes text and links to a study guide for each (Chapters 4, 5 & 7 about the Celestial Features) - Dust Echoes - <http://education.abc.net.au/home#!/digibook/2570774/dust-echoes>
 Information and examples of connections between Land and Sky - <http://www.aboriginalastronomy.com.au/content/topics/landscape/>

Students will...

- learn to infer meaning from various stories to extend their understanding of the complex relationships between Aboriginal and Torres Strait Islander astronomy, geography, economies, spiritualities and cultural transmission.
- learn about the ways in which Aboriginal and Torres Strait Islanders communicated messages with each other and through generations to maintain culture, people and environment.

Questions for inquiry-based learning

- How can Aboriginal and Torres Strait Islander stories be interpreted / what can be inferred?
- How are Aboriginal and Torres Strait Islander oral traditions effective at transmitting knowledge across generations for thousands of years?

Example classroom task

Discover complex meanings — Students will begin to understand the significant connections and interdependence that Aboriginal and Torres Strait Islander people share with the environment and sky by investigating the layered and complex meanings in Dreamtime stories.

Class watch Chapter 4 from the Dust Echoes series: <http://education.abc.net.au/home#!/digibook/2570774/dust-echoes>.

Students to record: name of story, language group, feature of sky, main message(s)

Students to answer: What does the film help us understand about aspects of Aboriginal life and society?

Students to repeat activity for Dust Echoes Chapters 5 & 7 (or other Dreamtime story about the sky)

Primary — Mathematics — Year 5

Summary

Students will understand how Aboriginal and Torres Strait Islander peoples observe the Sun, Moon, and stars and use that knowledge to understand time and allow them to predict a variety of natural phenomena.

Achievement Standard

This guide assists in meeting the following aspects of the achievement standard for Year 5 Mathematics: “They convert between 12- and 24-hour time”.

Content Description

Compare 12- and 24-hour time systems and convert between them (ACMMG110).

Background

Aboriginal and Torres Strait Islander people are the world’s oldest astronomers. They have developed intricate systems for detailing the patterns of movements of the stars, planets, and our sun and moon. These systems — many of which are still actively utilised today — assist Aboriginal and Torres Strait Islander people in navigating by land and sea, informing complex seasonal calendars, forecasting the weather, and understanding associated natural phenomena.

Astronomical knowledge is intimately tied to knowledge of other natural processes, such as animal migrations and breeding cycles; knowing the best seasons for fishing, planting, and hunting; predicting tides using the phases of the Moon; and forecasting weather and seasonal changes.

All of this knowledge is interwoven and connected through story, law, science, and spirituality.

Hamacher, Duane, Astronomy in Indigenous knowledge, In *The Conversation*, December 1, 2014; republished in *PhysOrg* (Astronomy & Space, Space Exploration, December 1, 2014):

<https://phys.org/news/2014-12-astronomy-indigenous-knowledge.html>; accessed 3 December, 2018.

Heathcote, Angela, A Guide to Aboriginal Astronomy. Aboriginal Australians are the world’s oldest astronomers. In, *Australian Geographic*, July 13, 2017:

<https://www.australiangeographic.com.au/topics/science-environment/2017/07/a-guide-to-aboriginal-astronomy/>; accessed 3 December, 2018.

Resources

Australian Indigenous Astronomy: <http://www.aboriginalastronomy.com.au/>

Stellarium (Version 0.18.1; Stellarium is a free open source planetarium for your computer): <https://stellarium.org/>

Heathcote, Angela, A Guide to Aboriginal Astronomy. Aboriginal Australians are the world’s oldest astronomers. in, *Australian Geographic*, July 13, 2017: <https://www.australiangeographic.com.au/topics/science-environment/2017/07/a-guide-to-aboriginal-astronomy/>

National earth Science Teachers Association, *Windows to the Universe. Southern Hemisphere Constellations*: https://www.windows2universe.org/the_universe/Constellations/south_constellations.html

Rao, Joe, Why the Night Sky Changes With the Seasons, In Space.com. *Skywatching*, February 10, 2011:

<https://www.space.com/10821-night-sky-changing-seasons.html>

Students will...

- Compare and contrast Aboriginal and Torres Strait Islander and European constellations (e.g. Orion and the Pleiades, the celestial emu, and the Milky Way).
- Identify daily, seasonal, and annual patterns in nature.
- Explore the relationship between Moon phases and tides.

Questions for inquiry-based learning

- How can you tell the time if you don’t have access to a clock or watch?
- How can you tell the time of year without a Gregorian calendar?
- Which indicators of time are natural and which are human-made?
- How can you predict the weather without modern technology?

Example classroom task

- List human-made and natural indicators of time (e.g. sunset/sunrise positions, length of shadows throughout the day, animal migrations and breeding cycles, clocks, school bells, TV shows, seasonal fruits and flowers)
- Identify relationships between astronomical features and natural phenomena on Earth (e.g. the rise and set times of constellations during different seasons, lunar cycles, effect of Moon on tides, and the twinkling of stars).

Primary — Science — Year 5

Summary

This guide focuses on developing an appreciation of Aboriginal and Torres Strait Islander people's understanding of the night sky and its use for navigation, time-keeping and tide prediction.

Achievement Standard

This guide assists in meeting the following aspects of the achievement standard for Year 5 Science: “describe the key features of our solar system” and “how science knowledge develops from many people's contributions”.

Content Description

The Earth is part of a system of planets orbiting around a star (the sun) (ACSSU078)

Background

Aboriginal and Torres Strait Islander people have a longstanding scientific knowledge tradition, which has given them a deep understanding about the Sun, Moon and the visible planets (Mercury, Venus, Mars, Jupiter and Saturn) and their complex motions. They linked the positions and motions (including retrograde motion) of celestial bodies to time, calendars, seasons, navigation, subsistence and social applications. This knowledge was recorded and passed to successive generations through oral traditions, song and dance, craftsmanship, social practices) to ensure that the integrity of their stories and lessons are preserved.

Resources

The planets in Indigenous Australian traditions: <https://arxiv.org/ftp/arxiv/papers/1806/1806.02462.pdf>

Aboriginal traditions describe the complex motions of planets, the “wandering stars” of the sky:

<http://theconversation.com/aboriginal-traditions-describe-the-complex-motions-of-planets-the-wandering-stars-of-the-sky-97938>

Ad Wer: Story of the Stars from Eastern Torres Strait education resource:

<https://issuu.com/umbrellastudio/docs/ad-wer-education-resource>

Astronomy in Indigenous knowledge: <https://phys.org/news/2014-12-astronomy-indigenous-knowledge.html>

Australian Indigenous Astronomy – The Planets (<http://www.aboriginalastronomy.com.au/content/topics/planets/>)

Norris, R.P. and Hamacher, D.W. (2009). The astronomy of Aboriginal Australia. In *The Role of Astronomy in Society and Culture*, edited by D. Valls-Gabaud and A. Boksenberg. Cambridge University Press, pp. 39-47.

Hamacher, D.W. and Norris, R.P. (2011). “Bridging the gap” through Australian cultural astronomy.

Archaeoastronomy and Ethnoastronomy: building bridges between cultures, edited by Clive Ruggles. Cambridge University Press, pp. 282-290

Star Stories of the Dreaming <http://www.aboriginalastronomy.com.au/wp-content/uploads/2018/05/Star-Stories-of-the-Dreaming-Guide.pdf>

Stellarium (<https://stellarium.org/>) is an online interactive planetarium which is also available as an App for Apple and Android devices

Students will...

- Explore how Aboriginal and Torres Strait Islander people used stories and myths to understand planets and their motion.

Questions for inquiry-based learning

- What do Aboriginal and Torres Strait Islander people know about the visible planets (Mercury, Venus, Mars, Jupiter and Saturn)?
- How do Aboriginal and Torres Strait Islander stories of the Sun, Moon and Visible planets relate to the observable facts about them?

Example classroom task

Explore Aboriginal and Torres Strait Islander stories about the Sun, Moon and Visible planets.

Through the stories of the Sun, Moon and Visible Planets students develop a chart (or series of cards) of observable characteristics of each planet (For example, where and when a particular planet can be viewed, colour/s, size, relative position to other celestial bodies, etc).

Primary — Humanities and Social Sciences — Year 5

Summary

Students will learn about astronomical knowledge of Torres Strait Islander peoples and will learn about their horticultural calendar by using star positions.

Achievement Standard

This guide assists in meeting: *“locate, collect and organise data and information from a range of sources to answer inquiry questions”* and *“interpret maps, geographical data and other information to identify and describe spatial distributions, simple patterns and trends, and suggest conclusions”*.

Content Description

The influence of people, including Aboriginal and Torres Strait Islander Peoples, on the environmental characteristics of Australian places (ACHASSK112).

Background

The science of astronomy has existed for thousands of years and forms a vital part of Aboriginal and Torres Strait Islander cultures, even today. As an example, the astronomy of Torres Strait Islander peoples is explored in this guide. The Sun, Moon, and visible planets were known to Aboriginal and Torres Strait Islander people. These cultures paid careful attention to the motions of solar system bodies through careful observation, which was recorded and passed to successive generations through oral tradition and material culture. Aboriginal and Islander people distinguished planets from the background stars, noted their changing positions in the sky, their changing positions relative to each other, their proximity to each other along the zodiac of the ecliptic, and their dynamic relationship to the Sun and Moon. (Hamacher and Banks, 2018). They created star maps and seasonal calendars by observing the sky and their environments on earth to enable travel across vast distances and the best times for their food producing and harvesting activities. The Torres Strait Islanders are horticulturalists who have lived on many of the islands of Australia’s northernmost archipelago between Cape York and Papua New Guinea. Astronomers, such as Dr Duane Hamacher and Kirsten Banks are recording Torres Strait Islander knowledge of the night sky.

Australian Indigenous Astronomy – The Planets (<http://www.aboriginalastronomy.com.au/content/topics/planets/>); Hamacher, D.W. and Banks, K. (2018). The Planets in Indigenous Australian Traditions. *Oxford Research Encyclopedia of Planetary Science*, in review; Norris, R.P. and Hamacher, D.W. (2009). The astronomy of Aboriginal Australia. In *The Role of Astronomy in Society and Culture*, edited by D. Valls-Gabaud and A. Bokseberg. Cambridge University Press, pp. 39-47; Hamacher, D.W. and Norris, R.P. (2011). “Bridging the gap” through Australian cultural astronomy. *Archaeoastronomy and Ethnoastronomy: building bridges between cultures*, edited by Clive Ruggles. Cambridge University Press.

Resources

Australian Indigenous Astronomy: <http://www.aboriginalastronomy.com.au/>; ABC Science - Beginners guide to the night sky: <http://www.abc.net.au/science/starhunt/>; A Shark in the Stars by Dr Duane H. Hamacher: <https://theconversation.com/a-shark-in-the-stars-astronomy-and-culture-in-the-torres-strait-15850>

Students will...

- analyse star maps and geographical maps to understand how Torres Strait Islander peoples’ use their unique sky maps and calendar for recognising the changes in stars as indicators of plants and animals for growing food and using the seas for fishing and harvesting.
- develop their own star maps for traveling from school to a place some distance away and map the journey out in the stars, as well as compare Aboriginal and Torres Strait Islander star maps and Global Positioning Systems.

Questions for inquiry-based learning

- How do people and environments influence one another?
- How do people influence the human characteristics of places and the management of spaces within them?

Example classroom task — Stargazing Activities

- Learn how to find your way around the night sky, spotting stars, planet and galaxies. The ABC Science Sky Tour has winter and summer tours or take a virtual tour: <https://www.abc.net.au/science/starhunt/tour/outdoor/>
- Learn how to measure the sky with your hands. Astronomers measure distances in the sky in degrees. Students follow the step-by-step instructions to learn how to use their hands to measure the sky in degrees.
- Explore the night sky using interactive software, such as Stellarium, which shows a realistic sky in 3D.
- Google Sky allows students to explore planets. Turn the ‘Sky’ button on in Google Earth to change to sky view.

Primary — The Arts — Year 5/6

Summary

This guide focuses on the Seven Sisters constellation and how it has been represented by Aboriginal and Torres Strait Islander artists.

Achievement Standard

This guide assists in meeting the following aspects of the achievement standard for Years 5 and 6 The Arts (Visual Arts): *“describe the influences of artworks and practices from different cultures, times and places on their art making”* and *“demonstrate different techniques and processes in planning and making artworks”*.

Content Description

Explore ideas and practices used by artists, including practices of Aboriginal and Torres Strait Islander artists, to represent different views, beliefs and opinions (ACAVAM114).

Background

The Seven Sisters is an important Australian Songline, Tjukurpa or dreaming, terms that refer to Aboriginal cosmology, encompassing the creator and ancestral beings, the laws of religious and social behaviour, the land, the spiritual forces which sustain life and the narratives which concern these (Currana, W., 1993). The seven sisters can be found in the night sky today as a cluster of seven stars that is part of the constellation of Taurus or the Pleiades. The Tjanpi Desert Weavers, a social enterprise of the NPY Women’s Council, created a major work the Songlines: Tracking the Seven Sisters exhibition at the National Museum of Australia, Canberra in 2017. The Story of the Seven Sisters came alive with flying woven works that are life size and burst with energy and colour. These sculptures are part figurative part spirit and capture the metamorphosis of spirit to corporeal form so much a part of the Seven Sisters Dreaming or Tjukurpa.

The classroom task is designed to encourage the students to work in three dimensions like the Tjanpi Desert Weavers but also to reinforce the metamorphosis represented in the Seven Sisters narrative.

Resources

Tjanpi Desert Weavers <https://tjanpi.com.au/>

The Museum of Contemporary Art <https://www.mca.com.au/artists-works/artists/tjanpi-desert-weavers/>

Art and Soul television series <https://www.abc.net.au/tv/programs/art-soul/>

Students will...

- Be encouraged to think about how we use shapes, pattern and colour to represent a range of ideas, identity and belonging
- Reflect on how Aboriginal and Torres Strait Islander people relate to the natural world and how it informs their sense of identity

Questions for inquiry-based learning

- How do the stories in Aboriginal and Torres Strait Islander art work connect to country and Identity?
- Consider how the visual depiction of The Seven Sisters differs both in symbols and in medium as it travels through different communities.

Example classroom task**Mod Rock Creations**

- Inspired by the Tjanpi Desert Weavers students will roll and crush newspaper to create the frame of the body of the Seven Sisters much as the Weavers do with grass. Students rolls balls for the head and torso and cylinders for the limbs. They use masking tape to wrap up and secure the paper and then join the various section of the body together with the masking tape.
- When the basic shape of the body/creature is complete students use mod rock (plaster) to wrap the figure and after applying water smooth all the sections together and then put aside to dry.
- Once dry the figure/creature will be hard and can be decorated with a number of materials including coloured wool tightly wrapped around the limbs and adhered further with PVA, feathers, glitter, buttons, paint etc...
- On a large piece of heavy cartridge create the backdrop of the night sky and the Pleiades constellation. In the classroom assemble the finished works as if moving/evolving across the night sky

Primary — Technologies — Year 5/6

Summary

In this guide students will come to know about Aboriginal and Torres Strait Islander people's understanding of the sun and moon and design their own way of presenting this information.

Achievement Standard

This guide assists in meeting the following aspects of the achievement standard for Years 5 and 6 Technologies (Design and Technologies): *“combine design ideas and communicate these to audiences using graphical representation techniques and technical terms. Students record project plans including production processes”.*

Content Description

Generate, develop and communicate design ideas and processes for audiences using appropriate technical terms and graphical representation techniques (ACTDEP025).

Background

There are many Aboriginal Dreaming stories about the sun and moon. Aboriginal and Torres Strait Islander people have long used knowledge systems to explain natural phenomenon. These stories are passed down through orality (i.e. oral traditions, song and dance, craftsmanship, social practices) to ensure that the integrity of their stories and lessons are preserved.

Resources

Ngaut Ngaut – A Lunar calendar?: <http://aboriginalastronomy.blogspot.com/2012/02/ngaut-ngaut-lunar-calendar.html>

The Sun and Moon – some Aboriginal perspectives and activities:

https://csem.flinders.edu.au/thegoodstuff/IndigiSTEM/docs/astronomy/The_Sun_and_Moon_Aborigin_1.pdf

Moon Man: <http://education.abc.net.au/home#!/media/2570552/moon-man>

The sun, the moon, the morning star:

https://www.westernsydney.edu.au/campbelltown_observatory/home/areas_of_research_and_teaching/aboriginal_astronomy/the_sun_the_moon_the_morning_star

How the sun was made: <http://www.kullillaart.com.au/dreamtime-stories/How-the-Sun-was-made>

Tiwi seasons and plants and animal calendars: <https://www.csiro.au/en/Research/Environment/Land-management/Indigenous/Indigenous-calendars/Tiwi>

Students will...

- explore how Aboriginal and Torres Strait Islander people used stories and engravings to understand the solar system, in particular the sun and the moon
- analyse the stories to find out where they come from and what they teach about the sun and the moon.

Questions for inquiry-based learning

- What myths and stories did Aboriginal and Torres Strait Islander people have about the sun and the moon?
- How do these myths and stories differ across different Aboriginal language groups across Australia?

Example classroom task

Optional preparation tasks

Gather Aboriginal and Torres Strait Islander stories and myths that explain the origin of the sun and the moon. Mark on a map of Australia where particular stories come from, which language group is linked to the story and the storyteller's name if possible. Analyse the stories to find out what they teach about the sun or moon.

Make a moon phases chart:

https://csem.flinders.edu.au/thegoodstuff/IndigiSTEM/docs/astronomy/The_Sun_and_Moon_Aborigin_1.pdf Explore lunar time, and how the moon affects the tide, harvesting and animal migration.

- Have students create a design idea for recording their chosen Aboriginal and Torres Strait Islander story about the moon or sun.
- Students should consider how the representation of these stories has changed in the past and how it might change in the future.

Primary — Health and Physical Education — Year 5/6

Summary

This guide focuses on cultural identity and how star stories may shape an individual and/or communities' identity.

Achievement Standard

This guide assists in meeting the following aspects of the achievement standard for Years 5 and 6 Health and Physical Education: *“explain the influence of people and places on identities”* and *“discuss factors that influence how people interact”*.

Content Description

Examine how identities are influenced by people and places (ACPPS051).

Background

This resource aims to provide information for teachers to introduce Aboriginal and Torres Strait Islander knowledge to students and enable them to investigate approaches to promote health and wellbeing, comparing contemporary health information with Aboriginal and Torres Strait Islander people's holistic approaches. Aboriginal and Torres Strait Islander cultural concepts and norms that shape identity include the sacred ancestral narratives. For Aboriginal and Torres Strait Islander people, the stars and sky serve as a law book for ensuring social cohesion and social behaviour. The stars can also signify reward for bravery and heroic acts. Some examples include: Luritja (NT): Falling Star as punishment for breaking law (Henbury meteorites); Kokatha (SA): Nyeeruna and the 7 sisters (variability of Betelgeuse); Ngarrindjeri (SA): Breaking taboos (variability of Antares); Meriam Mir (QLD): Story of Tagai (ate rations, inform seasons); Yolngu (NT): Brother dies saving sibling, to appear as a supernova in the Milky Way. The literature and resources can be found at: <http://www.aboriginalastronomy.com.au/>

Resources

M. Salmon, K. Doery, P. Dance, J Chapman, R. Gilbert, R. Williams and R. Lovett. 2018. Defining the Indefinable: Descriptors of Aboriginal and Torres Strait Islander Peoples' Cultures and their Links to Health and Wellbeing: Aboriginal and Torres Strait Islander Health Team, Research School of Population Health, Australian National University: Canberra, <http://dx.doi.org/10.25911/5bdbcdf5c89a7>

Australian Indigenous Astronomy: <http://www.aboriginalastronomy.com.au/>

Hamacher, D. et al, (2011). “Bridging the gap” through Australian cultural astronomy. *Archaeoastronomy and Ethnoastronomy: building bridges between cultures*. Cambridge University Press, pp. 282-290.

Stories and Activities that all link the Cultural Astronomy of the Kamilaroi and Euahlayi Peoples and Their Star Stories of the Dreaming <http://education.abc.net.au/res/pdf/indigenous-astronomy-guide.pdf>

Dreaming Stories Videos, includes text and links to a study guide for each (Chapters 4, 5 & 7 about the Celestial Features) - Dust Echoes - <http://education.abc.net.au/home#!/digibook/2570774/dust-echoes>

Information and examples of connections between Land and Sky - <http://www.aboriginalastronomy.com.au/content/topics/landscape/>

Students will...

- develop an awareness of how traditional knowledge and story-telling help shape individual and collective identities for Aboriginal and Torres Strait Islander People
- consider the importance of maintaining cultural connections for Aboriginal and Torres Strait Islander People

Questions for inquiry-based learning

- How may cultural stories shape a person's identity and connections to Country, community and cultural knowledge?
- Why are cultural stories important to a person's identity?

Example classroom task

Explore a number of star stories that young Aboriginal and Torres Strait Islander people would have listen to in their communities. Consider how those stories shape that young person's individual identity and connections to Country, community and cultural knowledge.

On a drawing of a young person articulate some of the connections that they may have that help shape their identity. As a class, come together and consider how a community's identity may be shaped by the traditional stories.