

TEACHER GUIDE  
Y5 MATHS

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# Comparing 12- and 24-hour time systems and Indigenous concepts of time

**Warning** – Aboriginal and Torres Strait Islander teachers and students are advised that this curriculum resource may contain images, voices or names of deceased people.

# Comparing 12- and 24-hour time systems and Indigenous concepts of time

**Australian Curriculum Link**

Mathematics/Year 5/Measurement and Geometry/Using units of measurement/ACMMG110

**Australian Curriculum Content Description**

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

**Australian Curriculum Elaboration**

Investigating the ways time was and is measured in different Aboriginal Country, such as using tidal change.

**Essential question**

How can we measure daily time using both abstract instruments and by noticing features of the earth we live on?

**Australians Together Learning Framework**

Tells Australia's narrative through the lens of 5 Key Ideas that inform teachers and students about Aboriginal and Torres Strait Islander perspectives.



**The Wound**

**Injustice from the impact of colonisation**

Students will recognise the pain and disadvantage many First Nations people experience, that started at colonisation and continues today.



**Our History**

**A past that shapes our story as a nation**

Students will critically engage with Australia's stories and understand the impact our history continues to have on Aboriginal and Torres Strait Islander people and all who call Australia home.



**Why Me?**

**What's it got to do with me?**

Students will explore why Aboriginal and Torres Strait Islander histories and cultures are relevant to them today.



**Our Cultures**

**Everyone has culture. Know about your culture and value the cultures of others**

Students will learn more about their own culture and identity, and gain a better understanding of, and respect for, Aboriginal and Torres Strait Islander cultures.



**My Response**

**Steps we can take to build a brighter future**

Students will gain an understanding that a brighter future is possible for all Australians, but to get there we each need to play our part.

## Glossary

Terms that may need to be introduced to students prior to teaching the resource:

**abstract:** relating to ideas, not objects.

**agricultural:** relating to farming practices, including soil cultivation, crop production and raising livestock (farm animals).

**cyclical:** happening as a collection of events that keep repeating themselves in the same order or at a given time interval.

**domestic:** relating to a household or family.

**First Nations people:** Aboriginal and Torres Strait Islander people.

**lunar cycle:** the way the moon periodically changes from a thin crescent through to a full moon and back again; the time between one new moon and the next new moon (approximately 29.5 days) is one lunar cycle.

**missions and reserves:** places where Aboriginal and Torres Strait Islander people were forced to live to learn European culture, religion and the English language.

**neap tide:** a tide just after the first or third quarters of the moon when there's least difference between high and low water.

**sequential:** following or arranged in order, in sequence.

**Songline:** a traditional story or song that's been passed down orally in First Nations cultures for thousands of years. A Songline may track the landscape of Australia and can be used to navigate across the country. It may also explain cultural laws. Songlines capture the interweaving of time and place by telling both Dreaming stories and the place of people today in these stories.

**spring tide:** a tide just after a new or full moon, when there's the greatest difference between high and low water.

**variability:** being likely to change frequently.

	Teacher guidance	Ideas for student activities
Introduction	<p><i>Before beginning the study, it's important to ask students to access their prior knowledge about the topic with an introductory question or activity.</i></p> <p><b>Student handout content</b></p> <p><b>First Nations people</b> have been able to work out daily time for thousands of years by using sophisticated methods that don't involve a clock. These methods are often based on features of the earth and relate more to the natural environment that we live in than an <b>abstract</b> clock face.</p> <p>In Western cultures, time is <b>sequential</b>; it's measured using numbers, down to the second. In contrast, Aboriginal and Torres Strait Islander people use features of the earth such as "daybreak, sunrise, morning, afternoon, late afternoon, sunset, evening and night" (Donaldson, 1996) to mark daily time. Time in First Nations cultures is <b>cyclical</b>, measured by counting sleeps and moons, and noticing phases of the moon and seasons – not seasons defined by months on a wall calendar, but seasons defined by changes in the earth. Time is more complex than clocks and calendars – past, present and future are all connected; this concept is often described as "everywhen" (Stanner, 1979).</p> <p>This resource focuses on how to tell daily time by comparing 12- and 24-hour time systems to each other, and to methods of telling time that have been used by First Nations people for thousands of years.</p>	<p><b>Class activity – using story to think about how time is measured</b></p> <p>Read one of the following books:</p> <ul style="list-style-type: none"><li>• <i>Cooee mittigar: a story on Darug Songlines</i> by Jasmine Seymour and Leanne Mulgo Watson</li><li>• <i>Ernie dances to the diggeridoo</i> by Alison Lester</li></ul> <p>If you don't have access to one of these books, have a look at the websites from the Bureau of Meteorology.</p> <p>At the end of the story, talk with students about how the people in the story (or the Indigenous people whose traditions are described in the website) measured time. Did they use a clock? Or a calendar on the wall?</p> <p><b>Clock face worksheets</b></p> <p>Ask students to work individually or in pairs to complete the two clock face worksheets.</p>

	Teacher guidance	Ideas for student activities
	<p>It challenges the myth that Aboriginal and Torres Strait Islander people didn't have advanced mathematical knowledge and supports understandings about the universality of mathematics. This resource highlights the important links between mathematics and connection to Country.</p> <p>The aims of this lesson are for students to:</p> <ol style="list-style-type: none"> <li>1. develop an understanding of time that's situated in context and story that has meaning.</li> <li>2. appreciate the importance of methods of telling time that are based on features of the earth. Especially,             <ol style="list-style-type: none"> <li>a. recognise the more flexible nature of time when it's measured by the progression of the natural environment as compared to the more rigid nature of time when measured on an arbitrary device such as a clock.</li> <li>b. recognise the cyclical, rather than sequential, understanding of time that's present in First Nations cultures.</li> </ol> </li> <li>3. understand the importance of mathematics for daily life and the vast mathematical knowledge that First Nations people have had and applied in their daily lives for many thousands of years.</li> </ol> <p>Students look to daily living, both in their own lives and in Aboriginal and Torres Strait Islander cultures, to develop a broader understanding of time than that offered by the 12- and 24-hour systems. This gives students an appreciation of Indigenous cultures and a broader understanding of the concept of daily time.</p> <p><b>Useful resources</b></p> <p>One of the reasons this resource suggests starting with a story is because appreciation of story builds empathy. This article talks about reading to learn empathy: <a href="https://www.canr.msu.edu/news/children_and_empathy_reading_to_learn_empathy">https://www.canr.msu.edu/news/children_and_empathy_reading_to_learn_empathy</a>.</p> <p>This paper <i>The End of Time? Aboriginal Temporality and the British Invasion of Australia</i> by Sociology lecturer Dr Mike Donaldson provides useful information about First Nations concepts of time: <a href="https://ro.uow.edu.au/artspapers/150">https://ro.uow.edu.au/artspapers/150</a>.</p> <p>This newspaper article by Paul Daley outlines what Indigenous people have helped him to understand about <b>Songlines</b>: <a href="https://www.theguardian.com/commentisfree/2016/jul/04/indigenous-songlines-a-beautiful-way-to-think-about-the-confluence-of-story-and-time">https://www.theguardian.com/commentisfree/2016/jul/04/indigenous-songlines-a-beautiful-way-to-think-about-the-confluence-of-story-and-time</a>. Songlines are important to understanding First Nations concepts of time because they capture the cyclic nature of time and the connection of time, place and story. For example, "An expert song man ... would count how many times he has crossed a river or scaled a ridge – and be able to calculate where, and how far along, the Songline he was ... A musical phrase is a map reference. Music is a memory bank for finding one's way about the world." (Chatwin, 1987 in Daley 2020)</p> <p>This website from the Bureau of Meteorology links to regional sites that show the different Indigenous seasons for different parts of Australia. It explains how the passing of each season is measured by noticing features of the earth: <a href="http://www.bom.gov.au/iwk/index.shtml">http://www.bom.gov.au/iwk/index.shtml</a>.</p>	<p>Prior to doing the worksheets have students write down how long they expect the activity to take. Then, get students to time the actual time taken for the activity and compare expected and actual time. Are the expected and actual times the same? Why/ why not?</p> <p><b>Small group activity – investigating punctuality</b></p> <p>Investigate punctuality in at least four different cultures (for example Middle eastern culture, an Indigenous culture, German culture and your own culture). How important is punctuality in each of these cultures?</p>



## Our History

### Teacher guidance

*There are many stories that make up Australia's history. It's important to use resources that include perspectives and voices of First Nations people, such as those contained in this resource.*

#### The language of mathematics in Indigenous cultures

Before the British arrived, the continent of Australia was a bit like Europe is today, and was made up of many different countries and cultures, with many different languages being spoken. While there were differences between these cultures, one common thread was a way of understanding time that was intricately linked to features of the earth.

Aboriginal and Torres Strait Islander people have traditionally had a sophisticated understanding of natural cycles on the earth and their interconnectedness. Coastal Aboriginal and Torres Strait Islander people have linked lunar phases to the different kinds of tides and used this knowledge to inform hunting, fishing and agricultural practices. For example, Torres Strait Islander people know that it's better to fish during a **neap tide**, which occurs during certain phases of the moon, rather than a **spring tide**, which occurs in other moon phases.

Sociology lecturer Dr Mike Donaldson puts it this way:

Time could be and was counted by sleeps, moons, phases of the moon and by seasons. Seasons were marked by religious ceremony, by temperature, winds and weather; by the appearance and disappearance of particular people and groups of people; the arrival of certain blossoms, plants, insects, birds, fish, animals, each according to their locality. Was the return of the peewee birds the harbinger of the wet season's end, was it the end of the wet season which brought the birds, or was it the journey of the appropriate people to the place of the lily roots, which prompted one or the other or both? [First Nations people] continuously created the cycle of time. Through ceremonies in which they re-created the events of their origin, they rejuvenated life - growth, depletion and renewal - through ritual activity. (Donaldson, 1996)

#### Student handout content

#### The first mathematicians measured time without clocks

First Nations people were the first mathematicians in Australia. Going back many thousands of years, Aboriginal and Torres Strait Islander people have had a detailed understanding of complex mathematical concepts including those relating to daily or short time, medium time and long time, including:

- time being measured using natural daily events, such as sunrise and sunset (Donaldson, 1996).
- the relationship between **lunar cycles** and tides being used to decide when the best time to fish is (University of Melbourne, n. d.).
- the position of stars in the sky being used to predict changes in seasons and decide the best times to carry out particular activities, such as hunting particular animals or harvesting particular foods (Quach, 2017; Bureau of Meteorology, 2016, 2016a).
- the blossoming of certain flowers marking the beginning or end of a season (Bureau of Meteorology, 2016, 2016a).

### Ideas for student activities

#### Class activity – measuring daily time

Talk about how students measure time in their own lives (they may know that certain months of the year represent certain seasons, and certain days on a calendar tell them that the season has changed; also, students may use a clock on a daily basis to tell time, and the hands on the clock may tell them what time it is).

Ask students if they needed to split time into short-, medium- and long-term time, what would short-term time be? What about medium-term? And long-term?

Ask students to think of how they measure or could measure daily time without a clock by noticing features of the earth around them. If they didn't have a clock how would they know when to go to school? How would they know when it was lunchtime? When to go to bed? Would they start school at the same time each day? Eat lunch at the same time each day?

What about medium time (as opposed to short-term or daily time): if students didn't have a calendar with months on it, how would they know which season it was? Would the season change on the same date each year?

If they didn't have a weather forecast, how might they know when it was going to rain?

#### Individual activity – time in *Cooee mittigar* or *Ernie dances to the digeridoo*

Using whichever story you read as part of the introduction to the lesson, compare the seasons mentioned in the book to the commonly used 12-month calendar.

- How do the seasons compare to this calendar?
- Do the seasons have set length (like 91 days)?
- Is there an overnight transition between seasons?

	Teacher guidance	Ideas for student activities
	<ul style="list-style-type: none"> <li>• using the slow and subtle <b>variability</b> in the brightness of three huge, red stars in the sky - Betelgeuse, Aldebaran and Antares - to describe long time: First Nations people recognised that Betelgeuse varies faster than Aldebaran (Betelgeuse varies by an order of magnitude about every 400 days) and used this fact in measuring time (Hamacher, 2017).</li> </ul> <p>This kind of knowledge continues to be an important part of cultural identity for many First Nations people today.</p> <p><b>Useful resources</b></p> <p>This webpage provides information about how Aboriginal and Torres Strait Islander people have used the connection between lunar cycles and tidal systems to determine the best fishing times: <a href="https://indigenousknowledge.unimelb.edu.au/curriculum/resources/mathematics-moon-phases-and-tides">https://indigenousknowledge.unimelb.edu.au/curriculum/resources/mathematics-moon-phases-and-tides</a></p> <p>This blog post summarises pre-colonial Indigenous science and mathematics knowledge and provides references to other useful resources: <a href="https://amiealbrecht.com/2019/02/05/australian-mathematics-education-and-indigenous-peoples-an-essay/">https://amiealbrecht.com/2019/02/05/australian-mathematics-education-and-indigenous-peoples-an-essay/</a></p>	
 <p><b>The Wound</b></p>	<p><i>The story of our nation's past is hard to face but it's important; it's left a wound that can be seen in the inequality between Aboriginal and Torres Strait Islander people and non-Indigenous Australians. Help students understand how this wound continues to have an impact today.</i></p> <p><b>Student handout content</b></p> <p><b>Loss of Indigenous mathematical knowledge</b></p> <p>When Europeans colonised Australia in 1788, much of the Indigenous population was killed from violence, disease and loss of land, food and livelihoods. Many Aboriginal and Torres Strait Islander people who survived were forced to live in places called <b>missions</b> and <b>reserves</b>, which were under government control, and sought to separate First Nations people from their cultural and spiritual identities. This prevented many First Nations people from passing on Indigenous mathematical knowledge to their children. First Nations people who grew up on missions and reserves were forced to tell time using a clock rather than traditional methods and were taught only a basic level of mathematics suitable for <b>domestic</b> and <b>agricultural</b> labour.</p> <p>Today, however, it's recognised that telling time using features of the earth is an important skill because it makes us more aware of what's happening to the earth - more aware of how to live on the earth in a way that takes good care of it. More and more it's recognised that non-Indigenous people can learn a lot from Indigenous timekeeping methods.</p> <p><b>Useful resources</b></p> <p>This paper by Mathews et al. from the proceedings of the 28th conference of the Mathematics Education Research Group of Australasia (MERGA) in 2005 highlights the importance of teaching mathematics in a way that values, rather than devalues, Indigenous culture: <a href="https://eprints.qut.edu.au/3622/1/3622.pdf">https://eprints.qut.edu.au/3622/1/3622.pdf</a></p>	<p><b>Class brainstorm</b></p> <p>Why might Indigenous timekeeping methods be useful for all Australians today?</p> <p>What could non-Indigenous people learn about nature from Indigenous timekeeping methods?</p>



## Why Me?

### Teacher guidance

Help students understand that because they call Australia home this relates to them. Explore what's happening, or has happened, around your local area that's relevant to this topic.

#### Student handout content

##### How do you use time in your everyday life?

It's easy to plan our lives around the clock without thinking about whether this is working well for us. For example, does it make sense to go to sleep at the same time each night all year round, including during daylight savings? Does it make sense for each person to have to spend the same amount of time on an activity at school?

Sometimes, we think of time as a line, with activities in an order: first, second, third, etc. Or with one activity before another. Another way of thinking about time is as a cycle, with activities that repeat and happen at the right time in the cycle.

In Aboriginal and Torres Strait Islander cultures, time is cyclical, rather than sequential. It's flexible and shifts according to people's needs and what's happening on the earth. Time isn't rigid; for example, a fish trap isn't set each day at the same time on a clock because you won't catch any fish that way. Tides don't come in and out at the same time every day. Coastal fish traps, for example, need to be set up at particular times of day when the tide is coming in or going out in order to catch fish.

##### Does your way of thinking about time reflect your reality?

It's important to think about how whether the way you work with time actually reflects what's really happening in your reality, or not. Being able to adjust your ideas about time to fit the reality of what happens in nature and the reality of how you work is an important mathematical skill. If mathematics is going to be useful to you, it needs to work with your real-life experiences and not just be about writing numbers in a book.

##### The RAMR cycle

The RAMR (reality, abstraction, mathematics and reflection) cycle describes a way of doing mathematics that's grounded in everyday life. Mathematical ideas are created as a way of explaining real-life experience. Those mathematical ideas are then critically reflected on to see if they help explain reality, or not. If they help explain reality, they are kept; if not, they are discarded.

The RAMR cycle involves four steps:

- Reality - what are you trying to explain?
- Abstraction - how can you write down symbols that explain your reality?
- Mathematics - how would you write those symbols in mathematics?
- Reflection - does the mathematics you've developed work? Does it explain what's going on in your reality?

For many thousands of years First Nations people have used the RAMR cycle for developing mathematics by abstracting from reality and then reflecting on that abstraction. You can apply this model to develop

### Ideas for student activities

#### Individual activity – cyclical time

With the 12- and 24-hour time systems, are there activities that you do at the same time each day?

Write down in both 12- and 24-hour format the times for four activities that you repeat at the same time each day, and draw these times on a clock face.

What if you didn't have a clock? Would you still do these activities at the same time each day? Or would you be more flexible? How would you know it was time to do each of these activities?

#### Individual or small group activity – variability in daylight hours through seasons

Find data on the times of sunrise and sunset on the first day of each month in the 12-month calendar. Write the times down in both 12- and 24-hour time format and draw them on a clock face. Then, calculate the difference between sunrise and sunset on each day.

- Is the amount of daylight the same on each day? Why/why not?
- If you were living your life according to sunrise/sunset instead of times on a clock, how might it look different? For example, would you go to sleep at the same time all year around?

	Teacher guidance	Ideas for student activities
	<p>mathematics to describe aspects of your everyday life. With respect to time, Aboriginal and Torres Strait Islander people have developed models of measuring time that reflect real-life experience. When students reflect on whether their models of time actual encompass real-life reality, they are participating in the RAMR cycle.</p> <p><b>Useful resources</b>            In this video Professor Tom Cooper explains the RAMR cycle and why it's important to teach mathematics in a way that allows mathematics knowledge to develop out of real-life experience: <a href="https://www.youtube.com/watch?v=9FAntCEMyjQ">https://www.youtube.com/watch?v=9FAntCEMyjQ</a></p>	
 <p><b>Our Cultures</b></p>	<p><i>Help students connect with and acknowledge the importance of culture and examine the living cultures of First Nations Peoples, which have adapted and survived since colonisation.</i></p> <p><b>A deeper understanding of time grounded in the natural reality of features of the earth and enriched by walking in someone else's shoes</b></p> <p>To understand why Aboriginal and Torres Strait Islander knowledge of time and seasons matter, children need to hear Indigenous stories about these topics and be allowed to develop empathy for the writers of the stories. The development of empathy - the capacity to walk in someone else's shoes and understand how they feel and think - is a valuable life skill. By seeing how knowledges of First Nations Peoples are intertwined with stories, students may be better able to embrace the importance of knowledge, cultures and traditions which are different to their own, but of immense value.</p> <p>Further, developing an understanding of time that isn't driven by an abstract clock but is much more connected to the earth we live on will be increasingly important for students from all cultures as the necessity of addressing climate change in order to ensure human survival becomes increasingly pressing.</p> <div style="background-color: #f0f0f0; padding: 10px; border: 1px solid #ccc;"> <p><b>Student handout content</b></p> <p><b>Deepening our understanding of time</b></p> <p>Developing an understanding of time that's connected to the earth we live on is important for helping us develop a better understanding of nature, and for helping us to notice whether the way we use time actually works well. For example, if we needed to set a fish trap and just set it at the same time each day, without paying attention to the earth, would we actually catch any fish? Exploring the interaction between natural events and timekeeping can be an interesting way to deepen our understanding of time.</p> </div> <p><b>Useful resources</b></p> <p>This article talks about how to teach empathy and why it matters: <a href="https://greatergood.berkeley.edu/article/item/why_the_world_needs_an_empathy_revolution">https://greatergood.berkeley.edu/article/item/why_the_world_needs_an_empathy_revolution</a>.</p> <p>The following websites show fish traps created by First Nations people using walls of rocks: <a href="https://www.abc.net.au/news/2019-08-12/fight-to-save-ancient-indigenous-fish-traps/11396302">https://www.abc.net.au/news/2019-08-12/fight-to-save-ancient-indigenous-fish-traps/11396302</a>, <a href="https://www.theguardian.com/australia-news/2015/jul/10/fish-traps-brewarrina-extraordinary-ancient-structures-protection">https://www.theguardian.com/australia-news/2015/jul/10/fish-traps-brewarrina-extraordinary-ancient-structures-protection</a>.</p>	<p><b>Class activity – virtual fish trap</b></p> <p>Discuss how a fish trap is created and draw on the board a virtual fish trap. Have class members take turns each day over a couple of weeks determining at what time the trap should be set and writing that time in 12- and 24-hour time format and on a clock for the class to see. Is it the same time each day? Why/why not?</p>

	Teacher guidance	Ideas for student activities
	<p>A fish trap needs to be set at high tide. A fish trap can be, for example, something as simple as a rockpool - at high tide, a wall of rocks can be built around a given section of water; when the tide goes out, the fish in that section of water are trapped in the rockpool and can be caught either by pulling them out of the water with hands or by using a net. A fish trap could also be built with netting.</p>	
 <p><b>My Response</b></p>	<p><i>Help students critically and creatively process and demonstrate their learning on this topic by exploring meaningful ways to respond. Ask students to come up with their own ideas about what they can do.</i></p> <p>Exploring daily time in the context of Indigenous cultures helps us understand and respect First Nations stories. There are many ways to continue this journey including:</p> <ul style="list-style-type: none"> <li>• Creating school days in which more flexible notions of time are accepted and valued. So, for example, instead of being required to finish an English activity in 45 minutes and a maths activity in 45 minutes, students might be allowed 90 minutes for the two activities and they could spend variable amounts of time on each activity, according to need. Students who finished early could be allowed to read a novel of choice or draw quietly at their seat, or they could support students who were struggling.</li> <li>• Inviting a First Nations person to come to the class to teach the class more about the interweaving of Dreaming stories and “present” time, and the notion of cyclical time and how that shapes worldview. We suggest you ask a local Indigenous-led organisation. Be mindful of remunerating people appropriately for sharing their time and experiences.</li> <li>• Doing a project on Songlines to learn more about the cyclical nature of time in First Nations cultures.</li> </ul>	<p><b>Summative activity – Students plan their own school day</b></p> <p>This activity involves three steps</p> <ul style="list-style-type: none"> <li>• <b>Step 1: Students write a plan for their own school day</b></li> </ul> <p>Ask students to individually write a plan for their own school day based around fixed start and finish times, and fixed recess and lunch times.</p> <p>Give students five activities to finish within the school day; they may do these activities in any order that they like. These should be activities that you’re already planning or that students are already doing in various learning areas – they’re not extra activities.</p> <p>Students write down a start and finish time for each activity, deciding how much time they’ll need to spend on it to complete it. All start and finish times need to be written down in both 12- and 24-hour times and on a clock.</p> <p>Students aren’t required to plan to use the whole day if they feel they can finish all activities more quickly; students who finish early may choose how they spend the rest of the school day provided they remain in the classroom and aren’t disturbing other students.</p> <ul style="list-style-type: none"> <li>• <b>Step 2: Students execute their plan</b></li> </ul> <p>Select a day for students to execute their plan; they complete all five activities during this day. As part of this, students must note their actual start and finish times in both 12- and 24-hour time. Students also need to note how their actual schedule compared to their planned schedule and comment on why any differences occurred.</p>

	Teacher guidance	Ideas for student activities
		<p>• <b>Step 3: Discussion of how it went</b></p> <p>Discuss with the class:</p> <ul style="list-style-type: none"> <li>• What were the advantages/ disadvantages of students being able to plan their day individually?</li> <li>• Did it allow students to work more effectively? Why/ why not?</li> <li>• Did students make different choices regarding the order in which to do activities and how long activities would take?</li> <li>• Was it helpful that students could make different choices?</li> <li>• Is it important to be rigid about allocation of time or is it helpful to be more flexible?</li> </ul>
<p><b>Other resources</b></p>	<p>Anna Salleh’s article for ABC Science, ‘Maths, story and dance: an Indigenous approach to teaching’, identifies the successes of using culture-based storytelling to teach maths to Aboriginal students: <a href="https://www.abc.net.au/news/science/2016-08-15/closing-the-maths-gap-with-story-and-dance/7700656">https://www.abc.net.au/news/science/2016-08-15/closing-the-maths-gap-with-story-and-dance/7700656</a></p> <p>John Harris’ paper ‘Australian Aboriginal and Islander Mathematics’ from Australian Aboriginal Studies 1987, number 2, discusses Indigenous counting methods: <a href="https://aiatsis.gov.au/sites/default/files/e_access/serial/m0005975_v_a.pdf">https://aiatsis.gov.au/sites/default/files/e_access/serial/m0005975_v_a.pdf</a></p>	
<p><b>References</b></p>	<p><b>Student handout content</b></p> <p>Bureau of Meteorology 2016, ‘Indigenous Weather Knowledge: Gariwerd calendar’, <a href="http://www.bom.gov.au/iwk/calendars/gariwerd.shtml">http://www.bom.gov.au/iwk/calendars/gariwerd.shtml</a></p> <p>Bureau of Meteorology 2016a, ‘Indigenous Weather Knowledge: Nyoongar calendar’, <a href="http://www.bom.gov.au/iwk/calendars/nyoongar.shtml">http://www.bom.gov.au/iwk/calendars/nyoongar.shtml</a>.</p> <p>Donaldson, M 1996, ‘The End of Time? Aboriginal Temporality and the British Invasion of Australia’, <i>Time and Society</i>, vol. 5, no. 2, pp. 187-207, viewed 7 August 2020, <a href="https://ro.uow.edu.au/artspapers/150">https://ro.uow.edu.au/artspapers/150</a>.</p> <p>Hamacher, D 2017, ‘Stars that vary in brightness shine in the oral traditions of Aboriginal Australians’, <i>The Conversation</i>, <a href="https://theconversation.com/stars-that-vary-in-brightness-shine-in-the-oral-traditions-of-aboriginal-australians-85833">https://theconversation.com/stars-that-vary-in-brightness-shine-in-the-oral-traditions-of-aboriginal-australians-85833</a>.</p> <p>Matthews, C, Watego, L, Cooper, TJ &amp; Baturo, AR 2005, ‘Does mathematics education in Australia devalue Indigenous culture? Indigenous perspectives and non-Indigenous reflections’, in P Clarkson, A Downton, D Gronn, M Horne, A McDonough, R Pierce et al. (eds.) <i>Proceedings 28th conference of the Mathematics</i></p>	

	Teacher guidance	Ideas for student activities
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