Light and Dark

Lesson Background

Day and night follow a different pattern at the poles to the pattern we are familiar with. North Pole expeditions routinely begin as soon as the Arctic winter finishes and the Arctic summer begins. There is a two week time period from complete dark in winter to complete light in summer. Most of an expedition takes place in 24 hour daylight. This lesson will explore the concept of what a day is at the poles.

Outcomes

Students will gain an understanding of how time measured in hours and days relates to the movement of the earth around the sun and how daylight, night and the experience of time differs at the poles.

Preparation

- Ensure that students have a clear understanding of 24 hour time. Students need to be aware of the rotation of the Earth to make night and day and the orbit of the Earth around the Sun to make seasons. Students need to be aware of time zones around the world.
- Provide students with the sunrise times and sunset times for Ward Hunt Island (attachment).

Student Activities

Student Activity 1. Day Length and Day Light

Students will investigate what a day means in their own location and in the Arctic.

Look at the local newspaper or internet to find out the sunrise and sunset times. Calculate the length of the day. Make the daylight calculations over a week or a month to compare the times and notice how they change. Compare these to the daylight hours of capital cities and in other places around the world.

Work out when the solstices and equinoxes are. Define the terms transit, twilight, sunset, sunrise.

Find out where Ward Hunt Island is on the map. (North Pole expeditions often begin at Ward Hunt Island - there are no easily available data for positions further north than this.)

Using the Ward Hunt Island Sun and Moon Data, 2008, table work out the answers to the following questions

- What do the dashes and the stars on the table indicate?
- What will the day be like on 21 January?
- What will the day be like on 21 March?
- What will the day be like on 21 June?
- North Pole Expeditions often begin in the first week of March. Why would this be the preferable time to start?

Extension

Explore how to use the sun to tell the time.

Discuss the strategy of “Rolling the clock”. Complete a Plus/ Minus/ Interesting Chart to analyse this strategy.

Think about your own sleep patterns. How would you change your day if you could?

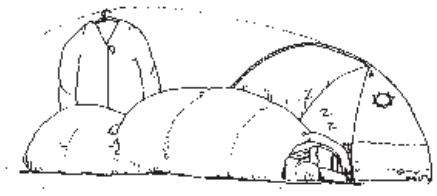
Attachments

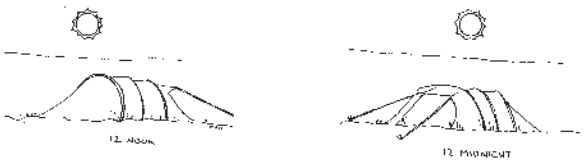
Ward Hunt Island Sun and Moon data, 2008 – sunrise, sunset and transit times for 3 dates showing variation in day length, plus table of sunset and sunrise for whole of 2008.

Rolling the Clock

Links

Geoscience Australia - calculation of sunrise and sunset times in Australia
http://www.ga.gov.au/geodesy/astro/sunrise.jsp



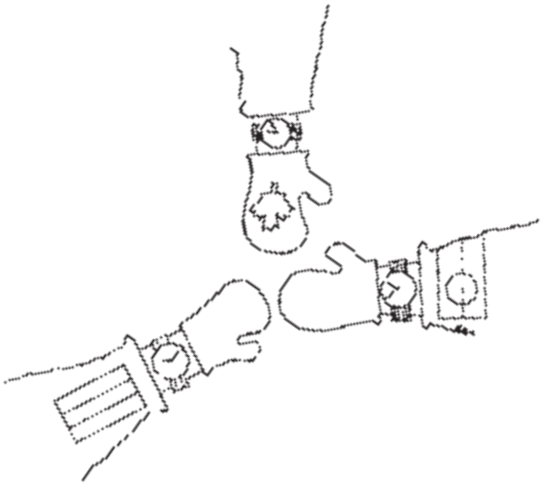


South Pole expedition, diary extracts – Linda Beilharz

24 Hour Daylight

"I find it hard to go to sleep at night, to realise that it's time to stop the journal writing or whatever. Once asleep, I can sleep through the sunlit night quite well. I wake regularly and check the time because there are no light cues, except where the sun is shining from. We always have the tent facing the same way - orientated to the southwest wind (which has been a constant direction). The sun is on my side of the tent in the evening, at the head end (south) of the tent overnight, and on Stuart's side of the tent in the morning. I get to dry out wet day time clothes, he gets to warm up clothes for the new day. There is little discernible drop in temperature in the tent."

South Pole expedition – recollections from the trip – Linda Beilharz



No Real Time Zone

There is no real time zone at the South Pole. You could really use any time zone you wanted to – and people tended to use the time zone that applied to where they came from. The South Pole station uses New Zealand time because they come to the station via New Zealand. The Polish team we met out there were using Polish time. We were using South American time because we had arrived that way and because the Patriot Hills base was using that time. It meant that when some people were sleeping others were getting up. This worked to our advantage as it meant that we could sneak into the South Pole Station gym while their staff were asleep and use the bathrooms (We were still camping and were not supposed to use the station facilities). As we were still there on New Year's Eve we joined the South Pole Station staff for their New Year's Eve party. We were picked up by airplane a couple of hours later and managed to get back to Patriot Hills just before News Year's Eve on their time – so we celebrated again!