

Lesson Background

The geographic North Pole, is the axis of the earth's rotation and exists in a constant place. However, as the ice mass of the arctic moves in ocean currents and with the wind, an expedition tent erected at the North Pole will drift out of position. Magnetic north is the position that a compass points to and is the axis of the earth's magnetic field. This point moves slowly according to changes in the magnetic field. The magnetic North Pole is now in the ocean north of Bathurst Island, Canada – approximately 1,600 kms from the Geographic North Pole. Similarly, there is a difference between the South Magnetic and Geographic Poles. Because the South Geographic Pole is on land (on ice over land) people have in fact put a pole there to mark the spot.

Linda Beilharz and her team will use a GPS (Global Positioning System device) to accurately locate the Geographic North Pole. When they start their journey at Ward Hunt island (83 N, 74 W), their compasses will be pointing to the North Magnetic Pole which is west at an angle of 68 degrees.

One of the challenges of the expedition is that it is not an exploration over a land mass but rather over sea ice that melts and reforms every winter. This large ice mass will move with the ocean currents and the wind. This means that the expedition team could travel a certain distance during the day and float back or sideways to the same spot overnight.

Outcomes

Students will gain a basic understanding of the location of the North Pole. They will develop an appreciation for the characteristics of the Arctic Ocean in winter and summer.

Preparation

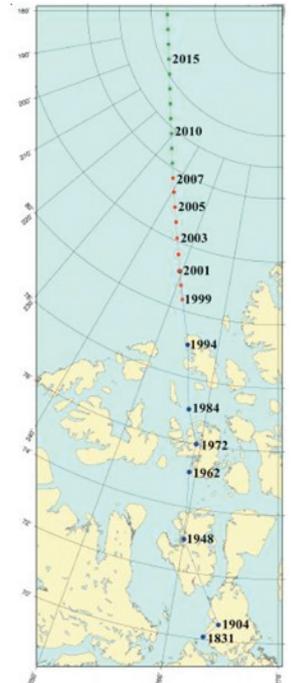
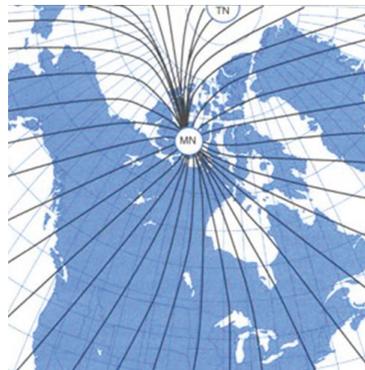
- Gather information texts on the Inuit people and the geographical features of the Arctic Circle.
- Provide students with maps of the Arctic region, compasses and a GPS.
- Make a 'pole' for the class /school yard and set an orienteering or navigation course.
- Compare what is at the northern end of the world with what is at the southern most point. What are the key differences?



Top: The 'pole' at the South Geographic Pole.

Right: Movement of the North Magnetic Pole (islands are part of Canada).

Below: Lines of the magnetic field from the North Magnetic Pole.



- Find out how much ice covers the Arctic Ocean and how that ice cover changes during the different seasons of the year. What are scientists saying is happening to the ice cover at the moment?
- Explore the countries of the Arctic Circle using Google earth, and atlases.

Student Activities

Student Activity 1. How do I know where North is?

Examine the difference between Geographic North and Magnetic North. Find out what latitude and longitude your school is at and what the 'declination' is. How does the declination vary across Australia? (Declination is the angle between the magnetic and geographic poles. Topographic maps generally have lines on them noting the declination in that part of the world. Bushwalkers, pilots – anyone who uses a compass to navigate has to adjust for the declination. The North shown on a map is True' or geographic North and a compass points to Magnetic North until you adjust for the difference.)

Student Activity 2. Countries in the Arctic

Plan a journey that will circumnavigate the northern borders of the lands in the Arctic Circle. Find out about each of the countries that the journey will visit using the jigsaw method for gathering data.

Student Activity 3. Navigation

Consider the methods of following a route such as using a GPS or compass and map and compare their effectiveness. Learn how to read a map, use a GPS and a compass. Develop an orienteering course and use a compass to follow the directions to a specific 'pole' in the school yard.

Student activity 4. Why all the fuss about the North West Passage?

What is the North West passage? Much of the early exploration in the Arctic waterways had the aim of discovering a north west passage that would allow easy access for trade between Asia and Europe. Why was it important to early explorers and why is it important at the moment? Plot the expeditions of early explorers as they sailed or dog sledged through northern Canada to find a way through.

Extension

Does Santa live at the North Pole? Discuss the myths and stories about Santa. Design a house that would keep him warm enough in the cold conditions.

Are we there yet? How do modern explorers know which way to travel and the fastest way to get there? What navigation strategies and tools do they use?

Celebration Design your own flag that you would place at the North Pole to celebrate your achievement.

Making progress The ice cap of the Arctic Circle appears to be a never ending expanse of ice. The members of the expedition team need to stay optimistic to ensure they maintain a positive attitude to achieve their goal. Ask students to consider what a positive attitude is and why it is necessary for achieving goals. Challenge students to walk on a treadmill or exercise bike (taking turns) and reflect on their mental status whilst they walk or cycle and how they remain positive and focussed to achieve their goal. Can they do what Linda and her team will do? – walk for 75 mins, break for 15 mins and repeat that cycle 6 times in the day.

Navigation Activities

In Australia there are a number of activities that people can do that rely on navigation. Orienteering and Rogaining are two activities that involve organized competition and social events. There are two more unusual activities that are also suitable for anyone to be involved in.

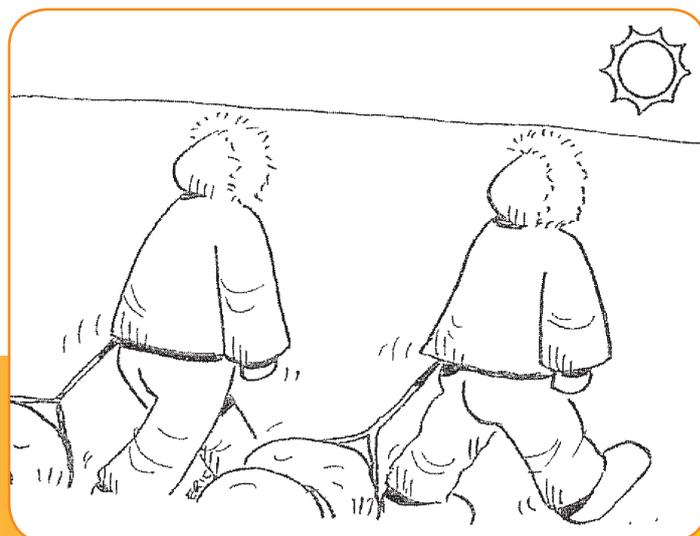
Geocaching

The Geocache Australia website says: "Geocaching is the free high-tech treasure hunt where you use your GPS to find caches hidden by other players. It's a great way to be outdoors and enjoy the thrill of the hunt!"

Geocaching is a loosely organised individual sport relying on satellite technology to show you where latitude and longitude coordinates are within a few metres. Geocachers set off to find coordinates that they have gotten from websites and when they get there they are rewarded with a find. They use a hand-held GPS, about the size of a mobile phone, to find their quarry.

What do they find? More often than not, a lunch box containing a log book, maybe some swappable goodies, and a pencil. Geocachers write a log in the book about their hunt, they may swap something they have for something in the box, always making sure their swap is fair, and replace the container exactly as they found it. The containers vary and may be as small as a film canister or as large as a 44 gallon drum.

But caching (pronounced by most Australians as "cay-shing" - not the American "cash-ing") is about a lot more than plastic boxes - it's all about getting out and seeing things you wouldn't otherwise have seen. Some are puzzle based, some take you through several steps before you get to the final point. There are lots of variations and only a few rules. "



Students can look for geocaches in the vicinity of the school and hunt for it. Alternatively students can make up and hide a geocache, registering it on the geocache website. Look on the website to find out if there are any caches hidden near you – there probably is. (see link below)

Confluences

There are people who make a point of going to places in the world where latitude and longitude lines intersect. You can report that you've reached one of these on a website. (see link below) Most of the world's confluences have been visited but not all. On the Linda Beilharz and her team mates went to the 85S 85W confluence on their Antardtid expedition. (If you search for Beilharz on the website you can see the entry and a photo of the spot – there is nothing there but ice.)

The Degree Confluence Project collects information about which confluences have been visited. Students can identify confluences in the vicinity of their schools and visit them.. Students can see whether there are any confluences in Victoria that haven't been visited before and see what it would take to visit them.

Resources

GPS (bushwalking model), compass and maps

Orienteering markers or equivalent

World atlas and globe

Attachments

Navigation on an Icecap – notes and diary excerpts from Linda's expeditions.

Links

Sea Ice

Icesheets Thinning, article about nature and rate of thinning – www.icecapjourneys.com.au/icesheetsthinning

Arctic Sea Ice News and Analysis

<http://www.nsidc.org/arcticseaicenews/>

Arctic Sea Ice Satellite Observations (with notes about implications for climate change)

<http://www.teachersdomain.org/resource/ipy07.sci.ess.eiu.nasadata/>

Poles and Compasses

Early concept of the North Magnetic Pole

http://gsc.nrcan.gc.ca/geomag/nmp/early_nmp_e.php

To calculate the declination for any position on the earth enter the Latitude and Longitude position.

<http://www.ngdc.noaa.gov/geomagmodels/struts/calcDeclination;jsessionid=9D3666EF798B41AF1599ABFB51E387E0>

Navigation Activities

Orienteering – the Victorian association

<http://www.vicorienteeing.asn.au/>

Rogaining – the Victorian association

<http://vra.rogaine.asn.au/>

Geocaching – the Australian website

<http://geocaching.com.au/>

The Degree Confluence Project

<http://confluence.org/index.php>