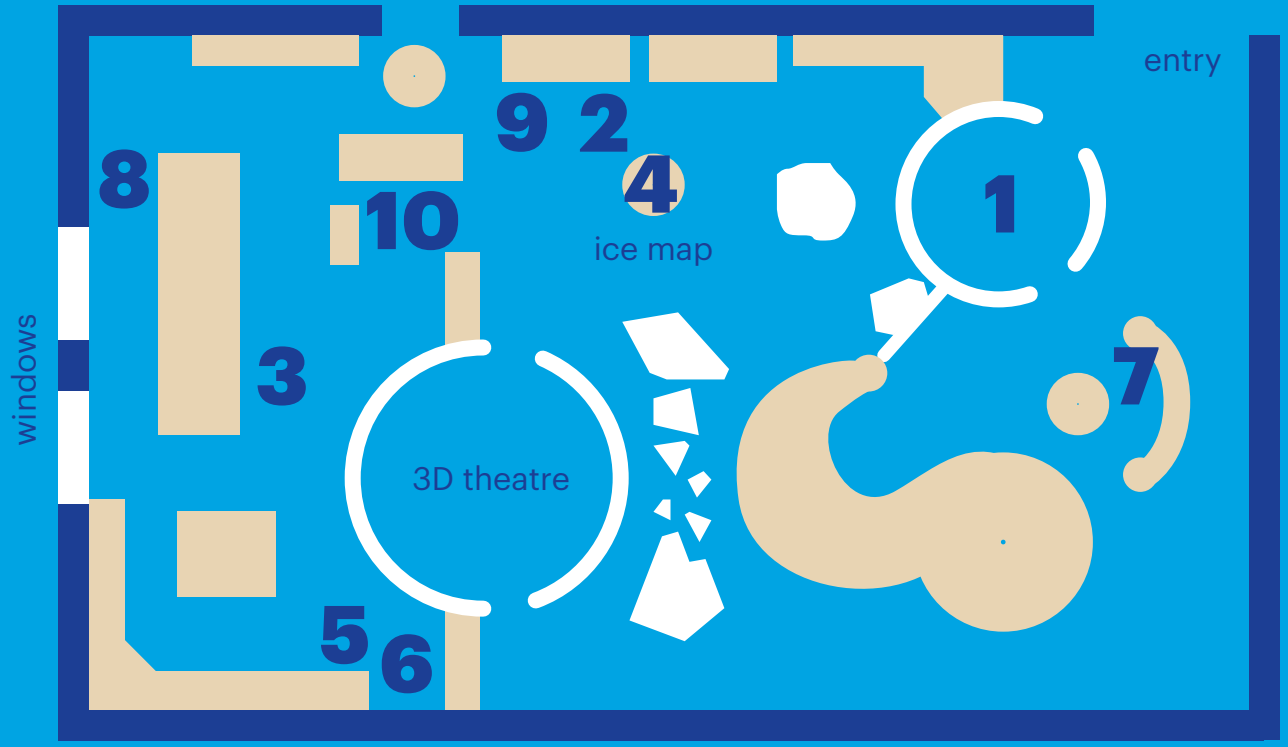
TEACHER BACKPACK

ANTARCTIC AND SOUTHERN OCEAN

Tasmanian Government

TASMANIAN MUSEUM & ART GALLERY

MAP OF ISLANDS TO ICE



Welcome to the Tasmanian Museum and Art Gallery ***Antarctic Teacher Backpack***.

We hope you and your students enjoy the discoveries you make using the objects provided.

The objects in the backpack relate to themes or items on display in the ***Islands to Ice*** Exhibition.

The objects are linked under three themes: ***Equipment and clothing; Natural history;*** and ***Science and technology***. Each object has a card with information and discussion topics.

You can separate the cards to facilitate group work if you wish.

The objects are to be carefully handled and passed around.

Please replace everything as you found it.

Thanks,
Centre for Learning and Discovery

Outerwear jacket

Theme 1: Equipment and Clothing

This jacket is called an 'outer layer' and is an essential part of all Antarctic clothing kits. The outer protective layer keeps out wind, rain and snow, and keeps the inner layer effective at insulating. This combination of two layers works by trapping air between the layers. Wind can lower the temperature dramatically (as seen in the wind chill chart).

Try on the jacket and zip it up with the hood on too. This will give you an idea of how insulated they are.

Beaufort Wind Force Scale

On the Beaufort scale, wind speeds are divided into 12 categories, each of which describes the physical effect of the wind.

0: calm Smoke rises vertically.	(< 1 km/h, < 1 knot)
1: light air Wind direction shown by smoke-drift, but not by wind vanes.	(1–5 km/h, 1–3 knots)
2: light breeze Wind felt on face; leaves rustle; ordinary vanes moved by wind.	(6–11 km/h, 4–6 knots)
3: gentle breeze Leaves, twigs in constant motion; wind extends light flag.	(12–19 km/h, 7–10 knots)
4: moderate breeze Raises dust and loose paper; small branches are moved.	(20–28 km/h, 11–16 knots)
5: fresh breeze Small trees in leaf begin to sway; crested wavelets form on inland waters.	(29–38 km/h, 17–21 knots)

6: strong breeze Large branches in motion; whistling heard in telephone wires; umbrellas hard to use.	(39–49 km/h, 22–27 knots)
7: near gale Whole trees in motion; inconvenience felt when walking against the wind.	(50–61 km/h, 28–33 knots)
8: gale Breaks twigs off trees; generally impedes progress.	(62–74 km/h, 34–40 knots)
9: strong gale Slight structural damage occurs (chimney pots and roof tiles removed).	(75–88 km/h, 41–47 knots)
10: storm Seldom experienced inland; trees uprooted; considerable structural damage occurs.	(89–102 km/h, 48–55 knots)
11: violent storm Very rarely experienced on land; accompanied by widespread damage.	(103–117 km/h, 56–63 knots)
12: cyclone/hurricane	(118+km/h, 64+ knots)

Discussion topics:

- Can you think why the clothing is mostly bright orange or yellow?
- In the historical section (MAP 1) find a jacket made out of different materials. What did early explorers wear?
- Try on the clothing, mitts and goggles at the same time and see how much skin is covered by them. How hard is it to move or perform tasks wearing them?
- Does clothing need to be waterproof in Antarctica?

Sledging mitt and digital timer *Theme 1: Equipment and Clothing*

Protective clothing is essential for covering up exposed skin in Antarctica. If you were to forget your gloves, it would be very dangerous and your hands would freeze, resulting in loss of fingers! These gloves are extremely warm, windproof and waterproof. Over-mitts are worn over lighter gloves to ensure fingers stay warm and dry. The inner gloves need to be worn so that bare skin does not come in contact with the air or any metal equipment.

Discussion topics:

- Place your hands on the ice and use the timer to see how long it takes for your hand to feel very cold. Compare the difference between a gloved hand and a bare hand on the ice. Does the gloved hand feel cold?

- Find other types of mitts and clothing in the gallery. What are they made of? How are they different from the mitt you have tried on?

- Do you know what frostbite looks like? Have a look at the photographs (Map 2). Imagine how painful it would be.

Goggles – what can you see?

Theme 1: Equipment and Clothing

Imagine what it is like in Antarctica only seeing a white landscape. Even when the sun is not shining it can be very bright.

Try on the goggles, and see how different the ice map looks. Goggles are an essential piece of equipment in Antarctica to prevent snow blindness. Goggles can have inter-changeable lenses to suit different conditions from whiteout and blizzards to bright sunshine days.

Look at the goggles on display and photographs of people wearing goggles.

Read what HR Bowers wrote about not wearing goggles in 1911, next to the photo of frostbitten fingers and toes (Map 3).

Discussion topics:

- Have goggles changed over time? How are they similar or different?
- Can you think of other reasons why people in Antarctica need goggles?

FUD

Theme 1: Equipment and Clothing

This object is a female urinary device (FUD). Antarctica is a place of severe and extreme weather and going to the toilet can be an unpleasant, even dangerous experience. If bare skin is exposed to icy winds and sub zero temperatures, it can quickly result in frostbite – and a frostbitten bottom is something that you don't want! This device was developed to make it easier for women to urinate without removing clothing or risking getting cold.

Discussion topics:

- Can you find out who was the first woman in Antarctica and when? What are some of the difficulties women (and men) face in working in Antarctica?

- Watch the expeditioner documentaries (MAP 4). Think about some of the roles and jobs women perform in Antarctica today. Which job would you choose to do?

Emperor penguin egg

Theme 2: Natural History

Warning! The egg is heavy so be careful not to drop it on your toes! Please examine the egg whilst on the carpeted section of the gallery.

See if you can find the chicks that hatch from an egg like this in the gallery.

The weight of the egg you are holding is a similar weight to a real emperor penguin egg (400-600 grams). Male emperor penguins look after the eggs and are the only species to spend all winter on the Antarctic continent. Imagine spending the whole winter standing still and balancing the egg on your feet through blizzards and darkness. Penguins really are amazing animals!

Discussion topics:

- What special adaptations do emperor penguins have to help survive the extreme winter in Antarctica?
- How might the egg be protected from freezing?
- Can you think of another bird that could have such a large egg?

Antarctic Copepods

Theme 2: Natural History

Copepods are small crustaceans, which means they have an armoured exoskeleton. However, as they are so small their entire body can be transparent. Polar copepods (like this one) can reach 1 centimetre in size. Copepods that live in Polar regions are herbivores and feed on phytoplankton. They have the ability to store up energy from their food as oil droplets during spring and summer plankton blooms. The oil droplets can take up over half their body's volume.

Copepods and Antarctic krill (*Euphausia superba*) both form the largest animal biomass on earth.

Discussion topics:

- Which animals eat copepods?
- How important are plankton (zooplankton, and phytoplankton) in the food web?
- Can you find some other marine invertebrates in the gallery? What features do they have in common?
- Copepods and krill are sensitive to changes in the marine ecosystem. Climate change is causing oceans to become warmer and more acidic. How might this affect these organisms?

Albatross wing bones

Theme 2: Natural History

The bones are from a wandering albatross, a sea bird which has the largest wingspan of any bird in the world (around 3.5 metres). Feel the albatross bones and that of a land animal (wallaby). What differences do you notice?

Locate the wandering albatross pair in the gallery and see if you can work out which part of the wing the bone is from.

Discussion topics:

- Why do you think albatross bones are so light?
- Look on the animal tracking monitor (MAP 5) and track an albatross as it searches for food. This will give you an idea of just how far these birds can travel without landing.
- How far do they go? How long can they spend at sea?
- What are some other types of albatross that live around the Sub-Antarctic Islands?

Marine debris from Macquarie Island *Theme 2: Natural History*

This marine debris was collected from the shores of Macquarie Island. Rubbish such as this can be found all over the world's beaches, and often in the most isolated and remote locations. As part of Australia's involvement in Antarctica and subantarctic islands, a rubbish clean-up program is in place. Tonnes of debris are removed from these places every year. This summer on Macquarie Island, a record number of debris items were collected, consisting of mostly green rope from long line fishing operations.

Discussion topics:

- What sorts of impacts could rubbish and debris like this have on wildlife in the ocean and on land?
- Where do you think rubbish such as this comes from? Can you recognise any rubbish items?
- How could we reduce the impact we are having on the oceans of the world?

Months of the year dice

Theme 3: Science and Technology

Roll the dice gently and see which month comes up. See if you can find out what might be happening in Antarctica at that time. Is it summer or winter? What would it be like down there during the selected month?

Discussion topics:

- Using the same month of the year, find out the average temperature for the three Australian bases in Antarctica and on Macquarie Island. Information can be found on the computers in the Southern Ocean section of the gallery.

- Which month of the year is the warmest or coldest? What is it like in Hobart at that time of year?

- What are animals doing at this time of year? How does their behaviour change with different seasons?

Polar Medal (Australian Antarctic Medal) and Antarctic Medallion

Theme 3: Science and Technology

The Polar Medal is awarded to a person who has made an outstanding contribution to service in the Antarctic and Arctic. It was originally called the Arctic Medal and first awarded to expeditions in the Arctic in 1857 for '*extreme human endeavour against the appalling weather and conditions that exist in the polar regions*'. It was renamed the Polar Medal and awarded to members of Captain Scott's first Antarctic expedition and later Sir Ernest Shackleton's Antarctic expedition members.

The Australian Antarctic Medal (AAM) was introduced in 1987, to replace the United Kingdom's Polar Medal Award. The AAM is awarded for outstanding service in scientific research or exploration in connection with an Australian Antarctic expedition, or for support of such work.

The *Antarctic Medallion* is awarded to all Australian Antarctic expeditioners who have over-wintered in Antarctica. The medal is inscribed with the name of the base the person has stayed at.

Discussion topics:

- Which famous explorers received Polar Medals? What for? Can you find one in the gallery?
- Do you know anyone who has spent a winter in Antarctica? Imagine what it would be like living there and being away from family and friends for so long.
- How has technology changed the remoteness and isolation of Antarctica?

Anemometer

Theme 3: Science and Technology

Did you know that Antarctica is the windiest and coldest place on earth?

Wind speed can be measured using special instruments called anemometers.

Take turns to blow onto the fan and record on paper your reading. Follow the operating instructions to change the air velocity unit of measurement. You don't need to put your mouth on the meter. Then use the Beaufort Wind Force Scale (on attached card) to work out the wind speed category you recorded.

Look at the film of Frank Hurley's Antarctic Journey with Sir Douglas Mawson from 1911 – 1914. (Map 6). Wait to see scenes of the men struggling to erect tents in a blizzard. What do you think a blizzard would be on the Beaufort Wind Force Scale?

Discussion topics:

- How do you think wind is measured in Antarctica today? You can see an automated wind measuring device in the cabinet (Map 7). How is it different to the one you are holding?
- What other aspects of weather can be measured?
- How does wind speed affect the temperature? Refer to the wind chill chart.

Compass – North or South? *Theme 3: Science and Technology*

Sir Douglas Mawson left Hobart with his expedition team in 1911, bound south for Antarctica.

Go to the window and use the compass to work out which direction Mawson's ship needed to go, to reach Antarctica. To use the compass, hold it flat and turn until the red end of the needle points to North (N).

You can also use a compass to find the South Magnetic Pole. Go to the ice map and use the compass provided on display. What happens to the needle when you reach the South Magnetic Pole?

Discussion topics:

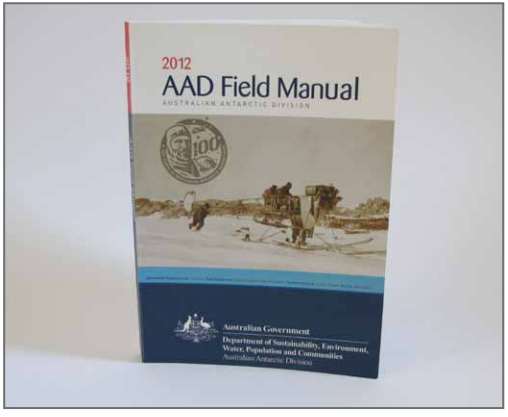
- Is the pole where you thought it might be? Have a look at the display near the ice map and see how far the magnetic pole has shifted since it was first reached in 1911.

- Do you know who the race to the South Pole was between?

- Can you find other compasses in the gallery? Think about how early explorers navigated.

2012 Field Manual

Theme 3: Science and Technology



The field manual is an essential item to be carried by every expeditioner when away from the station or base camp in Antarctica.

The contents page of the field manual has been highlighted where sections relate to the objects in the backpack.