

5 Movement And Migration

While on land (or ice), Adélie penguins walk at an average pace of 1.5 miles per hour (2.5 km/h); however, once they are in the water, Adélie penguins can swim 2.5-5 miles per hour (4-8 km/h) on average! We already know some Adélie penguins migrate close to 11,000 miles (17,702 km) to reach their breeding colonies during the warmer seasons; however, much less is known about where and how they spend their time during the winter season.

Scientists know Adélie penguins inhabit large ice platforms during the winter and are surrounded by plenty of food options. Krill, their primary source of food, tend to inhabit the underneath side of sea ice and offer an abundant source of nutrition for Adélie penguins. To help learn more about what happens during the winter months and where they go on their incredibly long journeys, scientists have begun tracking their routes in an effort to better understand these migration patterns. From their research, we know some Adélie penguins can swim as far as 746 miles (1,200 km) from their breeding locations in the summer months!

Adélie penguins work hard to return to the same breeding colony each year, regardless of where their winter migration led them. Once the male Adélie penguin has reached his breeding location, he will begin the process of courtship and finding his mate. In general, there are three different types of displays, or visual and auditory behaviors, the male penguin will perform to attract a female during courtship. These displays include ecstatic to initially claim the nesting site, mutual ecstatic in which the mated pair perform the display together and bowing to aide in recognition between the mated pairs. During the ecstatic stage, male penguins have been seen dipping their heads down low and then stretching their necks upward while holding out their flippers and “squawking” loudly. During mutual ecstatic, the male and female will perform the same or similar ecstatic displays together. Bowing is just like it sounds! One or both of the penguins will lower their heads and point their beaks towards their partner or nest.



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Grades 4-6 | Content Areas Science & Social Studies

Where Do Adélie Penguins Migrate In Winter?

ESSENTIAL QUESTIONS

Where do Adélie penguins migrate in winter? What factors influence migration patterns?

Materials

- Activity Sheet: Mapping Possible Adélie Penguin Migration Patterns
- pencils
- markers

Vocabulary

- foraging
- gyre
- migration
- polynya

WARM UP

As a class, discuss why tracking penguin migration patterns on maps is important work. List examples together such as checking the health of marine ecosystems, identifying ecological zones that need protection and identifying habitat destruction. Shift the discussion to why penguins migrate, for example to seek over-winter feeding grounds, escape the darkness of winter and to avoid harsh winter conditions. Ask students to hypothesize what factors scientists need to consider while tracking penguins. For example, Adélie penguins won't dive into the ocean in the dark — need light to confirm no predators are present; too much open water or too much thick ice keep penguins from foraging.

MAPPING MIGRATIONS

Request students work in peer pairs to complete *Activity Sheet: Mapping Possible Adélie Penguin Migration Patterns*. Move through the room and ask prompt questions to individual pairs — what distance did the penguins travel and how long do students think it would take to get to the over-winter grounds? Point out the factors that influence migration patterns to each group in Figure B.

WRAP UP

Ask students to compare the possible routes they drew in small groups and discuss what factors were the most important in deciding the route, how the routes differ and if any routes were more common than others. Discuss what distance penguins would travel on different routes and what are the implications for penguins if the ice pack melted significantly due to climate change.

KEEP GOING

Ask students to research how scientists use Geolocation sensor leg tags, chemical analysis of feathers and/or satellite tracking to shed light on Adélie penguin migratory movements, rate and direction.

Students Keep in Mind

- Round Trip Distance: Between 780 mi (1276 km) to 1100 mi (1760 km).
- Some leave in June and return in October.



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MAPPING POSSIBLE ADÉLIE PENGUIN MIGRATION PATTERNS

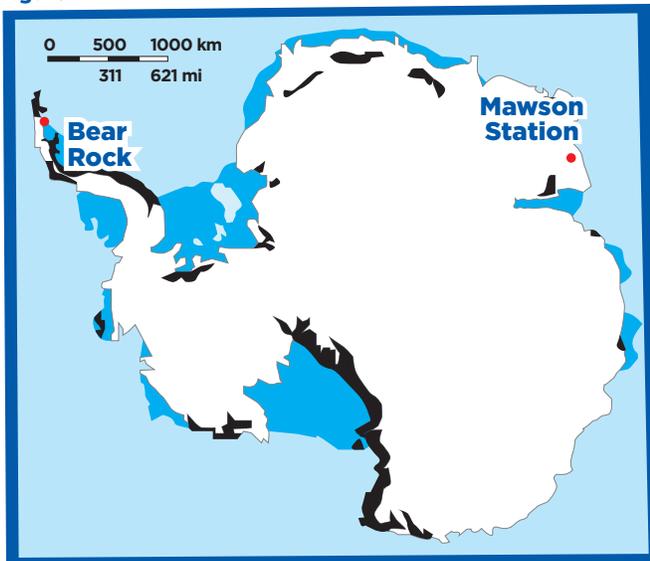
NAME _____

DATE _____

Directions: Locate Mawson Station and Bear Rock on the map of Antarctica in Figure A. Next, examine the Adélie penguin migration route shown from and to Mawson Station in Figure B. Consider how the factors listed below may influence migration patterns. Using these factors, draw a possible route from and back to Bear Rock in Figure C. How does your route compare to the one in Figure B? How does it compare to your classmates'?

LEGEND	 Ocean	 Ice sheet	 Ice shelf	 Ice-free zones
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Figure A



Migration Route Factors

TOO MUCH ICE = no access to water and food

NOT ENOUGH ICE = no place to rest

POLYNYA = access to krill
(a polynya is an area of open water surrounded by sea ice)

AREAS PREDATORS INHABIT = danger!

AREAS CLOSE TO COASTLINE = colder water and richer food sources

ICE FLOE = possible opportunity to hitch a ride moving 3.45 mi/day (5.5 km/day)

Figure B

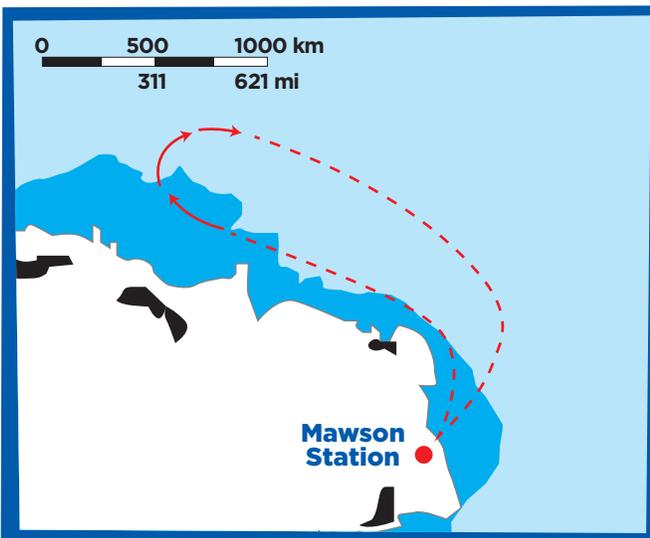
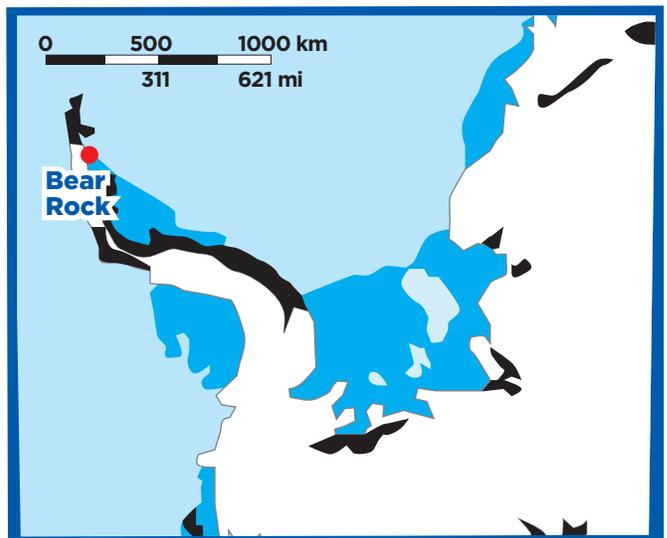


Figure C





Extension for Grades 4-6 | Content Areas Math & ELA

Can You Waddle Like An Adélie Penguin?

ESSENTIAL QUESTION

How does the speed of simulating waddling or walking like an Adélie penguin compare to the walking speeds of the penguins in Disneynature Penguins?

Materials

- Activity Sheet: Waddle Race
- stopwatches
- medium foam ball
- tape
- meter measuring stick

Vocabulary

- plonk
- toboggan
- waddle

WARM UP

Show clips of Adélie penguins walking fast across ice and encourage students to pay attention to how the penguins move. Discuss how movements vary from a quick **waddle**, to **plonking** on their bellies and **tobogganing** or even leaping. Explain that Adélie penguins have short legs and large feet so they need to build up a forward momentum by moving from side-to-side, or waddling, and this allows them to use less energy and keep their balance.

TIME TO WADDLE

Review the stages of *Activity Sheet: Waddle Races* as a class and distribute materials students need to complete the activity in pairs. While students are completing the warm up stages of the activity sheet, mark off ten-meter racing tracks in the room, in the gym or outside for each pair to use for their test runs

WRAP UP

Tell students to discuss why they think they raced faster when they walked or waddled. Ask how did students' speed compare with the Adélie Penguin's speed of 2.5 km/hr (1.6 mi/hr) and if their race times would have been different if they could have plonked, tobogganed or leapt through part of the track. Discuss students' hypotheses and how they could test them.

KEEP GOING

Try plonking and tobogganing:

- If you live where it snows use a plastic saucer or sled and slide face down on snow slopes.
- If you live where it hardly ever snows, try sliding belly-down on a water slide.
- After sliding, walk down the same area and decide which was faster and why.



Teacher Note

1 kilometer = 1000 meters = 100 x 10 meters, so with teacher support, students need to multiply their fastest time (in seconds) by 100 and then divide this number by the number of seconds in one hour (3600) to find their fastest speed in km/hr: $\text{Speed (in seconds)} \times 100 / 3,600 = \text{km/hr}$

Activity
GRADES
4-6

WADDLE RACES

NAME _____

DATE _____

Get Ready

Adelie penguins have very short legs and their stride length is approximately one-third their height. To determine you and your partners' penguin stride lengths, measure your height and divide this measure by 3.

STUDENT 1: NAME _____ HEIGHT _____ STRIDE-LENGTH _____

STUDENT 2: NAME _____ HEIGHT _____ STRIDE-LENGTH _____

Warm Up 1

To simulate the short legs of an Adelie penguin, take turns placing a foam ball between your knees. As one student takes a step (keep the ball in place), the other student measures the stride length. Adjust the ball above or below the knees until you get a stride length of approximately one-third your height.

STUDENT 1: BALL BETWEEN KNEES _____ ABOVE KNEES _____ BELOW KNEES _____

STUDENT 2: BALL BETWEEN KNEES _____ ABOVE KNEES _____ BELOW KNEES _____

Warm Up 2

Take turns quickly walking the 10 m (33 ft) track by two movements: by walking (without ball) and by waddling (with ball between legs).

STUDENT 1: WALKING # OF STEPS _____ TIME _____

WADDLING # OF STEPS _____ TIME _____

STUDENT 2: WALKING # OF STEPS _____ TIME _____

WADDLING # OF STEPS _____ TIME _____

Walk/Waddle Race:

Select the movement (regular walk or side-to-side waddling) that was fastest for each person. Position balls correctly between knees.

Take turns timing each other with a stop-watch. Record how much time it took when racing like an Adélie Penguin for the length of the 10 m (33 ft) track.

STUDENT 1: FASTEST TIME _____

STUDENT 2: FASTEST TIME _____

With teacher support, work out your speed in kilometers/hour and compare to the Adélie penguin speed of 2.5 km/hr (1.6 mi/hr).



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