

Applicable standards

Next Generation Science Standards (NGSS)

Element of the curriculum	Lessons				
	1	2	3	4	5
K-2-ETS1-3. Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.				✓	
2-PS1-1. Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.				✓	
2-PS1-2. Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.				✓	
2-LS4-1. Make observations of plants and animals to compare the diversity of life in different habitats.	✓				
2-ESS1-1. Use information from several sources to provide evidence that Earth events can occur quickly or slowly.					✓
2-ESS2-3. Obtain information to identify where water is found on Earth and that it can be solid or liquid.					✓
3-5-ETS1-2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.				✓	
3-LS4-2. Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.				✓	
3-LS4-3. Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.		✓		✓	
3-LS4-4. Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.					✓
4-LS1-1. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.		✓	✓	✓	
4-LS1-2. Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.		✓			

SCHEME OF WORK

Grades 2-5 Science (continued)	Lessons				
	1	2	3	4	5
Element of the curriculum					
5-PS3-1. Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun.	✓				
5-LS1-1. Support an argument that plants get the materials they need for growth chiefly from air and water.	✓				
5-LS2-1. Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.	✓				
5-ESS2-1. Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.					✓

Science and Engineering Practices	Lessons				
	1	2	3	4	5
Element of the curriculum					
• Asking questions				✓	✓
• Developing and using models	✓				
• Planning and carrying out investigations				✓	
• Analyzing and interpreting data				✓	✓
• Using mathematics			✓	✓	
• Constructing explanations		✓	✓	✓	✓
• Engaging in argument from evidence				✓	✓
• Obtaining, evaluating and communicating information	✓		✓	✓	✓

SCHEME OF WORK

Lesson 1: What organisms live in the Arctic?

Overview

Students develop their understanding of simple food chains or webs and scientific vocabulary through making an Arctic life mobile.

They will also be introduced to the work of marine scientist, Dr Ceri Lewis, who has worked in the Arctic investigating the impact of environmental change on this fragile ecosystem.

Learning outcomes

- Name five Arctic organisms
- Use scientific vocabulary correctly
- Draw simple food chains
- Draw a food chain with the correct arrows
- Construct a food web

Resources



Slideshow 1:
What organisms live in the Arctic?



Activity Overview 1:
Arctic life mobiles



Student Sheet 1a:
Researching Arctic organisms

Student Sheet 1b:
Arctic organism cards

Student Sheet 1c:
Arctic life mobiles



Thinglink:
What animals live in the Arctic?



Gallery:
What creatures live in the Arctic?

Lesson 2: How do you train like an Arctic explorer?

Overview

In this lesson students simulate the training of Arctic explorers to learn how lifestyles can affect physical and mental health.

The lesson is introduced by Ann Daniels, a record-breaking polar explorer as the first woman in history, along with expedition teammate Caroline Hamilton, to reach the North and South Poles as part of all women teams.

Learning outcomes

- Describe conditions in the Arctic
- Describe some of the challenges of surviving in the Arctic
- Explain why physical training is needed for Arctic explorers
- Explain why mental training is needed for Arctic explorers

Resources



Slideshow 2:
How do you train like an Arctic explorer?



Activity Overview 2a:
Tyre dragging relay

Activity Overview 2b:
Sleeping bag relay



Student Sheet 2a:
Training storyboard



Video:
Training for the Arctic in Devon

Video:
How do you sleep in the Arctic?



Subject Update:
What fitness training do Arctic explorers need?

SCHEME OF WORK

Lesson 3: How do you eat like an Arctic explorer?

Overview

Students learn about diet and the importance of a balanced diet through the experiences of polar explorers. Using creativity and scientific research skills, students will create a menu suitable for an Arctic expedition.

The lesson is introduced by Fran Orio, a specialist polar cook, who can make amazing meals in the most extreme circumstances.

Learning outcomes

- Link calories to the energy in food
- Use scientific vocabulary correctly
- Describe the role of carbohydrate, fat and protein in the body
- Describe the conditions in the Arctic
- Describe some of the difficulties of surviving in the Arctic
- Design a diet for a polar explorer
- Explain the differences between your diet and a polar explorer's diet

Resources



Slideshow 3:
How do you eat like an Arctic explorer?



Activity Overview 3:
Make your own pemmican



Student Sheet 3a:
Researching food

Student Sheet 3b:
Polar menu



Video:
How many calories does a polar explorer need a day?

Video:
What are the challenges of cooking in an Arctic Ice Base?



Subject Update:
What do polar explorers eat?

Lesson 4: How do humans and animals keep warm in the Arctic?

Overview

In this lesson students investigate the insulating properties of materials and consider how the adaptations of Arctic organisms help develop these.

The context of the lesson is helping to develop new clothing for Tyler Fish, one of the Catlin Arctic Survey explorers.

Learning outcomes

- Describe the conditions in the Arctic
- Make a prediction
- Investigate the insulating properties of three different materials
- Demonstrate learning by producing a poster with a graph and conclusion

Resources



Slideshow 4:
How do humans and animals keep warm in the Arctic?



Activity Overview 4a:
Investigating insulating materials



Student Sheet 4a:
Investigating insulating materials

Student Sheet 4b:
Scientific poster template

Student Sheet 4c:
Scientific poster template (Advanced)



Subject Update:
What equipment and clothing do polar explorers need?

Lesson 5: How is the Arctic changing?

Overview

In this lesson students learn about the impacts of ice in the Arctic melting by watching a series of demonstrations.

The context of the lesson is the work of Dr Helen Findlay who was investigating the effect of environmental change on the Arctic ecosystem.

Learning outcomes

- Describe the conditions in the Arctic
- Describe how the Arctic is changing
- Explain the cause and possible outcome of one problem facing the Arctic

Resources

**Slideshow 5:**

How is the Arctic changing?

**Activity Overview 5a:**

The albedo effect

Activity Overview 5b:

Sea level rise

Activity Overview 5c:

Ocean circulation

**Student Sheet 5a:**

Sentence card sort

Student Sheet 5b:

Storyboard

**Video:**

What trends are there in sea ice coverage?

**Subject Update:**

What are ice caps and how are they formed?

Subject Update:

Why is the Arctic melting and why is that a problem?

Subject Update:

How does ocean circulation affect the climate of the UK?