

Polar Week Unit Plan

Polar Week is sponsored by APECS. This unit is a unique way to integrate challenging lessons into all curricula areas. The lessons are organized by curricula area. The scope and sequence is up to the educator. The lessons were planned for a 3rd grade general education classroom, but can be adapted to many grade levels. However, I would start with the introductory lessons first.

Introduction: Language Arts

Materials: Polar Animals Student Booklet, DVD: DK Eyewitness, Arctic and Antarctic, chart paper, optional copy of Venn Diagram for each student

Objective: The students will compare and contrast the environments of the Arctic and the Antarctic. They will organize the information onto a Venn Diagram.

Procedure: Explain what Polar Week is and show the children the website:
<http://apecs.is/education-outreach/polarweekmarch2012>

This would also be a good time to register your class.

Pass out the copied Venn Diagram. As the students are watching the DVD, they are to record differences and similarities that they learn.

After the video, record all observations on the chart paper Venn Diagram.

Pass out booklet. Students should read, write, and color booklet.

Wrap Up: The next day, have the students use their booklets to add more details to the class chart. Discuss the similarities and differences.

Language Arts Lesson

Title: Plan a Polar Vacation

Materials: books, articles, graphic organizer, rubric, 12x18 construction paper, writing paper, water color paints, crayons, and markers.

Part 1

Start by reading aloud, *Travel Smart*, by Laura Buller. Make this book available to students throughout the lesson. You can decide how to group your students into an Arctic and an Antarctic group. Each group will research their polar area and create a poster to share their information.

First give the students time to look through the related books. If you don't have enough copies of the books, you can pair up students or teach small groups. After a 5 minute book preview, question the students on clothing, transportation, animals, and what they would see and do. Model how to fill out the graphic organizer. Pass out the graphic organizer and let the students research and write. Students will use the books, articles, and/or Internet to find the necessary information to plan a vacation to the polar areas.

Part 2

Read the article on the Auroras. Explain to the students that this phenomenon can only be seen in the polar regions. Point out that the auroras in the Arctic are called the Aurora Borealis and the auroras in the Antarctic are called the Aurora Australis. Using the books or photos from the Internet, show photos of what the auroras look like. Next, using pencil and a drawing paper, the students will draw and label a picture of them visiting their polar region. They should label the auroras, animals, clothing, etc..... To finish the picture, have the students trace the labels with fine tip markers and water color paint the picture. Show the students how to blend the colors to make it look like the auroras. Optional: add glitter stars or spray the sky with glitter paint.

Part 3

Fold the construction paper in half first. Unfold. Fold the edges of the paper to match the middle fold. This will create 2 flaps and a big middle section of the paper. Glue the painting to the inside of the construction paper. Glue white paper to the inside of the flaps. On the flaps, the students will write the information from the graphic organizer to show their completed vacation. When the flaps are closed, they are to create cover art, title, and author for their vacation. See diagram below.

Part 4

Pair up or group students with the opposite polar region. Have the students share their report. Students will then grade their own work and their partner. Finished posters can be displayed in the classroom or hallway.

Math Lesson

Title: Parade of Penguins

Materials: books on penguins, white roll paper, meter or yard sticks, rulers, pencils, crayons, markers, grid paper, penguin size chart.

Objective: Students will measure the exact height of different species of penguins. They will create bar graphs, line graphs, and a chart to show the heights of the penguins. To challenge students, you can have them convert all of the measurements into the metric system or vice versa.

Part 1

Group your students into groups of 2 or 3. Before you teach this lesson, research the different species of penguins to familiarize yourself. Choose an appropriate number of penguin species to accommodate the number of students. Make sure the books you choose have the heights and descriptions of the penguins. Additionally, the article, *Penguins of the World* can be used as a reference as well. You can also have the groups research their species on the Internet.

Give each group their species and height information. They may use the articles or books to see what the penguin looks like. Model how to measure using a yard/meter stick. On the edge of the large white roll paper, have the students draw a straight line showing the height of the penguin. Label the height in feet/inches and/or centimeters. Using pencil first, outline and draw the species of penguin to the actual height. Students will then trace the penguin with marker and color in with crayons. One can also add yellow feathers for the plumes on the heads of certain species. When finished, students should label their drawings with the species name of penguin..

Part 2

Line up your penguin species by size. You need a big open wall for this. Have the students note similarities and differences in the species.

Using grid paper, have the students make a chart that shows the height of each species of penguin. You will need to model this if your students are not familiar with how to make a chart. This can also be done as a class on chart paper as well. Additionally, one can also have the chart ready-made and hand out copies for those students needing modifications. Model how to make bar graphs and line graphs from the information on their chart. Students will create the graphs to match the penguin sizes. This can be done individually or in their groups. When finished, students should write mathematical conjectures to delineate the differences in sizes. To challenge students, you can have them make the graphs using metric measurements or vice versa.

Part 3 (optional)

To go beyond, give each student a 4x6 index card. They can make a penguin statistics trading card about the species they researched. Some facts to include are size, weight, habitat location, predators, food, or interesting information. Or, as a class or individually, chart where each species lives in the world. These can be posted by the species or traded amongst classmates.

Science Lessons

My students keep a science journal. Many of these pages are put into their journal. You may want to do this as well, or have them create a special Polar Week Journal.

Title: The Mitten Problem

Materials: at least 2 thermometers, at least one mitten, science probe page.

Vocabulary: thermometer, insulator,

Objective: Students will learn how to measure temperature on a thermometer to determine if a mitten can be used as an insulator. Learn about proper clothing in the polar regions.

Procedure: Teach the meaning of insulator. You may want to show several examples of what an insulator can be. Show how to measure temperature using a thermometer. Discuss the differences between Celsius and Fahrenheit.

You can choose to do this experiment in pairs, groups, or as whole class depending on the number of materials. Check both thermometers to make sure they are showing the same temperature. Record the temperature. Put one thermometer in a mitten.

Pass out the science probe. Have the students read, discuss, and write about the probe. Model how to write clear and concise scientific conjectures.

After 10 minutes check the temperature on both thermometers. Record the results. There should not be much change in temperature because everything started at room temperature. Discuss the results and explain that heat energy will be transferred when two systems react at different temperatures. If an insulator is at the same temperature as what it is insulating, there will be no change.

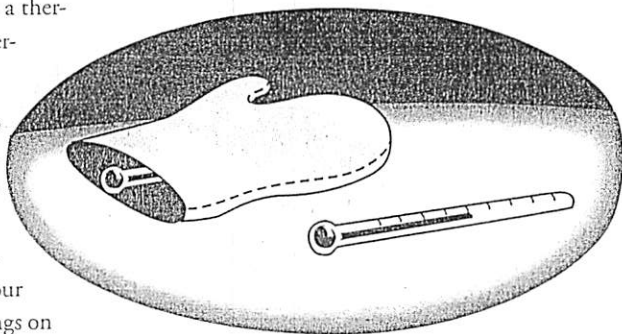
Next, ask what would happen if you went outside with the mitten and thermometers (if it is cold) or put them inside the refrigerator? Try the experiment again and record the results. To close the lesson, have the students discuss or write about how an insulator works and the importance of proper clothing for people in the polar lands. At this time, you may want to show samples of gear, or pictures of gear that a polar scientist would wear.

Extension: make a graph to graph the results of the temperature, show the different temperatures using Celsius and Fahrenheit, draw and label the gear needed for a polar scientist, have the students write about the experiment and explain how an insulator works or how heat energy is transferred.

The Mitten Problem

Sarah's science class is investigating heat energy. They wonder what would happen to the temperature reading on a thermometer if they put the thermometer inside a mitten.

Sarah's group obtained two thermometers and a mitten. They put one thermometer inside the mitten and the other thermometer on the table next to the mitten. An hour later they compared the readings on the two thermometers. The temperature inside the room remained the same during their experiment.



What do you think Sarah's group will discover from their investigation? Circle the response that best matches your thinking.

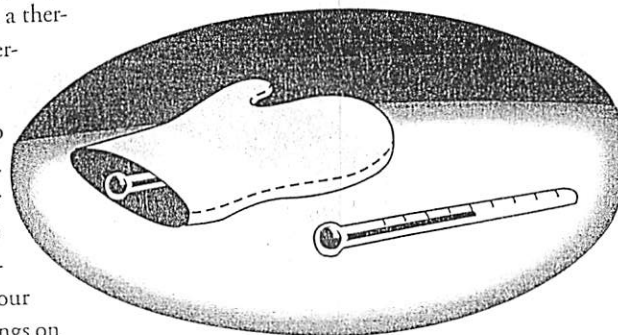
- A** The thermometer inside the mitten will have a lower temperature reading than the thermometer on the table.
- B** The thermometer inside the mitten will have a higher temperature reading than the thermometer on the table.
- C** Both thermometers will have the same temperature reading.

Describe your thinking. Provide an explanation for your answer.

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The Mitten Problem, Part 2

Define the vocabulary words.

Thermometer: _____

Insulator: _____

Predict: What would happen to the temperatures on both thermometers, when you put them in a refrigerator? Be sure to use the vocabulary words in your prediction:

Gather Data: Write the current temperatures.

_____ Mitten Thermometer 1 _____ Thermometer 2

The Mitten Problem, Part 2

Test: Now place the mitten thermometer and thermometer 2 inside a refrigerator for 10 minutes.

Gather Data: Write the current temperatures.

_____ Mitten Thermometer 1 _____ Thermometer 2

Explain: What happened to the temperature on each thermometer? What does that tell you about how an insulator works?

Apply: Using what you learned, explain why scientists in the polar regions need insulating clothing.

Title: Blubber!

Materials: Crisco, plastic baggies, bowls, ice, water, recording sheet

Vocabulary: blubber, insulates, adaptation

Objective: Students will understand how polar animals have adapted to the cold environment by having a thick layer of blubber.

Procedure: Decide how you want to teach this experiment. It can be done as small groups or as a whole class demonstration. You need to fill a large bowl with really cold water and ice. Choose a student to put a plastic bag on their hand and stick into the ice water. Continue with the lesson by teaching the vocabulary words and pointing out animals that have blubber to help them survive in the Arctic. The student with their hand in the water should be getting cold!

Have the student take their hand out of the water, but keep the plastic bag on. Smear Crisco on their hand to represent blubber. It needs to be rather thick, just like real blubber. Put a second plastic bag over the Crisco hand and have the student put their hand back into the water. Have the student explain the difference in temperature. To close the lesson, have the students complete the writing explanation. You can decide if you would like each student to try out the blubber! I found that if you call small groups after the lesson, each child can try while the others are completing the writing portion.

Title: Ice Core Samples

Material: *A Year in Antarctica*, ice tray that produces long skinny ice cubes, a variety of sand or other materials to put into the "ice cores", recording sheet, magnifying glasses

Vocabulary: ice core

Objective: Students will be able to simulate how the scientists in Antarctica study the ice cores. Students will learn how to make reasonable scientific conjectures about their ice core.

Procedure: First, I collect a variety of "stuff" that would fit into the skinny ice trays. You can get these at IKEA or make your own. I try to make 6 different ice core samples. I put a different type of soil, sand, or clay in each sample. I also put a small plastic sea creature in each core. You should freeze these 2 days before the lesson to ensure that they will be frozen solid.

In class, I read the section of the book, *A Year in Antarctica*, that is telling about the British team of scientists that were studying the ice cores at the Rothera Research Station. If you do not have the book, these websites will be helpful:

http://www.antarctica.ac.uk/living_and_working/research_stations/rothera/

<http://annebrodie.co.uk/antarctic-fellowship/>

<http://www.physorg.com/news/2012-02-scientists-successfully-antarctic-drilling.html>

Or just search Rothera and ice cores. After the students have an understanding of what ice cores are used for, begin the experiment.

Group your students into 6 groups. Pass out the ice cores. Have them hypothesize about what they will find in their ice core. They will record their answers on the sheet. Using the magnifying glasses, the students can take turns inspecting their core. While the core is melting, the students should be engaged in other activities.

After the core has melted, the students should inspect what was in the core. They should look carefully at the what type of soil and dirt is in the core and what sea creature was in the core. As a group, they should talk about possible conclusions that can be made from the evidence in the core. They need to come up with at least 3 reasonable scientific conjectures to write on the recording sheet. To close the lesson, they should reflect back on their beginning hypothesis and the new information they learned and write it onto the recording sheet. Compare each group's cores with each other and share conjectures.

Title: Icebergs

Materials: 4 clear plastic cups, large ice cubes or some other frozen shape, water, salt, recording sheet. Optional: ice cubes can be colored using food coloring so they can be seen easily.

Vocabulary: freezing point, buoyancy

Procedure: First make the salt water mixture. 1 cup of water and 8 tablespoons of salt. Stir until salt is completely dissolved. Divide the mixture evenly between the two cups. Fill another 2 cups with the same amount, using fresh water. Drop one ice cube in a fresh water cup and one ice cube in a salt water cup. Explain the term buoyancy to the children. Salt increases the buoyancy of the ice cube. The part of the ice cube that is above the surface of the water will take longer to melt. Relate this to how icebergs are formed and why the part above water does not melt quickly. Next predict will which ice cube will melt first and how long it will take.

Place the other 2 cups in the freezer. Check every half hour. Which one will freeze first? Salt lowers the freezing point of water, which should cause the salt water to take longer. The students can record their predictions on the recording sheet.

Polar Week Media List

DVD

DK Eyewitness: Arctic and Antarctic

Picture Books

Bauer, Jeff, *Cool Penguins*
Black, Sonia W., *Plenty of Penguins*
Buller, Laura, *Travel Smart*
Byles, Monica, *Life in the Polar Lands*
Cowcher, Helen, *Antarctica*
Crawford, Laura, *Antarctica: The Frozen Continent*
Ganeri, Anita, *A Year in Antarctica*
Herman, Gail, *The Magic School Bus: Arctic Adventure*
Lloyd, Morgan, *Penguins on Parade*
Lumry, Amanda, *Adventures of Riley: South Pole Penguins*
Morgan, Sally, *Animal Lives: Penguins*
Tatham, Betty, *Penguin Chick*
Theodorou, Rod, *From the Arctic to the Antarctic*
Waters, Kate, *Penguins*

Chapter Books

Osborne, Mary Pope, *Magic Treehouse: Eve of the Emperor Penguin*
Osborne, Mary Pope, *Magic Treehouse Research Guide: Polar Bears and the Arctic*
Osborne, Mary Pope, *Magic Treehouse: Polar Bears Past Bedtime*
Stamper, Judith, *Magic School Bus Chapter Book: Penguin Puzzles*
Stamper, Judith, *Magic School Bus Chapter Book: Polar Bear Patrol*
Varela, Barry, *Arctic Tale*

Articles

Boynton, Alice & Blevins, Wiley, *Scholastic Nonfiction Passages with Graphic Organizers for Independent Practice Grades 4 & up: At the Bottom of the World Exploring Antarctica*
Boynton, Alice & Blevins, Wiley, *Scholastic Nonfiction Passages with Graphic Organizers for Independent Practice Grades 2-4: Penguins of the World*
Evan-Moor, *Grade 3 Nonfiction Reading Practice: Auroras*
Scholastic: *Hi-Lo Nonfiction Passages for Struggling Readers, Grades 6-8: The Animals of the Arctic Tundra*
Scholastic: *Hi-Lo Nonfiction Passages for Struggling Readers, Grades 4-5: The Arctic, Closer than you Think*

Student Booklet

Sweeney, Alyse, *Scholastic Nonfiction Read & Write Booklets, Animals & Habitats: My Book About Polar Animals*