



Introduction to the Arctic

Setting the Stage

Long considered one of Earth's last unexplored frontiers, the Arctic is becoming more accessible as global temperatures rise and Arctic sea ice declines. Since 1979, Arctic sea ice extent has declined by more than 12% each year unlocking resources and shipping lanes. Countries bordering the Arctic are readying themselves for this new Arctic by defining their borders and therefore their rights to the Arctic's extensive resources. As the race for the Arctic heats up, continued research and exploration in the area will become increasingly important to inform future decision-making. In this lesson, students will define and describe the geography of the Arctic and identify the major players in Arctic politics.



Photo Credit: CIRES

Lesson Overview

- *Part 1 – (20 minutes) Introduction to the Arctic*
Access students prior Arctic knowledge through a warm up and Google Slides presentation.
- *Part 2 – (20 minutes) Geopolitics of the Arctic*
Watch a short video to learn how countries are extending their borders into international waters.
- *Part 3 – (10 minutes) Preparing for the Future of the Arctic*
Describe three ways the Arctic is changing with a Google Slides presentation. Students follow along with the presentation by completing guided notes.
- *Part 4 – (10 minutes) Exit Ticket*
Students reflect on their learning by completing an exit ticket.



Instructional Overview	
Grade Level	Middle/High School
Instructional Time	60 minutes
Standards Alignment	<p>NGSS Science Addresses Questions About the Natural and Material World:</p> <ul style="list-style-type: none"> Science knowledge can describe consequences of actions but is not responsible for society's decisions <p>NGSS Science and Engineering Practices:</p> <ul style="list-style-type: none"> Obtaining, evaluating, and communicating information
Unit Driving Question	<ul style="list-style-type: none"> How have scientific questions, methods, technologies, and our knowledge of the Arctic changed over time?
Driving Question For This Lesson	<ul style="list-style-type: none"> Why should we care about the Arctic?
Learning Goals	<ul style="list-style-type: none"> Define and describe the geography of the Arctic Identify Arctic stakeholders
Materials	<ul style="list-style-type: none"> <input type="checkbox"/> Introduction to the Arctic PPT <input type="checkbox"/> Introduction to the Arctic student worksheet (1 per student) <input type="checkbox"/> Exit Ticket Rubric <input type="checkbox"/> Answer Key <input type="checkbox"/> Summary Table - if using entire unit (1 per student) <input type="checkbox"/> Video: It's time to draw borders on the Arctic Ocean <p>Optional Resources</p> <ul style="list-style-type: none"> <input type="checkbox"/> Defining the Arctic PPT <input type="checkbox"/> Arctic Map / Example Map <input type="checkbox"/> Video: Changes in Polar Regions
Material Preparation	<ul style="list-style-type: none"> <input type="checkbox"/> Cue and test web links <input type="checkbox"/> Print student worksheets <input type="checkbox"/> Review presenter notes in the Introduction to the Arctic PPT
Vocabulary	<p><u>Arctic Circle</u>: Imaginary circle marking the latitude above which the sun does not set on the summer solstice, and does not rise on the winter solstice.</p> <p><u>10°C July Isotherm</u>: Area where average July temperatures do not rise above 10°C or 50°F.</p> <p><u>Treeline</u>: Area in which trees do not grow</p>



	<p><u>Isotherm</u>: A line on a map connecting points that have the same temperature</p> <p><u>Geopolitics</u>: The effects of Earth's geography on politics and international relations.</p>
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Part 1 - Introduction to the Arctic PPT (20 minutes)

Driving Question(s): Why should we care about the Arctic?

Refer to Part 1 slides included in the [Introduction to the Arctic PPT](#). See PPT presenter notes for additional information.

1. Use the [Introduction to the Arctic PPT](#) to provide students with background information about the Arctic. See PPT Presenter notes for additional information.
 - a. Students complete warm up on their student worksheet

Optional Extension - Defining the Arctic (15 minutes):

Print and distribute the "[Arctic Map](#)" worksheet to students. Teacher uses the "[Defining the Arctic PPT](#)" to facilitate the following:

- Step 1: Students will record three definitions (10°C July isotherm, treeline, and Arctic circle) for the Arctic on their "Defining the Arctic" map.
- Step 2: Label the eight countries surrounding the Arctic Ocean ([see example](#))

Discussion Prompts:

- Which country do you think has the greatest influence over the Arctic region? Why?
- Who owns the rights to the land/resources at the bottom of the ocean?

Part 2 - Geopolitics of the Arctic (20 minutes)

Driving Question(s): Why should we care about the Arctic?

Refer to Part 2 slides included in the [Introduction to the Arctic PPT](#). See PPT presenter notes for additional information.

1. Introduction to the Geopolitics of the Arctic video:
 - a. Say: *"The geopolitics (the effects of geography on politics or international relations) of the Arctic are becoming more complicated as sea ice melts and the Arctic becomes more accessible. This video describes how countries are trying to exert their influence in the region by staking claims and extending their borders into international waters."*



2. Watch "[It's time to draw borders on the Arctic Ocean](#)" video from 1:52-6:08. Option to watch the entire 13 minute video.
 - a. Students answer video questions (see student worksheet)
 - b. Review video questions as a whole class. Refer to slides included in Part 2 of the "[Introduction to the Arctic PPT](#)" to supplement the discussion (see presenter notes).

Optional Extension - "Changes in Polar Regions" video (5-10 minutes)

Watch [Changes in Polar Regions](#) video from 0-2:56.

Discussion Prompts:

1. How does the climate in the Arctic affect the climate at lower latitudes?
2. Why is it important that scientists study the Arctic climate system?
3. Why do you think the Arctic is one of the most poorly observed regions on earth?

Part 3 - Preparing for the Future of the Arctic (10 minutes)

Driving Question(s): Why should we care about the Arctic?

Refer to Part 3 slides included in the [Introduction to the Arctic PPT](#). See PPT presenter notes for additional information.

1. Describe three ways the Arctic is changing.
 - a. Students take notes by writing the underlined words on their worksheets.
 - b. **Discussion Prompt:** Say, "*Your student worksheet says, "Understanding the Arctic of the past and present is key to preparing for the Arctic of the future", what do you think that means?"* (See PPT presenter notes for answers)
2. Introduce the "Exploring the New and Old Arctic unit (**if using entire unit**):
 - a. Say, "*Understanding the Arctic of the past and present, is key to preparing for the future. In this unit, "Exploring the New and Old Arctic" we will compare two historic Arctic expeditions, one from the past - the 1893-1896 Fram expedition, and one from the present - the MOSAiC expedition (2019-present), to answer the unit driving question: How have scientific questions, methods, technologies, and our knowledge of the Arctic changed over time?*
3. Introduce the Summary Table (**if using entire unit**) - Tool the class will use to keep track of similarities and differences between the two expeditions and will complete at least one box each class.
 - a. Distribute [summary table](#) to students or have students record the summary table in their science notebooks



- b. Students must keep track of their summary table as they will be updating it after each class.

Part 4 - Exit Ticket (10 minutes)

Driving Question(s): Why should we care about the Arctic?

Refer to Part 4 slides included in the [Introduction to the Arctic PPT](#). See PPT presenter notes for additional information.

1. Students provide a short explanation and create an annotated sketch to answer the driving question, “Why should we care about the Arctic?”
 - a. Project and describe the [Exit Ticket Rubric](#) to the class before they begin the assessment as this is what you will use to grade their exit tickets.