Introduction to the Arctic

Setting the Stage

Long been 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

Explanation of the learning activity progression - one sentence.

- *Part 1 – (15 minutes) Introduction to the Arctic*
  Access students prior Arctic knowledge through a warm up and Google Slides presentation.
- *Part 2 – (15 minutes) Definitions of the Arctic*
  Students define the Arctic in this mapping exercise.
- *Part 3 – (15 minutes) Who Owns the Arctic?*
  Watch a short video to learn how countries are extending their borders into international waters.
- *Part 4 – (15 minutes) Preparing for the Future of the Arctic*
  Describe three ways the Arctic is changing and introduce students to the "Exploring the New and Old Arctic" unit.

Instructional Overview	
Grade Level	Middle/High School
Instructional Time	60 minutes *(total time needed)*
Standards Alignment	NGSS: **Science Addresses Questions About the Natural and Material World**: Science knowledge can describe consequences of actions but is not responsible for society's decisions
Anchoring Phenomenon	• How have scientific questions, methods, technologies, and our knowledge of the Arctic changed over time?
Driving Question	• Why should we care about the Arctic?
Learning Goals	• Define and describe the geography of the Arctic • Identify Arctic stakeholders
Materials	❑ Introduction to the Arctic PPT (Slides L-Q are optional) ❑ Introduction to the Arctic worksheet ❑ Definitions of the Arctic Map / Example Map ❑ Exit Ticket/Homework Assignment ❑ Colored pencils ❑ Video: It's time to draw borders on the Arctic Ocean ❑ Video: Changes in Polar Regions (Optional)
Material Preparation	❑ Cue and test web links ❑ Print student worksheets ❑ Review speaker notes in the Introduction to the Arctic PPT
Vocabulary	Arctic Circle: Imaginary circle marking the latitude above which the sun does not set on the summer solstice, and does not rise on the winter solstice. 10°C July Isotherm: Area where average July temperatures do not rise above 10°C or 50°F. Treeline: Area in which trees do not grow Isotherm: A line on a map connecting points that have the same temperature Geopolitics: The effects of Earth's geography on politics and international relations. • Example: Countries claiming the rights to natural resources (*politics*) in the Arctic (*geography*)

Part 1 - Introduction to the Arctic PPT (15 minutes)
Driving Question(s): Why do we care about the Arctic?

Use the Introduction to the Arctic PPT **(slides A-F)** to provide students with background information about the Arctic. See PPT Presenter notes for additional information.

- Students complete warm up on their student worksheet

Teacher Tip:

- To complete the entire lesson in one, 60-minute class period, the teacher must be aware of the suggested instructional time for each Part.

Part 2 - Defining the Arctic (15 minutes)
Driving Question(s): Why do we care about the Arctic?

Refer to the Introduction to the Arctic PPT **(slides G-J)**, and follow the steps below to complete the "Definitions of the Arctic" map

- 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)

Optional Extension: After completing Steps 1 and 2 above, ask students the following questions: (See PPT Presenter notes for answers).

- 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 3 - Who owns the Arctic? (15 minutes)
Driving Question(s): Why should we care about the Arctic?

Introduction to Video **(slide K)**:

- 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.*

Watch "It's time to draw borders on the Arctic Ocean" video from 1:56-6:08.

- Students answer video questions (see student worksheet)
- Review video questions as a whole class
- If time, use the "Introduction to the Arctic PPT" **(slides L-Q)** to supplement the whole class discussion of video questions. Slides have been "skipped". You will need to right click and unskip slides to project them as part of your presentation.

What happens in the Arctic doesn't stay in the Arctic **(slide R)**:

- Read PPT presenter notes to describe to students how a changing Arctic climate will impact the climate at lower latitudes.

Optional Extension **(slide V):** Best for high school students.
Watch Changes in Polar Regions video from 0-2:56 to supplement the **slide R** discussion.
See prompts in PPT presenter notes.

Part 4 - Preparing for a Changing Arctic(10 minutes)

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

Use the Introduction to the Arctic PPT **(slide S)** to describe three ways the Arctic is changing.

- Students take notes by writing the underlined words on their worksheets.
- 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)

Introduce the "Exploring the New and Old Arctic unit **(slide T)**:

- 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 anchoring phenomenon: How have scientific questions, methods, technologies, and our knowledge of the Arctic changed over time?*

Introduce the Summary Table **(slide U)** - Tool the class will use to keep track of similarities and differences between the two expeditions.

- If time, students should record the summary table in their science notebooks

Optional Extension: Exit Ticket/Homework (Done in class if there is time, or can be completed as a homework assignment).

- Students provide a short explanation and create a sketch to answer the driving question, "Why should we care about the Arctic?"

Answer Key
Student Worksheet: Introduction to the Arctic

Part 1 - Introduction to the Arctic
Warm up: Answers will vary.

Part 2 - Defining the Arctic
See example map

Part 3 - Who owns the Arctic?

1. Russia
2. Natural resources (oil, gas) and access to the Arctic for future shipping routes and tourism opportunities
3. Demonstrate that the continental shelf extends from their borders.

Part 4 - Preparing for the Future

1. Arctic temperatures are increasing and Arctic sea ice is declining.
2. Increased access to the Arctic (Natural resources, shipping routes, tourism).
3. Arctic climate change will impact the climate at lower latitudes.

Optional - Exit Ticket/Homework
Exit Ticket: Answers will vary.