Part B: Do you really want to visit the Arctic? - Teacher Guide

Setting the Stage

Students rearrange into *Research Teams* (each team will contain one member from each of the research groups). The research teams describe their parameter and then synthesize the data to determine the best time of year to visit the Arctic.



Eureka, Canada, from the air. Photo Credit: Wikimedia Commons

Lesson Overview

In this lesson, students will determine the best time to visit the Arctic:

- ***Lesson 1*** *– (15 min) Defining the Research Purpose and Timing*
  Students will discuss the purpose of their trip to the Arctic, identifying what they are studying and considering the best time of the year for their research.
- ***Lesson 2*** *– (25 min) Sharing and Summarizing Weather Data*
  Research teams form with different experts. Students will serve as experts in different research teams and work with other experts on planning a trip to Eureka
- ***Lesson 3*** *– (20 min) Determining the best time to visit Eureka*
  Students will collaborate to determine the most suitable time to visit the Arctic.

This project is funded by NSF, Award number 1107428

Instructional Overview	
Grade Level	Middle/High School
Instructional Time	60 minutes *(total time needed)*
Activity 2 Goals	● Read and interpret Arctic data graphs ● Compare seasonal weather patterns in the Arctic ● Synthesize data from four different datasets to determine the optimal time to visit the Arctic. ● Define winter using meteorological data ● Compare Arctic weather to weather in their hometown
Lesson Driving Question	● How do different weather variables (air temperature, wind speed, snow depth, incoming radiation) vary throughout the year in Eureka, and how do they impact travel decisions? ● How do weather conditions in the Arctic compare to those in your hometown?
Building Toward	NGSS: ESS2D, LS2C
Three Dimensions	Science and Engineering Practices: ● Analyzing and Interpreting Data ● Constructing Explanations and Designing Solutions ● Obtaining, Evaluating, and Communicating Information Disciplinary Core Ideas: ● ESS3: Earth and Human Activity Crosscutting Concepts: ● Systems and System Models ● Stability and Change
Materials	❑ Student Jigsaw Worksheet ❑ Student Worksheet (Student worksheet includes both Part A and Part C questions) ❑ Jigsaw graphs ❑ Computers with Google Earth installed and internet connectivity ❑ PowerPoint with all relevant images and graphs (slides 25-25)
Material Preparation	❑ Print a student worksheet for each student ❑ Print Jigsaw worksheet for each research team ❑ Print Jigsaw graphs for each research team

Part B – Research Teams

Applying weather knowledge to traveling to the Arctic

Recombine the teams so that each Research Team has one member of each of the four Research Groups. Your newly formed team assembles experts from each aspect of the Eureka weather conditions. Each team member will contribute information they learned in Part A of this activity to assist in the decision about when to visit Eureka.

Each team has a particular reason they are visiting the Arctic, so they need to combine the purpose of the visit with the conditions at Eureka during different times of the year.

- Research Team 1 – Testing a fat-tired bicycle for travel across a snowy surface for field research
- Research Team 2 – Collecting seeds from Arctic wildflowers
- Research Team 3 – Astronomy research and photographing the night sky
- Research Team 4 – Annual visit to maintain the meteorological instruments on the tower

Lesson 1: Defining the Research Purpose and Timing *(15 min)*

The team should first consider the purpose of their trip. What are they studying? What time of year would work best for this purpose?

Purpose of trip:

Conditions needed to engage in the research mission:

- Research Team 1 – Testing a fat-tired bicycle for travel across a snowy surface for field research.
- Research Team 2 – Collecting seeds from Arctic wildflowers
- Research Team 3 – Astronomy research and photographing the night sky
- Research Team 4 – Annual visit to maintain the meteorological instruments on the tower

Lesson 2: Sharing and Summarizing Weather Data *(25 min)*

In turn, each team member will describe the highs and lows for the parameter they examined. They will also describe when the best time of year would be to visit Eureka based on their particular variable **and** the research purpose. Everyone should write down the summary for each weather parameter on their own worksheet.

Best time of year to visit and why

Air temperature:

Wind speed:

Snow depth:

Incoming radiation:

After every team member has presented their data summary, the whole group should decide on a time of year that makes the most sense to plan for an Arctic visit. This answer should take into consideration both the research mission of the trip and the meteorological conditions necessary to engage in the research mission.

Lesson 3: Best overall time of the year to visit Eureka *(20 min)*

How does the Eureka weather compare to the weather in your hometown?

(A good place to look is the NOAA Climate Data Online
http://www.ncdc.noaa.gov/cdo-web/datasets
or for mountain regions of the Western US, you can find data (including snowfall and snow depth) here: http://www.wcc.nrcs.usda.gov/snow/)

Would you, personally, want to take a trip to the Arctic? Why or why not? What time of year would you want to go?

Find more curriculum here:
https://ceee.colorado.edu/lesson/arctic-climate-connections