

Lesson 3 | What is the history of the Earth's climate and how do we know? Prior Requirements:

It is preferable for the students to have completed Lessons 1 & 2 from this mini unit to have the best understanding of climate change basics and terminology.

Learning Objectives:	National Curriculum Links:
Students will explore the long-term patterns of climate change on the Earth, focusing on the correlation between CO ₂ and temperature. By the end of the lesson, students should be able to identify patterns and understand the significance of historical climate data.	 Geography Objectives Physical geography relating to: continental drift and plate tectonics; rocks, weathering and soils; weather and climate, including climate change; and glaciation, hydrology and coasts. Understand how human and physical processes interact to influence, and change, landscapes, environments, and the climate; and how human activity relies on effective functioning of natural systems.

Success Criteria (in "child friendly' language):

I understand how we measure the changes in climate from the past using ice core data. I understand why it is important to measure CO₂ levels and keep track of atmospheric temperatures.

I understand how temperatures levels and CO₂ levels are correlated.

I understand the difference between correlation and causation.

I can explain where the Keeling Curve came from and what it shows.

I can explain the Industrial Revolution and its role in the rise in CO₂ levels.

Key Language:

Carbon dioxide, atmosphere, graphs, ice cores, causation, correlation, Keeling Curve, Industrial Revolution, CO₂ concentrations

Introduction (5-7minutes)

- 1. Pose the question: "How can we know about the history of the climate?"
- 2. Elicit responses, guiding students to two main answers:
 - a. Direct measurements (current temperature, atmospheric gases, etc.)









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 Indirect evidence from times before human record-keeping (chemical and structural signatures in rocks, fossils, crystals, ocean sediments, tree rings, fossilized reefs, etc.)

Main Activities (40 minutes)

Activity 1:

Historical Temperature Data Analysis:

- Divide the class into small groups and provide each group with historical temperature data (800,000 yrs.). This data should stop just before the Industrial Revolution.
- Instruct students to discuss patterns they observe in the data.
- Each group should formulate three statements about the data they're examining.
- Each group should formulate three "How/Why" questions about the data they're examining.

Predicting CO₂ Levels:

- Based on the temperature data, each group should make a prediction about what CO₂ levels might look like over the same period.
- They should sketch their prediction directly onto the temperature graph.

Ice Core Video:

• Show a video about ice core samples, explaining how they provide a record of past CO₂ levels.

Comparing Predictions with Actual CO₂ Data:

- Distribute the actual CO₂ data from ice core samples to each group.
- Students should compare their predictions with the actual data, noting similarities and differences.

Activity 2:

Introduce the Keeling Curve - Video and PowerPoint.

Show students data from the Keeling Curve.

- As a class, discuss what this data means for the climate based on the historical data.
- Discuss the causation of increased CO₂ the Industrial Revolution and the burning of fossil fuels, as well as cutting down forests.

Distribute the worksheet to the students.

• Allow students a couple of minutes to jot down their answers (10 mins)











Conclusion (10 minutes)

- Ask a few groups to share their observations and answers. Use this as an opportunity to informally assess learning and address any common misconceptions about the information as needed.
- Highlight the importance of the Keeling Curve as evidence of human influence on atmospheric CO₂ levels and, by extension, climate change.











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