UNDERSTANDING EARTH'S CHANGING CLIMATE

Explore climate change, and learn how it will impact our future.

Exploring Climate Change

LESSON 1

Grade Level: 6-12 | **Duration:** 1-2 class periods

Students Will Be Able To:

- Differentiate between weather and climate
- Differentiate between climate change and global warming
- Explain the methods scientists use to study climate change
- Analyze graphical representations of data exhibiting climate change

Materials Needed:

- Paper
- Pencils or pens
- Discussion cards
- Global Temperature and Carbon Dioxide worksheet

In the Teachers Guide

- Weather, Climate, Global Warming, and Climate Change
- Investigative Processes for Studying Climate Change
- Human Activity as the Main Driver of Climate Change
- Graphical Representations of Climate Change Data

RESOURCES

Articles

- Frequently Asked Questions About Climate Change
- Basics of Climate Change
- Climate at the core: How scientists study ice cores to reveal Earth's climate history
- Past Climate

Videos

- How Carbon Affects Nearly Everything on Earth
- Frozen in Time: Climate Clues Hidden in Ice

Created in partnership with scientists and educators.

Environmental Literacy Project

LESSON 1: 5E LESSON

UNDERSTANDING EARTH'S CHANGING CLIMATE

Explore climate change and learn how it will impact our future.

1 ENGAGE:

1. Choose an article or video to share with the class.
2. Ask students the essential questions:
   - What is climate change?
   - How do scientists determine that the climate is changing?
   - How quickly are these changes taking place?
3. Have a class discussion to better understand students' prior knowledge on climate change. Ask students what comes to mind when they hear the terms weather, climate, climate change, and global warming.

2 EXPLORE:

1. Provide students with access to the additional resources listed in the lesson plan.
2. Have students watch the videos and read the related articles.
3. Instruct students to brainstorm and share ways to determine that the climate is changing.

3 EXPLAIN:

1. Review the difference between climate change, weather, and global warming with the class.
2. Explain the investigative processes that scientists use to document and monitor climate change.
3. Discuss why scientists believe human activity is the main driver of climate change.
4. Analyze graphical representations of data exhibiting climate change, focusing on the relationship between CO_2 levels and temperature.

Use the discussion cards to further conversations.

4 ELABORATE:

1. Encourage students to explore other methods scientists use to study long-term climate change. They can write, discuss, or debate their findings.
2. Optional Activity Extension: Have students create double line graphs with regional data, illustrating changes in temperature and precipitation.

Use the Global Temperature and Carbon Dioxide worksheet for the graphing activity.

5 EVALUATE:

1. To wrap up, have a similar conversation as you did at the beginning. Ask students what comes to mind when they hear the terms weather, climate, climate change, and global warming. How has their understanding grown or shifted?
2. Provide an opportunity in class for students to share their reflections with their classmates.

CLOSURE OR EXIT TICKET:

Reflect on the importance of understanding climate change and the role each individual plays in addressing it. Emphasize the significance of scientific research in informing our understanding of Earth's changing climate and the need for continued investigation and action.

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Discussion Cards: Use these questions to prompt discussions and encourage students to think critically about climate change and its implications.

What is the difference between weather and climate?

Can you summarize what climate change entails?

How does climate change differ from global warming?

What are some observable signs of climate change?

How do changes in temperature and weather patterns serve as evidence of climate change?

How is climate change impacting various aspects of our lives and environments?

What role do ice cores play in understanding Earth's climate history?

Can you explain the significance of increased carbon dioxide levels?

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Discussion Cards: Use these questions to prompt discussions and encourage students to think critically about climate change and its implications.

What are some human activities that contribute to climate change?

How does the increase in greenhouse gas concentrations from human activities impact Earth's climate?

Is greenhouse gas production the same for all activities, or are some activities worse than others?

Why do scientists believe human activity is the main driver of climate change?

What are some potential consequences of climate change for ecosystems and human societies?

How can individuals and communities take action to mitigate climate change?

In your opinion, why is it important for everyone to understand and address climate change?

What do you wish people would better understand about climate change?

LESSON 1: WORKSHEET

Name: _____

Date: _____

GLOBAL TEMPERATURE AND CARBON DIOXIDE

Observe the correlation between the two through data and graphing.

Directions: Analyze the data below to study the relationship between CO_2 and temperature. Create a double line graph that illustrates the change in average global temperature and average global CO_2 concentration from 1880 to 2020. How has it changed over time?

QUESTIONS TO ASK

What patterns or trends do you notice in the graph?

What do you think the carbon dioxide concentration and temperature will be 10 years from now?

What is the relationship between CO_2 levels and temperature?

Approximately what year did the concentration of CO_2 first exceed 300 ppm?

Average Global Temperature and CO_2 Concentration from 1880 to 2020

Sources: NASA GISS; NOAA ESRL; Worldwatch

	1880	1890	1900	1910	1920	1930	1940	1950	1960	1970	1980	1990	2000	2010	2020
Temperature (degrees F)	56.82	56.61	56.93	56.37	56.71	56.98	57.33	56.86	57.13	57.27	57.60	57.90	57.92	58.39	58.80
CO_2 (ppm)	290.74	293.18	295.55	299.42	301.42	305.91	307.41	311.26	316.91	325.68	338.68	354.35	369.52	389.85	412.50