

Weather Vs. Climate

Lesson Summary

Students will play a game show to understand the difference between weather and climate. The instructor will do a demonstration to show one of the effects of climate change.

Time Allotment

50 minutes plus 90 minutes for movie

Materials

- Piece of butcher paper
- 5-7 ice cubes (ice tray in Resource Kit)
- 2 10 oz paper cups
- Permanent marker
- Game Show Statements
- 16 prizes

Per student:

- Climate Vs. Weather Reading

Advance Preparation

Make a mark on the paper cups 7.5 cm from the bottom.

Make sure ice cubes are frozen before doing the lesson.

Copy and cut out the Game Show Statements.

Arrange students in 2 teams.

Lesson Objectives

- Define weather and climate.
- Understand the difference between weather and climate.
- Understand one of the effects of climate change.

Illinois Goals and Standards for Middle/Junior High School

Science:

Goal 12: E.3a, E.3b

Language Arts:

Goal 1: A.3a, A.3b

Goal 4: A.3c, B.3d

Vocabulary

Atmosphere

Climate

Global climate change

Global warming

Weather

Background Information

Weather is defined as the state of the **atmosphere** at a given time and place, with respect to variables such as temperature, moisture, wind velocity, and barometric pressure. **Climate** is defined as the generally prevailing weather conditions of a region. So, what is the difference? Weather is what happens at a certain moment, while climate is the general description of all of the weather conditions in an area over a long period of time (usually decades or longer). For example, when someone says, "it's a cold winter day today," they are talking about the weather. If someone says, "Chicago winters are cold," they are describing the climate.

This difference is important to note, as **global climate change** is a current topic of interest for scientists. The term global climate change refers to sustained and significant changes in the Earth's temperature, wind patterns, and precipitation. Natural and human impact cause changes in the climate.

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The global climate has changed dramatically throughout the Earth's history. At times, the Earth has been much warmer than it currently is. For example, 70 million years ago during the late Cretaceous, the Earth was 6° C warmer, there was no polar ice, and a large inland sea covered most of what is now the United States (California, Montana, North and South Dakota, Nebraska, Kansas, Oklahoma, Texas, Louisiana, Mississippi, Alabama, Georgia, South Carolina, and Florida were all under water). The Earth has also been much colder than it currently is. One million years ago during the Pleistocene, the Earth was 4° C colder, and vast glaciers covered Canada and the northern parts of the United States (Chicago was under a sheet of ice even higher than the Sears Tower!). These changes are extreme, but they aren't the whole story - the rate at which climate change occurs is very important as well. Human activities have accelerated climate change, and the 1980s and 1990s were the warmest decades on record.

One aspect of global climate change is **global warming**. Global warming refers to the sustained increase in the Earth's average surface temperature. This rise in temperature has already begun to affect migration, growing seasons, mating seasons, and glaciers. One fear is that glaciers are melting more rapidly and in greater amounts than they have in the past. In the past, glaciers that were floating off shore were the only glaciers that melted each year. This melting and freezing does not affect the ocean's water level, as the mass of the ice is displacing the water level. With global warming, however, glaciers that are on land are melting. This melting adds to the oceans and increases sea levels. The long-term fear is that sea levels will rise

enough to submerge coastal cities and countries.

Initial Discussion

1. Tell the students that they will discuss two often confused terms today - weather and climate.
2. Hang up a piece of butcher paper or make room on the board to write. Split the paper in half by drawing a vertical line down the middle. On one side of the paper write weather. Ask the students to brainstorm some examples of weather. If necessary, encourage students to say things like "it's raining out" or "a warm summer." Accept all answers.
3. Once students can think of nothing else or there is no space, write "climate" on the other side of the paper. Now, have them think of examples of climate. This may be harder. Either encourage students with things like "it's hot near the equator" or "it never snows in Florida" or simply use the lack of idea to segue into the discussion of climate versus weather.
4. Hand out a Climate Vs. Weather reading to each student. Have the students read to themselves or read it together as a class.
5. Once students have finished reading,, return to the lists that were generated as examples of weather and climate. Are they all correct? Adjust any incorrect examples and add new ones, if necessary.
6. Explain to the class that weather is important for day to day, but that

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climate is important for a general idea of the rainfall and temperature of an area.

7. Discuss with students their thoughts on climate change from the previous lesson.
8. Tell the class that they will see a demonstration that illustrates one of the effects of the Earth getting warmer.

Hands-On Activity

9. In an area of the room where all the students can see, set up the demonstration. Place one ice cube in one of the paper cups and stack the remaining ice cubes in the other paper cup. Make sure the stack of ice cubes rises well above the marked line, which may mean they rise above the cup.
10. Once the ice cubes are in the cups, fill the cups up with water until the level of the water is even with the marked line. Leave the cups alone, allowing the ice cubes to melt while continuing on with the lesson. Tell the class that they will now play a game while waiting for the ice cubes to melt.
11. If not already in teams, split the class into two teams. Give each team 2 minutes to come up with a name.
12. Tell the class that they will play a game show. One contestant from each team will compete at a time. The teacher will read a statement and the contestants will have to determine if the statement is describing weather or climate.
13. Tell the class that before playing, each team must come up with 5 statements to add to the game. Explain that this

way they will know at least 5 answers. If necessary, give these as an example:

- Chicago gets very warm in the summer (climate).
- There was a heat wave this summer in Chicago (weather).

Also, the 5 statements may all be answered “weather” or “climate,” or can be some of each.

14. Once the teams have written their 5 statements and the teacher has collected all of them, call up the first 2 contestants.
15. Before reading the first statement, explain that when the contestant knows the answer they will write it on the board, or a piece of paper, and when they are done they will put down the chalk, or pencil, and raise their hand. The first contestant to raise their hand that has the correct answer gets a point.
16. Play until all the statements are read. The team with the most points wins the prizes.

Relate Activity to Concept

17. After the game, go back and look at the two cups. Have the students examine where the water level is in each cup. The cup with the stack of ice cubes should have a water level above the line, while the other cup remains the same.
18. Explain to the class how this is an example of the effects of global climate change that are becoming more obvious to scientists. Discuss the impacts and effects of climate change and rising sea levels (see Background Information).

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Global Expressions Journal

Prompt

Make a journal entry in the form of a mandala that depicts any aspect of climate or weather. It should reflect personal knowledge gained. Write a short Haiku poem about the Earth's atmosphere and attach as a signature.

Assessment

Read to the class all of the Game Show Statements and have students record the answer of “weather” or “climate” for each of them. Grade their responses.

Have students come up with 5 statements and their answer to add to the game on their own or individually. Grade them on accuracy.

Evaluate student participation and performance using the assessment rubrics in the back of the curriculum.

Extension Activity

An Inconvenient Truth

If students are interested in more information about climate change, show the film *An Inconvenient Truth*.

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Climate Vs. Weather Reading

How is climate related to weather? Well, weather is a bunch of events that happen **daily** in the atmosphere all over the world. For example, it could be hot, cold, rainy, snowy, windy or a combination of any of these. Climate is the collection of weather patterns in one part of the world **over a period of time**.

Here's a simple explanation of weather: it's the conditions that exist outside. The air, or atmosphere, around us behaves in different ways. It changes based on temperature and precipitation. It acts differently when it's calm or stormy, and clear or cloudy. The atmosphere reacts to everything from rain to sunshine.

A snow flurry is weather. Thunder and lightning are weather, too. Sometimes the atmosphere behaves violently, and sometimes it's peaceful and quiet. Either way, it's weather.

Meteorologists record the weather every day. The constant recording of weather information helps to determine the climate of an area.

Climate is the average weather in a location over a long period of time. A place that doesn't get much rain over many years would have a dry climate. A place where it stays cold for most of the year would have a cold climate.

Climate is useful for weather forecasting. It also helps determine when the best time would be for farmers to plant their crops. It could even be helpful for you and your family to plan a vacation.

In other words, look out your window any day, any time and you see weather. Look out your window every day for a month (or much longer), observe the weather each day, and you can determine the climate.

Adapted from http://weathereye.kgan.com/cadet/climate/climate_vs.html

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<i>Statement</i>	<i>Answer</i>
The summers here are warm and sometimes humid.	Climate
Cumulus clouds presently cover the entire sky.	Weather
Our lowest temperature last winter was -29°C .	Weather
The air temperature outside is 22°C .	Weather
December is our foggiest month.	Climate
The highest temperature in Chicago was 105°F recorded on July 24, 1934.	Weather
Snow is falling at the rate of 5 cm per hour.	Weather
Autumn in Chicago is mild enough to still go to the beach.	Climate
The average temperature for the month of January in Chicago is 29°F .	Climate
There was a heat wave this summer.	Weather
It is supposed to rain tomorrow.	Weather
That region has rain from August through June.	Climate
It hardly ever snows in Florida.	Climate
The sky is clear and sunny, but it's cold out.	Weather