

**The Minnesota Literacy Council created this curriculum with funding from the MN Department of Education. We invite you to adapt it for your own classrooms.**

**MASTER** **Climate Change Week 1 of 3**

**Unit Overview**

This is a 3-week unit. This unit was created in response to student requests for more high school science and social studies content.

**Unit Objectives:**

* Students will practice making and checking predictions as a reading comprehension strategy
* Students will practice scanning for information
* Students will practice using a dictionary (English as well as 1st language)
* Students will be able to explain, draw, or demonstrate the effects of greenhouse gases
* Students will be able to name 3 sources of greenhouse gases
* Students will be able to identify 3 things they can do to reduce greenhouse gas emissions

**MATERIALS**

**Online Materials:** There are many hyperlinks in this document. Hyperlinks are words you can click on to open a webpage. To use these just open the Microsoft Word version of this document. Click (or Ctrl +Click) on the underlined resource titles to open the webpage.

**Nat. Geo. Global Warming:** Johnson, Rebecca L., Science Issues Today: Global Warming. National Geographic School Publishing. Washington, D.C. 2002.

**Nat. Geo. Teacher’s Guide:** Johnson, Rebecca L., Science Issues Today: Global Warming Teacher’s Guide**.** National Geographic School Publishing. Washington, D.C. 2002.

**PreGED Science:** Northcutt, Ellen, Ed. PreGED Science. Steck-Vaughn. Austin, 2003.

**PreGED CTS:** Northcutt, Ellen, Ed. PreGED Critical Thinking Skills. Steck-Vaughn. Austin 2003.

**Supplemental Activities:** [Global Warming Supplemental Activities](http://teacherweb.com/MN/MLC/teach/Global_Warming_Supplemental_Activities.doc) [**http://tinyurl.com/5tcncz**](http://tinyurl.com/5tcncz)Jones, Jessica Grace. “Global Warming Supplemental Activities.” Minnesota Literacy Council, 2008.

**Daily Geo.:** Johnson, Sandi and Chyrl Light, Ed. Daily Geography Practice Grade 6. Evan-Moor Educational Publishers. Monterey, 2004. ISBN: 1-55799-975-9

**World View:** Lubawy, Susan. World View: A Global Sutdy of Geography, History, and Culture. Linmore Publishing, Inc. Palatine, 2000. ISBN: 0-916591-30-1

**Climate Change: Monday, Week 1 of 3**
What is climate change?

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| **Lesson Objectives:** | **Materials** |
| Students will...* learn vocabulary related to global warming
* practice making and checking predictions
* practice scanning for information
* generate questions about global warming
 | **Nat. Geo. Global Warming:** p4-7**Nat. Geo. Global Warming:**  p.27 |

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| **Activity Ideas:** |
| * Find out what students already know about global warming
* Make a chart of student predictions about what information will be in the book. Leave this chart in the classroom so that students can check their predictions as they read different sections of the book.
* Before reading the Global Warming text, give students 3-5 comprehension questions. Discuss the questions and any unfamiliar vocabulary. Give students a time limit to scan for the answers to the questions. Discuss how “scanning” differs from the way they usually read. What are some documents that people usually scan? (bills, web pages, job ads, etc.)
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**Climate Change: Tuesday, Week 1 of 3**
What is the Greenhouse Effect?

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| **Lesson Objectives:** | **Materials:** |
| Students will...* Practice making and checking predictions
* Practice scanning for information
* Identify and analyze metaphors
 | * **Nat. Geo. Global Warming** p8-13
* **PreGED Science** p110-111 (Note: **this is challenging reading!** Use it if the students are ready to try something more difficult.)
* **“Greenhouse Effect in a Jar” activity (see below)**
* **Student Experiment Log for “Greenhouse Effect in a Jar” (see below)**
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| **Activity Ideas:** |
| * Look at the picture of the greenhouse on page 11. Explain that the greenhouse is a metaphor for what is happening to the planet. Have students identify how each part of the greenhouse (the glass, the sun, and the plants) corresponds with the planet Earth. Are there other metaphors that we could use to describe the “greenhouse” effect?
* The “Greenhouse Effect in a Jar” activity (see printout from [Cool Planet](http://www.primaveraviva.it/Download/Climate%20Chaos%20Introduction.pdf)  [**http://tinyurl.com/65nawn**](http://tinyurl.com/65nawn)**)**
* Remember to have students make predictions about what will happen and discuss the results of the experiment.
* Have students work in groups to create a poster diagram of the greenhouse effect using poster paper and markers. Provide a list of vocabulary to include in the diagram: atmosphere, earth, sun, carbon dioxide, gases, radiating heat
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**The Greenhouse Effect In A Jar**

**Grade Level:** K - 8

This simple experiment serves as an introduction to the greenhouse effect. Students can see for themselves the effects of a greenhouse, and relate this understanding to what occurs in our atmosphere.

**Objectives:**

1. Help students understand the greenhouse effect as a physical phenomenon.

2. Use simple experimentation techniques including: observing and recording data, use of a control, drawing conclusions from results, use of a model.

**Materials:**

For every group of (about) four students:

2 Small thermometers
1 Jar or other see-through container
1 Clock or watch
1 Copy of the worksheet
Sunlamp or access to a sunny area to perform the experiment

**Method:**

Group the students and distribute the materials. Each group should place their thermometers a few inches apart under the sunlamp or in direct sunlight.

Wait about three minutes so the thermometers will be giving accurate readings, and then have the students record the temperature readings on both thermometers as well as the time.

Each group should now place their jar over one of their thermometers, taking care that the jar does not cast a shadow over the uncovered one. If the thermometers are too large to remain horizontal inside the jars, it is fine to stand them against an inner side. Every minute, for ten minutes, the students should record the readings of both thermometers.

**Explanation**

The air over the exposed thermometer is constantly changing, and as it gets warm it is replaced by cooler air. Because the air in the jar cannot circulate to the rest of the room, this air stays in the sunlight and gets warmer and warmer. A similar trapping of heat happens in the Earth's atmosphere. Sunlight passes through the atmosphere and warms the Earth's surface. The heat radiating from the surface is trapped by greenhouse gasses. Without an atmosphere, the Earth's temperature would average about 0F. This warming due to heat-trapping gasses is called the "Greenhouse Effect." Both the atmosphere and the jar allow light to enter, but then trap that energy when it is converted to heat. They work differently, however, because the jar keeps in the heated air, while the greenhouse gasses absorb radiative heat.

**Going Further:**

Students can graph their data. To simulate global warming, the experiment can be done using two jars, one filled with air and the other with carbon dioxide.

**The Greenhouse Effect**

**Instructions**

1) Place the two thermometers in the sunlight for a few minutes to let them get warm.

2) Record the readings of both thermometers at the top of the columns.

3) Record the time next to the starting temperatures and place the jar over thermometer #1.

4) Every minute, record the readings of both thermometers without disturbing them.

 Data

 Observation Number Thermometer #1 Thermometer

 #2

 Time

 Start

 1

 2

 3

 4

 5

 6

 7

 8

 9

 10

**Greenhouse Effect in a Jar Student Log**

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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| --- | --- | --- |
| **Start Temp**. | **Thermometer 1:**   | **Thermometer 2:** |
|    |   |   |
| Time | Thermometer #1 (outside the jar) | Thermometer #2 (inside the jar) |
| 1 minute |     |   |
| 2 minutes |     |   |
| 3 minutes |     |   |
| 4 minutes |     |   |
| 5 minutes |     |   |
| 6 minutes |     |   |
| 7 minutes |     |   |
| 8 minutes |     |   |
| 9 minutes |     |   |
| 10 minutes |     |   |

**Climate Change: Wednesday, Week 1 of 3**
Effects of Global Warming: Melting Ice and Rising Sea Levels

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| **Lesson Objectives:** | **Materials:** |
| Students will...* Review and introduce new vocabulary
* Make connections between cause and effect.
* Form sentences using **because, since, therefore,** and **as a result**
 | * Nat. Geo. Global Warming p14-15
* Climate Kids (scroll down to [SEA ICE](http://climate.nasa.gov/kids/bigQuestions/planetHealthReport/))
* [A Student's Guide](http://www.epa.gov/climatechange/kids/impacts/index.html) to Global Climate Change
* Global Warming Supplement Act. p1 (see below)
* Wilkins Ice Sheet - <http://tinyurl.com/5jlsfb>

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| **Activity Ideas:** |
| * Look at the pictures and captions in the Nat. Geo. Book. Ask S's, "What do they tell you about the article? What do you think this part of the book is about?"
* Talk with a partner about which of the following things you would worry about most if they started disappearing (you may need pictures or other aides to describe these): Arctic ice, elephants, your country’s land, your savings, you country’s population, the size of your stomach and bottom, rainforests, your hair.
* Ask students to complete these sentences (Cause and effect)…

a. If sea levels rise,…b. If summers get hotter,…c. If artic ice melts,…d. If we keep creating greenhouse gases,…* Re-read the Nat. Geo. Article. Write down one question that you have. Have them ask other students and the teacher.
* Show before and after pictures of the Wilkins Ice Sheet (link under “Materials.” Ask students which is the earlier picture. How long do you think it took for this to happen? Is this a cause or effect of warmer temperatures? Pass out the map on the same page and ask students to find the ice sheet on the map. Can they find its approximate location on a globe?
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Using ‘**Because**’ and ‘**Since**’ to show cause and effect.

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| **CAUSE** | **EFFECT** |
| Global temperatures are rising. | Arctic ice is melting. |

**because** and **since** can be used to connect two complete sentences to show cause and effect.

1. Read the sentences below. Underline the causes in one color. Underline the effects in a different color.

 **Because** global temperatures are rising, arctic ice is melting.

 Arctic ice is melting **because** global temperatures are rising.

 **Since** global temperatures are rising, arctic ice is melting.

 Arctic ice is melting **since** global temperatures are rising.

1. Look at the position of the words **because** and **since**. Are these words placed before the cause or before the effect?

C. Fill in the chart with full sentences.

|  |  |
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| **CAUSE** | **EFFECT** |
| People are burning more fossil fuels. | There is more carbon dioxide in the atmosphere. |
| There are more greenhouse gases in the atmosphere. |  |
| Global temperatures are rising. | Glaciers are melting. |
|  | Sea levels are rising. |

D. Use the chart to help you write sentences about global warming using **because** and **since.**

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
5. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_­

Using ‘**Therefore**’ and ‘**As a result**’ to show cause and effect.

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| **CAUSE** | **EFFECT** |
| Global temperatures are rising. | Arctic ice is melting. |

**‘Therefore’** and ‘**as a result’** can be used to connect two complete sentences to show cause and effect.

1. Read the sentences below. Underline the causes in one color. Underline the effects in a different color.

Global temperatures are rising and **therefore**, arctic ice is melting.

 Global temperatures are rising and **as a result**, arctic ice is melting.

1. Look at the position of the words **therefore** and **as a result**. Are these words placed before the cause or before the effect?

C. Fill in the chart with full sentences.

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| --- | --- |
| **CAUSE** | **EFFECT** |
| Global temperatures are rising. | There will be changes in weather around the world. |
|  | We might see droughts in some parts of the world. |
| There will be more severe storms. |  |

D. Use the chart to help you write sentences about global warming using **therefore** and **as a result.**

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
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Drawing conclusions with **‘because’** and ‘**since’**

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| **OBSERVATION** | **CONCLUSION** |
| Burning fossil fuel contributes to global warming. | We should try to burn less fossil fuel. |

**because** and **since** can be used to connect two complete sentences to show a conclusion.

1. Read the sentences below. Underline the observations in one color. Underline the conclusions in a different color.
* **Because** burning fossil fuel contributes to global warming we should try to burn less fossil fuel.
* We should try to burn less fossil fuel **because** it contributes to global warming.
* **Since** burning fossil fuel contributes to global warming, we should try to burn less fossil fuel.
* We should try to burn less fossil fuel **since** it contributes to global warming.
1. Look at the position of the words **because** and **since**. Are these words placed before the observation or before the conclusion?

C. Fill in the chart with full sentences.

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| --- | --- |
| **OBSERVATION** | **CONCLUSION** |
| People are using more and more energy every year. |  |
| Solar power does not add to global warming. |  |
|  | We should try to save electricity. |

D. Use the chart to help you write sentences about energy use using **because** and **since.**

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
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Drawing conclusions with **‘therefore’** and ‘**as a result’**

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| **OBSERVATION** | **CONCLUSION** |
| Trees absorb carbon dioxide. | Forests help us fight global warming. |

**therefore** and **as a result** can be used to connect two complete sentences to show a conclusion.

1. Read the sentences below. Underline the observations in one color. Underline the conclusions in a different color.
* Trees absorb carbon dioxide and **therefore**, forests help us fight global warming.
* Trees absorb carbon dioxide and **as a result,** forests help us fight global warming.
1. Look at the position of the words **therefore** and **as a result**. Are these words placed before the observation or before the conclusion?

C. Fill in the chart with full sentences.

|  |  |
| --- | --- |
| **OBSERVATION** | **CONCLUSION** |
| Forests help us fight global warming. |  |
|  | People should plant more trees. |
| Rainforests are a source of many useful things. |  |

D. Use the chart to help you write sentences about deforestation using **therefore** and **as a result.**

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
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5. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_­

**Climate Change: Thursday, Week 1 of 3**
Effects of Global Warming: Weather Changes

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| **Lesson Objectives:** | **Materials:** |
| Students will... * Review and introduce new vocabulary.
* Practice making and checking predictions
* Identify cause and effect relationships
* Form sentences using **because, since, therefore,** and **as a result**
 | * **Nat. Geo. Global Warming**, p16-17
* [Effects of Climate Change](http://www.rbkc.gov.uk/coolit_resources/general/teachres02cchart3.pdf)[**http://tinyurl.com/67pg76**](http://tinyurl.com/67pg76)
* **PreGED CTS**, p108-109
* **Daily Geo**, p102-105
* Global Warming Supplement Act., p2 (See Wednesday materials)
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| **Activity Ideas:** |
| * Write previous vocabulary on notecards. Divide the class intro groups. Give each group a set of notecards. Students sort the cards into categories. The categories can be determined by the teacher or by the students.
* Introduce the word climate: look at the definition of climate in the glossary of *Nat. Geo. Global Warming,*look at the map in *Daily Geo.* Find Minnesota on the map. Ask students if the climate description matches their experience of weather in MN. How would they describe the climate in their home country? (If you have time later, return to p104-105 for more map reading practice).
* Ask students to scan the pictures and titles in *Nat. Geo. Global Warming* without reading the full-text. Ask students to describe the pictures. Who are these people? What are they doing and why? Have students read the text silently. Then discuss how the pictures support what is written in the text. Which parts of the text are illustrated by the pictures. Discuss vocabulary and re-red the text.
* Use the *Effects of Climate Change* chart as a prompt to help students discuss the effects of weather changes using cause and effect language (because, since, therefore, and as a result).
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