Document-Based Question: What is Causing Climate Change?

Your Task: You will examine various modern documents to determine what is causing Global Climate Change.

Source 1:

"Many factors, such as the sun, the Earth's orbit, and sometimes even volcanic eruptions, can affect the Earth's climate.

***The sun:** Since the 1970s, the sun has been cooling slightly. Over this same time period, the Earth has gotten warmer. Most of the warming has occurred in the lower atmosphere near the Earth's surface.*

***The Earth's tilt:** The way the Earth tilts on its axis and the way it circles the sun can influence the amount of the sun's energy that reaches the planet. As a result, changes in the Earth's orbit can cause the climate to change, but these changes happen very slowly, over tens to hundreds of thousands of years.*

***Volcanoes:** When volcanoes erupt, they release dust, ash, and other particles called aerosols. Some volcanic explosions are so strong that they throw these aerosols high enough into the atmosphere that they block some sunlight from reaching the Earth.*

1. What are the three potential causes of climate change listed above?

2. Is the sun responsible for climate change? Support your answer with information above.

3. Is the Earth's tilt responsible for climate change? Support your answer with information above.

4. Are volcanoes responsible for climate change? Support your answer with information above.

Source 2

"Fossil fuels are energy-providing materials formed from the long-dead remains of living things. Fossil fuels include coal, natural gas, and petroleum. For example, the gasoline in cars comes from petroleum, natural gas provides heat for homes, and many power plants burn coal to create electric power. Fossil fuels provide a tremendous amount of energy. In fact, most of the energy modern people use comes from burning fossil fuels.

Geologists believe fossil fuels come from living things that died millions of years ago. The remains eventually became buried with layers of sand and mud. Over time, the weight of these layers pressed down on the remains. The resulting pressure and heat, along with other natural processes, transformed the remains into the various fossil fuels.

There is a limited amount of fossil fuels. In addition, fossil fuels are formed by processes that take millions of years. As a result, fossil fuels are considered nonrenewable resources—that is, resources that cannot be replaced. Developed and developing countries use vast amounts of energy, rapidly depleting the supply of fossil fuels.

Burning fossil fuels also causes environmental problems, including air pollution and acid rain. Such burning also releases large amounts of carbon dioxide and other gases. The gases trap heat in Earth's atmosphere, contributing to global [climate change]."

-Lin, C.-Y. Cynthia. "Fossil fuel." *World Book Student.* World Book, 2013. Web. 18 Nov. 2013.

1. What are fossil fuels?

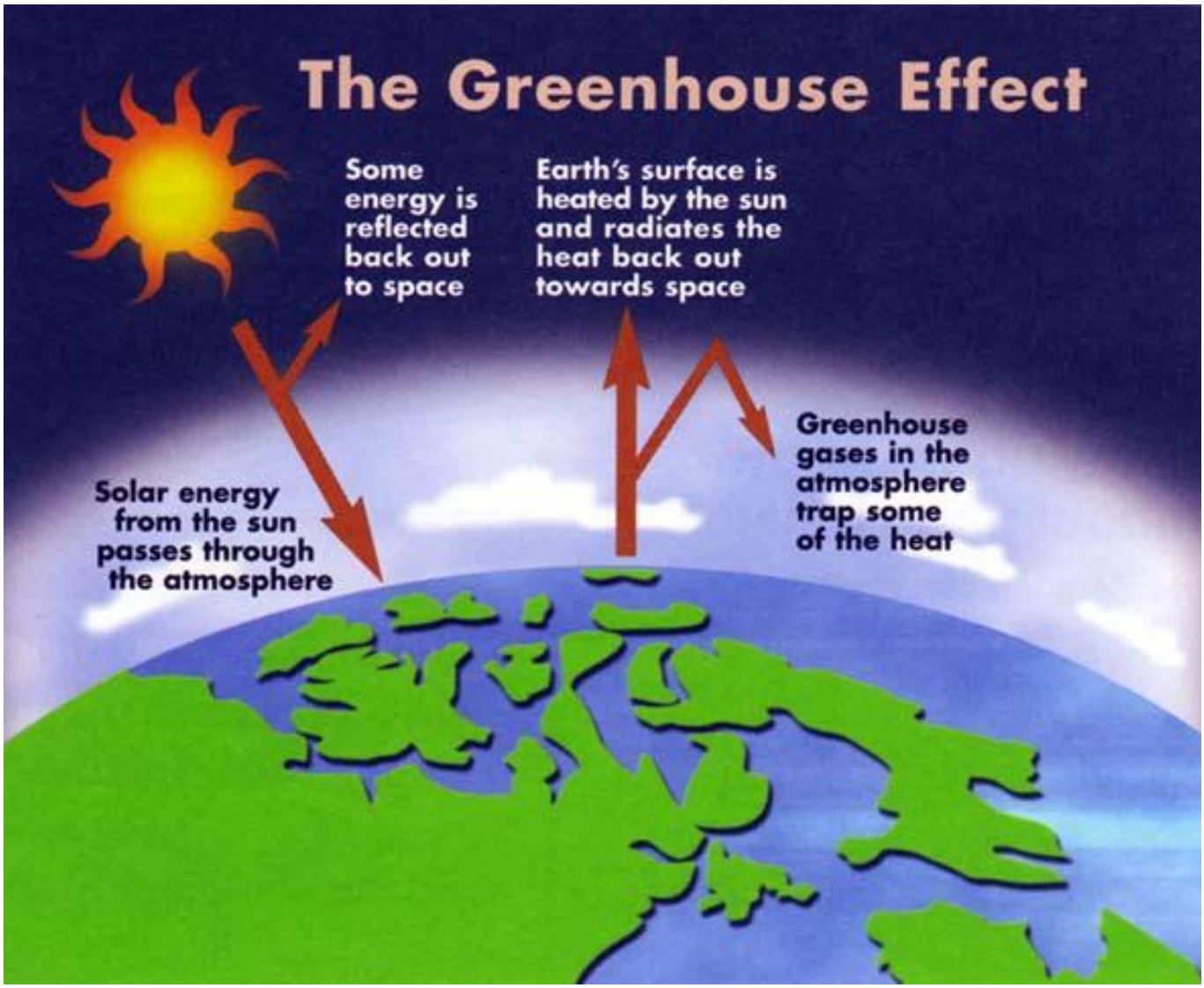
2. List 3 types of fossil fuels.

3. Describe how fossil fuels form.

4. What type of resource are fossil fuels? Explain.

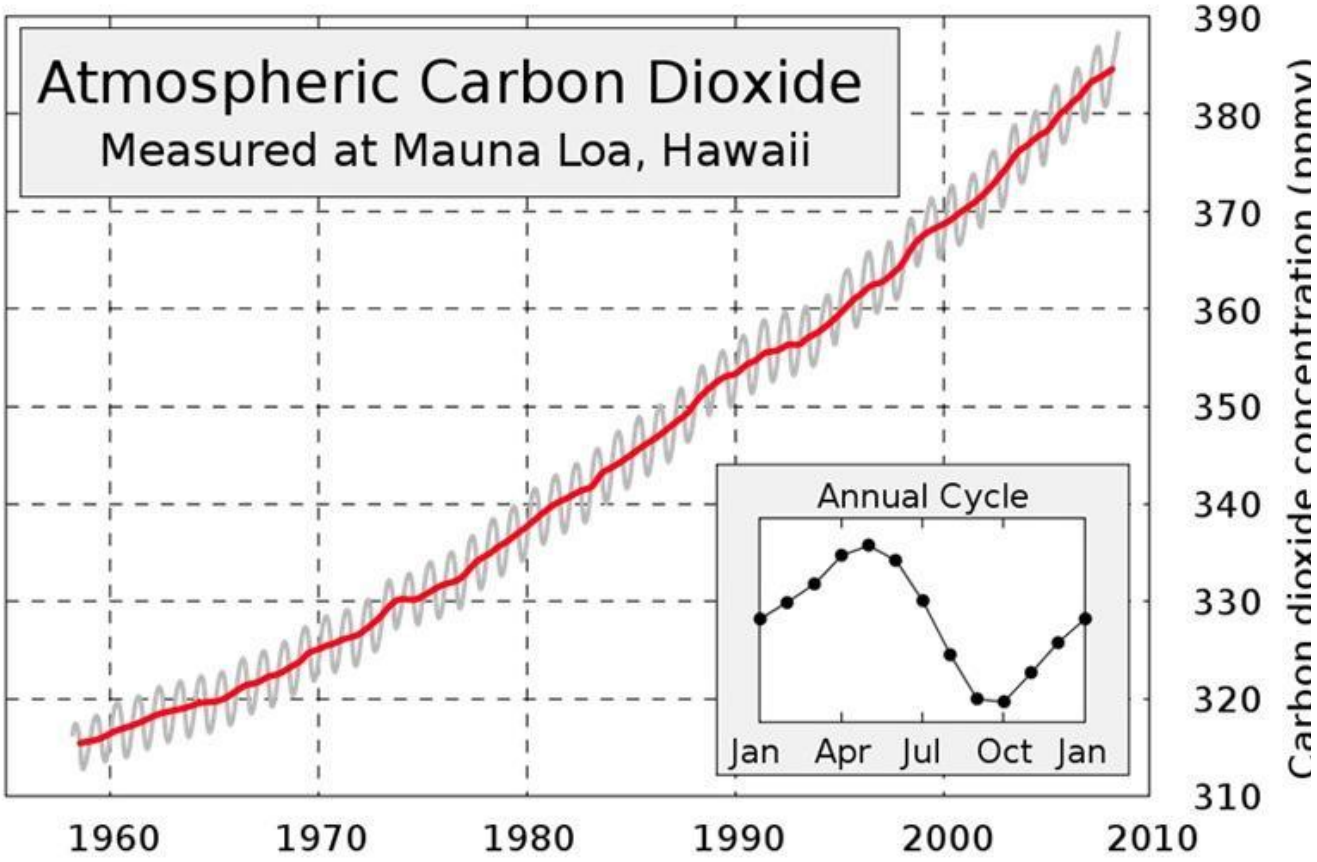
5. How are fossil fuels related to global climate change?

Source 3:



1. How does this diagram help explain how climate might change with increased pollution?

Source 4:



The Keeling Curve - The measured concentration of CO_2 in the atmosphere

Measurements made at Mauna Loa, Hawaii.

Source of data: CDIAC/SIO

Source of graph: Wikipedia - "Own work, from Image:Mauna Loa Carbon Dioxide.png, uploaded in Commons by Nils Simon under licence GFDL & CC-NC-SA ; itself creat by Robert A. Rohde from NOAA published data and is incorporated into the Global Warming Art project".

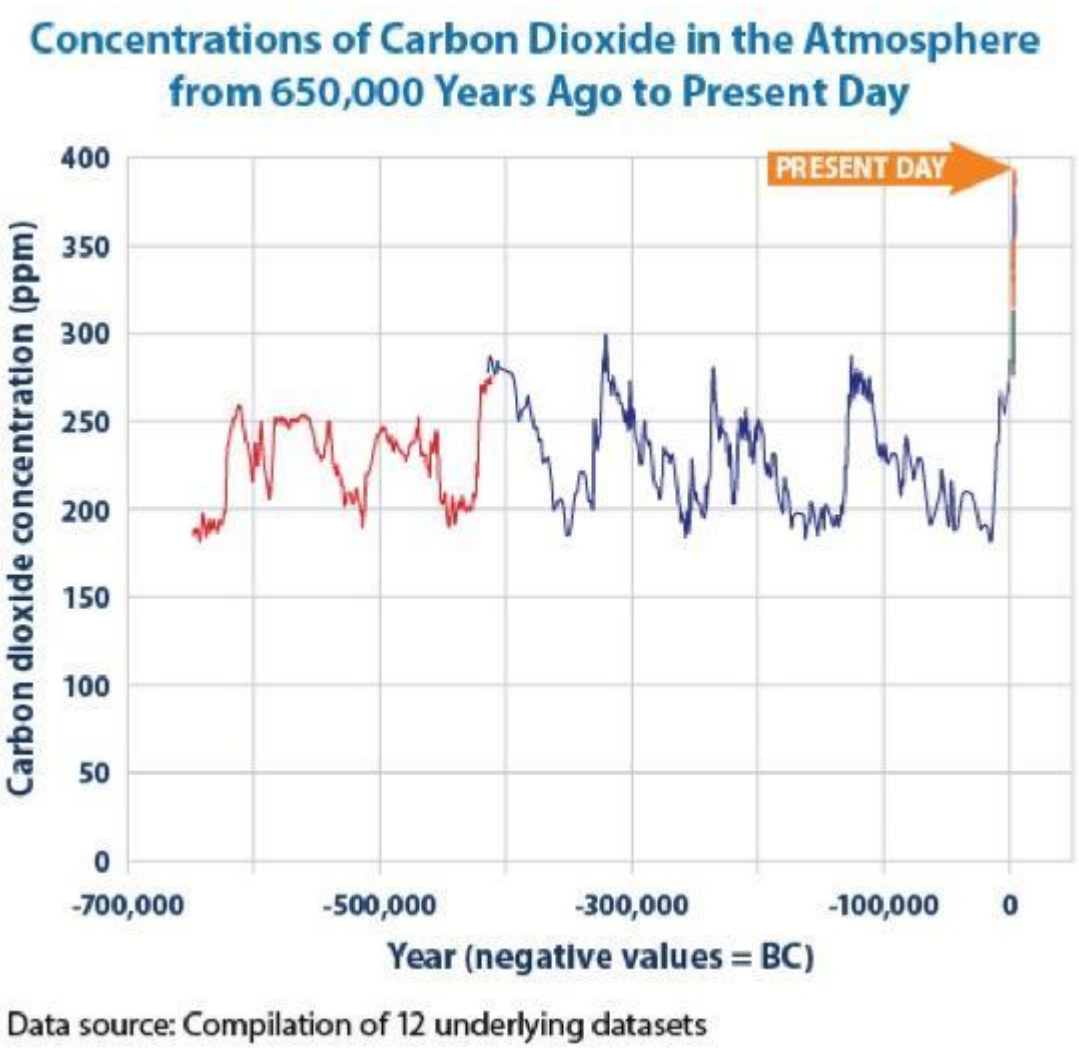
*<u>Note:</u> The atmosphere is comprised of a mixture of gases: oxygen, nitrogen, argon, and carbon dioxide, to name a few. The unit **ppmv** stands for "parts per million volume," a measure of the concentration of a particular gas in the atmosphere. Concentration refers to the amount of a particular gas that is present among a mixture of gases in the atmosphere. A higher concentration means that there is more of the particular gas.*

1. What information does this graph illustrate (ignore the annual cycle)?

2. What trend is shown in the data from 1960 to 2010?

3. How does the information in this graph support the idea that the Greenhouse Effect is causing global climate change?

Source 5:

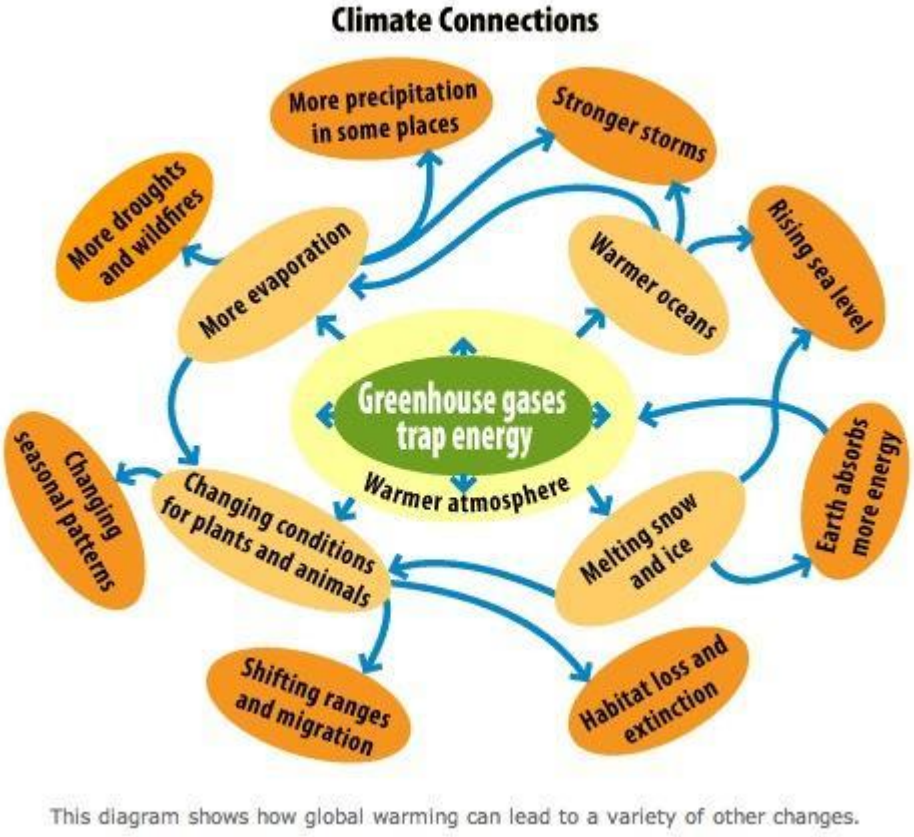


1. What information does this graph show?

As you can see from the graph, the concentration of carbon dioxide in the atmosphere cycles naturally up and down. Early humans only came into the picture around -200,000 years; you can see this on the graph where it changes in color from red to blue.

2. Many climate change skeptics claim that the modern-day increase in carbon dioxide concentration is due to a natural increase, not human activity. How does this graph support the idea that global climate change is influenced heavily by humans beyond the natural cycles?

Source 6:



This diagram shows how global warming can lead to a variety of other changes.

From: http://www.epa.gov/climatestudents/basics/concepts.html

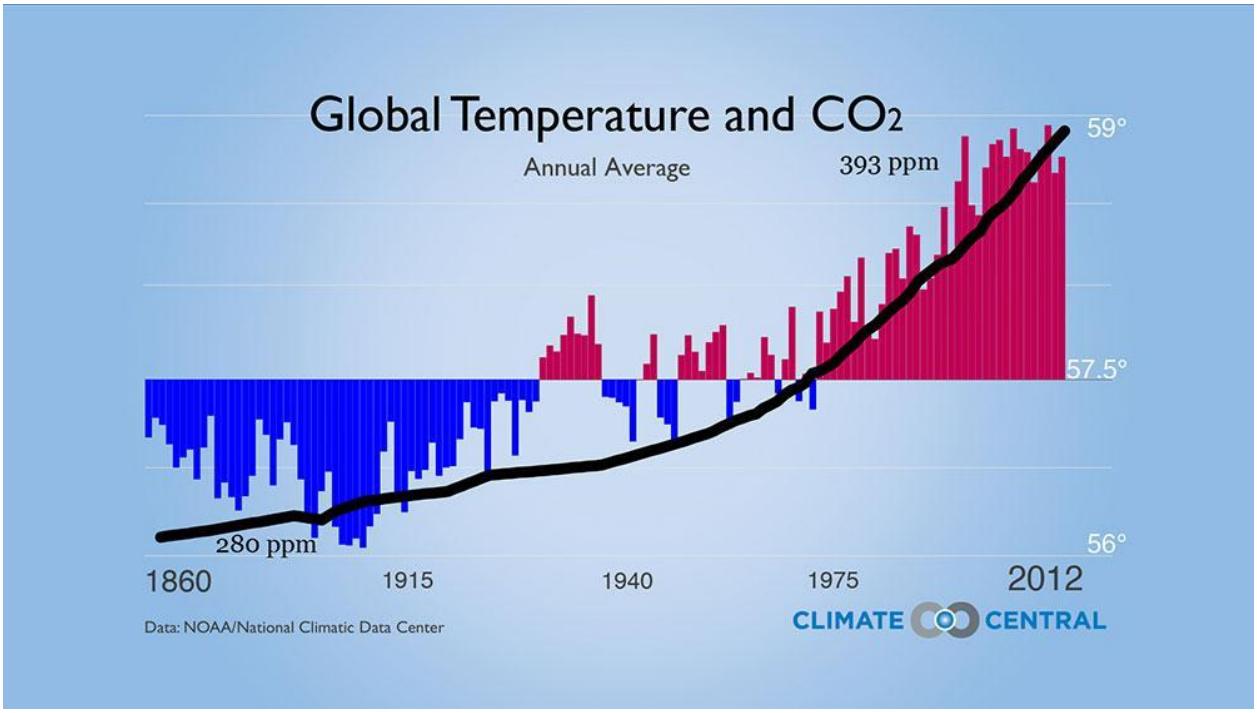
1. What information does this diagram show?

2. Trace a pathway from the center of the diagram out to “Habitat loss and extinction.” Describe each step along the way.

3. Describe the 4 effects that “More evaporation” can have on the Earth.

4. How does this diagram support the idea that the increase in greenhouse gases is causing climate change?

Source 7:



1. What two variables are plotted on this graph over time?

2. What is the relationship between these two variables?

3. How does the information in this graph support the idea that global climate change is caused by increases in greenhouse gases in the atmosphere?

Source 8:

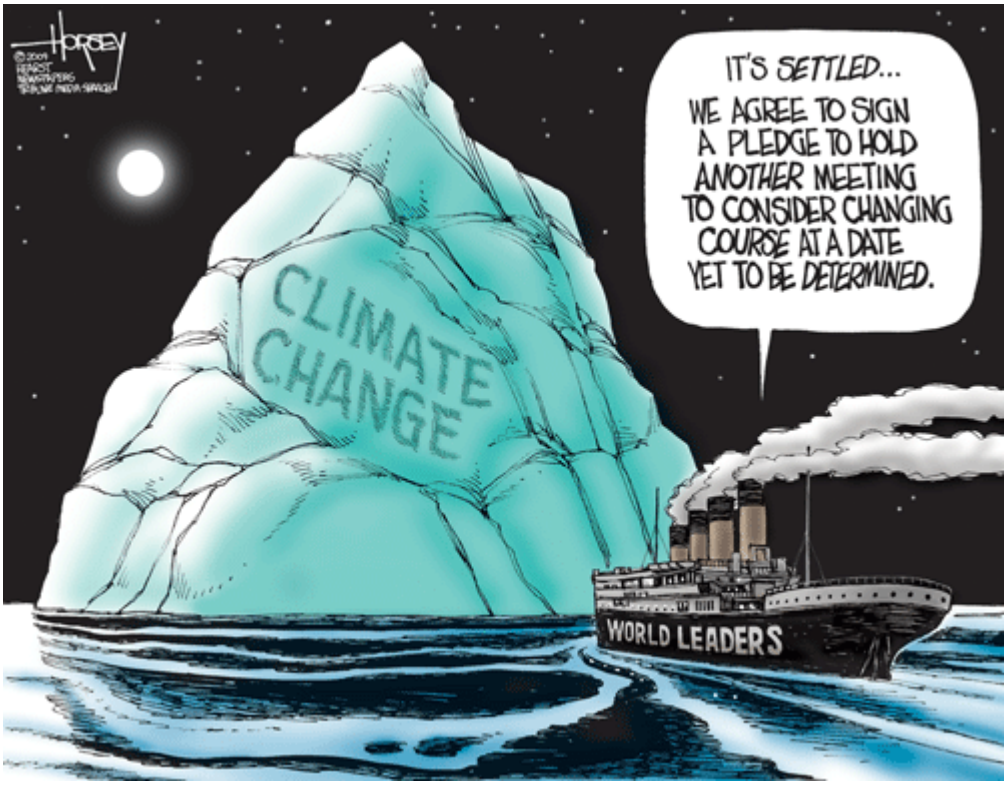
	Country	Total Emissions (Million Metric Tons of CO2)	Per Capita Emissions (Tons/Capita)
1.	China	6534	4.91
2.	United States	5833	19.18
3.	Russia	1729	12.29
4.	India	1495	1.31
5.	Japan	1214	9.54

2008. Energy Information Agency (Department of Energy) and Union of Concerned Scientists.

1. What is the difference between Total Emissions and Per Capita Emissions?

2. Why does China have higher total emissions but lower per capita emissions than the United States?

Source 9:



1. How does the object in this cartoon that represents climate change represent danger?

2. Why did the artist choose to represent the World Leaders as the Titanic?

3. What is the author's overall message about global climate change?