



Science Learning Packet

Grade 6:

Earth's Changing Climate, Lesson 8

Suggested science learning activities for SPS students during the COVID-19 school closure.

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Due to the COVID-19 closure, teachers were asked to provide packets of home activities. This is not intended to take the place of regular classroom instruction but will help supplement student learning and provide opportunities for student learning while they are absent from school. Assignments are not required or graded. Because of the unprecedented nature of this health crisis and the District's swift closure, some home activities may not be accessible.

If you have difficulty accessing the material or have any questions, please contact your student's teacher.



Grade 6 Science Learning Activity

Earth's Changing Climate Unit Instructional Materials

Lesson 8 (Amplify Lesson 3.1)

AmplifyScience



Earth's Changing Climate

Lesson 8: Climate Change Solutions

Investigation Question: What evidence do scientists use to support their claims about climate change?

Unit Investigation Question: Why is the ice on Earth's surface melting?



Lesson 8

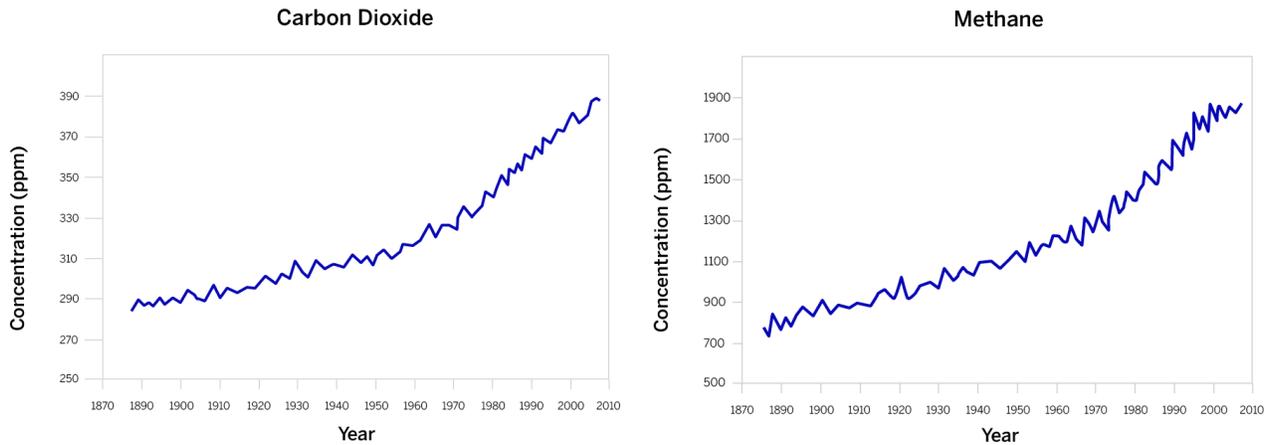
The Sim provides information about the kinds of human activities that increase carbon dioxide and methane, but we need to know whether these human activities have been changing over time—increasing or decreasing—in order to investigate whether they are actually causing the current change in climate. In the next part of this lesson, we will look at graphs that provide data about these activities. This data, together with information from the Sim, will provide us with a better understanding of why global average temperature is increasing.

Vocabulary you will use in this lesson:

- atmosphere
- carbon dioxide
- change
- claim
- climate
- climate change
- energy
- evidence
- methane
- model
- stability
- temperature

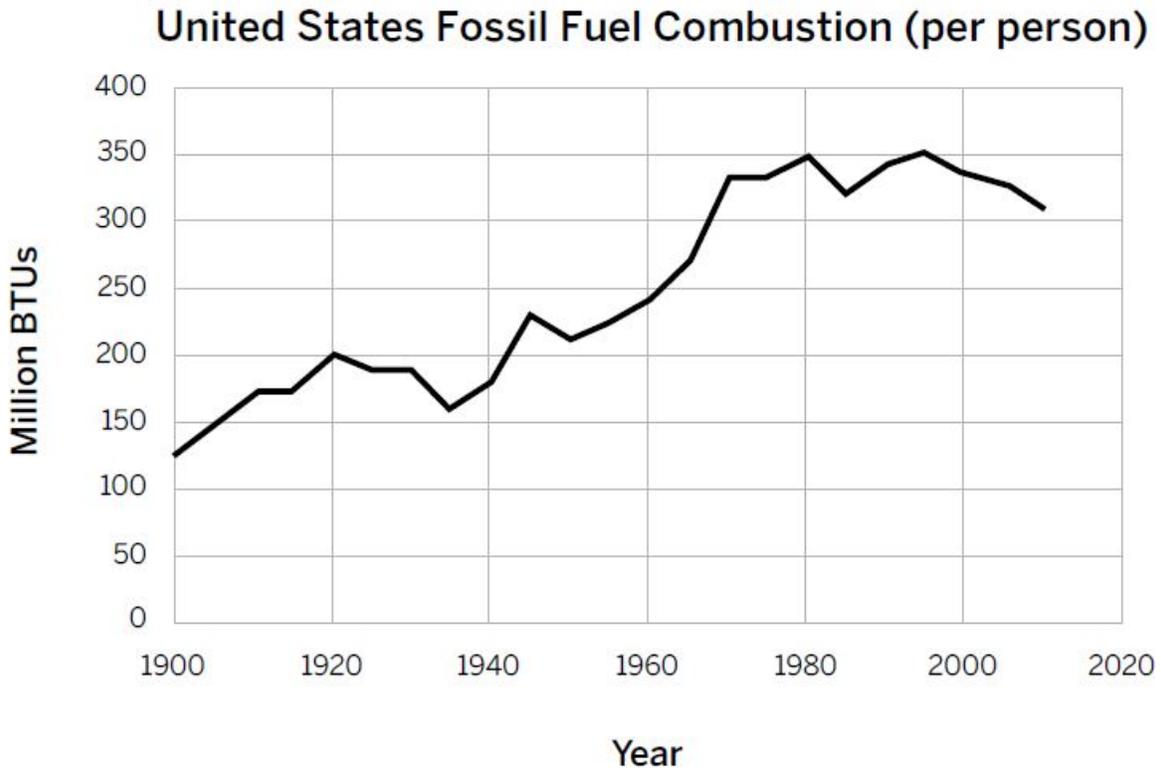
Lesson 8 – Part 1: Analyzing Human Activities Data

Investigation Question: Why are carbon dioxide and methane increasing in the atmosphere?

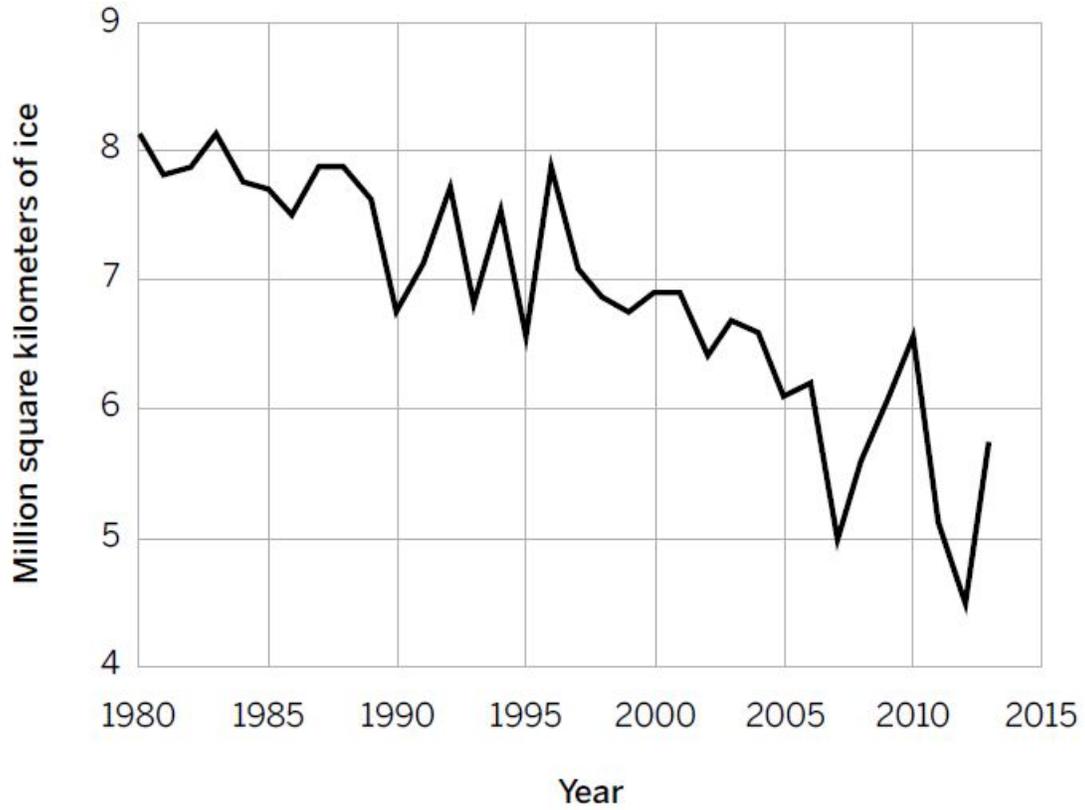


Carefully analyze the following four graphs. As you do so, consider the following:

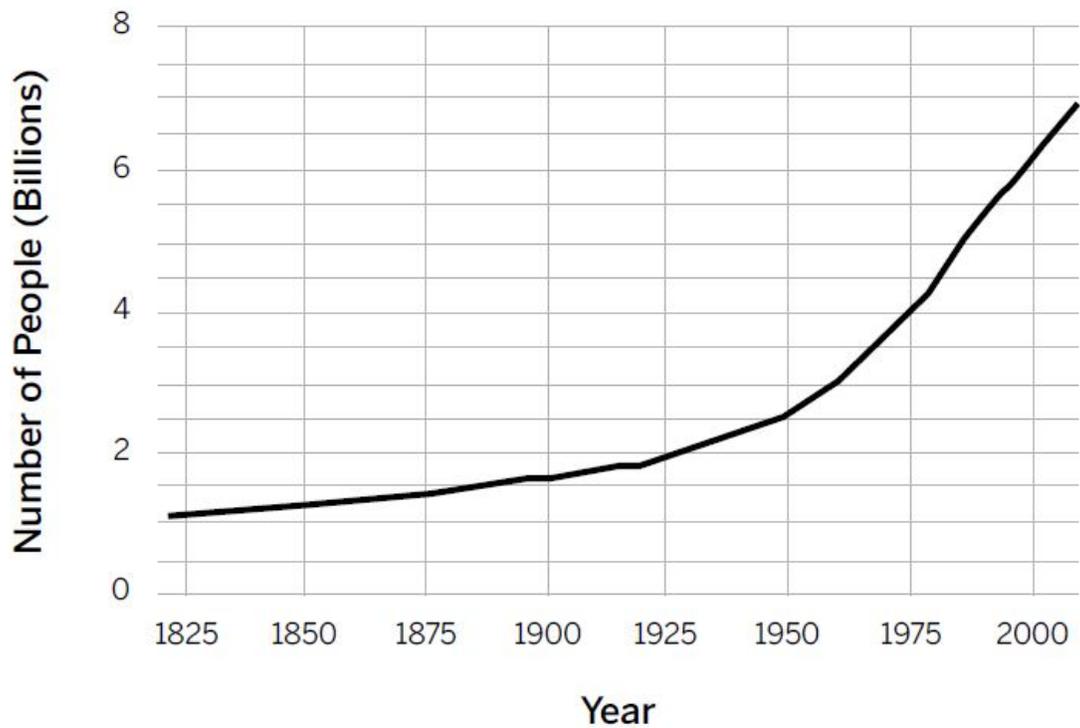
- Which evidence was strongest. Why?
- Which evidence was not as strong? Why?
- Look at the evidence you thought was strongest, and see if the trend on that card matches the trend for carbon dioxide or methane.



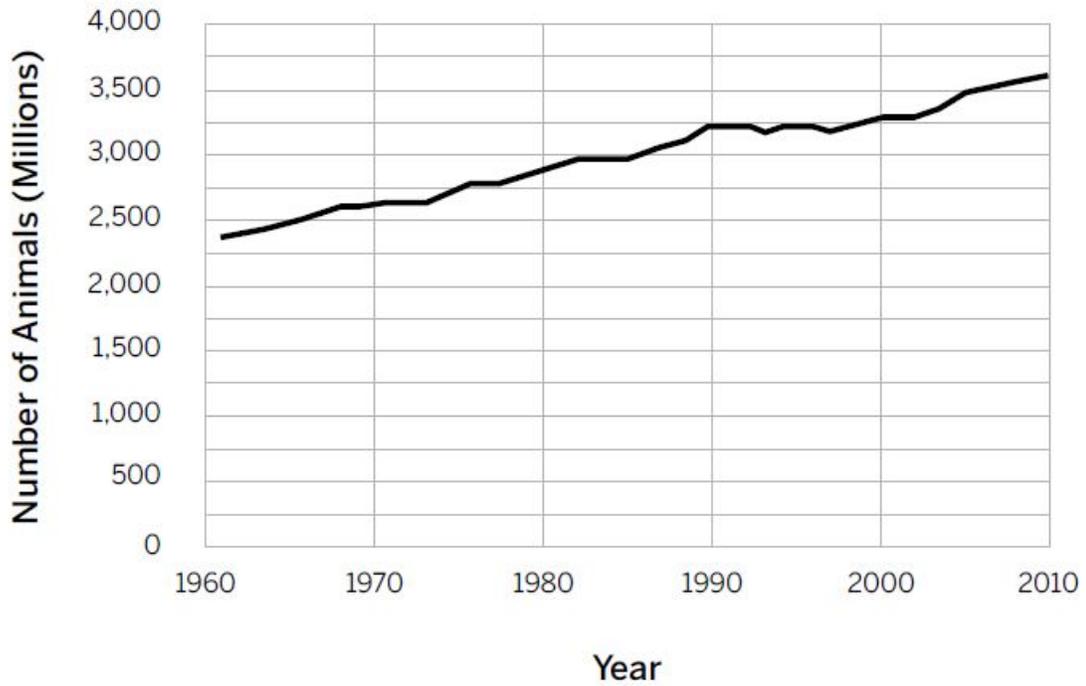
Amount of Summer Sea Ice in Arctic (1980–2013)



World Population 1820–2010



World Grass-Eating Livestock 1961–2010



After carefully analyzing the four graphs and comparing them to the graphs of increasing carbon dioxide and methane, what trends did you notice?

Lesson 8 – Part 2: Reading “Global Warming: A History of a Hot Debate”

You have learned a lot about how human activity is related to climate change. Read "Global Warming: A History of a Hot Debate" to learn about how scientists explored the role of human activities on climate, then answer the two questions at the end of the article.



When making goods in factories became more common, scientists began to research the effect of burning fuel on the atmosphere and on global temperatures.

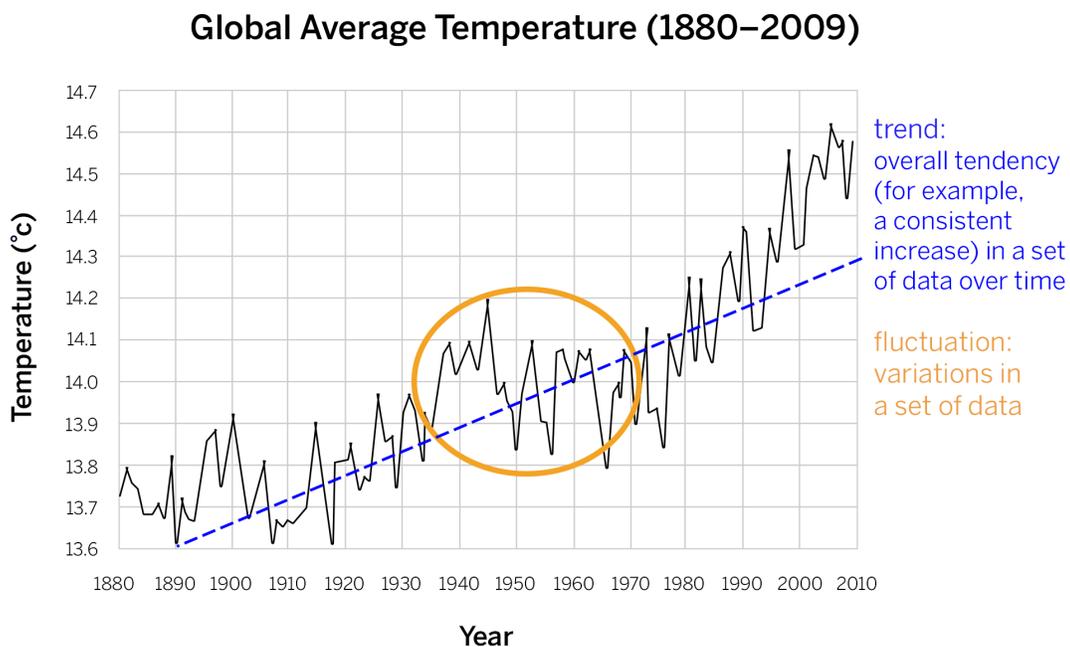
Today, scientists around the world agree that our planet is warming and that the rise in temperature is due to human activities over the past two hundred years. However, this level of agreement hasn't been around long! For hundreds of years, nobody knew exactly how carbon dioxide was affecting the planet or what kinds of effects humans had on the natural world. Many scientists had competing ideas that took centuries to work out.

Beginning in the nineteenth century, scientists understood that carbon dioxide and a few other types of gases in the atmosphere affected energy in the Earth system. They took measurements of the air in the atmosphere and Earth's temperature and found that global temperatures went up as the amount of carbon dioxide in the atmosphere increased. In 1896, a Swedish scientist named Svante Arrhenius (SVAN-tuh Ah-RAIN-ee-us) calculated that doubling the amount of carbon dioxide in the atmosphere would cause a temperature increase of 5 to 6 degrees Celsius (9 to 11 degrees Fahrenheit), while cutting the level of carbon dioxide in the atmosphere in half would be enough to cause a new ice age! The relationship between these gases in the atmosphere and global temperatures had become especially important in the nineteenth century as the first large factories began putting much more pollution into the air than before. The growth of factory-made goods and then the automobile meant that the atmosphere contained far more carbon dioxide than it had in all of human history.

In the twentieth century, scientists around the world studied the relationship between pollution in the atmosphere and Earth's temperature. However, they did not always agree about whether the carbon dioxide added to the atmosphere by humans would have effects on global temperatures, or about what those effects might be. Some agreed with Arrhenius and predicted warming due to carbon dioxide in the atmosphere. Others predicted that other types of pollution might cause the planet to cool rather than heat up: some types of pollution include tiny particles floating in the air, which block some of the sun's energy from reaching Earth's surface. They thought this cooling effect might be stronger than the heating effect of the carbon dioxide.

To determine what was really happening with Earth's atmosphere, scientists around the world needed more precise data. That kind of data became easier to get as computer technology improved and scientists were able to use better models to test their ideas. With the help of computers, the evidence began to show clearly that increases in gases like carbon dioxide and methane in the atmosphere happened at the same time as temperatures around the planet began to rise.

Today, scientists agree that Earth is getting warmer quickly, and that the rise in temperature is due to carbon dioxide and other gases released into the atmosphere by human activities. As technology improves today and in the future, scientists will learn even more about our effects on the planet—how we can solve some of the problems we've created. However, that is not enough to change how humans affect the planet. Scientists can describe the consequences of our actions, but society needs to decide what to do with that knowledge.



This graph shows the change in global temperature in degrees Celsius between the years 1880 and 2009.

Lesson 8 – Part 2: “Global Warming: A History of a Hot Debate” CONTINUED

1. What different ideas did scientists in the twentieth century have about the effect of adding carbon dioxide to the atmosphere?

2. What happened that made it easier for scientists to test their ideas about the effect of gases (such as carbon dioxide and methane) on the atmosphere?

 **Key Concept**

Carbon dioxide and methane in the atmosphere increase as a result of human activities, such as combustion.