Climate Cause Check

Use data and timescales to evaluate climate explanations

ESS.3.6 "Construct an explanation from data sets to obtain and evaluate scientific information to construct scientific arguments on changes in climate caused by various natural factors (e.g...."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline one claim about a natural cause and one claim about a human cause. Number the table columns 1 to 3 to trace the evidence from fossil fuel emissions to carbon dioxide to temperature.

What Explains the Warming?

(1) In 2020, a temperature sensor recorded one hot day in a city. That single reading cannot explain a global climate trend. Scientists instead combine measurements from many places and years. The table shows rounded global estimates. Temperature change is measured against the 1850 to 1900 average; a positive number means the planet was warmer than that baseline.

APPROXIMATE GLOBAL CLIMATE DATA

Year	Fossil fuel CO_2 emissions (billion tonnes per year)	Atmospheric CO_2 (parts per million)	Temperature change from 1850 to 1900 average (°C)
1900	2	296	0.0
1950	6	311	+0.2
2020	35	414	+1.2

(2) Several natural processes can shift climate. Changes in Earth's orbit alter where and when sunlight reaches Earth over thousands of years. Moving continents can redirect ocean currents over millions of years. Volcanic particles can briefly cool Earth by reflecting sunlight. These processes matter, but their timescales or cooling effects do not match the sharp warming shown in the table.

(3) Burning fossil fuels releases carbon dioxide, which traps heat. Livestock and rice fields release methane, another heat-trapping gas. The table shows fossil fuel emissions, carbon dioxide, and temperature rising together. That pattern alone does not prove causation. However, the gases' known heat-trapping effects and the mismatch with natural processes support human activity as the main cause of recent warming.

2 ANSWER WITH EVIDENCE

Use the passage

1. Use values from 1900 and 2020 to explain how the table supports a link between fossil fuel use and warming.

2. Why are changes in Earth's orbit a weaker explanation than human emissions for the warming shown in the table?

3. Compare the effect of volcanic particles with the temperature pattern in the table. Can volcanic particles explain that pattern?

4. What does the passage suggest about agriculture's role in warming, and what can the table not tell you about that role?

3 YOUR TURN

Your own words

A museum sign reads, "One hot summer proves humans caused global warming." Replace it with a four-sentence scientific argument that uses two numerical changes in the table, evaluates one natural explanation, and explains why one summer is not enough evidence.

ANSWER KEY

Climate Cause Check

HIGH SCHOOL · ESS.3.6

PART 1 · READ AND MARK

Underline one claim about a natural cause and one claim about a human cause. Number the table columns 1 to 3 to trace the evidence from fossil fuel emissions to carbon dioxide to temperature. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Use values from 1900 and 2020 to explain how the table supports a link between fossil fuel use and warming.	**Fossil fuel CO_2 emissions rose from about 2 to 35 billion tonnes per year, atmospheric CO_2 rose from 296 to 414 parts per million, and temperature change rose from 0.0°C to +1.2°C. These trends support a link, though the table alone does not prove causation.**
2	Why are changes in Earth's orbit a weaker explanation than human emissions for the warming shown in the table?	**Orbital changes affect sunlight over thousands of years, while the table shows sharp warming from 1900 to 2020 alongside rising emissions.**
3	Compare the effect of volcanic particles with the temperature pattern in the table. Can volcanic particles explain that pattern?	**Volcanic particles can briefly cool Earth, but the table shows warming from 1900 to 2020. Their effect does not explain that pattern.**
4	What does the passage suggest about agriculture's role in warming, and what can the table not tell you about that role?	**Livestock and rice fields release heat-trapping methane. The table has no agricultural or methane data, so it cannot show how much agriculture contributed.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

One hot summer in one place is not enough to establish a global climate trend. From 1900 to 2020, fossil fuel CO_2 emissions rose from about 2 to 35 billion tonnes per year, while atmospheric CO_2 rose from 296 to 414 parts per million. Global temperature change rose from 0.0°C to +1.2°C over the same period, consistent with carbon dioxide trapping heat. Orbital changes unfold over thousands of years, so they fit this warming less well than rising human emissions.

Accept arguments that connect the numerical trends to the heat-trapping mechanism without claiming the table alone proves causation. Natural-factor evaluations should match the passage's stated effects or timescales.