What Caused Warming?

Read the evidence, then ask questions that test possible causes.

MS-ESS3-5 "Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over time. [Clarification Statement: Examples of factors include human activities (such as fossil fuel combustion, cement production..."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline the sentence that warns against deciding a cause from one pattern, circle two possible causes of temperature change, and put a question mark beside one claim you would want to check with more evidence.

A Planet's Changing Temperature

1 Imagine checking Earth's temperature like a doctor checks for a fever. A single hot day says little about the whole planet, so scientists combine readings from many places over many years. The table shows rounded estimates of global temperature change since 1880 and carbon dioxide, or CO_2, in the atmosphere. Read across the years before deciding what the numbers suggest.

APPROXIMATE GLOBAL MEASURES, ROUNDED

Year	Temperature change since 1880 (°C)	Atmospheric CO_2 (parts per million)
1880	0	290
1980	+0.4	339
2020	+1.2	414

2 From 1880 to 2020, both measures in the table rose. That pattern alone does not prove what caused warming. Scientists also examine where added gases come from: burning coal, oil, and gas releases CO_2, and making cement releases more. Agriculture adds methane, another heat-trapping gas. These activities have increased the gases that slow the escape of heat to space.

3 Could nature explain the rise instead? Large volcanic eruptions send particles that briefly cool Earth; they do not explain lasting warming. Changes in incoming sunlight can affect temperature, but measured solar changes do not explain the long-term rise. Scientists test causes by comparing when temperatures change with records of gases, human activities, and natural processes.

2 ANSWER WITH EVIDENCE

Use the passage

1. Write a question using both measured columns of the table to clarify how CO_2 and temperature changed from 1880 to 2020.

2. Write a question the passage can answer about which human activities release CO_2.

3. Write a question the passage can answer about whether volcanic eruptions explain lasting warming.

4. Write a question the passage can answer about whether changes in incoming sunlight explain the long-term rise in temperature.

3 YOUR TURN

Your own words

Scientists want to test whether human activities or natural processes better explain warming. Write two different questions about evidence not shown on this page, and name the data needed to answer each one.

ANSWER KEY

What Caused Warming?

GRADE 8 · MS-ESS3-5

PART 1 · READ AND MARK

Underline the sentence that warns against deciding a cause from one pattern, circle two possible causes of temperature change, and put a question mark beside one claim you would want to check with more evidence. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Write a question using both measured columns of the table to clarify how CO_2 and temperature changed from 1880 to 2020.	**Sample: How did atmospheric CO_2 and global temperature change from 1880 to 2020? Both rose: CO_2 from 290 to 414 parts per million, and temperature by about 1.2°C.**
2	Write a question the passage can answer about which human activities release CO_2.	**Sample: Which human activities release CO_2? Burning coal, oil, and gas, and making cement.**
3	Write a question the passage can answer about whether volcanic eruptions explain lasting warming.	**Sample: Do large volcanic eruptions explain lasting warming? No. Their particles cool Earth briefly.**
4	Write a question the passage can answer about whether changes in incoming sunlight explain the long-term rise in temperature.	**Sample: Do measured changes in incoming sunlight explain the long-term temperature rise? No.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

Did fossil-fuel emissions rise before the sharpest increases in global temperature? I would need yearly emissions and temperature records. Did changes in incoming sunlight match the timing of temperature rises? I would need solar measurements and temperature records from the same years.

For Part 2, accept other clear questions that can be answered from the passage or table. For Part 3, each question should identify evidence not provided on the page and name data that could help test a cause.