

Warming Evidence Hunt

Examine evidence and questions about rising global temperatures.

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

NAME _____

DATE _____

1 READ AND MARK _____ Read it twice

YOUR JOB Underline statements that give evidence, circle possible factors that affect temperature, and put a question mark beside places where a scientist needs more explanation. These marks will help you separate evidence from possible causes.

Following the Evidence

- ① Scientists studying recent warming do not rely on one measurement. They compare global temperature records with measurements of gases in the atmosphere and records of energy use. Since the late 1800s, Earth's average surface temperature has risen by about 1.2 degrees Celsius. During much of that time, carbon dioxide and methane levels also increased. These gases absorb outgoing heat, so higher amounts can warm the planet. A graph that shows temperatures and carbon dioxide rising together is useful evidence, but scientists also ask what caused the gas increase.
- ② Natural processes can affect climate too. A large volcanic eruption can send particles high into the air, where they reflect some sunlight and often cool Earth for a short time. Changes in the Sun's energy can also influence temperature. However, scientists measure these factors rather than assume they explain a trend. Satellites have measured incoming solar energy, and instruments track volcanic particles. The warming of the past century continued while solar energy showed no long-term increase large enough to explain it. Major eruptions do not match the steady, decades-long warming pattern.
- ③ Evidence about human activities helps answer the cause question. Burning coal, oil, and natural gas releases carbon dioxide. Making cement releases carbon dioxide from both fuel use and a chemical process in limestone. Some farming, especially raising livestock and growing rice, adds methane to the air. Records show that these activities expanded as population and industry grew. Scientists use measurements, physics, and climate models to test explanations. The evidence shows that human-produced greenhouse gases are the main cause of the long-term global temperature rise, while natural factors cause smaller or temporary changes.

2 ANSWER WITH EVIDENCE Use the passage

1 What three types of records do scientists compare when they investigate recent warming?

2 What question do scientists ask before deciding that a graph with rising temperature and carbon dioxide proves a cause?

3 What evidence do scientists measure when they investigate whether natural processes explain the warming trend?

4 Which conclusion about the past century is supported by the evidence in the passage? Explain using one piece of evidence.

3 YOUR TURN Your own words

Choose fossil fuel combustion, cement production, agricultural activity, incoming solar radiation, or volcanic activity. Write three questions that would clarify whether it contributed to recent warming, then name two kinds of data you would examine and describe one pattern that would support your explanation.

PART 1 • READ AND MARK

Underline statements that give evidence, circle possible factors that affect temperature, and put a question mark beside places where a scientist needs more explanation. These marks will help you separate evidence from possible causes. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	What three types of records do scientists compare when they investigate recent warming?	Global temperature records, atmospheric gas measurements, and energy-use records.
2	What question do scientists ask before deciding that a graph with rising temperature and carbon dioxide proves a cause?	What caused the increase in the gases.
3	What evidence do scientists measure when they investigate whether natural processes explain the warming trend?	They measure incoming solar energy with satellites and track volcanic particles with instruments.
4	Which conclusion about the past century is supported by the evidence in the passage? Explain using one piece of evidence.	Human-produced greenhouse gases are the main cause of long-term warming. Human activities expanded while carbon dioxide and methane increased, and solar energy did not show a large enough long-term increase to explain the warming.

PART 3 • YOUR TURN (SAMPLE ANSWER)

Did carbon dioxide levels increase as fossil fuel use increased? Did global temperatures rise during the same decades? Can solar-energy measurements explain the temperature trend instead? I would examine fuel-use records and graphs of atmospheric carbon dioxide and global temperature. A pattern in which fuel use and carbon dioxide rise before or alongside long-term warming, while solar energy lacks a matching increase, would support fossil fuel combustion as a major cause.

Accept equivalent evidence-based questions and conclusions. For Part 3, responses should include three relevant questions, at least two appropriate data sources, and a reasonable pattern that connects evidence to a possible cause.