What Drives Warming?

Weigh natural and human evidence about climate change.

E.7.9B.3 "Engage in scientific argument based on current evidence to determine whether climate change happens naturally or is being accelerated through the influence of man."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline two observations that support human influence, circle two facts about natural causes, and number one observation that challenges a natural explanation for recent warming.

A Cold Day on a Warming Planet

1. On a snowy January morning, it can be hard to picture a warming planet. But one cold day is weather, while climate describes patterns measured over many years. Earth's climate changed long before cars or factories existed. Changes in Earth's orbit have helped start and end ice ages over thousands of years. The Sun's energy can vary, and large volcanic eruptions can cool Earth for a few years by sending particles into the air. These natural causes are real, but a cause must fit the timing and direction of the change we observe.

2. Today, thermometers on land and at sea show a long-term rise in global temperature since the late 1800s. Scientists test possible causes rather than guessing from one winter. Measurements show that the Sun's energy has not increased enough to explain the strong warming of recent decades. Large volcanic eruptions usually cause brief cooling, not decades of steady warming. Orbit changes act far too slowly to explain this rapid rise. Natural factors still affect temperatures from year to year, but these patterns do not account for the overall trend.

3. Meanwhile, burning coal, oil, and gas releases carbon dioxide, CO_2, which traps some heat that Earth would otherwise lose to space. Records of fuel use show that human emissions have grown greatly since the late 1800s. Air measurements show that CO_2 has also risen, and its carbon carries a chemical fingerprint of fossil fuels. The oceans have gained heat as well. Together, these observations support a claim: climate can change naturally, but human activities are accelerating the current warming. A strong argument weighs both natural and human evidence rather than choosing one fact alone.

2 ANSWER WITH EVIDENCE

Use the passage

1. Could changes in the Sun's energy explain most of the recent warming? Use an observation from the passage to support your answer.

2. Why are large volcanic eruptions a poor explanation for decades of warming?

3. How do fuel-use records and air measurements work together to support a human cause of warming?

4. Earth's orbit helped cause past ice ages. Why does that fact alone not explain the warming measured since the late 1800s?

3 YOUR TURN

Your own words

A student says, "This cold winter proves people are not warming Earth." Write four or five sentences in response. Explain why one winter is not enough evidence, use two observations from the passage to support your claim about current warming, and acknowledge one natural cause of climate change.

ANSWER KEY

What Drives Warming?

GRADE 7 · E.7.9B.3

PART 1 · READ AND MARK

Underline two observations that support human influence, circle two facts about natural causes, and number one observation that challenges a natural explanation for recent warming. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Could changes in the Sun's energy explain most of the recent warming? Use an observation from the passage to support your answer.	**No. Measurements show that the Sun's energy has not increased enough to explain the strong warming of recent decades.**
2	Why are large volcanic eruptions a poor explanation for decades of warming?	**Large eruptions usually cause brief cooling, which does not match decades of warming.**
3	How do fuel-use records and air measurements work together to support a human cause of warming?	**Fuel-use records show growing human emissions. Air measurements show rising CO_2 with a fossil-fuel fingerprint, linking the increase to those emissions.**
4	Earth's orbit helped cause past ice ages. Why does that fact alone not explain the warming measured since the late 1800s?	**Past natural change does not identify the cause of current change. Orbit changes act too slowly to explain the rapid warming measured since the late 1800s.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

One cold winter is weather, while climate describes patterns measured over many years. Land and sea thermometers show a long-term warming trend since the late 1800s. Air measurements show rising CO_2 with a fossil-fuel fingerprint, which supports a human cause of the warming. Changes in Earth's orbit can affect climate naturally, but they act too slowly to explain this rapid rise. A cold winter does not overturn the evidence that human activities are accelerating current warming.

Accept different observations when students explain how the evidence supports or challenges a proposed cause. Students should distinguish natural climate change from the cause of the current warming trend.