

Name: _____ Date: _____

Answer Key: Blast the Heat: 9th Grade Climate Dynamics Mission

Analyze the energy balance of our atmosphere through foundations of greenhouse gases and industrial impacts before moving to advanced carbon cycle modeling.

1. Which of these gases is primarily released during the manufacturing of cement and aluminum, acting as a potent driver of the greenhouse effect?

Answer: B) Carbon dioxide

Industrial processes like cement production involve chemical reactions that release significant amounts of CO₂ into the atmosphere.

2. The process where permafrost melts and releases stored carbon, leading to further warming, is known as a _____ loop.

Answer: C) Positive feedback

A positive feedback loop occurs when the product of a reaction leads to an increase in that reaction; in this case, warming causes more warming.

3. The greenhouse effect is a naturally occurring process that keeps Earth's surface warm enough to support life.

Answer: A) True

Without the natural greenhouse effect, Earth's average temperature would be well below freezing; the current concern is the 'enhanced' greenhouse effect caused by humans.

4. Which agricultural practice is a significant source of Nitrous Oxide (N₂O), a greenhouse gas much more powerful than CO₂?

Answer: B) Applying synthetic fertilizers

When synthetic nitrogen fertilizers are applied to soil, microbes break them down and release nitrous oxide into the air.

5. The shift in local weather patterns and global temperatures caused by human activity is scientifically categorized as _____.

Answer: A) Anthropogenic climate change

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'Anthropogenic' specifically refers to environmental changes caused or influenced by people.

6. Melting sea ice is the primary cause of global sea-level rise.

Answer: B) False

While melting glaciers on land contribute to sea-level rise, the melting of floating sea ice does not significantly change water levels; thermal expansion of seawater is a larger factor.

7. What happens to the pH of the ocean as it absorbs more carbon dioxide from the atmosphere?

Answer: C) It becomes more acidic

CO₂ reacts with seawater to form carbonic acid, lower the pH of the ocean in a process called ocean acidification.

8. A massive volcanic eruption can temporarily _____ the Earth by releasing aerosols that reflect sunlight.

Answer: A) Cool

Sulfate aerosols from volcanoes act like tiny mirrors in the stratosphere, reflecting solar energy back into space and cooling the planet for a few years.

9. The ozone hole is the main cause of global warming.

Answer: B) False

The ozone hole and global warming are two different environmental issues; ozone depletion allows harmful UV rays in, while global warming is caused by trapped infrared heat.

10. Which of the following describes 'climate' rather than 'weather'?

Answer: B) The average annual rainfall in the Amazon rainforest

Climate refers to the long-term averages and patterns of a region, usually calculated over 30 years or more.