

Name: _____ Date: _____

Answer Key: Could Permafrost Thaw Change Everything? 10th Grade Climate Quiz

Examine 10 essential indicators of global change focusing on atmospheric carbon isotopes, albedo feedback loops, and ocean acidification trends.

1. Which of these gases is a potent greenhouse gas released specifically from thawing permafrost in the Arctic regions?

Answer: B) Methane

Methane is released when organic matter that has been frozen for thousands of years begins to decompose in anaerobic conditions under thawing permafrost.

2. The 'Albedo Effect' refers to the ability of dark surfaces like the ocean to reflect more sunlight than white surfaces like ice.

Answer: B) False

This is false because light-colored surfaces like ice have a high albedo and reflect sunlight, whereas dark surfaces like the ocean absorb it.

3. The process by which the ocean absorbs excess CO₂, leading to a lower pH and harming shelled organisms, is called ocean _____.

Answer: B) Acidification

Ocean acidification occurs when CO₂ reacts with seawater to form carbonic acid, which reduces the availability of carbonate ions for marine life.

4. Which transition in transportation technology is considered a major 'mitigation' strategy for reducing urban carbon footprints?

Answer: B) Electrification of public transit

Electrifying public transit removes tailpipe emissions and, when powered by renewables, significantly lowers the carbon intensity of travel.

5. Scientists use ice cores from Antarctica to reconstruct atmospheric carbon dioxide levels from hundreds of thousands of years ago.

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Answer: A) True

Ice cores contain trapped air bubbles that provide a direct record of the Earth's past atmospheric composition.

6. What is the primary reason why sea levels rise as global temperatures increase?

Answer: C) Thermal expansion of water

Thermal expansion (water expanding as it warms) and the melting of land-based glaciers/ice sheets are the two main drivers of sea-level rise.

7. The use of reflective 'cool roofs' on buildings in hot cities is an example of an _____ strategy to deal with rising temperatures.

Answer: A) Adaptation

Adaptation involves making adjustments to live with the current or expected impacts of climate change, such as the urban heat island effect.

8. Current global warming is unique because it is primarily driven by natural Milankovitch cycles rather than human activity.

Answer: B) False

While Milankovitch cycles determine long-term ice age patterns, the current rapid warming is driven by greenhouse gas emissions from human industrial activity.

9. Which of these is a direct consequence of a 'positive feedback loop' in the Arctic?

Answer: C) Melting ice revealing dark water that absorbs more heat

As ice melts, it exposes darker ocean water, which absorbs more solar radiation, causing further warming and more ice melt.

10. Agriculture contributes to climate change partly through the release of _____ oxide from the use of synthetic fertilizers.

Answer: A) Nitrous

Nitrous oxide (N₂O) is a powerful greenhouse gas emitted during agricultural and industrial activities, as well as during combustion of fossil fuels.