

Name: _____ Date: _____

Nail Climate Policy and Feedback Loops for 9th Grade

Albedo effects, permafrost feedback, and global policy frameworks — this 10-question assessment tackles the complexities of planetary system dynamics.

1. The 'Ice-Albedo Feedback' loop is a critical driver of polar warming. Which scenario best evaluates the mechanism of this positive feedback loop?

- A. Melting ice decreases surface reflectivity, leading to more solar absorption and further warming.
- B. Increased ice cover reflects more sunlight, which triggers a localized cooling trend in the tropics.
- C. Sublimation of glaciers increases atmospheric water vapor, which acts as a cooling shielding layer.
- D. Darker ocean water reflects more ultraviolet radiation than white ice, stabilizing the temperature.

2. The _____, adopted in 1987, is often cited as a successful model for international climate policy, though it specifically targeted ozone-depleting substances rather than CO₂.

- A. Paris Agreement
- B. Kyoto Protocol
- C. Montreal Protocol
- D. Geneva Convention

3. True or False: The thawing of Arctic permafrost acts as a carbon sink because it allows for the rapid growth of new tundra vegetation that absorbs atmospheric methane.

- A. True
- B. False

4. When analyzing 'Ocean Acidification,' which chemical transition is caused by the increased absorption of anthropogenic CO₂?

- A. The formation of ammonium nitrate which increases toxicity for deep-sea fish.
- B. A decrease in pH levels and a reduction in the availability of carbonate ions.
- C. An increase in hydroxide ions which leads to the calcification of jellyfish.
- D. The stabilization of carbonic acid which protects bivalve shell development.

5. In the context of climate mitigation, 'Blue Carbon' refers to the carbon captured and stored by _____ ecosystems, such as salt marshes and mangroves.

- A. Deep sea
- B. Coastal
- C. Mountain
- D. Desert

6. True or False: Stratospheric aerosol injection is a proposed form of geoengineering that aims to reflect sunlight back into space to mimic the cooling effect of volcanic eruptions.

- A. True

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B. False

7. Which of these best describes 'Thermal Expansion' as it relates to sea-level rise?

- A. Water molecules expand in volume as they absorb heat, causing ocean levels to rise.
- B. Heat causes the seafloor to rise, pushing water toward the coastlines.
- C. Warmer air density increases, pushing the ocean surface downward in the center.
- D. The chemical expansion of salt crystals in warming water increases the total ocean mass.

8. The ____ Circulation acts as a 'global conveyor belt' moving heat around the planet; climate change threatens to slow this process by adding fresh water from melting glaciers.

- A. Hadley Cell
- B. Coriolis Force
- C. Thermohaline
- D. Jet Stream

9. How does the 'Urban Heat Island' (UHI) effect complicate the mitigation of climate change in densifying cities?

- A. Cities reflect too much sunlight, causing the upper atmosphere to overheat.
- B. Concentrated asphalt and concrete absorb and re-emit heat, increasing local energy demand for cooling.
- C. High-rise buildings block the greenhouse effect, trapping cold air at the street level.
- D. Urban areas produce more oxygen, which reacts with methane to create explosive local warming.

10. True or False: 'Climate Justice' refers to the ethical framework that argues those who have contributed the least to greenhouse gas emissions are often the most vulnerable to its effects.

- A. True
- B. False