Name: _____ **Date:** _____

Answer Key: Think You're a Climate Hero? Prove Your 6th Grade Science Prowess

Synthesize data on albedo shifts and permafrost feedback loops to show you understand the complex chain reactions shaping our planet's future.

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1. The 'Albedo Effect' acts as a feedback loop in the Arctic. If global temperatures rise and sea ice melts, uncovering dark ocean water, what is the most likely secondary outcome?

Answer: B) The dark water absorbs more solar radiation, accelerating further warming.

Albedo refers to reflectivity. Ice has high albedo (reflects light), while dark water has low albedo (absorbs heat). This creates a 'positive feedback loop' where warming causes more warming.

2. When permafrost in the Siberian tundra thaws, it releases _____, a greenhouse gas that is roughly 25 times more potent at trapping heat than carbon dioxide over a century.

Answer: C) Methane

Methane (CH_4) is trapped in frozen organic matter; as permafrost melts, microbes decompose that matter, releasing gas that significantly intensifies the greenhouse effect.

3. Ocean acidification, caused by the absorption of excess atmospheric CO_2, primarily threatens calcifying organisms like pteropods and shellfish by making it harder for them to build their shells.

Answer: A) True

As CO_2 dissolves in seawater, it forms carbonic acid, which reduces the availability of carbonate ions that marine life needs to produce calcium carbonate shells.

4. Which of these is an example of an 'Adaptation' strategy specifically designed for urban Heat Islands created by climate change?

Answer: C) Installing 'cool roofs' and planting urban 'micro-forests' to lower city temperatures.

Adaptation involves adjusting to live with the effects of climate change. Cooling a city through greenery and reflective surfaces helps residents survive higher temperatures.

5. Climate scientists use _____, such as ice cores and tree rings, to reconstruct Earth's climate history from thousands of years before thermometers were invented.

Name: _____ **Date:** _____

Answer: A) Proxy data

Proxy data are preserved physical characteristics of the past that stand in for direct measurements, allowing scientists to understand ancient climate patterns.

6. The Greenhouse Effect is a purely man-made phenomenon that did not exist before the Industrial Revolution.

Answer: B) False

The natural greenhouse effect is essential for life, keeping Earth warm enough to inhabit. Human activity has 'enhanced' it by adding too many gases, causing rapid warming.

7. How does the 'Thermohaline Circulation' (the Great Ocean Conveyor Belt) relate to climate change concerns in the North Atlantic?

Answer: B) Increased freshwater from melting glaciers could 'freshen' the water, potentially slowing the current that brings heat to Europe.

The current relies on cold, salty (dense) water sinking. Fresh meltwater is less dense, which could disrupt the 'pump' that drives this global heat-distribution system.

8. The process where certain species shift their seasonal behaviors, such as birds nesting earlier in the spring due to warming, can lead to a 'phenological _____' if their food sources aren't available at the same time.

Answer: B) Mismatch

A phenological mismatch occurs when the timing of interacting species (like birds and the caterpillars they eat) gets out of sync because they respond to different climate cues.

9. Which of the following describes a 'Mitigation' strategy aimed at 'Carbon Sequestration'?

Answer: C) Restoring peatlands and seagrass meadows that naturally trap and store carbon for centuries.

Sequestration is the long-term capture and storage of CO_2. Protecting natural ecosystems like peatlands is a biological way to keep carbon out of the atmosphere.

10. Global warming and climate change are exactly the same thing; the terms can be used interchangeably without any difference in scientific meaning.

Answer: B) False

Name: _____ Date: _____

Global warming refers specifically to the rise in Earth's average temperature, while climate change is a broader term encompassing shifts in wind patterns, precipitation, and extreme weather.