

Name: \_\_\_\_\_ Date: \_\_\_\_\_

## Cool Planet, Hot Topics: A 4th Grade Climate Challenge

Synthesize complex data across 10 advanced questions to design original solutions for urban heat islands and marine ecosystem shifts.

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**1. In a city with many dark asphalt roads, the 'Urban Heat Island' effect makes it hotter than the countryside. Which innovative engineering solution would best help cool the city down?**

- A. Replacing glass windows with solid metal sheets
- B. Installing 'cool roofs' with white, reflective coatings
- C. Building taller skyscrapers to block the wind
- D. Paving over parks to create more parking spaces

**2. When oceans absorb too much carbon dioxide, they undergo a process called \_\_\_\_\_, which makes it difficult for oysters and clams to build their shells.**

- A. Ocean Magnetization
- B. Ocean Acidification
- C. Ocean Evaporation
- D. Ocean Carbonization

**3. True or False: Permafrost is frozen ground that, when melted, releases ancient methane gas which further accelerates the greenhouse effect.**

- A. True
- B. False

**4. If a species of mountain pika (a small mammal) finds its habitat becoming too warm, what is the most likely 'migration' pattern it will follow to survive?**

- A. Moving down to the valleys to find more water
- B. Moving to a different continent across the ocean
- C. Moving higher up the mountain to find cooler air
- D. Staying in the same spot and changing its fur color

**5. To reduce the 'carbon footprint' of schools, many designers use \_\_\_\_\_, which involves placing windows to capture natural light and heat during winter without using electricity.**

- A. Active Solar Pumping
- B. Geothermal Fracking
- C. Passive Solar Design
- D. Biofuel Combustion

**6. True or False: Planting 'Blue Carbon' ecosystems like mangroves is less effective at storing carbon than planting traditional inland pine forests.**

- A. True

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B. False

**7. In the 'Circular Economy' model of waste management, how would a toy company change its business to help the climate?**

- A. Making toys that break quickly so people buy more
- B. Using only brand-new plastic from oil refineries
- C. Designing toys that can be easily taken apart and recycled into new toys
- D. Moving their factory to a place with fewer environmental laws

**8. The \_\_\_\_\_ describes how some surfaces, like sea ice, reflect sunlight, while darker surfaces, like the open ocean, absorb it and get warmer.**

- A. Photosynthesis Effect
- B. Albedo Effect
- C. Coriolis Effect
- D. Greenhouse Effect

**9. Why does the melting of 'land ice' (like glaciers in Greenland) cause sea levels to rise more than the melting of 'sea ice' (like in the North Pole)?**

- A. Land ice is much saltier than sea ice
- B. Sea ice is already floating in the water, so it has already displaced its volume
- C. Land ice is much colder and freezes more water around it
- D. Sea ice turns into clouds instead of liquid water when it melts

**10. True or False: Using 'biomimicry'—copying designs from nature—to build fans that look like whale fins can make wind turbines more efficient at generating clean energy.**

- A. True
- B. False