Name: _____ **Date:** _____

Sustaining Systems: Secrets of Strategic Senior Science

Examine the intricate nexus of life cycle assessments and circular economy frameworks through high-level case studies designed for AP-level critical analysis.

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1. When conducting a Life Cycle Assessment (LCA) for a smartphone, which stage typically accounts for the highest 'embodied energy' and largest environmental footprint due to rare-earth element extraction?

A. Post-consumer electronic waste recycling
B. Raw material acquisition and refining
C. Regional distribution and logistics
D. Retail packaging and consumer usage

2. The _____ framework focuses on a metabolic shift in manufacturing where industrial outputs from one process serve as nutrient inputs for another, effectively eliminating the concept of waste.

A. Linear Economic Model
B. Cradle-to-Grave Analysis
C. Cradle-to-Cradle (C2C)
D. Just-in-Time Manufacturing

3. Jevons Paradox suggests that increasing the efficiency of a resource's use will always lead to a total decrease in the consumption of that resource.

A. True
B. False

4. Which of the following best exemplifies the 'Triple Bottom Line' (TBL) evaluation of a corporate wind farm project in a developing coastal region?

A. Measuring only the net kilowatt-hours produced annually
B. Focusing solely on the Return on Investment (ROI) for shareholders
C. Analyzing carbon offsets, local job creation, and long-term profitability
D. Prioritizing the speed of construction over local zoning regulations

5. In the context of the UN Sustainable Development Goals (SDGs), the 'Precautionary Principle' dictates that if an action has a risk of causing severe harm to the public or environment, the burden of proof falls on _____.

A. The scientists observing the harm
B. The general public affected by the risk
C. Those proposing the action to prove it is safe
D. International courts after the harm occurs

Name: _____ Date: _____

6. The concept of 'Planetary Boundaries,' developed by the Stockholm Resilience Centre, identifies which of the following as a threshold already exceeded by human activity?

A. Ocean Acidification
B. Freshwater consumption
C. Biogeochemical flows (Nitrogen and Phosphorus)
D. Stratospheric ozone depletion

7. Intergenerational equity is the principle that current generations have a moral obligation to ensure future generations have access to the same natural capital we enjoy today.

A. True
B. False

8. A city implements a 'Congestion Pricing' zone to reduce traffic and emissions. Economically, this is an attempt to internalize a(n) _____.

A. Positive externality
B. Negative externality
C. Inelastic demand curve
D. Opportunity cost

9. In a truly 'Circular Economy,' how is the 'end-of-life' for a biological nutrient (like a wood-based textile) handled?

A. It is incinerated for waste-to-energy recovery
B. It is downcycled into a lower-quality synthetic fiber
C. It is safely composted to restore soil fertility
D. It is stored in a secured, anaerobic landfill

10. The 'Rebound Effect' clarifies that improved energy efficiency usually results in an equal percentage reduction in total energy consumption.

A. True
B. False