Name: _____ **Date:** _____

Answer Key: Jurassic Park: The 12th Grade Sustainability Endgame

Students cultivate systemic thinking by analyzing the complex trade-offs between ecological health, geopolitical stability, and thermodynamic limits in modern industry.

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1. The 'Rebound Effect' (Jevons Paradox) suggests that increased efficiency in resource use may lead to higher total consumption. Which scenario best illustrates this in a sustainable urban planning context?

Answer: B) Widespread LED adoption leading to increased decorative lighting and higher net energy demand.

Jevons Paradox occurs when technological progress increases the efficiency with which a resource is used, but the falling cost of use increases demand to the point that it offsets the efficiency gains.

2. The 'Cradle-to-Cradle' design framework posits that all industrial outputs should be viewed as technical or biological nutrients rather than waste.

Answer: A) True

Cradle-to-Cradle (C2C) is a biomimetic approach to the design of products where materials are circulated in closed loops, effectively eliminating the concept of waste.

3. In the context of the 'Triple Bottom Line' framework, a company that prioritizes long-term ecological health and social equity but fails to remain profitable is neglecting the _____ pillar.

Answer: C) Economic

The Triple Bottom Line consists of Social (People), Environmental (Planet), and Economic (Profit). Without economic viability, a practice cannot be sustained long-term.

4. When evaluates the 'Social License to Operate' (SLO) for a lithium mining project in the Salar de Atacama, which factor is most indicative of a high level of sustainability?

Answer: C) Consistent, ongoing support and collaborative decision-making with local indigenous communities.

Social License to Operate goes beyond legal compliance; it refers to the ongoing acceptance of a company's standard business practices and operating procedures by its employees, stakeholders, and the general public.

5. The Concept of 'Planetary Boundaries' identifies that the nitrogen and phosphorus cycles have already been pushed far beyond the 'zone of uncertainty' into a high-risk state.

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Answer: A) True

Biogeochemical flows (Nitrogen and Phosphorus) are one of the boundaries that scientists believe we have already significantly transgressed due to industrial agriculture.

6. The use of 'Life Cycle Assessment' (LCA) is a tool for evaluating the environmental impacts of a product from raw material extraction through disposal, commonly referred to as _____ analysis.

Answer: A) Cradle-to-Grave

Cradle-to-Grave analysis is the full Life Cycle Assessment from resource extraction ('cradle') to the disposal phase ('grave').

7. Which of these represents a 'Decoupling' strategy in a national economy aiming for sustainable development?

Answer: A) Increasing GDP while simultaneously decreasing total domestic CO_2 emissions.

Decoupling happens when an economy grows without a corresponding increase in environmental pressure, breaking the historical link between wealth and pollution.

8. In 'Strong Sustainability' theory, natural capital and human-made capital are considered perfect substitutes for one another.

Answer: B) False

Strong Sustainability argues that natural capital (ecosystem services) cannot be replaced by machines or technology, whereas Weak Sustainability suggests they are interchangeable.

9. When a small change in one part of an ecological system leads to a large, abrupt, and potentially irreversible shift, the system has reached a _____.

Answer: B) Tipping Point

A tipping point is a critical threshold that, when crossed, leads to large and often irreversible changes in the state of a system.

10. How does the 'Precautionary Principle' influence policy regarding the introduction of new chemicals into the environment?

Answer: C) It suggests that if an action has a risk of causing harm, the burden of proof that it is NOT harmful falls on those taking the action.

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The Precautionary Principle advocates for caution when scientific knowledge is incomplete, shifting the burden of proof of safety to the proponents of an activity.