Lesson 3.2 - Systems in Environmental Science

Vocabulary Review. Define each vocabulary term in your own words.

A) Feedback loop -
B) Erosion -
C) Geosphere -
D) Lithosphere -
E) Biosphere -
F) Atmosphere -
G) Hydrosphere -

Reading Strategy. As you read the lesson, complete each statement by writing in the correct word or words.

1. A **system** is a network of parts, elements, or components that interact with and influence one another.

2. Systems receive and process **inputs** of energy, matter, or information, and produce **outputs** of energy, matter, or information.

3. Systems do not have well-defined **boundaries**, which makes it difficult to decide where one system ends and another begins.

4. Systems may exchange energy, **matter**, and/or information with other systems.

5. Inputs into Earth's systems can include both **solar** energy and geothermal energy.

6. An event that is both a cause and an effect is a cyclical process known as a **feedback loop**, and can be either positive or negative.

7. A predator-prey relationship in which the two populations rise and fall in response to each other is an example of a **negative** feedback loop.

8. **Negative** feedback loops enhance stability by canceling an action once it reaches an extreme.

9. Erosion is an example of a **positive** feedback loop.

10. Positive feedback loops are relatively **rare** in nature but **common** in environmental systems that people have changed.

11. Scientists divide Earth into spheres, which are often described by their **makeup** rather than by their location.
12. Earth’s geosphere is made up of all the rock at and below the surface of Earth.

13. The sphere of the Earth that consists of all the planet’s living or once-living things and the nonliving parts of the environment with which they interact is the **biosphere**.

14. The outermost layer of Earth and the geosphere is known as the **crust/lithosphere**.

15. The hydrosphere includes all water on Earth, including all forms of liquid, solid, and **gas/vapor**.

16. Earth’s spheres both overlap and **interact**.

17. An earthworm tunneling through the soil is an example of the biosphere interacting with the **lithosphere**.

**Interacting Systems**

18. Give an example of each type of input into Earth’s systems.
   - Solar energy, sensory cues, chemical/physical materials

19. Contrast the two different types of feedback loops in terms of how they affect the stability of a system.
   - Negative – stabilize systems by stopping an action once it reaches an extreme
   - Positive – move systems to an extreme and increase instability

20. Write in the boxes to complete the following on how the human body relies on a negative feedback loop to respond to heat and cold.

   ![Negative Feedback Loop](image)

   - Too hot → Brain (control center) → Seek shade, sweat → Body cools
   - Too cold → Brain (control center) → Wear more clothes, shiver → Body warms

**Earth’s “Spheres”**. For the following questions, write True if the statement is true. If the statement is false, replace the underlined word to make the statement true. Write your changes on the line.

____________________21. The lithosphere is part of the **geosphere**. **T**

____________________22. A human being is part of Earth’s **lithosphere**. **F**, biosphere

____________________23. The **hydrosphere** includes water in Earth’s atmosphere. **T**

24. How are Earth’s spheres defined?
   - By their function, makeup and location

25. What are the components of Earth’s geosphere?
   - All the rock at or below Earth’s surface

26. What materials make up Earth’s biosphere?
   - All the living and once-living parts of the environment

27. Give an example of how two of Earth’s spheres overlap or interact.
   - An earthworm (biosphere) tunnels through the soil (geosphere)