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Topic 1 - Foundations of Environmental Systems and Societies
1.3 Energy and Equilibria

1. The Second Law of Thermodynamics states that in any

   A. open system, entropy tends to increase spontaneously.

   B. open system, entropy tends to decrease spontaneously.

   C. isolated system, entropy tends to increase spontaneously.

   D. isolated system, entropy tends to decrease spontaneously.

2. Which is an example of negative feedback?

   A. Loss of vegetation leading to soil erosion leading to further loss of vegetation.

   B. A decline in a large predator population after they have eaten most of their prey population.

   C. Melting of permafrost in the tundra due to climatic change leading to further release of methane, causing further change.

   D. Unsustainable slash and burn agriculture practices in tropical rain forests.

3. A lake with a stream flowing into it, but with water lost only by evaporation, is an example of a system which is

   A. isolated.

   B. stable and closed.

   C. unstable and closed.

   D. open

4. Which of the following contributes most effectively to self-regulation within a system?

   A. Rapid transfer of materials

   B. Inputs of energy being greater than outputs

   C. Negative feedback mechanisms

   D. Positive feedback mechanisms

5. A stable ecosystem will be in . . . (I) . . . equilibrium, achieved largely through mechanisms of . . . (II) . . . feedback.

Complete this statement.

	(I)	(II)
A.	Steady state	Positive
B.	Static	Negative
C.	Steady state	Negative
D.	Static	Positive

6. Consider these statements concerning the flow of energy through ecosystems:

Statement 1: The amount of energy that is available to living things decreases as it is transformed and passed along food chains.

Statement 2: As energy is transformed along food chains, no energy is destroyed.

Which is a correct evaluation of these statements?

	Statement 1	Statement 2
A.	Demonstrates the first law of thermodynamics	Demonstrates the second law of thermodynamics
B.	Is unrelated to the laws of thermodynamics	Demonstrates the second law of thermodynamics
C.	Demonstrates the second law of thermodynamics	Demonstrates the first law of thermodynamics
D.	Demonstrates the second law of thermodynamics	is unrelated to the laws of thermodynamics

7. Which statement best illustrates the second law of thermodynamics?

A. Potential energy increases as energy moves through a system.

B. The amount of energy is unchanged as matter moves through a system.

C. Potential energy decreases as energy and matter move through a system.

D. Energy cannot leave a system.

8. The capacity of a system to self-regulate is generally increased by

   A. the presence of positive feedback.

   B. the presence of negative feedback.

   C. low energy inputs in the system.

   D. energy outputs greater than energy inputs in the system.

9. Which of the following is an essential feature of a system in steady-state equilibrium?

   A. Positive feedback mechanisms

   B. Negative feedback mechanisms

   C. Balanced inputs and outputs

   D. High diversity

10. As disease spreads through a population, numbers fall. As the result of a reduction in contact between individuals, the rate of spread of the disease is reduced. This is followed by a recovery in numbers.

    This is an example of

    A. positive feedback

    B. negative feedback

    C. demographic transition

    D. entropy

11. Which statement expresses the second law of thermodynamics?

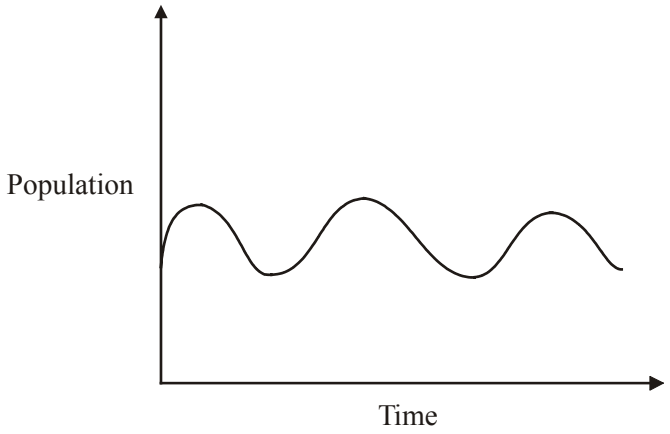
    A. The amount of energy available to do useful work in a system decreases over time.

    B. Energy can neither be created nor destroyed.

    C. Entropy will always decrease spontaneously in a system over time.

    D. Energy inputs equal energy outputs.

12. The graph below shows how a population changed over a period of time.



Which of the following best describes the regulation process in this system?

A. Positive feedback

B. Static equilibrium

C. Negative feedback

D. Transformation

13. Which of the following best describes the result of positive feedback in a system?

A. The system changing further in the same direction

B. The system remaining stable

C. The system changing in the opposite direction

D. The system remaining unchanged

14. Which of the following is an example of negative feedback?

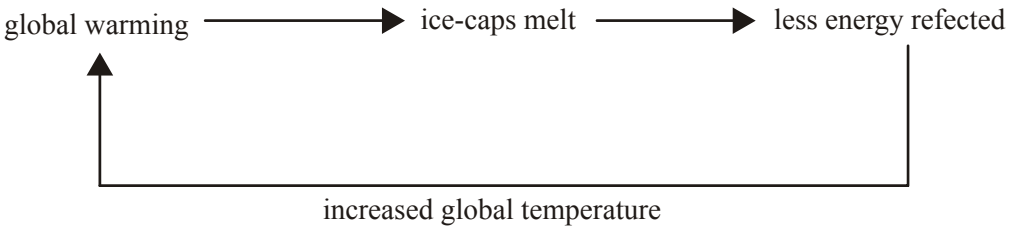
A. Loss of vegetation, leading to soil erosion, leading to further loss of vegetation

B. Animals failing to reproduce when food is abundant

C. More carbon dioxide favouring plant growth, so plants absorb more carbon dioxide

D. A population of small mammals in a forest decreasing due to a fire

15. Of what is the diagram below an example?

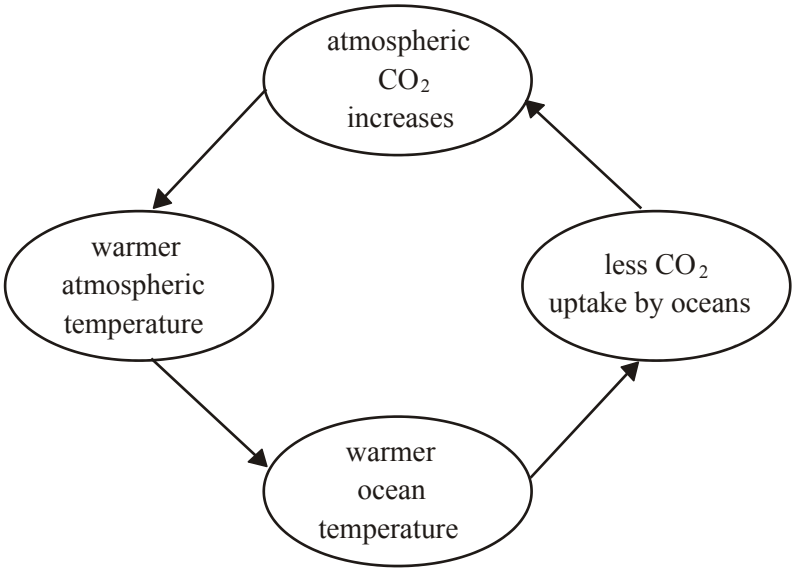


A. Negative feedback

B. Positive feedback

C. Steady-state equilibrium

D. Static equilibrium



16.

The diagram above is an example of

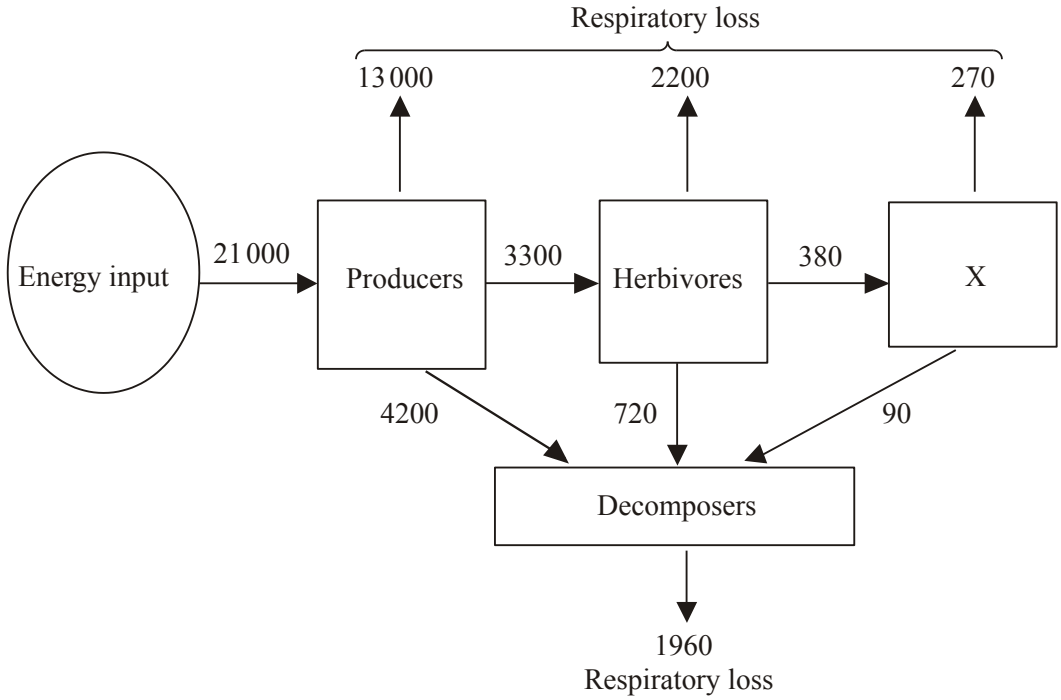
A. steady state equilibrium.

B. positive feedback.

C. negative feedback.

D. static equilibrium.

17.



What are the organisms in X?

A. Autotrophs

B. Primary consumers

C. Secondary consumers

D. Tertiary consumers