

Topic 4.2: Energy Flow

4.2.U1 Most ecosystems rely on a supply of energy from sunlight.

1. State the source of energy most ecosystems rely upon.
2. What are the three groups of organisms that carry out photosynthesis? How do ecologists refer to these organisms?
3. Explain why heterotrophs do not need light energy directly, but are dependent upon it.
4. Complete the DBQ: Insolation on page 214.

4.2.U2 Light energy is converted to chemical energy in carbon compounds by photosynthesis.

5. Outline how producers convert light energy into usable energy for themselves.
6. Complete the statement: Most of the energy in an ecosystem is lost in energy transfers as ____.

4.2.U3 Chemical energy in carbon compounds flows through food chains by means of feeding.

7. Define the term trophic level.
8. Explain why it is rare to find food chains with more than five organisms.
9. Draw a simple food chain including a producer to a quaternary consumer. Label each organism's role.
10. In the text (page 215) it states: "No consumers feed on the last organism in a food chain." Evaluate the accuracy of this claim by providing evidence for **or** against this statement.

4.2.U4 Energy released from carbon compounds by respiration is used in living organisms and converted to heat.

11. Define the terms exothermic and endothermic.
12. Define the term oxidation.
13. Give several examples of why organisms need energy.
14. State the name of the process that makes energy for living organisms and the name of the molecule that supplies energy to living organisms.
15. State the second law of thermodynamics.
16. Apply the second law of thermodynamics to how energy is transferred in living organisms.

4.2.U5 Living organisms cannot convert heat to other forms of energy.

17. List the ways organisms can complete energy conversions.
18. In which way can organisms **not** convert energy? Suggest a reason why this is true.

4.2.U6 Heat is lost from ecosystems.

19. State the first law of thermodynamics.
20. Define the terms endotherms and exotherms. Give an example of each kind of organism.
21. Heat is created as a byproduct of cellular respiration and energy transfers. How is this an advantage for exotherms? Why could it be a disadvantage for exotherms?
22. Thermodynamics describes that heat moves from warmer areas to colder areas. Draw a diagram of heat loss beginning with the sun, moving through a three level food chain, and out to the abiotic environment/outer space.

4.2.U7 Energy losses between trophic levels restrict the length of food chains and the biomass of higher trophic levels.

23. Define the term biomass.
24. Describe the trend that is noted as trophic levels increase in an ecosystem.
25. State the estimated percentage of energy that will be passed on from one trophic level to the next. Calculate the percentage of energy that will be received by your secondary consumer in problem 22 based on this percentage.
26. Complete the Activity: Salmon and soy on page 218.
27. Label the two diagrams [4.2.S1].

