

Name: _____ Date: _____ Block: _____

Miller and Spoolman's Living in the Environment 16th ed.

Chapter 2 Reading Guide – Science, Matter, Energy, and Systems

Case Study – Carrying Out a Controlled Scientific Experiment

1. Describe the controlled scientific experiment carried out at the Hubbard Brook Experimental Forest (core case study). Be sure to identify the experimental and control groups and summarize their findings.

Section 2-1 – What Is Science?

2. What is science? Identify and briefly summarize the 8 steps in the scientific process.
3. Distinguish among a scientific hypothesis, scientific theory, and scientific law.
4. Terry L. Hunt developed a new hypothesis about Easter Island. What is his new hypothesis? How does it differ from the old one? How is this an example of how science works?
5. Distinguish between inductive reasoning and deductive reasoning and give an example of each.
6. Explain why scientific theories and laws are the most important results of science.
7. Distinguish among tentative or frontier science, reliable science, and unreliable science. Be sure to discuss the role peer review plays in each type of science.
8. Describe the scientific consensus concerning global warming.
9. What is statistics? What is probability and what is its role in the scientific conclusions?
10. What are five limitations of science and environmental science?

Section 2-2 – What Is Matter?

11. What is matter? Distinguish between an element and a compound.
12. Distinguish among atoms, ions, and molecules. Identify 5 ions important to the study of environmental science.
13. What is the atomic theory?

14. Distinguish among protons, neutrons, and electrons. Which parts are found in the nucleus of the atom?
15. Distinguish between the atomic number and mass number of an element. Explain how an isotope is related to these two terms.
16. What is pH? What does it mean to say something is acidic?
17. What is a chemical formula? Identify 5 compounds by name and formula that are important to the study of environmental science.
18. Distinguish between inorganic and organic compounds. Identify the 3 main groups of organic compounds. What are the 3 major types of organic polymers essential to life? Give an example of each.
19. Explain how genes, traits, and chromosomes are related to each other.
20. What is matter quality? Distinguish between high and low quality matter. Give an example of each.

Section 2-3 – How Can Matter Change?

21. Distinguish between a physical, chemical, and nuclear change. Identify the 3 types of nuclear changes.
22. Why is the law of conservation of matter so important to environmental science?

Section 2-4 – What Is Energy and How Can It Be Changed?

23. What is energy? Distinguish between kinetic and potential energies, heat, and electromagnetic radiation. Give an example of each.
24. Contrast high quality and low quality energies.
25. Restate the second law of thermodynamics in your own words. Explain why this law means that we can never recycle or reuse high quality energy.
26. Explain why energy efficiency is important to the study of environmental science.

Section 2-5 – What Are Systems and How Do They Respond to Change?

27. Define a positive feedback loop and a negative feedback loop and give an example of each.
28. How is smoking and exposure to asbestos particles a synergistic interaction?