

CONCEPTUAL THEMES, GUIDING QUESTIONS, *Content Standards*, and *Performance Outcomes*

From "Core Science Curriculum Framework: An Invitation for Students and Teachers to Explore Science and Its Role in Society," 2004 Connecticut Science Framework, published by the Connecticut Department of Education (revised November 2005). Used with permission of the Connecticut State Department of Education.

V. MATTER AND ENERGY IN ECOSYSTEMS - HOW DO MATTER AND ENERGY FLOW THROUGH ECOSYSTEMS?

6.2 - An ecosystem is composed of all the populations that are living in a certain space and the physical factors with which they interact.

Populations in ecosystems are affected by biotic factors, such as other populations, and abiotic factors, such as soil and water supply.

Populations in ecosystems can be categorized as producers, consumers and decomposers of organic matter.

C 5. Explain how populations are affected by predator-prey relationships.

C 6. Describe common food webs in different Connecticut ecosystems.

VI. STRUCTURE AND FUNCTION - HOW ARE ORGANISMS STRUCTURED TO ENSURE EFFICIENCY AND SURVIVAL?

7.2 - Many organisms, including humans, have specialized organ systems that interact with each other to maintain dynamic internal balance.

All organisms are composed of one or more cells; each cell carries on life-sustaining functions.

Multicellular organisms need specialized structures and systems to perform basic life functions.

C 15. Describe the basic structures of an animal cell, including nucleus, cytoplasm, mitochondria and cell membrane, and how they function to support life.

10.1 - Fundamental life processes depend on the physical structure and the chemical activities of the cell.

D 30. Explain the role of the cell membrane in supporting cell functions.

VII. HEREDITY AND EVOLUTION - WHAT PROCESSES ARE RESPONSIBLE FOR LIFE'S UNITY AND DIVERSITY?

8.2 - Reproduction is a characteristic of living systems and it is essential for the continuation of every species.

10.5 - Evolution and biodiversity are the result of genetic changes that occur over time in constantly changing environments.

Mutations and recombination of genes create genetic variability in populations.

Changes in the environment may result in the selection of organisms that are better able to survive and reproduce.

D 40. Explain how the processes of genetic mutation and natural selection are related to the evolution of species

D 42. Describe how structural and behavioral adaptations increase the chances for organisms to survive in their environments.

XI. SCIENCE AND TECHNOLOGY IN SOCIETY - HOW DO SCIENCE AND TECHNOLOGY AFFECT THE QUALITY OF OUR LIVES?

6.4 - Water moving across and through earth materials carries with it the products of human activities.

Most precipitation that falls on Connecticut eventually reaches Long Island Sound.

C 10. Explain the role of septic and sewage systems on the quality of surface and ground water.

C 11. Explain how human activity may impact water resources in Connecticut, such as ponds, rivers and the Long Island Sound ecosystem.

7.4 Technology allows us to improve food production and preservation, thus improving our ability to meet the nutritional needs of growing populations.

C 21. Describe how freezing, dehydration, pickling and irradiation prevent food spoilage caused by microbes.

9.8 - The use of resources by human populations may affect the quality of the environment.

D 24. Explain how the accumulation of mercury, phosphates and nitrates affects the quality of water and the organisms that live in rivers, lakes and oceans.

9.9 - Some materials can be recycled, but others accumulate in the environment and may affect the balance of the Earth systems.

D 25. Explain how land development, transportation options and consumption of resources may affect the environment.

10.2 - Microorganisms have an essential role in life processes and cycles on Earth.

Understanding the growth and spread patterns of viruses and bacteria enables the development of methods to prevent and treat infectious diseases.

D 31. Describe the similarities and differences between bacteria and viruses.

D 32. Describe how bacterial and viral infectious diseases are transmitted, and explain the roles of sanitation, vaccination and antibiotic medications in the prevention and treatment of infectious diseases.

10.3 - Similarities in the chemical and structural properties of DNA in all living organisms allow the transfer of genes from one organism to another.

D 34. Describe, in general terms, how the genetic information of organisms can be altered to make them produce new materials.

10.6 - Living organisms have the capability of producing populations of unlimited size, but the environment can support only a limited number of individuals from each species.

Human populations grow due to advances in agriculture, medicine, construction and the use of energy.

Humans modify ecosystems as a result of rapid population growth, use of technology and consumption of resources.

D 43. Describe the factors that affect the carrying capacity of the environment.

D 44. Explain how change in population density is affected by emigration, immigration, birth rate and death rate, and relate these factors to the exponential growth of human populations.

D 45. Explain how technological advances have affected the size and growth rate of human populations throughout history.