

South Hadley Public Schools

Subject: Standard Biology

School: High School

**Big Idea/Essential Question: Living things are made of atoms bonded together to form organic molecules.
How do chemicals join together to form the basis of organisms?**

Standard Chemistry of Life	South Hadley Learning Expectations	Skills	Assessments	Content
<p>1.1 Explain the significance of carbon in organic molecules.</p> <p>1.2 Recognize the six most common elements in organic molecules. (C, H, O, N, P, S)</p> <p>1.3 Describe the composition and functions of the four major categories of organic molecules (carbohydrates, lipids, proteins, nucleic acids.)</p> <p>1.5 Explain the role of enzymes in biochemical reactions.</p>	<p>LE 1: Read, write, and communicate effectively.</p> <p>LE 2: Define, analyze, and solve complex problems and communicate results.</p> <p>LE 3: Study and work productively both independently and in groups.</p> <p>LE 5: Acquire, apply, integrate, analyze, and synthesize knowledge.</p>	<p>1. Distinguish among atoms, elements, molecules, compounds and the bonds: ionic, covalent: polar and nonpolar, and hydrogen.</p> <p>2. Distinguish between a compound with carbon that is organic from one that is inorganic.</p> <p>3. Recognize an organic compound from an inorganic compound.</p> <p>4. Know the five elements associated with organic compounds.</p> <p>5. Identify the differences between the four major organic molecules and each of the subunits.</p> <p>6. Know the major functions of carbohydrates, lipids, proteins, nucleic acids.</p> <p>7. Know how an enzyme works and what factors affect its action.</p>	<p>1. Quiz: Basic Chemistry and Bonds</p> <p>2. Lab: Organic Models</p> <p>3. Quiz: Organic Molecules Table</p> <p>4. Quiz: Enzyme Diagram</p>	<p>Ch. 2</p>

Big Idea/Essential Question: All living things are composed of cells. Life processes in a cell are based on molecular interactions.

What chemicals make up cells? Are all cells the same?

What are the differences between cells? How do cells get materials in & out? How does CO₂ become glucose? How is food used as an energy source?

Standard Structure/Function of Cells	South Hadley Learning Expectations	Skills	Assessments	Content
<p>2.4 Describe how cells function in a narrow range of physical conditions, such as temperature & pH, to perform life functions that help to maintain homeostasis.</p> <p>2.1 Relate cell parts (organelles) to their functions.</p> <p>2.2 Differentiate between prokaryotic cells & eukaryotic cells in terms of their general structures & degrees of complexity.</p> <p>2.3 Distinguish between plant & animal cells.</p> <p>2.5 Explain the role of cell membranes as a highly selective barrier (diffusion, osmosis, & active transport)</p> <p>2.6 Identify the reactants &</p>	<p>LE 1: Read, write, and communicate effectively.</p> <p>LE 2: Define, analyze, and solve complex problems and communicate results.</p> <p>LE 3: Study and work productively both independently and in groups.</p> <p>LE 5: Acquire, apply, integrate, analyze, and synthesize knowledge.</p>	<p>1. Use the pH scale to explain how enzymes stop working. Know how temperature denatures enzymes and why lower temperatures slow down most reactions.</p> <p>2. Identify each cell part and its function .</p> <p>3. Recognize a prokaryotic cell and a eukaryotic cell. Label parts of a prokaryotic cell.</p> <p>4. Recognize a plant cell & an animal cell. Label parts of a plant cell & an animal cell.</p> <p>5. Differentiate between diffusion, osmosis & active transport. Explain how the membrane moves materials in & out through these processes.</p> <p>6. Understand why</p>	<p>1. Quiz: Enzyme Action</p> <p>UNIT TEST</p> <p>1. Quiz: Cell Organelles & Functions</p> <p>2. Lab: Cells</p> <p>3. Lab: Cells</p> <p>4. Lab: Cells</p> <p>5. TEST: Cells</p> <p>6. Quiz: Photosynthesis</p>	<p>Ch. 3 & 4</p> <p>Ch. 5</p>

<p>products in the general reaction of photosynthesis. Describe the use of isotopes in this identification.</p> <p>2.7 Provide evidence that the organic compounds produced by plants are the primary source of energy & nutrients for most living things.</p> <p>2.8 Identify how cellular respiration is important for the production of ATP.</p> <p>2.9 Explain the interrelated nature of photosynthesis & cellular respiration.</p>		<p>photosynthesis is important to most heterotrophs. Know how reactants enter the plant & are used to make glucose.</p> <p>7. Understand how the products of photosynthesis are the reactants of cellular respiration.</p> <p>8. Know what the 3 stages of cellular respiration are & how glucose becomes ATP.</p> <p>9. Know each reaction of photosynthesis & cellular respiration & that the products of one are the reactants of the other.</p>	<p>7. Lab: Leaf Structure & Function</p> <p>8. Lab: Test for Sugars & Starch in Plants</p> <p>9. Quiz: Cellular Respiration</p> <p>10. Quiz: Equations of Photosynthesis & Cellular Respiration</p> <p>UNIT TEST</p>	
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Big Idea/Essential Question: Genes are a set of instructions encoded in the DNA sequence of each organism that specify the sequence of amino acids in proteins characteristic of that organism.
How can such a simple genetic code generate the diversity of living things?

Standard Genetics	South Hadley Learning Expectations	Skills	Assessments	Content
<p>3.1 Describe the structure and function of DNA, and distinguish among replication, transcription, and translation.</p> <p>3.9 Recognize that while viruses lack cellular structure, they have the genetic material to invade living cells.</p> <p>2.10 Describe and compare the processes of mitosis and meiosis, and their role in the cell cycle.</p> <p>3.8 Explain how zygotes are produced in the fertilization process.</p> <p>3.4 Explain how mutations in the DNA sequence of a gene may be silent or result in phenotypic change in an organism and in its offspring.</p> <p>3.5 Differentiate between</p>	<p>LE 1: Read, write, and communicate effectively.</p> <p>LE 2: Define, analyze, and solve complex problems and communicate results.</p> <p>LE 3: Study and work productively both independently and in groups.</p> <p>LE 5: Acquire, apply, integrate, analyze, and synthesize knowledge.</p>	<ol style="list-style-type: none"> 1. Explain the structure of DNA as a double helix. 2. Understand that the base pair sequence is the genetic code for traits. 3. Know the parts and functions of a basic virus, and that it requires a host cell for replication 4. Describe mitosis and meiosis. 5. Compare and contrast mitosis and meiosis. 6. Explain how each is involved in the cell cycle. 7. Understand how zygotes are produced through the process of fertilization. 8. Know what a mutation is and how it arises. 9. Understand that mutations may be beneficial, harmful, or neutral. 10. Know examples of mutations and the phenotypic change that results. <p>11. Read genetic word</p>	<p>1. Lab: DNA Structure</p> <p>2. Lab: Virus Replication</p> <p>3. Lab: Mitosis Onion Root Tip</p> <p>4. Lab: Meiosis</p> <p>5. Test: Mitosis and Meiosis</p> <p>7. Lab: Pedigrees</p>	<p>Ch. 9.2, 9.3, 6, 7, 10.1, 10.2</p>

<p>dominant, recessive, codominant, polygenic, and sex-linked traits.</p> <p>3.6 State Mendel's laws of segregation and independent assortment.</p> <p>3.7 Use a Punnett square to determine the genotype and phenotype of monohybrid crosses.</p>		<p>problems and determine the type of inheritance.</p> <p>16. Know Mendel's laws and examples of each.</p> <p>17. Solve genetic word problems using Punnett squares.</p>	<p>8. Quiz: Punnett squares</p> <p>9. Test</p>	
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Big Idea/Essential Question: Evolution and biodiversity are the result of genetic changes that occur in constantly changing environments.

What causes organisms to change?

Standard Evolution & Biodiversity	South Hadley Learning Expectations	Skills	Assessments	Content
<p>5.1 Explain how the fossil record, comparative anatomy, and other evidence support the theory of evolution.</p> <p>5.2 Illustrate how genetic variation is preserved or eliminated from a population through Darwinian natural selection (evolution) resulting in biodiversity.</p> <p>5.3 Describe how the taxonomic system classifies living things into domains (eubacteria, archaeobacteria, eukaryotes) and kingdoms (animal, plants, fungi, protists, bacteria).</p>	<p>LE 1: Read, write, and communicate effectively.</p> <p>LE 2: Define, analyze, and solve complex problems and communicate results.</p> <p>LE 3: Study and work productively both independently and in groups.</p> <p>LE 5: Acquire, apply, integrate, analyze, and synthesize knowledge.</p>	<p>1. Use present scientific evidence to argue for the theory of evolution.</p> <p>2. Understand why mutations occur, how they can be beneficial or harmful to a population, and drive its biodiversity.</p> <p>3. To be able to classify and organism using a dichotomous key.</p>	<p>1. Lab: Population Evolution</p> <p>2. Lab: Classification</p> <p>UNIT TEST</p>	<p>Ch. 12, 13, 15</p>

Big Idea/Essential Question: Ecology is the interaction between living organisms and their environment.
Why are living organisms part of the environment?

Standard Ecology	South Hadley Learning Expectations	Skills	Assessments	Content
<p>6.1 Explain how biotic and abiotic factors cycle in an ecosystem (water, carbon, oxygen, and nitrogen).</p> <p>6.2 Use a food web to identify and distinguish producers, consumers, and decomposers, and explain the transfer of energy through trophic levels.</p> <p>6.3 Identify the factors in an ecosystem that influence fluctuations in population size.</p> <p>6.5 Explain how symbiotic behavior produces interactions within ecosystems.</p>	<p>LE 1: Read, write, and communicate effectively.</p> <p>LE 2: Define, analyze, and solve complex problems and communicate results.</p> <p>LE 3: Study and work productively both independently and in groups.</p> <p>LE 5: Acquire, apply, integrate, analyze, and synthesize knowledge.</p>	<p>1. Know the biotic and abiotic factors in an environment.</p> <p>2. Know the components of the water, carbon, and nitrogen cycles.</p> <p>3. Create and describe all the components of a food web.</p> <p>4. Explain how energy flows through a food web.</p> <p>5. Know and explain factors that influence populations.</p> <p>6. Know the various symbiotic relationships and describe examples.</p>	<p>1. Quiz: nutrient cycles</p> <p>2. Quiz: food webs</p> <p>3. Lab: Kaibab deer</p> <p>UNIT TEST</p>	<p>Ch. 17</p>