

BERKELEY HEIGHTS PUBLIC SCHOOLS  
BERKELEY HEIGHTS, NEW JERSEY

**GOVERNOR LIVINGSTON HIGH SCHOOL  
SCIENCE DEPARTMENT**

**BIOLOGY  
#SCY0910**

**Curriculum Guide**

**September 2013**

Mrs. Judith A. Rattner, Superintendent  
Ms. Patricia Qualshie, Assistant Superintendent  
Mrs. Susan Rembetsy, District Supervisor

Developed by: Matthew Dailey  
Lisa Dhaibar  
Gregory Dunkerton  
James Rutzler

This curriculum may be modified through varying techniques,  
strategies, and materials, as per an individual student's  
Individualized Educational Plan (IEP).

Approved by the Berkeley Heights Board of Education  
at the regular meeting held on 9/26/13.

## TABLE OF CONTENTS

	Page
<b>Vision Statement .....</b>	<b>1</b>
<b>Mission Statement .....</b>	<b>2</b>
<b>Course Proficiencies .....</b>	<b>4</b>
<b>Course Objectives.....</b>	<b>4</b>
<b>Student Proficiencies.....</b>	<b>5</b>
<b>Methods of Evaluation.....</b>	<b>7</b>
<b>Course Outline/Student Objectives .....</b>	<b>8</b>
<b>Resources/Activities Guide .....</b>	<b>28</b>
<b>Suggested Audio Visual/Computer Aids .....</b>	<b>29</b>
<b>Suggested Materials .....</b>	<b>30</b>
<b>Resources for Students .....</b>	<b>30</b>
<b>Resources for Teacher.....</b>	<b>30</b>

## **VISION STATEMENT**

Through the study of this program, students will gain an understanding of biological principles and the living world. Students will become biologically literate individuals while applying the scientific method and improving observational reading, writing, and critical-thinking skills.

Students will develop laboratory techniques and practice problem-solving through hands-on, inquiry activities. Students will be encouraged to develop appropriate personal values regarding scientific investigations, biodiversity, and the impact of biotechnology on society. Students will be exposed to information related to career selection in the life sciences, as applicable throughout the course.

## **MISSION STATEMENT**

The philosophy of this program is to develop scientifically literate individuals with an appreciation for, and an insight into, the complexities of biology.

Throughout the biology program, several major unifying themes will be highlighted:

- ◆ Scientific inquiry and the process of science
- ◆ The relationships of science and technology to society
- ◆ The hierarchical organization of the living world
- ◆ The relationship between structure and function
- ◆ The cell as the basic unit of structure and function
- ◆ Regulation of biological systems
- ◆ Inheritance of genetic information and the continuity of life
- ◆ Evolution and the unity and diversity of life
- ◆ An organism's interactions with living and non-living functions in the environment
- ◆ Interdependencies among systems

Topics included in this course are:

- ◆ Chemistry in Biology
- ◆ The Molecules of Cells
- ◆ Metabolism
- ◆ Cell Structure and Function
- ◆ Membrane Structure and Function
- ◆ Cellular Respiration
- ◆ Photosynthesis
- ◆ The Cell Cycle
- ◆ Human Anatomy and Physiology
- ◆ Meiosis and Sexual Reproduction
- ◆ Genetics
- ◆ DNA
- ◆ RNA and Protein Synthesis
- ◆ The Genetics of Viruses and Bacteria
- ◆ Evolution
- ◆ Classification and Biodiversity
- ◆ Ecology
- ◆ Biotechnology

Students enrolled in biology will be expected to complete laboratory exercises that stress independent and group work skills. Students will complete several formal laboratory reports during the school year. The course will also include online and traditional research.

Students will demonstrate the ability to effectively communicate in a variety of ways, including oral and written presentations and reports (including laboratory reports), class participation, homework, classwork, note taking, and projects. Student performance will be evaluated, using a variety of traditional and alternate forms of assessment.

Biology is intended for students in grade 9. It is a comprehensive and challenging course that prepares motive learners who may later pursue a career in a science-related field. The

## **MISSION STATEMENT** (continued)

laboratory component broadens opportunities for students to develop their analytical and inquiry skills and prepares them for future scientific endeavors. Six (6.0) credits are awarded upon successful completion of this course. National and State Standards have been integrated throughout the curriculum.

## **COURSE PROFICIENCIES**

### **COURSE OBJECTIVES**

1. To instill in our students an awareness of the interdependence of chemical and biological processes, in the maintenance of living systems. (5.1/12A1, B3; 5.3/12A1, B1, C1,2)
2. To introduce the concept of continuity of life. (5.3/12A4, D1,2,3; E3; 5.5/12C7)
3. To help students develop an understanding of structure and function in living things, from the evolution of the cell to the complex hierarchy of organization, in the multi-cellular organisms. (5.3/12A4, C1, D1,2,3, E2,3; 5.5/12A1-4)
4. To provide students with opportunities to practice the skills of the scientific research method. (5.1/12A1,2,3, B1,2,3,4, C1,2,3, D2; 5.3/12A1; 9.1/12A1,4, B1,3, D1, F5)
5. To help students develop an appreciation for the complexity of living systems. (5.1/12D3; 5.3/12A1,6, B3,4,5, C1,2; 5.5/12B2,3)
6. To provide for career orientation, in the various aspects of biological activities where appropriate. (9.3/12C2,3; 9.4/12C3)
7. To have students correctly use scientific instruments, apparatus, and technologies of biology (such as the microscope and computer/Internet) and demonstrate the procedures of biology (preparation of wet mount slides, use of laboratory materials, and protective equipment) in a safe, prescribed manner. (5.1/12A1,2,3, B1,2,3,4; 5.3/12A1; 5.4/12C1; 8.1/12A2, B1,3,5,7,8; 8.2/12B3; 12/N-Q1; 12/A-CED2,10, B5, C1,2; 12/S-ID1-2; 12/S-IC1-6)
8. To encourage students to develop informed ethical views about issues in research, technology, and public health and policy. 5.1/12B4; 5.2/12B1-3; 9.4/12D-52,53,54)
9. To have students evaluate information about current biological issues. (5.1/12A3, C1,3, D1; 5.2/12A1; 5.3/12C2, D1; 9.1/12A1,4, B1,3, D1,2, F5)
10. To assist students in using technology skills and tools, to gather and organize information and to solve problems. (5.1/12A2,3, B1,2,3,4; 5.3/12C1; 9.1/8F6; 9.1/12A1,4, B1,3, C4,5, F2; 12/N-Q1; 12/A-CED2,10; 12/S-ID1-7, 12/S-IC1-6, 12/S-CP1-5, 12/S-MD1-7)
11. To have students develop an understanding of, and appreciation for, the organization of the living world. (5.1/12A1, B3; 5.3/12A1, B1, C1,2; 5.5/12A1-4, B1,2, C1-3; 5.10/12A1, B1)

## **STUDENT PROFICIENCIES**

The biology student will be able to:

1. Apply course material and demonstrate proficiency (including adherence to safety guidelines) during laboratory activities.
2. Use appropriate procedural skills for scientific inquiry and problem-solving. (5.1/12A2,3, B1,2,3,4; 9.1/12A1)
3. Solve problems cooperatively and creatively. (5.1/12B4; 9.4/12-52,53,54)
4. Explain how the experimentation leads to further investigation. (5.1/12A2,3, B1,2,3,4; 9.1/12A1)
5. Select and use appropriate instrumentation, to design and conduct investigations. (5.1/12A1,2,3, B1,2,3,4,5, C1,2; 5.3/12A1)
6. Create and interpret a variety of graphs. (5.1/12A2,3, B1,2,3,4; 9.1/12A1)
7. Use spreadsheets and design computer-generated graphs effectively. (5.1/12A2,3, B1,2,3,4; 9.1/12A1)
8. Utilize computer programs and other technologies in investigations to collect, organize, and interpret scientific data. (5.1/12A1,2,3, B1,2,3,4,5, C1,2; 5.3/12A1)
9. Assess, critique, and justify the accuracy, relevance, and appropriateness of the Internet and other information sources. (5.1/12A1,2,3, B1,2,3,4,5, C1,2; 5.3/12A1)
10. Properly utilize applicable principles of chemistry, physics, earth science, mathematics, probability, and statistics in explaining biological concepts and processes.
11. Identify and compare the structure and function of the molecules that control cellular activities.
12. Demonstrate an understanding and an appreciation of the relationship among major biological concepts and processes. (5.1/12D3; 5.3/12A1,6, B3,4,5, C1,2)
13. Explain the way in which genetic information is encoded and replicated.
14. Describe the role of genetics in today's world and its potential impact in the future. (5.5/12A1, C1-3; 9.1/12A2,5)

## **STUDENT PROFICIENCIES** (continued)

15. Evaluate the connections among variation, fitness, natural selection, and evolution, based on organizational and environmental characteristics. (5.5/12B1, C2)
16. Assess the value of biodiversity. (5.5/12B1, C2)
17. Describe the relationships among organisms and between organisms and their environments. (5.1/12A1,2, B3; 5.2/12A2; 5.3/12A1, B1, C1,2; 5.5/12A1, B1,2; 5.8/12A1, B1, C1-3; 5.10/12A1, B1,2; 9.2/12A3)
18. Analyze the influences of science on society and of society on science. (5.1/12A1-4; B4; 5.2/12A1; 5.4/12A1, B1, C1; 5.5/12C3; 9.4/12-52,53,54)
19. Identify career opportunities within the sphere of science. (5.1/12A4; 9.1/12A2,3,5; 9.3/12C2,3; 9.4/12D3)
20. Predict how human activity or natural phenomena may affect the balance of life on earth.
21. Use models effectively, to explain the structure and behavior of biological concepts. (5.1/12A2,3, B1,2,3,4; 9.1/12A1)
22. Understand how the various systems of the body interact with one another.
23. Identify cell parts and explain connections to their function.
24. Design and conduct investigations, based on appropriate instrumentations for a given question/problem. (5.1/12A1,2,3, B1,2,3,4,5, C1,2; 5.3/12A1)



## **METHODS OF EVALUATION**

Methods of evaluation that may be used in Biology include, but are not limited to:

1. Class participation and discussions.
2. Homework assignments.
3. Individual and cooperative learning class work assignments.
4. Laboratory practical examinations/demonstrations.
5. Laboratory reports.
6. Notebooks.
7. Oral and written reports.
8. Projects.
9. Proper use of scientific equipment.
10. Quizzes.
11. Unit and comprehensive tests (Traditional and alternative)
12. Midterm and final examinations.

**SCOPE AND SEQUENCE**  
**COURSE OUTLINE/STUDENT OBJECTIVE**

The student will be able to:

NJ Core Curriculum Standards/ Grade	Strands & Indicators	Course Outline/Student Objectives
5.3/12 RST9-10 CTE9.1/12  CTE9.4/12  12/N-Q 12/A-SSE 12/A-CED 12/A-REI 12/S-ID 12/S-IC 12/S-CP 12/S-MD	C1 1,2,3,4,6,7 A1 B1 F1 3,5,8,12,15, 17,24,44 1.3 3 1-4 1,2,10 1-7 1-6 1-5 1-7	I. Introduction To Biology (1.5 Weeks) A. Biology as a Science 1. Define biology as a science that studies living things 2. Recognize themes in the study of life 3. Formulate several reasons why everyone should study biology 4. Provide examples of the importance of biology 5. Name several branches of biology 6. List and describe several careers related to biology 7. Create a timeline of historical events important to biology 8. Demonstrate how ethics play a role in biology B. Laboratory Safety and Skills 1. Recognize potential safety hazards associated with science 2. Apply the scientific method to laboratory activities 3. Practice safe use of tools and equipment 4. Recognize biology laboratory apparatus 5. Use and read instruments, such as metric rulers, thermometers, and graduated cylinders 6. Develop appropriate safe response procedures to hazardous situations 7. Interpret and produce a variety of graphs by hand, as well as by computer 8. Develop several formal laboratory reports 9. Use advanced biological laboratory materials for bacterial/genetic studies 10. Design an experiment, using computer aided analysis/recording devices C. The Microscope 1. List and discuss the rules for care and operation of the microscope

		<p>I. Introduction To Biology (continued)</p> <ol style="list-style-type: none"> <li>2. List, describe, and operate the parts of a compound microscope</li> <li>3. Complete an experiment, demonstrating the use of a compound microscope</li> </ol> <p>D. The Scientific Method</p> <ol style="list-style-type: none"> <li>1. List the steps of the scientific method</li> <li>2. Formulate a hypothesis from questions or problems</li> <li>3. Develop an experiment, using the scientific methods and test the experiment</li> <li>4. Explain the reasons for the following scientific method</li> <li>5. Define theory and explain how they are developed</li> </ol>
<p>5.3/12</p> <p>RST/9-10</p> <p>CTE9.1/11</p> <p>CTE9.4/12</p> <p>12/N-Q</p> <p>12/A-REI</p> <p>12/S-ID</p> <p>12/S-IC</p>	<p>A3</p> <p>B1,3,6</p> <p>C1,2,3</p> <p>1,4,5,10</p> <p>A3</p> <p>F6</p> <p>1,7,52</p> <p>1</p> <p>10</p> <p>1-7</p> <p>1-6</p>	<p>II. Ecology (4.5 Weeks)</p> <p>A. Principles of Ecology</p> <ol style="list-style-type: none"> <li>1. Differentiate between abiotic and biotic factors</li> <li>2. Sequence the levels of biological organization</li> <li>3. Differentiate between an organism's habitat and niche</li> <li>4. List, describe, and provide examples of the three different kinds of symbiosis</li> </ol> <p>B. Organization of the Environment</p> <ol style="list-style-type: none"> <li>1. Define ecology</li> <li>2. Trace the flow of energy through living systems, identifying energy roles in ecosystems and feeding relationships</li> <li>3. Evaluate the efficiency of energy transfer among organisms through the various trophic levels and ecological pyramids</li> <li>4. Describe how abiotic and biotic factors work together in an ecosystem</li> <li>5. Interpret food chains, food webs, and pyramid models</li> <li>6. Identify community interactions <ol style="list-style-type: none"> <li>a. niche</li> <li>b. competition</li> <li>c. predation</li> <li>d. symbiosis</li> </ol> </li> </ol> <p>C. Define Biodiversity and Evaluate Its Importance</p> <ol style="list-style-type: none"> <li>1. Explain the importance of biodiversity</li> <li>2. List and describe several threats to biodiversity</li> </ol>

		<p>II. Ecology (continued)</p> <ol style="list-style-type: none"> <li>3. Describe how the decline of a single species can affect an entire ecosystem</li> <li>4. Evaluate the methods used to conserve biodiversity</li> </ol> <p>D. Cycles of Matter</p> <ol style="list-style-type: none"> <li>1. Describe how nutrients move through the biotic and abiotic parts of an ecosystem</li> <li>2. Compare biogeochemical cycles</li> <li>3. Model the following cycles       <ol style="list-style-type: none"> <li>a. water cycle</li> <li>b. carbon cycle</li> <li>c. nitrogen cycle</li> <li>d. phosphorus cycle</li> </ol> </li> </ol> <p>E. Population Dynamics</p> <ol style="list-style-type: none"> <li>1. Describe characteristics of populations</li> <li>2. Explain and apply the concepts of carrying capacity and limiting factors</li> </ol> <p>F. Biomes</p> <ol style="list-style-type: none"> <li>1. Identify the biomes on the planet</li> <li>2. Create a model of a biome, including biotic and abiotic factors</li> <li>3. Identify renewable and non-renewable resources and predict how the loss of each might affect the biome</li> <li>4. Model ecological succession in a biome</li> </ol> <p>G. Populations</p> <ol style="list-style-type: none"> <li>1. Identify factors that affect population size</li> <li>2. Infer how limiting factors can affect a population's growth rate</li> <li>3. Draw and interpret population growth curves</li> <li>4. Analyze why population growth rates differ throughout the world</li> <li>5. Predict the consequences of unchecked population growth</li> </ol> <p>H. Human Ecology</p> <ol style="list-style-type: none"> <li>1. Research how human activities affect the biosphere, identifying environmental and human costs and benefits       <ol style="list-style-type: none"> <li>a. deforestation</li> <li>b. global warming</li> <li>c. pollution</li> <li>d. land use</li> <li>e. hunting</li> </ol> </li> </ol>
--	--	--

		<p>II. Ecology (continued)</p> <ol style="list-style-type: none"> <li>2. Investigate how humans may be impacted if global climate changes were to occur</li> <li>3. Develop ways humans can change their impact on global climate changes and other environmental effects on the planet</li> </ol> <p>I. Senses (Time Permitting)</p> <ol style="list-style-type: none"> <li>1. Identify the human senses</li> <li>2. Describe how the senses allow organisms to react to changes in the environment</li> <li>3. Experiment with the senses of the tongue and nose</li> </ol>
<p>5.3/12</p> <p>9.1/12</p> <p>RST9-10</p> <p>12/N-RN</p> <p>12/N-Q</p>	<p>A1,2</p> <p>B1,2,5</p> <p>A1</p> <p>C4</p> <p>F2</p> <p>2,5,6,7,9</p> <p>2</p> <p>3</p>	<p>III. Chemistry, Biochem, Digestion, Energy, and Enzymes (4 Weeks)</p> <p>A. Inorganic Chemistry</p> <ol style="list-style-type: none"> <li>1. Describe the relationship between atoms and molecules</li> <li>2. Describe and diagram atomic structure</li> <li>3. Construct and label a diagram of an atom</li> <li>4. Use a periodic table to find an atomic number and mass number of an atom</li> <li>5. Distinguish among atomic number, mass number, and atomic mass</li> <li>6. Distinguish among matter, elements, and compounds</li> <li>7. List elements required for life</li> <li>8. Predict the types of bonds that will form in molecules</li> <li>9. Construct a pH scale of household products</li> <li>10. Identify reactants and products of chemical equations</li> <li>11. Identify properties of, and use for, isotopes</li> <li>12. Describe how electron configuration determines bonding properties</li> <li>13. Compare, contrast, and list examples of covalent and ionic bonds</li> <li>14. Distinguish between polar and non-polar compound</li> </ol> <p>B. Water and Its Polarity</p> <ol style="list-style-type: none"> <li>1. Describe why water is a polar molecule and describe its significance</li> <li>2. Explain properties of water that influence biology <ol style="list-style-type: none"> <li>a. density</li> <li>b. specific heat/evaporative cooling</li> </ol> </li> </ol>

		<p>III. Chem, Biochem, Digestion, Energy, and Enzymes (continued)</p> <ul style="list-style-type: none"> <li>c. dissolving abilities</li> <li>d. cohesion/surface tension/adhesion</li> </ul> <p>3. Illustrate and explain hydrogen bonding</p> <p>4. Diagram the formation of hydrogen bonds between water molecules</p> <p>5. The dissociation of water molecules</p> <ul style="list-style-type: none"> <li>a. split water to model how acids and bases form</li> <li>b. explain and diagram dissociation of water molecules</li> <li>c. distinguish between acids and bases</li> <li>d. use and interpret the pH scale</li> <li>e. describe the function and importance of buffers</li> </ul> <p>C. Organic Chemistry</p> <ul style="list-style-type: none"> <li>1. Construct models of organic molecules</li> <li>2. Identify organic molecules and their functions</li> <li>3. Create polymers from simple monomers</li> <li>4. Describe similarities and differences between hydrolysis and dehydration synthesis</li> <li>5. Distinguish between organic and inorganic compounds</li> <li>6. Describe the chemical properties of carbon</li> <li>7. Identify and model/diagram selected functional groups of organic compounds</li> <li>8. Carbohydrates <ul style="list-style-type: none"> <li>a. identify and describe the chemical properties of selected monosaccharides, disaccharides, and polysaccharides</li> <li>b. diagram disaccharide synthesis and hydrolysis (glycosidic linkage)</li> </ul> </li> <li>9. Nucleic acids <ul style="list-style-type: none"> <li>a. list the parts of DNA and RNA nucleotides</li> <li>b. diagram DNA and RNA structure and outline function</li> </ul> </li> <li>10. Proteins <ul style="list-style-type: none"> <li>a. diagram structure and describe chemical properties of amino acids</li> <li>b. diagram polypeptide synthesis and hydrolysis (peptide bond)</li> <li>c. distinguish among primary, secondary, tertiary, and quaternary structure</li> </ul> </li> </ul>
--	--	--

		<p>III. Chem, Biochem, Digestion, Energy, and Enzymes (continued)</p> <ul style="list-style-type: none"> <li>d. describe the function and list examples of several different types (classes) of proteins</li> </ul> <p>11. Lipids</p> <ul style="list-style-type: none"> <li>a. compare and contrast chemical structure of lipids with that of other organic macromolecules</li> <li>b. diagram synthesis and hydrolysis of a fat (ester linkage)</li> <li>c. compare and contrast saturated and unsaturated fatty acids and fats</li> <li>d. describe the function of different types of lipids: <ul style="list-style-type: none"> <li>(1) steroids (cholesterol, sex hormones)</li> <li>(2) phospholipid</li> </ul> </li> </ul> <p>D. Metabolism</p> <ul style="list-style-type: none"> <li>1. Diagram the ATP cycle</li> <li>2. Explain how ATP performs work in the cell</li> <li>3. Construct ATP and demonstrate how its energy is stored and released</li> <li>4. Enzymes <ul style="list-style-type: none"> <li>a. describe how enzymes speed up chemical reactions</li> <li>b. describe the role of activation energy in reactions</li> <li>c. outline the catalytic cycle of an enzyme</li> <li>d. describe the effect of various factors on enzyme activity: <ul style="list-style-type: none"> <li>(1) temperature</li> <li>(2) pH</li> <li>(3) enzyme concentration</li> <li>(4) substrate concentration</li> </ul> </li> </ul> </li> </ul> <p>E. Nutrition (Time Permitting)</p> <ul style="list-style-type: none"> <li>1. Describe the roles of nutrients needed to sustain life</li> <li>2. Evaluate the need for a balanced diet</li> <li>3. Discuss how vitamins are important for the body</li> </ul> <p>F. Digestion (Time Permitting)</p> <ul style="list-style-type: none"> <li>1. Evaluate the functions of enzymes in digestion</li> <li>2. Identify the organs of the digestive system and their functions</li> </ul>
--	--	---

5.3/12	A1,2,3,4,5,6 E4	IV. Cells/FFF/Transport/Urinary (4.5 Weeks)
9.1/12	A1 C4 F2	<p>A. Overview of Cell Structure and Function</p> <ol style="list-style-type: none"> <li>1. Cell Theory       <ol style="list-style-type: none"> <li>a. state and summarize the principles of the cell theory</li> <li>b. construct a timeline of cell discoveries and relate them to the cell theory</li> </ol> </li> <li>2. Compare and contrast prokaryotic and eukaryotic cells</li> <li>3. Observe cells under a microscope</li> <li>4. Viruses       <ol style="list-style-type: none"> <li>a. identify the parts of a virus</li> <li>b. interpret the lysogenic and lytic life cycles</li> <li>c. research the impact viruses have on organisms</li> <li>d. bacteriophages           <ol style="list-style-type: none"> <li>(1) describe the structure of a bacteriophage</li> <li>(2) compare and contrast lytic and lysogenic infections</li> </ol> </li> </ol> </li> </ol> <p>B. Animal Viruses (Time Permitting)</p> <ol style="list-style-type: none"> <li>1. List examples of DNA and RNA animal viruses</li> <li>2. Describe the structure of animal viruses</li> <li>3. Compare and contrast phages and animal viruses</li> <li>4. Outline the replication cycle of HIV</li> <li>5. Discuss the structure, replication, and action of prions in relationship to causing disease</li> <li>6. Prokaryotes       <ol style="list-style-type: none"> <li>a. model bacteria</li> <li>b. recognize the types of bacteria</li> <li>c. research the capabilities of bacteria to survive in extremes</li> <li>d. show how humans can be affected by and utilize bacteria</li> </ol> </li> <li>7. Eukaryotic cells       <ol style="list-style-type: none"> <li>a. identify and describe the structures and functions of the parts of a typical eukaryotic cell           <ol style="list-style-type: none"> <li>(1) compare and contrast plant and animal cells</li> <li>(2) cholesterol</li> </ol> </li> <li>b. distinguish between integral and peripheral proteins</li> <li>c. list and describe functions of membrane proteins</li> <li>d. describe the role of carbohydrates in the cell membrane</li> </ol> </li> </ol> <p>C. Passive Transport</p>



		<p>IV. Cells/FFF/Transport/Urinary (continued)</p> <ol style="list-style-type: none"> <li>1. Create a concentration gradient and explain how it is used in cell transport</li> <li>2. Demonstrate osmosis and diffusion</li> <li>3. Conduct an experiment that models the behavior of an egg in an isotonic, hypertonic, and hypotonic solution</li> <li>4. Relate diffusion to energy</li> <li>5. Identify the role of a concentration gradient on diffusion</li> <li>6. Describe why diffusion is passive transport</li> <li>7. Predict the effect of hypertonic, isotonic, and hypotonic solutions on cells</li> <li>8. Describe the role of transport proteins in facilitated diffusion</li> </ol> <p>D. Active Transport</p> <ol style="list-style-type: none"> <li>1. Propose ideas about why there is a need for energy in active transport – contrast active and passive transport</li> <li>2. Compare and contrast endocytosis and exocytosis</li> <li>3. Distinguish among phagocytosis, pinocytosis, and receptor-mediated endocytosis</li> </ol> <p>E. Excretion (Time Permitting)</p> <ol style="list-style-type: none"> <li>1. Define excretion and its function in living things</li> <li>2. Describe the structure and function of the organs involved in the excretory system</li> <li>3. Model the process of excretion</li> </ol>
<p>5.3/12 9.1/12 RST9-10 12/N-Q 12/A-CED 12/A-REI 12/S-ID 12/S-IC 12/S-CP</p>	<p>A1,2,3,4 B1,3,4,5 A1 C4 F2 1,5,8,10 1 1 10 1-7 1-6 1-5</p>	<p>V. Cellular Energetics (4.5 Weeks)</p> <p>A. Principles of Cellular Respiration</p> <ol style="list-style-type: none"> <li>1. Diagram energy flow and chemical recycling in ecosystems</li> <li>2. Write the overall equation for cellular respiration in both symbols and words</li> <li>3. Describe how electrons “fall” from organic molecules during cellular respiration</li> <li>4. Explain the roles of electron carriers and the electron transport chain on energy harvest during respiration</li> </ol> <p>B. Anerobic and Aerobic Respiration</p> <ol style="list-style-type: none"> <li>1. Illustrate a mitochondrion and identify the structures related to respiration</li> <li>2. Fermentation</li> </ol>

		<p>V. Cellular Energetics (continued)</p> <ul style="list-style-type: none"> <li>a. write the equation for lactic acid fermentation and identify how the body uses this process as a default to produce energy during exercise</li> <li>b. conduct an experiment that demonstrates alcoholic fermentation with yeast</li> <li>c. outline the chemical processes of alcoholic and lactic acid fermentation</li> <li>d. compare and contrast respiration and fermentation</li> </ul> <p>3. The reactions of cellular respiration</p> <ul style="list-style-type: none"> <li>a. identify the reactants and products of cell respiration</li> <li>b. outline the chemical processes of glycolysis, the Krebs cycle, and the electron transport chain</li> <li>c. describe how the structure of the mitochondrion fits its function in aerobic respiration <ul style="list-style-type: none"> <li>(1) differentiate between plant and animal cells</li> <li>(2) create analogies between eukaryotic cells and systems, such as a factory or city</li> <li>(3) provide examples and explain the importance of membranes to compartmentalize the eukaryotic cell</li> </ul> </li> </ul> <p>4. Endosymbiotic Theory</p> <ul style="list-style-type: none"> <li>a. identify Lynn Margulis as the author of the Endosymbiotic Theory</li> <li>b. define the Endosymbiotic Theory</li> <li>c. hypothesize how independent bacterial cells entered and survived inside a host cell</li> <li>d. formulate reasons for why symbiosis benefits both organisms</li> <li>e. list other symbiotic relationships on the planet</li> </ul> <p>5. Cell diversity</p> <ul style="list-style-type: none"> <li>a. describe levels of organization in living things</li> <li>b. research how cell shape and structure influences its function <ul style="list-style-type: none"> <li>(1) red and white blood cells</li> <li>(2) nerve cells</li> <li>(3) amoeba</li> </ul> </li> </ul> <p>C. Membrane Structure</p> <ul style="list-style-type: none"> <li>1. Describe the fluid mosaic model of the cell membrane</li> </ul>
--	--	--

		<p>V. Cellular Energetics (continued)</p> <ol style="list-style-type: none"> <li>2. Describe features of cell membranes that keep them fluid:       <ol style="list-style-type: none"> <li>a. phospholipid movement</li> <li>b. unsaturated phospholipids</li> <li>c. summarize ATP yield in aerobic respiration</li> <li>d. rank the processes of glycolysis, fermentation, and cellular respiration in terms of ATP production and predict which is most efficient</li> </ol> </li> </ol> <p>D. Photosynthesis Overview</p> <ol style="list-style-type: none"> <li>1. Distinguish between producers and consumers</li> <li>2. Describe and list examples of:       <ol style="list-style-type: none"> <li>a. photoautotrophs</li> <li>b. chemoautotrophs</li> <li>c. heterotrophs</li> </ol> </li> <li>3. Describe structure and function of the chloroplast</li> </ol> <p>E. The Light-Dependent Reactions</p> <ol style="list-style-type: none"> <li>1. Describe the nature of sunlight</li> <li>2. Evaluate the role of pigments in the l-d reactions</li> <li>3. Outline the chemical processes of the l-d reactions</li> <li>4. Describe the importance of water in the l-d reactions</li> <li>5. Explain the role of NADP<sup>+</sup>/NADPH in the l-d reactions</li> </ol> <p>F. The Light Independent Reactions (Calvin Cycle)</p> <ol style="list-style-type: none"> <li>1. Define <i>carbon fixation</i></li> <li>2. Evaluate the role of CO<sub>2</sub> in the Calvin Cycle</li> <li>3. Outline the chemical processes of the Calvin Cycle</li> <li>4. Construct an equation for photosynthesis</li> <li>5. Explain the importance of red, blue, and green wavelengths in the visible spectrum</li> <li>6. Predict the absorbed and reflected light in several objects, including plants</li> <li>7. Illustrate a chloroplast and identify structures involved in photosynthesis</li> <li>8. Identify reactants and products of the light reactions and the Calvin Cycle</li> <li>9. Extract plant pigments from leaves</li> </ol> <p>G. Energy and Life</p> <ol style="list-style-type: none"> <li>1. Describe how the structure of the chloroplast fits its function in photosynthesis</li> <li>2. Analyze the relationship between cellular respiration and photosynthesis</li> </ol>
--	--	---

		<p>V. Cellular Energetics (continued)</p> <ol style="list-style-type: none"> <li>3. Interpret graphs, showing how rate of photosynthesis is influenced by environmental factors</li> </ol> <p>H. Photosynthesis and Cellular Respiration Comparison</p> <ol style="list-style-type: none"> <li>1. Compare cellular respiration and photosynthesis</li> <li>2. Suggest reasons why plant cells have mitochondria</li> <li>3. Show how the products of photosynthesis become the reactants of cellular respiration</li> </ol> <p>I. Circulatory System (Time Permitting)</p> <ol style="list-style-type: none"> <li>1. Describe the structures and functions of the heart</li> <li>2. Identify the main blood vessels and describe their functions in the transport of materials through the body</li> <li>3. Illustrate the path of blood through the body</li> <li>4. Associate the heart rate with exercise</li> <li>5. Relate the pulse to blood moving through the body</li> </ol> <p>J. Respiratory System (Time Permitting)</p> <ol style="list-style-type: none"> <li>1. Define breathing and its function in living things</li> <li>2. Identify the organs of the respiratory system and describe their functions</li> <li>3. Evaluate the correlation between increased breathing rate and body activity</li> </ol>
<p>5.3/12</p> <p>CTE/9.1/12</p> <p>CTE/9.4/12</p> <p>RST9-10</p> <p>12/N-Q</p> <p>12/A-CED</p>	<p>A1,3,4,5,6</p> <p>D2,3</p> <p>A1</p> <p>C4</p> <p>F2</p> <p>52</p> <p>1,2,6,10</p> <p>1</p> <p>2,4</p>	<p>VI. Cellular And Human Reproduction (4.5 Weeks)</p> <p>A. Cell Growth and Division</p> <ol style="list-style-type: none"> <li>1. Cell size       <ol style="list-style-type: none"> <li>a. explain the limitations of cells size</li> <li>b. define DNA overload</li> <li>c. compare surface area to volume, with respect to cell size</li> </ol> </li> <li>2. Cell growth       <ol style="list-style-type: none"> <li>a. explain the problems that growth causes for cells</li> <li>b. describe how cell division solves the problems of cell growth</li> <li>c. interpret and label a diagram of the cell cycle</li> <li>d. describe the stages of interphase</li> <li>e. DNA and RNA           <ol style="list-style-type: none"> <li>(1) differentiate among chromatin, chromatids, and chromosomes</li> <li>(2) model DNA</li> <li>(3) extract DNA from an organism to visualize the strands</li> </ol> </li> </ol> </li> </ol>

		<p>VI. Cellular And Human Reproduction (continued)</p> <ul style="list-style-type: none"> <li>(4) develop a timeline of scientists and experiments that contributed to an understanding of DNA</li> <li>(5) summarize the experiments leading to the discovery of DNA as the genetic material</li> <li>(6) describe the design and results and interpret the conclusions of the experiments performed by: <ul style="list-style-type: none"> <li>(a) Griffith</li> <li>(b) Avery</li> <li>(c) Hershey and Chase</li> </ul> </li> <li>(7) DNA structure <ul style="list-style-type: none"> <li>(a) describe how the work of the following scientists contributed to the discovery of DNA structure: <ul style="list-style-type: none"> <li>1) Chargaff</li> <li>2) Franklin</li> <li>3) Watson and Crick</li> </ul> </li> <li>(b) describe the structure of the DNA molecule</li> <li>(c) describe the structure of a DNA nucleotide</li> <li>(d) differentiate between and list examples of purines and pyrimidines</li> </ul> </li> <li>(8) DNA replication <ul style="list-style-type: none"> <li>(a) summarize the events of DNA replication</li> <li>(b) outline the process of DNA replication, including involved enzymes</li> <li>(c) compare the synthesis of leading and lagging strands</li> <li>(d) explain how enzymes proofread DNA during its replication and repair damage in existing DNA</li> </ul> </li> </ul> <p>3. Cell division</p> <ul style="list-style-type: none"> <li>a. describe binary fission and compare it to eukaryotic cell cycling</li> <li>b. mitosis <ul style="list-style-type: none"> <li>(1) outline and identify the stages of mitosis in a eukaryotic cell</li> <li>(2) model the cell cycle and explain what occurs at each stage</li> <li>(3) identify the structures involved in mitosis</li> </ul> </li> </ul>
--	--	---

		<p>VI. Cellular And Human Reproduction (continued)</p> <ul style="list-style-type: none"> <li>(4) contrast cytokinesis in plant and animal cells</li> <li>(5) observe cells in mitosis, using a microscope</li> </ul> <p>4. Cell Cycle Regulation</p> <ul style="list-style-type: none"> <li>a. describe the role of cyclins and CDKs on cell cycle regulation</li> <li>b. list external factors in the regulation of the cell cycle</li> <li>c. research the controversy regarding stem cells</li> <li>d. explain how cancer relates to the cell cycle <ul style="list-style-type: none"> <li>(1) contrast cancer cells and healthy cells</li> <li>(2) compare and contrast benign and malignant tumors</li> <li>(3) define <i>metastasis</i></li> <li>(4) identify cancer-causing factors: <ul style="list-style-type: none"> <li>(a) environment (carcinogens, radiation)</li> <li>(b) genetics</li> <li>(c) age</li> <li>(d) viruses</li> </ul> </li> </ul> </li> </ul> <p>5. Meiosis</p> <ul style="list-style-type: none"> <li>a. summarize the events of meiosis</li> <li>b. observe cells and recognize and summarize the stages of meiosis</li> <li>c. evaluate the importance of crossing over on genetic diversity</li> <li>d. construct a diagram that identifies the stages of meiosis</li> <li>e. summarize spermatogenesis and oogenesis</li> <li>f. explain how non-disjunctions occur</li> <li>g. compare and contrast meiosis and mitosis</li> </ul> <p>6. Errors in chromosomal inheritance</p> <ul style="list-style-type: none"> <li>a. describe the effect of non-disjunction on gamete formation</li> <li>b. chromosome structure (deletions, duplications, inversions, and translocations)</li> </ul> <p>7. Explain how a karyotype is prepared</p> <p>8. Interpret a karyotype</p> <p>9. Describe the causes and effects of selected genetic disorders, such as:</p> <ul style="list-style-type: none"> <li>a. Down's Syndrome</li> <li>b. Klinefelter Syndrome</li> <li>c. Turner's Syndrome</li> </ul> <p>10. Assess the benefits and risks of diagnostic fetal testing</p>
--	--	--

		<p>VI. Cellular And Human Reproduction (continued)</p> <p>B. The Human Life Cycle</p> <ol style="list-style-type: none"> <li>1. Distinguish between: <ol style="list-style-type: none"> <li>a. somatic cells and gametes</li> <li>b. autosomes and sex chromosomes</li> <li>c. diploid and haploid cells</li> </ol> </li> <li>2. Compare and contrast spermatogenesis and oogenesis</li> <li>3. Describe the roles of each of the following on the human life cycle: <ol style="list-style-type: none"> <li>a. meiosis</li> <li>b. fertilization</li> <li>c. mitosis</li> </ol> </li> <li>4. Describe fertilization and the development of the zygote and embryo</li> <li>5. Explain the reduction division that occurs in meiosis</li> </ol> <p>C. Human Reproductive System</p> <p>D. Asexual vs. Sexual Reproduction</p>
<p>5.3/12</p> <p>9.1/12</p> <p>RST/9-10</p>	<p>A1,2,3,6</p> <p>D1,2,3</p> <p>A1</p> <p>C4</p> <p>F2</p> <p>1,2,10</p>	<p>VII. Protein Synthesis/Endocrine/Immune/Lymphatic (3 Weeks)</p> <p>A. RNA</p> <ol style="list-style-type: none"> <li>1. List and describe the three major types of RNA</li> <li>2. Explain how mRNA, rRNA, and tRNA are involved in the transcription and translation of genes</li> <li>3. Compare and contrast RNA and DNA</li> </ol> <p>B. Transcription</p> <ol style="list-style-type: none"> <li>1. Outline the process of transcription</li> <li>2. Summarize the role of RNA polymerase in mRNA synthesis</li> <li>3. Describe some of the ways eukaryotic cells modify RNA after transcription</li> </ol> <p>C. Translation</p> <ol style="list-style-type: none"> <li>1. Outline the processes of initiation and elongation</li> <li>2. Trace the formation of a functional protein from a polypeptide</li> </ol> <p>D. Mutations</p> <ol style="list-style-type: none"> <li>1. List examples of mutations,</li> <li>2. Explain the potential impact of mutations, such as point and frame shift mutation on protein synthesis</li> </ol> <p>E. Summarize the Events of Transcription and Translation</p> <p>F. Hypothesize the Effect Mutations in DNA Replication, Transcription, and Translation Could Create</p> <p>G. Explain How Genes are Regulated</p>

		<p>VII. Protein Synthesis/Endocrine/Immune/Lymphatic (continued)</p> <ol style="list-style-type: none"> <li>1. Prokaryotic lac operon</li> <li>2. Eukaryotic TATA box</li> <li>3. Endocrine system <ol style="list-style-type: none"> <li>a. identify the purpose of the endocrine system</li> <li>b. evaluate how the hormones regulate growth and development</li> <li>c. identify the major endocrine glands and the hormones they secrete</li> </ol> </li> </ol> <p>H. Human Immune System (Time Permitting)</p> <p>I. Human Lymphatic System (Time Permitting)</p> <p>J. Human Endocrine System (Time Permitting)</p>
<p>5.3/12</p> <p>9.1/12</p> <p>RST/9-10</p> <p>CTE/9.1/12</p> <p>CTE/9.4/12</p> <p>12/S-MB</p> <p>12/S-CP</p>	<p>A2,5,6</p> <p>D1,2,3</p> <p>A1</p> <p>C4</p> <p>1,2,3,6,9</p> <p>F6</p> <p>52</p> <p>1-7</p> <p>1-5</p>	<p>VIII. Genetics/Human Integumentary System (4.5 Weeks)</p> <p>A. Mendelian Genetics</p> <ol style="list-style-type: none"> <li>1. Explain the significance of Mendel’s experiments to the study of genetics <ol style="list-style-type: none"> <li>a. summarize the principles of dominance, segregation, and independent assortment</li> <li>b. apply the principles of probability to genetic problems</li> <li>c. predict the possibilities of offspring from a cross, using a Punnett Square</li> <li>d. distinguish between: <ol style="list-style-type: none"> <li>(1) homozygous and heterozygous</li> <li>(2) genotype and phenotype</li> </ol> </li> </ol> </li> <li>2. Apply the principles of genetics to genetic crossing, using a Punnett Square</li> <li>3. Relate the mathematics of probability to genetics</li> <li>4. Predict genotype and phenotype of one and two factor crosses</li> <li>5. Conduct an experiment, involving two factor crosses</li> </ol> <p>B. Non-Mendelian and Human Genetics</p> <ol style="list-style-type: none"> <li>1. Distinguish between various complex inheritance patterns</li> <li>2. Solve genetic problems, involving human blood type</li> <li>3. Solve problems involving dominant and recessive disorders</li> <li>4. Analyze sex-linked and sex-limited inheritance patterns</li> <li>5. Describe mechanisms for sex determination</li> </ol>



		<p>VIII. Genetics/Human Integumentary System (continued)</p> <ol style="list-style-type: none"> <li>6. Solve problems involving sex-linked traits and disorders</li> <li>7. Create and analyze pedigrees</li> <li>8. Explain how gene linkage can be used to create chromosome maps</li> <li>9. Explain how environment can affect the phenotype of an organism</li> <li>10. Explain how incomplete dominance and co-dominance occur</li> <li>11. Use a pedigree to follow dominant and recessive human genetic disorders</li> <li>12. Depict multiple allele inheritance       <ol style="list-style-type: none"> <li>a. blood type</li> <li>b. skin color</li> </ol> </li> <li>13. Investigate the inheritance of sex-linked genetics</li> </ol> <p>C. Bacterial Genetics</p> <ol style="list-style-type: none"> <li>1. Outline the replication of a bacterial chromosome</li> <li>2. Compare and contrast genetic recombination processes:       <ol style="list-style-type: none"> <li>a. transformation</li> <li>b. transduction</li> <li>c. conjugation</li> </ol> </li> <li>3. Describe how bacteria are able to regulate their genes, using two types of operons</li> </ol> <p>D. Applied Genetics and Biotechnology</p> <ol style="list-style-type: none"> <li>1. Describe how selective breeding is used to produce organisms with desired traits</li> <li>2. Compare inbreeding and hybridization</li> <li>3. Assess the genotypes of organisms, using a Punnett Square</li> </ol> <p>E. Genetic Engineering and the Human Genome</p> <ol style="list-style-type: none"> <li>1. Describe how genetic engineering manipulates recombinant DNA</li> <li>2. Evaluate the potential effects of genetic engineering on human health and society</li> <li>3. Explain how information from the human genome can be used to diagnose human diseases</li> <li>4. Explore the pros and cons of genetic variation</li> <li>5. Cloning       <ol style="list-style-type: none"> <li>a. explain the method of cloning</li> <li>b. list organisms that can be cloned to date, including the first mammal cloned</li> </ol> </li> </ol>
--	--	---

		<p>VIII. Genetics/Human Integumentary System (continued)</p> <ul style="list-style-type: none"> <li>c. state some problems that can occur with cloning</li> <li>6. Practical applications of transgenic organisms <ul style="list-style-type: none"> <li>a. transgenic bacteria</li> <li>b. transgenic animals</li> <li>c. transgenic plants</li> </ul> </li> <li>7. DNA fingerprinting <ul style="list-style-type: none"> <li>a. explain gel electrophoresis technology</li> <li>b. summarize how DNA is extracted and becomes amplified</li> <li>c. summarize how DNA is sequenced and read</li> <li>d. synthesize a list of the pros and cons of using DNA fingerprinting for court cases and cases of identity</li> </ul> </li> <li>8. Cell transformation (Time Permitting) <ul style="list-style-type: none"> <li>a. explain how bacteria is transformed, using plasmids</li> <li>b. summarize the pros and cons of genetically modified foods</li> </ul> </li> <li>F. Human Integumentary System <ul style="list-style-type: none"> <li>1. Skin color (Time Permitting)</li> <li>2. Skin cells for genetic research (Time Permitting)</li> <li>3. Skin cancer (Time Permitting)</li> </ul> </li> </ul>
<p>5.3/12</p> <p>9.1/12</p> <p>RST/9-10</p>	<p>A4</p> <p>E1,2,3,4</p> <p>A1</p> <p>C4</p> <p>F2</p> <p>1,2,6,8,9,10</p>	<p>IX. Evolution And The History Of Life (2.5 Weeks)</p> <ul style="list-style-type: none"> <li>A. The History of Life <ul style="list-style-type: none"> <li>1. Describe a typical sequence of events in fossilization</li> <li>2. Compare techniques for dating fossils</li> <li>3. Identify and describe major events, using the geologic time scale</li> <li>4. Differentiate between spontaneous generation and biogenesis</li> <li>5. Sequence the events that might lead to cellular life</li> </ul> </li> <li>B. Theories of Evolution <ul style="list-style-type: none"> <li>1. Evaluate Lamarck's Theory of Evolution and explain why it was refuted</li> <li>2. Explain Darwin's Theory of Evolution <ul style="list-style-type: none"> <li>a. influences on Darwin timeline/flipbook</li> <li>b. survival of the fittest</li> <li>c. adaptation and variation</li> <li>d. natural selection</li> <li>e. decent with modification</li> </ul> </li> <li>3. List and describe the principles of natural selection</li> <li>4. Show how natural selection could change a population</li> </ul> </li> </ul>

		<p>IX. Evolution And The History Of Life (continued)</p> <p>C. Evidence of Evolution</p> <ol style="list-style-type: none"> <li>1. Describe how fossils provide evidence of evolution</li> <li>2. Interpret morphological evidence of evolution</li> <li>3. Explain how biochemistry provides evidence of evolution</li> <li>4. Site evidence for evolution       <ol style="list-style-type: none"> <li>a. fossil record</li> <li>b. homologous body structures</li> <li>c. embryology</li> <li>d. genetics</li> <li>e. convergent and divergent evolution</li> <li>f. common ancestor</li> </ol> </li> <li>5. Identify modern evidence that support Darwin's Theory of Evolution       <ol style="list-style-type: none"> <li>a. Hardy-Weinberg Principle</li> <li>b. genetic drift</li> <li>c. giraffe and moth case studies</li> <li>d. gene mapping, cytochrome c and hox genes</li> </ol> </li> </ol> <p>D. Shaping Evolutionary Theory - Analyze Graphs and/or Provide Examples of Patterns of Natural Selection</p> <ol style="list-style-type: none"> <li>1. Directional selection</li> <li>2. Disruptive selection</li> <li>3. Sexual selection</li> <li>4. Stabilizing selection</li> </ol> <p>E. Describe Factors That Influence Speciation</p> <ol style="list-style-type: none"> <li>1. Compare gradualism with punctuated equilibrium</li> <li>2. Model speciation</li> <li>3. Define reproductive isolation</li> <li>4. Analyze the speciation of Darwin's finches</li> </ol> <p>F. Homonid Evolution</p> <ol style="list-style-type: none"> <li>1. Homo genus extinctions</li> <li>2. Development of erect posture, skull size, and larynx positioning</li> </ol> <p>G. Regulation (Time Permitting)</p> <ol style="list-style-type: none"> <li>1. Identify the regions of the brain and their functions</li> <li>2. Identify the parts of the central nervous system</li> <li>3. Illustrate the actions of a nerve impulse</li> <li>4. Distinguish between involuntary and voluntary activities of nerves</li> <li>5. Research the effects of drugs on the nervous system</li> </ol>
--	--	--

		<p>IX. Evolution And The History Of Life (continued)</p> <p>H. Locomotion (Time Permitting)</p> <ol style="list-style-type: none"> <li>1. Identify the structures and functions of the skeletal and muscular systems</li> <li>2. Associate movement with muscles and bones</li> <li>3. Illustrate the mechanism of a simple reflex</li> <li>4. Evaluate the function of muscles and bones in protecting other body parts</li> </ol>
<p>5.3/12</p> <p>9.1/12</p> <p>RST/9-10</p>	<p>A1,2,3,4</p> <p>E1,2</p> <p>A1</p> <p>C4</p> <p>F2</p> <p>3,4,5,6,8</p>	<p>X. Diversity/Classification/Invertebrates (2.5 Weeks)</p> <p>A. Classification and Biodiversity</p> <ol style="list-style-type: none"> <li>1. The history of classification <ol style="list-style-type: none"> <li>a. compare Aristotle’s and Linnaeus’s classification</li> <li>b. explain how to write a scientific name, using binomial nomenclature</li> <li>c. sequence the categories of biological classification</li> </ol> </li> <li>2. Classification <ol style="list-style-type: none"> <li>a. explain the Linnaean System of classification</li> <li>b. identify characteristics used for classification</li> <li>c. classify organisms on earth <ol style="list-style-type: none"> <li>(1) five kingdom system</li> <li>(2) six kingdom system</li> <li>(3) three domain system</li> </ol> </li> </ol> </li> <li>3. Modern classification <ol style="list-style-type: none"> <li>a. provide examples of the ways morphological and biochemical data has changed the classification of some organisms</li> <li>b. explain how a cladogram is constructed</li> <li>c. interpret cladograms and explain how they provide clues to the phylogeny of an organism or group</li> </ol> </li> </ol> <p>B. Domains and Kingdoms</p> <ol style="list-style-type: none"> <li>1. Characterize major phylum of eukaryotes <ol style="list-style-type: none"> <li>a. fungi – compare the different types of fungal growth and relate them to the environment they grow in</li> <li>b. plants – compare vascular and non-vascular plants</li> <li>c. animals <ol style="list-style-type: none"> <li>(1) research the importance of “form fits function” in the animal kingdom, by showing how one animal has adapted to its lifestyle</li> <li>(2) list characteristics and provide examples of organisms in each domain</li> </ol> </li> </ol> </li> </ol>

		<p>X. Diversity/Classification/Invertebrates (continued)</p> <p>d. protists</p> <p>2. List characteristics and provide examples of organisms in each eukaryotic kingdom</p>
<p>5.3/12</p> <p>9.1/12</p>	<p>A1,2,3,4</p> <p>A1</p> <p>C4</p>	<p>XI. Plants (1.5 Weeks)</p> <p>A. Plant Structure and Function</p> <p>1. Plant cells and tissues</p> <p>a. describe the major types of plant cells</p> <p>b. identify the major types of plant tissues</p> <p>2. Relate the structure of roots, stems, and leaves to function</p> <p>3. Flowers and fruits</p> <p>a. describe the reproductive cycle of angiosperms</p> <p>b. dissect and examine the different types of flowers and fruits</p> <p>(1) compare the type of flower to pollination</p> <p>(2) draw conclusions about fruit type and seed dispersal</p> <p>4. Identify possible plant responses through the major types of plant hormones</p> <p>a. explain how hormones affect the growth of plants</p> <p>b. describe the different types of plant responses</p> <p>c. examine human uses for plant hormones in agriculture and economics</p>

Note: The New Jersey Core Curriculum Content Standards can be accessed at [www.state.nj.us](http://www.state.nj.us)

## **RESOURCES/ACTIVITIES GUIDE**

### **Labs**

1. Build models of inorganic and organic molecules.
2. Examine the resistance of buffers to changes in pH.
3. Use reagents to test for the presence of organic macromolecules in foods and unknown substances.
4. Use a calorimeter to determine the caloric contents of foods.
5. Examine the effect of various factors on enzyme activity.
6. Use microscopes to examine a variety of cells.
7. Build models of typical plant and animal cells.
8. Examine the effects of hypotonic and hypertonic environments on model cells.
9. Examine the effect of various factors on fermentation in yeast.
10. Use chromatography to separate the pigments in a leaf.
11. Model meiosis, using different colored pieces of yarn.
12. Prepare and interpret karyotypes.
13. Examine the probability principles, using coins or dice.
14. Research a genetic disorder.
15. Extract DNA from cells.
16. Model DNA replication and protein synthesis.
17. Dissection – shark, frog, fetal pig.

## **SUGGESTED AUDIO VISUAL/COMPUTER AIDS**

1. LCD Projector.
2. Microsoft PowerPoint Software.
3. Microsoft Word Software.
4. Microsoft Internet Explorer.
5. U-Tube.
6. Teacher Online Access Pack with iText.
7. Prentice Hall Presentation Pro.

## **SUGGESTED MATERIALS**

### **Resources of Students**

Text:

Miller, Kenneth R. and Joseph Levine. Prentice Hall Biology. Prentice Hall, 2002.

Online Resource:

[http://www.phschool.com/atschool/biology/Dragonfly/StudentArea/PHB\\_S\\_BK index.html](http://www.phschool.com/atschool/biology/Dragonfly/StudentArea/PHB_S_BK index.html)

### **Resources for Teacher**

Text:

Miller, Kenneth R. and Joseph Levine. Prentice Hall Biology Annotated Teachers Edition. Prentice Hall, 2002.

Supplemental Materials:

Core Teaching Resources  
Prentice Hall  
2002

Resource Pro CD-ROM  
Prentice Hall Biology  
Pearson Education, Inc.  
2002

Teacher Online Access Pack with Text  
Pearson Education, Inc.  
2002