

**Inquiry Investigations™**  
**Biotechnology Applications MODULE - 1278382**  
**Grades: 7-10**

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**Washington D.C. Learning Standards**  
**Science**  
**Grade 7**

CONTENT STANDARD	DC.7.1. Scientific Thinking and Inquiry: Broad Concept: Scientific progress is made by asking relevant questions and conducting careful investigations. As a basis for understanding this concept, and to address the content in this grade, students should develop their own questions and perform investigations. Students:
PERFORMANCE STANDARD/ESSENTIAL SKILL	<p>7.1.4. Recognize testable hypotheses in investigations that pertain to the content under study, and write instructions others can follow in carrying out the investigation.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 1 Activity 1: Genetically Modified Crops</li> <li>• Biotechnology Applications: Unit 1 Lab 2 Activity 1: Making Cheese the Biotech Way</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 1: Biodegrading a Simulated Oil Spill</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 2: Cleaning up Mini-Oil Spills in Various Shore Environments</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 3: Examining Oil-Degrading Microbes</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 1: Taking a Case History of Baby Mike</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 2: Analyzing Karyotypes</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 3: The Blue People of Troublesome Creek</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 4: Uncovering a Family Secret</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 5: Creating a Pedigree to Analyze a Family Trait</li> <li>• Biotechnology Applications: Unit 2 Lab 5 Activity 1: Diagnosing a Gene Defect</li> <li>• Biotechnology Applications: Unit 3 Lab 6 Activity 1: Modeling DNA Profiles to Solve a Mystery</li> <li>• Biotechnology Applications: Unit 3 Lab 7 Activity 1: Comparing Electrophoresed DNA Profiles</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 1: Case of the Second Examination</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 2: Finding Out Who Is at Risk for SARS</li> <li>• Virtual Laboratory: Preparation and Analysis of a Human Karyotype</li> </ul>
PERFORMANCE STANDARD/ESSENTIAL	7.1.6. Incorporate circle charts, bar and line graphs, diagrams, scatter plots, and symbols into writing, such as lab or research reports, to serve as visual

SKILL		<p>displays of evidence for claims and/or conclusions.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 2: Analyzing Karyotypes</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 3: The Blue People of Troublesome Creek</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 4: Uncovering a Family Secret</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 5: Creating a Pedigree to Analyze a Family Trait</li> <li>• Biotechnology Applications: Unit 2 Lab 5 Activity 1: Diagnosing a Gene Defect</li> <li>• Biotechnology Applications: Unit 3 Lab 6 Activity 1: Modeling DNA Profiles to Solve a Mystery</li> <li>• Biotechnology Applications: Unit 3 Lab 7 Activity 1: Comparing Electrophoresed DNA Profiles</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 1: Case of the Second Examination</li> </ul>
CONTENT STANDARD	DC.7.2.	Science and Technology: Broad Concept: Although each of the human enterprises of science and technology has a character and history of its own, each is dependent on and reinforces the other. Students:
PERFORMANCE STANDARD/ESSENTIAL SKILL	7.2.1.	<p>Explain types of technology that are developed and in use such as in agriculture, manufacturing, sanitation, medicine, warfare, transportation, information processing, and communication.</p> <ul style="list-style-type: none"> <li>• Teacher Resource CD: Biotechnology in Agriculture and the Environment</li> <li>• Teacher Resource CD: Biotechnology in Medicine</li> </ul>
CONTENT STANDARD	DC.7.4.	Cell Biology: Broad Concept: All living things are composed of cells, from just one to many quadrillions, whose details usually are visible only through a microscope. As a basis for understanding this concept, students:
PERFORMANCE STANDARD/ESSENTIAL SKILL	7.4.3.	<p>Explain that in those cells that contain a nucleus (eukaryotic plant and animal cells), the nucleus is the main repository for genetic information.</p> <ul style="list-style-type: none"> <li>• Teacher Resource CD: Biotechnology in Medicine</li> </ul>
PERFORMANCE STANDARD/ESSENTIAL SKILL	7.4.9.	<p>Explain how cells in multicellular organism continually divide to make more cells for growth and repair, and various organs and tissues function to serve the needs of cells for food, air, and waste removal.</p> <ul style="list-style-type: none"> <li>• Virtual Laboratory: Preparation and Analysis of a Human Karyotype</li> </ul>
CONTENT STANDARD	DC.7.5.	Genetics: Broad Concept: Every organism requires information in the form of a set of instructions that specifies its traits. Those traits may be modified by environmental influences. As a basis for understanding this concept, students:
PERFORMANCE STANDARD/ESSENTIAL SKILL	7.5.1.	<p>Describe that heredity is the passage of information for developing and maintaining the organism's body from one generation to another, that genes are the basic units of heredity, and they are made of DNA, consisting of very long molecules located in the chromosomes of each cell.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 1 Activity 1:</li> </ul>

		<p>Genetically Modified Crops</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 1: Taking a Case History of Baby Mike</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 2: Analyzing Karyotypes</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 3: The Blue People of Troublesome Creek</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 4: Uncovering a Family Secret</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 5: Creating a Pedigree to Analyze a Family Trait</li> <li>• Biotechnology Applications: Unit 2 Lab 5 Activity 1: Diagnosing a Gene Defect</li> <li>• Biotechnology Applications: Unit 3 Lab 6 Activity 1: Modeling DNA Profiles to Solve a Mystery</li> <li>• Biotechnology Applications: Unit 3 Lab 7 Activity 1: Comparing Electrophoresed DNA Profiles</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 1: Case of the Second Examination</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 2: Finding Out Who Is at Risk for SARS</li> <li>• Teacher Resource CD: Biotechnology in Agriculture and the Environment</li> <li>• Teacher Resource CD: Biotechnology in Forensic Science</li> <li>• Teacher Resource CD: Biotechnology in Medicine</li> <li>• Virtual Laboratory: Preparation and Analysis of a Human Karyotype</li> </ul>
<p>PERFORMANCE STANDARD/ESSENTIAL SKILL</p>	<p>7.5.4.</p>	<p>Recognize and describe that new varieties of cultivated plants, such as corn and apples, and domestic animals, such as dogs and horses, have resulted from selective breeding, over multiple generations, for particular traits.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 1 Activity 1: Genetically Modified Crops</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 1: Biodegrading a Simulated Oil Spill</li> <li>• Biotechnology Applications: Unit 3 Lab 6 Activity 1: Modeling DNA Profiles to Solve a Mystery</li> <li>• Teacher Resource CD: Biotechnology in Agriculture and the Environment</li> <li>• Teacher Resource CD: Biotechnology in Forensic Science</li> <li>• Teacher Resource CD: Biotechnology in Medicine</li> </ul>
<p>PERFORMANCE STANDARD/ESSENTIAL SKILL</p>	<p>7.5.5.</p>	<p>Explain how the use of genetic-engineering techniques can speed the process of creating new varieties and introduce characteristics not easily available by selective breeding and can make possible more precise modifications involving the manipulation of just one or a few genes.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 1 Activity 1: Genetically Modified Crops</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 1: Biodegrading a Simulated Oil Spill</li> <li>• Biotechnology Applications: Unit 3 Lab 6 Activity 1: Modeling DNA Profiles to Solve a Mystery</li> <li>• Teacher Resource CD: Biotechnology in Agriculture and the</li> </ul>

		<p>Environment</p> <ul style="list-style-type: none"> <li>• Teacher Resource CD: Biotechnology in Forensic Science</li> <li>• Teacher Resource CD: Biotechnology in Medicine</li> </ul>
<b>CONTENT STANDARD</b>	<b>DC.7.6.</b>	<b>Biological Evolution: Broad Concept: Biological evolution accounts for the diversity of species developed through gradual processes over many generations. As a basis for understanding this concept, students:</b>
<b>PERFORMANCE STANDARD/ESSENTIAL SKILL</b>	<b>7.6.3.</b>	<p>Describe how biological evolution results primarily from the action of natural selection on the available variation in a population of organisms.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 1: Taking a Case History of Baby Mike</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 2: Analyzing Karyotypes</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 3: The Blue People of Troublesome Creek</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 4: Uncovering a Family Secret</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 5: Creating a Pedigree to Analyze a Family Trait</li> </ul>
<b>PERFORMANCE STANDARD/ESSENTIAL SKILL</b>	<b>7.6.4.</b>	<p>Explain how independent lines of evidence drawn from geology, fossils, comparative anatomy, and molecular biology provide the firm basis of evolutionary theory.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 1: Taking a Case History of Baby Mike</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 2: Analyzing Karyotypes</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 3: The Blue People of Troublesome Creek</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 4: Uncovering a Family Secret</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 5: Creating a Pedigree to Analyze a Family Trait</li> </ul>
<b>CONTENT STANDARD</b>	<b>DC.7.7.</b>	<b>Human Body: Broad Concept: Human beings have body systems for obtaining and providing energy, defense, reproduction, and the coordination of body functions. As a basis for understanding this concept, students:</b>
<b>PERFORMANCE STANDARD/ESSENTIAL SKILL</b>	<b>7.7.5.</b>	<p>Identify specific examples of how viruses, bacteria, fungi, and more complex parasites may infect the human body and interfere with normal body functions.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 1: Biodegrading a Simulated Oil Spill</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 2: Cleaning up Mini-Oil Spills in Various Shore Environments</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 3: Examining Oil-Degrading Microbes</li> </ul>
<b>PERFORMANCE STANDARD/ESSENTIAL SKILL</b>	<b>7.7.10.</b>	<p>Explain how fundamental changes in health practices have resulted from the establishment of the germ theory of disease.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 3: The Blue People of Troublesome Creek</li> </ul>

		<ul style="list-style-type: none"> <li>• Teacher Resource CD: Biotechnology in Agriculture and the Environment</li> <li>• Teacher Resource CD: Biotechnology in Medicine</li> </ul>
<b>CONTENT STANDARD</b>	<b>DC.7.8.</b>	<b>Ecology: Broad Concept: Organisms in ecosystems exchange energy and nutrients among themselves and with the physical environment. As a basis for understanding this concept, students:</b>
<b>PERFORMANCE STANDARD/ESSENTIAL SKILL</b>	<b>7.8.1.</b>	<p>Recognize that in all environments, such as freshwater, marine, forest, desert, grassland, mountain, farms, cities, and others, organisms with similar needs and living strategies compete with one another for resources, including food, space, water, air, and shelter.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 2: Cleaning up Mini-Oil Spills in Various Shore Environments</li> </ul>
<b>PERFORMANCE STANDARD/ESSENTIAL SKILL</b>	<b>7.8.4.</b>	<p>Create a food web to explain how energy and matter are transferred between producers and primary consumers and secondary consumers.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 2 Lab 5 Activity 1: Diagnosing a Gene Defect</li> <li>• Biotechnology Applications: Unit 3 Lab 7 Activity 1: Comparing Electrophoresed DNA Profiles</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 1: Case of the Second Examination</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 2: Finding Out Who Is at Risk for SARS</li> </ul>
<b>PERFORMANCE STANDARD/ESSENTIAL SKILL</b>	<b>7.8.5.</b>	<p>Describe how organisms that eat plants break down the plant structures to produce the materials and energy that they need to survive, and in turn, other organisms consume them.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 2 Lab 5 Activity 1: Diagnosing a Gene Defect</li> <li>• Biotechnology Applications: Unit 3 Lab 7 Activity 1: Comparing Electrophoresed DNA Profiles</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 1: Case of the Second Examination</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 2: Finding Out Who Is at Risk for SARS</li> </ul>
<b>PERFORMANCE STANDARD/ESSENTIAL SKILL</b>	<b>7.8.8.</b>	<p>Explain why in urban environments, a species (mostly human beings) settles in dense concentrations.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 1: Biodegrading a Simulated Oil Spill</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 2: Cleaning up Mini-Oil Spills in Various Shore Environments</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 3: Examining Oil-Degrading Microbes</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 3: The Blue People of Troublesome Creek</li> </ul>
<b>PERFORMANCE STANDARD/ESSENTIAL SKILL</b>	<b>7.8.10.</b>	<p>Recognize that entire species may prosper in spite of the poor survivability or bad fortune of individuals.</p>

		<ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 1: Taking a Case History of Baby Mike</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 2: Analyzing Karyotypes</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 3: The Blue People of Troublesome Creek</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 4: Uncovering a Family Secret</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 5: Creating a Pedigree to Analyze a Family Trait</li> </ul>
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Washington D.C. Learning Standards  
Science  
Grade 8

CONTENT STANDARD	DC.8.1.	Scientific Thinking and Inquiry: Broad Concept: Scientific progress is made by asking relevant questions and conducting careful investigations. As a basis for understanding this concept, and to address the content in this grade, students should develop their own questions and perform investigations. Students:
PERFORMANCE STANDARD/ESSENTIAL SKILL	8.1.5.	<p>Write clear step-by-step instructions (procedural summaries) for conducting investigations.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 1 Activity 1: Genetically Modified Crops</li> <li>• Biotechnology Applications: Unit 1 Lab 2 Activity 1: Making Cheese the Biotech Way</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 1: Biodegrading a Simulated Oil Spill</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 2: Cleaning up Mini-Oil Spills in Various Shore Environments</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 3: Examining Oil-Degrading Microbes</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 1: Taking a Case History of Baby Mike</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 2: Analyzing Karyotypes</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 3: The Blue People of Troublesome Creek</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 4: Uncovering a Family Secret</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 5: Creating a Pedigree to Analyze a Family Trait</li> <li>• Biotechnology Applications: Unit 2 Lab 5 Activity 1: Diagnosing a Gene Defect</li> <li>• Biotechnology Applications: Unit 3 Lab 6 Activity 1: Modeling DNA Profiles to Solve a Mystery</li> <li>• Biotechnology Applications: Unit 3 Lab 7 Activity 1: Comparing Electrophoresed DNA Profiles</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 1: Case of the Second Examination</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 2: Finding Out Who Is at Risk for SARS</li> <li>• Virtual Laboratory: Preparation and Analysis of a Human Karyotype</li> </ul>
PERFORMANCE	8.1.7.	Use tables, charts, and graphs in making arguments and claims in

STANDARD/ESSENTIAL SKILL		<p>presentations about lab work.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 2: Analyzing Karyotypes</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 3: The Blue People of Troublesome Creek</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 4: Uncovering a Family Secret</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 5: Creating a Pedigree to Analyze a Family Trait</li> <li>• Biotechnology Applications: Unit 3 Lab 6 Activity 1: Modeling DNA Profiles to Solve a Mystery</li> <li>• Biotechnology Applications: Unit 3 Lab 7 Activity 1: Comparing Electrophoresed DNA Profiles</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 1: Case of the Second Examination</li> </ul>
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Washington D.C. Learning Standards  
Science  
Grade 9

CONTENT STANDARD	DC.ES.1.	Earth Science: Scientific Investigation and Inquiry: Broad Concept: Scientific progress is made by asking relevant questions and conducting careful investigations. As a basis for understanding this concept, and to address the content in this grade, students should develop their own questions and perform investigations. Students:
PERFORMANCE STANDARD/ESSENTIAL SKILL	ES.1.4.	<p>Recognize the use and limitations of models and theories as scientific representations of reality.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 2: Cleaning up Mini-Oil Spills in Various Shore Environments</li> <li>• Biotechnology Applications: Unit 3 Lab 6 Activity 1: Modeling DNA Profiles to Solve a Mystery</li> </ul>
PERFORMANCE STANDARD/ESSENTIAL SKILL	ES.1.10.	<p>Select and use appropriate tools and technology to perform tests, collect data, analyze relationships, and display data. (The focus is on manual graphing, interpreting graphs, and mastery of metric measurements and units, with supplementary use of computers and electronic data gathering when appropriate.)</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 1 Activity 1: Genetically Modified Crops</li> <li>• Biotechnology Applications: Unit 1 Lab 2 Activity 1: Making Cheese the Biotech Way</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 1: Biodegrading a Simulated Oil Spill</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 2: Cleaning up Mini-Oil Spills in Various Shore Environments</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 3: Examining Oil-Degrading Microbes</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 1: Taking a Case History of Baby Mike</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 2: Analyzing Karyotypes</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 3: The Blue People of Troublesome Creek</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 4:</li> </ul>

		<p>Uncovering a Family Secret</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 5: Creating a Pedigree to Analyze a Family Trait</li> <li>• Biotechnology Applications: Unit 2 Lab 5 Activity 1: Diagnosing a Gene Defect</li> <li>• Biotechnology Applications: Unit 3 Lab 6 Activity 1: Modeling DNA Profiles to Solve a Mystery</li> <li>• Biotechnology Applications: Unit 3 Lab 7 Activity 1: Comparing Electrophoresed DNA Profiles</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 1: Case of the Second Examination</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 2: Finding Out Who Is at Risk for SARS</li> </ul>
<b>CONTENT STANDARD</b>	<b>DC.ES.4.</b>	<b>Earth Science: The Earth System: Broad Concept: Interactions among the solid Earth, hydrosphere, and atmosphere have resulted in ongoing evolution of the earth system over geologic time. As a basis for understanding this concept, students:</b>
<b>PERFORMANCE STANDARD/ESSENTIAL SKILL</b>	<b>ES.4.7.</b>	<p>Investigate and identify the causes and effects of severe weather.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 1: Biodegrading a Simulated Oil Spill</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 2: Cleaning up Mini-Oil Spills in Various Shore Environments</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 3: Examining Oil-Degrading Microbes</li> </ul>
<b>CONTENT STANDARD</b>	<b>DC.B.1.</b>	<b>Biology: Scientific Investigation and Inquiry: Broad Concept: Scientific progress is made by asking relevant questions and conducting careful investigations. As a basis for understanding this concept, and to address the content in this grade, students should develop their own questions and perform investigations. Students:</b>
<b>PERFORMANCE STANDARD/ESSENTIAL SKILL</b>	<b>B.1.4.</b>	<p>Recognize the use and limitations of models and theories as scientific representations of reality.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 2: Cleaning up Mini-Oil Spills in Various Shore Environments</li> <li>• Biotechnology Applications: Unit 3 Lab 6 Activity 1: Modeling DNA Profiles to Solve a Mystery</li> </ul>
<b>PERFORMANCE STANDARD/ESSENTIAL SKILL</b>	<b>B.1.6.</b>	<p>Plan and conduct scientific investigations to explore new phenomena, to check on previous results, to verify or falsify the prediction of a theory, and to use a crucial experiment to discriminate between competing theories.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 2 Activity 1: Making Cheese the Biotech Way</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 1: Biodegrading a Simulated Oil Spill</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 2: Cleaning up Mini-Oil Spills in Various Shore Environments</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 3: Examining Oil-Degrading Microbes</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 1: Taking a Case History of Baby Mike</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 2: Analyzing</li> </ul>

		<p>Karyotypes</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 4: Uncovering a Family Secret</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 5: Creating a Pedigree to Analyze a Family Trait</li> <li>• Biotechnology Applications: Unit 2 Lab 5 Activity 1: Diagnosing a Gene Defect</li> <li>• Biotechnology Applications: Unit 3 Lab 6 Activity 1: Modeling DNA Profiles to Solve a Mystery</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 1: Case of the Second Examination</li> </ul>
<p><b>PERFORMANCE STANDARD/ESSENTIAL SKILL</b></p>	<p><b>B.1.10.</b></p>	<p>Select and use appropriate tools and technology to perform tests, collect data, analyze relationships, and display data. (The focus is on manual graphing, interpreting graphs, and mastery of metric measurements and units, with supplementary use of computers and electronic data gathering when appropriate.)</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 1 Activity 1: Genetically Modified Crops</li> <li>• Biotechnology Applications: Unit 1 Lab 2 Activity 1: Making Cheese the Biotech Way</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 1: Biodegrading a Simulated Oil Spill</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 2: Cleaning up Mini-Oil Spills in Various Shore Environments</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 3: Examining Oil-Degrading Microbes</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 1: Taking a Case History of Baby Mike</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 2: Analyzing Karyotypes</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 3: The Blue People of Troublesome Creek</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 4: Uncovering a Family Secret</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 5: Creating a Pedigree to Analyze a Family Trait</li> <li>• Biotechnology Applications: Unit 2 Lab 5 Activity 1: Diagnosing a Gene Defect</li> <li>• Biotechnology Applications: Unit 3 Lab 6 Activity 1: Modeling DNA Profiles to Solve a Mystery</li> <li>• Biotechnology Applications: Unit 3 Lab 7 Activity 1: Comparing Electrophoresed DNA Profiles</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 1: Case of the Second Examination</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 2: Finding Out Who Is at Risk for SARS</li> </ul>
<p><b>PERFORMANCE STANDARD/ESSENTIAL SKILL</b></p>	<p><b>B.1.14.</b></p>	<p>Observe natural phenomena and analyze their location, sequence, or time intervals (e.g., relative ages of rocks and succession of species in an ecosystem).</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 2: Analyzing Karyotypes</li> <li>• Biotechnology Applications: Unit 3 Lab 6 Activity 1: Modeling</li> </ul>

		<p>DNA Profiles to Solve a Mystery</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 3 Lab 7 Activity 1: Comparing Electrophoresed DNA Profiles</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 1: Case of the Second Examination</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 2: Finding Out Who Is at Risk for SARS</li> </ul>
PERFORMANCE STANDARD/ESSENTIAL SKILL	B.1.15.	<p>Explain that science discoveries can have both positive and negative implications, involve different decisions regarding ethics and allocation of resources (e.g., organ transplants, stem cell research, forest management and land use).</p> <ul style="list-style-type: none"> <li>• Teacher Resource CD: Biotechnology in Agriculture and the Environment</li> <li>• Teacher Resource CD: Biotechnology in Forensic Science</li> <li>• Teacher Resource CD: Biotechnology in Medicine</li> </ul>
CONTENT STANDARD	DC.B.2.	<p>Biology: Chemistry of Living Things: Broad Concept: Living things are made of atoms bonded together to form molecules, some of the most important of which are large and contain carbon (i.e., 'organic' compounds). As a basis for understanding this concept, students:</p>
PERFORMANCE STANDARD/ESSENTIAL SKILL	B.2.6.	<p>Observe and explain the role of enzymatic catalysis in biochemical processes.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 2 Activity 1: Making Cheese the Biotech Way</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 1: Case of the Second Examination</li> <li>• Teacher Resource CD: Biotechnology in Agriculture and the Environment</li> <li>• Teacher Resource CD: Biotechnology in Forensic Science</li> </ul>
CONTENT STANDARD	DC.B.3.	<p>Biology: Cell Biology: Broad Concept: All living things are composed of cells. All the fundamental life processes of a cell are either chemical reactions or molecular interactions. As a basis for understanding this concept, students:</p>
PERFORMANCE STANDARD/ESSENTIAL SKILL	B.3.11.	<p>Describe that all growth and development of organisms is a consequence of an increase in cell number, size, and/or products.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 1 Activity 1: Genetically Modified Crops</li> </ul>
PERFORMANCE STANDARD/ESSENTIAL SKILL	B.3.15.	<p>Differentiate between the functions of mitosis and meiosis: Mitosis is a process by which a cell divides into each of two daughter cells, each of which has the same number of chromosomes as the original cell. Meiosis is a process of cell division in organisms that reproduce sexually, during which the nucleus divides eventually into four nuclei, each of which contains half the usual number of chromosomes.</p> <ul style="list-style-type: none"> <li>• Virtual Laboratory: Preparation and Analysis of a Human Karyotype</li> </ul>
CONTENT STANDARD	DC.B.4.	<p>Biology: Genetics: Broad Concept: 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. As a</p>

		basis for understanding this concept, students:
PERFORMANCE STANDARD/ESSENTIAL SKILL	B.4.2.	<p>Describe how the discovery of the structure of DNA by James D. Watson, Francis Crick made it possible to interpret the genetic code on the basis of a nucleotide sequence. Know the important contribution of Rosalind Franklin's data to this discovery, i.e., the careful X-ray crystallography on DNA that provided Watson and Crick the clue they needed to build the correct structure.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 1 Activity 1: Genetically Modified Crops</li> <li>• Biotechnology Applications: Unit 2 Lab 5 Activity 1: Diagnosing a Gene Defect</li> <li>• Biotechnology Applications: Unit 3 Lab 6 Activity 1: Modeling DNA Profiles to Solve a Mystery</li> <li>• Biotechnology Applications: Unit 3 Lab 7 Activity 1: Comparing Electrophoresed DNA Profiles</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 1: Case of the Second Examination</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 2: Finding Out Who Is at Risk for SARS</li> <li>• Teacher Resource CD: Biotechnology in Agriculture and the Environment</li> <li>• Teacher Resource CD: Biotechnology in Forensic Science</li> <li>• Teacher Resource CD: Biotechnology in Medicine</li> </ul>
PERFORMANCE STANDARD/ESSENTIAL SKILL	B.4.3.	<p>Explain how hereditary information is passed from parents to offspring in the form of 'genes' which are long stretches of DNA consisting of sequences of nucleotides. Explain that in eukaryotes, the genes are contained in chromosomes, which are bodies made up of DNA and various proteins.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 1 Activity 1: Genetically Modified Crops</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 1: Taking a Case History of Baby Mike</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 2: Analyzing Karyotypes</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 3: The Blue People of Troublesome Creek</li> <li>• Biotechnology Applications: Unit 3 Lab 6 Activity 1: Modeling DNA Profiles to Solve a Mystery</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 1: Case of the Second Examination</li> <li>• Teacher Resource CD: Biotechnology in Agriculture and the Environment</li> <li>• Teacher Resource CD: Biotechnology in Forensic Science</li> <li>• Teacher Resource CD: Biotechnology in Medicine</li> <li>• Virtual Laboratory: Preparation and Analysis of a Human Karyotype</li> </ul>
PERFORMANCE STANDARD/ESSENTIAL SKILL	B.4.4.	<p>Know every species has its own characteristic DNA sequence.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 1 Activity 1: Genetically Modified Crops</li> <li>• Biotechnology Applications: Unit 2 Lab 5 Activity 1: Diagnosing a Gene Defect</li> <li>• Biotechnology Applications: Unit 3 Lab 6 Activity 1: Modeling</li> </ul>

		<p>DNA Profiles to Solve a Mystery</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 3 Lab 7 Activity 1: Comparing Electrophoresed DNA Profiles</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 1: Case of the Second Examination</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 2: Finding Out Who Is at Risk for SARS</li> <li>• Teacher Resource CD: Biotechnology in Agriculture and the Environment</li> <li>• Teacher Resource CD: Biotechnology in Forensic Science</li> <li>• Teacher Resource CD: Biotechnology in Medicine</li> </ul>
PERFORMANCE STANDARD/ESSENTIAL SKILL	B.4.7.	<p>Understand that and describe how inserting, deleting, or substituting short stretches of DNA alters a gene. Recognize that changes (mutations) in the DNA sequence in or near a specific gene may (or may not) affect the sequence of amino acids in the encoded protein or the expression of the gene.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 2: Analyzing Karyotypes</li> <li>• Teacher Resource CD: Biotechnology in Medicine</li> </ul>
PERFORMANCE STANDARD/ESSENTIAL SKILL	B.4.8.	<p>Explain the mechanisms of genetic mutations and chromosomal recombinations, and when and how they are passed on to offspring.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 1: Taking a Case History of Baby Mike</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 2: Analyzing Karyotypes</li> <li>• Teacher Resource CD: Biotechnology in Forensic Science</li> <li>• Teacher Resource CD: Biotechnology in Medicine</li> <li>• Virtual Laboratory: Preparation and Analysis of a Human Karyotype</li> </ul>
PERFORMANCE STANDARD/ESSENTIAL SKILL	B.4.9.	<p>Understand and explain that specialization of cells is almost always due to different patterns of gene expression rather than differences in the genes themselves.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 1: Case of the Second Examination</li> </ul>
PERFORMANCE STANDARD/ESSENTIAL SKILL	B.4.11.	<p>Explain that genetic variation can occur from such processes as crossing over, jumping genes, and deletion and duplication of genes.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 1 Activity 1: Genetically Modified Crops</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 2: Analyzing Karyotypes</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 3: The Blue People of Troublesome Creek</li> <li>• Biotechnology Applications: Unit 3 Lab 6 Activity 1: Modeling DNA Profiles to Solve a Mystery</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 1: Case of the Second Examination</li> <li>• Teacher Resource CD: Biotechnology in Agriculture and the</li> </ul>

		<p>Environment</p> <ul style="list-style-type: none"> <li>• Teacher Resource CD: Biotechnology in Forensic Science</li> <li>• Teacher Resource CD: Biotechnology in Medicine</li> </ul>
<b>CONTENT STANDARD</b>	<b>DC.B.5.</b>	<b>Biology: Biological Evolution: Broad Concept: Evolution and biodiversity are the result of genetic changes that occur in constantly changing environments. As a basis for understanding this concept, students:</b>
<b>PERFORMANCE STANDARD/ESSENTIAL SKILL</b>	<b>B.5.1.</b>	<p>Investigate and explain how molecular evidence reinforces and confirms the fossil, anatomical, and other evidence for evolution and provides additional detail about the sequence in which various lines of descent branched off from one another.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 1: Taking a Case History of Baby Mike</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 2: Analyzing Karyotypes</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 3: The Blue People of Troublesome Creek</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 4: Uncovering a Family Secret</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 5: Creating a Pedigree to Analyze a Family Trait</li> </ul>
<b>PERFORMANCE STANDARD/ESSENTIAL SKILL</b>	<b>B.5.2.</b>	<p>Explain how a large diversity of species increases the chance that at least some living things will survive in the face of large or even catastrophic changes in the environment.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 3 Lab 6 Activity 1: Modeling DNA Profiles to Solve a Mystery</li> </ul>
<b>PERFORMANCE STANDARD/ESSENTIAL SKILL</b>	<b>B.5.5.</b>	<p>Describe how life on Earth is thought to have begun as one or a few simple one-celled organisms about 3.5 billion years ago, and that during the first 2 billion years, only single-cell microorganisms existed. Know that, once cells with nuclei developed about a billion years ago, increasingly complex multicellular organisms could evolve.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 1: Taking a Case History of Baby Mike</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 2: Analyzing Karyotypes</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 3: The Blue People of Troublesome Creek</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 4: Uncovering a Family Secret</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 5: Creating a Pedigree to Analyze a Family Trait</li> </ul>
<b>PERFORMANCE STANDARD/ESSENTIAL SKILL</b>	<b>B.5.6.</b>	<p>Explain that prior to the theory first offered by Charles Darwin and Alfred Wallace, the universal belief was that all known species had been created de novo at about the same time and had remained unchanged.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 1: Taking a Case History of Baby Mike</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 2: Analyzing Karyotypes</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 3: The Blue</li> </ul>

		<p>People of Troublesome Creek</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 4: Uncovering a Family Secret</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 5: Creating a Pedigree to Analyze a Family Trait</li> </ul>
PERFORMANCE STANDARD/ESSENTIAL SKILL	B.5.9.	<p>Explain how biological evolution is also supported by the discovery that the genetic code found in DNA is the same for almost all organisms.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 1: Taking a Case History of Baby Mike</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 2: Analyzing Karyotypes</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 3: The Blue People of Troublesome Creek</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 4: Uncovering a Family Secret</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 5: Creating a Pedigree to Analyze a Family Trait</li> </ul>
PERFORMANCE STANDARD/ESSENTIAL SKILL	B.5.10.	<p>Explain that evolution builds on what already exists, so the more variety there is, the more there can be in the future.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 1: Taking a Case History of Baby Mike</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 2: Analyzing Karyotypes</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 3: The Blue People of Troublesome Creek</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 4: Uncovering a Family Secret</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 5: Creating a Pedigree to Analyze a Family Trait</li> </ul>
CONTENT STANDARD	DC.B.8.	<p><b>Biology: Ecosystems: Broad Concept: Stability in an ecosystem is a balance between competing effects. As a basis for understanding this concept, students:</b></p>
PERFORMANCE STANDARD/ESSENTIAL SKILL	B.8.7.	<p>Explain how layers of energy-rich organic material, mostly of plant origin, have been gradually turned into great coal beds and oil pools by the pressure of the overlying Earth and its internal heat.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 1: Biodegrading a Simulated Oil Spill</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 2: Cleaning up Mini-Oil Spills in Various Shore Environments</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 3: Examining Oil-Degrading Microbes</li> </ul>
PERFORMANCE STANDARD/ESSENTIAL SKILL	B.8.9.	<p>Investigate and describe how point and non-point source pollution can affect the health of a bay's watershed and wetlands.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 1: Biodegrading a Simulated Oil Spill</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 2: Cleaning up Mini-Oil Spills in Various Shore Environments</li> </ul>

		<ul style="list-style-type: none"> <li>Biotechnology Applications: Unit 1 Lab 3 Activity 3: Examining Oil-Degrading Microbes</li> </ul>
CONTENT STANDARD	DC.C.1.	Chemistry: Scientific Investigation and Inquiry: Broad Concept: Scientific progress is made by asking relevant questions and conducting careful investigations. As a basis for understanding this concept, and to address the content in this grade, students should develop their own questions and perform investigations. Students:
PERFORMANCE STANDARD/ESSENTIAL SKILL	C.1.4.	Recognize the use and limitations of models and theories as scientific representations of reality. <ul style="list-style-type: none"> <li>Biotechnology Applications: Unit 1 Lab 3 Activity 2: Cleaning up Mini-Oil Spills in Various Shore Environments</li> <li>Biotechnology Applications: Unit 3 Lab 6 Activity 1: Modeling DNA Profiles to Solve a Mystery</li> </ul>
PERFORMANCE STANDARD/ESSENTIAL SKILL	C.1.10.	Select and use appropriate tools and technology to perform tests, collect data, analyze relationships, and display data. (The focus is on manual graphing, interpreting graphs, and mastery of metric measurements and units, with supplementary use of computers and electronic data gathering when appropriate.) <ul style="list-style-type: none"> <li>Biotechnology Applications: Unit 1 Lab 1 Activity 1: Genetically Modified Crops</li> <li>Biotechnology Applications: Unit 1 Lab 2 Activity 1: Making Cheese the Biotech Way</li> <li>Biotechnology Applications: Unit 1 Lab 3 Activity 1: Biodegrading a Simulated Oil Spill</li> <li>Biotechnology Applications: Unit 1 Lab 3 Activity 2: Cleaning up Mini-Oil Spills in Various Shore Environments</li> <li>Biotechnology Applications: Unit 1 Lab 3 Activity 3: Examining Oil-Degrading Microbes</li> <li>Biotechnology Applications: Unit 2 Lab 4 Activity 1: Taking a Case History of Baby Mike</li> <li>Biotechnology Applications: Unit 2 Lab 4 Activity 2: Analyzing Karyotypes</li> <li>Biotechnology Applications: Unit 2 Lab 4 Activity 3: The Blue People of Troublesome Creek</li> <li>Biotechnology Applications: Unit 2 Lab 4 Activity 4: Uncovering a Family Secret</li> <li>Biotechnology Applications: Unit 2 Lab 4 Activity 5: Creating a Pedigree to Analyze a Family Trait</li> <li>Biotechnology Applications: Unit 2 Lab 5 Activity 1: Diagnosing a Gene Defect</li> <li>Biotechnology Applications: Unit 3 Lab 6 Activity 1: Modeling DNA Profiles to Solve a Mystery</li> <li>Biotechnology Applications: Unit 3 Lab 7 Activity 1: Comparing Electrophoresed DNA Profiles</li> <li>Biotechnology Applications: Unit 4 Lab 8 Activity 1: Case of the Second Examination</li> <li>Biotechnology Applications: Unit 4 Lab 8 Activity 2: Finding Out Who Is at Risk for SARS</li> </ul>
CONTENT STANDARD	DC.C.3.	Chemistry: Acids and Bases: Broad Concept: Acids, bases, and salts are three classes of compounds that form ions in water solutions. As a basis for understanding this concept, students:
PERFORMANCE	C.3.2.	Define pH as the negative of the logarithm of the hydrogen (hydronium)

STANDARD/ESSENTIAL SKILL		<p>ion concentration, and calculate pH from concentration data.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 2 Activity 1: Making Cheese the Biotech Way</li> </ul>
PERFORMANCE STANDARD/ESSENTIAL SKILL	C.3.3.	<p>Illustrate and explain the pH scale to characterize acid and base solutions: Neutral solutions have pH 7, acids are less than 7, and bases are greater than 7.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 2 Activity 1: Making Cheese the Biotech Way</li> </ul>
CONTENT STANDARD	DC.P.1.	<p>Physics: Scientific Investigation and Inquiry: Broad Concept: Scientific progress is made by asking relevant questions and conducting careful investigations. As a basis for understanding this concept, and to address the content in this grade, students should develop their own questions and perform investigations. Students:</p>
PERFORMANCE STANDARD/ESSENTIAL SKILL	P.1.4.	<p>Recognize the use and limitations of models and theories as scientific representations of reality.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 2: Cleaning up Mini-Oil Spills in Various Shore Environments</li> <li>• Biotechnology Applications: Unit 3 Lab 6 Activity 1: Modeling DNA Profiles to Solve a Mystery</li> </ul>
PERFORMANCE STANDARD/ESSENTIAL SKILL	P.1.10.	<p>Select and use appropriate tools and technology to perform tests, collect data, analyze relationships, and display data. (The focus is on manual graphing, interpreting graphs, and mastery of metric measurements and units, with supplementary use of computers and electronic data gathering when appropriate.)</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 1 Activity 1: Genetically Modified Crops</li> <li>• Biotechnology Applications: Unit 1 Lab 2 Activity 1: Making Cheese the Biotech Way</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 1: Biodegrading a Simulated Oil Spill</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 2: Cleaning up Mini-Oil Spills in Various Shore Environments</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 3: Examining Oil-Degrading Microbes</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 1: Taking a Case History of Baby Mike</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 2: Analyzing Karyotypes</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 3: The Blue People of Troublesome Creek</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 4: Uncovering a Family Secret</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 5: Creating a Pedigree to Analyze a Family Trait</li> <li>• Biotechnology Applications: Unit 2 Lab 5 Activity 1: Diagnosing a Gene Defect</li> <li>• Biotechnology Applications: Unit 3 Lab 6 Activity 1: Modeling DNA Profiles to Solve a Mystery</li> <li>• Biotechnology Applications: Unit 3 Lab 7 Activity 1:</li> </ul>

		<p>Comparing Electrophoresed DNA Profiles</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 1: Case of the Second Examination</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 2: Finding Out Who Is at Risk for SARS</li> </ul>
CONTENT STANDARD	DC.P.5.	Physics: Heat and Thermodynamics: Broad Concept: Energy cannot be created or destroyed; however, in many processes energy is transformed into the microscopic form called heat energy, that is, the energy of the disordered motion of atoms. As a basis for understanding this concept, students:
PERFORMANCE STANDARD/ESSENTIAL SKILL	P.5.15.	<p>Use a p-V diagram to graph simple thermodynamic processes for an ideal gas (for which <math>pV = nRT</math>); for example, an isothermal process is described by a hyperbola, an isobaric process by a horizontal straight line, and an isochoric process by a vertical straight line.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 2 Lab 5 Activity 1: Diagnosing a Gene Defect</li> <li>• Biotechnology Applications: Unit 3 Lab 6 Activity 1: Modeling DNA Profiles to Solve a Mystery</li> <li>• Biotechnology Applications: Unit 3 Lab 7 Activity 1: Comparing Electrophoresed DNA Profiles</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 1: Case of the Second Examination</li> </ul>
CONTENT STANDARD	DC.E.1.	Environmental Science: Scientific Investigation and Inquiry: Broad Concept: Scientific progress is made by asking relevant questions and conducting careful investigations. As a basis for understanding this concept, and to address the content in this grade, students should develop their own questions and perform investigations. Students:
PERFORMANCE STANDARD/ESSENTIAL SKILL	E.1.4.	<p>Recognize the use and limitations of models and theories as scientific representations of reality.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 2: Cleaning up Mini-Oil Spills in Various Shore Environments</li> <li>• Biotechnology Applications: Unit 3 Lab 6 Activity 1: Modeling DNA Profiles to Solve a Mystery</li> </ul>
PERFORMANCE STANDARD/ESSENTIAL SKILL	E.1.6.	<p>Plan and conduct scientific investigations to explore new phenomena, to check on previous results, to verify or falsify the prediction of a theory, and to use a crucial experiment to discriminate between competing theories.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 2 Activity 1: Making Cheese the Biotech Way</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 1: Biodegrading a Simulated Oil Spill</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 2: Cleaning up Mini-Oil Spills in Various Shore Environments</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 3: Examining Oil-Degrading Microbes</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 1: Taking a Case History of Baby Mike</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 2: Analyzing Karyotypes</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 4: Uncovering a Family Secret</li> </ul>

		<ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 5: Creating a Pedigree to Analyze a Family Trait</li> <li>• Biotechnology Applications: Unit 2 Lab 5 Activity 1: Diagnosing a Gene Defect</li> <li>• Biotechnology Applications: Unit 3 Lab 6 Activity 1: Modeling DNA Profiles to Solve a Mystery</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 1: Case of the Second Examination</li> </ul>
<p>PERFORMANCE STANDARD/ESSENTIAL SKILL</p>	<p>E.1.10.</p>	<p>Select and use appropriate tools and technology to perform tests, collect data, analyze relationships, and display data. (The focus is on manual graphing, interpreting graphs, and mastery of metric measurements and units, with supplementary use of computers and electronic data gathering when appropriate.)</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 1 Activity 1: Genetically Modified Crops</li> <li>• Biotechnology Applications: Unit 1 Lab 2 Activity 1: Making Cheese the Biotech Way</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 1: Biodegrading a Simulated Oil Spill</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 2: Cleaning up Mini-Oil Spills in Various Shore Environments</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 3: Examining Oil-Degrading Microbes</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 1: Taking a Case History of Baby Mike</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 2: Analyzing Karyotypes</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 3: The Blue People of Troublesome Creek</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 4: Uncovering a Family Secret</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 5: Creating a Pedigree to Analyze a Family Trait</li> <li>• Biotechnology Applications: Unit 2 Lab 5 Activity 1: Diagnosing a Gene Defect</li> <li>• Biotechnology Applications: Unit 3 Lab 6 Activity 1: Modeling DNA Profiles to Solve a Mystery</li> <li>• Biotechnology Applications: Unit 3 Lab 7 Activity 1: Comparing Electrophoresed DNA Profiles</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 1: Case of the Second Examination</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 2: Finding Out Who Is at Risk for SARS</li> </ul>
<p>PERFORMANCE STANDARD/ESSENTIAL SKILL</p>	<p>E.1.14.</p>	<p>Observe natural phenomena and analyze their location, sequence, or time intervals (e.g., relative ages of rocks and succession of species in an ecosystem).</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 2: Analyzing Karyotypes</li> <li>• Biotechnology Applications: Unit 3 Lab 6 Activity 1: Modeling DNA Profiles to Solve a Mystery</li> <li>• Biotechnology Applications: Unit 3 Lab 7 Activity 1: Comparing Electrophoresed DNA Profiles</li> </ul>

		<ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 1: Case of the Second Examination</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 2: Finding Out Who Is at Risk for SARS</li> </ul>
<b>CONTENT STANDARD</b>	<b>DC.E.2.</b>	<b>Environmental Science: Environmental Systems: Broad Concept: The environment is a system of interdependent components affected by natural phenomena and human activity. As a basis for understanding this concept, students:</b>
<b>PERFORMANCE STANDARD/ESSENTIAL SKILL</b>	<b>E.2.1.</b>	<p>Understand and explain that human beings are part of Earth's ecosystems, and that human activities can, deliberately or inadvertently, alter ecosystems.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 1: Biodegrading a Simulated Oil Spill</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 2: Cleaning up Mini-Oil Spills in Various Shore Environments</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 3: Examining Oil-Degrading Microbes</li> </ul>
<b>PERFORMANCE STANDARD/ESSENTIAL SKILL</b>	<b>E.2.4.</b>	<p>Recognize and explain that in evolutionary change, the present arises from the materials of the past and in ways that can be explained (e.g., formation of soil from rocks and dead organic matter).</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 1: Taking a Case History of Baby Mike</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 2: Analyzing Karyotypes</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 3: The Blue People of Troublesome Creek</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 4: Uncovering a Family Secret</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 5: Creating a Pedigree to Analyze a Family Trait</li> </ul>
<b>CONTENT STANDARD</b>	<b>DC.E.3.</b>	<b>Environmental Science: Ecosystems: Broad Concept: Stability in an ecosystem is a balance between competing effects. As a basis for understanding this concept, students:</b>
<b>PERFORMANCE STANDARD/ESSENTIAL SKILL</b>	<b>E.3.1.</b>	<p>Explain that biodiversity is the sum total of different kinds of organisms in a given ecological community or system, and is affected by alterations of habitats.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 3 Lab 6 Activity 1: Modeling DNA Profiles to Solve a Mystery</li> </ul>
<b>PERFORMANCE STANDARD/ESSENTIAL SKILL</b>	<b>E.3.4.</b>	<p>Understand and explain that ecosystems tend to have cyclic fluctuations around a state of rough equilibrium, and change results from shifts in climate, natural causes, human activity, or when a new species or non-native species appears.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 2: Cleaning up Mini-Oil Spills in Various Shore Environments</li> </ul>
<b>PERFORMANCE STANDARD/ESSENTIAL SKILL</b>	<b>E.3.13.</b>	<p>Explain how soil, water and pest management are achieved in various agricultural systems (conventional and organic). Describe the tenets of</p>

		<p>sustainable agriculture.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 1 Activity 1: Genetically Modified Crops</li> <li>• Teacher Resource CD: Biotechnology in Agriculture and the Environment</li> </ul>
<b>CONTENT STANDARD</b>	<b>DC.E.5.</b>	<b>Environmental Science: Natural Resources: Broad Concept: Numerous Earth resources are used to sustain human affairs. The abundance and accessibility of these resources can influence their use. As a basis for understanding this concept, students:</b>
<b>PERFORMANCE STANDARD/ESSENTIAL SKILL</b>	<b>E.5.3.</b>	<p>Give examples of the various forms and uses of fossil fuels and nuclear energy in our society and describe alternative sources of energy provided by water, the atmosphere, and the sun.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 1: Biodegrading a Simulated Oil Spill</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 2: Cleaning up Mini-Oil Spills in Various Shore Environments</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 3: Examining Oil-Degrading Microbes</li> </ul>
<b>PERFORMANCE STANDARD/ESSENTIAL SKILL</b>	<b>E.5.4.</b>	<p>Demonstrate knowledge of the distribution of natural resources in the U.S. and the world, and explain how natural resources influence relationships among nations.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 1: Biodegrading a Simulated Oil Spill</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 2: Cleaning up Mini-Oil Spills in Various Shore Environments</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 3: Examining Oil-Degrading Microbes</li> </ul>
<b>PERFORMANCE STANDARD/ESSENTIAL SKILL</b>	<b>E.5.6.</b>	<p>Analyze the trade-offs among different fuels, such as how energy use contributes to the rising standard of living in the industrially developing nations, yet also leads to more rapid depletion of Earth's energy resources and to increased environmental risks associated with the use of fossil and nuclear fuels.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 2: Cleaning up Mini-Oil Spills in Various Shore Environments</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 3: Examining Oil-Degrading Microbes</li> </ul>
<b>CONTENT STANDARD</b>	<b>DC.E.6.</b>	<b>Environmental Science: Watersheds and Wetlands: Broad Concept: Water is continually being recycled by the hydrologic cycle through the watersheds, oceans, and the atmosphere by processes such as evaporation, condensation, precipitation runoff, and infiltration. This life-giving cycle is continually and increasingly impacted by human affairs. As a basis for understanding this concept, students:</b>
<b>PERFORMANCE STANDARD/ESSENTIAL SKILL</b>	<b>E.6.6.</b>	<p>Investigate and describe how point and non-point source pollution can affect the health of a bay's watershed and wetlands.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 1: Biodegrading a Simulated Oil Spill</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 2: Cleaning</li> </ul>

		<ul style="list-style-type: none"> <li>up Mini-Oil Spills in Various Shore Environments</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 3: Examining Oil-Degrading Microbes</li> </ul>
<b>CONTENT STANDARD</b>	<b>DC.E.7.</b>	<b>Environmental Science: Energy in the Earth System: Broad Concept: Energy and matter have multiple forms and can be changed from one form to another. As a basis for understanding this concept, students:</b>
<b>PERFORMANCE STANDARD/ESSENTIAL SKILL</b>	<b>E.7.3.</b>	<p>Understand and describe how layers of energy-rich organic material have been gradually turned into great coal beds and oil pools by the pressure of the overlying earth. Recognize that by burning these fossil fuels, people are passing stored energy back into the environment as heat and releasing large amounts of carbon dioxide.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 1: Biodegrading a Simulated Oil Spill</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 2: Cleaning up Mini-Oil Spills in Various Shore Environments</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 3: Examining Oil-Degrading Microbes</li> </ul>
<b>PERFORMANCE STANDARD/ESSENTIAL SKILL</b>	<b>E.7.4.</b>	<p>Describe how energy derived from the sun is used by green plants to produce chemical energy in the form of sugars (photosynthesis), and this energy is transferred along a food chain from producers (plants) to consumers to decomposers.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 2 Lab 5 Activity 1: Diagnosing a Gene Defect</li> <li>• Biotechnology Applications: Unit 3 Lab 7 Activity 1: Comparing Electrophoresed DNA Profiles</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 1: Case of the Second Examination</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 2: Finding Out Who Is at Risk for SARS</li> </ul>
<b>PERFORMANCE STANDARD/ESSENTIAL SKILL</b>	<b>E.7.5.</b>	<p>Illustrate the flow of energy through various trophic levels of food chains and food webs within an ecosystem. Describe how each link in a food web stores some energy in newly made structures and how much of the energy is dissipated into the environment as heat. Understand that a continual input of energy from sunlight is needed to keep the process going.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 2 Lab 5 Activity 1: Diagnosing a Gene Defect</li> <li>• Biotechnology Applications: Unit 3 Lab 7 Activity 1: Comparing Electrophoresed DNA Profiles</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 1: Case of the Second Examination</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 2: Finding Out Who Is at Risk for SARS</li> </ul>
<b>CONTENT STANDARD</b>	<b>DC.E.8.</b>	<b>Environmental Science: Environmental Quality: Broad Concept: Environmental quality is linked to natural and human-induced hazards, and the ability of science and technology to meet local, national, and global challenges. As a basis for understanding this concept, students:</b>
<b>PERFORMANCE STANDARD/ESSENTIAL SKILL</b>	<b>E.8.1.</b>	<p>Differentiate between natural pollution and pollution caused by humans and give examples of each.</p>

		<ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 1: Biodegrading a Simulated Oil Spill</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 2: Cleaning up Mini-Oil Spills in Various Shore Environments</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 3: Examining Oil-Degrading Microbes</li> </ul>
PERFORMANCE STANDARD/ESSENTIAL SKILL	E.8.2.	<p>Describe sources of air and water pollution and explain how air and water quality impact wildlife, vegetation, and human health.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 1: Biodegrading a Simulated Oil Spill</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 2: Cleaning up Mini-Oil Spills in Various Shore Environments</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 3: Examining Oil-Degrading Microbes</li> </ul>
PERFORMANCE STANDARD/ESSENTIAL SKILL	E.8.3.	<p>Describe the historical and current methods of water management and recycling, including the waste treatment practices of landfills, incineration, reuse/recycle and source reduction.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 2 Activity 1: Making Cheese the Biotech Way</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 2: Cleaning up Mini-Oil Spills in Various Shore Environments</li> </ul>
PERFORMANCE STANDARD/ESSENTIAL SKILL	E.8.6.	<p>Identify natural Earth hazards, such as earthquakes and hurricanes, and identify the regions in which they occur as well as the short-term and long-term effects on the environment and on people.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 1: Biodegrading a Simulated Oil Spill</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 2: Cleaning up Mini-Oil Spills in Various Shore Environments</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 3: Examining Oil-Degrading Microbes</li> </ul>

Washington D.C. Learning Standards

Science

Grade 10

CONTENT STANDARD	DC.ES.1.	Earth Science: Scientific Investigation and Inquiry: Broad Concept: Scientific progress is made by asking relevant questions and conducting careful investigations. As a basis for understanding this concept, and to address the content in this grade, students should develop their own questions and perform investigations. Students:
PERFORMANCE STANDARD/ESSENTIAL SKILL	ES.1.4.	<p>Recognize the use and limitations of models and theories as scientific representations of reality.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 2: Cleaning up Mini-Oil Spills in Various Shore Environments</li> <li>• Biotechnology Applications: Unit 3 Lab 6 Activity 1: Modeling DNA Profiles to Solve a Mystery</li> </ul>
PERFORMANCE STANDARD/ESSENTIAL SKILL	ES.1.10.	Select and use appropriate tools and technology to perform tests, collect data, analyze relationships, and display data. (The focus is on manual

SKILL		<p>graphing, interpreting graphs, and mastery of metric measurements and units, with supplementary use of computers and electronic data gathering when appropriate.)</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 1 Activity 1: Genetically Modified Crops</li> <li>• Biotechnology Applications: Unit 1 Lab 2 Activity 1: Making Cheese the Biotech Way</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 1: Biodegrading a Simulated Oil Spill</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 2: Cleaning up Mini-Oil Spills in Various Shore Environments</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 3: Examining Oil-Degrading Microbes</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 1: Taking a Case History of Baby Mike</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 2: Analyzing Karyotypes</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 3: The Blue People of Troublesome Creek</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 4: Uncovering a Family Secret</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 5: Creating a Pedigree to Analyze a Family Trait</li> <li>• Biotechnology Applications: Unit 2 Lab 5 Activity 1: Diagnosing a Gene Defect</li> <li>• Biotechnology Applications: Unit 3 Lab 6 Activity 1: Modeling DNA Profiles to Solve a Mystery</li> <li>• Biotechnology Applications: Unit 3 Lab 7 Activity 1: Comparing Electrophoresed DNA Profiles</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 1: Case of the Second Examination</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 2: Finding Out Who Is at Risk for SARS</li> </ul>
CONTENT STANDARD	DC.ES.4.	Earth Science: The Earth System: Broad Concept: Interactions among the solid Earth, hydrosphere, and atmosphere have resulted in ongoing evolution of the earth system over geologic time. As a basis for understanding this concept, students:
PERFORMANCE STANDARD/ESSENTIAL SKILL	ES.4.7.	<p>Investigate and identify the causes and effects of severe weather.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 1: Biodegrading a Simulated Oil Spill</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 2: Cleaning up Mini-Oil Spills in Various Shore Environments</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 3: Examining Oil-Degrading Microbes</li> </ul>
CONTENT STANDARD	DC.B.1.	Biology: Scientific Investigation and Inquiry: Broad Concept: Scientific progress is made by asking relevant questions and conducting careful investigations. As a basis for understanding this concept, and to address the content in this grade, students should develop their own questions and perform investigations. Students:
PERFORMANCE STANDARD/ESSENTIAL SKILL	B.1.4.	<p>Recognize the use and limitations of models and theories as scientific representations of reality.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 2: Cleaning</li> </ul>

		<ul style="list-style-type: none"> <li>up Mini-Oil Spills in Various Shore Environments</li> <li>• Biotechnology Applications: Unit 3 Lab 6 Activity 1: Modeling DNA Profiles to Solve a Mystery</li> </ul>
PERFORMANCE STANDARD/ESSENTIAL SKILL	B.1.6.	<p>Plan and conduct scientific investigations to explore new phenomena, to check on previous results, to verify or falsify the prediction of a theory, and to use a crucial experiment to discriminate between competing theories.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 2 Activity 1: Making Cheese the Biotech Way</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 1: Biodegrading a Simulated Oil Spill</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 2: Cleaning up Mini-Oil Spills in Various Shore Environments</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 3: Examining Oil-Degrading Microbes</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 1: Taking a Case History of Baby Mike</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 2: Analyzing Karyotypes</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 4: Uncovering a Family Secret</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 5: Creating a Pedigree to Analyze a Family Trait</li> <li>• Biotechnology Applications: Unit 2 Lab 5 Activity 1: Diagnosing a Gene Defect</li> <li>• Biotechnology Applications: Unit 3 Lab 6 Activity 1: Modeling DNA Profiles to Solve a Mystery</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 1: Case of the Second Examination</li> </ul>
PERFORMANCE STANDARD/ESSENTIAL SKILL	B.1.10.	<p>Select and use appropriate tools and technology to perform tests, collect data, analyze relationships, and display data. (The focus is on manual graphing, interpreting graphs, and mastery of metric measurements and units, with supplementary use of computers and electronic data gathering when appropriate.)</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 1 Activity 1: Genetically Modified Crops</li> <li>• Biotechnology Applications: Unit 1 Lab 2 Activity 1: Making Cheese the Biotech Way</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 1: Biodegrading a Simulated Oil Spill</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 2: Cleaning up Mini-Oil Spills in Various Shore Environments</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 3: Examining Oil-Degrading Microbes</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 1: Taking a Case History of Baby Mike</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 2: Analyzing Karyotypes</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 3: The Blue People of Troublesome Creek</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 4: Uncovering a Family Secret</li> </ul>

		<ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 5: Creating a Pedigree to Analyze a Family Trait</li> <li>• Biotechnology Applications: Unit 2 Lab 5 Activity 1: Diagnosing a Gene Defect</li> <li>• Biotechnology Applications: Unit 3 Lab 6 Activity 1: Modeling DNA Profiles to Solve a Mystery</li> <li>• Biotechnology Applications: Unit 3 Lab 7 Activity 1: Comparing Electrophoresed DNA Profiles</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 1: Case of the Second Examination</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 2: Finding Out Who Is at Risk for SARS</li> </ul>
PERFORMANCE STANDARD/ESSENTIAL SKILL	B.1.14.	<p>Observe natural phenomena and analyze their location, sequence, or time intervals (e.g., relative ages of rocks and succession of species in an ecosystem).</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 2: Analyzing Karyotypes</li> <li>• Biotechnology Applications: Unit 3 Lab 6 Activity 1: Modeling DNA Profiles to Solve a Mystery</li> <li>• Biotechnology Applications: Unit 3 Lab 7 Activity 1: Comparing Electrophoresed DNA Profiles</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 1: Case of the Second Examination</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 2: Finding Out Who Is at Risk for SARS</li> </ul>
PERFORMANCE STANDARD/ESSENTIAL SKILL	B.1.15.	<p>Explain that science discoveries can have both positive and negative implications, involve different decisions regarding ethics and allocation of resources (e.g., organ transplants, stem cell research, forest management and land use).</p> <ul style="list-style-type: none"> <li>• Teacher Resource CD: Biotechnology in Agriculture and the Environment</li> <li>• Teacher Resource CD: Biotechnology in Forensic Science</li> <li>• Teacher Resource CD: Biotechnology in Medicine</li> </ul>
CONTENT STANDARD	DC.B.2.	Biology: Chemistry of Living Things: Broad Concept: Living things are made of atoms bonded together to form molecules, some of the most important of which are large and contain carbon (i.e., 'organic' compounds). As a basis for understanding this concept, students:
PERFORMANCE STANDARD/ESSENTIAL SKILL	B.2.6.	<p>Observe and explain the role of enzymatic catalysis in biochemical processes.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 2 Activity 1: Making Cheese the Biotech Way</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 1: Case of the Second Examination</li> <li>• Teacher Resource CD: Biotechnology in Agriculture and the Environment</li> <li>• Teacher Resource CD: Biotechnology in Forensic Science</li> </ul>
CONTENT STANDARD	DC.B.3.	Biology: Cell Biology: Broad Concept: All living things are composed of cells. All the fundamental life processes of a cell are either chemical reactions or molecular interactions. As a basis for understanding this

		concept, students:
PERFORMANCE STANDARD/ESSENTIAL SKILL	B.3.11.	Describe that all growth and development of organisms is a consequence of an increase in cell number, size, and/or products. <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 1 Activity 1: Genetically Modified Crops</li> </ul>
PERFORMANCE STANDARD/ESSENTIAL SKILL	B.3.15.	Differentiate between the functions of mitosis and meiosis: Mitosis is a process by which a cell divides into each of two daughter cells, each of which has the same number of chromosomes as the original cell. Meiosis is a process of cell division in organisms that reproduce sexually, during which the nucleus divides eventually into four nuclei, each of which contains half the usual number of chromosomes. <ul style="list-style-type: none"> <li>• Virtual Laboratory: Preparation and Analysis of a Human Karyotype</li> </ul>
CONTENT STANDARD	DC.B.4.	Biology: Genetics: Broad Concept: 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. As a basis for understanding this concept, students:
PERFORMANCE STANDARD/ESSENTIAL SKILL	B.4.2.	Describe how the discovery of the structure of DNA by James D. Watson, Francis Crick made it possible to interpret the genetic code on the basis of a nucleotide sequence. Know the important contribution of Rosalind Franklin's data to this discovery, i.e., the careful X-ray crystallography on DNA that provided Watson and Crick the clue they needed to build the correct structure. <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 1 Activity 1: Genetically Modified Crops</li> <li>• Biotechnology Applications: Unit 2 Lab 5 Activity 1: Diagnosing a Gene Defect</li> <li>• Biotechnology Applications: Unit 3 Lab 6 Activity 1: Modeling DNA Profiles to Solve a Mystery</li> <li>• Biotechnology Applications: Unit 3 Lab 7 Activity 1: Comparing Electrophoresed DNA Profiles</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 1: Case of the Second Examination</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 2: Finding Out Who Is at Risk for SARS</li> <li>• Teacher Resource CD: Biotechnology in Agriculture and the Environment</li> <li>• Teacher Resource CD: Biotechnology in Forensic Science</li> <li>• Teacher Resource CD: Biotechnology in Medicine</li> </ul>
PERFORMANCE STANDARD/ESSENTIAL SKILL	B.4.3.	Explain how hereditary information is passed from parents to offspring in the form of 'genes' which are long stretches of DNA consisting of sequences of nucleotides. Explain that in eukaryotes, the genes are contained in chromosomes, which are bodies made up of DNA and various proteins. <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 1 Activity 1: Genetically Modified Crops</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 1: Taking a Case History of Baby Mike</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 2: Analyzing Karyotypes</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 3: The Blue</li> </ul>

		<p>People of Troublesome Creek</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 3 Lab 6 Activity 1: Modeling DNA Profiles to Solve a Mystery</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 1: Case of the Second Examination</li> <li>• Teacher Resource CD: Biotechnology in Agriculture and the Environment</li> <li>• Teacher Resource CD: Biotechnology in Forensic Science</li> <li>• Teacher Resource CD: Biotechnology in Medicine</li> <li>• Virtual Laboratory: Preparation and Analysis of a Human Karyotype</li> </ul>
PERFORMANCE STANDARD/ESSENTIAL SKILL	B.4.4.	<p>Know every species has its own characteristic DNA sequence.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 1 Activity 1: Genetically Modified Crops</li> <li>• Biotechnology Applications: Unit 2 Lab 5 Activity 1: Diagnosing a Gene Defect</li> <li>• Biotechnology Applications: Unit 3 Lab 6 Activity 1: Modeling DNA Profiles to Solve a Mystery</li> <li>• Biotechnology Applications: Unit 3 Lab 7 Activity 1: Comparing Electrophoresed DNA Profiles</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 1: Case of the Second Examination</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 2: Finding Out Who Is at Risk for SARS</li> <li>• Teacher Resource CD: Biotechnology in Agriculture and the Environment</li> <li>• Teacher Resource CD: Biotechnology in Forensic Science</li> <li>• Teacher Resource CD: Biotechnology in Medicine</li> </ul>
PERFORMANCE STANDARD/ESSENTIAL SKILL	B.4.7.	<p>Understand that and describe how inserting, deleting, or substituting short stretches of DNA alters a gene. Recognize that changes (mutations) in the DNA sequence in or near a specific gene may (or may not) affect the sequence of amino acids in the encoded protein or the expression of the gene.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 2: Analyzing Karyotypes</li> <li>• Teacher Resource CD: Biotechnology in Medicine</li> </ul>
PERFORMANCE STANDARD/ESSENTIAL SKILL	B.4.8.	<p>Explain the mechanisms of genetic mutations and chromosomal recombinations, and when and how they are passed on to offspring.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 1: Taking a Case History of Baby Mike</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 2: Analyzing Karyotypes</li> <li>• Teacher Resource CD: Biotechnology in Forensic Science</li> <li>• Teacher Resource CD: Biotechnology in Medicine</li> <li>• Virtual Laboratory: Preparation and Analysis of a Human Karyotype</li> </ul>
PERFORMANCE STANDARD/ESSENTIAL SKILL	B.4.9.	<p>Understand and explain that specialization of cells is almost always due to different patterns of gene expression rather than differences in the genes</p>

SKILL		<p>themselves.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 1: Case of the Second Examination</li> </ul>
PERFORMANCE STANDARD/ESSENTIAL SKILL	B.4.11.	<p>Explain that genetic variation can occur from such processes as crossing over, jumping genes, and deletion and duplication of genes.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 1 Activity 1: Genetically Modified Crops</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 2: Analyzing Karyotypes</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 3: The Blue People of Troublesome Creek</li> <li>• Biotechnology Applications: Unit 3 Lab 6 Activity 1: Modeling DNA Profiles to Solve a Mystery</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 1: Case of the Second Examination</li> <li>• Teacher Resource CD: Biotechnology in Agriculture and the Environment</li> <li>• Teacher Resource CD: Biotechnology in Forensic Science</li> <li>• Teacher Resource CD: Biotechnology in Medicine</li> </ul>
CONTENT STANDARD	DC.B.5.	<p><b>Biology: Biological Evolution: Broad Concept: Evolution and biodiversity are the result of genetic changes that occur in constantly changing environments. As a basis for understanding this concept, students:</b></p>
PERFORMANCE STANDARD/ESSENTIAL SKILL	B.5.1.	<p>Investigate and explain how molecular evidence reinforces and confirms the fossil, anatomical, and other evidence for evolution and provides additional detail about the sequence in which various lines of descent branched off from one another.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 1: Taking a Case History of Baby Mike</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 2: Analyzing Karyotypes</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 3: The Blue People of Troublesome Creek</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 4: Uncovering a Family Secret</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 5: Creating a Pedigree to Analyze a Family Trait</li> </ul>
PERFORMANCE STANDARD/ESSENTIAL SKILL	B.5.2.	<p>Explain how a large diversity of species increases the chance that at least some living things will survive in the face of large or even catastrophic changes in the environment.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 3 Lab 6 Activity 1: Modeling DNA Profiles to Solve a Mystery</li> </ul>
PERFORMANCE STANDARD/ESSENTIAL SKILL	B.5.5.	<p>Describe how life on Earth is thought to have begun as one or a few simple one-celled organisms about 3.5 billion years ago, and that during the first 2 billion years, only single-cell microorganisms existed. Know that, once cells with nuclei developed about a billion years ago, increasingly complex multicellular organisms could evolve.</p>

		<ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 1: Taking a Case History of Baby Mike</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 2: Analyzing Karyotypes</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 3: The Blue People of Troublesome Creek</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 4: Uncovering a Family Secret</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 5: Creating a Pedigree to Analyze a Family Trait</li> </ul>
PERFORMANCE STANDARD/ESSENTIAL SKILL	B.5.6.	<p>Explain that prior to the theory first offered by Charles Darwin and Alfred Wallace, the universal belief was that all known species had been created de novo at about the same time and had remained unchanged.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 1: Taking a Case History of Baby Mike</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 2: Analyzing Karyotypes</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 3: The Blue People of Troublesome Creek</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 4: Uncovering a Family Secret</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 5: Creating a Pedigree to Analyze a Family Trait</li> </ul>
PERFORMANCE STANDARD/ESSENTIAL SKILL	B.5.9.	<p>Explain how biological evolution is also supported by the discovery that the genetic code found in DNA is the same for almost all organisms.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 1: Taking a Case History of Baby Mike</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 2: Analyzing Karyotypes</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 3: The Blue People of Troublesome Creek</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 4: Uncovering a Family Secret</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 5: Creating a Pedigree to Analyze a Family Trait</li> </ul>
PERFORMANCE STANDARD/ESSENTIAL SKILL	B.5.10.	<p>Explain that evolution builds on what already exists, so the more variety there is, the more there can be in the future.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 1: Taking a Case History of Baby Mike</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 2: Analyzing Karyotypes</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 3: The Blue People of Troublesome Creek</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 4: Uncovering a Family Secret</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 5: Creating a Pedigree to Analyze a Family Trait</li> </ul>
CONTENT STANDARD	DC.B.8.	Biology: Ecosystems: Broad Concept: Stability in an ecosystem is a

		balance between competing effects. As a basis for understanding this concept, students:
PERFORMANCE STANDARD/ESSENTIAL SKILL	B.8.7.	<p>Explain how layers of energy-rich organic material, mostly of plant origin, have been gradually turned into great coal beds and oil pools by the pressure of the overlying Earth and its internal heat.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 1: Biodegrading a Simulated Oil Spill</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 2: Cleaning up Mini-Oil Spills in Various Shore Environments</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 3: Examining Oil-Degrading Microbes</li> </ul>
PERFORMANCE STANDARD/ESSENTIAL SKILL	B.8.9.	<p>Investigate and describe how point and non-point source pollution can affect the health of a bay's watershed and wetlands.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 1: Biodegrading a Simulated Oil Spill</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 2: Cleaning up Mini-Oil Spills in Various Shore Environments</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 3: Examining Oil-Degrading Microbes</li> </ul>
CONTENT STANDARD	DC.C.1.	Chemistry: Scientific Investigation and Inquiry: Broad Concept: Scientific progress is made by asking relevant questions and conducting careful investigations. As a basis for understanding this concept, and to address the content in this grade, students should develop their own questions and perform investigations. Students:
PERFORMANCE STANDARD/ESSENTIAL SKILL	C.1.4.	<p>Recognize the use and limitations of models and theories as scientific representations of reality.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 2: Cleaning up Mini-Oil Spills in Various Shore Environments</li> <li>• Biotechnology Applications: Unit 3 Lab 6 Activity 1: Modeling DNA Profiles to Solve a Mystery</li> </ul>
PERFORMANCE STANDARD/ESSENTIAL SKILL	C.1.10.	<p>Select and use appropriate tools and technology to perform tests, collect data, analyze relationships, and display data. (The focus is on manual graphing, interpreting graphs, and mastery of metric measurements and units, with supplementary use of computers and electronic data gathering when appropriate.)</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 1 Activity 1: Genetically Modified Crops</li> <li>• Biotechnology Applications: Unit 1 Lab 2 Activity 1: Making Cheese the Biotech Way</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 1: Biodegrading a Simulated Oil Spill</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 2: Cleaning up Mini-Oil Spills in Various Shore Environments</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 3: Examining Oil-Degrading Microbes</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 1: Taking a Case History of Baby Mike</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 2: Analyzing Karyotypes</li> </ul>

		<ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 3: The Blue People of Troublesome Creek</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 4: Uncovering a Family Secret</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 5: Creating a Pedigree to Analyze a Family Trait</li> <li>• Biotechnology Applications: Unit 2 Lab 5 Activity 1: Diagnosing a Gene Defect</li> <li>• Biotechnology Applications: Unit 3 Lab 6 Activity 1: Modeling DNA Profiles to Solve a Mystery</li> <li>• Biotechnology Applications: Unit 3 Lab 7 Activity 1: Comparing Electrophoresed DNA Profiles</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 1: Case of the Second Examination</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 2: Finding Out Who Is at Risk for SARS</li> </ul>
CONTENT STANDARD	DC.C.3.	Chemistry: Acids and Bases: Broad Concept: Acids, bases, and salts are three classes of compounds that form ions in water solutions. As a basis for understanding this concept, students:
PERFORMANCE STANDARD/ESSENTIAL SKILL	C.3.2.	<p>Define pH as the negative of the logarithm of the hydrogen (hydronium) ion concentration, and calculate pH from concentration data.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 2 Activity 1: Making Cheese the Biotech Way</li> </ul>
PERFORMANCE STANDARD/ESSENTIAL SKILL	C.3.3.	<p>Illustrate and explain the pH scale to characterize acid and base solutions: Neutral solutions have pH 7, acids are less than 7, and bases are greater than 7.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 2 Activity 1: Making Cheese the Biotech Way</li> </ul>
CONTENT STANDARD	DC.P.1.	Physics: Scientific Investigation and Inquiry: Broad Concept: Scientific progress is made by asking relevant questions and conducting careful investigations. As a basis for understanding this concept, and to address the content in this grade, students should develop their own questions and perform investigations. Students:
PERFORMANCE STANDARD/ESSENTIAL SKILL	P.1.4.	<p>Recognize the use and limitations of models and theories as scientific representations of reality.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 2: Cleaning up Mini-Oil Spills in Various Shore Environments</li> <li>• Biotechnology Applications: Unit 3 Lab 6 Activity 1: Modeling DNA Profiles to Solve a Mystery</li> </ul>
PERFORMANCE STANDARD/ESSENTIAL SKILL	P.1.10.	<p>Select and use appropriate tools and technology to perform tests, collect data, analyze relationships, and display data. (The focus is on manual graphing, interpreting graphs, and mastery of metric measurements and units, with supplementary use of computers and electronic data gathering when appropriate.)</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 1 Activity 1: Genetically Modified Crops</li> <li>• Biotechnology Applications: Unit 1 Lab 2 Activity 1: Making Cheese the Biotech Way</li> </ul>

		<ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 1: Biodegrading a Simulated Oil Spill</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 2: Cleaning up Mini-Oil Spills in Various Shore Environments</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 3: Examining Oil-Degrading Microbes</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 1: Taking a Case History of Baby Mike</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 2: Analyzing Karyotypes</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 3: The Blue People of Troublesome Creek</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 4: Uncovering a Family Secret</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 5: Creating a Pedigree to Analyze a Family Trait</li> <li>• Biotechnology Applications: Unit 2 Lab 5 Activity 1: Diagnosing a Gene Defect</li> <li>• Biotechnology Applications: Unit 3 Lab 6 Activity 1: Modeling DNA Profiles to Solve a Mystery</li> <li>• Biotechnology Applications: Unit 3 Lab 7 Activity 1: Comparing Electrophoresed DNA Profiles</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 1: Case of the Second Examination</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 2: Finding Out Who Is at Risk for SARS</li> </ul>
CONTENT STANDARD	DC.P.5.	Physics: Heat and Thermodynamics: Broad Concept: Energy cannot be created or destroyed; however, in many processes energy is transformed into the microscopic form called heat energy, that is, the energy of the disordered motion of atoms. As a basis for understanding this concept, students:
PERFORMANCE STANDARD/ESSENTIAL SKILL	P.5.15.	Use a p-V diagram to graph simple thermodynamic processes for an ideal gas (for which $pV = nRT$ ); for example, an isothermal process is described by a hyperbola, an isobaric process by a horizontal straight line, and an isochoric process by a vertical straight line. <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 2 Lab 5 Activity 1: Diagnosing a Gene Defect</li> <li>• Biotechnology Applications: Unit 3 Lab 6 Activity 1: Modeling DNA Profiles to Solve a Mystery</li> <li>• Biotechnology Applications: Unit 3 Lab 7 Activity 1: Comparing Electrophoresed DNA Profiles</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 1: Case of the Second Examination</li> </ul>
CONTENT STANDARD	DC.E.1.	Environmental Science: Scientific Investigation and Inquiry: Broad Concept: Scientific progress is made by asking relevant questions and conducting careful investigations. As a basis for understanding this concept, and to address the content in this grade, students should develop their own questions and perform investigations. Students:
PERFORMANCE STANDARD/ESSENTIAL SKILL	E.1.4.	Recognize the use and limitations of models and theories as scientific representations of reality. <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 2: Cleaning up Mini-Oil Spills in Various Shore Environments</li> <li>• Biotechnology Applications: Unit 3 Lab 6 Activity 1: Modeling</li> </ul>

		DNA Profiles to Solve a Mystery
PERFORMANCE STANDARD/ESSENTIAL SKILL	E.1.6.	<p>Plan and conduct scientific investigations to explore new phenomena, to check on previous results, to verify or falsify the prediction of a theory, and to use a crucial experiment to discriminate between competing theories.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 2 Activity 1: Making Cheese the Biotech Way</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 1: Biodegrading a Simulated Oil Spill</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 2: Cleaning up Mini-Oil Spills in Various Shore Environments</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 3: Examining Oil-Degrading Microbes</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 1: Taking a Case History of Baby Mike</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 2: Analyzing Karyotypes</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 4: Uncovering a Family Secret</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 5: Creating a Pedigree to Analyze a Family Trait</li> <li>• Biotechnology Applications: Unit 2 Lab 5 Activity 1: Diagnosing a Gene Defect</li> <li>• Biotechnology Applications: Unit 3 Lab 6 Activity 1: Modeling DNA Profiles to Solve a Mystery</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 1: Case of the Second Examination</li> </ul>
PERFORMANCE STANDARD/ESSENTIAL SKILL	E.1.10.	<p>Select and use appropriate tools and technology to perform tests, collect data, analyze relationships, and display data. (The focus is on manual graphing, interpreting graphs, and mastery of metric measurements and units, with supplementary use of computers and electronic data gathering when appropriate.)</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 1 Activity 1: Genetically Modified Crops</li> <li>• Biotechnology Applications: Unit 1 Lab 2 Activity 1: Making Cheese the Biotech Way</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 1: Biodegrading a Simulated Oil Spill</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 2: Cleaning up Mini-Oil Spills in Various Shore Environments</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 3: Examining Oil-Degrading Microbes</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 1: Taking a Case History of Baby Mike</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 2: Analyzing Karyotypes</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 3: The Blue People of Troublesome Creek</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 4: Uncovering a Family Secret</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 5: Creating a Pedigree to Analyze a Family Trait</li> </ul>

		<ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 2 Lab 5 Activity 1: Diagnosing a Gene Defect</li> <li>• Biotechnology Applications: Unit 3 Lab 6 Activity 1: Modeling DNA Profiles to Solve a Mystery</li> <li>• Biotechnology Applications: Unit 3 Lab 7 Activity 1: Comparing Electrophoresed DNA Profiles</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 1: Case of the Second Examination</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 2: Finding Out Who Is at Risk for SARS</li> </ul>
PERFORMANCE STANDARD/ESSENTIAL SKILL	E.1.14.	<p>Observe natural phenomena and analyze their location, sequence, or time intervals (e.g., relative ages of rocks and succession of species in an ecosystem).</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 2: Analyzing Karyotypes</li> <li>• Biotechnology Applications: Unit 3 Lab 6 Activity 1: Modeling DNA Profiles to Solve a Mystery</li> <li>• Biotechnology Applications: Unit 3 Lab 7 Activity 1: Comparing Electrophoresed DNA Profiles</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 1: Case of the Second Examination</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 2: Finding Out Who Is at Risk for SARS</li> </ul>
CONTENT STANDARD	DC.E.2.	Environmental Science: Environmental Systems: Broad Concept: The environment is a system of interdependent components affected by natural phenomena and human activity. As a basis for understanding this concept, students:
PERFORMANCE STANDARD/ESSENTIAL SKILL	E.2.1.	<p>Understand and explain that human beings are part of Earth's ecosystems, and that human activities can, deliberately or inadvertently, alter ecosystems.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 1: Biodegrading a Simulated Oil Spill</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 2: Cleaning up Mini-Oil Spills in Various Shore Environments</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 3: Examining Oil-Degrading Microbes</li> </ul>
PERFORMANCE STANDARD/ESSENTIAL SKILL	E.2.4.	<p>Recognize and explain that in evolutionary change, the present arises from the materials of the past and in ways that can be explained (e.g., formation of soil from rocks and dead organic matter).</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 1: Taking a Case History of Baby Mike</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 2: Analyzing Karyotypes</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 3: The Blue People of Troublesome Creek</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 4: Uncovering a Family Secret</li> <li>• Biotechnology Applications: Unit 2 Lab 4 Activity 5: Creating a Pedigree to Analyze a Family Trait</li> </ul>

<b>CONTENT STANDARD</b>	<b>DC.E.3.</b>	<b>Environmental Science: Ecosystems: Broad Concept: Stability in an ecosystem is a balance between competing effects. As a basis for understanding this concept, students:</b>
<b>PERFORMANCE STANDARD/ESSENTIAL SKILL</b>	<b>E.3.1.</b>	<p>Explain that biodiversity is the sum total of different kinds of organisms in a given ecological community or system, and is affected by alterations of habitats.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 3 Lab 6 Activity 1: Modeling DNA Profiles to Solve a Mystery</li> </ul>
<b>PERFORMANCE STANDARD/ESSENTIAL SKILL</b>	<b>E.3.4.</b>	<p>Understand and explain that ecosystems tend to have cyclic fluctuations around a state of rough equilibrium, and change results from shifts in climate, natural causes, human activity, or when a new species or non-native species appears.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 2: Cleaning up Mini-Oil Spills in Various Shore Environments</li> </ul>
<b>PERFORMANCE STANDARD/ESSENTIAL SKILL</b>	<b>E.3.13.</b>	<p>Explain how soil, water and pest management are achieved in various agricultural systems (conventional and organic). Describe the tenets of sustainable agriculture.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 1 Activity 1: Genetically Modified Crops</li> <li>• Teacher Resource CD: Biotechnology in Agriculture and the Environment</li> </ul>
<b>CONTENT STANDARD</b>	<b>DC.E.5.</b>	<b>Environmental Science: Natural Resources: Broad Concept: Numerous Earth resources are used to sustain human affairs. The abundance and accessibility of these resources can influence their use. As a basis for understanding this concept, students:</b>
<b>PERFORMANCE STANDARD/ESSENTIAL SKILL</b>	<b>E.5.3.</b>	<p>Give examples of the various forms and uses of fossil fuels and nuclear energy in our society and describe alternative sources of energy provided by water, the atmosphere, and the sun.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 1: Biodegrading a Simulated Oil Spill</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 2: Cleaning up Mini-Oil Spills in Various Shore Environments</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 3: Examining Oil-Degrading Microbes</li> </ul>
<b>PERFORMANCE STANDARD/ESSENTIAL SKILL</b>	<b>E.5.4.</b>	<p>Demonstrate knowledge of the distribution of natural resources in the U.S. and the world, and explain how natural resources influence relationships among nations.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 1: Biodegrading a Simulated Oil Spill</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 2: Cleaning up Mini-Oil Spills in Various Shore Environments</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 3: Examining Oil-Degrading Microbes</li> </ul>
<b>PERFORMANCE STANDARD/ESSENTIAL SKILL</b>	<b>E.5.6.</b>	<p>Analyze the trade-offs among different fuels, such as how energy use contributes to the rising standard of living in the industrially developing nations, yet also leads to more rapid depletion of Earth's energy resources</p>

		<p>and to increased environmental risks associated with the use of fossil and nuclear fuels.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 2: Cleaning up Mini-Oil Spills in Various Shore Environments</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 3: Examining Oil-Degrading Microbes</li> </ul>
<b>CONTENT STANDARD</b>	<b>DC.E.6.</b>	<b>Environmental Science: Watersheds and Wetlands: Broad Concept: Water is continually being recycled by the hydrologic cycle through the watersheds, oceans, and the atmosphere by processes such as evaporation, condensation, precipitation runoff, and infiltration. This life-giving cycle is continually and increasingly impacted by human affairs. As a basis for understanding this concept, students:</b>
<b>PERFORMANCE STANDARD/ESSENTIAL SKILL</b>	<b>E.6.6.</b>	<p>Investigate and describe how point and non-point source pollution can affect the health of a bay's watershed and wetlands.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 1: Biodegrading a Simulated Oil Spill</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 2: Cleaning up Mini-Oil Spills in Various Shore Environments</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 3: Examining Oil-Degrading Microbes</li> </ul>
<b>CONTENT STANDARD</b>	<b>DC.E.7.</b>	<b>Environmental Science: Energy in the Earth System: Broad Concept: Energy and matter have multiple forms and can be changed from one form to another. As a basis for understanding this concept, students:</b>
<b>PERFORMANCE STANDARD/ESSENTIAL SKILL</b>	<b>E.7.3.</b>	<p>Understand and describe how layers of energy-rich organic material have been gradually turned into great coal beds and oil pools by the pressure of the overlying earth. Recognize that by burning these fossil fuels, people are passing stored energy back into the environment as heat and releasing large amounts of carbon dioxide.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 1: Biodegrading a Simulated Oil Spill</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 2: Cleaning up Mini-Oil Spills in Various Shore Environments</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 3: Examining Oil-Degrading Microbes</li> </ul>
<b>PERFORMANCE STANDARD/ESSENTIAL SKILL</b>	<b>E.7.4.</b>	<p>Describe how energy derived from the sun is used by green plants to produce chemical energy in the form of sugars (photosynthesis), and this energy is transferred along a food chain from producers (plants) to consumers to decomposers.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 2 Lab 5 Activity 1: Diagnosing a Gene Defect</li> <li>• Biotechnology Applications: Unit 3 Lab 7 Activity 1: Comparing Electrophoresed DNA Profiles</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 1: Case of the Second Examination</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 2: Finding Out Who Is at Risk for SARS</li> </ul>
<b>PERFORMANCE STANDARD/ESSENTIAL SKILL</b>	<b>E.7.5.</b>	<p>Illustrate the flow of energy through various trophic levels of food chains and food webs within an ecosystem. Describe how each link in a food web stores some energy in newly made structures and how much of the energy</p>

		<p>is dissipated into the environment as heat. Understand that a continual input of energy from sunlight is needed to keep the process going.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 2 Lab 5 Activity 1: Diagnosing a Gene Defect</li> <li>• Biotechnology Applications: Unit 3 Lab 7 Activity 1: Comparing Electrophoresed DNA Profiles</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 1: Case of the Second Examination</li> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 2: Finding Out Who Is at Risk for SARS</li> </ul>
<b>CONTENT STANDARD</b>	<b>DC.E.8.</b>	<b>Environmental Science: Environmental Quality: Broad Concept: Environmental quality is linked to natural and human-induced hazards, and the ability of science and technology to meet local, national, and global challenges. As a basis for understanding this concept, students:</b>
<b>PERFORMANCE STANDARD/ESSENTIAL SKILL</b>	<b>E.8.1.</b>	<p>Differentiate between natural pollution and pollution caused by humans and give examples of each.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 1: Biodegrading a Simulated Oil Spill</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 2: Cleaning up Mini-Oil Spills in Various Shore Environments</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 3: Examining Oil-Degrading Microbes</li> </ul>
<b>PERFORMANCE STANDARD/ESSENTIAL SKILL</b>	<b>E.8.2.</b>	<p>Describe sources of air and water pollution and explain how air and water quality impact wildlife, vegetation, and human health.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 1: Biodegrading a Simulated Oil Spill</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 2: Cleaning up Mini-Oil Spills in Various Shore Environments</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 3: Examining Oil-Degrading Microbes</li> </ul>
<b>PERFORMANCE STANDARD/ESSENTIAL SKILL</b>	<b>E.8.3.</b>	<p>Describe the historical and current methods of water management and recycling, including the waste treatment practices of landfills, incineration, reuse/recycle and source reduction.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 2 Activity 1: Making Cheese the Biotech Way</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 2: Cleaning up Mini-Oil Spills in Various Shore Environments</li> </ul>
<b>PERFORMANCE STANDARD/ESSENTIAL SKILL</b>	<b>E.8.6.</b>	<p>Identify natural Earth hazards, such as earthquakes and hurricanes, and identify the regions in which they occur as well as the short-term and long-term effects on the environment and on people.</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 1: Biodegrading a Simulated Oil Spill</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 2: Cleaning up Mini-Oil Spills in Various Shore Environments</li> <li>• Biotechnology Applications: Unit 1 Lab 3 Activity 3: Examining</li> </ul>

