

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

Frey Scientific  
 80 Northwest Boulevard  
 Nashua, NH 03063-4067  
 1-800-225-3739  
 www.freyscientific.com  
 www.freyscientific.com/inquiryinvestigations

**Colorado K-12 Academic Standards**  
**Science**  
**Grade 7**

| STANDARD         | CO. 1. Students apply the processes of scientific investigation and design, conduct, communicate about, and evaluate such investigations.   |
|------------------|---|
| STRAND/BENCHMARK | <p>1.1. Ask questions and state hypotheses that lead to different types of scientific investigations (for example: experimentation, collecting specimens, constructing models, researching scientific literature)</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 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> |
| STRAND/BENCHMARK | <p>1.2. Use appropriate tools, technologies and metric measurements to gather and organize data and report results</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> <li>• Virtual Laboratory: Preparation and Analysis of a Human Karyotype</li> </ul> |
| STRAND/BENCHMARK | 1.3. | <p>Interpret and evaluate data in order to formulate logical conclusions</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> </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> <li>• Virtual Laboratory: Preparation and Analysis of a Human Karyotype</li> </ul>  |
| STRAND/BENCHMARK | 1.6.  | <p>Communicate results of their investigations in appropriate ways (for example: written reports, graphic displays, oral presentations)</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> |
| STANDARD         | CO.3. | Life Science: Students know and understand the characteristics and structure of living things, the processes of life, and how living things interact with each other and their environment. (Focus: Biology-- Anatomy, Physiology, Botany, Zoology, Ecology)  |
| STRAND/BENCHMARK | 3.6.  | <p>Different types of cells have basic structures, components and functions (for example: cell membrane, nucleus, cytoplasm, chloroplast, single-celled organisms in pond water, Elodea, onion cell, human cheek cell)</p> <ul style="list-style-type: none"> <li>• Teacher Resource CD: Biotechnology in Medicine</li> </ul>   |
| STRAND/BENCHMARK | 3.7.  | <p>There are non-communicable conditions and communicable diseases (for example: heart disease and chicken pox)</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</li> </ul>   |

|                  |       |  |
|------------------|-------|--|
|                  |       | <p>Is at Risk for SARS</p> <ul style="list-style-type: none"> <li>Teacher Resource CD: Biotechnology in Medicine</li> </ul>  |
| STRAND/BENCHMARK | 3.8.  | <p>There is a flow of energy and matter in an ecosystem (for example: as modeled in a food chain, web, pyramid, decomposition)</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>   |
| STRAND/BENCHMARK | 3.10. | <p>Chromosomes and genes play a role in heredity (for example, genes control traits, while chromosomes are made up of many 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 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> |
| STRAND/BENCHMARK | 3.11. | <p>Changes in environmental conditions can affect the survival of individual organisms, populations, and entire species</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>   |
| STRAND/BENCHMARK | 3.13. | <p>Individual organisms with certain traits are more likely than others to survive and have 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>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</li> </ul>   |

|                  |       |   |
|------------------|-------|---|
|                  |       | Pedigree to Analyze a Family Trait  |
| STANDARD         | CO.4. | Earth and Space Science: Students know and understand the processes and interactions of Earth's systems and the structure and dynamics of Earth and other objects in space. (Focus: Geology, Meteorology, Astronomy, Oceanography)  |
| STRAND/BENCHMARK | 4.1.  | Inter-relationships exist between minerals, rocks, and soils <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>  |
| STRAND/BENCHMARK | 4.2.  | Humans use renewable and nonrenewable resources (for example: forests and fossil fuels) <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>  |
| STANDARD         | CO.5. | Students understand that the nature of science involves a particular way of building knowledge and making meaning of the natural world.   |
| STRAND/BENCHMARK | 5.2.  | Scientific knowledge changes as new knowledge is acquired and previous ideas are modified (for example: through space exploration) <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 1 Activity 1: Genetically Modified Crops</li> </ul>  |
| STRAND/BENCHMARK | 5.4.  | Models can be used to predict change (for example: computer simulation, video sequence, stream table) <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>   |
| STRAND/BENCHMARK | 5.5.  | There are interrelationships among science, technology and human activity that affect the world <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 5 Activity 1: Diagnosing a Gene Defect</li> <li>• Biotechnology Applications: Unit 3 Lab 6 Activity 1: Modeling DNA</li> </ul> |

|  |  |   |
|--|--|---|
|  |  | <p>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> |
|--|--|---|

**Colorado K-12 Academic Standards  
Science  
Grade 8**

| STANDARD         | CO. 1. | Students apply the processes of scientific investigation and design, conduct, communicate about, and evaluate such investigations.   |
|------------------|--------|--|
| STRAND/BENCHMARK | 1.1.   | <p>Ask questions and state hypotheses that lead to different types of scientific investigations (for example: experimentation, collecting specimens, constructing models, researching scientific literature)</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 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> |
| STRAND/BENCHMARK | 1.2.   | <p>Use appropriate tools, technologies and metric measurements to gather and organize data and report results</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> </ul>   |

|                  |      |  |
|------------------|------|--|
|                  |      | <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> <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>   |
| STRAND/BENCHMARK | 1.3. | <p>Interpret and evaluate data in order to formulate logical conclusions</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> </ul> |

|                  |       |   |
|------------------|-------|---|
|                  |       | <ul style="list-style-type: none"> <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>   |
| STRAND/BENCHMARK | 1.6.  | <p>Communicate results of their investigations in appropriate ways (for example: written reports, graphic displays, oral presentations)</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> |
| STANDARD         | CO.3. | Life Science: Students know and understand the characteristics and structure of living things, the processes of life, and how living things interact with each other and their environment. (Focus: Biology-- Anatomy, Physiology, Botany, Zoology, Ecology)  |
| STRAND/BENCHMARK | 3.6.  | <p>Different types of cells have basic structures, components and functions (for example: cell membrane, nucleus, cytoplasm, chloroplast, single-celled organisms in pond water, Elodea, onion cell, human cheek cell)</p> <ul style="list-style-type: none"> <li>• Teacher Resource CD: Biotechnology in Medicine</li> </ul>   |
| STRAND/BENCHMARK | 3.7.  | <p>There are non-communicable conditions and communicable diseases (for example: heart disease and chicken pox)</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>   |

|                  |       |  |
|------------------|-------|--|
|                  |       | <ul style="list-style-type: none"> <li>Teacher Resource CD: Biotechnology in Medicine</li> </ul>   |
| STRAND/BENCHMARK | 3.8.  | <p>There is a flow of energy and matter in an ecosystem (for example: as modeled in a food chain, web, pyramid, decomposition)</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>   |
| STRAND/BENCHMARK | 3.10. | <p>Chromosomes and genes play a role in heredity (for example, genes control traits, while chromosomes are made up of many 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 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> |
| STRAND/BENCHMARK | 3.11. | <p>Changes in environmental conditions can affect the survival of individual organisms, populations, and entire species</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>   |
| STRAND/BENCHMARK | 3.13. | <p>Individual organisms with certain traits are more likely than others to survive and have 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>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</li> </ul>   |

|                  |       |   |
|------------------|-------|---|
|                  |       | Pedigree to Analyze a Family Trait  |
| STANDARD         | CO.4. | Earth and Space Science: Students know and understand the processes and interactions of Earth's systems and the structure and dynamics of Earth and other objects in space. (Focus: Geology, Meteorology, Astronomy, Oceanography)  |
| STRAND/BENCHMARK | 4.1.  | Inter-relationships exist between minerals, rocks, and soils <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>  |
| STRAND/BENCHMARK | 4.2.  | Humans use renewable and nonrenewable resources (for example: forests and fossil fuels) <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>  |
| STANDARD         | CO.5. | Students understand that the nature of science involves a particular way of building knowledge and making meaning of the natural world.   |
| STRAND/BENCHMARK | 5.2.  | Scientific knowledge changes as new knowledge is acquired and previous ideas are modified (for example: through space exploration) <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 1 Activity 1: Genetically Modified Crops</li> </ul>  |
| STRAND/BENCHMARK | 5.4.  | Models can be used to predict change (for example: computer simulation, video sequence, stream table) <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>   |
| STRAND/BENCHMARK | 5.5.  | There are interrelationships among science, technology and human activity that affect the world <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 5 Activity 1: Diagnosing a Gene Defect</li> <li>• Biotechnology Applications: Unit 3 Lab 6 Activity 1: Modeling DNA</li> </ul> |

|  |  |   |
|--|--|---|
|  |  | <p>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> |
|--|--|---|

**Colorado K-12 Academic Standards**  
**Science**  
**Grade 9**

| STANDARD         | CO. 1. | Students apply the processes of scientific investigation and design, conduct, communicate about, and evaluate such investigations.  |
|------------------|--------|---|
| STRAND/BENCHMARK | 1.1.   | <p>Ask questions and state hypotheses using prior scientific knowledge to help design and guide development and implementation of a scientific 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> |
| STRAND/BENCHMARK | 1.2.   | <p>Select and use appropriate technologies to gather, process, and analyze data and to report information related to an 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</li> </ul>  |

|                  |      |   |
|------------------|------|---|
|                  |      | <p>Simulated Oil Spill</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> <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>   |
| STRAND/BENCHMARK | 1.5. | <p>Construct and revise scientific explanations and models, using evidence, logic, and experiments that include identifying and controlling variables</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 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> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 2: Finding Out Who</li> </ul> |

|                  |       |   |
|------------------|-------|---|
|                  |       | Is at Risk for SARS   |
| STRAND/BENCHMARK | 1.6.  | <p>Communicate and evaluate scientific thinking that leads to particular conclusions</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> |
| STANDARD         | CO.2. | Physical Science: Students know and understand common properties, forms, and changes in matter and energy. (Focus: Physics and Chemistry)   |
| STRAND/BENCHMARK | 2.3.  | <p>There are observable and measurable physical and chemical properties that allow one to compare, contrast, and separate substances (for example: pH, melting point, conductivity, magnetic attraction)</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 2 Activity 1: Making Cheese the Biotech Way</li> </ul>   |
| STANDARD         | CO.3. | Life Science: Students know and understand the characteristics and structure of living things, the processes of life, and how living things interact with each other and their environment. (Focus: Biology-- Anatomy, Physiology, Botany, Zoology, Ecology)  |
| STRAND/BENCHMARK | 3.7.  | <p>There is a cycling of matter (for example: carbon, nitrogen) and the movement and change of energy through the ecosystem (for example: some energy dissipates as heat as it is transferred through a food web)</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</li> </ul>   |

|                  |       |  |
|------------------|-------|--|
|                  |       | <p>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>  |
| STRAND/BENCHMARK | 3.10. | <p>Cell reproduction/division has various processes and purposes (mitosis, meiosis, binary fission)</p> <ul style="list-style-type: none"> <li>• Virtual Laboratory: Preparation and Analysis of a Human Karyotype</li> </ul>  |
| STRAND/BENCHMARK | 3.11. | <p>DNA has a general structure and function and a role in heredity and protein synthesis (for example: replication of DNA and the role of RNA in protein synthesis)</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> |
| STRAND/BENCHMARK | 3.12. | <p>Genes serve as the vehicle for genetic continuity and the source of genetic diversity upon which natural selection can act</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 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>  |
| STRAND/BENCHMARK | 3.13. | <p>Some traits can be inherited while others are due to the interaction of genes and the environment (for example: skin cancer triggered by over- exposure to sunlight or contact with chemical carcinogens)</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</li> </ul>   |

|                  |       |   |
|------------------|-------|---|
|                  |       | <p>History of Baby Mike</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 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>  |
| STRAND/BENCHMARK | 3.18. | <p>Organisms change over time in terms of biological evolution and genetics</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>  |
| STANDARD         | CO.5. | <p>Students understand that the nature of science involves a particular way of building knowledge and making meaning of the natural world.</p>  |
| STRAND/BENCHMARK | 5.3.  | <p>Graphs, equations or other models are used to analyze systems involving change and constancy (for example: comparing the geologic time scale to shorter time frame, exponential growth, a mathematical expression for gas behavior; constructing a closed ecosystem such as an aquarium)</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 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</li> </ul> |

|                  |      |  |
|------------------|------|--|
|                  |      | Second Examination   |
| STRAND/BENCHMARK | 5.5. | <p>Scientific knowledge changes and accumulates over time; usually the changes that take place are small modifications of prior knowledge but major shifts in the scientific view of how the world works do occur</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 1 Activity 1: Genetically Modified Crops</li> </ul>  |
| STRAND/BENCHMARK | 5.6. | <p>Interrelationships among science, technology and human activity lead to further discoveries that impact the world in positive and negative ways</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 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> |

Colorado K-12 Academic Standards

Science

Grade 10

|                  |       |  |
|------------------|-------|--|
| STANDARD         | CO.1. | Students apply the processes of scientific investigation and design, conduct, communicate about, and evaluate such investigations.   |
| STRAND/BENCHMARK | 1.1.  | <p>Ask questions and state hypotheses using prior scientific knowledge to help design and guide development and implementation of a scientific 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> </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> <li>• Virtual Laboratory: Preparation and Analysis of a Human Karyotype</li> </ul>  |
| STRAND/BENCHMARK | 1.2. | <p>Select and use appropriate technologies to gather, process, and analyze data and to report information related to an 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> |
| STRAND/BENCHMARK | 1.5. | <p>Construct and revise scientific explanations and models, using evidence, logic, and experiments that include identifying and controlling variables</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 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> <li>• Biotechnology Applications: Unit 4 Lab 8 Activity 2: Finding Out Who Is at Risk for SARS</li> </ul> |
|--|--|---|

|                  |      |   |
|------------------|------|---|
| STRAND/BENCHMARK | 1.6. | <p>Communicate and evaluate scientific thinking that leads to particular conclusions</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</li> </ul> |
|------------------|------|---|

|                         |              |  |
|-------------------------|--------------|--|
|                         |              | <p>Second Examination</p> <ul style="list-style-type: none"> <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>  |
| <b>STANDARD</b>         | <b>CO.2.</b> | <b>Physical Science: Students know and understand common properties, forms, and changes in matter and energy. (Focus: Physics and Chemistry)</b>   |
| <b>STRAND/BENCHMARK</b> | <b>2.3.</b>  | <p>There are observable and measurable physical and chemical properties that allow one to compare, contrast, and separate substances (for example: pH, melting point, conductivity, magnetic attraction)</p> <ul style="list-style-type: none"> <li>• Biotechnology Applications: Unit 1 Lab 2 Activity 1: Making Cheese the Biotech Way</li> </ul>  |
| <b>STANDARD</b>         | <b>CO.3.</b> | <b>Life Science: Students know and understand the characteristics and structure of living things, the processes of life, and how living things interact with each other and their environment. (Focus: Biology-- Anatomy, Physiology, Botany, Zoology, Ecology)</b>  |
| <b>STRAND/BENCHMARK</b> | <b>3.7.</b>  | <p>There is a cycling of matter (for example: carbon, nitrogen) and the movement and change of energy through the ecosystem (for example: some energy dissipates as heat as it is transferred through a food web)</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>STRAND/BENCHMARK</b> | <b>3.10.</b> | <p>Cell reproduction/division has various processes and purposes (mitosis, meiosis, binary fission)</p> <ul style="list-style-type: none"> <li>• Virtual Laboratory: Preparation and Analysis of a Human Karyotype</li> </ul>  |
| <b>STRAND/BENCHMARK</b> | <b>3.11.</b> | <p>DNA has a general structure and function and a role in heredity and protein synthesis (for example: replication of DNA and the role of RNA in protein synthesis)</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> </ul> |

|                  |       |   |
|------------------|-------|---|
|                  |       | <ul style="list-style-type: none"> <li>• Teacher Resource CD: Biotechnology in Medicine</li> </ul>  |
| STRAND/BENCHMARK | 3.12. | <p>Genes serve as the vehicle for genetic continuity and the source of genetic diversity upon which natural selection can act</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 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>   |
| STRAND/BENCHMARK | 3.13. | <p>Some traits can be inherited while others are due to the interaction of genes and the environment (for example: skin cancer triggered by over- exposure to sunlight or contact with chemical carcinogens)</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 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 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> |
| STRAND/BENCHMARK | 3.18. | <p>Organisms change over time in terms of biological evolution and genetics</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> </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> </ul>   |
| <b>STANDARD</b>         | <b>CO.5.</b> | <b>Students understand that the nature of science involves a particular way of building knowledge and making meaning of the natural world.</b>   |
| <b>STRAND/BENCHMARK</b> | <b>5.3.</b>  | <p>Graphs, equations or other models are used to analyze systems involving change and constancy (for example: comparing the geologic time scale to shorter time frame, exponential growth, a mathematical expression for gas behavior; constructing a closed ecosystem such as an aquarium)</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 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>                       |
| <b>STRAND/BENCHMARK</b> | <b>5.5.</b>  | <p>Scientific knowledge changes and accumulates over time; usually the changes that take place are small modifications of prior knowledge but major shifts in the scientific view of how the world works do occur</p> <ul style="list-style-type: none"> <li>Biotechnology Applications: Unit 1 Lab 1 Activity 1: Genetically Modified Crops</li> </ul>  |
| <b>STRAND/BENCHMARK</b> | <b>5.6.</b>  | <p>Interrelationships among science, technology and human activity lead to further discoveries that impact the world in positive and negative ways</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 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</li> </ul> |

|  |  |                     |
|--|--|---------------------|
|  |  | Is at Risk for SARS |
|--|--|---------------------|

© 2008, EdGate Correlation Services, LLC. All Rights reserved.