

Inquiry Investigations™
Biotechnology Techniques MODULE - 1278357
Grades: 7-10

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Hawaii Content and Performance Standards
Science
Grade 7

CONTENT STANDARD / COURSE	HI.1.	The Scientific Process: Scientific Investigation: Discover, invent, and investigate using the skills necessary to engage in the scientific process
CONTENT STANDARD / PERFORMANCE INDICATOR	SC.7.1.1.	<p>Scientific Inquiry: Design and safely conduct a scientific investigation to answer a question or test a hypothesis</p> <ul style="list-style-type: none"> • Biotechnology Techniques: Unit 1 Lab 1 Activity 1: DNA Structure and Replication • Biotechnology Techniques: Unit 1 Lab 2 Activity 1: Preparing a Plant Tissue for DNA Extraction • Biotechnology Techniques: Unit 1 Lab 2 Activity 2: Extracting Cellular DNA • Biotechnology Techniques: Unit 2 Lab 3 Activity 1: Using Restriction Enzymes to Cut DNA Strands • Biotechnology Techniques: Unit 2 Lab 3 Activity 2: Sorting DNA Using Gel Electrophoresis • Biotechnology Techniques: Unit 2 Lab 4 Activity 1: Determining Molecular Mass and Charge • Biotechnology Techniques: Unit 2 Lab 4 Activity 2: Identifying DNA Fragments • Biotechnology Techniques: Unit 2 Lab 5 Activity 1: Restriction Site Mapping • Biotechnology Techniques: Unit 3 Lab 6 Activity 1: Engineering Recombinant DNA Molecules • Biotechnology Techniques: Unit 3 Lab 7 Activity 1: Turning Genes On and Off • Biotechnology Techniques: Unit 4 Lab 8 Activity 1: Discover How Plasmids Transfer Genes • Biotechnology Techniques: Unit 4 Lab 8 Activity 2: The DNA Chip and Gene Expression • Virtual Laboratory: Restriction Enzyme Cleavage of DNA
CONTENT STANDARD / PERFORMANCE INDICATOR	SC.7.1.3.	<p>Scientific Knowledge: Explain the need to revise conclusions and explanations based on new scientific evidence</p> <ul style="list-style-type: none"> • Biotechnology Techniques: Unit 1 Lab 1 Activity 1: DNA Structure and Replication • Biotechnology Techniques: Unit 1 Lab 2 Activity 1: Preparing a Plant Tissue for DNA Extraction • Biotechnology Techniques: Unit 1 Lab 2 Activity 2: Extracting Cellular DNA • Biotechnology Techniques: Unit 2 Lab 3 Activity 1: Using Restriction Enzymes to Cut DNA Strands • Biotechnology Techniques: Unit 2 Lab 3 Activity 2: Sorting

		<p>DNA Using Gel Electrophoresis</p> <ul style="list-style-type: none"> • Biotechnology Techniques: Unit 2 Lab 4 Activity 1: Determining Molecular Mass and Charge • Biotechnology Techniques: Unit 2 Lab 4 Activity 2: Identifying DNA Fragments • Biotechnology Techniques: Unit 2 Lab 5 Activity 1: Restriction Site Mapping • Biotechnology Techniques: Unit 3 Lab 6 Activity 1: Engineering Recombinant DNA Molecules • Biotechnology Techniques: Unit 3 Lab 7 Activity 1: Turning Genes On and Off • Biotechnology Techniques: Unit 4 Lab 8 Activity 1: Discover How Plasmids Transfer Genes • Biotechnology Techniques: Unit 4 Lab 8 Activity 2: The DNA Chip and Gene Expression • Virtual Laboratory: Restriction Enzyme Cleavage of DNA
CONTENT STANDARD / COURSE	HI.3.	Life and Environmental Sciences: Organisms and The Environment: Understand the unity, diversity, and interrelationships of organisms, including their relationship to cycles of matter and energy in the environment
CONTENT STANDARD / PERFORMANCE INDICATOR	SC.7.3.1.	<p>Cycles of Matter and Energy: Explain how energy moves through food webs, including the roles of photosynthesis and cellular respiration</p> <ul style="list-style-type: none"> • Biotechnology Techniques: Unit 2 Lab 3 Activity 1: Using Restriction Enzymes to Cut DNA Strands • Biotechnology Techniques: Unit 2 Lab 3 Activity 2: Sorting DNA Using Gel Electrophoresis • Biotechnology Techniques: Unit 2 Lab 5 Activity 1: Restriction Site Mapping
CONTENT STANDARD / COURSE	HI.4.	Life and Environmental Sciences: Structure and Function In Organisms: Understand the structures and functions of living organisms and how organisms can be compared scientifically
CONTENT STANDARD / PERFORMANCE INDICATOR	SC.7.4.1.	<p>Cells, Tissues, Organs, and Organ Systems: Describe the cell theory</p> <ul style="list-style-type: none"> • Biotechnology Techniques: Unit 1 Lab 2 Activity 1: Preparing a Plant Tissue for DNA Extraction • Biotechnology Techniques: Unit 1 Lab 2 Activity 2: Extracting Cellular DNA • Biotechnology Techniques: Unit 3 Lab 6 Activity 1: Engineering Recombinant DNA Molecules • Biotechnology Techniques: Unit 4 Lab 8 Activity 1: Discover How Plasmids Transfer Genes • Biotechnology Techniques: Unit 4 Lab 8 Activity 2: The DNA Chip and Gene Expression • Teacher Resource CD: Biotechnology Techniques II - Gene Expression • Teacher Resource CD: Understanding DNA
CONTENT STANDARD / PERFORMANCE INDICATOR	SC.7.4.2.	<p>Cells, Tissues, Organs, and Organ Systems: Describe the basic structure and function of various types of cells</p> <ul style="list-style-type: none"> • Biotechnology Techniques: Unit 1 Lab 2 Activity 1: Preparing a Plant Tissue for DNA Extraction • Biotechnology Techniques: Unit 1 Lab 2 Activity 2: Extracting

		<p>Cellular DNA</p> <ul style="list-style-type: none"> • Biotechnology Techniques: Unit 3 Lab 6 Activity 1: Engineering Recombinant DNA Molecules • Biotechnology Techniques: Unit 4 Lab 8 Activity 1: Discover How Plasmids Transfer Genes • Biotechnology Techniques: Unit 4 Lab 8 Activity 2: The DNA Chip and Gene Expression • Teacher Resource CD: Biotechnology Techniques II - Gene Expression • Teacher Resource CD: Understanding DNA
CONTENT STANDARD / COURSE	HI.5.	Life and Environmental Sciences: Diversity, Genetics, and Evolution: Understand genetics and biological evolution and their impact on the unity and diversity of organisms
CONTENT STANDARD / PERFORMANCE INDICATOR	SC.7.5.2.	<p>Heredity: Describe how an inherited trait can be determined by one or more genes which are found on chromosomes</p> <ul style="list-style-type: none"> • Biotechnology Techniques: Unit 2 Lab 5 Activity 1: Restriction Site Mapping • Biotechnology Techniques: Unit 3 Lab 6 Activity 1: Engineering Recombinant DNA Molecules • Biotechnology Techniques: Unit 3 Lab 7 Activity 1: Turning Genes On and Off • Biotechnology Techniques: Unit 4 Lab 8 Activity 1: Discover How Plasmids Transfer Genes • Biotechnology Techniques: Unit 4 Lab 8 Activity 2: The DNA Chip and Gene Expression • Teacher Resource CD: Biotechnology Techniques I - Gel Electrophoresis • Teacher Resource CD: Biotechnology Techniques II - Gene Expression • Teacher Resource CD: Understanding DNA
CONTENT STANDARD / PERFORMANCE INDICATOR	SC.7.5.3.	<p>Heredity: Explain that small differences between parents and offspring could produce descendants that look very different from their ancestors</p> <ul style="list-style-type: none"> • Biotechnology Techniques: Unit 1 Lab 1 Activity 1: DNA Structure and Replication • Biotechnology Techniques: Unit 1 Lab 2 Activity 1: Preparing a Plant Tissue for DNA Extraction • Biotechnology Techniques: Unit 1 Lab 2 Activity 2: Extracting Cellular DNA • Biotechnology Techniques: Unit 2 Lab 3 Activity 1: Using Restriction Enzymes to Cut DNA Strands • Biotechnology Techniques: Unit 2 Lab 3 Activity 2: Sorting DNA Using Gel Electrophoresis • Biotechnology Techniques: Unit 2 Lab 4 Activity 1: Determining Molecular Mass and Charge • Biotechnology Techniques: Unit 2 Lab 4 Activity 2: Identifying DNA Fragments • Biotechnology Techniques: Unit 2 Lab 5 Activity 1: Restriction Site Mapping • Biotechnology Techniques: Unit 3 Lab 6 Activity 1: Engineering Recombinant DNA Molecules • Biotechnology Techniques: Unit 3 Lab 7 Activity 1: Turning Genes On and Off

		<ul style="list-style-type: none"> • Biotechnology Techniques: Unit 4 Lab 8 Activity 1: Discover How Plasmids Transfer Genes • Biotechnology Techniques: Unit 4 Lab 8 Activity 2: The DNA Chip and Gene Expression • Teacher Resource CD: Biotechnology Techniques II - Gene Expression • Teacher Resource CD: Understanding DNA
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**Hawaii Content and Performance Standards
Science
Grade 8**

CONTENT STANDARD / COURSE	HI.1.	The Scientific Process: Scientific Investigation: Discover, invent, and investigate using the skills necessary to engage in the scientific process
CONTENT STANDARD / PERFORMANCE INDICATOR	SC.8.1.1.	<p>Scientific Inquiry: Determine the link(s) between evidence and the conclusion(s) of an investigation</p> <ul style="list-style-type: none"> • Biotechnology Techniques: Unit 1 Lab 1 Activity 1: DNA Structure and Replication • Biotechnology Techniques: Unit 1 Lab 2 Activity 1: Preparing a Plant Tissue for DNA Extraction • Biotechnology Techniques: Unit 1 Lab 2 Activity 2: Extracting Cellular DNA • Biotechnology Techniques: Unit 2 Lab 3 Activity 1: Using Restriction Enzymes to Cut DNA Strands • Biotechnology Techniques: Unit 2 Lab 3 Activity 2: Sorting DNA Using Gel Electrophoresis • Biotechnology Techniques: Unit 2 Lab 4 Activity 1: Determining Molecular Mass and Charge • Biotechnology Techniques: Unit 2 Lab 4 Activity 2: Identifying DNA Fragments • Biotechnology Techniques: Unit 2 Lab 5 Activity 1: Restriction Site Mapping • Biotechnology Techniques: Unit 3 Lab 6 Activity 1: Engineering Recombinant DNA Molecules • Biotechnology Techniques: Unit 3 Lab 7 Activity 1: Turning Genes On and Off • Biotechnology Techniques: Unit 4 Lab 8 Activity 1: Discover How Plasmids Transfer Genes • Biotechnology Techniques: Unit 4 Lab 8 Activity 2: The DNA Chip and Gene Expression • Virtual Laboratory: Restriction Enzyme Cleavage of DNA
CONTENT STANDARD / PERFORMANCE INDICATOR	SC.8.1.2.	<p>Scientific Inquiry: Communicate the significant components of the experimental design and results of a scientific investigation</p> <ul style="list-style-type: none"> • Biotechnology Techniques: Unit 1 Lab 1 Activity 1: DNA Structure and Replication • Biotechnology Techniques: Unit 1 Lab 2 Activity 1: Preparing a Plant Tissue for DNA Extraction • Biotechnology Techniques: Unit 1 Lab 2 Activity 2: Extracting Cellular DNA • Biotechnology Techniques: Unit 2 Lab 3 Activity 1: Using Restriction Enzymes to Cut DNA Strands • Biotechnology Techniques: Unit 2 Lab 3 Activity 2: Sorting DNA Using Gel Electrophoresis

		<ul style="list-style-type: none"> • Biotechnology Techniques: Unit 2 Lab 4 Activity 1: Determining Molecular Mass and Charge • Biotechnology Techniques: Unit 2 Lab 4 Activity 2: Identifying DNA Fragments • Biotechnology Techniques: Unit 2 Lab 5 Activity 1: Restriction Site Mapping • Biotechnology Techniques: Unit 3 Lab 6 Activity 1: Engineering Recombinant DNA Molecules • Biotechnology Techniques: Unit 3 Lab 7 Activity 1: Turning Genes On and Off • Biotechnology Techniques: Unit 4 Lab 8 Activity 1: Discover How Plasmids Transfer Genes • Biotechnology Techniques: Unit 4 Lab 8 Activity 2: The DNA Chip and Gene Expression
CONTENT STANDARD / COURSE	HI.2.	The Scientific Process: Nature Of Science: Understand that science, technology, and society are interrelated
CONTENT STANDARD / PERFORMANCE INDICATOR	SC.8.2.1.	<p>Science, Technology, and Society: Describe significant relationships among society, science, and technology and how one impacts the other</p> <ul style="list-style-type: none"> • Biotechnology Techniques: Unit 1 Lab 2 Activity 2: Extracting Cellular DNA • Biotechnology Techniques: Unit 2 Lab 3 Activity 1: Using Restriction Enzymes to Cut DNA Strands • Biotechnology Techniques: Unit 2 Lab 3 Activity 2: Sorting DNA Using Gel Electrophoresis • Biotechnology Techniques: Unit 2 Lab 4 Activity 1: Determining Molecular Mass and Charge • Biotechnology Techniques: Unit 2 Lab 4 Activity 2: Identifying DNA Fragments • Biotechnology Techniques: Unit 2 Lab 5 Activity 1: Restriction Site Mapping • Biotechnology Techniques: Unit 3 Lab 6 Activity 1: Engineering Recombinant DNA Molecules • Biotechnology Techniques: Unit 3 Lab 7 Activity 1: Turning Genes On and Off • Biotechnology Techniques: Unit 4 Lab 8 Activity 1: Discover How Plasmids Transfer Genes • Biotechnology Techniques: Unit 4 Lab 8 Activity 2: The DNA Chip and Gene Expression • Teacher Resource CD: Biotechnology Techniques I - Gel Electrophoresis • Teacher Resource CD: Biotechnology Techniques II - Gene Expression
CONTENT STANDARD / PERFORMANCE INDICATOR	SC.8.2.2.	<p>Unifying Concepts and Themes: Describe how scale and mathematical models can be used to support and explain scientific data</p> <ul style="list-style-type: none"> • Biotechnology Techniques: Unit 2 Lab 4 Activity 2: Identifying DNA Fragments • Biotechnology Techniques: Unit 2 Lab 5 Activity 1: Restriction Site Mapping
CONTENT STANDARD / COURSE	HI.3.	Life and Environmental Sciences: Organisms and The Environment: Understand the unity, diversity, and interrelationships of organisms, including their relationship to cycles of matter and energy in the

		environment <ul style="list-style-type: none"> • Biotechnology Techniques: Unit 2 Lab 3 Activity 1: Using Restriction Enzymes to Cut DNA Strands • Biotechnology Techniques: Unit 2 Lab 3 Activity 2: Sorting DNA Using Gel Electrophoresis • Biotechnology Techniques: Unit 2 Lab 5 Activity 1: Restriction Site Mapping
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**Hawaii Content and Performance Standards
Science
Grade 9**

CONTENT STANDARD / COURSE	HI.2.	Physical Science: The Scientific Process: Nature Of Science: Understand that science, technology, and society are interrelated
CONTENT STANDARD / PERFORMANCE INDICATOR	SC.PS.2.1.	Science, Technology, and Society: Explain how scientific advancements and emerging technologies have influenced society <ul style="list-style-type: none"> • Teacher Resource CD: Biotechnology Techniques I - Gel Electrophoresis • Teacher Resource CD: Biotechnology Techniques II - Gene Expression
CONTENT STANDARD / PERFORMANCE INDICATOR	SC.PS.2.2.	Science, Technology, and Society: Compare the risks and benefits of potential solutions to technological issues <ul style="list-style-type: none"> • Teacher Resource CD: Biotechnology Techniques I - Gel Electrophoresis • Teacher Resource CD: Biotechnology Techniques II - Gene Expression
CONTENT STANDARD / COURSE	HI.3.	Physical Science: Life and Environmental Sciences: Organisms and The Environment: Understand the unity, diversity, and interrelationships of organisms, including their relationship to cycles of matter and energy in the environment <ul style="list-style-type: none"> • Biotechnology Techniques: Unit 2 Lab 3 Activity 1: Using Restriction Enzymes to Cut DNA Strands • Biotechnology Techniques: Unit 2 Lab 3 Activity 2: Sorting DNA Using Gel Electrophoresis • Biotechnology Techniques: Unit 2 Lab 5 Activity 1: Restriction Site Mapping
CONTENT STANDARD / COURSE	HI.1.	Biological Science: The Scientific Process: Scientific Investigation: Discover, invent, and investigate using the skills necessary to engage in the scientific process
CONTENT STANDARD / PERFORMANCE INDICATOR	SC.BS.1.2.	Scientific Inquiry: Design and safely implement an experiment, including the appropriate use of tools and techniques to organize, analyze, and validate data <ul style="list-style-type: none"> • Biotechnology Techniques: Unit 1 Lab 1 Activity 1: DNA Structure and Replication • Biotechnology Techniques: Unit 1 Lab 2 Activity 1: Preparing a Plant Tissue for DNA Extraction • Biotechnology Techniques: Unit 1 Lab 2 Activity 2: Extracting Cellular DNA

		<ul style="list-style-type: none"> • Biotechnology Techniques: Unit 2 Lab 3 Activity 1: Using Restriction Enzymes to Cut DNA Strands • Biotechnology Techniques: Unit 2 Lab 3 Activity 2: Sorting DNA Using Gel Electrophoresis • Biotechnology Techniques: Unit 2 Lab 4 Activity 2: Identifying DNA Fragments • Biotechnology Techniques: Unit 2 Lab 5 Activity 1: Restriction Site Mapping • Biotechnology Techniques: Unit 3 Lab 6 Activity 1: Engineering Recombinant DNA Molecules • Biotechnology Techniques: Unit 3 Lab 7 Activity 1: Turning Genes On and Off • Biotechnology Techniques: Unit 4 Lab 8 Activity 1: Discover How Plasmids Transfer Genes
<p>CONTENT STANDARD / PERFORMANCE INDICATOR</p>	<p>SC.BS.1.4.</p>	<p>Scientific Inquiry: Determine the connection(s) among hypotheses, scientific evidence, and conclusions</p> <ul style="list-style-type: none"> • Biotechnology Techniques: Unit 1 Lab 1 Activity 1: DNA Structure and Replication • Biotechnology Techniques: Unit 1 Lab 2 Activity 1: Preparing a Plant Tissue for DNA Extraction • Biotechnology Techniques: Unit 1 Lab 2 Activity 2: Extracting Cellular DNA • Biotechnology Techniques: Unit 2 Lab 3 Activity 1: Using Restriction Enzymes to Cut DNA Strands • Biotechnology Techniques: Unit 2 Lab 3 Activity 2: Sorting DNA Using Gel Electrophoresis • Biotechnology Techniques: Unit 2 Lab 4 Activity 1: Determining Molecular Mass and Charge • Biotechnology Techniques: Unit 2 Lab 4 Activity 2: Identifying DNA Fragments • Biotechnology Techniques: Unit 2 Lab 5 Activity 1: Restriction Site Mapping • Biotechnology Techniques: Unit 3 Lab 6 Activity 1: Engineering Recombinant DNA Molecules • Biotechnology Techniques: Unit 3 Lab 7 Activity 1: Turning Genes On and Off • Biotechnology Techniques: Unit 4 Lab 8 Activity 1: Discover How Plasmids Transfer Genes • Biotechnology Techniques: Unit 4 Lab 8 Activity 2: The DNA Chip and Gene Expression • Virtual Laboratory: Restriction Enzyme Cleavage of DNA
<p>CONTENT STANDARD / PERFORMANCE INDICATOR</p>	<p>SC.BS.1.5.</p>	<p>Scientific Inquiry: Communicate the components of a scientific investigation, using appropriate techniques</p> <ul style="list-style-type: none"> • Biotechnology Techniques: Unit 1 Lab 1 Activity 1: DNA Structure and Replication • Biotechnology Techniques: Unit 1 Lab 2 Activity 1: Preparing a Plant Tissue for DNA Extraction • Biotechnology Techniques: Unit 1 Lab 2 Activity 2: Extracting Cellular DNA • Biotechnology Techniques: Unit 2 Lab 3 Activity 1: Using Restriction Enzymes to Cut DNA Strands • Biotechnology Techniques: Unit 2 Lab 3 Activity 2: Sorting

		<p>DNA Using Gel Electrophoresis</p> <ul style="list-style-type: none"> • Biotechnology Techniques: Unit 2 Lab 4 Activity 1: Determining Molecular Mass and Charge • Biotechnology Techniques: Unit 2 Lab 4 Activity 2: Identifying DNA Fragments • Biotechnology Techniques: Unit 2 Lab 5 Activity 1: Restriction Site Mapping • Biotechnology Techniques: Unit 3 Lab 6 Activity 1: Engineering Recombinant DNA Molecules • Biotechnology Techniques: Unit 3 Lab 7 Activity 1: Turning Genes On and Off • Biotechnology Techniques: Unit 4 Lab 8 Activity 1: Discover How Plasmids Transfer Genes • Biotechnology Techniques: Unit 4 Lab 8 Activity 2: The DNA Chip and Gene Expression
CONTENT STANDARD / PERFORMANCE INDICATOR	SC.BS.1.7.	<p>Scientific Knowledge: Revise, as needed, conclusions and explanations based on new evidence</p> <ul style="list-style-type: none"> • Biotechnology Techniques: Unit 1 Lab 1 Activity 1: DNA Structure and Replication • Biotechnology Techniques: Unit 1 Lab 2 Activity 1: Preparing a Plant Tissue for DNA Extraction • Biotechnology Techniques: Unit 1 Lab 2 Activity 2: Extracting Cellular DNA • Biotechnology Techniques: Unit 2 Lab 3 Activity 1: Using Restriction Enzymes to Cut DNA Strands • Biotechnology Techniques: Unit 2 Lab 3 Activity 2: Sorting DNA Using Gel Electrophoresis • Biotechnology Techniques: Unit 2 Lab 4 Activity 1: Determining Molecular Mass and Charge • Biotechnology Techniques: Unit 2 Lab 4 Activity 2: Identifying DNA Fragments • Biotechnology Techniques: Unit 2 Lab 5 Activity 1: Restriction Site Mapping • Biotechnology Techniques: Unit 3 Lab 6 Activity 1: Engineering Recombinant DNA Molecules • Biotechnology Techniques: Unit 3 Lab 7 Activity 1: Turning Genes On and Off • Biotechnology Techniques: Unit 4 Lab 8 Activity 1: Discover How Plasmids Transfer Genes • Biotechnology Techniques: Unit 4 Lab 8 Activity 2: The DNA Chip and Gene Expression • Virtual Laboratory: Restriction Enzyme Cleavage of DNA
CONTENT STANDARD / PERFORMANCE INDICATOR	SC.BS.1.8.	<p>Scientific Knowledge: Describe the importance of ethics and integrity in scientific investigation</p> <ul style="list-style-type: none"> • Teacher Resource CD: Biotechnology Techniques II - Gene Expression
CONTENT STANDARD / COURSE	HI.2.	<p>Biological Science: The Scientific Process: Nature Of Science: Understand that science, technology, and society are interrelated</p>
CONTENT STANDARD / PERFORMANCE INDICATOR	SC.BS.2.1.	<p>Science, Technology, and Society: Explain how scientific advancements and emerging technology have influenced society</p>

		<ul style="list-style-type: none"> Teacher Resource CD: Biotechnology Techniques I - Gel Electrophoresis Teacher Resource CD: Biotechnology Techniques II - Gene Expression
CONTENT STANDARD / PERFORMANCE INDICATOR	SC.BS.2.2.	<p>Science, Technology, and Society: Compare the risks and benefits of potential solutions to technological issues</p> <ul style="list-style-type: none"> Teacher Resource CD: Biotechnology Techniques I - Gel Electrophoresis Teacher Resource CD: Biotechnology Techniques II - Gene Expression
CONTENT STANDARD / COURSE	HI.3.	<p>Biological Science: Life and Environmental Sciences: Organisms and The Environment: Understand the unity, diversity, and interrelationships of organisms, including their relationship to cycles of matter and energy in the environment</p>
CONTENT STANDARD / PERFORMANCE INDICATOR	SC.BS.3.3.	<p>Cycles of Matter and Energy: Explain how matter and energy flow through living systems and the physical environment</p> <ul style="list-style-type: none"> Biotechnology Techniques: Unit 2 Lab 3 Activity 1: Using Restriction Enzymes to Cut DNA Strands Biotechnology Techniques: Unit 2 Lab 3 Activity 2: Sorting DNA Using Gel Electrophoresis Biotechnology Techniques: Unit 2 Lab 5 Activity 1: Restriction Site Mapping
CONTENT STANDARD / COURSE	HI.4.	<p>Biological Science: Life and Environmental Sciences: Structure and Function In Organisms: Understand the structures and functions of living organisms and how organisms can be compared scientifically</p>
CONTENT STANDARD / PERFORMANCE INDICATOR	SC.BS.4.1.	<p>Cells, Tissues, Organs, and Organ Systems: Describe different cell parts and their functions</p> <ul style="list-style-type: none"> Biotechnology Techniques: Unit 1 Lab 2 Activity 1: Preparing a Plant Tissue for DNA Extraction Biotechnology Techniques: Unit 1 Lab 2 Activity 2: Extracting Cellular DNA Biotechnology Techniques: Unit 3 Lab 6 Activity 1: Engineering Recombinant DNA Molecules Biotechnology Techniques: Unit 4 Lab 8 Activity 1: Discover How Plasmids Transfer Genes Biotechnology Techniques: Unit 4 Lab 8 Activity 2: The DNA Chip and Gene Expression Teacher Resource CD: Biotechnology Techniques II - Gene Expression Teacher Resource CD: Understanding DNA
CONTENT STANDARD / PERFORMANCE INDICATOR	SC.BS.4.3.	<p>Cells, Tissues, Organs, and Organ Systems: Differentiate between the processes of mitosis and meiosis</p> <ul style="list-style-type: none"> Biotechnology Techniques: Unit 4 Lab 8 Activity 2: The DNA Chip and Gene Expression
CONTENT STANDARD / PERFORMANCE	SC.BS.4.5.	<p>Cells, Tissues, Organs, and Organ Systems: Describe the components and</p>

INDICATOR		<p>functions of a variety of macromolecules active in biological systems</p> <ul style="list-style-type: none"> • Teacher Resource CD: Biotechnology Techniques II - Gene Expression • Teacher Resource CD: Understanding DNA
CONTENT STANDARD / COURSE	HI.5.	Biological Science: Life and Environmental Sciences: Diversity, Genetics, and Evolution: Understand genetics and biological evolution and their impact on the unity and diversity of organisms
CONTENT STANDARD / PERFORMANCE INDICATOR	SC.BS.5.3.	<p>Unity and Diversity: Explain the structural properties of DNA and the role of DNA in heredity and protein synthesis</p> <ul style="list-style-type: none"> • Biotechnology Techniques: Unit 1 Lab 1 Activity 1: DNA Structure and Replication • Biotechnology Techniques: Unit 1 Lab 2 Activity 1: Preparing a Plant Tissue for DNA Extraction • Biotechnology Techniques: Unit 1 Lab 2 Activity 2: Extracting Cellular DNA • Biotechnology Techniques: Unit 2 Lab 3 Activity 1: Using Restriction Enzymes to Cut DNA Strands • Biotechnology Techniques: Unit 2 Lab 3 Activity 2: Sorting DNA Using Gel Electrophoresis • Biotechnology Techniques: Unit 2 Lab 4 Activity 1: Determining Molecular Mass and Charge • Biotechnology Techniques: Unit 2 Lab 4 Activity 2: Identifying DNA Fragments • Biotechnology Techniques: Unit 2 Lab 5 Activity 1: Restriction Site Mapping • Biotechnology Techniques: Unit 3 Lab 6 Activity 1: Engineering Recombinant DNA Molecules • Biotechnology Techniques: Unit 3 Lab 7 Activity 1: Turning Genes On and Off • Biotechnology Techniques: Unit 4 Lab 8 Activity 1: Discover How Plasmids Transfer Genes • Biotechnology Techniques: Unit 4 Lab 8 Activity 2: The DNA Chip and Gene Expression • Teacher Resource CD: Biotechnology Techniques I - Gel Electrophoresis • Teacher Resource CD: Biotechnology Techniques II - Gene Expression • Teacher Resource CD: Understanding DNA
CONTENT STANDARD / PERFORMANCE INDICATOR	SC.BS.5.4.	<p>Unity and Diversity: Explain how Mendel's laws of heredity can be used to determine the traits of possible offspring</p> <ul style="list-style-type: none"> • Teacher Resource CD: Understanding DNA
CONTENT STANDARD / COURSE	HI.2.	Earth Space Science: The Scientific Process: Nature Of Science: Understand that science, technology, and society are interrelated
CONTENT STANDARD / PERFORMANCE INDICATOR	SC.ES.2.1.	<p>Science, Technology, and Society: Explain how scientific advancements and emerging technology have influenced society</p> <ul style="list-style-type: none"> • Teacher Resource CD: Biotechnology Techniques I - Gel Electrophoresis • Teacher Resource CD: Biotechnology Techniques II - Gene

		Expression
CONTENT STANDARD / PERFORMANCE INDICATOR	SC.ES.2.2.	Science, Technology, and Society: Compare the risks and benefits of potential solutions to technological issues <ul style="list-style-type: none"> • Teacher Resource CD: Biotechnology Techniques I - Gel Electrophoresis • Teacher Resource CD: Biotechnology Techniques II - Gene Expression
CONTENT STANDARD / PERFORMANCE INDICATOR	SC.ES.2.4.	Science, Technology, and Society: Describe technologies used to collect information about the universe <ul style="list-style-type: none"> • Biotechnology Techniques: Unit 2 Lab 4 Activity 1: Determining Molecular Mass and Charge • Biotechnology Techniques: Unit 2 Lab 4 Activity 2: Identifying DNA Fragments
CONTENT STANDARD / COURSE	HI.3.	Earth Space Science: Life and Environmental Sciences: Organisms and The Environment: Understand the unity, diversity, and interrelationships of organisms, including their relationship to cycles of matter and energy in the environment <ul style="list-style-type: none"> • Biotechnology Techniques: Unit 2 Lab 3 Activity 1: Using Restriction Enzymes to Cut DNA Strands • Biotechnology Techniques: Unit 2 Lab 3 Activity 2: Sorting DNA Using Gel Electrophoresis • Biotechnology Techniques: Unit 2 Lab 5 Activity 1: Restriction Site Mapping

Hawaii Content and Performance Standards

Science

Grade 10

CONTENT STANDARD / COURSE	HI.2.	Physical Science: The Scientific Process: Nature Of Science: Understand that science, technology, and society are interrelated
CONTENT STANDARD / PERFORMANCE INDICATOR	SC.PS.2.1.	Science, Technology, and Society: Explain how scientific advancements and emerging technologies have influenced society <ul style="list-style-type: none"> • Teacher Resource CD: Biotechnology Techniques I - Gel Electrophoresis • Teacher Resource CD: Biotechnology Techniques II - Gene Expression
CONTENT STANDARD / PERFORMANCE INDICATOR	SC.PS.2.2.	Science, Technology, and Society: Compare the risks and benefits of potential solutions to technological issues <ul style="list-style-type: none"> • Teacher Resource CD: Biotechnology Techniques I - Gel Electrophoresis • Teacher Resource CD: Biotechnology Techniques II - Gene Expression
CONTENT STANDARD / COURSE	HI.3.	Physical Science: Life and Environmental Sciences: Organisms and The Environment: Understand the unity, diversity, and interrelationships of organisms, including their relationship to cycles of matter and energy in

		<p>the environment</p> <ul style="list-style-type: none"> • Biotechnology Techniques: Unit 2 Lab 3 Activity 1: Using Restriction Enzymes to Cut DNA Strands • Biotechnology Techniques: Unit 2 Lab 3 Activity 2: Sorting DNA Using Gel Electrophoresis • Biotechnology Techniques: Unit 2 Lab 5 Activity 1: Restriction Site Mapping
CONTENT STANDARD / COURSE	HI.1.	Biological Science: The Scientific Process: Scientific Investigation: Discover, invent, and investigate using the skills necessary to engage in the scientific process
CONTENT STANDARD / PERFORMANCE INDICATOR	SC.BS.1.2.	<p>Scientific Inquiry: Design and safely implement an experiment, including the appropriate use of tools and techniques to organize, analyze, and validate data</p> <ul style="list-style-type: none"> • Biotechnology Techniques: Unit 1 Lab 1 Activity 1: DNA Structure and Replication • Biotechnology Techniques: Unit 1 Lab 2 Activity 1: Preparing a Plant Tissue for DNA Extraction • Biotechnology Techniques: Unit 1 Lab 2 Activity 2: Extracting Cellular DNA • Biotechnology Techniques: Unit 2 Lab 3 Activity 1: Using Restriction Enzymes to Cut DNA Strands • Biotechnology Techniques: Unit 2 Lab 3 Activity 2: Sorting DNA Using Gel Electrophoresis • Biotechnology Techniques: Unit 2 Lab 4 Activity 2: Identifying DNA Fragments • Biotechnology Techniques: Unit 2 Lab 5 Activity 1: Restriction Site Mapping • Biotechnology Techniques: Unit 3 Lab 6 Activity 1: Engineering Recombinant DNA Molecules • Biotechnology Techniques: Unit 3 Lab 7 Activity 1: Turning Genes On and Off • Biotechnology Techniques: Unit 4 Lab 8 Activity 1: Discover How Plasmids Transfer Genes
CONTENT STANDARD / PERFORMANCE INDICATOR	SC.BS.1.4.	<p>Scientific Inquiry: Determine the connection(s) among hypotheses, scientific evidence, and conclusions</p> <ul style="list-style-type: none"> • Biotechnology Techniques: Unit 1 Lab 1 Activity 1: DNA Structure and Replication • Biotechnology Techniques: Unit 1 Lab 2 Activity 1: Preparing a Plant Tissue for DNA Extraction • Biotechnology Techniques: Unit 1 Lab 2 Activity 2: Extracting Cellular DNA • Biotechnology Techniques: Unit 2 Lab 3 Activity 1: Using Restriction Enzymes to Cut DNA Strands • Biotechnology Techniques: Unit 2 Lab 3 Activity 2: Sorting DNA Using Gel Electrophoresis • Biotechnology Techniques: Unit 2 Lab 4 Activity 1: Determining Molecular Mass and Charge • Biotechnology Techniques: Unit 2 Lab 4 Activity 2: Identifying DNA Fragments • Biotechnology Techniques: Unit 2 Lab 5 Activity 1: Restriction Site Mapping

		<ul style="list-style-type: none"> • Biotechnology Techniques: Unit 3 Lab 6 Activity 1: Engineering Recombinant DNA Molecules • Biotechnology Techniques: Unit 3 Lab 7 Activity 1: Turning Genes On and Off • Biotechnology Techniques: Unit 4 Lab 8 Activity 1: Discover How Plasmids Transfer Genes • Biotechnology Techniques: Unit 4 Lab 8 Activity 2: The DNA Chip and Gene Expression • Virtual Laboratory: Restriction Enzyme Cleavage of DNA
<p>CONTENT STANDARD / PERFORMANCE INDICATOR</p>	<p>SC.BS.1.5.</p>	<p>Scientific Inquiry: Communicate the components of a scientific investigation, using appropriate techniques</p> <ul style="list-style-type: none"> • Biotechnology Techniques: Unit 1 Lab 1 Activity 1: DNA Structure and Replication • Biotechnology Techniques: Unit 1 Lab 2 Activity 1: Preparing a Plant Tissue for DNA Extraction • Biotechnology Techniques: Unit 1 Lab 2 Activity 2: Extracting Cellular DNA • Biotechnology Techniques: Unit 2 Lab 3 Activity 1: Using Restriction Enzymes to Cut DNA Strands • Biotechnology Techniques: Unit 2 Lab 3 Activity 2: Sorting DNA Using Gel Electrophoresis • Biotechnology Techniques: Unit 2 Lab 4 Activity 1: Determining Molecular Mass and Charge • Biotechnology Techniques: Unit 2 Lab 4 Activity 2: Identifying DNA Fragments • Biotechnology Techniques: Unit 2 Lab 5 Activity 1: Restriction Site Mapping • Biotechnology Techniques: Unit 3 Lab 6 Activity 1: Engineering Recombinant DNA Molecules • Biotechnology Techniques: Unit 3 Lab 7 Activity 1: Turning Genes On and Off • Biotechnology Techniques: Unit 4 Lab 8 Activity 1: Discover How Plasmids Transfer Genes • Biotechnology Techniques: Unit 4 Lab 8 Activity 2: The DNA Chip and Gene Expression
<p>CONTENT STANDARD / PERFORMANCE INDICATOR</p>	<p>SC.BS.1.7.</p>	<p>Scientific Knowledge: Revise, as needed, conclusions and explanations based on new evidence</p> <ul style="list-style-type: none"> • Biotechnology Techniques: Unit 1 Lab 1 Activity 1: DNA Structure and Replication • Biotechnology Techniques: Unit 1 Lab 2 Activity 1: Preparing a Plant Tissue for DNA Extraction • Biotechnology Techniques: Unit 1 Lab 2 Activity 2: Extracting Cellular DNA • Biotechnology Techniques: Unit 2 Lab 3 Activity 1: Using Restriction Enzymes to Cut DNA Strands • Biotechnology Techniques: Unit 2 Lab 3 Activity 2: Sorting DNA Using Gel Electrophoresis • Biotechnology Techniques: Unit 2 Lab 4 Activity 1: Determining Molecular Mass and Charge • Biotechnology Techniques: Unit 2 Lab 4 Activity 2: Identifying DNA Fragments • Biotechnology Techniques: Unit 2 Lab 5 Activity 1: Restriction

		<p>Site Mapping</p> <ul style="list-style-type: none"> • Biotechnology Techniques: Unit 3 Lab 6 Activity 1: Engineering Recombinant DNA Molecules • Biotechnology Techniques: Unit 3 Lab 7 Activity 1: Turning Genes On and Off • Biotechnology Techniques: Unit 4 Lab 8 Activity 1: Discover How Plasmids Transfer Genes • Biotechnology Techniques: Unit 4 Lab 8 Activity 2: The DNA Chip and Gene Expression • Virtual Laboratory: Restriction Enzyme Cleavage of DNA
CONTENT STANDARD / PERFORMANCE INDICATOR	SC.BS.1.8.	<p>Scientific Knowledge: Describe the importance of ethics and integrity in scientific investigation</p> <ul style="list-style-type: none"> • Teacher Resource CD: Biotechnology Techniques II - Gene Expression
CONTENT STANDARD / COURSE	HI.2.	<p>Biological Science: The Scientific Process: Nature Of Science: Understand that science, technology, and society are interrelated</p>
CONTENT STANDARD / PERFORMANCE INDICATOR	SC.BS.2.1.	<p>Science, Technology, and Society: Explain how scientific advancements and emerging technology have influenced society</p> <ul style="list-style-type: none"> • Teacher Resource CD: Biotechnology Techniques I - Gel Electrophoresis • Teacher Resource CD: Biotechnology Techniques II - Gene Expression
CONTENT STANDARD / PERFORMANCE INDICATOR	SC.BS.2.2.	<p>Science, Technology, and Society: Compare the risks and benefits of potential solutions to technological issues</p> <ul style="list-style-type: none"> • Teacher Resource CD: Biotechnology Techniques I - Gel Electrophoresis • Teacher Resource CD: Biotechnology Techniques II - Gene Expression
CONTENT STANDARD / COURSE	HI.3.	<p>Biological Science: Life and Environmental Sciences: Organisms and The Environment: Understand the unity, diversity, and interrelationships of organisms, including their relationship to cycles of matter and energy in the environment</p>
CONTENT STANDARD / PERFORMANCE INDICATOR	SC.BS.3.3.	<p>Cycles of Matter and Energy: Explain how matter and energy flow through living systems and the physical environment</p> <ul style="list-style-type: none"> • Biotechnology Techniques: Unit 2 Lab 3 Activity 1: Using Restriction Enzymes to Cut DNA Strands • Biotechnology Techniques: Unit 2 Lab 3 Activity 2: Sorting DNA Using Gel Electrophoresis • Biotechnology Techniques: Unit 2 Lab 5 Activity 1: Restriction Site Mapping
CONTENT STANDARD / COURSE	HI.4.	<p>Biological Science: Life and Environmental Sciences: Structure and Function In Organisms: Understand the structures and functions of living organisms and how organisms can be compared scientifically</p>
CONTENT STANDARD / PERFORMANCE INDICATOR	SC.BS.4.1.	<p>Cells, Tissues, Organs, and Organ Systems: Describe different cell parts and their functions</p>

		<ul style="list-style-type: none"> • Biotechnology Techniques: Unit 1 Lab 2 Activity 1: Preparing a Plant Tissue for DNA Extraction • Biotechnology Techniques: Unit 1 Lab 2 Activity 2: Extracting Cellular DNA • Biotechnology Techniques: Unit 3 Lab 6 Activity 1: Engineering Recombinant DNA Molecules • Biotechnology Techniques: Unit 4 Lab 8 Activity 1: Discover How Plasmids Transfer Genes • Biotechnology Techniques: Unit 4 Lab 8 Activity 2: The DNA Chip and Gene Expression • Teacher Resource CD: Biotechnology Techniques II - Gene Expression • Teacher Resource CD: Understanding DNA
CONTENT STANDARD / PERFORMANCE INDICATOR	SC.BS.4.3.	<p>Cells, Tissues, Organs, and Organ Systems: Differentiate between the processes of mitosis and meiosis</p> <ul style="list-style-type: none"> • Biotechnology Techniques: Unit 4 Lab 8 Activity 2: The DNA Chip and Gene Expression
CONTENT STANDARD / PERFORMANCE INDICATOR	SC.BS.4.5.	<p>Cells, Tissues, Organs, and Organ Systems: Describe the components and functions of a variety of macromolecules active in biological systems</p> <ul style="list-style-type: none"> • Teacher Resource CD: Biotechnology Techniques II - Gene Expression • Teacher Resource CD: Understanding DNA
CONTENT STANDARD / COURSE	HI.5.	<p>Biological Science: Life and Environmental Sciences: Diversity, Genetics, and Evolution: Understand genetics and biological evolution and their impact on the unity and diversity of organisms</p>
CONTENT STANDARD / PERFORMANCE INDICATOR	SC.BS.5.3.	<p>Unity and Diversity: Explain the structural properties of DNA and the role of DNA in heredity and protein synthesis</p> <ul style="list-style-type: none"> • Biotechnology Techniques: Unit 1 Lab 1 Activity 1: DNA Structure and Replication • Biotechnology Techniques: Unit 1 Lab 2 Activity 1: Preparing a Plant Tissue for DNA Extraction • Biotechnology Techniques: Unit 1 Lab 2 Activity 2: Extracting Cellular DNA • Biotechnology Techniques: Unit 2 Lab 3 Activity 1: Using Restriction Enzymes to Cut DNA Strands • Biotechnology Techniques: Unit 2 Lab 3 Activity 2: Sorting DNA Using Gel Electrophoresis • Biotechnology Techniques: Unit 2 Lab 4 Activity 1: Determining Molecular Mass and Charge • Biotechnology Techniques: Unit 2 Lab 4 Activity 2: Identifying DNA Fragments • Biotechnology Techniques: Unit 2 Lab 5 Activity 1: Restriction Site Mapping • Biotechnology Techniques: Unit 3 Lab 6 Activity 1: Engineering Recombinant DNA Molecules • Biotechnology Techniques: Unit 3 Lab 7 Activity 1: Turning Genes On and Off • Biotechnology Techniques: Unit 4 Lab 8 Activity 1: Discover How Plasmids Transfer Genes

		<ul style="list-style-type: none"> • Biotechnology Techniques: Unit 4 Lab 8 Activity 2: The DNA Chip and Gene Expression • Teacher Resource CD: Biotechnology Techniques I - Gel Electrophoresis • Teacher Resource CD: Biotechnology Techniques II - Gene Expression • Teacher Resource CD: Understanding DNA
CONTENT STANDARD / PERFORMANCE INDICATOR	SC.BS.5.4.	<p>Unity and Diversity: Explain how Mendel's laws of heredity can be used to determine the traits of possible offspring</p> <ul style="list-style-type: none"> • Teacher Resource CD: Understanding DNA
CONTENT STANDARD / COURSE	HI.2.	Earth Space Science: The Scientific Process: Nature Of Science: Understand that science, technology, and society are interrelated
CONTENT STANDARD / PERFORMANCE INDICATOR	SC.ES.2.1.	<p>Science, Technology, and Society: Explain how scientific advancements and emerging technology have influenced society</p> <ul style="list-style-type: none"> • Teacher Resource CD: Biotechnology Techniques I - Gel Electrophoresis • Teacher Resource CD: Biotechnology Techniques II - Gene Expression
CONTENT STANDARD / PERFORMANCE INDICATOR	SC.ES.2.2.	<p>Science, Technology, and Society: Compare the risks and benefits of potential solutions to technological issues</p> <ul style="list-style-type: none"> • Teacher Resource CD: Biotechnology Techniques I - Gel Electrophoresis • Teacher Resource CD: Biotechnology Techniques II - Gene Expression
CONTENT STANDARD / PERFORMANCE INDICATOR	SC.ES.2.4.	<p>Science, Technology, and Society: Describe technologies used to collect information about the universe</p> <ul style="list-style-type: none"> • Biotechnology Techniques: Unit 2 Lab 4 Activity 1: Determining Molecular Mass and Charge • Biotechnology Techniques: Unit 2 Lab 4 Activity 2: Identifying DNA Fragments
CONTENT STANDARD / COURSE	HI.3.	<p>Earth Space Science: Life and Environmental Sciences: Organisms and The Environment: Understand the unity, diversity, and interrelationships of organisms, including their relationship to cycles of matter and energy in the environment</p> <ul style="list-style-type: none"> • Biotechnology Techniques: Unit 2 Lab 3 Activity 1: Using Restriction Enzymes to Cut DNA Strands • Biotechnology Techniques: Unit 2 Lab 3 Activity 2: Sorting DNA Using Gel Electrophoresis • Biotechnology Techniques: Unit 2 Lab 5 Activity 1: Restriction Site Mapping