



Pine Grove Area
SCHOOL DISTRICT

Science

CP Biology

May 21, 2009

I. PHILOSOPHY

The world is rapidly changing due to almost daily advances in science and technology. This course is designed to teach students the basic principles of scientific discovery while preparing them for the world of tomorrow. It is understood that students need to understand basic science principles in order to make informed decisions in their daily lives. In addition, as human beings, we need to understand nature and how human beings fit into nature so we can continue to preserve the world we live in.

II. CORE CONCEPTS

1. Features of Life – Organization of living things, why we study Biology and/or Science.
2. Scientific Method – Utilizing the scientific method steps as it relates to (a)biogenesis and work scientists did to prove biogenesis.
3. Tools of Biology – Microscope (light, stereo, electron), graduated cylinder, balance, meter stick, metric system, computer.
4. Chemistry – Properties of matter, atoms, elements, compounds, mixtures, form of energy, ionic and covalent bonds, properties of water, organic compounds
5. Cell Parts and Cellular Functions – Study of functions of organelles, osmosis, diffusion, carrier transport, enzyme action, photosynthesis, cellular respiration
6. Viruses and Bacteria – Discuss the traits of viruses and bacteria, how they cause disease, and current issues with each in the society
7. 5 Kingdoms – Monerans, Protists, Plants, Fungi, Animals
8. Genetics – Cell reproduction (mitosis and meiosis), Mendelian genetics, dominant and recessive traits, probability, chromosome theory, sex-linked traits, structure of DNA, protein synthesis, mutations, human genetics, controlled breeding, genetic engineering, adaptation due to genetic mutation
9. Ecology – Ecosystems, cycles: water, nitrogen, and CO₂ – O₂ cycle, Energy pyramids, relationships, succession, biomes, population growth, human population, human's and effect of the environment, alternative energies

III. COURSE OF STUDY

A. Course Name: College Prep Biology

B. Grade Level: 9th

C. Length of Course: Full year

1. Frequency: Daily

2. Duration: 42 minutes

D. Academic Level: College Prep

E. Credits: 1.04

F. Prerequisites: 8th grade science

G. Course Description:

The purpose of this course is to develop a background in biology. Biology is the study of the natural world.

This course is designed to give students a basic understanding of the natural world and how humans relate to it.

CONTENT: College Prep Biology

CORE CONCEPT 1: Features of Life

MAJOR OBJECTIVE: Organization of living things, why we study Biology and/or Science

CURRICULUM STANDARD:

PA State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
<p>PA Standard 3.3.10.A Explain the structural and functional similarities and differences found among living things.</p> <ul style="list-style-type: none">Identify and characterize major life forms according to their placement in existing classification groups.	<p>Teacher will guide students to:</p> <p>Analyze and describe the features that constitute life according to specific characteristics</p> <p>Observe and describe an indirect feature of life by adding yeast to juice.</p> <p>State the order of organization within living things.</p> <p>Explain in order of how atoms are the basic building blocks and how they relate to life.</p>	<p>Teacher evaluation of:</p> <p>Concept Maps</p> <p>Class discussion</p> <p>Worksheets</p> <p>Review games</p> <p>Journal questions</p> <p>Question and answer sessions</p> <p>Test</p> <p>Concept Map</p>	<p>Textbook resources</p> <p>Internet resources</p> <p>Journals / Notebooks</p> <p>Microscope</p>

CONTENT: College Prep Biology

CORE CONCEPT 1: Features of Life

MAJOR OBJECTIVE: Organization of living things, why we study Biology and/or Science

CURRICULUM STANDARD:

PA State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
<p>PA Standard 3.3.10.B Describe and explain the chemical and structural basis of living organisms.</p> <ul style="list-style-type: none">Describe the relationship between the structure of organic molecules and the function they serve in living organisms	<p>Teacher will guide students to:</p> <p>Explain how atoms are the basic building blocks of life.</p>	<p>Teacher evaluation of:</p> <p>Concept Maps</p> <p>Class discussion</p> <p>Worksheets</p> <p>Review games</p> <p>Journal questions</p> <p>Question and answer sessions</p> <p>Test</p> <p>Concept Map</p>	<p>Textbook resources</p> <p>Internet resources</p> <p>Journals / Notebooks</p> <p>Microscope</p>

CONTENT: College Prep Biology

CORE CONCEPT 2: Scientific Method

MAJOR OBJECTIVE: Utilizing the scientific method steps as it relates to (a)biogenesis and work scientists did to prove biogenesis.

CURRICULUM STANDARD:

State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
<p>PA Standard 3.1.10.B Describe concepts of models as a way to predict and understand science and technology.</p> <ul style="list-style-type: none">Examine the advantages of using models to demonstrate processes and outcomes (e.g., blue print analysis, structural stability).Apply mathematical models to science and technology.	<p>Teacher will guide students to:</p> <p>Experiment and utilize the using the scientific method.</p> <p>Create graphs using the results from various experiments.</p> <p>Create graphs using Excel.</p> <p>Make inferences from the information on the graphs.</p> <p>Research material for setting up an experiment either in the library or online.</p> <p>.</p>	<p>Teacher evaluation of:</p> <p>Concept Map</p> <p>Class discussion</p> <p>Worksheets</p> <p>Review games</p> <p>Journal questions</p> <p>Question and answer sessions</p> <p>Test</p> <p>Lab questions</p> <p>Graphs</p>	<p>Textbook resources</p> <p>Internet resources</p> <p>Journals / Notebooks</p> <p>Microscopes</p> <p>Laptops</p> <p>Pennies, water droppers, seeds and planting materials</p>

CONTENT: College Prep Biology

CORE CONCEPT 2: Scientific Method

MAJOR OBJECTIVE: Utilizing the scientific method steps as it relates to (a)biogenesis and work scientists did to prove biogenesis.

CURRICULUM STANDARD:

State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
<p>PA Standard 3.2.10.B Apply process knowledge and organize scientific and technological phenomena in varied ways.</p> <ul style="list-style-type: none">Describe materials using precise quantitative and qualitative skills based on observations.Develop appropriate scientific experiments: raising questions, formulating hypotheses, testing, controlled experiments, recognizing variables, manipulating variables, interpreting data, and producing solutions.Use process skills to make inferences and predictions using collected information and to communicate, using space / time relationships	<p>Teacher will guide students to:</p> <p>Explain and evaluate the difference between abiogenesis and biogenesis.</p> <p>Contrast various experiments in biogenesis as it relates to the scientific method.</p> <p>Differentiate between Scientific Law and Theory.</p> <p>Differentiate between direct and indirect observation.</p>	<p>Teacher evaluation of:</p> <p>Concept Map</p> <p>Class discussion</p> <p>Worksheets</p> <p>Review games</p> <p>Journal questions</p> <p>Question and answer sessions</p> <p>Test</p> <p>Lab questions</p> <p>Graphs</p>	<p>Textbook resources</p> <p>Internet resources</p> <p>Journals / Notebooks</p> <p>Pennies, water droppers, seeds and planting materials</p>

CONTENT: College Prep Biology

CORE CONCEPT 2: Scientific Method

MAJOR OBJECTIVE: Utilizing the scientific method steps as it relates to (a)biogenesis and work scientists did to prove biogenesis.

CURRICULUM STANDARD:

State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
<p>PA Standard 3.2.10.D Identify and apply the technological design process to solve problems.</p> <ul style="list-style-type: none">• Examine the problem, rank all necessary information and all questions that must be answered.• Propose and analyze a solution.• Implement the solution.• Evaluate the solution, test, redesign and improve as necessary.• Communicate the process and evaluate and present the impacts of the solution.	<p>Teacher will guide students to:</p> <p>Use the scientific method to solve problems.</p> <p>Create graphs using the results from various experiments.</p> <p>Create graphs using Excel.</p> <p>Make inferences from the information on the graphs.</p> <p>Design a laboratory experiment based on research.</p> <p>Evaluate and revise an experiment based data obtained from experimentation.</p>	<p>Teacher evaluation of:</p> <p>Concept Map</p> <p>Class discussion</p> <p>Worksheets</p> <p>Review games</p> <p>Journal questions</p> <p>Question and answer sessions</p> <p>Test</p> <p>Lab questions</p> <p>Graphs</p>	<p>Textbook resources</p> <p>Internet resources</p> <p>Journals / Notebooks</p> <p>Pennies, water droppers, seeds and planting materials</p>

CONTENT: College Prep Biology

CORE CONCEPT 2: Scientific Method

MAJOR OBJECTIVE: Scientific method steps as it relates to (a)biogenesis and work scientists did to prove biogenesis.

CURRICULUM STANDARD:

State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
<p>PA Standard 3.7.10.A Identify and safely use a variety of tools, basic machines, materials and techniques to solve problems and answer questions.</p> <ul style="list-style-type: none">Apply advanced tool and equipment manipulation techniques to solve problems.	<p>Teacher will guide students to:</p> <p>Utilize the scientific method to solve problems.</p> <p>Contrast various experiments used to prove or disprove biogenesis as they relate to the scientific method.</p>	<p>Teacher evaluation of:</p> <p>Concept Map</p> <p>Class discussion</p> <p>Worksheets</p> <p>Review games</p> <p>Journal questions</p> <p>Question and answer sessions</p> <p>Test</p> <p>Lab questions</p> <p>Graphs</p>	<p>Textbook resource</p> <p>Professional knowledge</p> <p>Internet resource</p> <p>Journals / Notebooks</p> <p>Pennies, water droppers, seeds and planting materials</p>

CONTENT: College Prep Biology

CORE CONCEPT 3: Tools of Biology

MAJOR OBJECTIVE: Tools of Biology – Microscope (light, stereo, electron), graduated cylinder, balance, meter stick, metric system, computer

CURRICULUM STANDARD:

State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
<p>PA Standard 3.7.10.A Identify and safely use a variety of tools, basic machines, materials and techniques to solve problems and answer questions.</p> <ul style="list-style-type: none">• Select and safely apply appropriate tools, materials and processes necessary to solve complex problems.• Apply advanced tool and equipment manipulation techniques to solve problems.	<p>Teacher will guide students to:</p> <p>Utilize software to present and organize scientific data.</p> <p>Demonstrate the correct use of lab equipment.</p> <p>Properly use a microscope.</p> <p>View and analyze slides using a microscope.</p> <p>Evaluate the metric system and when to utilize it.</p> <p>Utilize the metric system.</p> <p>Measure using the metric system.</p>	<p>Teacher evaluation of:</p> <p>Concept Map</p> <p>Class discussion</p> <p>Worksheets</p> <p>Metric system review worksheets</p> <p>Pictures of what they viewed under the microscope</p> <p>Review game</p> <p>Journal questions</p> <p>Question and answer sessions</p> <p>Test</p> <p>Lab questions</p> <p>Graphs</p> <p>Metric system measurements</p>	<p>Textbook resources</p> <p>Computer programs/web sites</p> <p>Journal or notebook</p> <p>Supplemental materials</p> <p>Internet resources</p> <p>Microscopes</p> <p>Slides</p> <p>Meter Sticks</p> <p>Balances (electronic / triple beam)</p> <p>Graduated cylinders</p> <p>Thermometers</p>

CONTENT: College Prep Biology

CORE CONCEPT 3: Tools of Biology

MAJOR OBJECTIVE: Tools of Biology – Microscope (light, stereo, electron), graduated cylinder, balance, meter stick, metric system, computer

CURRICULUM STANDARD:

State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
<p>PA Standard 3.7.10.B Apply appropriate instruments and apparatus to examine a variety of objects and processes.</p> <ul style="list-style-type: none">• Describe and use appropriate instruments to gather and analyze data.• Compare and contrast different scientific measurement systems; select the best measurement system for a specific situation.• Explain the need to estimate measurements within error of various instruments.• Apply accurate measurement knowledge to solve everyday problems.• Describe and demonstrate the operation and use of advanced instrumentation in evaluating material and chemical properties (e.g., scanning electron microscope, nuclear magnetic resonance machines).	<p>Teacher will guide students to:</p> <p>Properly use a microscope.</p> <p>View and analyze slides using the microscope.</p> <p>Evaluate the metric system and when to utilize it.</p> <p>Utilize metric conversions.</p> <p>Measure using the metric system.</p> <p>Compare and contrast different scientific measurement systems and select the best measurement system for each situation.</p> <p>Evaluate the amount of given error in a given measurement.</p>	<p>Teacher evaluation of:</p> <p>Concept Map</p> <p>Class discussion</p> <p>Worksheets</p> <p>Metric system review worksheets</p> <p>Pictures of what they viewed under the microscope</p> <p>Review game</p> <p>Journal questions</p> <p>Question and answer sessions</p> <p>Test</p> <p>Lab questions</p> <p>Graphs</p> <p>Metric system measurements</p>	<p>Textbook resources</p> <p>Computer programs/web sites</p> <p>Journal or notebook</p> <p>Supplemental materials</p> <p>Internet resources</p> <p>Microscopes</p> <p>Slides</p> <p>Meter Sticks</p> <p>Balances (electronic / triple beam)</p> <p>Graduated cylinders</p> <p>Thermometers</p>

CONTENT: College Prep Biology

CORE CONCEPT 3: Tools of Biology

MAJOR OBJECTIVE: Microscope (light, stereo, electron), graduated cylinder, balance, meter stick, metric system, computer

CURRICULUM STANDARD:

State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
<p>PA Standard 3.1.10.D Apply scale as a way of relating concepts and ideas to one another by some measure.</p> <ul style="list-style-type: none">• Apply dimensional analysis and scale as a ratio.• Convert one scale to another	<p>Teacher will guide students to:</p> <p>Discuss the metric system and why we are studying it.</p> <p>Convert in the metric system.</p> <p>Measure and convert in the metric system.</p>	<p>Teacher evaluation of:</p> <p>Concept Map</p> <p>Class discussion</p> <p>Worksheets</p> <p>Metric system review worksheets</p> <p>Pictures of what they viewed under the microscope</p> <p>Review game</p> <p>Journal questions</p> <p>Question and answer sessions</p> <p>Test</p> <p>Lab questions</p> <p>Graphs</p> <p>Metric system measurements</p>	<p>Textbook resources</p> <p>Computer programs/web sites</p> <p>Journal or notebook</p> <p>Supplemental materials</p> <p>Internet resources</p> <p>Microscopes</p> <p>Slides</p> <p>Meter Sticks</p> <p>Balances (electronic / triple beam)</p> <p>Graduated cylinders</p> <p>Thermometers</p>

CONTENT: College Prep Biology**CORE CONCEPT 4: Chemistry**

MAJOR OBJECTIVE: Properties of matter, atoms, elements, compounds, mixtures, form of energy, ionic and covalent bonds, properties of water, organic compounds

CURRICULUM STANDARD:

State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
<p>PA Standard 3.1.10.B Describe concepts of models as a way to predict and understand science and technology.</p> <ul style="list-style-type: none"> Distinguish between different types of models and modeling techniques and apply their appropriate use in specific applications (e.g., kinetic gas theory, DNA). Examine the advantages of using models to demonstrate processes and outcomes (e.g., blue print analysis, structural stability). Apply mathematical models to science and technology. 	<p>Teacher will guide students to:</p> <p>Explain the difference between physical and chemical properties.</p> <p>Identify atoms, elements, molecules, and compounds.</p> <p>Use the Periodic Table of Elements.</p> <p>Find the molecular weight of various molecules.</p> <p>Describe potential and kinetic energy.</p> <p>Describe energy levels of atoms and how it relates to ionic and covalent bonds.</p> <p>Be able to show how ionic and covalent bonds are formed by using Bohr's models.</p> <p>To show the various properties of water. (ex. Cohesion, adhesion..)</p> <p>To draw and create models of organic compounds.</p>	<p>Teacher evaluation of:</p> <p>Concept Map</p> <p>Class discussion</p> <p>Worksheets</p> <p>Periodic Table review worksheet (includes molecular weight)</p> <p>Review game</p> <p>Journal questions</p> <p>Question and answer sessions</p> <p>Test</p> <p>Lab questions</p>	<p>Textbook resources</p> <p>Computer programs/web sites</p> <p>Journal or notebook</p> <p>Supplemental materials</p> <p>Periodic Table of Elements found in the agenda book</p> <p>Internet resources</p> <p>Calculators</p>

CONTENT: College Prep Biology

CORE CONCEPT 4: Chemistry

MAJOR OBJECTIVE: Properties of matter, atoms, elements, compounds, mixtures, form of energy, ionic and covalent bonds, properties of water, organic compounds

CURRICULUM STANDARD:

State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
<p>PA Standard 3.3.10.B Describe and explain the chemical and structural basis of living organisms.</p> <ul style="list-style-type: none">Describe the relationship between the structure of organic molecules and the function they serve in living organisms.	<p>Teacher will guide students to:</p> <p>Identify the difference between physical and chemical properties.</p> <p>Describe atoms, elements, molecules, and compounds.</p> <p>Use the Periodic Table of Elements.</p> <p>Find the molecular weight of various molecules.</p> <p>Identify various molecules by chemical structure and describe their function in an organism.</p>	<p>Teacher evaluation of:</p> <p>Concept Map</p> <p>Class discussion</p> <p>Worksheets</p> <p>Periodic Table review worksheet (includes molecular weight)</p> <p>Review game</p> <p>Journal questions</p> <p>Question and answer sessions</p> <p>Test</p> <p>Lab questions</p>	<p>Textbook resources</p> <p>Computer programs/web sites</p> <p>Journal or notebook</p> <p>Supplemental materials</p> <p>Periodic Table of Elements found in the agenda book</p> <p>Internet resources</p> <p>Calculators</p>

CONTENT: College Prep Biology**CORE CONCEPT 4: Chemistry**

MAJOR OBJECTIVE: Properties of matter, atoms, elements, compounds, mixtures, form of energy, ionic and covalent bonds, properties of water, organic compounds

CURRICULUM STANDARD:

State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
<p>PA Standard 3.4.10.A Explain concepts about the structure and properties of matter.</p> <ul style="list-style-type: none"> Know that atoms are composed of even smaller sub-atomic structures whose properties are measurable. Explain the formation of compounds and their resulting properties using bonding theories (ionic and covalent). Recognize formulas for simple inorganic compounds. Understand that carbon can form several types of compounds 	<p>Teacher will guide students to:</p> <p>Explain the difference between physical and chemical properties.</p> <p>Describe atoms, elements, molecules, and compounds.</p> <p>Use the Periodic Table of Elements.</p> <p>Find the molecular weight of various molecules.</p> <p>Compare potential and kinetic energy.</p> <p>Explain energy levels of atoms and how it relates to ionic and covalent bonds.</p> <p>Demonstrate how ionic and covalent bonds are formed by using Bohr's models.</p> <p>Explain the various properties of water. (ex. Cohesion, adhesion)</p> <p>Describe organic compounds.</p>	<p>Teacher evaluation of:</p> <p>Concept Map</p> <p>Class discussion</p> <p>Worksheets</p> <p>Periodic Table review worksheet (includes molecular weight)</p> <p>Review game</p> <p>Journal questions</p> <p>Question and answer sessions</p> <p>Test</p> <p>Lab questions</p>	<p>Textbook resources</p> <p>Computer programs/web sites</p> <p>Journal or notebook</p> <p>Supplemental materials</p> <p>Periodic Table of Elements found in the agenda book</p> <p>Internet resources</p> <p>Calculators</p>

CONTENT: College Prep Biology**CORE CONCEPT 5: Cells Parts and Cellular Functions****MAJOR OBJECTIVE:** Study of functions of organelles, osmosis, diffusion, carrier transport, enzyme action, photosynthesis, cellular respiration**CURRICULUM STANDARD:**

State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
<p>PA Standard 3.1.10.A Discriminate among the concepts of systems, subsystems, feedback and control in solving technological problems.</p> <ul style="list-style-type: none"> Identify the function of subsystems within a larger system (e.g., role of thermostat in an engine, pressure switch). Describe the interrelationships among inputs, processes, outputs, feedback and control in specific systems. Analyze and describe the effectiveness of systems to solve specific problems. 	<p>Teacher will guide students to:</p> <p>Describe the parts of the cells.</p> <p>Describe the difference between prokaryotic and eukaryotic cells.</p> <p>Differentiate between diffusion and osmosis.</p> <p>Observe the affects of saltwater and freshwater on potato cores and purple onion cells.</p> <p>Model carrier transport.</p> <p>Show how enzyme reactions progress by doing toothpick activity.</p> <p>Describe and photosynthesis and cellular respiration.</p> <p>Describe how enzymes regulate biofunction.</p>	<p>Teacher evaluation of:</p> <p>Concept Map</p> <p>Diagrams</p> <p>Graphic organizers</p> <p>Class discussion</p> <p>Worksheets</p> <p>Review game</p> <p>Journal questions</p> <p>Question and answer sessions</p> <p>Test/quiz</p> <p>Lab questions</p> <p>Cell Parts poster project</p> <p>Take-home test</p> <p>Guided notes</p>	<p>Textbook resources</p> <p>Computer programs/web sites</p> <p>Journal or notebook</p> <p>Supplemental materials</p> <p>Internet resources</p> <p>Potatoes</p> <p>Microscopes</p> <p>Paper</p> <p>Toothpicks</p>

CONTENT: College Prep Biology

CORE CONCEPT 5: Cells Parts and Cellular Functions

MAJOR OBJECTIVE: Study of functions of organelles, osmosis, diffusion, carrier transport, enzyme action, photosynthesis, cellular respiration

CURRICULUM STANDARD:			
State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
<p>PA Standard 3.1.10.B Describe concepts of models as a way to predict and understand science and technology.</p> <ul style="list-style-type: none">Examine the advantages of using models to demonstrate processes and outcomes (e.g., blue print analysis, structural stability).	<p>Teacher will guide students to:</p> <p>Compare the organelles with various everyday objects.</p>	<p>Teacher evaluation of:</p> <p>Concept Map</p> <p>Diagrams</p> <p>Graphic organizers</p> <p>Class discussion</p> <p>Worksheets</p> <p>Review game</p> <p>Journal questions</p> <p>Question and answer sessions</p> <p>Test/quiz</p> <p>Lab questions</p> <p>Cell Parts poster project</p> <p>Take-home test</p> <p>Guided notes</p> <p>Poster Project</p>	<p>Textbook resources</p> <p>Computer programs/web sites</p> <p>Journal or notebook</p> <p>Supplemental materials</p> <p>Internet resources</p> <p>Potatoes</p> <p>Microscopes</p> <p>Paper</p> <p>Toothpicks</p>

CONTENT: College Prep Biology

CORE CONCEPT 5: Cells Parts and Cellular Functions

MAJOR OBJECTIVE: Study of functions of organelles, osmosis, diffusion, carrier transport, enzyme action, photosynthesis, cellular respiration

CURRICULUM STANDARD:			
State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
<p>PA Standard 3.3.10.A Explain the structural and functional similarities and differences found among living things.</p> <ul style="list-style-type: none">• Identify and characterize major life forms according to their placement in existing classification groups.• Explain the relationship between structure and function at the molecular and cellular levels.• Identify and characterize major life forms by kingdom, phyla, class and order.	<p>Teacher will guide students to:</p> <p>Compare and contrast Prokaryotic and Eukaryotic cells.</p> <p>Analyze which organisms have which type of cells.</p> <p>Examine the difference between plant and animal cells.</p>	<p>Teacher evaluation of:</p> <p>Concept Map</p> <p>Diagrams</p> <p>Graphic organizers</p> <p>Class discussion</p> <p>Worksheets</p> <p>Review game</p> <p>Journal questions</p> <p>Question and answer sessions</p> <p>Test/quiz</p> <p>Lab questions</p> <p>Cell Parts poster project</p> <p>Take-home test</p> <p>Guided notes</p>	<p>Textbook resources</p> <p>Computer programs/web sites</p> <p>Journal or notebook</p> <p>Supplemental materials</p> <p>Internet resources</p> <p>Potatoes</p> <p>Microscopes</p> <p>Paper</p> <p>Toothpicks</p>

CONTENT: College Prep Biology

CORE CONCEPT 5: Cells Parts and Cellular Functions

MAJOR OBJECTIVE: Study of functions of organelles, osmosis, diffusion, carrier transport, enzyme action, photosynthesis, cellular respiration

CURRICULUM STANDARD:			
State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
<p>PA Standard 3.3.10.B Describe and explain the chemical and structural basis of living organisms.</p> <ul style="list-style-type: none"> Describe the relationship between the structure of organic molecules and the function they serve in living organisms. Identify the specialized structures and regions of the cell and the functions of each. Explain how cells store and use information to guide their functions. Explain cell functions and processes in terms of chemical reactions and energy changes. 	<p>Teacher will guide students to:</p> <p>Characterize cell parts, cell structure and their functions.</p> <p>Compare the difference between prokaryotic and eukaryotic cells.</p> <p>Compare diffusion and osmosis.</p> <p>Observe the affects of saltwater and freshwater on potato cores and purple onion cells.</p> <p>Show how carrier transport works with a physical model.</p> <p>Observe enzyme action by viewing an online animation.</p> <p>Show how enzyme reactions progress by doing toothpick activity.</p> <p>Distinguish between photosynthesis and cellular respiration.</p> <p>Create a graphic organizer of what goes into and what comes out of each process.</p>	<p>Teacher evaluation of:</p> <p>Concept Map</p> <p>Diagrams</p> <p>Graphic organizers</p> <p>Class discussion</p> <p>Worksheets</p> <p>Review game</p> <p>Journal questions</p> <p>Question and answer sessions</p> <p>Test/quiz</p> <p>Lab questions</p> <p>Cell Parts poster project</p> <p>Take-home test</p> <p>Guided notes</p>	<p>Textbook resources</p> <p>Computer programs/web sites</p> <p>Journal or notebook</p> <p>Supplemental materials</p> <p>Internet resources</p> <p>Potatoes</p> <p>Microscopes</p> <p>Paper</p> <p>Toothpicks</p>

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CONTENT: College Prep Biology

CORE CONCEPT 5: Cells Parts and Cellular Functions

MAJOR OBJECTIVE: Study of functions of organelles, osmosis, diffusion, carrier transport, enzyme action, photosynthesis, cellular respiration

CURRICULUM STANDARD:			
State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
<p>PA Standard 3.7.10.B Apply appropriate instruments and apparatus to examine a variety of objects and processes.</p> <ul style="list-style-type: none">• Describe and use appropriate instruments to gather and analyze data.• Compare and contrast different scientific measurement systems; select the best measurement system for a specific situation.• Describe and demonstrate the operation and use of advanced instrumentation in evaluating material and chemical properties (e.g., scanning electron microscope, nuclear magnetic resonance machines).	<p>Teacher will guide students to:</p> <p>Observe the affects of saltwater and freshwater on potato cores and purple onion cells.</p> <p>Observe enzyme action by viewing an online animation.</p> <p>Show how enzyme reactions progress by doing toothpick activity.</p> <p>Compare and contrast photosynthesis and cellular respiration.</p> <p>Students will use a light microscope to view various microscopic organisms.</p> <p>The light microscope will be used to analyze movement of single-celled organisms from a pond or other water source.</p>	<p>Teacher evaluation of:</p> <p>Concept Map</p> <p>Diagrams</p> <p>Graphic organizers</p> <p>Class discussion</p> <p>Worksheets</p> <p>Review game</p> <p>Journal questions</p> <p>Question and answer sessions</p> <p>Test/quiz</p> <p>Lab questions</p> <p>Cell Parts poster project</p> <p>Take-home test</p> <p>Guided notes</p>	<p>Textbook resources</p> <p>Computer programs/web sites</p> <p>Journal or notebook</p> <p>Supplemental materials</p> <p>Internet resources</p> <p>Potatoes</p> <p>Microscopes</p> <p>Paper</p> <p>Toothpicks</p>

CONTENT: College Prep Biology

CORE CONCEPT 6: Viruses and Bacteria

MAJOR OBJECTIVE: Discuss the traits of viruses and bacteria, how they cause disease, and current issues with each in the society

CURRICULUM STANDARD:

State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
<p>PA Standard 3.3.10.A Explain the structural and functional similarities and differences found among living things.</p> <ul style="list-style-type: none">• Identify and characterize major life forms according to their placement in existing classification groups.• Explain the relationship between structure and function at the molecular and cellular levels.	<p>Teacher will guide students to:</p> <p>Students will create models of viruses and compare them to cells.</p> <p>Compare and contrast the structures of bacteria and Eukaryotic cells.</p> <p>Visualize the receptors and how viruses must attach to begin infection.</p> <p>Analyze the CD-4 receptor and the AIDS virus.</p>	<p>Teacher evaluation of:</p> <p>Concept Map</p> <p>Diagrams</p> <p>Graphic organizers</p> <p>Class discussion</p> <p>Worksheets</p> <p>Review game</p> <p>Journal questions</p> <p>Question and answer sessions</p> <p>Test</p> <p>Lab questions</p> <p>Viral and bacterial reports</p> <p>Guided notes</p>	<p>Textbook resources</p> <p>Computer programs/web sites</p> <p>Journal or notebook</p> <p>Supplemental materials</p> <p>Microscopes</p>

CONTENT: College Prep Biology

CORE CONCEPT 6: Viruses and Bacteria

MAJOR OBJECTIVE: Discuss the traits of viruses and bacteria, how they cause disease, and current issues with each in the society

CURRICULUM STANDARD:

State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
<p>PA Standard 3.3.10.B Describe and explain the chemical and structural basis of living organisms.</p> <ul style="list-style-type: none">• Describe the relationship between the structure of organic molecules and the function they serve in living organisms.• Identify the specialized structures and regions of the cell and the functions of each.• Explain how cells store and use information to guide their functions.• Explain cell functions and processes in terms of chemical reactions and energy changes.	<p>Teacher will guide students to:</p> <p>Explain how to defend against viruses.</p> <p>Converse how the AIDS virus works.</p> <p>Identify the traits of bacteria.</p> <p>Research a bacterial disease.</p> <p>Research and explain how bacteria have become resistant to antibiotics (ex. MRSA).</p> <p>Ascertain the many benefits of bacteria and how all organisms must live in symbiosis with them.</p> <p>Utilize a microscope to view, draw, and identify several types of bacteria.</p>	<p>Teacher evaluation of:</p> <p>Concept Map</p> <p>Diagrams</p> <p>Graphic organizers</p> <p>Class discussion</p> <p>Worksheets</p> <p>Review game</p> <p>Journal questions</p> <p>Question and answer sessions</p> <p>Test</p> <p>Lab questions</p> <p>Viral and bacterial reports</p> <p>Guided notes</p>	<p>Textbook resources</p> <p>Computer programs/web sites</p> <p>Journal or notebook</p> <p>Supplemental materials</p> <p>Microscopes</p>

CONTENT: College Prep Biology

CORE CONCEPT 6: Viruses and Bacteria

MAJOR OBJECTIVE: Discuss the traits of viruses and bacteria, how they cause disease, and current issues with each in the society

CURRICULUM STANDARD:

State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
<p>PA Standard 3.3.10.C Describe how genetic information is inherited and expressed.</p> <ul style="list-style-type: none">• Describe mutations' effects on a trait's expression.• Distinguish different reproductive patterns in living things (e.g., budding, spores, fission).• Compare random and selective breeding practices and their results (e.g., antibiotic resistant bacteria).• Explain the relationship among DNA, genes and chromosomes.	<p>Teacher will guide students to:</p> <p>Identify the traits of viruses.</p> <p>Diagram the lytic cycle of viruses accompanied by diagrams.</p> <p>Research a viral disease.</p> <p>Research and make out how to defend against viruses.</p> <p>Identify the traits of bacteria.</p> <p>Research a bacterial disease.</p> <p>Explain how bacteria have become resistant to antibiotics (ex. MRSA).</p> <p>Use microscopes to view bacterial slides.</p>	<p>Teacher evaluation of:</p> <p>Concept Map</p> <p>Diagrams</p> <p>Graphic organizers</p> <p>Class discussion</p> <p>Worksheets</p> <p>Review game</p> <p>Journal questions</p> <p>Question and answer sessions</p> <p>Test</p> <p>Lab questions</p> <p>Viral and bacterial reports</p> <p>Guided notes</p>	<p>Textbook resources</p> <p>Computer programs/web sites</p> <p>Journal or notebook</p> <p>Supplemental materials</p> <p>Microscopes</p>

CONTENT: College Prep Biology

CORE CONCEPT 6: Viruses and Bacteria

MAJOR OBJECTIVE: Discuss the traits of viruses and bacteria, how they cause disease, and current issues with each in the society

CURRICULUM STANDARD:

State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
<p>PA Standard 3.3.10.D Explain the mechanisms of the theory of evolution.</p> <ul style="list-style-type: none">• Explain the role of mutations and gene recombination in changing a population of organisms.• Describe and differentiate between the roles of natural selection and genetic drift.• Explain why natural selection can act only on inherited traits.• Apply the concept of natural selection to illustrate and account for a species' survival, extinction or change over time.	<p>Teacher will guide students to:</p> <p>Analyze how bacteria have become resistant to antibiotics through mutations and gene recombinations (ex. MRSA).</p> <p>Ascertain the many benefits of bacteria and how all organisms must live in symbiosis with them.</p> <p>Research species that have gone extinct over the last 100 years to look at natural selection.</p> <p>Analyze the changes of the peppered moth and why they happened.</p> <p>Create a graph of various species through time. (ex. humans, birds [Darwin's finches], reptiles, birds, etc.)</p> <p>Examine the aspects of changing pesticides every few years to reduce the adaptations they acquire to being resistant to the pesticide.</p>	<p>Teacher evaluation of:</p> <p>Concept Map</p> <p>Diagrams</p> <p>Graphic organizers</p> <p>Class discussion</p> <p>Worksheets</p> <p>Review game</p> <p>Journal questions</p> <p>Question and answer sessions</p> <p>Test</p> <p>Lab questions</p> <p>Viral and bacterial reports</p> <p>Guided notes</p>	<p>Textbook resources</p> <p>Computer programs/web sites</p> <p>Journal or notebook</p> <p>Supplemental materials</p> <p>Microscopes</p>

CONTENT: College Prep Biology

CORE CONCEPT 7: 5 Kingdoms

MAJOR OBJECTIVE: Monerans, Protists, Plants, Fungi, Animals

CURRICULUM STANDARD:

State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
<p>PA Standard 3.3.10.A Explain the structural and functional similarities and differences found among living things.</p> <ul style="list-style-type: none">• Identify and characterize major life forms according to their placement in existing classification groups.• Explain the relationship between structure and function at the molecular and cellular levels.• Describe organizing schemes of classification keys.• Identify and characterize major life forms by kingdom, phyla, class and order.	<p>Teacher will guide students to:</p> <p>Compare and contrast the traits of organisms in the 5 Kingdoms.</p> <p>Create a chart to show traits of each Kingdom.</p> <p>Identify the uses and importance of each Kingdom.</p> <p>Dissect a variety of animals when studying the animal Kingdom.</p> <p>Examine, evaluate, compare and contrast slides of protists and monerans.</p>	<p>Teacher evaluation of:</p> <p>Concept Map</p> <p>Diagrams</p> <p>Graphic organizers</p> <p>Class discussion</p> <p>Worksheets</p> <p>Review game</p> <p>Journal questions</p> <p>Question and answer sessions</p> <p>Test</p> <p>Lab questions</p> <p>Dissection quiz</p> <p>Guided notes</p>	<p>Textbook resources</p> <p>Computer programs/web sites</p> <p>Journal or notebook</p> <p>Supplemental materials</p> <p>Internet resources</p> <p>Microscopes</p> <p>Dissection supplies and manual (worm, crayfish, frog)</p>

CONTENT: College Prep Biology

CORE CONCEPT 7: 5 Kingdoms

MAJOR OBJECTIVE: 5 Kingdoms – Monerans, Protists, Plants, Fungi, Animals

CURRICULUM STANDARD:

State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
<p>PA Standard 3.7.10.A Identify and safely use a variety of tools, basic machines, materials and techniques to solve problems and answer questions.</p> <ul style="list-style-type: none">• Select and safely apply appropriate tools, materials and processes necessary to solve complex problems.• Apply advanced tool and equipment manipulation techniques to solve problems.	<p>Teacher will guide students to:</p> <p>Dissect and investigate a variety of animals when studying the animal Kingdom.</p> <p>Examine, evaluate, compare and contrast slides slides of Protists and Monerans.</p>	<p>Teacher evaluation of:</p> <p>Concept Map</p> <p>Diagrams</p> <p>Graphic organizers</p> <p>Class discussion</p> <p>Worksheets</p> <p>Review game</p> <p>Journal questions</p> <p>Question and answer sessions</p> <p>Test</p> <p>Lab questions</p> <p>Dissection quiz</p> <p>Guided notes</p>	<p>Textbook resources</p> <p>Computer programs/web sites</p> <p>Journal or notebook</p> <p>Supplemental materials</p> <p>Internet resources</p> <p>Microscopes</p> <p>Dissection supplies and manuals (worm, crayfish, frog)</p>

CONTENT: College Prep Biology

CORE CONCEPT 8: Genetics

MAJOR OBJECTIVE: Genetics – Cell reproduction (mitosis and meiosis), Mendelian genetics, dominant and recessive traits, probability, chromosome theory, sex-linked traits, structure of DNA, protein synthesis, mutations, human genetics, controlled breeding, genetic engineering, adaptation due to genetic mutation

CURRICULUM STANDARD:

State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
<p>PA Standard 3.3.10.B Describe and explain the chemical and structural basis of living organisms.</p> <ul style="list-style-type: none">• Describe the relationship between the structure of organic molecules and the function they serve in living organisms.• Identify the specialized structures and regions of the cell and the functions of each.• Explain how cells store and use information to guide their functions.	<p>Teacher will guide students to:</p> <p>Create a flat model of DNA and have them identify the components of the structure of DNA.</p> <p>Create a 3-D model of DNA and examine its relevance to the cell.</p> <p>Analyze and diagram how DNA creates the proteins.</p> <p>View online animations of transcription and translation.</p>	<p>Teacher evaluation of:</p> <p>Concept Map</p> <p>Diagrams</p> <p>Graphic organizers</p> <p>Class discussion</p> <p>Worksheets</p> <p>Review games</p> <p>Journal questions</p> <p>Question and answer sessions</p> <p>Tests/quizzes</p> <p>Lab questions</p> <p>Punnett squares worksheets</p> <p>DNA model quiz</p> <p>Yarn mitosis</p>	<p>Textbook resources</p> <p>Computer programs/web sites</p> <p>Journal or notebook</p> <p>Supplemental materials</p> <p>Internet resources</p> <p>Microscopes</p> <p>Electrophoresis equipment</p>

CONTENT: College Prep Biology

CORE CONCEPT 8: Genetics

MAJOR OBJECTIVE: Genetics – Cell reproduction (mitosis and meiosis), Mendelian genetics, dominant and recessive traits, probability, chromosome theory, sex-linked traits, structure of DNA, protein synthesis, mutations, human genetics, controlled breeding, genetic engineering, adaptation due to genetic mutation

CURRICULUM STANDARD:

State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
<p>PA Standard 3.3.10.C Describe how genetic information is inherited and expressed.</p> <ul style="list-style-type: none"> • Compare and contrast the function of mitosis and meiosis. • Describe mutations’ effects on a trait’s expression. • Distinguish different reproductive patterns in living things (e.g., budding, spores, fission). • Compare random and selective breeding practices and their results (e.g., antibiotic resistant bacteria). • Explain the relationship among DNA, genes and chromosomes. • Explain different types of inheritance (e.g., multiple allele, sex-influenced traits). • Describe the role of DNA in protein synthesis as it relates to gene expression. 	<p>Teacher will guide students to: Explain (a)sexual reproduction.</p> <p>Compare and contrast mitosis and meiosis.</p> <p>Describe Mendelian genetics (ex. Traits, dominant and recessive genes)</p> <p>Utilize Punnett squares to predict gentic outcomes.</p> <p>Clarify sex-linked traits and how they relate to Punnett squares.</p> <p>Create a model of the structure of DNA.</p> <p>View online animations of each process of protein synthesis.</p> <p>Identify mutations, human genetics and genetic diseases, while researching a genetic disorder.</p> <p>Evaluate the effectiveness of controlled breeding.</p> <p>Explain genetic engineering (cloning, splicing genes, etc.) and ethics involved with this topic.</p> <p>Perform gel electrophoresis as it relates to base sequencing and DNA fingerprinting.</p>	<p>Teacher evaluation of:</p> <p>Concept Map</p> <p>Diagrams</p> <p>Graphic organizers</p> <p>Class discussion</p> <p>Worksheets</p> <p>Review games</p> <p>Journal questions</p> <p>Question and answer sessions</p> <p>Tests</p> <p>Lab questions</p> <p>Punnett squares worksheets</p> <p>DNA model quiz</p> <p>Yarn mitosis</p>	<p>Textbook resources</p> <p>Computer programs/web sites</p> <p>Journal or notebook</p> <p>Supplemental materials</p> <p>Internet resources</p> <p>Microscopes</p> <p>Electrophoresis equipment</p>

CONTENT: College Prep Biology

CORE CONCEPT 8: Genetics

MAJOR OBJECTIVE: Cell reproduction (mitosis and meiosis), Mendelian genetics, dominant and recessive traits, probability, chromosome theory, sex-linked traits, structure of DNA, protein synthesis, mutations, human genetics, controlled breeding, genetic engineering, adaptation due to genetic mutation

CURRICULUM STANDARD:

State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
<p>PA Standard 3.3.10.D Explain the mechanisms of the theory of evolution.</p> <ul style="list-style-type: none">Analyze data from fossil records, similarities in anatomy and physiology, embryological studies and DNA studies that are relevant to the theory of evolution.Explain the role of mutations and gene recombination in changing a population of organisms.Explain why natural selection can act only on inherited traits.Apply the concept of natural selection to illustrate and account for a species' survival, extinction or change over time.	<p>Teacher will guide students to:</p> <p>Examine the peppered moth study.</p> <p>Create a timeline of the history of changes of various species over time. (ex. humans, birds)</p> <p>Examine how mutations are now creating superbugs like MRSA and other antibiotic resistant bacteria.</p> <p>Critique Darwin's studies. (ex. birds, lizards)</p> <p>Look for fossils in nearby shale pits and predict when these organisms may have lived.</p>	<p>Teacher evaluation of:</p> <p>Concept Map</p> <p>Diagrams</p> <p>Graphic organizers</p> <p>Class discussion</p> <p>Worksheets</p> <p>Review games</p> <p>Journal questions</p> <p>Question and answer sessions</p> <p>Tests</p> <p>Lab questions</p> <p>Punnett squares worksheets</p> <p>DNA model quiz</p> <p>Yarn mitosis</p>	<p>Textbook resources</p> <p>Computer programs/web sites</p> <p>Journal or notebook</p> <p>Supplemental materials</p> <p>Internet resources</p> <p>Microscopes</p> <p>Electrophoresis equipment</p>

CONTENT: College Prep Biology

CORE CONCEPT 8: Genetics

MAJOR OBJECTIVE: Cell reproduction (mitosis and meiosis), Mendelian genetics, dominant and recessive traits, probability, chromosome theory, sex-linked traits, structure of DNA, protein synthesis, mutations, human genetics, controlled breeding, genetic engineering, adaptation due to genetic mutation

CURRICULUM STANDARD:

State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
<p>PA Standard 3.2.10.A Apply knowledge and understanding about the nature of scientific and technological knowledge.</p> <ul style="list-style-type: none">• Compare and contrast scientific theories and beliefs.• Know that science uses both direct and indirect observation means to study the world and the universe.• Integrate new information into existing theories and explain implied results.	<p>Teacher will guide students to:</p> <p>Debate various technologies of DNA research. (ex. cloning, stem cell research, increasing life span)</p> <p>Research the new information about genetics and how it has changed over the last 20 years and how it will affect our future.</p>	<p>Teacher evaluation of:</p> <p>Concept Map</p> <p>Diagrams</p> <p>Graphic organizers</p> <p>Class discussion</p> <p>Worksheets</p> <p>Review games</p> <p>Journal questions</p> <p>Question and answer sessions</p> <p>Tests</p> <p>Lab questions</p> <p>Punnett squares worksheets</p> <p>DNA model quiz</p> <p>Yarn mitosis</p>	<p>Textbook resources</p> <p>Computer programs/web sites</p> <p>Journal or notebook</p> <p>Supplemental materials</p> <p>Internet resources</p> <p>Microscopes</p> <p>Electrophoresis equipment</p>

CONTENT: College Prep Biology

CORE CONCEPT 8: Genetics

MAJOR OBJECTIVE: Cell reproduction (mitosis and meiosis), Mendelian genetics, dominant and recessive traits, probability, chromosome theory, sex-linked traits, structure of DNA, protein synthesis, mutations, human genetics, controlled breeding, genetic engineering, adaptation due to genetic mutation

CURRICULUM STANDARD:

State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
<p>PA Standard 3.7.10.A Identify and safely use a variety of tools, basic machines, materials and techniques to solve problems and answer questions.</p> <ul style="list-style-type: none">• Select and safely apply appropriate tools, materials and processes necessary to solve complex problems.• Apply advanced tool and equipment manipulation techniques to solve problems.	<p>Teacher will guide students to:</p> <ul style="list-style-type: none">• Use yarn to demonstrate the steps of mitosis.• View and analyze slides that show mitosis and meiosis.• Perform Punnett squares and how to determine the results.• Create a model of the structure of DNA.• Perform gel electrophoresis and explain how it relates to base sequencing and DNA fingerprinting.	<p>Teacher evaluation of:</p> <p>Concept Map</p> <p>Diagrams</p> <p>Graphic organizers</p> <p>Class discussion</p> <p>Worksheets</p> <p>Review games</p> <p>Journal questions</p> <p>Question and answer sessions</p> <p>Tests</p> <p>Lab questions</p> <p>Punnett squares worksheets</p> <p>DNA model quiz</p> <p>Yarn mitosis</p>	<p>Textbook resources</p> <p>Computer programs/web sites</p> <p>Journal or notebook</p> <p>Supplemental materials</p> <p>Internet resources</p> <p>Microscopes</p> <p>Electrophoresis equipment</p>

CONTENT: College Prep Biology

CORE CONCEPT 8: Genetics

MAJOR OBJECTIVE: Cell reproduction (mitosis and meiosis), Mendelian genetics, dominant and recessive traits, probability, chromosome theory, sex-linked traits, structure of DNA, protein synthesis, mutations, human genetics, controlled breeding, genetic engineering, adaptation due to genetic mutation

CURRICULUM STANDARD:

State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
<p>PA Standard 3.8.10.C Evaluate possibilities consequences and impacts of scientific and technological solutions.</p> <ul style="list-style-type: none">• Relate scientific and technological advancements in terms of cause and effect.• Describe and evaluate the impacts that financial considerations have had on specific scientific and technological applications.• Compare and contrast potential solutions to technological, social, economic and environmental problems.• Analyze the impacts on society of accepting or rejecting scientific and technological advances.	<p>Teacher will guide students to:</p> <p>Analyze the various new genetic techniques. (ex. stem cell research, cloning)</p> <p>Debate how these new genetic technologies will affect society. What new problems will occur? How will they be regulated? What will the government's stance be?</p> <p>Create their own opinion by seeing both sides to the story and writing about it.</p>	<p>Teacher evaluation of:</p> <p>Concept Map</p> <p>Diagrams</p> <p>Graphic organizers</p> <p>Class discussion</p> <p>Worksheets</p> <p>Review games</p> <p>Journal questions</p> <p>Question and answer sessions</p> <p>Tests</p> <p>Lab questions</p> <p>Punnett squares worksheets</p> <p>DNA model quiz</p> <p>Yarn mitosis</p>	<p>Textbook resources</p> <p>Computer programs/web sites</p> <p>Journal or notebook</p> <p>Supplemental materials</p> <p>Internet resources</p> <p>Microscopes</p> <p>Electrophoresis equipment</p>

CONTENT: College Prep Biology

CORE CONCEPT 9: Ecology

MAJOR OBJECTIVE: Ecosystems, cycles: water, nitrogen, and CO₂ – O₂ cycle, Energy pyramids, relationships, succession, biomes, population growth, human population, human’s and effect of the environment, alternative energies

CURRICULUM STANDARD:

State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
<p>PA Standard 3.1.10.C Apply patterns as repeated processes or recurring elements in science and technology.</p> <ul style="list-style-type: none"> Examine and describe recurring patterns that form the basis of biological classification, chemical periodicity, geological order and astronomical order. 	<p>Teacher will guide students to:</p> <p>Locate the stages of succession using school property.</p> <p>Analyze what makes up an ecosystem. [Includes (a)biotic factors, communities, populations, habitats, and niches.]</p> <p>Create a model of the water, carbon-dioxide, and nitrogen cycle.</p> <p>Diagram an ecological pyramids. (Includes food chain and food webs.)</p>	<p>Teacher evaluation of:</p> <ul style="list-style-type: none"> Worksheets Posters Presentations. Projects Concept Maps Diagrams Class discussion Review games Journal questions Question and answer sessions Tests Lab questions 	<p>Textbook resources</p> <p>Computer programs/web sites</p> <p>Journal or notebook</p> <p>Supplemental materials</p> <p>Internet resources</p> <p>CBR</p> <p>DEP</p> <p>DCNR</p> <p>EPA</p> <p>Project Wild</p> <p>Project Wet</p>

CONTENT: College Prep Biology

CORE CONCEPT 9: Ecology

MAJOR OBJECTIVE: Ecosystems, cycles: water, nitrogen, and CO₂ – O₂ cycle, Energy pyramids, relationships, succession, biomes, population growth, human population, human's and effect of the environment, alternative energies

CURRICULUM STANDARD:

State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
<p>PA Standard 3.5.10.B Explain sources and uses of earth resources.</p> <ul style="list-style-type: none"> • Compare the locations of strategic minerals and earth resources in the world with their geologic history using maps and global information systems. • Demonstrate the effects of sedimentation and erosion before and after a conservation plan is implemented. • Evaluate the impact of geologic activities/hazards (e.g., earthquakes, sinkholes, landslides). 	<p>Teacher will guide students to:</p> <p>Explain the water, carbon-dioxide, and nitrogen cycle.</p> <p>Discuss population growth. (carrying capacity, limiting factors, growth curves)</p> <p>Analyze overpopulation of humans and probe other problems it creates.</p> <p>Research conservation of natural resources.</p> <p>Research alternative energies and analyze their effectiveness.</p> <p>Explain pollution and test various sources around school. (Ex. Water pollution)</p> <p>Investigate how humans affect the environment.</p>	<p>Teacher evaluation of:</p> <ul style="list-style-type: none"> • Worksheets • Posters • Presentations. • Projects • Concept Maps • Diagrams • Class discussion • Review games • Journal questions • Question and answer sessions • Tests • Lab questions 	<p>Textbook resources</p> <p>Computer programs/web sites</p> <p>Journal or notebook</p> <p>Supplemental materials</p> <p>Internet resources</p> <p>CBR</p> <p>DEP</p> <p>DCNR</p> <p>EPA</p> <p>Project Wild</p> <p>Project Wet</p>

CONTENT: College Prep Biology

CORE CONCEPT 9: Ecology

MAJOR OBJECTIVE: Ecosystems, cycles: water, nitrogen, and CO₂ – O₂ cycle, Energy pyramids, relationships, succession, biomes, population growth, human population, human's and effect of the environment, alternative energies

CURRICULUM STANDARD:

State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
<p>PA Standard 3.8.10.C Evaluate possibilities, consequences and impacts of scientific and ecological solutions.</p> <ul style="list-style-type: none"> • Relate scientific and technological advancements in terms of cause and effect. • Describe and evaluate the impacts that financial considerations have had on specific scientific and technological applications. • Compare and contrast potential solutions to technological, social, economic and environmental problems. • Analyze the impacts on society of accepting or rejecting scientific and technological advances. 	<p>Teacher will guide students to:</p> <p>Diagram population growth. (carrying capacity, limiting factors, growth curves)</p> <p>Analyze overpopulation of humans and probe other problems it creates.</p> <p>Research and describe conservation of natural resources.</p> <p>Research alternative energies and analyze their effectiveness.</p> <p>Describe pollution and test various sources around school. (Ex. Water pollution)</p> <p>Investigate how humans affect the environment.</p>	<p>Teacher evaluation of:</p> <ul style="list-style-type: none"> • Worksheets • Posters • Presentations. • Projects • Concept Maps • Diagrams • Class discussion • Review games • Journal questions • Question and answer sessions • Tests • Lab questions 	<p>Textbook resources</p> <p>Computer programs/web sites</p> <p>Journal or notebook</p> <p>Supplemental materials</p> <p>Internet resources</p> <p>CBR</p> <p>DEP</p> <p>DCNR</p> <p>EPA</p> <p>Project Wild</p> <p>Project Wet</p>

CONTENT: College Prep Biology

CORE CONCEPT 9: Ecology

MAJOR OBJECTIVE: Ecosystems, cycles: water, nitrogen, and CO₂ – O₂ cycle, Energy pyramids, relationships, succession, biomes, population growth, human population, human's and effect of the environment, alternative energies

CURRICULUM STANDARD:

State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
<p>PA Standard 4.1.10.C Describe the multiple functions of wetlands.</p> <ul style="list-style-type: none"> • Describe wetlands in terms of their effects (e.g., habitat, flood, buffer zones, prevention areas, nurseries, food production areas). • Explain how a wetland influences water quality, wildlife and water retention. • Analyze wetlands through their indicators (e.g., soils, plants, hydrology). 	<p>Teacher will guide students to:</p> <p>Describe wetlands and explain their benefit to humans.</p> <p>Perform a stream study of water before and after it goes through a wetlands.</p> <p>Perform a soil studies and water properties.</p>	<p>Teacher evaluation of:</p> <ul style="list-style-type: none"> • Worksheets • Posters • Presentations. • Projects • Concept Maps • Diagrams • Class discussion • Review games • Journal questions • Question and answer sessions • Tests • Lab questions 	<p>Textbook resources</p> <p>Computer programs/web sites</p> <p>Journal or notebook</p> <p>Supplemental materials</p> <p>Internet resources</p> <p>CBR</p> <p>DEP</p> <p>DCNR</p> <p>EPA</p> <p>Project Wild</p> <p>Project Wet</p>

CONTENT: College Prep Biology

CORE CONCEPT 9: Ecology

MAJOR OBJECTIVE: Ecosystems, cycles: water, nitrogen, and CO₂ – O₂ cycle, Energy pyramids, relationships, succession, biomes, population growth, human population, human's and effect of the environment, alternative energies

CURRICULUM STANDARD:

State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
<p>PA Standard 4.2.10.A Explain that renewable and nonrenewable resources supply energy and materials.</p> <ul style="list-style-type: none"> • Identify alternative sources of energy. • Identify and compare fuels used in industrial and agricultural societies. • Compare and contrast the cycles of various natural resources. 	<p>Teacher will guide students to:</p> <p>Analyze overpopulation of humans and probe other problems it creates.</p> <p>Describe conservation of natural resources.</p> <p>Research alternative energies and their effectiveness. Analyze the benefits.</p>	<p>Teacher evaluation of:</p> <ul style="list-style-type: none"> • Worksheets • Posters • Presentations. • Projects • Concept Maps • Diagrams • Class discussion • Review games • Journal questions • Question and answer sessions • Tests • Lab questions 	<p>Textbook resources</p> <p>Computer programs/web sites</p> <p>Journal or notebook</p> <p>Supplemental materials</p> <p>Internet resources</p> <p>CBR</p> <p>DEP</p> <p>DCNR</p> <p>EPA</p> <p>Project Wild</p> <p>Project Wet</p>

CONTENT: College Prep Biology

CORE CONCEPT 9: Ecology

MAJOR OBJECTIVE: Ecosystems, cycles: water, nitrogen, and CO₂ – O₂ cycle, Energy pyramids, relationships, succession, biomes, population growth, human population, human's and effect of the environment, alternative energies

CURRICULUM STANDARD:

State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
<p>PA Standard 4.2.10.D Explain different management alternatives involved in recycling and solid waste management.</p> <ul style="list-style-type: none"> • Analyze the manufacturing process (before, during and after) with consideration for resource recovery. • Compare various methods dealing with solid waste (e.g., incineration, compost, land application). • Differentiate between pre/post consumer and raw materials. • Illustrate how one natural resource can be managed through reduction, recycling, reuse or use. 	<p>Teacher will guide students to:</p> <p>Research alternative energies.</p> <p>Describe how a wastewater treatment plant works.</p> <p>Tour a wastewater treatment facility.</p> <p>Investigate how humans get rid of waste and analyze the (dis)advantages.</p> <p>Research and describe human use of natural resources.</p>	<p>Teacher evaluation of:</p> <ul style="list-style-type: none"> • Worksheets • Posters • Presentations. • Projects • Concept Maps • Diagrams • Class discussion • Review games • Journal questions • Question and answer sessions • Tests • Lab questions 	<p>Textbook resources</p> <p>Computer programs/web sites</p> <p>Journal or notebook</p> <p>Supplemental materials</p> <p>Internet resources</p> <p>CBR</p> <p>DEP</p> <p>DCNR</p> <p>EPA</p> <p>Project Wild</p> <p>Project Wet</p>

CONTENT: College Prep Biology

CORE CONCEPT 9: Ecology

MAJOR OBJECTIVE: Ecosystems, cycles: water, nitrogen, and CO₂ – O₂ cycle, Energy pyramids, relationships, succession, biomes, population growth, human population, human's and effect of the environment, alternative energies

CURRICULUM STANDARD:

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<p>PA Standard 4.3.10.B Explain how multiple variables determine the effects of pollution on environmental health, natural processes and human practices.</p> <ul style="list-style-type: none"> • Explain how human practices affect the quality of the water and soil. • Identify evidence of natural events around the world and their effects on environmental health (e.g., Yellowstone National Park fires). • Identify local and state environmental regulations and their impact on environmental health. • Analyze data and explain how point source pollution can be detected and eliminated. 	<p>Teacher will guide students to:</p> <p>Research and describe human use of natural resources.</p> <p>Research alternative energies and analyze their effectiveness.</p> <p>Describe pollution and test various sources around school. (Ex. Water pollution)</p> <p>Investigate how humans affect the environment.</p> <p>Research numbers from a study of water quality of stream before and after a point source pollution site.</p> <p>Analyze why the water quality has changed.</p> <p>Research environmental regulations and the reason for their inception.</p>	<p>Teacher evaluation of:</p> <ul style="list-style-type: none"> • Worksheets • Posters • Presentations. • Projects • Concept Maps • Diagrams • Class discussion • Review games • Journal questions • Question and answer sessions • Tests • Lab questions 	<p>Textbook resources</p> <p>Computer programs/web sites</p> <p>Journal or notebook</p> <p>Supplemental materials</p> <p>Internet resources</p> <p>CBR</p> <p>DEP</p> <p>DCNR</p> <p>EPA</p> <p>Project Wild</p> <p>Project Wet</p>

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<p>PA Standard 4.6.10.A Explain the biotic and abiotic components of an ecosystem and their interaction.</p> <ul style="list-style-type: none"> • Identify the major biomes and explain their similarities and differences. • Compare and contrast the interactions of biotic and abiotic components in an ecosystem. • Analyze the effects of abiotic factors on specific ecosystems. • Describe how the availability of resources affects organisms in an ecosystem. • Explain energy flow in a food chain through an energy pyramid. • Evaluate the efficiency of energy flow in a food chain. • Explain the concept of carrying capacity in an ecosystem. • Explain trophic levels. • Identify a specific environmental impact and predict what change may take place to affect homeostasis. 	<p>Teacher will guide students to:</p> <p>Describe ecosystems. [Includes (a)biotic factors, communities, populations, habitats, and niches.]</p> <p>Create a poster of the cycles as they relate to the environment. (ex. water, carbon dioxide-oxygen, and nitrogen cycle.)</p> <p>Diagram an ecological pyramids. (Includes food chain and food webs.)</p> <p>Analyze relationships in the forested area of the outdoor classroom.</p> <p>Locate the stages of succession using school property.</p> <p>Create a poster showing the biomes.</p> <p>Analyze population growth. (carrying capacity, limiting</p>	<p>Teacher evaluation of:</p> <ul style="list-style-type: none"> • Worksheets • Posters • Presentations. • Projects • Concept Maps • Diagrams • Class discussion • Review games • Journal questions • Question and answer sessions • Tests • Lab questions 	<p>Textbook resources</p> <p>Computer programs/web sites</p> <p>Journal or notebook</p> <p>Supplemental materials</p> <p>Internet resources</p> <p>CBR</p> <p>DEP</p> <p>DCNR</p> <p>EPA</p> <p>Project Wild</p> <p>Project Wet</p>

- Examine and explain how organisms modify their environments to sustain their needs.
- Assess the effects of latitude and altitude on biomes.
- Interpret possible causes of population fluctuations.
- Explain how erosion and sedimentation have changed the quality of soil related habitats.

factors, growth curves)

Investigate the impact humans have on the environments.

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<p>PA Standard 4.6.10.B Explain how cycles affect the balance in an ecosystem.</p> <ul style="list-style-type: none">• Describe an element cycle and its role in an ecosystem.• Explain the consequences of interrupting natural cycles.	<p>Teacher will guide students to:</p> <p>Describe the water, carbon-dioxide, and nitrogen cycle and create a poster to show the cycle as it relates to us.</p> <p>Locate the stages of succession using school property.</p> <p>Analyze what would happen if succession was interrupted.</p>	<p>Teacher evaluation of:</p> <ul style="list-style-type: none">• Worksheets• Posters• Presentations.• Projects• Concept Maps• Diagrams• Class discussion• Review games• Journal questions• Question and answer sessions• Tests• Lab questions	<p>Textbook resources</p> <p>Computer programs/web sites</p> <p>Journal or notebook</p> <p>Supplemental materials</p> <p>Internet resources</p> <p>CBR</p> <p>DEP</p> <p>DCNR</p> <p>EPA</p> <p>Project Wild</p> <p>Project Wet</p>

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<p>PA Standard 4.6.10.C Analyze how ecosystems change over time.</p> <ul style="list-style-type: none">• Identify and explain the succession stages in an ecosystem.• Identify causes of succession.• Analyze consequences of interrupting natural cycles.	<p>Teacher will guide students to:</p> <p>Locate the stages of succession using school property.</p> <p>Analyze what would happen if succession was interrupted.</p>	<p>Teacher evaluation of:</p> <ul style="list-style-type: none">• Worksheets• Posters• Presentations.• Projects• Concept Maps• Diagrams• Class discussion• Review games• Journal questions• Question and answer sessions• Tests• Lab questions	<p>Textbook resources</p> <p>Computer programs/web sites</p> <p>Journal or notebook</p> <p>Supplemental materials</p> <p>Internet resources</p> <p>CBR</p> <p>DEP</p> <p>DCNR</p> <p>EPA</p> <p>Project Wild</p> <p>Project Wet</p>

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CURRICULUM STANDARD:

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<p>PA Standard 4.8.10.A Analyze how society’s needs relate to the sustainability of natural resources.</p> <ul style="list-style-type: none"> • Explain why some societies have been unable to meet their natural resource needs. • Compare and contrast the use of natural resources and the environmental conditions in several countries. • Describe how uses of natural resources impact sustainability. 	<p>Teacher will guide students to:</p> <p>Research what current scientists are doing to make their country more sustainable.</p> <p>Look at China, the US, Europe and other developed countries and their natural resource consumption.</p> <p>Compare them to undeveloped countries.</p> <p>Tie everything together as they relate to increased human population.</p>	<p>Teacher evaluation of:</p> <ul style="list-style-type: none"> • Worksheets • Posters • Presentations. • Projects • Concept Maps • Diagrams • Class discussion • Review games • Journal questions • Question and answer sessions • Tests • Lab questions 	<p>Textbook resources</p> <p>Computer programs/web sites</p> <p>Journal or notebook</p> <p>Supplemental materials</p> <p>Internet resources</p> <p>CBR</p> <p>DEP</p> <p>DCNR</p> <p>EPA</p> <p>Project Wild</p> <p>Project Wet</p>

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<p>PA Standard 4.8.10.B Analyze the relationship between the use of natural resources and sustaining our society.</p> <ul style="list-style-type: none">• Explain the role of natural resources in sustaining society.	<p>Teacher will guide students to:</p> <p>Research natural resources and how humans use them.</p> <p>Research alternative energies.</p> <p>Compare the advantages and disadvantages of alternative energies.</p> <p>Analyze how humans affect the environment now and in the future.</p> <p>Predict what might happen in the future if humans do not conserve natural resources.</p>	<p>Teacher evaluation of:</p> <ul style="list-style-type: none">• Worksheets• Posters• Presentations.• Projects• Concept Maps• Diagrams• Class discussion• Review games• Journal questions• Question and answer sessions• Tests• Lab questions	<p>Textbook resources</p> <p>Computer programs/web sites</p> <p>Journal or notebook</p> <p>Supplemental materials</p> <p>Internet resources</p> <p>CBR</p> <p>DEP</p> <p>DCNR</p> <p>EPA</p> <p>Project Wild</p> <p>Project Wet</p>

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<p>PA Standard 4.8.10.C Analyze how human activities may cause changes in an ecosystem.</p> <ul style="list-style-type: none"> Analyze and evaluate changes in the environment that are the result of human activities. Compare and contrast the environmental effects of different industrial strategies (e.g., energy generation, transportation, logging, mining, agriculture). 	<p>Teacher will guide students to:</p> <p>Research alternative energies.</p> <p>Describe pollution and test various sources around school. (Ex. Water pollution)</p> <p>Analyze the impact humans have on the Cheseapeake Bay, Gulf of Mexico, etc.</p> <p>Compare and contrast the (dis)advantages of alternative energies.</p> <p>Present specific examples of how various jobs have changed due to environmental laws.</p>	<p>Teacher evaluation of:</p> <ul style="list-style-type: none"> Worksheets Posters Presentations. Projects Concept Maps Diagrams Class discussion Review games Journal questions Question and answer sessions Tests Lab questions 	<p>Textbook resources</p> <p>Computer programs/web sites</p> <p>Journal or notebook</p> <p>Supplemental materials</p> <p>Internet resources</p> <p>CBR</p> <p>DEP</p> <p>DCNR</p> <p>EPA</p> <p>Project Wild</p> <p>Project Wet</p>

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<p>PA Standard 4.8.10.D Explain how the concept of supply and demand affects the environment.</p> <ul style="list-style-type: none">• Identify natural resources for which societal demands have been increasing.• Describe the relationship between population density and resource use and management.	<p>Teacher will guide students to:</p> <p>Examine global warming.</p> <p>Debate whether the information on the news by researching current articles on global warming, etc.</p> <p>Analyze what would happen if the human population continued to increase on Earth and how it would affect how humans live.</p> <p>Create a graph to show how resource consumption has gone up in what areas of the world as it relates to population.</p>	<p>Teacher evaluation of:</p> <ul style="list-style-type: none">• Worksheets• Posters• Presentations.• Projects• Concept Maps• Diagrams• Class discussion• Review games• Journal questions• Question and answer sessions• Tests• Lab questions	<p>Textbook resources</p> <p>Computer programs/web sites</p> <p>Journal or notebook</p> <p>Supplemental materials</p> <p>Internet resources</p> <p>CBR</p> <p>DEP</p> <p>DCNR</p> <p>EPA</p> <p>Project Wild</p> <p>Project Wet</p>

V. EXPECTED LEVELS OF ACHIEVEMENT

A. Students are expected to reach the proficient level of achievement in College Prep Biology. These skills include all of those noted in the specific content area of this curriculum.

B. Grading system for all CP Biology classes is as follows:

Grading Scale	
A	100%-90%
B	89%-80%
C	79%-70%
D	69%-60%
F	59% & below

C. Each student's grade will be determined at the conclusion of each marking period. Progress reports will be issued at the mid-point of the marking period for those students below a 70%.