Dover Area School District
Curriculum Cover Sheet

Grade: 9

Subject/Course Title: Environmental Biology

Credit: 1

Course Description: This course is based on the Environment and Ecology Standards for Pennsylvania and is designed to prepare students for the Ecology portion of the Keystone Exam. Topics to be covered are Biotic Interactions, Cycles: Nutrient and Water, Energy Flow, Man and the Environment, and Organizational Levels.

Instructional Resources:

Textbooks: Pearson: *Environmental Science-Your World, Your Turn* and
Pearson: Miller & Levine-*Biology*

Internet

Dover Area School District Curriculum K-U-D
High School Environmental Biology

	Know	Understand	Do
BIO.A.1.1 Explain the characteristics common to all organisms.	- Abiotic and biotic factors - Classification of organisms - Characteristics of life	Students will understand the unity and diversity of life.	Describe and identify the characteristics of life shared by all prokaryotic and eukaryotic organisms.
BIO.A.1.2 Describe relationships between structure and function at biological levels of organization.	-Chemical levels of organization: proton, neutron, electron, molecule, macromolecule -Biological levels of multicellular organization: organelles, cells, tissues, organs, organ systems, and multicellular organisms	Students will demonstrate understanding that structure determines function at all levels.	Describe and interpret relationships between structure and function at various levels of biological organization .
BIO.A.2.1 Describe how the unique properties of water support life on Earth.	Structure and classification of matter, basic chemical bonding, polarity	Students will demonstrate understanding that structure determines function at the chemical level. Students will understand the chemical basis of life.	Describe the unique properties of water and how these properties support life on Earth (e.g., freezing point, high specific heat, cohesion).
BIO.B.3.1 Explain the mechanisms of evolution.	- Structure of DNA - Mutations - Migration - Genetic Drift - Gene Flow - Natural Selection - Fitness - Adaptations	Students will understand that evolution explains the unity, continuity, and diversity of life.	Explain how natural selection can impact allele frequencies of a population. Describe the factors that can contribute to the development of new species (e.g., isolating mechanisms, genetic drift, founder effect, migration). Explain how genetic mutations may result in genotypic and phenotypic variations within a population.
BIO.B.3.3 Apply scientific thinking, processes, tools, and technologies in the study of the theory of evolution.	-Laboratory safety rules/skills -Laboratory equipment uses -Inquiry skills: observation, inference, prediction, analysis, conclusion	Students will understand that evolution explains the unity, continuity, and diversity of life.	Distinguish between the scientific terms: hypothesis, inference, law, theory, principle, fact, and observation. Write hypotheses and conclusions. Design experiments and collect data.
BIO.B.4.1 Describe ecological levels of organization in the biosphere.	-Ecological levels of organization: individual, population, community, ecosystem, biome, biosphere	Students will demonstrate understanding that structure determines function at all levels.	Describe the levels of ecological organization (i.e., organism, population, community, ecosystem, biome, and biosphere). Describe characteristic biotic and abiotic components of aquatic and terrestrial ecosystems.
BIO.B.4.2 Describe interactions and relationships in an ecosystem.	- competition, predation, symbiosis - food chains, food webs, energy pyramids - water cycle, carbon cycle, oxygen cycle, and nitrogen cycle - climate changes, introduction of nonnative species, invasive species, pollution, fires	Students will demonstrate an understanding of interdependence in nature. Students will understand that organisms use materials and energy.	Describe how energy flows through an ecosystem Describe biotic interactions in an ecosystem Describe how matter recycles through an ecosystem Describe how ecosystems change in response to natural and human disturbances
4.1.10.A. Explain the concept of carrying capacity in an ecosystem.	- limiting factors - carrying capacity	Students will demonstrate an understanding of interdependence in nature.	Describe factors that affect the growth of populations. Describe the effects of limiting factors on population dynamics and potential species extinction.

Dover Area School District Curriculum K-U-D
High School Environmental Biology

	Know	Understand	Do
4.1.10.A Explain the concept of endangered species.	- vulnerable species - threatened species - endangered species	Students will demonstrate an understanding of how humans affect the balance of an ecosystem.	Describe how organisms become classified as threatened or endangered.
4.2.10.C. Explain the relationship between water quality and the diversity of life in a freshwater ecosystem.	- types of pollution	Students will demonstrate an understanding of interdependence in nature.	Assess the health of an aquatic ecosystem using chemical and biological tests.
4.3.10.A. Evaluate factors affecting the use of natural resources.	-Renewability continuum -Sustainability -Ecological footprints	Students will explain how humans use and affect natural resources	Differentiate between renewable and non-renewable resources and factors that affect these resources.
4.5.10.C. Analyze real-world data and explain how point and nonpoint source pollution can be detected and eliminated.	-Types of pollution -Watershed structure	Students will explain and interpret data linked to human effects on the environment.	Differentiate between point and nonpoint sources of pollution and factors that cause them.

Dover Area School District Curriculum Pacing Guide
Science: Environmental Biology (Grade 9)

WEEK	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6
1	Intro to Environmental Science					
2						
3						
4						
5		Earth's Environmental Systems				
6						
7						
8			Population Ecology			
9						
10						
11				Evolution and Natural Selection		
12						
13						
14					Community Ecology	
15						
16						
17						Ecosystems and Biomes
18						

Environmental Biology Unit 1 - Introduction to Environmental Science

Subject:	Environmental Biology	Grade Level:	9	Duration:	20 Days

Key Learning	*The nature of science as it relates to environmental topics and concerns within our world.*

Unit Essential Question:	How does environmental science help us understand the natural world?

Identified Standards Addressed in the Unit:

Standard - 3.1.B.A1: Describe the common characteristics of life.
Standard - 4.1.10.E: Analyze how humans influence the pattern of natural changes.
Standard - 4.3.10.A: Evaluate factors affecting the use of natural resources.
Standard - 4.3.10.B: Analyze how humans manage and distribute natural resources.
Standard - 4.5.10.A: Explain how public policy encourages or discourages the sustainable use of natural resources.
Scientific Inquiry Standards

- Compare and contrast scientific theories.
- Know that both direct and indirect observations are used by scientists to study the natural world and universe.
- Identify questions and concepts that guide scientific investigations.
- Recognize and analyze alternative explanations and models.
- Explain the importance of accuracy and precision in making valid measurements.
- Examine the status of existing theories.
- Evaluate experimental information for relevance and adherence to science processes.
- Judge that conclusions are consistent and logical with experimental conditions.
- Interpret results of experimental research to predict new information, propose additional investigable questions, or advance a solution.
- Communicate and defend a scientific argument.

Identified Eligible Content Addressed in the Unit:

Eligible Content - BIO.B.4.2.4 Describe how ecosystems change in response to natural and human disturbances (e.g., climate changes, introduction of nonnative species, pollution, fires).
Eligible Content - BIO.B.4.2.5 Describe the effects of limiting factors on population dynamics and potential species extinction.

Know (Concepts):	Do (Competencies):
Scientific thinking, processes, tools, and technologies help us solve environmental problems. Earth's environments are influenced by human activities. Environmental problems can be grouped into three categories (resource depletion, pollution, and loss of biodiversity). Humans rely on the diversity of life on Earth for food and oxygen. Nature makes natural resources in different ways at varied speeds. Environmental justice depends on environmental ethics and environmental science.	Distinguish between the scientific terms: hypothesis, inference, law, theory, principle, fact, and observation. Use scientific processes to understand environmental issues. Describe trends in human population growth. Classify environmental issues Compare ecological footprints Relate natural resources to the renewability continuum Explore how environmental science interacts with, and is guided by a society's morals and principles.

Unit Key vocabulary	environment, environmental science, environmentalism, natural resource, renewable, nonrenewable, sustainable, fossil fuel, ecological footprint, hypothesis, scientific theory, scientific law, independent variable, dependent variable, control variable, data, peer review, environmental ethics

Sample Unit Activating Strategy	Fixing a Hole in the Sky Central Case

	Lesson 1	Lesson 2	Lesson 3
Duration	7 days	10 days	3 days
Lesson Essential Question	How does environmental science help us understand the natural world?	What does it mean to "do science"?	What happens to a scientific study after data have been gathered and the results are analyzed?

Key Lesson Vocabulary	environment, environmental science, environmentalism, natural resource, renewable, nonrenewable, sustainable, fossil fuel, ecological footprint		hypothesis, independent variable, dependent variable, control, data, controlled experiment, applied science		peer review, environmental ethics, scientific theory, scientific law
Assessment	Exit ticket strategies and quizzes		Exit ticket strategies and quizzes		Exit ticket strategies and quizzes

Authentic, Varied, and Frequent Assessment Types
Common Pre-Assessment (If applicable):
Bell ringer and exit ticket strategies
Common Summative Assessment:
Chapter/Unit 1 Test, Labs, Projects, Keystone Biology
Unit Success Criteria:
Score of 65% on lab reports, projects, and Chapter/Unit Exam

Resources

Scaffolds and Enrichment		
Struggling Learners	**Multilingual Learners**	**Advanced Learners**
Individualized instruction, Notes, Study guides, Quizlets provided	web-based translation tools, Spanish Biology Keystone Glossary	Interactives and online labs

Environmental Biology Unit 2 - Earth's Environmental Systems

Subject:	Environmental Biology	**Grade Level:**	9	**Duration:**	10 Days

Key Learning	*The structure and function of matter at different levels of environmental science and biology.*
Unit Essential Question:	How do the properties of matter support life on Earth?

Standard - 3.2.10.A2: Compare and contrast different bond types that result in the formation of molecules and compounds.
Standard - 3.3.10.A1: Relate plate tectonics to both slow and rapid changes in the earth's surface. Relate geochemical cycles to the conservation of matter. Explain how the Earth is composed of a number of dynamic, interacting systems exchanging energy or matter.
Standard - 3.3.10.A2: Analyze the effects on the environment and the carbon cycle of using both renewable and nonrenewable sources of energy.
Standard - 3.3.10.A3: Explain how the evolution of Earth has been driven by interactions between the lithosphere, hydrosphere, atmosphere, and biosphere.
Standard - 3.3.10.A4: Relate geochemical cycles to conservation of matter. Explain how the Earth's systems and its various cycles are driven by energy.

Identified Eligible Content Addressed in the Unit:

Eligible Content - BIO.A.2.1.1 Describe the unique properties of water and how these properties support life on Earth (e.g., freezing point, high specific heat, cohesion).
Eligible Content - BIO.A.2.2.1 Explain how carbon is uniquely suited to form biological macromolecules.
Eligible Content - BIO.A.2.2.2 Describe how biological macromolecules form from monomers.
Eligible Content - BIO.A.2.2.3 Compare and contrast the structure and function of carbohydrates, lipids, proteins, and nucleic acids in organisms.

Know (Concepts):	Do (Competencies):
The unique properties of water support life on Earth. The polarity of water causes its unique properties (cohesion, adhesion, solvent abilities, low ice density, and high specific heat capacity). Relationships between structure and function exist at various levels of biochemical organization (i.e., atoms, molecules, and macromolecules). Carbon's four valence electrons allow it to form covalent bonds with up to four other atoms, making chains, rings, and branching structures. Newton's law of conservation of mass and energy describes matter and energy flow in Earth's systems. The Earth system is made up of 4 spheres of function (geosphere, atmosphere, hydrosphere, and biosphere) which influence each other through inputs and outputs of matter, energy, and information. Earth's nonliving components support life by cycling matter and energy through ecosystems. The evolution of Earth has been driven by interactions between the lithosphere, hydrosphere, atmosphere, and biosphere. Plate tectonics influences both slow and rapid changes in Earth's surface and the biogeographical distribution of life on Earth.	Explain how the structure of water is responsible for its unique properties. Describe how solutions in water are formed. Use models to explain how cohesion of water molecules influence hydrogen bonding, surface tension, and capillary action. Explain how water's thermal properties relate to molecular structure and hydrogen bonding. Explain how water functions in living things. Analyze abiotic components of an ecosystem through various field site observational studies. Model how the atomic structure of carbon makes it uniquely suited to be the chemical basis of life on Earth. Describe how biological macromolecules form from monomers. Compare and contrast the structure and function of carbohydrates, lipids, proteins, and nucleic acids in organisms. Model how macronutrients cycle through Earth's interconnected systems. Analyze the human impact on our biogeochemical cycles.

Unit Key vocabulary	atom, subatomic particle, nucleus, proton, neutron, electron, valence electrons, element, periodic table, isotope, ionic bond, ion, covalent bond, molecule, compound, inorganic, organic, chemical formula, macromolecule, hydrocarbon, carbohydrate, protein, lipid, nucleic acid, mixture, solution, solvent, solute, polarity, cohesion, adhesion, capillary action, density, specific heat, acid, base, pH, system, feedback loop, geosphere, tectonic plate, landform, erosion, deposition, biosphere, atmosphere, hydrosphere, hydrologic cycle, evaporation, transpiration, condensation, precipitation, aquifer, groundwater, conservation of matter, nutrients, biogeochemical cycle, producer, consumer, decomposer, photosynthesis, respiration, eutrophication, nitrogen fixation, ammonification, nitrification, denitrification

Sample Unit Activating Strategy	Dead Zones Central Case

	Lesson 1	**Lesson 2**	**Lesson 3**
Duration	2 days	2 days	3 days
Lesson Essential Question	What are the building blocks of matter and how do they behave?	What are the molecules of life?	How does water support life on Earth?
Key Lesson Vocabulary	atom, subatomic particle, nucleus, proton, neutron, electron, valence electrons, element, periodic table, isotope, ionic bond, ion, covalent bond, polar, nonpolar, molecule, compound, solution, mixture	inorganic, organic, chemical formula, macromolecule, hydrocarbon, carbohydrate, protein, lipid, nucleic acid	solution, solvent, solute, polarity, cohesion, adhesion, capillary action, density, specific heat, acid, base, pH
Assessment	Exit ticket strategies and quizzes	Exit ticket strategies and quizzes	Exit ticket strategies and quizzes

	Lesson 4	**Lesson 5**	**Lesson 6**
Duration	1 day	2 days	
Essential Question	What types of systems play roles in environmental science?	How do nutrients cycle through the environment?	
Key Lesson Vocabulary	feedback loop, input, output, geosphere, tectonic plate, landform, erosion, deposition, biosphere, atmosphere, hydrosphere	hydrologic cycle, evaporation, transpiration, condensation, precipitation, aquifer, groundwater, conservation of matter, nutrients, biogeochemical cycle, producer, consumer, decomposer, photosynthesis, respiration, eutrophication, nitrogen	

			fixation, ammonification, nitrification, denitrification	
Assessment	Exit ticket strategies and quizzes		Exit ticket strategies and quizzes	

Authentic, Varied, and Frequent Assessment Types
Common Pre-Assessment (If applicable):
Bell ringer and exit ticket strategies
Common Summative Assessment:
Chapter/Unit 2 Test, Labs, Projects, Keystone Biology
Unit Success Criteria:
Score of 65% on lab reports, projects, and Chapter/Unit Exam

Resources
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Scaffolds and Enrichment		
Struggling Learners	**Multilingual Learners**	**Advanced Learners**
Individualized instruction, Notes, Study guides, Quizlets provided	web-based translation tools, Spanish Biology Keystone Glossary	Interactives and online labs

Environmental Biology Unit 3 - Population Ecology

Subject	Environmental Biology	Grade Level:	9	Duration:	20 Days

Key Learning	*The characteristics of a population and dynamic changes that happen to groups of organisms.*

Unit Essential Question:	How do changes in population size relate to environmental conditions?

Identified Standards Addressed in the Unit:
Standard - 3.1.10.A1: Explain the characteristics of life common to all organisms. Standard - 4.1.10.A: Examine the effects of limiting factors on population dynamics. Standard - 4.1.10.B: Explain the consequences of interrupting natural cycles.

Identified Eligible Content Addressed in the Unit:
BIO.B.4.1.1 Describe the levels of ecological organization (i.e., organism, population, community, ecosystem, biome, biosphere). BIO.B.4.2.5 Describe the effects of limiting factors on population dynamics and potential species extinction.

Know (Concepts):	Do (Competencies):
Life is organized on different levels. Life requires both biotic and abiotic factors. Biotic and abiotic factors determine the size of populations. Gestation and generation time determine an organism's biotic potential. The characteristics of populations are size, density, distribution, age structure, sex ratio.	Describe characteristic biotic and abiotic components of aquatic and terrestrial ecosystems. Describe the levels of ecological organization (i.e., organism, population, community, ecosystem, biome, and biosphere) Describe and interpret relationships between structure and function at various levels of biological organization (i.e. organelles, cells, tissues, organs, organ systems, and multicellular organisms).

Populations grow exponentially and logistically. Migration causes population size to change cyclically. (births + immigration) - (deaths + emigration) = population growth rate	Describe the effects of limiting factors on population dynamics and potential species extinction. Analyze possible causes of population fluctuations. Explain the concept of carrying capacity in an ecosystem. Describe how organisms become classified as threatened or endangered. Describe how limiting factors cause organisms to become extinct.

Unit Key vocabulary	ecology, species, population, community, ecosystem, biome, biosphere, biotic factor, abiotic factor, habitat, resource, population size, population density, population distribution, age structure, diagram, sex ratio, survivorship curve, birth rate, death rate, immigration, emigration, migration, exponential growth, logistic growth, density dependent limiting factor, density independent limiting factor, carrying capacity, biotic potential

Sample Unit Activating Strategy	Finding Gold Central Case

	Lesson 1	**Lesson 2**	**Lesson 3**
Duration	5 days	7 days	8 days
Lesson Essential Question	How do ecologists organize and study life?	What are the important characteristics of populations?	What factors determine whether, and how, a population's size changes?
Key Lesson Vocabulary	ecology, species, population, community, ecosystem, biome, biosphere, biotic factor, abiotic factor, habitat, resource	population size, population density, population distribution, age structure diagram, sex ratio	survivorship curve, birth rate, death rate, immigration, emigration, migration, exponential growth, logistic growth, density dependent limiting factor, density independent limiting factor, carrying capacity, biotic potential
Assessment	Endangered Species Documentary	Field Site Analysis Mark-Recapture Lab	Limiting Factors Lab Population Ecology Graphs

	Levels of Ecological Organization Project		Random Sampling Lab	

Authentic, Varied, and Frequent Assessment Types
Common Pre-Assessment (If applicable):
Bell ringer and exit ticket strategies
Common Summative Assessment:
Chapter/Unit Test, Labs, Projects, Keystone Biology
Unit Success Criteria:
Score of 65% on lab reports, projects, and Chapter/Unit Exam

Resources

Scaffolds and Enrichment		
Struggling Learners	**Multilingual Learners**	**Advanced Learners**
Individualized instruction, Notes, Study guides, Quizlets provided	web-based translation tools, Spanish Biology Keystone Glossary	Interactives and online labs

Environmental Biology Unit 4 - Evolution and Natural Selection

Subject:	Environmental Biology	**Grade Level:**	9	**Duration:**	5 Days

Key Learning	*The mutability and permanence of life.*

Unit Essential Question:	How does Earth's biodiversity change over time?

Identified Standards Addressed in the Unit:

Standard - 3.1.10.C1: Explain the mechanisms of biological evolution.
Standard - 3.1.10.C2: Explain the role of mutations and gene recombination in changing a population of organisms.
Standard - 3.1.10.C3: Interpret data from fossil records, anatomy and physiology, and DNA studies relevant to the theory of evolution.

BIO.B.3.1.1 Explain how natural selection can impact allele frequencies of a population.
BIO.B.3.1.2 Describe the factors that can contribute to the development of new species (e.g., isolating mechanisms, genetic drift, founder effect, migration).
BIO.B.3.1.3 Explain how genetic mutations may result in genotypic and phenotypic variations within a population.
BIO.B.3.2.1 Interpret evidence supporting the theory of evolution (i.e., fossil, anatomical, physiological, embryological, biochemical, and universal genetic code).

Know (Concepts):	Do (Competencies):
Charles Darwin was a key player in the understanding of how organisms change over time. There are four mechanisms that drive the evolution of species over time.	Identify Charles Darwin's Contribution to science. Describe the three patterns of biodiversity noted by Darwin. Identify and describe the four primary mechanisms of biological evolution.

Natural selection of a species is driven by three underlying conditions. The diversity of Earth is influenced by speciation and extinction. The theory of evolution is supported by anatomical, temporal, geographical, ecological, mechanical, and chemical evidence.	Describe how speciation and extinction affect the diversity of life on Earth. Describe the conditions for natural selection. Explain what evolutionary theory suggests about the unity and diversity of life. Describe how the geographic distribution of species today relates to their evolutionary history. Identify how fossils help document the descent of modern species. Explain what homologous structures and similarities in development suggest about the process of evolutionary change. Describe how molecular biology can be used to trace the process of evolution. Explain what recent research of the Galapagos finches show about natural selection.

Unit Key vocabulary	evolution, survival of the fittest, gene, mutation, genetic drift, natural selection, fitness, adaptation, artificial selection, geographical isolation, behavioral isolation, temporal isolation, mechanical isolation, ecological isolation, speciation, genetic divergence, homologous structure, analogous structure, vestigial structure, extinction, fossils

Sample Unit Activating Strategy	Natural selection simulation

	Lesson 1	Lesson 2	Lesson 3
Duration	2 days	3 days	
Lesson Essential Question	What role does the environment play in an organism's survival and reproduction?	What is the evidence of evolution?	
Key Lesson Vocabulary	evolution, survival of the fittest, gene, mutation, migration, genetic drift, natural selection, fitness, adaptation, artificial selection, genotype, phenotype, allele frequency, founder effect, isolating mechanism	allopatric speciation, mass extinction, vestigial organ, comparative anatomy, homology, transitional form	
Assessment	Mechanisms of Evolution Webquest	Evidence of Evolution Webquest	

Authentic, Varied, and Frequent Assessment Types
Common Pre-Assessment (If applicable):
Bell ringer and exit ticket strategies
Common Summative Assessment:
Chapter/Unit 1 Test, Labs, Projects, Keystone Biology
Unit Success Criteria:
Score of 65% on lab reports, projects, and Chapter/Unit Exam

Scaffolds and Enrichment		
Struggling Learners	**Multilingual Learners**	**Advanced Learners**
Individualized instruction, Notes, Study guides, Quizlets provided	web-based translation tools, Spanish Biology Keystone Glossary	Interactives and online labs

Environmental Biology Unit 5 - Community Ecology

Subject:	Environmental Biology	**Grade Level:**	9	**Duration:**	15 Days

Key Learning	The interactions between the biotic and abiotic factors make up the foundation of our natural ecosystems.

Unit Essential Question:	How do organisms affect one another's survival and environment?

Identified Standards Addressed in the Unit:

Standard - 4.1.10.A: Examine the effects of limiting factors on population dynamics.

- Analyze possible causes of population fluctuations.
- Explain the concept of carrying capacity in an ecosystem.
- Describe how organisms become classified as threatened or endangered.
- Describe how limiting factors cause organisms to become extinct.

Standard - 4.1.10.B: Explain the consequences of interrupting natural cycles.

Standard - 4.1.10.C: Evaluate the efficiency of energy flow within a food web.
Describe how energy is converted from one form to another as it moves through a food web (photosynthetic, geothermal).

Standard - 4.1.10.D: Research practices that impact biodiversity in specific ecosystems.

- Analyze the relationship between habitat changes to plant and animal population fluctuations.

Standard - 4.1.10.E: Analyze how humans influence the pattern of natural changes (e.g. primary / secondary succession and desertification) in ecosystems over time.

Identified Eligible Content Addressed in the Unit:
BIO.B.4.2.2 Describe biotic interactions in an ecosystem (e.g., competition, predation, symbiosis). BIO.B.4.2.4 Describe how ecosystems change in response to natural and human disturbances (e.g., climate changes, introduction of nonnative species, pollution, fires). BIO.A.3.2.1 Compare and contrast the basic transformation of energy during photosynthesis and cellular respiration. BIO.B.4.2.1 Describe how energy flows through an ecosystem (e.g., food chains, food webs, energy pyramids). BIO.B.4.2.4 Describe how ecosystems change in response to natural and human disturbances (e.g., climate changes, introduction of nonnative species, pollution, fires).

Know (Concepts):	Do (Competencies):
An organism's niche is affected by both its tolerance and competitive interactions. Predation, parasitism and herbivory are interactions in which one species benefits, while the other is harmed. Mutualism and commensalism are relationships in which neither participants are harmed. Organisms are classified as either producers or consumers based on how they obtain energy and nutrients. Inefficient energy transfer between organisms shapes the structure of communities. Feeding relationships have both direct and indirect effects on organisms in the community. Following a disturbance, communities may undergo succession. Without limiting factors, species introduced to a new area can become invasive.	Discuss the factors that influence an organism's niche. Compare and contrast predation, parasitism, and herbivory. Describe mutualism and commensalism. Analyze the relationships present in an ecosystem. Explain the difference between producers and consumers. Explain the effect of the 10% Rule of energy transfer on community structure. Describe how feeding relationships can have both direct and indirect effects on community members. Construct a food chain and a food web and explain the transfer of energy through trophic levels. Describe what happens to a community after a disturbance. Explain the conditions for a species to become invasive.

Unit Key vocabulary	realized niche, fundamental niche, tolerance, resource partitioning, predation, coevolution, parasitism, symbiosis, herbivory, mutualism, commensalism, interspecific competition, intraspecific competition, competitive exclusion, producer, photosynthesis, chemosynthesis, primary consumer, secondary consumer, tertiary consumer, cellular respiration, herbivore,

[redacted]	carnivore, omnivore, detritivore, decomposer, trophic level, biomass, food chain, food web, keystone species, autotroph, heterotroph,

Sample Unit Activating Strategy	Black and White and Spread All Over Central Case

	Lesson 1	**Lesson 2**	**Lesson 3**
Duration	5 days	5 days	5 days
Lesson Essential Question	How do species interact in nature?	How do energy and nutrients move through communities?	How do communities respond to a disturbance?
Key Lesson Vocabulary	realized niche, fundamental niche, tolerance, resource partitioning	predation, coevolution, parasitism, symbiosis, herbivory, mutualism, commensalism, interspecific competition, intraspecific competition, competitive exclusion	producer, photosynthesis, chemosynthesis, primary consumer, secondary consumer, tertiary consumer, cellular respiration, herbivore, carnivore, omnivore, detritivore, decomposer, trophic level, biomass, food chain, food web, keystone species, autotroph, heterotroph
Assessment	Resource Partitioning Analysis Lab	Trials of Life Video Analysis	Food Chains and Food Web Project

Authentic, Varied, and Frequent Assessment Types
Common Pre-Assessment (If applicable):
Bell ringer and exit ticket strategies
Common Summative Assessment:
Chapter/Unit Test, Labs, Projects, Keystone Biology
Unit Success Criteria:
Score of 65% on lab reports, projects, and Chapter/Unit Exam

Resources

Scaffolds and Enrichment		
Struggling Learners	**Multilingual Learners**	**Advanced Learners**
Individualized instruction, Notes, Study guides, Quizlets provided	web-based translation tools, Spanish Biology Keystone Glossary	Interactives and online labs

Environmental Biology Unit 6 - Ecosystem and Biomes

Subject:	Environmental Biology	**Grade Level:**	9	**Duration:**	10 Days

Key Learning	The conditions and organisms that characterize the world's biomes and aquatic ecosystems
Unit Essential Question:	How does the environment affect where and how an organism lives?

Identified Standards Addressed in the Unit:

Standard - 4.1.10.D: Research practices that impact biodiversity in specific ecosystems.

- Analyze the relationship between habitat changes to plant and animal population fluctuations.

Identified Eligible Content Addressed in the Unit:

BIO.B.4.1.1 Describe the levels of ecological organization (i.e., organism, population, community, ecosystem, biome, biosphere).

Know (Concepts):	**Do (Competencies):**
Biomes are characterized by their climates as well as typical plant and animal life. Organisms are adapted to the conditions of their biomes. Ecologists classify aquatic ecosystems according to criteria such as salinity, depth, and whether water is flowing or standing. Estuaries are home to diverse ecosystems that prevent soil erosion and flooding.	Model how biomes are characterized. Explain how organisms are adapted to the conditions of their biomes. Describe the criteria ecologists use to classify aquatic ecosystems. Model the major categories of freshwater ecosystems. Explain how estuaries contribute to ecosystems. Model the three major zones of the ocean.

The ocean can be divided into three zones based on their distance from shore: intertidal, neritic, and open ocean.	

Unit Key vocabulary	biome, climate, weather, climatograph, gross primary production, net primary production, canopy, emergent layer, understory, epiphyte, deciduous, estivation, coniferous, hibernation, permafrost, adaptation, salinity, photic zone, aphotic zone, benthic zone, littoral zone, limnetic zone, wetland, flood plain, estuary, upwelling, downwelling, brackish, intertidal zone, neritic zone

Sample Unit Activating Strategy	Addo Elephant Central Case

Duration	2 days	4 days	4 days
Lesson Essential Question	What biotic and abiotic factors are used to classify biomes?	How are organisms adapted to the conditions of their biomes?	What conditions and organisms characterize the world's aquatic ecosystems?
Key Lesson Vocabulary	biome, climate, weather, climatograph, gross primary production, net primary production	canopy, emergent layer, understory, epiphyte, deciduous, estivation, coniferous, hibernation, permafrost, adaptation	salinity, photic zone, aphotic zone, benthic zone, littoral zone, limnetic zone, wetland, flood plain, estuary, upwelling, downwelling, brackish, intertidal zone, neritic zone
Assessment	Biome Project	Biome Project	Biome Project

Authentic, Varied, and Frequent Assessment Types
Common Pre-Assessment (If applicable):
Bell ringer and exit ticket strategies
Common Summative Assessment:
Chapter/Unit Test, Labs, Projects, Keystone Biology
Unit Success Criteria:
Score of 65% on lab reports, projects, and Chapter/Unit Exam

Resources

Scaffolds and Enrichment		
Struggling Learners	**Multilingual Learners**	**Advanced Learners**
Individualized instruction, Notes, Study guides, Quizlets provided	web-based translation tools, Spanish Biology Keystone Glossary	Interactives and online labs