PLANNED INSTRUCTION

A PLANNED COURSE FOR:

Science 9

Curriculum writing committee:

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Grade Level:

9

Date of Board Approval: _____2020_____

Science Department Grading Policy

Category	Major Assessments	Skills Application	Skills Practice	Participation
Weight %	**45%**	**30%**	**20%**	**5%**
Examples	Common Assessment/ Unit Test	chapter test- MC for recall	summary writing process- introduction/body/conclusion	research paper check for completion
	Research Paper	article summary- page +	rough draft for content	outlining a chapter- T chart/completing vocab
	Persuasive essay- or any formal writing assignment that requires more than 1 citation	lab questions with collection of data and graphing of data	vocab quiz	warmups/exit slips
			short answer homework	parent signatures of grade reports
	Chapter test- short answer/essay (can include MC)	Constructed Responses- can be homework or in class	assessing their reading comprehension- quiz	homework graded for completion
	formal lab report	Presentation graded on depth of knowledge	developing a powerpoint/brochure	participation
	lab application exam		study workbook evaluation	class preparation
	assessing real world problems or applying knowledge in real world context	Writing assignment for a video	graphing of data	pre-assessments
		Short answer quiz	practice problems	behavior

Each assignment within a category can be further weighted by use of a point system. Some assigments will be worth more points and some less.

Curriculum Map

Overview:

This course provides students an understanding of ecology and environmental study. The course will delve into aspects of ecological study including organism adaptations, population dynamics, trophic structure, community interactions and ecosystem connections, culminating in application of these features to terrestrial and aquatic biomes. The course will also provide a focus on human population growth, demographic study and its connection to a variety of environmental topics including, but not limited, to land use, soil, energy and resource management, mining, water pollution, conservation and global warming. This course will begin to prepare students for the Keystone Biology Exam, stressing writing and data analysis utilizing current events to develop necessary critical thinking skills in a rapidly evolving society.

FULL YEAR, 1 CREDIT, GRADE 9

Goals:

Understanding of:

Marking Period 1:

- Science and the Scientific Method
- Earth's Spheres, Systems, and Cycles
- Population Ecology

Marking Period 2:

- Population Ecology
- Community Ecology
- Energy in Ecosystem

Marking Period 3:

- Terrestrial Biomes and Ecosystems
- Aquatic Ecosystems
- Characteristics of Living Things, Biodiversity, and Biological Classification
- Natural Resource Management: Fisheries and Forestry
- Natural Resource Management: Agriculture and Food production

Marking Period 4:

- Natural Resource Management: Mining and Mineral Resources
- Natural Resource Management: Water
- Natural Resource Management: Renewable and Non-Renewable Energy
- Earth's Atmosphere and Climate Change
- Human Populations
- Environmental Issues Final Project

Big Ideas:

- Environmental science is built upon multiple other fields of science
- Living things depend on their habitat to meet their basic needs.
- The survival of living things is dependent upon their adaptations and ability to respond to natural changes and human influences on the environment.
- Aquatic, terrestrial and human-made ecosystems consist of diverse living and nonliving components that change over time and among geographic areas.
- The survival of living things is dependent upon their adaptations and ability to respond to natural changes in and human influences on the environment.
- People acting individually and/or as groups influence the environment.
- Environmental laws and regulations influence humans, the environment, and the economy in both positive and negative ways.
- Sustainable use of natural resources is essential to provide for the needs and wants of all living things now and in the future.
- Humans depend upon the management and practices of agricultural systems.

Textbook and Supplemental Resources:

- Primary Text: Pearson Environmental Science, Pearson Education, 2011.
- Pearson Environmental Science Section Assessments
- Pearson Environmental Science Study Workbook Level A
- Pearson Environmental Science Chapter Assessments
- Pearson Environmental Science Examview Assessment Builder
- Pearson Environmental Science Electronic Resources Disc

Curriculum Plan

Unit 1: Science and the Scientific Method **Time/Days: 15 days**

Standards: 3.2.10.B.7, 3.3.10.A.8, 3.1.12.A8, 4.3.12.C, 3.5.7.B, 3.1.12.B, 3.1.12.C, 3.4.10.B1., 3.4.10.D3., CC.3.5.9-10.C, CC.3.5.9-10.E, CC.3.6.11-12.C, 3.2.C.B7, 3.3.10.A8, 3.1.10.A9, 3.1.B.A9

Anchors: S11.A.3.2 S11.A.1.1.1, S11.A.1.1.2, S11.A.1.1.3, S11.A.1.1.5, S11.A.1.2.2, S11.A.1.3.1, S11.A.1.3.3, S11.A.1.3.4, S11.A.2.1.1, S11.A.2.1.2, S11.A.2.1.3, S11.A.2.1.4, S11.A.2.1.5, S11.A.2.2.1, S11.A.3.1.2, S11.A.3.2.2, BIO.A.2.2

Eligible Content: Classify observations as qualitative and/or quantitative; Distinguish between the scientific terms: hypothesis, inference, law, theory, principle, fact, and observation; Distinguish between a scientific theory and an opinion, explaining how a theory is supported with evidence, or how new data/information may change existing theories and practice; Explain how certain questions can be answered through scientific inquiry and/or technological design; Use evidence, such as observations or experimental results, to support inferences about a relationship; Develop descriptions, explanations, predictions, and models using evidence; Identify environmental issues and explain their potential long-term health effects (e.g., pollution, pest controls, vaccinations); Use evidence, observations, or explanations to make inferences about change in systems over time (e.g., carrying capacity, succession, population dynamics, loss of mass in chemical reactions, indicator fossils in geologic time scale) and the variables affecting these changes; Given a scenario, explain how a dynamically changing environment provides for the sustainability of living systems; Compare the time span of renewability for fossil fuels and the time span of renewability for alternative fuels.

Objectives:

- Define the environment (DOK 1)
- Distinguish between the natural and supernatural world (DOK 2)
- Define environmental science (DOK 1)
- Identify problems that environmental science can address (DOK 1)
- List the contributing branches of science that make environmental science an interdisciplinary field (DOK 1)
- Identify bias (DOK 1)
- Argue why bias does not belong in scientific thinking (DOK 3)
- Define natural resources (DOK 1)
- Categorize resources as renewable or nonrenewable (DOK 2)
- Apply the concept of sustainability at the individual, community, national levelsl (DOK 4)
- Describe the trend in human population growth, identifying key events (agricultural and industrial revolution, etc.) (DOK 1)
- Calculate ecological footprints (DOK 2)
- Apply the Tragedy of the Commons concept to Earth's limited natural resources (DOK 4)

- Compare/contrast science as both a body of knowledge and a process (DOK 2)
- Argue the importance of evidence in supporting scientific fact (DOK 3)
- Distinguish between evidence/opinions and objective/subjective ideas (DOK 2)
- Make and differentiate between observations and inferences (DOK 3)
- Identify the steps of the scientific method (DOK 1)
- Generate a hypothesis (DOK 2)
- Compare/contrast independent and dependent variables (DOK 2)
- Identify the independent and dependent variables in an experiment (DOK2)
- Design a controlled scientific experiment (DOK 4)
- Predict outcomes of a scientific experiment (DOK 2)
- Use data to support or reject hypotheses (DOK 3)
- Argue the importance of peer-review in scientific publishing (DOK 3)
- Differentiate between hypotheses, scientific theory and scientific laws (DOK 3)
- Define environmental ethics (DOK 1)
- Distinguish between anthropocentric, biocentric, ecocentric, and other worldviews (DOK 2)
- Argue the ethical basis for securing a sustainable future (DOK 3)

Core Activities and Corresponding Instructional Methods:

- "What is Science/Environmental Science" Drawing Activity
- Calculate Ecological Footprints
- Tragedy of the Commons Fishing Activity
- Observation/Inference Outdoor Drawing Activity (conditions permitting)
- Mineral Density Lab
- Chapter 1 Central Case: Fixing a Hole in the Sky

Assessments:

- **Diagnostic:** "What is Science/Environmental Science" drawing activity, and ATBs
- **Formative:** ATBs, section quizzes, class activities, and assignments
- **Summative:** Unit One Common Assessment

Unit 2: Earth's Spheres, Systems, and Cycles **Time/Days: 15 days**

Standards: 3.1.B.A2, 3.1.B.A7, 3.1.C.A9, 3.1.B.B1,BIO.A.2.1, BIO.A.2.2, CC.3.5.11-12.B, CC.3.5.9-10.E, CC.3.6.11-12.C, 3.3.10.A1, 3.3.10.A2, 3.2.C.B7, 3.3.10.A3,3.3.10.A4, 3.3.10.A5, 3.3.10.A6, 3.3.10.A7, 3.3.10.A8, 3.3.12.A1, 3.3.12.A5, 3.3.10.A4,Standard - 3.3.10.A5, 3.1.10.A7, 3.1.10.A9, 3.1.B.A2, 3.1.B.A5, 3.1.B.A7, 3.1.B.A8, 3.1.B.A9, 3.2.10.A2

Anchors: BIO.A.2.2, BIO.A.3.2, BIO.B.4.2, BIO.B.1, BIO.A.2.1, BIO.B.1.2, BIO.B.3.3

Eligible Content: Describe how biological macromolecules form from monomers. Compare and contrast the basic transformation of energy during photosynthesis and cellular respiration. Describe how matter recycles through an ecosystem (i.e., water cycle, carbon cycle, oxygen cycle, nitrogen cycle). Know that both direct and indirect observations are used by scientists to study the natural world and universe. Recognize and analyze alternative explanations and models. Describe the unique properties of water and how these properties support life on Earth (e.g., freezing point, high specific heat, cohesion). Identify the initial reactants, final products, and general purposes of photosynthesis and cellular respiration. Analyze the importance of carbon to the structure of biological macromolecules. Compare and contrast the functions and structures of proteins, lipids, carbohydrates, and nucleic acids. Describe how the unique properties of water support life.

Objectives:

- Describe Matter (DOK 1)
- Distinguish between an element and an atom (DOK 2)
- Identify the three subatomic particles (DOK 1)
- Compare and contrast ionic and covalent bonding (DOK 2)
- Define molecules and compounds and provide examples of each (DOK 1)
- Compare/contrast organic and inorganic molecules (DOK 2)
- Explain the importance of carbon in organic molecules (DOK 3)
- Define a hydrocarbon (DOK 1)
- Show how polymers are created from monomers (DOK 2)
- Describe how the four macromolecules are essential to life. (DOK 3)
- Identify the properties of water. (DOK 1)
- Define a solution as an acid, base, or neutral based on position on the pH scale (DOK 2)
- Compare/contrast positive and negative feedback loops (DOK 2)
- Define Earth's geosphere, lithosphere, biosphere, atmosphere, and hydrosphere. (DOK 1)
- Explain the parts of Earth's geosphere and atmosphere. (DOK 3)
- Describe how plate tectonics may have given rise to landmasses (DOK 3)
- Distinguish and explain the processes of the water, carbon, nitrogen, and phosphorus cycles. (DOK level 2)

- Explain how the law of conservation of matter applies to nutrient cycles. (DOK 3)
- Analyze and propose solutions to human impacts on the water cycle and aquifers (DOK 4)
- Compare and contrast the net equations for photosynthesis/cellular respiration (DOK 1)
- Define consumers and producers (DOK 1)
- Describe the roles of consumers and producers in biogeochemical cycles (DOK 2)
- Correlate the process of eutrophication to the formation of “dead zones” (DOK 4)

Core Activities and Corresponding Instructional Methods:

- Chapter 3 Central Case: The Gulf of Mexico’s Dead Zone
- Nitrogen Cycle Activity

Assessments:

- **Diagnostic:** ATBs
- **Formative:** ATBs, section quizzes, class activities, and assignments
- **Summative:** Unit 2 Common Assessment

Unit 3: Population Ecology **Time/Days: 20 days**

Standards: CC.3.5.9-10.E, CC.3.6.11-12.C, 3.1.10.A1,3.1.10.A2, 3.1.10.A9, 3.1.B.A1, 3.1.B.A2, 3.1.B.A9, 3.1.B.B6

Anchors: BIO.B.3.3, BIO.B.4.1, BIO.B.4.2

Eligible Content: Describe relationships between structure and function at biological levels of organization. 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). Describe ecological levels of organization in the biosphere. Describe the levels of ecological organization (i.e., organism, population, community, ecosystem, biome, biosphere).
Describe characteristic biotic and abiotic components of aquatic and terrestrial ecosystems.
Describe interactions and relationships in an ecosystem. Describe biotic interactions in an ecosystem (e.g., competition, predation, symbiosis). Describe the effects of limiting factors on population dynamics and potential species extinction.

Objectives:

- Define ecology (DOK 1)
- List and describe the levels of biological organization from atom to biosphere (DOK 1)
- Identify which levels of organization are studied by ecologists (DOK 1)
- Differentiate among individuals, populations, communities, ecosystems, biomes, & the biosphere (DOK 2)
- Compare/contrast biotic and abiotic factors (DOK 2)
- Distinguish the difference between climate and weather (DOK 2)
- Compare and assess how abiotic factors, such as terrain and climate, impact generalists and specialists
- Explain how a species' habitat provides the resources it needs for survival (DOK 3)
- Define ecological tolerance (DOK 1)
- Define population size (DOK 1)
- Explain the usefulness of tracking population size. (DOK level 3)
- Compare different population counting methods (DOK 3)
- Calculate population sizes using sampling and mark-recapture techniques (DOK 2)
- Define population density. (DOK level 1)
- Investigate the three ways populations can be distributed. (DOK level 3)
- Explain the historical and future patterns age structure diagrams tell you about a population. (DOK level 3)
- Distinguish the differences between type 1, 2 and 3 survivorship curves

- Provide examples of organisms defined by the three type of survivorship curves (DOK 3)
- Distinguish the factors that influence a population's growth rate (natality, mortality, immigration, emigration). (DOK 2)
- Distinguish the differences between seasonal migration, immigration, and emigration (DOK 2)
- Cite evidence on how habitat fragmentation and human development impacts the migration of populations
- Compare/contrast exponential and logistic growth. (DOK 2)
- Construct a graph labeling and explaining the phases of exponential and logistic growth
- Define carrying capacity (DOK 1)
- Predict carrying capacity using a logistic growth curve (DOK 2)
- Define limiting factors (DOK 1)
- Define the two types of limiting factors (DOK 1)
- Describe how limiting factors (density dependent and density independent) and biotic potential affect population growth. (DOK 3)
- Show how limiting factors determine carrying capacity (DOK 2)
- Calculate population growth (DOK 2)

Core Activities and Corresponding Instructional Methods:

- Chapter 4 Central Case: Finding Gold in a Costa Rican Cloud Forest
- Sampling Simulation Lab
- Exponential and Logistic Growth Constructed Response
- Logistic Growth Curve Drawing Project

Assessments:

- **Diagnostic:** ATBs, think share, KWL
- **Formative:** ATBs, section quizzes, class activities, and assignments
- **Summative:** Unit 3 Common Assessment

Unit 4: Community Ecology **Time/Days: 20 days**

Standards: CC.3.5.9-10.E, CC.3.6.11-12.C, 3.2.C.B2, 3.2.C.B3, 3.3.10.A5, 3.1.10.A1, 3.1.10.A2, 3.1.10.A3, 3.1.10.A5, 3.1.10.A9, 3.1.B.A2, 3.1.B.A5, 3.1.B.A9, 3.1.B.B6, 3.1.10.C1, 3.1.10.C2

Anchors: BIO.A.2.2, BIO.A.3.1, BIO.A.3.2, BIO.B.1.2, BIO.B.2.3, BIO.B.3.1,BIO.B.3.2, BIO.B.4.1, BIO.B.4.2, 3.1.B.C1

Eligible Content: Describe ecological levels of organization in the biosphere. Describe the levels of ecological organization (i.e., organism, population, community, ecosystem, biome, biosphere). Describe characteristic biotic and abiotic components of aquatic and terrestrial ecosystems.
Describe interactions and relationships in an ecosystem. Describe how energy flows through an ecosystem (e.g., food chains, food webs, energy pyramids). Describe biotic interactions in an ecosystem (e.g., competition, predation, symbiosis). Describe how matter recycles through an ecosystem (i.e., water cycle, carbon cycle, oxygen cycle, nitrogen cycle). Describe how ecosystems change in response to natural and human disturbances (e.g., climate changes, introduction of nonnative species, pollution, fires). Describe the effects of limiting factors on population dynamics and potential species extinction. Identify and describe the cell structures involved in processing energy. Describe the fundamental roles of plastids (e.g., chloroplasts) and mitochondria in energy transformations. Identify and describe how energy is captured and transformed in organisms to drive their life processes. Compare and contrast the basic transformation of energy during photosynthesis and cellular respiration. 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). Describe how the process of DNA replication results in the transmission and/or conservation of genetic information.

Objectives:

- Compare/contrast evolution and biological evolution (DOK 2)
- Summarize the four primary mechanisms of biological evolution. (DOK 2)
- Assess how speciation and extinction affect the diversity of life on Earth. (DOK 3)
- Summarize how a species' adaptations determine an organism's niche in a habitat. (DOK 2)
- Define resource (DOK 1)
- Identify patterns in the relationship between a habitat and niche (DOK 2)
- Define niche and resource partitioning (DOK 1)
- Compare examples of niche and resource partitioning (DOK 2)
- Distinguish between competition and competitive exclusion (DOK 2)
- Investigate examples of scientific studies to explain competitive exclusion (DOK 3)

- Describe the difference between intraspecific and interspecific competition (DOK 2)
- Identify patterns of how invasive species impact biodiversity, habitats, and native species (DOK 3)
- Compare the differences in ecological tolerance between generalists and specialists (DOK 2)
- Compare and contrast predation, parasitism, and herbivory. (DOK 2)
- Use data to show how predator and prey population sizes are related (DOK 3)
- Identify patterns in predator and prey relationships (DOK 2)
- Define mutualism and commensalism. (DOK 1)
- Distinguish examples of the different types of symbiotic relationships (DOK 2)

Core Activities and Corresponding Instructional Methods:

- Predation or Starvation Graphing Activity
- Chapter 5 Central Case: Black and White and Spread All Over

Assessments:

- **Diagnostic:** ATBs, think share, KWL
- **Formative:** ATBs, section quizzes, class activities, and assignments
- **Summative:** Unit 3 Common Assessment

Unit 5: Energy in Ecosystems **Time/Days: 20 days**

Standards: CC.3.5.9-10.E, CC.3.6.11-12.C, 3.2.C.B2, 3.2.C.B3, 3.3.10.A5, 3.1.10.A1, 3.1.10.A2, 3.1.10.A3, 3.1.10.A5, 3.1.10.A9, 3.1.B.A2, 3.1.B.A5, 3.1.B.A9, 3.1.B.B6, 3.1.10.C1, 3.1.10.C2

Anchors: BIO.A.2.2, BIO.A.3.1, BIO.A.3.2, BIO.B.1.2, BIO.B.2.3, BIO.B.3.1,BIO.B.3.2, BIO.B.4.1, BIO.B.4.2, 3.1.B.C1

Eligible Content: Describe ecological levels of organization in the biosphere. Describe the levels of ecological organization (i.e., organism, population, community, ecosystem, biome, biosphere). Describe characteristic biotic and abiotic components of aquatic and terrestrial ecosystems.
Describe interactions and relationships in an ecosystem. Describe how energy flows through an ecosystem (e.g., food chains, food webs, energy pyramids). Describe biotic interactions in an ecosystem (e.g., competition, predation, symbiosis). Describe how matter recycles through an ecosystem (i.e., water cycle, carbon cycle, oxygen cycle, nitrogen cycle). Describe how ecosystems change in response to natural and human disturbances (e.g., climate changes, introduction of nonnative species, pollution, fires). Describe the effects of limiting factors on population dynamics and potential species extinction. Identify and describe the cell structures involved in processing energy. Describe the fundamental roles of plastids (e.g., chloroplasts) and mitochondria in energy transformations. Identify and describe how energy is captured and transformed in organisms to drive their life processes. Compare and contrast the basic transformation of energy during photosynthesis and cellular respiration. 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). Describe how the process of DNA replication results in the transmission and/or conservation of genetic information.

Objectives:

- Explain the difference between a producer and a consumer. (DOK level 3)
- Explain the difference between autotrophs and heterotrophs (DOK 3)
- Identify examples of producers and consumers (DOK 1)
- Name and define the different types of consumers (DOK 1)
- Distinguish the difference between photosynthesis and chemosynthesis (DOK 2)
- Summarize gas exchange and transpiration through plants (DOK 2)
- Compare the roles of phytoplankton and zooplankton as producers and consumers (DOK 2)
- Using examples, explain why producers are the foundation of all food chains – aquatic and terrestrial (DOK 4)
- Define the 10% rule (DOK 1)
- Investigate how energy pyramids are used to explain the flow of energy and energy transfer in a community (DOK 4)

- Explain the effect of inefficient energy transfer on community structure. (DOK level 3)
- Show that food chains and food web display trophic levels and direction of the flow of energy (DOK 2)
- Classify the trophic levels of food chains and food webs (DOK 2)
- Cite evidence as to how omnivores can be drawn or labeled in multiple trophic levels (DOK 3)
- Assess why apex predators (using a food web) are necessary for healthy communities (DOK 4)
- Analyze how feeding relationships can have both direct and indirect effects on community members. (DOK level 4)
- Define keystone species (DOK 1)
- Compare examples of plant and animals species that are scientifically considered keystone species (DOK 3)
- Cite evidence to argue why a species is considered a keystone species (DOK 3)
- Distinguish the difference between primary and secondary succession (DOK 2)
- Summarize the stages of succession from pioneer species to a climax community (DOK 2)
- Explain what happens to a community after a disturbance. (DOK 3)
- Explain the conditions necessary for a species to become invasive. (DOK 3)

Core Activities and Corresponding Instructional Methods:

- Create a diagram of a real food chain within an ecosystem to identify each trophic level and the amount of energy available at each level
- Analyze data to identify the effect of the presence and absence of a keystone species
- Draw images to depict the stages of primary and secondary succession

Assessments:

- **Diagnostic:** ATBs, think share, KWL
- **Formative:** ATBs, section quizzes, class activities, and assignments
- **Summative:** Unit 5 Common Assessment

Unit 6: Terrestrial Biomes/Ecosystems and Aquatic Ecosystems
Time/Days: 15 days

Standards: CC.3.5.9-10.E, CC.3.6.11-12.C, 3.1.10.A1,3.1.10.A2, 3.1.10.A3, 3.1.10.A5, 3.1.10.A9, 3.1.B.A2, 3.1.B.A5, 3.1.10.B1, 3.1.10.B6, 3.1.B.B1

Anchors: BIO.A.2.2, BIO.A.3.1, BIO.A.3.2, BIO.B.4.2

Eligible Content: Describe ecological levels of organization in the biosphere. Describe the levels of ecological organization (i.e., organism, population, community, ecosystem, biome, biosphere). Describe characteristic biotic and abiotic components of aquatic and terrestrial ecosystems. Describe interactions and relationships in an ecosystem. Describe how energy flows through an ecosystem (e.g., food chains, food webs, energy pyramids). Describe biotic interactions in an ecosystem (e.g., competition, predation, symbiosis). Describe how matter recycles through an ecosystem (i.e., water cycle, carbon cycle, oxygen cycle, nitrogen cycle). Describe how ecosystems change in response to natural and human disturbances (e.g., climate changes, introduction of nonnative species, pollution, fires). Describe the effects of limiting factors on population dynamics and potential species extinction.

Objectives:

- Create a presentation that applies concepts of ecology to a biome and ecosystem. (DOK 4)
- Explain the conditions necessary for a species to become invasive. (DOK level 3)
- Explain the abiotic factors that determine how biomes are characterized. (DOK level 3)
- Distinguish between climate and weather (DOK 2)
- Describe three major climate zones (DOK 2)
- Analyze climate data from climatographs, to determine the types of biomes (DOK 3)
- Distinguish between gross primary production and net primary production (DOK 2)
- Formulate how net primary production varies among biomes (DOK level 3)
- Explain how organisms are adapted to the conditions of their biomes (DOK level 3)
- Analyze the criteria (characteristics and zones), ecologists use to classify aquatic ecosystems. (DOK level 4)
- List the major categories of freshwater ecosystems. (DOK level 1)
- Describe the basic types of wetlands (DOK 2)
- Explain the ecological importance of estuaries. (DOK level 3)
- Analyze the criteria (characteristics and zones), ecologists use to classify marine ecosystems. (DOK level 4)

Core Activities and Corresponding Instructional Methods:

- Chapter 6 Central Case: Too Much of a Good Thing?
- Climatograph Activity
- Biome Presentation Project

Assessments:

- **Diagnostic:** ATBs, think share, KWL
- **Formative:** ATBs, section quizzes, class activities, and assignments
- **Summative:** Unit 6 Common Assessment

Unit 7: Taxonomy, Biodiversity, and Characteristics of Living Things

Time/Days: 10 days

Standards: CC.3.5.9-10.E, 3.1.10.A1,3.1.10.A2, 3.1.10.A3, 3.1.10.A5, 3.1.10.A6, 3.1.10.A7, 3.1.10.A9, 3.1.B.A1, 3.1.B.A2, 3.1.B.A3, 3.1.B.A5, 3.1.B.A7, 3.1.B.A8, 3.1.C.A1, 3.1.10.B1, 3.1.B.B6, 4.1.10.D

Anchors: BIO.A.1.1, BIO.A.1.2, BIO.A.2.2, BIO.A.2.3, BIO.A.3.1, BIO.A.3.2, BIO.A.4.2, BIO.B.1.2

Eligible Content: Describe the characteristics of life shared by all prokaryotic and eukaryotic organisms. 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). Compare the structure and function of carbohydrates, lipids, proteins, and nucleic acids in organisms. Explain how organisms maintain homeostasis (e.g., thermoregulation, water regulation, oxygen regulation). Explain how genetic information is inherited. Describe the levels of ecological organization (i.e., organism, population, community, ecosystem, biome, and biosphere). Describe how ecosystems change in response to natural and human disturbances (e.g., climate changes, introduction of nonnative species, pollution, fires). Describe the effects of limiting factors on population dynamics and potential species extinction.

Objectives:

- Distinguish between eukaryotes and prokaryotes (DOK 2)
- Define binomial nomenclature (DOK 1)
- Investigate how scientists systematically classify organisms (DOK 3)
- Summarize the characteristics of living things (DOK 2)
- Distinguish between the different macro(bio)molecules (DOK 2)
- Define nutrient (DOK 1)
- Distinguish the basic nutrients (DOK 2)
- Define homeostasis (DOK 1)
- Define metabolism (DOK 2)
- Define system (DOK 1)
- Distinguish between genetic, species, and ecosystem diversity (DOK 2)
- Describe a species as a reproductively distinct group of organisms.
- Explain how evolution through natural selection can result in changes in biodiversity through the increase or decrease of genetic diversity within a population.
- Differentiate the components of biodiversity. (DOK level 3)
- Analyze the relationship between habitat changes to plant and animal population fluctuations.

- Explain two ways in which biodiversity varies across groups or geography. (DOK level 3)
- Investigate the economic and ecological benefits of biodiversity. (DOK level 3)
- Describe how biodiversity is monitored and explain current biodiversity trends. (DOK level 3)
- Summarize the major causes of biodiversity loss (habitat loss/fragmentation, invasive species…) (DOK level 2)
- Investigate the reasons and importance of captive breeding programs (DOK 3)
- Explain legal actions nations can take to protect biodiversity. (DOK level 3)
- Explain the goal of Species Survival Plans. (DOK level 3)
- Analyze three strategies for managing whole ecosystems and habitats. (DOK level 4)

Core Activities and Corresponding Instructional Methods:

- Chapter 7 Central Case: Saving the Siberian Tiger

Assessments:

- **Diagnostic:** ATBs, think share, KWL
- **Formative:** ATBs, section quizzes, class activities, and assignments
- **Summative:** Unit 7 Common Assessment and Ecology Common Assessment

Unit 8: Natural Resources: Fisheries and Forestry, Agriculture and Food Production
Time/Days: 20 days

Standards: 11.1.9.A.,3.2.10.B.7., 3.3.10.A.8., 4.3.12.A.,4.3.12.B., 4.3.12.C.,4.5.12.A., 4.4.12.B.,4.4.12.C.,4.4.12.D., CC.3.5.9-10.E, CC.3.6.11-12.C, 3.3.10.A8, 3.4.10.E2, 3.1.10.B4, 3.1.10.B6, 3.1.B.B1, 3.1.B.B4, 3.1.B.B6, 3.1.10.C2

Anchors: S11.D.1.3.,S11.D.2.1., S11.A.3.2., S11.B.3.2., S11.B.3.3., S11.C.2.2., S11.A.1.3., S11.C.1.1., S11.A.1.1., S11.A.1.2.

Eligible Content: Explain how genetic engineering has impacted the fields of medicine, forensics, and agriculture (e.g., selective breeding, gene splicing, cloning, genetically modified organisms, gene therapy). Describe how the process of DNA replication results in the transmission and/or conservation of genetic information. 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).

Objectives:

- Define maximum sustainable yield. (DOK 1)
- Assess the impact of MSY on marine fish population carrying capacities. (DOK 3)
- Describe current management strategies for sustainable commercial fishing. (DOK 2)
- List some of the ecological and economical values of forest resources. (DOK 1)
- Estimate the economic and ecological values of Pennsylvania forests (DOK 2)
- Distinguish anatomy (layers) of a tree (DOK 2)
- Describe the costs and benefits of the different methods of timber harvesting (DOK 2)
- Discuss the current levels of deforestation in the U.S. and in developing nations. (DOK 2)
- Explain how logging is managed in U.S. national forests and PA state forests. (DOK 3)
- Describe where most logging in PA and the U.S. takes place. (DOK 1)
- Summarize the role of fire in forest management. (DOK 2)
- Summarize the importance of the fire triangle to forest management (DOK 2)
- Discuss the potential effects of fire suppression on an ecosystem and on future fires. (DOK 2)
- Summarize the role of fire in secondary succession. (DOK 2)
- Investigate the impact of fire on communities. (DOK 3)
- Assess the importance of fire to endangered and threatened species. (DOK 3)
- Distinguish the difference in the importance of fire in eastern and western ecosystems. (DOK 2)
- Explain the importance of prescribed fires in forest management. (DOK 2)
- Explain how consumer demand is important to sustainable forestry. (DOK 3)
- List the components of soil (DOK 1)
- Explain the processes by which soil forms. (DOK 2)

- Describe the horizons that make up the soil profile. (DOK 2)
- Classify soil texture using the soil texture triangle. (DOK 2)
- Distinguish between weathering, erosion, and deposition (DOK 2)
- Describe some practices that can lead to soil erosion and some that can prevent it. (DOK 1)
- Identify the causes and effects of desertification. (DOK 1)
- Discuss the activities of state and federal agricultural organizations. (DOK 2)
- Investigate how farming practices, irrigation, and pesticide use can cause desertification, salinization, and soil pollution. (DOK 3)
- Discuss the beginnings of agriculture. (DOK level 2)
- Explain the importance of industrial agriculture and the green revolution. (DOK 3)
- Explain the importance of pollinators to agriculture. (DOK 3)
- Investigate the reasons for the decline of bumble bees and honeybees (DOK 3)
- Explain why the world needs to grow more food and to grow it sustainably. (DOK 3)
- Summarize the risks and benefits of GM food. (DOK 2)
- Summarize the differences between organic and conventional food. (DOK
- Describe the advantages and disadvantages of industrial food production. (DOK 1)
- Discuss sustainable agriculture. (DOK 2)

Core Activities and Corresponding Instructional Methods:

- Chapter 11 Central Case: Transgenic Maize
- Chapter 12 Central Case: Battling Over Clayoquot's Big Trees

Assessments:

- **Diagnostic:** ATBs, think share, KWL
- **Formative:** ATBs, section quizzes, class activities, and assignments
- **Summative:** Unit 8 Common Assessment

Unit 9: Natural Resource Management: Mining and Mineral Resources
Time/Days: 5 days

Standards: CC.3.5.9-10.E, CC.3.6.9-10.I, CC.3.6.11-12.C, 3.3.10.A1, 3.3.10.A2, 3.3.10.A3, 3.3.10.A4, 3.3.10.A8, 3.3.12.A2

Anchors: S11.D.1.3.,S11.D.2.1., S11.A.3.2., S11.B.3.2., S11.B.3.3., S11.C.2.2., S11.A.1.3., S11.C.1.1., S11.A.1.1., S11.A.1.2., CC.3.5.9-10.E, CC.3.6.11-12.C, 3.2.C.B7

Eligible Content:

Objectives:

- Explain what a mineral is. (DOK 1)
- Describe how minerals form. (DOK 2)
- Identify types of rocks and the stages of the rock cycle. (DOK 2)
- Identify the types of resources that are mined. (DOK 1)
- Summarize the different methods used for mining. (DOK 2)
- Explain how metals are processed. (DOK 2)
- Describe the negative impacts of mining on the environment and society (DOK 2)
- Explain how mining is regulated at the state and federal level (DOK 2)
- Assess how mineral use can become more sustainable. (DOK 3)

Core Activities and Corresponding Instructional Methods:

- Chapter 13 Central Case: Mining For Cell Phones

Assessments:

- **Diagnostic:** ATBs, think share, KWL
- **Formative:** ATBs, section quizzes, class activities, and assignments
- **Summative:** Unit 9 Common Assessment

Unit 10: Natural Resource Management: Water **Time/Days: 10 days**

Standards: CC.3.5.9-10.E, CC.3.6.9-10.I, CC.3.6.11-12.C, 3.3.10.A1, 3.3.10.A3, 3.3.10.A4, 3.3.10.A5, 3.3.10.A6, 3.3.10.A8, 3.3.10.A5

Anchors: S11.D.1.3.,S11.D.2.1., S11.A.3.2., S11.B.3.2., S11.B.3.3., S11.C.2.2., S11.A.1.3., S11.C.1.1., S11.A.1.1., S11.A.1.2., CC.3.5.9-10.E, CC.3.6.11-12.C, 3.2.C.B7

Eligible Content:

Objectives:

- Discuss how fresh water can be both renewable and limited. (DOK level 2)
- Explain the significance of a watershed. (DOK level 3)
- Explain how most groundwater is accessed. (DOK level 3)
- Relate the causes of surface water depletion to their effects. (DOK level 2)
- Explain the major causes and effects of groundwater depletion. (DOK level 3)
- Explain why groundwater pollution is difficult to clean up. (DOK level 3)
- Discuss the sources and effects of major pollutants found in the ocean. (DOK level 2)
- Describe how water is regulated and treated. (DOK level 1)

Core Activities and Corresponding Instructional Methods:

- Chapter 2 Central Case: Cleaning the Tides of San Diego and Tijuana
- Chapter 12 Central Case: Looking For Water in the Desert

Assessments:

- **Diagnostic:** ATBs, think share, KWL
- **Formative:** ATBs, section quizzes, class activities, and assignments
- **Summative:** Unit 10 Common Assessment

Unit 11: Natural Resource Management: Renewable and Nonrenewable Energy
Time/Days: 10 days

Standards: 11.1.9.A.,3.2.10.B.7., 3.3.10.A.8.,4.3.12.A., 4.3.12.B., 4.3.12.C., 4.5.12.A., 4.5.12.D, CC.3.5.9-10.E, CC.3.5.9-10.F, CC.3.6.9-10.I, 3.3.10.A2, 3.2.C.B3, 3.2.C.B2, 3.3.10.A1, 3.3.10.A4, 3.3.10.A5, 3.3.10.A8, 3.3.12.A2

Anchors: S11.D.1.3., S11.D.2.1., S11.A.3.2., S11.B.3.2., S11.B.3.3., S11.C.2.2., S11.A.1.3., S11.C.1.1., S11.A.1.1., S11.A.1.2.

Eligible Content:

Objectives:

- Explain how fossil fuels formed. (DOK level 3)
- Describe the uses of coal and how it is removed from the ground. (DOK level 1)
- Describe the uses of oil and how it is extracted. (DOK level 1)
- Explain the characteristics and uses of natural gas. (DOK level 3)
- Predict the future of fossil fuels. (DOK level 2)
- Explain how pollutants released by fossil fuels damage health and the environment. (DOK level 3)
- Explain the implications of dependence on foreign countries for fossil fuels. (DOK level 3)
- Explain why energy conservation is important. (DOK level 3)
- Describe how a nuclear power plant generates electricity. (DOK level 1)
- Identify the advantages and disadvantages of nuclear power. (DOK level 1)
- Contrast nuclear fusion with nuclear fission, and explain the issues related to nuclear fusion. (DOK level 2)
- Explain the benefits and current status of renewable energy resources. (DOK level 3)
- Define biomass energy and explain how it is used. (DOK level 1)
- Describe how geothermal energy is harnessed and used. (DOK level 1)
- Explain how river water can be used to generate electricity. (DOK level 3)
- Identify benefits and costs of hydropower. (DOK level 1)
- Describe how energy from the ocean can generate electricity. (DOK level 1)
- Describe techniques for using solar energy to heat buildings and generate electricity. (DOK level 1)
- Analyze the benefits and costs of solar energy. (DOK level 4)
- Explain how wind energy can be used to produce electricity. Analyze the benefits and costs of wind energy. (DOK level 3)
- Describe how hydrogen fuel can be produced. (DOK level 1)
- Explain the way fuel cells work and how they are used. (DOK level 3)
- Identify the three categories of waste. (DOK level 1)
- Describe conventional waste disposal methods. (DOK level 1)
- Discuss the importance of reducing waste. (DOK level 2)

- Describe how composting and recycling help reduce the amount of waste. (DOK level 3)
- Define hazardous waste. (DOK level 1)
- Describe some of the sources of hazardous wastes. (DOK level 1)
- Describe current methods for hazardous waste disposal. (DOK level 1)
- Describe the danger of radioactive wastes. (DOK level 1)
- Identify agencies that regulate hazardous waste. (DOK level 1)

Core Activities and Corresponding Instructional Methods:

- Create a Venn Diagram to compare and contrast three energy sources
- Compare current waste disposalrecycling efforts of different nations

Assessments:

- **Diagnostic:** ATBs, think share, KWL
- **Formative:** ATBs, section quizzes, class activities, and assignments
- **Summative:** Unit 11 Common Assessment

Unit 12: Earth's Atmosphere and Climate Change **Time/Days: 10 days**

Standards: 11.1.9.A.,3.2.10.B.7., 3.3.10.A.8.,4.3.12.A., 4.3.12.B., 4.3.12.C., 4.5.12.A., 4.5.12.D, CC.3.5.9-10.E, CC.3.6.9-10.E, CC.3.6.9-10.I, 3.3.10.A4, 3.3.10.A5, 3.3.10.A6, 3.3.10.A7, 3.3.10.A8, 3.3.12.A2, 3.3.12.A6,

Anchors: S11.D.1.3., S11.D.2.1., S11.A.3.2., S11.B.3.2., S11.B.3.3., S11.C.2.2., S11.A.1.3., S11.C.1.1., S11.A.1.1., S11.A.1.2.

Eligible Content:

Objectives:

- Explain how the oceans affect climate. (DOK level 3)
- Describe how climate is affected by topography, volcanoes, regional vegetation, sunspot activity, and periodic changes in Earth's orbit. (DOK level 1)
- Identify evidence of global warming. (DOK level 3)
- Explain three methods used to study climate change. (DOK level 3)
- State the probable cause of global climate change. (DOK level 1)
- State the ways in which the warming atmosphere affects ecosystems and organisms. (DOK level 1)
- Predict future effects of climate change on people. (DOK level 3)
- List ways to reduce greenhouse gases related to the use and generation of electricity. (DOK level 1)
- Describe some of the ways of reducing greenhouse gases related to transportation. (DOK level 1)
- Describe other strategies for reducing greenhouse gases. (DOK level 1)

Core Activities and Corresponding Instructional Methods:

- Environmental Issue Final Project

Assessments:

- **Diagnostic:** ATBs, think share, KWL
- **Formative:** ATBs, section quizzes, class activities, and assignments
- **Summative:** Unit 12 Common Assessment

Unit 7: Human Populations **Time/Days: 10 days**

Standards: 11.1.9.A., 3.2.10.B.7., 3.3.10.A.8., 4.3.12.B., 4.3.12.C., 4.5.12.A., 4.4.12.B., 4.5.12.C., CC.3.5.9-10.E, CC.3.6.9-10.E, CC.3.6.11-12.C, 3.3.10.A8, 3.1.B.B6

Anchors: S11.A.3.2., S11.B.3.2., S11.B.3.3., S11.C.2.2., S11.A.1.3., S11.A.1.1., S11.A.1.2.

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

Objectives:

- Explain how technological advances have contributed to human population growth. (DOK level 3)
- Explain recent trends in population growth. (DOK level 3)
- Explain how the age structure and sex ratio of a population defines its potential for growth. (DOK level 3)
- Analyze the demographic transition. (DOK level 4)
- Assess social factors that affect population growth. (DOK level 3)
- Investigate how humans impact their environments. (DOK level 3)
- Define the negative and positive impacts of technology. (DOK level 1)
- Explain the reasons why individuals respond differently to the same environmental hazards. (DOK level 3)
- Predict how infectious diseases spread. (DOK level 2)
- Explain why emerging diseases are important to monitor and control. (DOK level 3)
- Summarize how chemical hazards affect human health. (DOK level 2)

Core Activities and Corresponding Instructional Methods:

- Human Population Growth Project
- Environmental Issue Final Project

Assessments:

- **Diagnostic:** ATBs, think share, KWL
- **Formative:** ATBs, section quizzes, class activities, and assignments
- **Summative:** Unit 13 Common Assessment and Environmental Issues Final Project

Checklist to Complete and Submit:

(Scan and email)

__x___ Copy of the curriculum using the template entitled "Planned Instruction," available on the district website.

_____ The primary textbook form(s).

__x___ The appropriate payment form, in compliance with the maximum curriculum writing hours noted on the first page of this document.

Each principal and/or department chair has a schedule of First and Second Readers/Reviewers. Each Reader/Reviewer must sign & date below.

First Reader/Reviewer Printed Name_____

First Reader/Reviewer Signature_____

Date_____

Second Reader/Reviewer Printed Name_____

Second Reader/Reviewer Signature _____

Date_____

Please Go to Human Resources page on the Delaware Valley School District website for updated Payment form to be submitted.

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