



Pine Grove Area

SCHOOL DISTRICT

SCIENCE DEPARTMENT

Environmental Science

May 21, 2009

I. PHILOSOPHY

The course will allow for the accommodation of many learning styles, motivational levels, and academic abilities. Environmental science deals with the interaction of human beings with their environment. This course provides the student with an introduction to : environmental science, ecology, populations, mineral and energy resources, and government environmental policy.

II. CORE CONCEPTS

1. Introduction to Environmental Science- Explain how to solve environmental problems, we must first be able to identify causes and describe solutions.
2. Ecology- Explain the interrelationship of organisms with their environment.
3. Populations-Explore the properties of populations, how populations increase or decrease in response to their environment, and the interrelationship of different populations.
4. Water- Describe the importance of water in our environment.
5. Air- Describe the affects of different kinds of pollution on air quality and climate.
6. Land- Analyze the uses of land and its affect on the environment.
7. Mineral Resources- Discuss the economic importance of minerals and the environmental, political ramifications of mining.
8. Energy Resources- Differentiate between renewable and nonrenewable sources of energy, and their environmental and political impact on the world in which we live.
9. Environmental Outcomes for the Future – Explain how human health is affected by environmental condition and how government and people can affect environmental issues.

III. COURSE OF STUDY

A. Course Name: *Environmental Science*

B. Grade Level: 10th -11th -12th

C. Length of Course: *full year*

1. Frequency: *one time per day*

2. Duration: *50 minutes*

D. Academic Level: College Preparatory, Post Secondary, and Votechnical

E. Credits: 1.0

F. Prerequisites: Biology

G. Course Description:

This course provides the student with an introduction to: environmental science, ecology, populations, mineral and energy resources, and government environmental policy.

IV. CONTENT: Environmental Science

CORE CONCEPT 1: Introduction to Environmental

MAJOR OBJECTIVE: Explain how to solve environmental problems, we must first be able to identify causes and describe solutions.

CURRICULUM STANDARD:

PA State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
<p>PA Standard 4.6.10A Explain the biotic and abiotic components of an ecosystem and their interaction.</p> <ul style="list-style-type: none"> • 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. 	<p>Teacher will guide students to:</p> <ul style="list-style-type: none"> • Describe the interdisciplinary study of human interactions with the living and nonliving world. • Explain the major environmental changes that occurred throughout the Earth's history. • Differentiate among: the arrival of hunter gatherer societies, agricultural and industrial revolution and their impact on the environment. • Discuss the major environmental problems faced today. 	<p>Teacher evaluation of:</p> <ul style="list-style-type: none"> • Student white board work. • Student class discussion. • Student homework assignments. • Student laboratory reports/notebooks. • Student workbooks. • Student tests/quizzes. • Student video presentations. • Student electronic portfolios. 	<p>Resources:</p> <ul style="list-style-type: none"> • Textbook resources • Computer programs/web sites. • Journal or notebook • Supplemental materials

CONTENT: Environmental Science

CORE CONCEPT 1: Introduction to Environmental

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<p>PA Standard 3.2.10.C Apply the elements of scientific inquiry to solve problems.</p> <ul style="list-style-type: none">• Generate questions about objects, organisms and/or events that can be answered through scientific investigations.• Evaluate the appropriateness of questions.• Design an investigation with adequate control and limited variables to investigate a question.• Conduct a multiple step experiment.• Organize experimental information using a variety of analytic methods.• Judge the significance of experimental information in answering the question.• Suggest additional steps that might be done experimentally.	<p>Teacher will guide students to:</p> <ul style="list-style-type: none">• Explain and apply the scientific method to explore natural and man - made phenomena.• Classify, create, and interpret data.• Utilize statistics to describe and evaluate information.• Utilize models to understand dynamically changing systems.	<p>Teacher evaluation of:</p> <ul style="list-style-type: none">• Student white board work.• Student class discussion.• Student homework assignments.• Student laboratory reports/notebooks.• Student workbooks.• Student tests/quizzes.• Student video presentations.• Student electronic portfolios.	<p>Resources:</p> <ul style="list-style-type: none">• Textbook resources• Computer programs/web sites.• Journal or notebook• Supplemental materials

CONTENT: Environmental Science

CORE CONCEPT 1: Introduction to Environmental

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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.	<p>Teacher will guide students to:</p> <ul style="list-style-type: none">Make informed environmental decisions.Explain how a particular human activity has changed the local area over the years	<p>Teacher evaluation of:</p> <ul style="list-style-type: none">Student white board work.Student class discussion.Student homework assignments.Student laboratory reports/notebooks.Student workbooks.Student tests/quizzes.Student video presentations.Student electronic portfolio	<p>Resources:</p> <ul style="list-style-type: none">Textbook resourcesComputer programs/web sites.Journal or notebookSupplemental materials

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CORE CONCEPT 1: Introduction to Environmental

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<p>PA Standard 3.5.10.A</p> <p>Relate earth features and processes that change the earth.</p> <ul style="list-style-type: none">• Illustrate and explain plate tectonics as the mechanism of continental movement and sea floor changes.• Compare examples of change to the earth's surface over time as they related to continental movement and ocean basin formation	<p>Teacher will guide students to:</p> <ul style="list-style-type: none">• List the contents of the Earth's geosphere.• List the parts of the Earth's interior.• Describe the interaction of tectonic plates and the geological events caused by their collision.• Explain the alteration of the Earth's surface features by water and wind.	<p>Teacher evaluation of:</p> <ul style="list-style-type: none">• Student white board work.• Student class discussion.• Student homework assignments.• Student laboratory reports/notebooks.• Student workbooks.• Student tests/quizzes.• Student video presentations.• Student electronic portfolios.	<p>Resources:</p> <ul style="list-style-type: none">• Textbook resources• Computer programs/web sites.• Journal or notebook• Supplemental materials

CONTENT: Environmental Science

CORE CONCEPT 1: Introduction to Environmental

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<p>PA Standard 3.5.10. C</p> <p>Interpret meteorological data.</p> <ul style="list-style-type: none">Analyze information from meteorological instruments and online sources to predict weather patterns.Describe weather and climate patterns on global levels.Evaluate specific adaptations plants and animals have made that enable them to survive in different climates.	<p>Teacher will guide students to:</p> <ul style="list-style-type: none">Differentiate among the atmosphere, troposphere, mesosphere, and stratosphere.Explain heat transfer in the Earth's atmosphere in terms of radiation, conduction, and convection .Describe the Green House Effect.Name three major processes in the water cycle.Explain how the ocean regulates the Earth's temperature.Discuss the factors that confine life to the biosphere.	<p>Teacher evaluation of:</p> <ul style="list-style-type: none">Student white board work.Student class discussion.Student homework assignments.Student laboratory reports/notebooks.Student workbooks.Student tests/quizzes.Student video presentations.Student electronic portfolios.	<p>Resources:</p> <ul style="list-style-type: none">Textbook resourcesComputer programs/web sites.Journal or notebookSupplemental materials

CONTENT: Environmental Science

CORE CONCEPT 2: Ecology

MAJOR OBJECTIVE: Explain the interrelationship of organisms with their environment.

CURRICULUM STANDARD:

State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
<p>PA Standard 4.6.10A</p> <p>Explain the biotic and abiotic components of an ecosystem and their interaction.</p> <ul style="list-style-type: none">• Compare and contrast the interactions of biotic and abiotic components in an ecosystem.	<p>Teacher will guide students to:</p> <ul style="list-style-type: none">• Distinguish between the biotic and abiotic factors in an ecosystem.• Describe how a population differs from a species.• Explain how habitats are important for organisms.	<p>Teacher evaluation of:</p> <ul style="list-style-type: none">• Student white board work.• Student class discussion.• Student homework assignments.• Student laboratory reports/notebooks.• Student workbooks.• Student tests/quizzes.• Student video presentations.• Student electronic portfolios.	<p>Resources:</p> <ul style="list-style-type: none">• Textbook resources• Computer programs/web sites.• Journal or notebook• Supplemental materials

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<p>PA Standard 3.3.10.D</p> <p>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.Compare modern day descendants of extinct species and propose possible scientific accounts for their present appearance.describe the factors (e.g., isolation,	<p>Teacher will guide students to:</p> <ul style="list-style-type: none">Explain the process of evolution by natural selection.Explain the concept of adaptation.Describe the steps by which a population on insects becomes resistant to a pesticide.	<p>Teacher evaluation of:</p> <ul style="list-style-type: none">Student white board work.Student class discussion.Student homework assignments.Student laboratory reports/notebooks.Student workbooks.Student tests/quizzes.Student video presentations.Student electronic portfolios.	<p>Resources:</p> <ul style="list-style-type: none">Textbook resourcesComputer programs/web sites.Journal or notebookSupplemental materials

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<p>PA Standard 3.3.10.A</p> <p>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> <ul style="list-style-type: none">• Name six kingdoms of organisms and identify two characteristics of each.• Explain the importance of bacteria and fungi in the environment.• Describe the importance of protists in the ocean environment.• Describe how angiosperms and animals depend on each other.• Explain why insects are such successful animals.	<p>Teacher evaluation of:</p> <ul style="list-style-type: none">• Student white board work.• Student class discussion.• Student homework assignments.• Student laboratory reports/notebooks.• Student workbooks.• Student tests/quizzes.• Student video presentations.• Student electronic portfolios.	<p>Resources:</p> <ul style="list-style-type: none">• Textbook resources• Computer programs/web sites.• Journal or notebook• Supplemental materials

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<p>PA Standard 4.6.10.A</p> <p>Explain the biotic and abiotic components of an ecosystem and their interaction.</p> <ul style="list-style-type: none">• Explain energy flow in a food chain through an energy pyramid.• Evaluate the efficiency of energy flow in a food chain.	<p>Teacher will guide students to:</p> <ul style="list-style-type: none">• Describe how energy is transferred from the sun to the producers and then to consumers.• Describe one way in which consumers depend on producers.• List two types of consumers.• Explain how energy transfer in a food web is more complex than energy transfer in a food chain.• Explain why an energy pyramid is a representation of trophic levels.• Describe the carbon and nitrogen cycles.	<p>Teacher evaluation of:</p> <ul style="list-style-type: none">• Student white board work.• Student class discussion.• Student homework assignments.• Student laboratory reports/notebooks.• Student workbooks.• Student tests/quizzes.• Student video presentations.• Student electronic portfolios.	<p>Resources:</p> <ul style="list-style-type: none">• Textbook resources• Computer programs/web sites.• Journal or notebook• Supplemental materials

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<p>PA Standard 4.6.10.A</p> <p>Explain the flows of energy and matter from organism to organism within an ecosystem.</p> <ul style="list-style-type: none">• Identify the major characteristics of a biome.• Compare and contrast different biomes and their characteristics.• Identify the relationship of abiotic and biotic components and explain their interaction in an ecosystem.	<p>Teacher will guide students to:</p> <ul style="list-style-type: none">• Describe why vegetation is used to name a biome.• Explain how temperature and precipitation determine which plants grow in an area.• Explain how latitude and altitude affect which plants grow in an area.	<p>Teacher evaluation of:</p> <ul style="list-style-type: none">• Student white board work.• Student class discussion.• Student homework assignments.• Student laboratory reports/notebooks.• Student workbooks.• Student tests/quizzes.• Student video presentations.• Student electronic portfolios.	<p>Resources:</p> <ul style="list-style-type: none">• Textbook resources• Computer programs/web sites.• Journal or notebook• Supplemental materials

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CORE CONCEPT 2: Ecology

MAJOR OBJECTIVE: Explain the interrelationship of organisms with their environment.

CURRICULUM STANDARD:

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<p>PA Standard 4.1.10.C</p> <p>Describe the physical characteristics of a stream and determine the types of organisms found in aquatic environments.</p> <ul style="list-style-type: none">• Identify terrestrial and aquatic organisms that live in a watershed.	<p>Teacher will guide students to:</p> <ul style="list-style-type: none">• List three characteristics of tropical rain forests.• Name and describe the main layers of a tropical rain forest.• Describe one plant in a temperate deciduous forest and an adaptation that helps the plant survive.• Describe one adaptation that may help an animal survive in the taiga.• Name two threats to the world's forest biomes.	<p>Teacher evaluation of:</p> <ul style="list-style-type: none">• Student white board work.• Student class discussion.• Student homework assignments.• Student laboratory reports/notebooks.• Student workbooks.• Student tests/quizzes.• Student video presentations.• Student electronic portfolios.	<p>Resources:</p> <ul style="list-style-type: none">• Textbook resources• Computer programs/web sites.• Journal or notebook• Supplemental materials

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<p>PA Standard 4.1.10.C</p> <p>Describe the physical characteristics of a stream and determine the types of organisms found in aquatic environments.</p> <ul style="list-style-type: none">• Identify terrestrial and aquatic organisms that live in a watershed.	<p>Teacher will guide students to:</p> <ul style="list-style-type: none">• Describe the difference between tropical and temperate grasslands.• Describe the climate in a chaparral biome.• Describe two desert animals and the adaptations that help them survive.• Describe one threat to the tundra biome.	<p>Teacher evaluation of:</p> <ul style="list-style-type: none">• Student white board work.• Student class discussion.• Student homework assignments.• Student laboratory reports/notebooks.• Student workbooks.• Student tests/quizzes.• Student video presentations.• Student electronic portfolios.	<p>Resources:</p> <ul style="list-style-type: none">• Textbook resources• Computer programs/web sites.• Journal or notebook• Supplemental materials

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<p>PA Standard 4.1.10 C</p> <p>Describe the physical characteristics of a stream and determine the types of organisms found in aquatic environments.</p> <ul style="list-style-type: none">• Describe and explain the physical factors that affect a stream and the organisms that live there• Identify terrestrial and aquatic organisms that live in a watershed• Categorize aquatic organisms found in a watershed continuum from headwater to mouth (eg shredder, predator, decomposer)• Identify the types of organisms that would live in a stream based on the stream's physical characteristics• Explain the habitat needs of specific aquatic organisms.	<p>Teacher will guide students to:</p> <ul style="list-style-type: none">• Describe the factors that determine where an organism lives in an aquatic ecosystem.• Describe the littoral zone and the benthic zone that make up a lake or a pond.	<p>Teacher evaluation of:</p> <ul style="list-style-type: none">• Student white board work.• Student class discussion.• Student homework assignments.• Student laboratory reports/notebooks.• Student workbooks.• Student tests/quizzes.• Student video presentations.• Student electronic portfolios.	<p>Resources:</p> <ul style="list-style-type: none">• Textbook resources• Computer programs/web sites.• Journal or notebook• Supplemental materials

CONTENT: Environmental Science

CORE CONCEPT 2: Ecology

MAJOR OBJECTIVE: Explain the interrelationship of organisms with their environment.

CURRICULUM STANDARD:

State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
<p>PA Standard 4.6.10.B</p> <p>Explain how cycles affect the balance in an ecosystem.</p> <ul style="list-style-type: none">• Explain the consequences of interrupting natural cycles.	<p>Teacher will guide students to:</p> <ul style="list-style-type: none">• Describe and analyze one threat against river ecosystems	<p>Teacher evaluation of:</p> <ul style="list-style-type: none">• Student white board work.• Student class discussion.• Student homework assignments.• Student laboratory reports/notebooks.• Student workbooks.• Student tests/quizzes.• Student video presentations.• Student electronic portfolios.	<p>Resources:</p> <ul style="list-style-type: none">• Textbook resources• Computer programs/web sites.• Journal or notebook• Supplemental materials

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<p>PA Standard 4.6.10 .C</p> <p>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:</p> <ul style="list-style-type: none">• Explain how river ecosystems change over time due to natural and made man interventions.	<p>Teacher evaluation of:</p> <ul style="list-style-type: none">• Student white board work.• Student class discussion.• Student homework assignments.• Student laboratory reports/notebooks.• Student workbooks.• Student tests/quizzes.• Student video presentations.• Student electronic portfolios	<p>Resources:</p> <ul style="list-style-type: none">• Textbook resources• Computer programs/web sites.• Journal or notebook• Supplemental materials

CONTENT: Environmental Science

CORE CONCEPT 3: Populations

MAJOR OBJECTIVE: Explore the properties of populations, how populations increase or decrease in response to their environment, and the interrelationship of different populations.

CURRICULUM STANDARD:

State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
<p>PA Standard 4.6.10.A.</p> <p>Explain the biotic and abiotic components of an ecosystem and their interaction.</p> <ul style="list-style-type: none">• Interpret possible causes of population fluctuations.	<p>Teacher will guide students to:</p> <ul style="list-style-type: none">• Describe the three main properties of a population.• Describe exponential population growth.• Describe how the reproductive behavior of individuals can affect the growth rate of their population.• Explain how population sizes in nature are regulated.	<p>Teacher evaluation of:</p> <ul style="list-style-type: none">• Student white board work.• Student class discussion.• Student homework assignments.• Student laboratory reports/notebooks.• Student workbooks.• Student tests/quizzes.• Student video presentations.• Student electronic portfolios.	<p>Resources:</p> <ul style="list-style-type: none">• Textbook resources• Computer programs/web sites.• Journal or notebook• Supplemental materials

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CORE CONCEPT 3: Populations

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<p>PA Standard 3.1.10. E.</p> <p>Describe patterns of change in nature, physical and man made systems.</p> <ul style="list-style-type: none">Recognize that stable systems often involve underlying dynamic changes	<p>Teacher will guide students to:</p> <ul style="list-style-type: none">Explain the difference between a niche and habitat.Give examples of parts of a niche.Describe the five major types of interactions between species.Differentiate among : communalism, parasitism, mutualism, predation, and symbiotic relationships.Describe how the size and growth rate of the human population has changed in the last 200 years.Define four properties that scientists use to predict population sizes.	<p>Teacher evaluation of:</p> <ul style="list-style-type: none">Student white board work.Student class discussion.Student homework assignments.Student laboratory reports/notebooks.Student workbooks.Student tests/quizzes.Student video presentations.Student electronic portfolios.	<p>Resources:</p> <ul style="list-style-type: none">Textbook resourcesComputer programs/web sites.Journal or notebookSupplemental materials

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CORE CONCEPT 3: Populations

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<p>PA Standard 4.7.10 A</p> <p>Explain the significance of diversity in ecosystems.</p> <ul style="list-style-type: none">• Explain the role that specific organisms have in their ecosystem.• Identify a species and explain what effects its increase or decline might have on the ecosystem.• Identify a species and explain how its adaptations are related to its niche in the environment.	<p>Teacher will guide students to:</p> <ul style="list-style-type: none">• Describe the diversity of species types on Earth, relating the difference between known numbers and estimated numbers.• List and describe three levels of biodiversity.• Explain four ways in which biodiversity is important to ecosystems and humans.	<p>Teacher evaluation of:</p> <ul style="list-style-type: none">• Student white board work.• Student class discussion.• Student homework assignments.• Student laboratory reports/notebooks.• Student workbooks.• Student tests/quizzes.• Student video presentations.• Student electronic portfolios.	<p>Resources:</p> <ul style="list-style-type: none">• Textbook resources• Computer programs/web sites.• Journal or notebook• Supplemental materials

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<p>PA Standard 4.7.10 B</p> <p>Explain how structure, function and behavior of plants and animals affect their ability to survive.</p> <ul style="list-style-type: none">• Describe an organism’s adaptations for survival in its habitat.• Compare adaptations among species used by scientists for categorizing organisms as threatened, endangered or extinct.	<p>Teacher will guide students to:</p> <ul style="list-style-type: none">• Analyze the potential value of a single species.• Define and give examples of endangered and threatened species.• Describe several ways that species are being threatened with extinction globally.	<p>Teacher evaluation of:</p> <ul style="list-style-type: none">• Student white board work.• Student class discussion.• Student homework assignments.• Student laboratory reports/notebooks.• Student workbooks.• Student tests/quizzes.• Student video presentations.• Student electronic portfolios.	<p>Resources:</p> <ul style="list-style-type: none">• Textbook resources• Computer programs/web sites.• Journal or notebook• Supplemental materials

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CORE CONCEPT 3: Populations

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<p>PA Standard 4.7.10 C</p> <p>Identify and explain why adaptations can lead to specialization.</p> <ul style="list-style-type: none">• Explain factors that could lead to a species' increase or decrease.• Explain how management practices may influence the success of specific species.	<p>Teacher will guide students to:</p> <ul style="list-style-type: none">• Explain which types of threats are having the largest impact on biodiversity.• Compare the amount of biodiversity in the United States to that of the rest of the world.	<p>Teacher evaluation of:</p> <ul style="list-style-type: none">• Student white board work.• Student class discussion.• Student homework assignments.• Student laboratory reports/notebooks.• Student workbooks.• Student tests/quizzes.• Student video presentations.• Student electronic portfolios.	<p>Resources:</p> <ul style="list-style-type: none">• Textbook resources• Computer programs/web sites.• Journal or notebook• Supplemental materials

CONTENT: Environmental Science

CORE CONCEPT 4: Water

MAJOR OBJECTIVE: Describe the importance of water in our environment.

CURRICULUM STANDARD:

State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
<p>PA Standard 4.1.10.A</p> <p>Describe changes that occur from a stream's origin to its final outflow.</p> <ul style="list-style-type: none">• Identify Pennsylvania's major watersheds and their related river systems.• Describe changes by tracing a specific river's origin back to its headwaters including its major tributaries.	<p>Teacher will guide students to:</p> <ul style="list-style-type: none">• Describe the distribution of Earth's water resources.• Explain why fresh water is one of Earth's limited resources.• Describe the distribution of Earth's surface water.• Describe the relationship between groundwater and surface water in a watershed.	<p>Teacher evaluation of:</p> <ul style="list-style-type: none">• Student white board work.• Student class discussion.• Student homework assignments.• Student laboratory reports/notebooks.• Student workbooks.• Student tests/quizzes.• Student video presentations.• Student electronic portfolios.	<p>Resources:</p> <ul style="list-style-type: none">• Textbook resources• Computer programs/web sites.• Journal or notebook• Supplemental materials

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CORE CONCEPT 4: Water

MAJOR OBJECTIVE: Describe the importance of water in our environment.

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<p>PA Standard 4.1.10.B</p> <p>Explain the relationship among landforms, vegetation and the amount and speed of water.</p> <ul style="list-style-type: none">• Analyze a stream’s physical characteristics.• Describe how topography influences streams.• Explain the influence of mountains on precipitation.• Explain how vegetation affects storm water runoff.• Delineate the boundaries of a watershed.• Describe factors that affect the quality of groundwater.• Explain how the speed of water and vegetation cover relates to erosion.	<p>Teacher will guide students to:</p> <ul style="list-style-type: none">• Describe the affect that water speed has on an aquatic biome.	<p>Teacher evaluation of:</p> <ul style="list-style-type: none">• Student white board work.• Student class discussion.• Student homework assignments.• Student laboratory reports/notebooks.• Student workbooks.• Student tests/quizzes.• Student video presentations.• Student electronic portfolios.	<p>Resources:</p> <ul style="list-style-type: none">• Textbook resources• Computer programs/web sites.• Journal or notebook• Supplemental materials

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CURRICULUM STANDARD:

State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
<p>PA Standard 4.3.10.A</p> <p>Describe environmental health issues.</p> <ul style="list-style-type: none">• Identify the effects on human health of air, water and soil pollution and the possible economic costs to society.	<p>Teacher will guide students to:</p> <ul style="list-style-type: none">• Compare point-source pollution and nonpoint-source pollution.• Classify water pollutants by five types.• Explain why groundwater pollution is difficult to clean up.• Describe the major sources of ocean pollution, and explain the effects of pollution on ecosystems.• Describe six major laws designed to improve water quality in the United States.	<p>• Teacher evaluation of:</p> <ul style="list-style-type: none">• Student white board work.• Student class discussion.• Student homework assignments.• Student laboratory reports/notebooks.• Student workbooks.• Student tests/quizzes.• Student video presentations.• Student electronic portfolios.	<p>Resources:</p> <ul style="list-style-type: none">• Textbook resources• Computer programs/web sites.• Journal or notebook• Supplemental materials

CONTENT: Environmental Science

CORE CONCEPT 5: Air

MAJOR OBJECTIVE: Describe the affects of different kinds of pollution on air quality and climate.

CURRICULUM STANDARD:

State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
<p>PA Standard 4.3.10.A</p> <p>Describe environmental health issues.</p> <ul style="list-style-type: none">• Identify the effects on human health of air, water and soil pollution and the possible economic costs to society.	<p>Teacher will guide students to:</p> <ul style="list-style-type: none">• Name five primary air pollutants, and give sources for each.• Name the two major sources of air pollution in urban areas.• Describe the way in which smog forms.• Explain the way in which a thermal inversion traps air pollution.	<p>Teacher evaluation of:</p> <ul style="list-style-type: none">• Student white board work.• Student class discussion.• Student homework assignments.• Student laboratory reports/notebooks.• Student workbooks.• Student tests/quizzes.• Student video presentations.• Student electronic portfolios.	<p>Resources:</p> <ul style="list-style-type: none">• Textbook resources• Computer programs/web sites.• Journal or notebook• Supplemental materials

CONTENT: Environmental Science

CORE CONCEPT 5: Air

MAJOR OBJECTIVE: Describe the affects of different kinds of pollution on air quality and climate.

CURRICULUM STANDARD:

State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
<p>PA Standard 4.3.10.B</p> <p>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.• Identify and explain ways of detecting pollution by using state-of-the-art technologies.	<p>Teacher will guide students to:</p> <ul style="list-style-type: none">• Explain the causes of acid precipitation.• Explain how acid precipitation affects plants, soils, and aquatic ecosystems.• Describe three ways that acid precipitation affects humans.• Describe ways that countries are working together to solve the problem of acid precipitation.• Explain how the ozone layer shields the Earth from much of the sun's harmful radiation.• Explain how the ozone layer is damaged.	<p>Teacher evaluation of:</p> <ul style="list-style-type: none">• Student white board work.• Student class discussion.• Student homework assignments.• Student laboratory reports/notebooks.• Student workbooks.• Student tests/quizzes.• Student video presentations.• Student electronic portfolios.	<p>Resources:</p> <ul style="list-style-type: none">• Textbook resources• Computer programs/web sites.• Journal or notebook• Supplemental materials

CONTENT: Environmental Science

CORE CONCEPT 5: Air

MAJOR OBJECTIVE: Describe the affects of different kinds of pollution on air quality and climate.

CURRICULUM STANDARD:

State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
<p>PA Standard 3.5.10.C</p> <p>Interpret meteorological data.</p> <ul style="list-style-type: none">Analyze information from meteorological instruments and online sources to predict weather patterns.Evaluate specific adaptations plants and animals have made that enable them to survive in different climates.	<p>Teacher will guide students to:</p> <ul style="list-style-type: none">Explain the difference between weather and climate.Identify four factors that determine climate.Explain why different parts of the Earth have different climates.Explain what causes the seasons.	<p>Teacher evaluation of:</p> <ul style="list-style-type: none">Student white board work.Student class discussion.Student homework assignments.Student laboratory reports/notebooks.Student workbooks.Student tests/quizzes.Student video presentations.Student electronic portfolios.	<p>Resources:</p> <ul style="list-style-type: none">Textbook resourcesComputer programs/web sites.Journal or notebookSupplemental materials

CONTENT: Environmental Science

CORE CONCEPT 5: Air

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CURRICULUM STANDARD:

State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
<p>PA Standard 3.5.10.C</p> <p>Interpret meteorological data.</p> <ul style="list-style-type: none">Describe weather and climate patterns on global levels	<p>Teacher will guide students to:</p> <ul style="list-style-type: none">Explain why Earth’s atmosphere is like the glass in a greenhouse.Explain why carbon dioxide content of the atmosphere is increasing.Identify one possible explanation for the increase in average global temperature.Describe what a warmer Earth might be like.	<p>Teacher evaluation of:</p> <ul style="list-style-type: none">Student white board work.Student class discussion.Student homework assignments.Student laboratory reports/notebooks.Student workbooks.Student tests/quizzes.Student video presentations.Student electronic portfolios.	<p>Resources:</p> <ul style="list-style-type: none">Textbook resourcesComputer programs/web sites.Journal or notebookSupplemental materials

CONTENT: Environmental Science

CORE CONCEPT 6: Land

MAJOR OBJECTIVE: Analyze the uses of land and its affect on the environment.

CURRICULUM STANDARD:

State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
<p>PA Standard 4.4.10. A</p> <p>Describe the importance of agriculture to society.</p> <ul style="list-style-type: none">• Identify the major cash crops of Pennsylvania.• Identify what percentage of the United States' population is involved in the food and fiber industry.• Compare and contrast the influence of agriculture on a nation's culture, standard of living and foreign trade.• Identify laws that affect conservation and management of food and fiber production in the local area and analyze their impact.• Compare a contemporary economic issue in agriculture to its historical origin.	<p>Teacher will guide students to:</p> <ul style="list-style-type: none">• Distinguish between urban and rural land.• Describe three major ways in which humans use land.• Explain the concept of ecosystem services and the laws that govern these services.	<p>Teacher evaluation of:</p> <ul style="list-style-type: none">• Student white board work.• Student class discussion.• Student homework assignments.• Student laboratory reports/notebooks.• Student workbooks.• Student tests/quizzes.• Student video presentations.• Student electronic portfolios.	<p>Resources:</p> <ul style="list-style-type: none">• Textbook resources• Computer programs/web sites.• Journal or notebook• Supplemental materials

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CORE CONCEPT 6: Land

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CURRICULUM STANDARD:

State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
<p>PA Standard 4.4.10.D</p> <p>Explain the improvement of agricultural production through technology.</p> <ul style="list-style-type: none">• Compare the technologies that have advanced agricultural production.• Explain how energy sources have changed to meet agricultural technology.	<p>Teacher will guide students to:</p> <ul style="list-style-type: none">• Explain the technology's role in preserving farmland.• Describe two ways that rangeland can be managed sustainably.• Describe the environmental effects of deforestation.• Explain the function of parks and of wilderness areas.	<p>Teacher evaluation of:</p> <ul style="list-style-type: none">• Student white board work.• Student class discussion.• Student homework assignments.• Student laboratory reports/notebooks.• Student workbooks.• Student tests/quizzes.• Student video presentations. <p>Student electronic portfolios.</p>	<p>Resources:</p> <ul style="list-style-type: none">• Textbook resources• Computer programs/web sites.• Journal or notebook• Supplemental materials

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<p>PA Standard 4.4.10.B</p> <p>Assess the influence of agricultural science on farming practices.</p> <ul style="list-style-type: none">• Compare the practices of no-till farming to traditional soil preparation (e.g., plow, disc).• Analyze and explain the various practices of nutrient management on the farm.• Analyze and explain how farm efficiencies have changed human nutrition.	<p>Teacher will guide students to:</p> <ul style="list-style-type: none">• Identify the major causes of malnutrition.• Compare the environmental cost of producing different types of food.• Explain how poverty is a major cause of malnutrition.• Explain the importance of the green revolution.	<p>Teacher evaluation of:</p> <ul style="list-style-type: none">• Student white board work.• Student class discussion.• Student homework assignments.• Student laboratory reports/notebooks.• Student workbooks.• Student tests/quizzes.• Student video presentations.• Student electronic portfolios.	<p>Resources:</p> <ul style="list-style-type: none">• Textbook resources• Computer programs/web sites.• Journal or notebook• Supplemental materials

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<p>PA Standard 4.4.10.C</p> <p>Explain the functions of the components of the food and fiber system.</p> <ul style="list-style-type: none">• Compare and analyze growing conditions in the United States to determine which plants and animals are most suitable to each region.	<p>Teacher will guide students to:</p> <ul style="list-style-type: none">• Describe fertile soil.• Describe the need for soil conservation.• Analyze plant and animal agriculture by region.	<p>Teacher evaluation of:</p> <ul style="list-style-type: none">• Student white board work.• Student class discussion.• Student homework assignments.• Student laboratory reports/notebooks.• Student workbooks.• Student tests/quizzes.• Student video presentations.• Student electronic portfolios.	<p>Resources:</p> <ul style="list-style-type: none">• Textbook resources• Computer programs/web sites.• Journal or notebook• Supplemental materials

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<p>PA Standard 4.5.10.A</p> <p>Identify similar classifications of pests that may or may not have similar effects on different regions.</p> <ul style="list-style-type: none">• Identify environmental effect(s) of pests on different regions of the world.	<p>Teacher will guide students to:</p> <ul style="list-style-type: none">• Distinguish between traditional and modern agricultural techniques.• Explain what is involved in integrated pest management.• Explain how genetic engineering is used in agriculture.	<p>Teacher evaluation of:</p> <ul style="list-style-type: none">• Student white board work.• Student class discussion.• Student homework assignments.• Student laboratory reports/notebooks.• Student workbooks.• Student tests/quizzes.• Student video presentations.• Student electronic portfolios.	<p>Resources:</p> <ul style="list-style-type: none">• Textbook resources• Computer programs/web sites.• Journal or notebook• Supplemental materials

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<p>PA Standard 4.5.10.B</p> <p>Analyze health benefits and risks associated with integrated pest management.</p> <ul style="list-style-type: none">• Identify the health risks associated with chemicals used in common pesticides.	<p>Teacher will guide students to:</p> <ul style="list-style-type: none">• Describe the risks and benefits to using pesticides.	<p>Teacher evaluation of:</p> <ul style="list-style-type: none">• Student white board work.• Student class discussion.• Student homework assignments.• Student laboratory reports/notebooks.• Student workbooks.• Student tests/quizzes.• Student video presentations.• Student electronic portfolios.	<p>Resources:</p> <ul style="list-style-type: none">• Textbook resources• Computer programs/web sites.• Journal or notebook• Supplemental materials

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<p>PA Standard 4.5.10.C</p> <p>Determine the effects of integrated pest management practices on society over time.</p> <ul style="list-style-type: none">Analyze the benefits to the environment and society associated with alternative practices used in integrated pest management.	<p>Teacher will guide students to:</p> <ul style="list-style-type: none">Explain the benefits and environmental impacts of pesticide use.	<p>Teacher evaluation of:</p> <ul style="list-style-type: none">Student white board work.Student class discussion.Student homework assignments.Student laboratory reports/notebooks.Student workbooks.Student tests/quizzes.Student video presentations.Student electronic portfolios.	<p>Resources:</p> <ul style="list-style-type: none">Textbook resourcesComputer programs/web sites.Journal or notebookSupplemental materials

CONTENT: Environmental Science

CORE CONCEPT 7: Mining and Mineral Resources

MAJOR OBJECTIVE: Discuss the economic importance of minerals and the environmental, political ramifications of mining.

CURRICULUM STANDARD:

State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
<p>PA Standard 4.8.10.A</p> <p>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 stability	<p>Teacher will guide students to:</p> <ul style="list-style-type: none">• Define the term mineral.• Explain the difference between a metal and a nonmetal, and give two examples of each.• Describe three processes by which ore minerals form.• Describe the changes in mining over the last 100 years.	<p>Teacher evaluation of:</p> <ul style="list-style-type: none">• Student white board work.• Student class discussion.• Student homework assignments.• Student laboratory reports/notebooks.• Student workbooks.• Student tests/quizzes.• Student video presentations.• Student electronic portfolios.	<p>Resources:</p> <ul style="list-style-type: none">• Textbook resources• Computer programs/web sites.• Journal or notebook• Supplemental materials

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CURRICULUM STANDARD:

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<p>PA Standard 4.8.12.B</p> <p>Analyze technology's role on natural resource sustainability.</p> <ul style="list-style-type: none">• Explain how technology has decreased the use of raw natural resources.• Explain how technology has impacted the efficiency of the use of natural resources.	<p>Teacher will guide students to:</p> <ul style="list-style-type: none">• Describe the manner in which mining companies explore for new mineral deposits.• Describe three methods of subsurface mining.• Describe to methods of surface mining.• Describe the steps that take place in smelting an ore.	<p>Teacher evaluation of:</p> <ul style="list-style-type: none">• Student white board work.• Student class discussion.• Student homework assignments.• Student laboratory reports/notebooks.• Student workbooks.• Student tests/quizzes.• Student video presentations.• Student electronic portfolios.	<p>Resources:</p> <ul style="list-style-type: none">• Textbook resources• Computer programs/web sites.• Journal or notebook• Supplemental materials

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CURRICULUM STANDARD:

State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
<p>PA Standard 4.8.12.D</p> <p>Analyze the international implications of environmental occurrences.</p> <ul style="list-style-type: none">Analyze environmental issues and their international implications.	<p>Teacher will guide students to:</p> <ul style="list-style-type: none">Describe seven important potential environmental consequences of mining.Name four federal laws that relate to mining and reclaiming mined land.Define the term reclamation.Describe two ways in which governments regulate mining.	<p>Teacher evaluation of:</p> <ul style="list-style-type: none">Student white board work.Student class discussion.Student homework assignments.Student laboratory reports/notebooks.Student workbooks.Student tests/quizzes.Student video presentations.Student electronic portfolios.	<p>Resources:</p> <ul style="list-style-type: none">Textbook resourcesComputer programs/web sites.Journal or notebookSupplemental materials

CONTENT: Environmental Science

CORE CONCEPT 8: Energy Resources

MAJOR OBJECTIVE: Differentiate between renewable and nonrenewable sources of energy, and their environmental and political impact on the world in which we live.

CURRICULUM STANDARD:

State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
<p>PA Standard 4.8.10.A</p> <p>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> <ul style="list-style-type: none">• List five factors that influence the value of a fuel.• Explain how fuels are used to generate electricity in an electric power plant.• Identify patterns of energy consumption and production in the world and in the United States.• Explain how fossil fuels form and how they are used• Compare the advantages and disadvantages of fossil fuel use.• List three factors that influence predictions of fossil-fuel use.	<p>Teacher evaluation of:</p> <ul style="list-style-type: none">• Student white board work.• Student class discussion.• Student homework assignments.• Student laboratory reports/notebooks.• Student workbooks.• Student tests/quizzes.• Student video presentations.• Student electronic portfolios.	<p>Resources:</p> <ul style="list-style-type: none">• Textbook resources• Computer programs/web sites.• Journal or notebook• Supplemental materials

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CURRICULUM STANDARD:

State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
<p>PA Standard 4.8.10.C</p> <p>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> <ul style="list-style-type: none">Describe nuclear fission.Describe how nuclear power plant works.List three advantages and three disadvantages of nuclear energy.	<p>Teacher evaluation of:</p> <ul style="list-style-type: none">Student white board work.Student class discussion.Student homework assignments.Student laboratory reports/notebooks.Student workbooks.Student tests/quizzes.Student video presentations.Student electronic portfolios.	<p>Resources:</p> <ul style="list-style-type: none">Textbook resourcesComputer programs/web sites.Journal or notebookSupplemental materials

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State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
<p>PA Standard 4.8.10.C</p> <p>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> <ul style="list-style-type: none">Describe three alternative energy technologies.Identify two ways that hydrogen could be used as a fuel source in the future.Explain the difference between energy efficiency and energy conservation.Describe two forms of energy efficient transportation.Identify three ways that you can conserve energy in your daily life.	<p>Teacher evaluation of:</p> <ul style="list-style-type: none">Student white board work.Student class discussion.Student homework assignments.Student laboratory reports/notebooks.Student workbooks.Student tests/quizzes.Student video presentations.Student electronic portfolios.	<p>Resources:</p> <ul style="list-style-type: none">Textbook resourcesComputer programs/web sites.Journal or notebookSupplemental materials

CONTENT: Environmental Science

CORE CONCEPT 9: Environmental Outcomes for the Future

MAJOR OBJECTIVE: Explain how human health is affected by environmental condition and how government and people can affect environmental issues.

CURRICULUM STANDARD:

State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
<p>PA Standard 4.8.10.C</p> <p>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> <ul style="list-style-type: none">Name one characteristic that makes a material biodegradable.Identify two types of solid waste.Describe how a modern landfill works.Name two environmental problems caused by landfills.	<p>Teacher evaluation of:</p> <ul style="list-style-type: none">Student white board work.Student class discussion.Student homework assignments.Student laboratory reports/notebooks.Student workbooks.Student tests/quizzes.Student video presentations.Student electronic portfolios.	<p>Resources:</p> <ul style="list-style-type: none">Textbook resourcesComputer programs/web sites.Journal or notebookSupplemental materials

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CURRICULUM STANDARD:

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<p>PA Standard 4.8.10.C</p> <p>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	<p>Teacher will guide students to:</p> <ul style="list-style-type: none">Identify three ways you can produce less waste.Describe how you can use your consumer buying power to reduce solid waste.List the steps that an item must go through to be recycled.	<p>Teacher evaluation of:</p> <ul style="list-style-type: none">Student white board work.Student class discussion.Student homework assignments.Student laboratory reports/notebooks.Student workbooks.Student tests/quizzes.Student video presentations.Student electronic portfolios.	<p>Resources:</p> <ul style="list-style-type: none">Textbook resourcesComputer programs/web sites.Journal or notebookSupplemental materials

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State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
<p>PA Standard 4.3.10.A</p> <p>Describe environmental health issues.</p> <ul style="list-style-type: none">• Identify the effects on human health of air, water and soil pollution and the possible economic costs to society.• Describe how indoor pollution may affect human health (e.g., dust mites, fumes, cat dandruff).• Explain the costs and benefits of cleaning up contaminants.	<p>Teacher will guide students to:</p> <ul style="list-style-type: none">• List five pollutant, their sources and their effects on human health.• Explain how scientists use toxicology and epidemiology.• Explain how pollution can come from both natural sources and human activities.• Describe the relationship between waste, pollution, and human health.	<p>Teacher evaluation of:</p> <ul style="list-style-type: none">• Student white board work.• Student class discussion.• Student homework assignments.• Student laboratory reports/notebooks.• Student workbooks.• Student tests/quizzes.• Student video presentations.• Student electronic portfolios.	<p>Resources:</p> <ul style="list-style-type: none">• Textbook resources• Computer programs/web sites.• Journal or notebook• Supplemental materials

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CURRICULUM STANDARD:

State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
<p>PA Standard 4.9.10.A</p> <p>Explain why environmental laws and regulations are developed and enacted.</p> <ul style="list-style-type: none">• Understand conflicting rights of property owners and environmental laws and regulations.• Identify local and state environmental regulations and their impact on environmental health.	<p>Teacher will guide students to:</p> <ul style="list-style-type: none">• Describe some of the challenges to achieving sustainability.• Describe several major international meetings and agreements relating to the environment.• Explain how economics and environmental science are related.• Compare two ways that governments influence economics.• Give an example of a private effort to address environmental problems.	<p>Teacher evaluation of:</p> <ul style="list-style-type: none">• Student white board work.• Student class discussion.• Student homework assignments.• Student laboratory reports/notebooks.• Student workbooks.• Student tests/quizzes.• Student video presentations.• Student electronic portfolios.	<p>Resources:</p> <ul style="list-style-type: none">• Textbook resources• Computer programs/web sites.• Journal or notebook• Supplemental materials

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CURRICULUM STANDARD:

State Standard/Student Expectation	Specific Content	Assessments	Resources/Materials
<p>PA Standard 4.9.10.A</p> <p>Explain why environmental laws and regulations are developed and enacted.</p> <ul style="list-style-type: none">• Explain the positive and negative impacts associated with passing environmental laws and regulations.• Analyze the roles that local, state and federal governments play in the development and enforcement of environmental laws.	<p>Teacher will guide students to:</p> <ul style="list-style-type: none">• Describe two major developments in U.S. environmental history.• Give examples of three federal agencies that have environmental responsibilities.• Explain the purpose of Environmental Impact Systems.• Give an example of how citizens can affect environmental policy at each level of government- local, state, and national.• Evaluate the media as a source of information about the environment.	<p>Teacher evaluation of:</p> <ul style="list-style-type: none">• Student white board work.• Student class discussion.• Student homework assignments.• Student laboratory reports/notebooks.• Student workbooks.• Student tests/quizzes.• Student video presentations.• Student electronic portfolios.	<p>Resources:</p> <ul style="list-style-type: none">• Textbook resources• Computer programs/web sites.• Journal or notebook• Supplemental materials

V. EXPECTED LEVELS OF ACHIEVEMENT

A. Students are expected to reach a proficient level.

B. Grading system for the Environmental Science Class is as follows:

Grading Scale	
A	90-100
B	80-89
C	70-79
D	60-69
F	0-59

C. Each student's grade will be determined at the conclusion of each marking period. Progress notes will be issued half-way throughout each marking period for students who are performing below 70%.