

Southern York County School District Instructional Plan

Name:	Dates: September / October
Course/Subject: Environmental Science	Unit Plan 1: Introduction to Environmental Science – Global Climate Change
Stage 1 – Desired Results	
<p>PA Standard(s)/Assessment Anchors Addressed:</p> <p>4.1.10 B Explain the consequences of interrupting natural cycles.</p> <p>4.1.10.C: Evaluate the efficiency of energy flow within a food web. Describe how energy is converted from one form to another as it moves through a food web (photosynthetic, geothermal).</p> <p>4.1.10.D: Research practices that impact biodiversity in specific ecosystems. Analyze the relationship between habitat changes to plant and animal population fluctuations.</p> <p>4.1.10.E: Analyze how humans influence the pattern of natural changes (e.g. primary / secondary succession and desertification) in ecosystems over time.</p> <p>S11.A.1.1: Analyze and explain the nature of science in the search for understanding the natural world and its connection to technological systems.</p> <p>S11.A.1.2: Identify and analyze the scientific or technological challenges of societal issues; propose possible solutions and discuss implications.</p> <p>S11.A.1.2.1: Explain and apply scientific concepts to societal issues using case studies (e.g., spread of HIV, deforestation, environmental health, energy).</p> <p>S11.A.1.2.2: Use case studies to propose possible solutions and analyze economic and environmental implications of solutions for real world problems.</p> <p>S11.A.1.3: Describe and interpret patterns of change in natural and human-made systems.</p>	
<p>Understanding(s): <i>Students will understand . . .</i></p> <p>1. Human activity is changing the planet Earth.</p>	<p>Essential Question(s):</p> <ul style="list-style-type: none"> ▪ To what extent does human activity change the natural cycles of planet Earth? ▪ To what extent will scientific research help us understand climate change?
<p>Learning Objectives: <i>Students will know . . .</i></p> <ul style="list-style-type: none"> ▪ The difference between climate and weather. ▪ The relationship between climate and latitude. ▪ The relationship between climate and the oceans. ▪ The relationship between climate and the atmosphere. ▪ The principles of atmospheric circulation. ▪ The Greenhouse Effect. ▪ The components of our local ecosystem, an Eastern deciduous forest. 	<p>Students will be able to:</p> <ul style="list-style-type: none"> ▪ Conduct a quadrat study of a forested area. ▪ Properly use forest study equipment to collect data in the field. ▪ Analyze data collected in the field.
Name:	Dates: November through January

Course/Subject: Environmental Science	Unit Plan 2: CO ₂ Emissions and Vehicles
Stage 1 – Desired Results	
PA Standard(s)/Assessment Anchors Addressed:	
Understanding(s): <i>Students will understand . . .</i> 1. CO ₂ emissions from all sectors of society and the economy can impact the greenhouse effect.	Essential Question(s): <ul style="list-style-type: none"> ▪ To what extent can the transportation sector affect CO₂ emissions and the greenhouse effect? ▪ How can the selection of a car affect CO₂ emissions?
Learning Objectives: <i>Students will know . . .</i> <ul style="list-style-type: none"> ▪ The social “cost” of carbon. ▪ The Clean Air Act of 1970, the Clean Air Act Amendments of 1990 and changes of 1997. ▪ Carbon neutral. ▪ The carbon cycle. ▪ The source of CO₂ emissions in the atmosphere by sector of society and the economy. ▪ The similarities and differences between electric cars, hybrid cars, diesel engines and gasoline powered engines. ▪ The effect of ethanol levels in gasoline on engine performance and maintenance. ▪ Fuel economy. ▪ Biofuels. ▪ Cost of “used” cars and car recycling. ▪ Laws and government regulation. 	Students will be able to: <ul style="list-style-type: none"> ▪ Calculate personal carbon footprint. ▪ Analyze auto emission data to calculate effect on CO₂ levels in the atmosphere. ▪ Analyze electric cars, hybrid cars, diesel engines and gasoline powered engines in terms of carbon footprint and economic cost. ▪ Convert waste vegetable oil to biodiesel.
Name:	Dates: January / February
Course/Subject: Environmental Science	Unit Plan 3: Trash
Stage 1 – Desired Results	
PA Standard(s)/Assessment Anchors Addressed:	
4.2.10 D: Explain different management alternatives involved in recycling and solid waste management. 4.2.12 D: Evaluate solid waste management practices.	
Understanding(s): <i>Students will understand . . .</i> 1. Humans consume products and thereby affect the availability of renewable and nonrenewable natural resources and the management of waste materials.	Essential Question(s): <ul style="list-style-type: none"> ▪ What happens to something I throw away? ▪ To what extent can I limit the amount of solid waste I generate?
Learning Objectives:	

<p>Students will know . . .</p> <ul style="list-style-type: none"> ▪ The definition of municipal solid waste. ▪ The difference between municipal solid waste and hazardous waste. ▪ The components of the solid waste stream. ▪ The sources of municipal solid waste. ▪ The management of solid waste. ▪ The prevention and reduction of solid waste. ▪ That solid waste can generate electricity. ▪ How recycling can impact the amount of solid waste that must be managed. ▪ The path their garbage takes. ▪ The structure and function of a landfill. ▪ The role of federal, state, and local governments in the management of solid waste. 	<p>Students will be able to:</p> <ul style="list-style-type: none"> ▪ Create a compost pile. ▪ Identify recyclable materials. ▪ Impact the waste stream at Susquehannock High School. ▪ Conduct a survey, graph and analyze the results of the data.
<p>Name:</p>	<p>Dates: February / March</p>
<p>Course/Subject: Environmental Science</p>	<p>Unit Plan 4: Science Process Skills</p>
<p>Stage 1 – Desired Results</p>	
<p>PA Standard(s)/Assessment Anchors Addressed: 4.1.10.E: Analyze how humans influence the pattern of natural changes (e.g. primary / secondary succession and desertification) in ecosystems over time.</p> <p>S11.A.1.1: Analyze and explain the nature of science in the search for understanding the natural world and its connection to technological systems.</p> <p>S11.A.1.2: Identify and analyze the scientific or technological challenges of societal issues; propose possible solutions and discuss implications.</p> <p>S11.A.1.2.1: Explain and apply scientific concepts to societal issues using case studies (e.g., spread of HIV, deforestation, environmental health, energy).</p> <p>S11.A.1.2.2: Use case studies to propose possible solutions and analyze economic and environmental implications of solutions for real world problems.</p> <p>S11.A.1.3: Describe and interpret patterns of change in natural and human-made systems.</p>	
<p>Understanding(s): Students will understand . . .</p> <ol style="list-style-type: none"> 1. Scientists study the impact of human activity on changing the planet Earth. 	<p>Essential Question(s):</p> <ul style="list-style-type: none"> ▪ To what extent does human activity change the natural cycles of planet Earth? ▪ To what extent will scientific research help us understand the impact of human actions on planet Earth?
<p>Learning Objectives:</p>	

<p>Students will know . . .</p> <ul style="list-style-type: none"> ▪ Direct and indirect observation can be used to study human impact on the planet. 	<p>Students will be able to:</p> <ul style="list-style-type: none"> ▪ Develop an appropriate science experiment that includes raising questions, formulation hypotheses, testing, controlled experiments, recognizing variables, manipulating variables, interpreting data and producing solutions. ▪ Use process skills to make inferences and predictions using collected information and to communicate, using space/time relationships, defining operationally. ▪ Apply the elements of scientific inquiry to solve problems.
<p>Name:</p>	<p>Dates: March through May</p>
<p>Course/Subject: Environmental Science</p>	<p>Unit Plan 5 : Genetically Modified Foods</p>
<p>Stage 1 – Desired Results</p>	
<p>PA Standard(s)/Assessment Anchors Addressed:</p> <ul style="list-style-type: none"> ▪ 3.1.B.B4: Explain how genetic technologies have impacted the fields of medicine, forensics and agriculture. ▪ BIO.B.2.3: Explain how genetic information is expressed. ▪ BIO.B.2.4: Apply scientific thinking, processes, tools and technologies in the study of biology. 	
<p>Understanding(s): <i>Students will understand . . .</i></p> <ol style="list-style-type: none"> 1. Genetic engineering can impact our everyday life. 	<p>Essential Question(s):</p> <ul style="list-style-type: none"> ▪ To what extent are genetically engineered crops used to produce food for human consumption? ▪ How can science prevent famine?
<p>Learning Objectives: <i>Students will know . . .</i></p> <ul style="list-style-type: none"> ▪ The structure of DNA. ▪ The role of DNA in the synthesis of protein. ▪ The use of restriction enzymes. ▪ The plant crop source for ingredients in processed food. ▪ The ways humans have selected and changed plants used for food. ▪ Procedures for genetically engineering a cell or organism. ▪ The benefits and risks of genetically engineering crops. ▪ The characteristics and traits that can be engineered in crops. ▪ The theory behind electrophoresis and PCR. 	<p>Students will be able to:</p> <ul style="list-style-type: none"> ▪ Determine if a foodstuff contains genetically modified corn through DNA extraction, PCR, and electrophoresis. ▪ Design an experiment to determine if soybean seeds are traditional or genetically modified.
<p>Name:</p>	<p>Dates: May / June</p>

Course/Subject: Environmental Science	Unit Plan 6: Science Process Skills Final Project
Stage 1 – Desired Results	
<p>PA Standard(s)/Assessment Anchors Addressed: 4.1.10.E: Analyze how humans influence the pattern of natural changes (e.g. primary / secondary succession and desertification) in ecosystems over time.</p> <p>S11.A.1.1: Analyze and explain the nature of science in the search for understanding the natural world and its connection to technological systems.</p> <p>S11.A.1.2: Identify and analyze the scientific or technological challenges of societal issues; propose possible solutions and discuss implications.</p> <p>S11.A.1.2.1: Explain and apply scientific concepts to societal issues using case studies (e.g., spread of HIV, deforestation, environmental health, energy).</p> <p>S11.A.1.2.2: Use case studies to propose possible solutions and analyze economic and environmental implications of solutions for real world problems.</p> <p>S11.A.1.3: Describe and interpret patterns of change in natural and human-made systems.</p>	
<p>Understanding(s): Students will understand . . .</p> <ol style="list-style-type: none"> 1. Scientists study the impact of human activity on changing the planet Earth. 	<p>Essential Question(s):</p> <ul style="list-style-type: none"> ▪ To what extent will scientific research help us understand the impact of human actions on planet Earth?
<p>Learning Objectives: Students will know . . .</p> <ul style="list-style-type: none"> ▪ Direct and indirect observation can be used to study human impact on the planet. 	<p>Students will be able to:</p> <ul style="list-style-type: none"> ▪ Develop an appropriate science experiment that includes raising questions, formulation hypotheses, testing, controlled experiments, recognizing variables, manipulating variables, interpreting data and producing solutions. ▪ Use process skills to make inferences and predictions using collected information and to communicate, using space/time relationships, defining operationally. ▪ Apply the elements of scientific inquiry to solve problems.