Environmental Science

Curriculum Guide

Dunmore School District

Dunmore, PA

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Curriculum Guide

Environmental Science

Prerequisite:

- Science 9 and Biology

Course Description:
Environmental Science is an elective course designed to further develop students' knowledge and skills that apply to major environmental science concepts. Upon successful completion of the course, students will have a working knowledge of the course content and be able to apply this knowledge and skill set to demonstrate an understanding of a variety of environmental concepts. In particular, a major focus of this course is the interrelationships of humans and the natural world. In addition, students should be able to analyze environmental issues, their proposed solutions, and the importance of studying these issues.

Special Education:

After a student has been evaluated and found to be eligible for specially designed instruction under one of the 13 disability categories, an individualized education plan will be developed to help the student succeed through a more intense intervention program. Special Education is the practice of educating students in a way that addresses their individual differences and needs. The purpose of special education is to provide equal access to education for children ages birth through 21 by providing specialized services that will lead to school success in general education. Our goal for each student is for him/her to be educated in his/her least restrictive environment with additional supports by way of specially designed instruction. After all interventions in the general education setting have been exhausted and the student is still not making progress, students can receive direct instruction in a special education classroom. Direct instruction provides more intense intervention and replacement instruction in order to minimize skill deficits. In our special education classrooms, students will have access to the standards-based general education curriculum, as well as using various research-based intervention programs. Resources and activities will be adjusted based on individual student needs. Suggested time found within the curriculum will be adjusted as needed per individual student's needs.

Special Education Strategies can be located in the IEP Enhancements table located in Appendix: A at the end of this document.

Dunmore School District
Curriculum Guide

Year-at-a-glance

Subject: Environmental Science	**Grade Level: 11 and 12**	**Date Completed: 4/8/2019**

1st Quarter

Topic	Resources	Standards
Science and the Environment	*Environmental Science* Chapter 01, Supplements, and Brain Pop	4.2 4.3 4.8
Tools of Environmental Science	*Environmental Science* Chapter 02, Supplements, and Brain Pop	3.1 3.2 3.3 4.8
The Dynamic Earth	*Environmental Science* Chapter 03, Supplements, and Brain Pop	3.5 4.1 4.6

2nd Quarter

Topic	Resources	Standards
The Organization of Life	*Environmental Science* Chapter 04, Supplements, and Brain Pop	3.1 3.2 3.5
How Ecosystems Work	*Environmental Science* Chapter 05, Supplements, and Brain Pop	3.3 3.5 4.6

3rd Quarter

Topic	Resources	Standards
Biomes	*Environmental Science* Chapter 06, Supplements, and Brain Pop	3.6 3.7 4.3 4.6 4.7 4.8
Aquatic Ecosystems	*Environmental Science* Chapter 07, Supplements, and Brain Pop	4.3 4.6 4.7 4.8
Understanding Populations	*Environmental Science* Chapter 08, Supplements, and Brain Pop	3.3 4.3 4.6 4.8

Dunmore School District
Curriculum Guide

4th Quarter

Topic	Resources	Standards
The Human Population	*Environmental Science* Chapter 09, Supplements, and Brain Pop	4.3 4.6 4.8
Biodiversity	*Environmental Science* Chapter 10, Supplements, and Brain Pop	3.1 3.3 3.5 4.1 4.3 4.5
Water	*Environmental Science* Chapter 11, Supplements, and Brain Pop	3.1 3.3 3.5 4.1 4.2 4.3 4.8
Review and Final Exam		

General Topic	PA Academic and Core Standards	Essential Knowledge, Skills & Vocabulary	Resources & Activities	Assessments	Suggested Time (In Days)
Science and The Environment	**PA Academic Standards: Science** 4.2 Renewable and Nonrenewable Resources 4.3 Environmental Health 4.8 Humans and the Environment **PA Core Standards:** **Reading for Science and Technical Subjects, 6-12** 3.5 Reading Informational Text Students read, understand, and respond to informational text-with emphasis on comprehension, making connections among ideas and between texts with focus on textual evidence. **PA Core Standards: Writing for Science and Technical Subjects**, **6-12** 3.6 Writing Students write for different purposes and audiences. Students write clear and focused text to convey a well-defined perspective and appropriate content.	**Essential Knowledge/Skills:** 4.2.12.A. Analyze the use of renewable and nonrenewable resources. • Explain the effects on the environment and sustainability through the use of nonrenewable resources. • Evaluate the advantages and disadvantages of reusing our natural resources. 4.2.12.B. Analyze factors affecting the availability of renewable and nonrenewable resources. • Evaluate the use of natural resources and offer approaches for using them while diminishing waste. • Compare the economics of different areas based on the availability and accessibility of the natural resources. 4.2.12.C. Analyze factors that influence the availability of natural resources.	**Approved textbook** *Environmental Science* Chapter 01 and Supplements Brain Pop	**Teacher prepared tests** **Quizzes** **Worksheets**	**15 days**

		• Compare the use of natural resources in different countries. • Determine how delivery systems influence the availability of resources at the local, regional and national level. 4.2.12.D. Evaluate solid waste management practices. • Examine and explain the path of a recyclable material from collection to waste, reuse or recycling identifying the market forces. • Understand current regulations concerning recycling and solid waste. • Research new technologies in the use, reuse or recycling of materials. 4.3.12.A. Analyze the complexity of environmental health issues. • Identify environmental health issues and explain how they have been addressed on a worldwide level. • Analyze efforts to prevent, control and/or reduce pollution through cost and			

		benefit analysis and risk management. • Describe the impact of occupational exposures as they relate to environmental health issues. • Identify invisible pollutants and explain their effects on human health. • Explain the relationship between wind direction and velocity as it relates to dispersal and occurrence of pollutants. • Explain the different disposal methods used for toxic and hazardous waste. 4.3.12.B. Analyze the local, regional and national impacts of environmental health. • Analyze the cost of natural disasters in both dollars and loss of natural habitat. • Research and analyze the local, state and national laws that deal with point and nonpoint source pollution; evaluate the costs and benefits of these laws. • Explain mitigation and its role in environmental health. • Explain industry's initiatives			

		to meet state and federal mandates on clean air and water. • Describe the impacts of point and nonpoint source pollution on the Chesapeake Bay. • Identify and evaluate the costs and benefits of laws regulating air and water quality and waste disposal. 4.3.12.C. Analyze the need for a healthy environment. • Research the relationship of some chronic diseases to an environmental pollutant. • Explain how man-made systems may affect the environment. 4.8.12.A. Explain how technology has influenced the sustainability of natural resources over time. • Describe how technology has changed the use of natural resources by business and industry. • Analyze the effect of natural resource conservation on a product over time (e.g., automobile manufacturing, aluminum can recycling, paper			

		products). 4.8.12.B. Analyze technology's role on natural resource sustainability. • Explain how technology has decreased the use of raw natural resources. • Explain how technology has impacted the efficiency of the use of natural resources. • Analyze the role of technology in the reduction of pollution. 4.8.12.C. Analyze how pollution has changed in quality, variety and toxicity as the United States developed its industrial base. • Analyze historical pollution trends and project them for the future. • Compare and contrast historical and current pollution levels at a given location. 4.8.12.D. Analyze the international implications of environmental occurrences. • Identify natural occurrences that have international impact (e.g., El Nino, volcano			

		eruptions, earthquakes). • Analyze environmental issues and their international implications. **Vocabulary:** Environmental science Ecology Agriculture Natural Resource Pollution Biodiversity Hunter-gatherers Agricultural revolution Industrial revolution Law of supply and demand Open system Closed system Ecological footprint Tragedy of the commons Sustainability			

General Topic	PA Academic and Core Standards	Essential Knowledge, Skills & Vocabulary	Resources & Activities	Assessments	Suggested Time (In Days)
Tools of Environmental Science	**PA Academic Standards: Science** 3.1 Unifying Themes 3.2 Inquiry and Design 3.3 Biological Sciences 4.8 Humans and the Environment **PA Core Standards: Reading for Science and Technical Subjects, 6-12** 3.5 Reading Informational Text Students read, understand, and respond to informational text-with emphasis on comprehension, making connections among ideas and between texts with focus on textual evidence. **PA Core Standards: Writing for Science and Technical Subjects, 6-12** 3.6 Writing Students write for different purposes and audiences. Students write clear and focused text to convey a well-defined perspective and appropriate content.	**Essential Knowledge/Skills:** 3.1.12.A. Apply concepts of systems, subsystems, feedback and control to solve complex technological problems. • Apply knowledge of control systems concept by designing and modeling control systems that solve specific problems. • Apply systems analysis to predict results. • Analyze and describe the function, interaction and relationship among subsystems and the system itself. • Compare and contrast several systems that could be applied to solve a single problem. • Evaluate the causes of a system's inefficiency. 3.1.12.B. Apply concepts of models as a method to predict and understand science and technology. • Evaluate technological	**Approved textbook** *Environmental Science* Chapter 02 and Supplements Brain Pop	**Teacher prepared tests** **Quizzes** **Worksheets**	**11 days**

		processes by collecting data and applying mathematical models (e.g., process control). • Apply knowledge of complex physical models to interpret data and apply mathematical models. • Appraise the importance of computer models in interpreting science and technological systems. 3.1.12.C. Assess and apply patterns in science and technology. • Assess and apply recurring patterns in natural and technological systems. • Compare and contrast structure and function relationships as they relate to patterns. • Assess patterns in nature using mathematical formulas. 3.1.12.D. Analyze scale as a way of relating concepts and ideas to one another by some measure. • Compare and contrast various forms of dimensional analysis. • Assess the use of several			

		units of measurement to the same problem. • Analyze and apply appropriate measurement scales when collecting data. 3.1.12.E. Evaluate change in nature, physical systems and man-made systems. • Evaluate fundamental science and technology concepts and their development over time (e.g., DNA, cellular respiration, unified field theory, energy measurement, automation, miniaturization, and Copernican and Ptolemaic universe theories). • Analyze how models, systems and technologies have changed over time (e.g., germ theory, theory of evolution, solar system, cause of fire). • Explain how correlation of variables does not necessarily imply causation. • Evaluate the patterns of change within a technology (e.g., changes in engineering in the automotive industry). 3.2.12.A. Evaluate the nature of scientific and technological			

		knowledge. • Know and use the ongoing scientific processes to continually improve and better understand how things work. • Critically evaluate the status of existing theories (e.g., germ theory of disease, wave theory of light, classification of subatomic particles, theory of evolution, and epidemiology of aids). 3.2.12.B. Evaluate experimental information for appropriateness and adherence to relevant science processes. • Evaluate experimental data correctly within experimental limits. • Judge that conclusions are consistent and logical with experimental conditions. • Interpret results of experimental research to predict new information or improve a solution. 3.2.12.C. Apply the elements of scientific inquiry to solve multi-step problems. • 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. • Organize experimental information using analytic and descriptive techniques. • Evaluate the significance of experimental information in answering the question. • Project additional questions from a research study that could be studied. 3.2.12.D. Analyze and use the technological design process to solve problems. • Assess all aspects of the problem, prioritize the necessary information and formulate questions that must be answered. • Propose, develop and appraise the best solution and develop alternative solutions. • Implement and assess the solution.			

		• Evaluate and assess the solution, redesign and improve as necessary. • Communicate and assess the process and evaluate and present the impacts of the solution. 3.3.12.A. Explain the relationship between structure and function at all levels of organization. • Identify and explain interactions among organisms (e.g., mutually beneficial, harmful relationships). • Explain and analyze the relationship between structure and function at the molecular, cellular and organ-system level. • Describe and explain structural and functional relationships in each of the five (or six) kingdoms. • Explain significant biological diversity found in each of the biomes. 3.3.12.B. Analyze the chemical and structural basis of living organisms. • Identify and describe factors affecting metabolic function			

		(e.g., temperature, acidity, hormones). • Evaluate metabolic activities using experimental knowledge of enzymes. • Evaluate relationships between structure and functions of different anatomical parts given their structure. • Describe potential impact of genome research on the biochemistry and physiology of life. 3.3.12.C. Explain gene inheritance and expression at the molecular level. • Analyze gene expression at the molecular level. • Describe the roles of nucleic acids in cellular reproduction and protein synthesis. • Describe genetic engineering techniques, applications and impacts. • Explain birth defects from the standpoint of embryological development and/or changes in genetic makeup. 3.3.12.D. Analyze the theory of			

		evolution. • Examine human history by describing the progression from early hominids to modern humans. • apply the concept of natural selection as a central concept in illustrating evolution theory. 4.8.12.A. Explain how technology has influenced the sustainability of natural resources over time. • Describe how technology has changed the use of natural resources by business and industry. • Analyze the effect of natural resource conservation on a product over time (e.g., automobile manufacturing, aluminum can recycling, paper products). 4.8.12.B. Analyze technology's role on natural resource sustainability. • Explain how technology has decreased the use of raw natural resources. • Explain how technology has impacted the efficiency of the use of natural resources.			

		• Analyze the role of technology in the reduction of pollution. 4.8.12.C. Analyze how pollution has changed in quality, variety and toxicity as the United States developed its industrial base. • Analyze historical pollution trends and project them for the future. • Compare and contrast historical and current pollution levels at a given location. 4.8.12.D. Analyze the international implications of environmental occurrences. • Identify natural occurrences that have international impact (e.g., El Nino, volcano eruptions, earthquakes). • Analyze environmental issues and their international implications. **Vocabulary:** Observation Hypothesis Prediction Experiment Variable			

		Experimental group Control group Data Correlation Statistics Mean Distribution Probability Sample Risk Model Conceptual model Mathematical model			

General Topic	PA Academic and Core Standards	Essential Knowledge, Skills & Vocabulary	Resources & Activities	Assessments	Suggested Time (In Days)
The Dynamic Earth	**PA Academic Standards: Science** 3.5 Biological Sciences 4.1 Watersheds and Wetlands 4.6 Ecosystems and their Interactions **PA Core Standards:** **Reading for Science and Technical Subjects, 6-12** 3.5 Reading Informational Text Students read, understand, and respond to informational text-with emphasis on comprehension, making connections among ideas and between texts with focus on textual evidence. **PA Core Standards: Writing for Science and Technical Subjects, 6-12** 3.6 Writing Students write for different purposes and audiences. Students write clear and focused text to convey a well-defined perspective and appropriate content.	**Essential Knowledge/Skills:** 3.5.12.A. Analyze and evaluate earth features and processes that change the earth. • Apply knowledge of geophysical processes to explain the formation and degradation of earth structures (e.g., mineral deposition, cave formations, soil composition). • Interpret geological evidence supporting evolution. • Apply knowledge of radioactive decay to assess the age of various earth features and objects. 3.5.12.B. Analyze the availability, location and extraction of earth resources. • Describe how the location of earth's major resources has affected a country's strategic decisions. • Compare locations of earth features and country boundaries. • Analyze the impact of	**Approved textbook** *Environmental Science* Chapter 03 and Supplements Brain Pop	**Teacher prepared tests** **Quizzes** **Worksheets**	**20 days**

		resources (e.g., coal deposits, rivers) on the life of Pennsylvania's settlements and cities. 3.5.12.C. Analyze atmospheric energy transfers. • Describe how weather and climate involve the transfer of energy in and out of the atmosphere. • Explain how unequal heating of the air, ocean and land produces wind and ocean currents. • Analyze the energy transformations that occur during the greenhouse effect and predict the long-term effects of increased pollutant levels in the atmosphere. • Analyze the mechanisms that drive a weather phenomena (e.g., El Nino, hurricane, tornado) using the correlation of three methods of heat energy transfer. 3.5.12.D. Analyze the principles and history of hydrology. • Analyze the operation and effectiveness of a water purification and desalination			

		system. • Evaluate the pros and cons of surface water appropriation for commercial and electrical use. • Analyze the historical development of water use in Pennsylvania (e.g., recovery of Lake Erie). • Compare the marine life and type of water found in the intertidal, neritic and bathyal zones. 4.1.12.A. Categorize stream order in a watershed. • Explain the concept of stream order. • Identify the order of watercourses within a major river's watershed. • Compare and contrast the physical differences found in the stream continuum from headwater to mouth. 4.1.12.B. Explain the relationships that exist within watersheds in the United States. • Understand that various ecosystems may be contained in a watershed.			

		• Examine and describe the ecosystems contained within a specific watershed. • Identify and describe the major watersheds in the United States. 4.1.12.C. Analyze the parameters of a watershed. • Interpret physical, chemical and biological data as a means of assessing the environmental quality of a watershed. • Apply appropriate techniques in the analysis of a watershed (e.g., water quality, biological diversity, erosion, sedimentation). 4.1.12.D. Analyze the complex and diverse ecosystems of wetlands. • Explain the functions of habitat, nutrient production, migration stopover and groundwater recharge as it relates to wetlands. • Explain the dynamics of a wetland ecosystem. • Describe and analyze different types of wetlands. 4.1.12.E. Evaluate the trade-			

		offs, costs and benefits of conserving watersheds and wetlands. • Evaluate the effects of natural events on watershed and wetlands. • Evaluate the effects of human activities on watersheds and wetlands. 4.6.12.A. Analyze the interdependence of an ecosystem. • Analyze the relationships among components of an ecosystem. • Evaluate the efficiency of energy flow within an ecosystem. • Explain limiting factors and their impact on carrying capacity. • Understand how biological diversity impacts the stability of an ecosystem. • Analyze the positive or negative impacts of outside influences on an ecosystem. • Analyze how different land use practices can affect the quality of soils. 4.6.12.B. Analyze the impact of			

		cycles on the ecosystem. • Evaluate the materials necessary for natural cycles. • Explain the processes involved in the natural cycles. 4.6.12.C. Analyze how human action and natural changes affect the balance within an ecosystem. • Analyze the effects of substances that move through natural cycles. • Analyze the effects of natural occurrences and their effects on ecosystems. • Analyze effects of human action on an ecosystem. • Compare the stages of succession and how they influence the cycles existing in an ecosystem. **Vocabulary:** Geosphere Hydrosphere Crust Mantle Core Lithosphere Asthenosphere Tectonic Plate Chemical Weathering		

		Erosion Atmosphere Troposphere Stratosphere Ozone Radiation Conduction Convection Greenhouse Effect Water Cycle Evaporation Condensation Precipitation Salinity Fresh Water Biosphere			

General Topic	PA Academic and Core Standards	Essential Knowledge, Skills & Vocabulary	Resources & Activities	Assessments	Suggested Time (In Days)
The Organization of Life	**PA Academic Standards: Science** 3.1 Unifying Themes of Science 3.2 Inquiry and Design 3.5 Earth Sciences **PA Core Standards:** **Reading for Science and Technical Subjects, 6-12** 3.5 Reading Informational Text Students read, understand, and respond to informational text-with emphasis on comprehension, making connections among ideas and between texts with focus on textual evidence. **PA Core Standards: Writing for Science and Technical Subjects, 6-12** 3.6 Writing Students write for different purposes and audiences. Students write clear and focused text to convey a well-defined perspective and appropriate content.	**Essential Knowledge/Skills:** 3.1.12.A. Apply concepts of systems, subsystems, feedback and control to solve complex technological problems. • Apply knowledge of control systems concept by designing and modeling control systems that solve specific problems. • Apply systems analysis to predict results. • Analyze and describe the function, interaction and relationship among subsystems and the system itself. • Compare and contrast several systems that could be applied to solve a single problem. • Evaluate the causes of a system's inefficiency. 3.1.12.B. Apply concepts of models as a method to predict and understand science and technology. • Evaluate technological	**Approved textbook** *Environmental Science* Chapter 04 and Supplements Brain Pop	**Teacher prepared tests, quizzes, etc.** **Series available assessments online. (Optional)**	**17 days**

		processes by collecting data and applying mathematical models (e.g., process control). • Apply knowledge of complex physical models to interpret data and apply mathematical models. • Appraise the importance of computer models in interpreting science and technological systems. 3.1.12.C. Assess and apply patterns in science and technology. • Assess and apply recurring patterns in natural and technological systems. • Compare and contrast structure and function relationships as they relate to patterns. • Assess patterns in nature using mathematical formulas. 3.1.12.D. Analyze scale as a way of relating concepts and ideas to one another by some measure. • Compare and contrast various forms of dimensional analysis. • Assess the use of several			

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		• Evaluate and assess the solution, redesign and improve as necessary. • Communicate and assess the process and evaluate and present the impacts of the solution. **Vocabulary:** Ecosystem Biotic Factor Abiotic Factor Organism Species Population Community Habitat Natural Selection Evolution Adaptation Artificial Selection Resistance Archaea Bacteria Fungus Protista Gymnosperm Angiosperm Invertebrate Vertebrate			

Dunmore School District
Curriculum Guide

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How Ecosystems Work	**PA Academic Standards: Science** 3.3 Biological Sciences 3.5 Earth Sciences 4.6 Ecosystems and their Interactions **PA Core Standards: Reading for Science and Technical Subjects, 6-12** 3.5 Reading Informational Text Students read, understand, and respond to informational text-with emphasis on comprehension, making connections among ideas and between texts with focus on textual evidence. **PA Core Standards: Writing for Science and Technical Subjects, 6-12** 3.6 Writing Students write for different purposes and audiences. Students write clear and focused text to convey a well-defined perspective and appropriate content.	**Essential Knowledge/Skills:** 3.3.12.A. Explain the relationship between structure and function at all levels of organization. • Identify and explain interactions among organisms (e.g., mutually beneficial, harmful relationships). • Explain and analyze the relationship between structure and function at the molecular, cellular and organ-system level. • Describe and explain structural and functional relationships in each of the five (or six) kingdoms. • Explain significant biological diversity found in each of the biomes. 3.3.12.B. Analyze the chemical and structural basis of living organisms. • Identify and describe factors affecting metabolic function (e.g., temperature, acidity, hormones). • Evaluate metabolic activities	**Approved textbook** *Environmental Science* Chapter 05 and Supplements Brain Pop	**Teacher prepared tests, quizzes, etc.** **Series available assessments online. (Optional)**	**20 days**

		using experimental knowledge of enzymes. • Evaluate relationships between structure and functions of different anatomical parts given their structure. • Describe potential impact of genome research on the biochemistry and physiology of life. 3.3.12.C. Explain gene inheritance and expression at the molecular level. • Analyze gene expression at the molecular level. • Describe the roles of nucleic acids in cellular reproduction and protein synthesis. • Describe genetic engineering techniques, applications and impacts. • Explain birth defects from the standpoint of embryological development and/or changes in genetic makeup. 3.3.12.D. Analyze the theory of evolution. • Examine human history by describing the progression			

		from early hominids to modern humans. • apply the concept of natural selection as a central concept in illustrating evolution theory. 3.5.12.A. Analyze and evaluate earth features and processes that change the earth. • Apply knowledge of geophysical processes to explain the formation and degradation of earth structures (e.g., mineral deposition, cave formations, soil composition). • Interpret geological evidence supporting evolution. • Apply knowledge of radioactive decay to assess the age of various earth features and objects. 3.5.12.B. Analyze the availability, location and extraction of earth resources. • Describe how the location of earth's major resources has affected a country's strategic decisions. • Compare locations of earth features and country boundaries. • Analyze the impact of			

		resources (e.g., coal deposits, rivers) on the life of Pennsylvania's settlements and cities. 3.5.12.C. Analyze atmospheric energy transfers. • Describe how weather and climate involve the transfer of energy in and out of the atmosphere. • Explain how unequal heating of the air, ocean and land produces wind and ocean currents. • Analyze the energy transformations that occur during the greenhouse effect and predict the long-term effects of increased pollutant levels in the atmosphere. • Analyze the mechanisms that drive a weather phenomenon (e.g., El Nino, hurricane, tornado) using the correlation of three methods of heat energy transfer. 3.5.12.D. Analyze the principles and history of hydrology. • Analyze the operation and effectiveness of a water purification and desalination			

		system. • Evaluate the pros and cons of surface water appropriation for commercial and electrical use. • Analyze the historical development of water use in Pennsylvania (e.g., recovery of Lake Erie). • Compare the marine life and type of water found in the intertidal, neritic and bathyal zones. **Vocabulary:** Photosynthesis Producers Consumers Decomposer Cellular Respiration Food Chain Food Web Trophic Level Carbon Cycle Nitrogen-fixing Bacteria Nitrogen Cycle Phosphorus Cycle Ecological Succession Primary Succession Pioneer Species Climax Community			

Dunmore School District
Curriculum Guide

General Topic	PA Academic and Core Standards	Essential Knowledge, Skills & Vocabulary	Resources & Activities	Assessments	Suggested Time (In Days)
Biomes	**PA Academic Standards: Science** 3.6 Technology Education 3.7 Technological Devices 4.3 Environmental Health 4.6 Ecosystems and their Interactions 4.7 Threatened, Endangered and Extinct Species 4.8 Humans and the Environment **PA Core Standards:** **Reading for Science and Technical Subjects, 6-12** 3.5 Reading Informational Text Students read, understand, and respond to informational text-with emphasis on comprehension, making connections among ideas and between texts with focus on textual evidence. **PA Core Standards: Writing for Science and Technical Subjects**, **6-12** 3.6 Writing Students write for different purposes and audiences. Students write clear and focused text to convey a well-defined perspective and appropriate content.	**Essential Knowledge/Skills:** 3.6.12.A. Analyze biotechnologies that relate to propagating, growing, maintaining, adapting, treating and converting. • Analyze and solve a complex production process problem using biotechnologies (e.g., hydroponics, fish farming, and crop propagation). • Analyze specific examples where engineering has impacted society in protection, personal health application or physical enhancement. • Appraise and evaluate the cause and effect and subsequent environmental, economic and societal impacts that result from biomass and biochemical conversion. • Evaluate and apply biotechnical processes to complex plant and animal production methods. • Apply knowledge of biochemical related technologies to propose alternatives to hazardous	**Approved textbook** *Environmental Science* Chapter 06 and Supplements Brain Pop	**Teacher prepared tests, quizzes, etc.** **Series available assessments online. (Optional)**	**15 days**

		waste treatment. • apply knowledge of agricultural science to solve or improve a biochemical related problem. 3.6.12.B. Analyze knowledge of information technologies of processes encoding, transmitting, receiving, storing, retrieving and decoding. • Apply and analyze advanced information techniques to produce a complex image that effectively conveys a message (e.g., desktop publishing, audio and/or video production). • Analyze and evaluate a message designed and produced using still, motion and animated communication techniques. • Describe the operation of fiber optic, microwave and satellite informational systems. • Apply various graphic and electronic information techniques to solve real world problems (e.g., data organization and analysis, forecasting, interpolation). 3.6.12.C. Analyze physical technologies of structural			

		design, analysis and engineering, personnel relations, financial affairs, structural production, marketing, research and design to real world problems. • Apply knowledge of construction technology by designing, planning and applying all the necessary resources to successfully solve a construction problem. • Compare resource options in solving a specific manufacturing problem. • Analyze and apply complex skills needed to process materials in complex manufacturing enterprises. • Apply advanced information collection and communication techniques to successfully convey solutions to specific construction problems. • Assess the importance of capital on specific construction applications. • Analyze the positive and negative qualities of several different types of materials as they would relate to specific construction applications. • Analyze transportation			

		technologies of propelling, structuring, suspending, guiding, controlling and supporting. • Analyze the concepts of vehicular propulsion, guidance, control, suspension and structural systems while designing and producing specific complex transportation systems. 3.7.12.A. Apply advanced tools, materials and techniques to answer complex questions. • Demonstrate the safe use of complex tools and machines within their specifications. • Select and safely apply appropriate tools, materials and processes necessary to solve complex problems that could result in more than one solution. • Evaluate and use technological resources to solve complex multistep problems. 3.7.12.B. Evaluate appropriate instruments and apparatus to accurately measure materials and processes.			

		• Apply and evaluate the use of appropriate instruments to accurately measure scientific and technological phenomena within the error limits of the equipment. • Evaluate the appropriate use of different measurement scales (macro and micro). • Evaluate the utility and advantages of a variety of absolute and relative measurement scales for their appropriate application. 3.7.12.C. Evaluate computer operations and concepts as to their effectiveness to solve specific problems. • Describe and demonstrate atypical software installation. • Analyze and solve hardware and advanced software problems. • Assess and apply multiple input and output devices to solve specific problems. 3.7.12.D. Evaluate the effectiveness of computer software to solve specific problems. • Evaluate the effectiveness of			

		software to produce an output and demonstrate the process. • Design and apply advanced multimedia techniques. • Analyze, select and apply the appropriate software to solve complex problems. • Evaluate the effectiveness of the computer as a presentation tool. • Analyze the legal responsibilities of computer users. 3.7.12.E. Assess the effectiveness of computer communications systems. • Assess the effectiveness of a computer based communications system. • Transfer files among different computer platforms. • Analyze the effectiveness of online information resources to meet the needs for collaboration, research, publications, communications and productivity. • Apply knowledge of protocol standards to solve connectivity problems. 4.3.12.A. Analyze the			

		complexity of environmental health issues. • Identify environmental health issues and explain how they have been addressed on a worldwide level. • Analyze efforts to prevent, control and/or reduce pollution through cost and benefit analysis and risk management. • Describe the impact of occupational exposures as they relate to environmental health issues. • Identify invisible pollutants and explain their effects on human health. • Explain the relationship between wind direction and velocity as it relates to dispersal and occurrence of pollutants. • Explain the different disposal methods used for toxic and hazardous waste. 4.3.12.B. Analyze the local, regional and national impacts of environmental health. • Analyze the cost of natural disasters in both dollars and loss of natural habitat. • Research and analyze the			

		local, state and national laws that deal with point and nonpoint source pollution; evaluate the costs and benefits of these laws. • Explain mitigation and its role in environmental health. • Explain industry's initiatives to meet state and federal mandates on clean air and water. • Describe the impacts of point and nonpoint source pollution on the Chesapeake Bay. • Identify and evaluate the costs and benefits of laws regulating air and water quality and waste disposal. 4.3.12.C. Analyze the need for a healthy environment. • Research the relationship of some chronic diseases to an environmental pollutant. • Explain how man-made systems may affect the environment. 4.6.12.A. Analyze the interdependence of an ecosystem. • Analyze the relationships among components of an			

		ecosystem. • Evaluate the efficiency of energy flow within an ecosystem. • Explain limiting factors and their impact on carrying capacity. • Understand how biological diversity impacts the stability of an ecosystem. • Analyze the positive or negative impacts of outside influences on an ecosystem. • Analyze how different land use practices can affect the quality of soils. 4.6.12.B. Analyze the impact of cycles on the ecosystem. • Evaluate the materials necessary for natural cycles. • Explain the processes involved in the natural cycles. 4.6.12.C. Analyze how human action and natural changes affect the balance within an ecosystem. • Analyze the effects of substances that move through natural cycles. • Analyze the effects of natural occurrences and their effects on ecosystems.			

		• Analyze effects of human action on an ecosystem. • Compare the stages of succession and how they influence the cycles existing in an ecosystem. 4.7.12.A. Analyze biological diversity as it relates to the stability of an ecosystem. • Examine and explain what happens to an ecosystem as biological diversity changes. • Explain the relationship between species' loss and bio-diversity. • Examine and explain how a specialized interaction between two species may affect the survival of both species. 4.7.12.B. Examine the effects of extinction, both natural and human caused, on the environment. • Predict how human or natural action can produce change to which organisms cannot adapt. • Identify species that became extinct through natural causes and explain how that occurred.			

		• Identify a species that became extinct due to human actions and explain what occurred. 4.7.12.C. Analyze the effects of threatened, endangered or extinct species on human and natural systems. • Identify and explain how a species' increase, decline or elimination affects the ecosystem and/or human social, cultural and economic structures. • Explain why natural populations do not remain constant. • Analyze management strategies regarding threatened or endangered species. • Identify laws, agreements or treaties at national or international levels regarding threatened or endangered species. • Analyze the role of zoos and wildlife preserves on species that have been identified as threatened or endangered. • Examine the influence of wildlife management in			

		preserving different species in Pennsylvania (e.g., bobcat, elk, bald eagle). 4.8.12.A. Explain how technology has influenced the sustainability of natural resources over time. • Describe how technology has changed the use of natural resources by business and industry. • Analyze the effect of natural resource conservation on a product over time (e.g., automobile manufacturing, aluminum can recycling, paper products). 4.8.12.B. Analyze technology's role on natural resource sustainability. • Explain how technology has decreased the use of raw natural resources. • Explain how technology has impacted the efficiency of the use of natural resources. • Analyze the role of technology in the reduction of pollution. 4.8.12.C. Analyze how			

		pollution has changed in quality, variety and toxicity as the United States developed its industrial base. • Analyze historical pollution trends and project them for the future. • Compare and contrast historical and current pollution levels at a given location. 4.8.12.D. Analyze the international implications of environmental occurrences. • Identify natural occurrences that have international impact (e.g., El Nino, volcano eruptions, earthquakes). • Analyze environmental issues and their international implications. **Vocabulary:** Biome Climate Latitude Altitude Tropical Rain Forest Emergent Layer Canopy Epiphyte Understory Temperate Rain Forest			

		Temperate Deciduous Forest Taiga Savanna Temperate Grassland Chaparral Desert Tundra Permafrost			

Dunmore School District
Curriculum Guide

General Topic	PA Academic and Core Standards	Essential Knowledge, Skills & Vocabulary	Resources & Activities	Assessments	Suggested Time (In Days)
Aquatic Ecosystems	**PA Academic Standards: Science** 4.3 Environmental Health 4.6 Ecosystems and their Interactions 4.7 Threatened, Endangered and Extinct Species 4.8 Humans and the Environment **PA Core Standards: Reading for Science and Technical Subjects, 6-12** 3.5 Reading Informational Text Students read, understand, and respond to informational text-with emphasis on comprehension, making connections among ideas and between texts with focus on textual evidence. **PA Core Standards: Writing for Science and Technical Subjects, 6-12** 3.6 Writing Students write for different purposes and audiences. Students write clear and focused text to convey a well-defined perspective and appropriate content.	**Essential Knowledge/Skills:** 4.3.12.A. Analyze the complexity of environmental health issues. • Identify environmental health issues and explain how they have been addressed on a worldwide level. • Analyze efforts to prevent, control and/or reduce pollution through cost and benefit analysis and risk management. • Describe the impact of occupational exposures as they relate to environmental health issues. • Identify invisible pollutants and explain their effects on human health. • Explain the relationship between wind direction and velocity as it relates to dispersal and occurrence of pollutants. • Explain the different disposal methods used for toxic and hazardous waste. 4.3.12.B. Analyze the local, regional and national impacts	**Approved textbook** *Environmental Science* Chapter 07 and Supplements Brain Pop	**Teacher prepared tests, quizzes, etc.** **Series available assessments online. (Optional)**	**15 days**

		of environmental health. • Analyze the cost of natural disasters in both dollars and loss of natural habitat. • Research and analyze the local, state and national laws that deal with point and nonpoint source pollution; evaluate the costs and benefits of these laws. • Explain mitigation and its role in environmental health. • Explain industry's initiatives to meet state and federal mandates on clean air and water. • Describe the impacts of point and nonpoint source pollution on the Chesapeake Bay. • Identify and evaluate the costs and benefits of laws regulating air and water quality and waste disposal. 4.3.12.C. Analyze the need for a healthy environment. • Research the relationship of some chronic diseases to an environmental pollutant. • Explain how man-made systems may affect the environment.			

		4.6.12.A. Analyze the interdependence of an ecosystem. • Analyze the relationships among components of an ecosystem. • Evaluate the efficiency of energy flow within an ecosystem. • Explain limiting factors and their impact on carrying capacity. • Understand how biological diversity impacts the stability of an ecosystem. • Analyze the positive or negative impacts of outside influences on an ecosystem. • Analyze how different land use practices can affect the quality of soils. 4.6.12.B. Analyze the impact of cycles on the ecosystem. • Evaluate the materials necessary for natural cycles. • Explain the processes involved in the natural cycles. 4.6.12.C. Analyze how human action and natural changes affect the balance within an ecosystem. • Analyze the effects of			

		substances that move through natural cycles. • Analyze the effects of natural occurrences and their effects on ecosystems. • Analyze effects of human action on an ecosystem. • Compare the stages of succession and how they influence the cycles existing in an ecosystem. 4.7.12.A. Analyze biological diversity as it relates to the stability of an ecosystem. • Examine and explain what happens to an ecosystem as biological diversity changes. • Explain the relationship between species' loss and bio-diversity. • Examine and explain how a specialized interaction between two species may affect the survival of both species. 4.7.12.B. Examine the effects of extinction, both natural and human caused, on the environment. • Predict how human or natural action can produce			

		change to which organisms cannot adapt. • Identify species that became extinct through natural causes and explain how that occurred. • Identify a species that became extinct due to human actions and explain what occurred. 4.7.12.C. Analyze the effects of threatened, endangered or extinct species on human and natural systems. • Identify and explain how a species' increase, decline or elimination affects the ecosystem and/or human social, cultural and economic structures. • Explain why natural populations do not remain constant. • Analyze management strategies regarding threatened or endangered species. • Identify laws, agreements or treaties at national or international levels regarding threatened or endangered species. • Analyze the role of zoos and			

		wildlife preserves on species that have been identified as threatened or endangered. • Examine the influence of wildlife management in preserving different species in Pennsylvania (e.g., bobcat, elk, bald eagle). 4.8.12.A. Explain how technology has influenced the sustainability of natural resources over time. • Describe how technology has changed the use of natural resources by business and industry. • Analyze the effect of natural resource conservation on a product over time (e.g., automobile manufacturing, aluminum can recycling, paper products). 4.8.12.B. Analyze technology's role on natural resource sustainability. • Explain how technology has decreased the use of raw natural resources. • Explain how technology has impacted the efficiency of the use of natural resources.			

		• Analyze the role of technology in the reduction of pollution. 4.8.12.C. Analyze how pollution has changed in quality, variety and toxicity as the United States developed its industrial base. • Analyze historical pollution trends and project them for the future. • Compare and contrast historical and current pollution levels at a given location. 4.8.12.D. Analyze the international implications of environmental occurrences. • Identify natural occurrences that have international impact (e.g., El Nino, volcano eruptions, earthquakes). • Analyze environmental issues and their international implications. **Vocabulary:** Wetland Plankton Nekton Benthos Littoral Zone			

		Benthic Zone Eutrophication Estuary Salt Marsh Mangrove Swamp Barrier Island Coral Reef			

General Topic	PA Academic and Core Standards	Essential Knowledge, Skills & Vocabulary	Resources & Activities	Assessments	Suggested Time (In Days)
Understanding Populations	**PA Academic Standards: Science** 3.3 Biological Sciences 4.3 Environmental Health 4.6 Ecosystems and their Interactions 4.8 Humans and the Environment **PA Core Standards:** **Reading for Science and Technical Subjects, 6-12** 3.5 Reading Informational Text Students read, understand, and respond to informational text-with emphasis on comprehension, making connections among ideas and between texts with focus on textual evidence. **PA Core Standards: Writing for Science and Technical Subjects**, **6-12** 3.6 Writing Students write for different purposes and audiences. Students write clear and focused text to convey a well-defined perspective and appropriate content.	**Essential Knowledge/Skills:** 3.3.12.A. Explain the relationship between structure and function at all levels of organization. • Identify and explain interactions among organisms (e.g., mutually beneficial, harmful relationships). • Explain and analyze the relationship between structure and function at the molecular, cellular and organ-system level. • Describe and explain structural and functional relationships in each of the five (or six) kingdoms. • Explain significant biological diversity found in each of the biomes. 3.3.12.B. Analyze the chemical and structural basis of living organisms. • Identify and describe factors affecting metabolic function (e.g., temperature, acidity, hormones). • Evaluate metabolic activities	**Approved textbook** *Environmental Science* Chapter 08 and Supplements Brain Pop	**Teacher prepared tests, quizzes, etc.** **Series available assessments online. (Optional)**	**17 days**

		using experimental knowledge of enzymes. • Evaluate relationships between structure and functions of different anatomical parts given their structure. • Describe potential impact of genome research on the biochemistry and physiology of life. 3.3.12.C. Explain gene inheritance and expression at the molecular level. • Analyze gene expression at the molecular level. • Describe the roles of nucleic acids in cellular reproduction and protein synthesis. • Describe genetic engineering techniques, applications and impacts. • Explain birth defects from the standpoint of embryological development and/or changes in genetic makeup. 3.3.12.D. Analyze the theory of evolution. • Examine human history by describing the progression			

		from early hominids to modern humans. • apply the concept of natural selection as a central concept in illustrating evolution theory. 3.5.12.A. Analyze and evaluate earth features and processes that change the earth. • Apply knowledge of geophysical processes to explain the formation and degradation of earth structures (e.g., mineral deposition, cave formations, soil composition). • Interpret geological evidence supporting evolution. • Apply knowledge of radioactive decay to assess the age of various earth features and objects. 3.5.12.B. Analyze the availability, location and extraction of earth resources. • Describe how the location of earth's major resources has affected a country's strategic decisions. • Compare locations of earth features and country boundaries. • Analyze the impact of			

		resources (e.g., coal deposits, rivers) on the life of Pennsylvania's settlements and cities. 3.5.12.C. Analyze atmospheric energy transfers. • Describe how weather and climate involve the transfer of energy in and out of the atmosphere. • Explain how unequal heating of the air, ocean and land produces wind and ocean currents. • Analyze the energy transformations that occur during the greenhouse effect and predict the long-term effects of increased pollutant levels in the atmosphere. • Analyze the mechanisms that drive a weather phenomenon (e.g., El Nino, hurricane, tornado) using the correlation of three methods of heat energy transfer. 3.5.12.D. Analyze the principles and history of hydrology. • Analyze the operation and effectiveness of a water purification and desalination			

		system. • Evaluate the pros and cons of surface water appropriation for commercial and electrical use. • Analyze the historical development of water use in Pennsylvania (e.g., recovery of Lake Erie). • Compare the marine life and type of water found in the intertidal, neritic and bathyal zones. 4.3.12.A. Analyze the complexity of environmental health issues. • Identify environmental health issues and explain how they have been addressed on a worldwide level. • Analyze efforts to prevent, control and/or reduce pollution through cost and benefit analysis and risk management. • Describe the impact of occupational exposures as they relate to environmental health issues. • Identify invisible pollutants and explain their effects on human health.			

		• Explain the relationship between wind direction and velocity as it relates to dispersal and occurrence of pollutants. • Explain the different disposal methods used for toxic and hazardous waste. 4.3.12.B. Analyze the local, regional and national impacts of environmental health. • Analyze the cost of natural disasters in both dollars and loss of natural habitat. • Research and analyze the local, state and national laws that deal with point and nonpoint source pollution; evaluate the costs and benefits of these laws. • Explain mitigation and its role in environmental health. • Explain industry's initiatives to meet state and federal mandates on clean air and water. • Describe the impacts of point and nonpoint source pollution on the Chesapeake Bay. • Identify and evaluate the costs and benefits of laws regulating air and water quality			

		and waste disposal. 4.3.12.C. Analyze the need for a healthy environment. • Research the relationship of some chronic diseases to an environmental pollutant. • Explain how man-made systems may affect the environment. 4.6.12.A. Analyze the interdependence of an ecosystem. • Analyze the relationships among components of an ecosystem. • Evaluate the efficiency of energy flow within an ecosystem. • Explain limiting factors and their impact on carrying capacity. • Understand how biological diversity impacts the stability of an ecosystem. • Analyze the positive or negative impacts of outside influences on an ecosystem. • Analyze how different land use practices can affect the quality of soils.			

		4.6.12.B. Analyze the impact of cycles on the ecosystem. • Evaluate the materials necessary for natural cycles. • Explain the processes involved in the natural cycles. 4.6.12.C. Analyze how human action and natural changes affect the balance within an ecosystem. • Analyze the effects of substances that move through natural cycles. • Analyze the effects of natural occurrences and their effects on ecosystems. • Analyze effects of human action on an ecosystem. • Compare the stages of succession and how they influence the cycles existing in an ecosystem. 4.8.12.A. Explain how technology has influenced the sustainability of natural resources over time. • Describe how technology has changed the use of natural resources by business and industry. • Analyze the effect of natural			

		resource conservation on a product over time (e.g., automobile manufacturing, aluminum can recycling, paper products). 4.8.12.B. Analyze technology's role on natural resource sustainability. • Explain how technology has decreased the use of raw natural resources. • Explain how technology has impacted the efficiency of the use of natural resources. • Analyze the role of technology in the reduction of pollution. 4.8.12.C. Analyze how pollution has changed in quality, variety and toxicity as the United States developed its industrial base. • Analyze historical pollution trends and project them for the future. • Compare and contrast historical and current pollution levels at a given location. 4.8.12.D. Analyze the international implications of			

		environmental occurrences. • Identify natural occurrences that have international impact (e.g., El Nino, volcano eruptions, earthquakes). • Analyze environmental issues and their international implications. **Vocabulary:** Population Density Dispersion Growth Rate Reproductive Potential Exponential Growth Carrying Capacity Niche Competition Predation Parasitism Mutualism Commensalism Symbiosis			
General Topic	**PA Academic and Core Standards**	**Essential Knowledge, Skills & Vocabulary**	**Resources & Activities**	**Assessments**	**Suggested Time (In Days)**
The Human Population	**PA Academic Standards: Science** 4.3 Environmental Health 4.6 Ecosystems and their Interactions 4.8 Humans and the Environment	**Essential Knowledge/Skills:** 4.3.12.A. Analyze the complexity of environmental health issues. • Identify environmental health issues and explain how	**Approved textbook** *Environmental Science* Chapter 09 and Supplements Brain Pop	**Teacher prepared tests, quizzes, etc.** **Series available assessments online. (Optional)**	**12 days**

	PA Core Standards: **Reading for Science and Technical Subjects, 6-12** 3.5 Reading Informational Text Students read, understand, and respond to informational text-with emphasis on comprehension, making connections among ideas and between texts with focus on textual evidence. **PA Core Standards: Writing for Science and Technical Subjects, 6-12** 3.6 Writing Students write for different purposes and audiences. Students write clear and focused text to convey a well-defined perspective and appropriate content.	they have been addressed on a worldwide level. • Analyze efforts to prevent, control and/or reduce pollution through cost and benefit analysis and risk management. • Describe the impact of occupational exposures as they relate to environmental health issues. • Identify invisible pollutants and explain their effects on human health. • Explain the relationship between wind direction and velocity as it relates to dispersal and occurrence of pollutants. • Explain the different disposal methods used for toxic and hazardous waste. 4.3.12.B. Analyze the local, regional and national impacts of environmental health. • Analyze the cost of natural disasters in both dollars and loss of natural habitat. • Research and analyze the local, state and national laws that deal with point and nonpoint source pollution; evaluate the costs and benefits			

		of these laws. • Explain mitigation and its role in environmental health. • Explain industry's initiatives to meet state and federal mandates on clean air and water. • Describe the impacts of point and nonpoint source pollution on the Chesapeake Bay. • Identify and evaluate the costs and benefits of laws regulating air and water quality and waste disposal. 4.3.12.C. Analyze the need for a healthy environment. • Research the relationship of some chronic diseases to an environmental pollutant. • Explain how man-made systems may affect the environment. 4.6.12.A. Analyze the interdependence of an ecosystem. • Analyze the relationships among components of an ecosystem. • Evaluate the efficiency of energy flow within an ecosystem.			

		• Explain limiting factors and their impact on carrying capacity. • Understand how biological diversity impacts the stability of an ecosystem. • Analyze the positive or negative impacts of outside influences on an ecosystem. • Analyze how different land use practices can affect the quality of soils. 4.6.12.B. Analyze the impact of cycles on the ecosystem. • Evaluate the materials necessary for natural cycles. • Explain the processes involved in the natural cycles. 4.6.12.C. Analyze how human action and natural changes affect the balance within an ecosystem. • Analyze the effects of substances that move through natural cycles. • Analyze the effects of natural occurrences and their effects on ecosystems. • Analyze effects of human action on an ecosystem. • Compare the stages of succession and how they			

		influence the cycles existing in an ecosystem. 4.8.12.A. Explain how technology has influenced the sustainability of natural resources over time. • Describe how technology has changed the use of natural resources by business and industry. • Analyze the effect of natural resource conservation on a product over time (e.g., automobile manufacturing, aluminum can recycling, paper products). 4.8.12.B. Analyze technology's role on natural resource sustainability. • Explain how technology has decreased the use of raw natural resources. • Explain how technology has impacted the efficiency of the use of natural resources. • Analyze the role of technology in the reduction of pollution. 4.8.12.C. Analyze how pollution has changed in quality, variety and toxicity as			

		the United States developed its industrial base. • Analyze historical pollution trends and project them for the future. • Compare and contrast historical and current pollution levels at a given location. 4.8.12.D. Analyze the international implications of environmental occurrences. • Identify natural occurrences that have international impact (e.g., El Nino, volcano eruptions, earthquakes). • Analyze environmental issues and their international implications. **Vocabulary:** Demography Age Structure Survivorship Fertility Rate Migration Life Expectancy Demographic Transition Infrastructure Arable Land Urbanization Least Developed Countries		

Dunmore School District
Curriculum Guide

General Topic	PA Academic and Core Standards	Essential Knowledge, Skills & Vocabulary	Resources & Activities	Assessments	Suggested Time (In Days)
Biodiversity	**PA Academic Standards: Science** 3.1 Unifying Themes of Science 3.3 Biological Sciences 3.5 Earth Sciences 4.1 Watersheds and Wetlands 4.3 Environmental Health 4.5 Integrated Pest Management **PA Core Standards:** **Reading for Science and Technical Subjects, 6-12** 3.5 Reading Informational Text Students read, understand, and respond to informational text-with emphasis on comprehension, making connections among ideas and between texts with focus on textual evidence. **PA Core Standards: Writing for Science and Technical Subjects, 6-12** 3.6 Writing Students write for different purposes and audiences. Students write clear and focused text to convey a well-defined perspective and appropriate content.	**Essential Knowledge/Skills:** 3.1.12.A. Apply concepts of systems, subsystems, feedback and control to solve complex technological problems. • Apply knowledge of control systems concept by designing and modeling control systems that solve specific problems. • Apply systems analysis to predict results. • Analyze and describe the function, interaction and relationship among subsystems and the system itself. • Compare and contrast several systems that could be applied to solve a single problem. • Evaluate the causes of a system's inefficiency. 3.1.12.B. Apply concepts of models as a method to predict and understand science and technology. • Evaluate technological processes by collecting data and applying mathematical	**Approved textbook** *Environmental Science* Chapter 10 and Supplements Brain Pop	**Teacher prepared tests, quizzes, etc.** **Series available assessments online. (Optional)**	**18 days**

		models (e.g., process control). • Apply knowledge of complex physical models to interpret data and apply mathematical models. • Appraise the importance of computer models in interpreting science and technological systems. 3.1.12.C. Assess and apply patterns in science and technology. • Assess and apply recurring patterns in natural and technological systems. • Compare and contrast structure and function relationships as they relate to patterns. • Assess patterns in nature using mathematical formulas. 3.1.12.D. Analyze scale as a way of relating concepts and ideas to one another by some measure. • Compare and contrast various forms of dimensional analysis. • Assess the use of several units of measurement to the same problem.			

		• Analyze and apply appropriate measurement scales when collecting data. 3.1.12.E. Evaluate change in nature, physical systems and man-made systems. • Evaluate fundamental science and technology concepts and their development over time (e.g., DNA, cellular respiration, unified field theory, energy measurement, automation, miniaturization, and Copernican and Ptolemaic universe theories). • Analyze how models, systems and technologies have changed over time (e.g., germ theory, theory of evolution, solar system, cause of fire). • Explain how correlation of variables does not necessarily imply causation. • Evaluate the patterns of change within a technology (e.g., changes in engineering in the automotive industry). 3.3.12.A. Explain the relationship between structure and function at all levels of organization.			

		• Identify and explain interactions among organisms (e.g., mutually beneficial, harmful relationships). • Explain and analyze the relationship between structure and function at the molecular, cellular and organ-system level. • Describe and explain structural and functional relationships in each of the five (or six) kingdoms. • Explain significant biological diversity found in each of the biomes. 3.3.12.B. Analyze the chemical and structural basis of living organisms. • Identify and describe factors affecting metabolic function (e.g., temperature, acidity, hormones). • Evaluate metabolic activities using experimental knowledge of enzymes. • Evaluate relationships between structure and functions of different anatomical parts given their structure. • Describe potential impact of			

		genome research on the biochemistry and physiology of life. 3.3.12.C. Explain gene inheritance and expression at the molecular level. • Analyze gene expression at the molecular level. • Describe the roles of nucleic acids in cellular reproduction and protein synthesis. • Describe genetic engineering techniques, applications and impacts. • Explain birth defects from the standpoint of embryological development and/or changes in genetic makeup. 3.3.12.D. Analyze the theory of evolution. • Examine human history by describing the progression from early hominids to modern humans. • apply the concept of natural selection as a central concept in illustrating evolution theory. 3.5.12.A. Analyze and evaluate earth features and processes			

		that change the earth. • Apply knowledge of geophysical processes to explain the formation and degradation of earth structures (e.g., mineral deposition, cave formations, soil composition). • Interpret geological evidence supporting evolution. • Apply knowledge of radioactive decay to assess the age of various earth features and objects. 3.5.12.B. Analyze the availability, location and extraction of earth resources. • Describe how the location of earth's major resources has affected a country's strategic decisions. • Compare locations of earth features and country boundaries. • Analyze the impact of resources (e.g., coal deposits, rivers) on the life of Pennsylvania's settlements and cities. 3.5.12.C. Analyze atmospheric energy transfers. • Describe how weather and			

		climate involve the transfer of energy in and out of the atmosphere. • Explain how unequal heating of the air, ocean and land produces wind and ocean currents. • Analyze the energy transformations that occur during the greenhouse effect and predict the long-term effects of increased pollutant levels in the atmosphere. • Analyze the mechanisms that drive a weather phenomenon (e.g., El Nino, hurricane, tornado) using the correlation of three methods of heat energy transfer. 3.5.12.D. Analyze the principles and history of hydrology. • Analyze the operation and effectiveness of a water purification and desalination system. • Evaluate the pros and cons of surface water appropriation for commercial and electrical use. • Analyze the historical development of water use in Pennsylvania (e.g., recovery of			

		Lake Erie). • Compare the marine life and type of water found in the intertidal, neritic and bathyal zones. 4.1.12.A. Categorize stream order in a watershed. • Explain the concept of stream order. • Identify the order of watercourses within a major river's watershed. • Compare and contrast the physical differences found in the stream continuum from headwater to mouth. 4.1.12.B. Explain the relationships that exist within watersheds in the United States. • Understand that various ecosystems may be contained in a watershed. • Examine and describe the ecosystems contained within a specific watershed. • Identify and describe the major watersheds in the United States. 4.1.12.C. Analyze the			

		parameters of a watershed. • Interpret physical, chemical and biological data as a means of assessing the environmental quality of a watershed. • Apply appropriate techniques in the analysis of a watershed (e.g., water quality, biological diversity, erosion, sedimentation). 4.1.12.D. Analyze the complex and diverse ecosystems of wetlands. • Explain the functions of habitat, nutrient production, migration stopover and groundwater recharge as it relates to wetlands. • Explain the dynamics of a wetland ecosystem. • Describe and analyze different types of wetlands. 4.1.12.E. Evaluate the trade-offs, costs and benefits of conserving watersheds and wetlands. • Evaluate the effects of natural events on watershed and wetlands. • Evaluate the effects of human activities on			

		watersheds and wetlands. 4.3.12.A. Analyze the complexity of environmental health issues. • Identify environmental health issues and explain how they have been addressed on a worldwide level. • Analyze efforts to prevent, control and/or reduce pollution through cost and benefit analysis and risk management. • Describe the impact of occupational exposures as they relate to environmental health issues. • Identify invisible pollutants and explain their effects on human health. • Explain the relationship between wind direction and velocity as it relates to dispersal and occurrence of pollutants. • Explain the different disposal methods used for toxic and hazardous waste. 4.3.12.B. Analyze the local, regional and national impacts of environmental health.			

		• Analyze the cost of natural disasters in both dollars and loss of natural habitat. • Research and analyze the local, state and national laws that deal with point and nonpoint source pollution; evaluate the costs and benefits of these laws. • Explain mitigation and its role in environmental health. • Explain industry's initiatives to meet state and federal mandates on clean air and water. • Describe the impacts of point and nonpoint source pollution on the Chesapeake Bay. • Identify and evaluate the costs and benefits of laws regulating air and water quality and waste disposal. 4.3.12.C. Analyze the need for a healthy environment. • Research the relationship of some chronic diseases to an environmental pollutant. • Explain how man-made systems may affect the environment. 4.5.12.A. Research integrated			

		pest management systems. • Analyze the threshold limits of pests and the need for intervention in a managed environment. • Research the types of germicides and analyze their effects on homes industry, hospitals and institutions. • Design and explain an integrated pest management plan that uses a range of pest controls. 4.5.12.B. Research and analyze integrated pest management practices globally. • Research worldwide integrated pest management systems and evaluate the level of impact. • Research and analyze the international regulations that exist related to integrated pest management. • Explain the complexities associated with moving from one level of control to the next with different integrated pest management practices and compare the related costs of each system.			

		4.5.12.C. Analyze the historical significance of integrated pest management on society. • Explain the dynamics of integrated pest management practices and their relative effects upon society. • Identify historic events affecting integrated pest management and cite the practices used (e.g., avian flu, bubonic plague, potato blight). • Research and analyze the long-term effects of pest management practices on the environment. **Vocabulary:** Biodiversity Gene Keystone Species Ecotourism Endangered Species Threatened Species Exotic Species Poaching Endemic Species Germ Plasm Endangered Species Act Habitat Conservation Plan Biodiversity Treaty			

Dunmore School District
Curriculum Guide

General Topic	PA Academic and Core Standards	Essential Knowledge, Skills & Vocabulary	Resources & Activities	Assessments	Suggested Time (In Days)
Water	**PA Academic Standards: Science** 3.1 Unifying Themes of Science 3.3 Biological Sciences 3.5 Earth Sciences 4.1 Watersheds and Wetlands 4.3 Environmental Health 4.8 Humans and the Environment **PA Core Standards:** **Reading for Science and Technical Subjects, 6-12** 3.5 Reading Informational Text Students read, understand, and respond to informational text-with emphasis on comprehension, making connections among ideas and between texts with focus on textual evidence. **PA Core Standards: Writing for Science and Technical Subjects**, **6-12** 3.6 Writing Students write for different purposes and audiences. Students write clear and focused text to convey a well-defined perspective and appropriate content.	**Essential Knowledge/Skills:** 3.1.12.A. Apply concepts of systems, subsystems, feedback and control to solve complex technological problems. • Apply knowledge of control systems concept by designing and modeling control systems that solve specific problems. • Apply systems analysis to predict results. • Analyze and describe the function, interaction and relationship among subsystems and the system itself. • Compare and contrast several systems that could be applied to solve a single problem. • Evaluate the causes of a system's inefficiency. 3.1.12.B. Apply concepts of models as a method to predict and understand science and technology. • Evaluate technological processes by collecting data and applying mathematical	**Approved textbook** *Environmental Science* Chapter 11 and Supplements Brain Pop	**Teacher prepared tests, quizzes, etc.** **Series available assessments online. (Optional)**	**10 days**

		models (e.g., process control). • Apply knowledge of complex physical models to interpret data and apply mathematical models. • Appraise the importance of computer models in interpreting science and technological systems. 3.1.12.C. Assess and apply patterns in science and technology. • Assess and apply recurring patterns in natural and technological systems. • Compare and contrast structure and function relationships as they relate to patterns. • Assess patterns in nature using mathematical formulas. 3.1.12.D. Analyze scale as a way of relating concepts and ideas to one another by some measure. • Compare and contrast various forms of dimensional analysis. • Assess the use of several units of measurement to the same problem.			

		• Analyze and apply appropriate measurement scales when collecting data 3.1.12.E. Evaluate change in nature, physical systems and man-made systems. • Evaluate fundamental science and technology concepts and their development over time (e.g., DNA, cellular respiration, unified field theory, energy measurement, automation, miniaturization, and Copernican and Ptolemaic universe theories). • Analyze how models, systems and technologies have changed over time (e.g., germ theory, theory of evolution, solar system, cause of fire). • Explain how correlation of variables does not necessarily imply causation. • Evaluate the patterns of change within a technology (e.g., changes in engineering in the automotive industry). 3.3.12.A. Explain the relationship between structure and function at all levels of organization.			

		• Identify and explain interactions among organisms (e.g., mutually beneficial, harmful relationships). • Explain and analyze the relationship between structure and function at the molecular, cellular and organ-system level. • Describe and explain structural and functional relationships in each of the five (or six) kingdoms. • Explain significant biological diversity found in each of the biomes. 3.3.12.B. Analyze the chemical and structural basis of living organisms. • Identify and describe factors affecting metabolic function (e.g., temperature, acidity, hormones). • Evaluate metabolic activities using experimental knowledge of enzymes. • Evaluate relationships between structure and functions of different anatomical parts given their structure. • Describe potential impact of			

		genome research on the biochemistry and physiology of life. 3.3.12.C. Explain gene inheritance and expression at the molecular level. • Analyze gene expression at the molecular level. • Describe the roles of nucleic acids in cellular reproduction and protein synthesis. • Describe genetic engineering techniques, applications and impacts. • Explain birth defects from the standpoint of embryological development and/or changes in genetic makeup. 3.3.12.D. Analyze the theory of evolution. • Examine human history by describing the progression from early hominids to modern humans. • apply the concept of natural selection as a central concept in illustrating evolution theory. 3.5.12.A. Analyze and evaluate earth features and processes that change the earth.			

		• Apply knowledge of geophysical processes to explain the formation and degradation of earth structures (e.g., mineral deposition, cave formations, soil composition). • Interpret geological evidence supporting evolution. • Apply knowledge of radioactive decay to assess the age of various earth features and objects. 3.5.12.B. Analyze the availability, location and extraction of earth resources. • Describe how the location of earth's major resources has affected a country's strategic decisions. • Compare locations of earth features and country boundaries. • Analyze the impact of resources (e.g., coal deposits, rivers) on the life of Pennsylvania's settlements and cities. 3.5.12.C. Analyze atmospheric energy transfers. • Describe how weather and climate involve the transfer of			

		energy in and out of the atmosphere. • Explain how unequal heating of the air, ocean and land produces wind and ocean currents. • Analyze the energy transformations that occur during the greenhouse effect and predict the long-term effects of increased pollutant levels in the atmosphere. • Analyze the mechanisms that drive a weather phenomenon (e.g., El Nino, hurricane, tornado) using the correlation of three methods of heat energy transfer. 3.5.12.D. Analyze the principles and history of hydrology. • Analyze the operation and effectiveness of a water purification and desalination system. • Evaluate the pros and cons of surface water appropriation for commercial and electrical use. • Analyze the historical development of water use in Pennsylvania (e.g., recovery of Lake Erie).			

		• Compare the marine life and type of water found in the intertidal, neritic and bathyal zones. 4.1.12.A. Categorize stream order in a watershed. • Explain the concept of stream order. • Identify the order of watercourses within a major river's watershed. • Compare and contrast the physical differences found in the stream continuum from headwater to mouth. 4.1.12.B. Explain the relationships that exist within watersheds in the United States. • Understand that various ecosystems may be contained in a watershed. • Examine and describe the ecosystems contained within a specific watershed. • Identify and describe the major watersheds in the United States. 4.1.12.C. Analyze the parameters of a watershed.			

		• Interpret physical, chemical and biological data as a means of assessing the environmental quality of a watershed. • Apply appropriate techniques in the analysis of a watershed (e.g., water quality, biological diversity, erosion, sedimentation). 4.1.12.D. Analyze the complex and diverse ecosystems of wetlands. • Explain the functions of habitat, nutrient production, migration stopover and groundwater recharge as it relates to wetlands. • Explain the dynamics of a wetland ecosystem. • Describe and analyze different types of wetlands. 4.1.12.E. Evaluate the trade-offs, costs and benefits of conserving watersheds and wetlands. • Evaluate the effects of natural events on watershed and wetlands. • Evaluate the effects of human activities on watersheds and wetlands.			

		4.3.12.A. Analyze the complexity of environmental health issues. • Identify environmental health issues and explain how they have been addressed on a worldwide level. • Analyze efforts to prevent, control and/or reduce pollution through cost and benefit analysis and risk management. • Describe the impact of occupational exposures as they relate to environmental health issues. • Identify invisible pollutants and explain their effects on human health. • Explain the relationship between wind direction and velocity as it relates to dispersal and occurrence of pollutants. • Explain the different disposal methods used for toxic and hazardous waste. 4.3.12.B. Analyze the local, regional and national impacts of environmental health. • Analyze the cost of natural			

		disasters in both dollars and loss of natural habitat. • Research and analyze the local, state and national laws that deal with point and nonpoint source pollution; evaluate the costs and benefits of these laws. • Explain mitigation and its role in environmental health. • Explain industry's initiatives to meet state and federal mandates on clean air and water. • Describe the impacts of point and nonpoint source pollution on the Chesapeake Bay. • Identify and evaluate the costs and benefits of laws regulating air and water quality and waste disposal. 4.3.12.C. Analyze the need for a healthy environment. • Research the relationship of some chronic diseases to an environmental pollutant. • Explain how man-made systems may affect the environment. 4.8.12.A. Explain how technology has influenced the			

		sustainability of natural resources over time. • Describe how technology has changed the use of natural resources by business and industry. • Analyze the effect of natural resource conservation on a product over time (e.g., automobile manufacturing, aluminum can recycling, paper products). 4.8.12.B. Analyze technology's role on natural resource sustainability. • Explain how technology has decreased the use of raw natural resources. • Explain how technology has impacted the efficiency of the use of natural resources. • Analyze the role of technology in the reduction of pollution. 4.8.12.C. Analyze how pollution has changed in quality, variety and toxicity as the United States developed its industrial base. • Analyze historical pollution trends and project them for			

		the future. • Compare and contrast historical and current pollution levels at a given location. 4.8.12.D. Analyze the international implications of environmental occurrences. • Identify natural occurrences that have international impact (e.g., El Nino, volcano eruptions, earthquakes). • Analyze environmental issues and their international implications. **Vocabulary:** Surface Water River System Watershed Groundwater Aquifer Porosity Permeability Recharge Zone Potable Pathogen Dam Reservoir Desalination Water Pollution Point-source Pollution Nonpoint-source Pollution			

		Wastewater Artificial Eutrophication Thermal pollution Bio magnification			

Dunmore School District
Curriculum Guide

General Topic	PA Academic and Core Standards	Essential Knowledge, Skills & Vocabulary	Resources & Activities	Assessments	Suggested Time (In Days)
Keystones and PSAT's					**5 days**

Dunmore School District
Curriculum Guide

General Topic	PA Academic and Core Standards	Essential Knowledge, Skills & Vocabulary	Resources & Activities	Assessments	Suggested Time (In Days)
Review and Final Exams					**5 days**

PA Core Standards:
Reading for Science and Technical Subjects, 6-12

3.5 Reading Informational Text
Students read, understand, and respond to informational text-with emphasis on comprehension, making connections among ideas and between texts with focus on textual evidence.

Grades 6-8

CC.3.5.6-8.A.
Cite specific textual evidence to support analysis of science and technical texts.

CC.3.5.6-8.B.
Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.

CC.3.5.6-8.C.
Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

CC.3.5.6-8.D.
Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics.

CC.3.5.6-8.E.
Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the topic.

CC.3.5.6-8.F.
Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.

CC.3.5.6-8.G.
Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

CC.3.5.6-8.H.

Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.

CC.3.5.6-8.I.
Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.

CC.3.5.6-8.J.
By the end of grade 8, read and comprehend science/technical texts in the grades 6–8 text complexity band independently and proficiently.

Grades 9-10

CC.3.5.9-10.A.
Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.

CC.3.5.9-10.B.
Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.

CC.3.5.9-10.C.
Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.

CC.3.5.9-10.D.
Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.

CC.3.5.9-10.E.
Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).

CC.3.5.9-10.F.
Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.

CC.3.5.9-10.G.
Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.

CC.3.5.9-10.H.
Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.

CC.3.5.9-10.I.
Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.

CC.3.5.9-10.J.
By the end of grade 10, read and comprehend science/technical texts in the grades 9–10 text complexity band independently and proficiently.

Grades 11-12

CC.3.5.11-12.A.
Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.

CC.3.5.11-12.B.
Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.

CC.3.5.11-12.C.
Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

CC.3.5.11-12.D.

Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.

CC.3.5.11-12.E.
Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.

CC.3.5.11-12.F.
Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.

CC.3.5.11-12.G.
Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.

CC.3.5.11-12.H.
Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.

CC.3.5.11-12.I.
Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.

CC.3.5.11-12.J.
By the end of grade 12, read and comprehend science/technical texts in the grades 11–12 text complexity band independently and proficiently.

PA Core Standards:
Writing for Science and Technical Subjects, 6-12

3.6 Writing
Students write for different purposes and audiences. Students write clear and focused text to convey a well-defined perspective and appropriate content.

Grades 6-8

CC.3.6.6-8.A.
Write arguments focused on discipline-specific content.

- Introduce claim(s) about a topic or issue, acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically.
- Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources.
- Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence.
- Establish and maintain a formal style.
- Provide a concluding statement or section that follows from and supports the argument presented.

CC.3.6.6-8.B. *
Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

- Introduce a topic clearly, previewing what is to follow; organize ideas, concepts, and information into broader categories as appropriate to achieving purpose; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension.
- Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples.
- Use appropriate and varied transitions to create cohesion and clarify the relationships among ideas and concepts.
- Use precise language and domain-specific vocabulary to inform about or explain the topic.
- Establish and maintain a formal style and objective tone.
- Provide a concluding statement or section that follows from and supports the information or explanation presented.

CC.3.6.6-8.C.
Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

CC.3.6.6-8.D.
With some guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on how well purpose and audience have been addressed.

CC.3.6.6-8.E.
Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently.

CC.3.6.6-8.F.
Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.

CC.3.6.6-8.G.
Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.

CC.3.6.6-8.H.
Draw evidence from informational texts to support analysis reflection, and research.

CC.3.6.6-8.J.I.
Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

Grades 9-10

CC.3.6.9-10.A.
Write arguments focused on discipline-specific content.

- Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence.
- Develop claim(s) and counterclaims fairly, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience's knowledge level and concerns.
- Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.
- Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

- Provide a concluding statement or section that follows from or supports the argument presented.

CC.3.6.9-10B. *
Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

- Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.
- Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic.
- Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among ideas and concepts.
- Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers.
- Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.
- Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).

CC.3.6.9-10.C.
Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

CC.3.6.9-10.D.
Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience

CC.3.6.9-10.E.
Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.

CC.3.6.9-10.F.
Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

CC.3.6.9-10.G.

Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.

CC.3.6.9-10.H.
Draw evidence from informational texts to support analysis, reflection, and research.

CC.3.6.9-10.I.
Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

Grades 11-12

CC.3.6.11-12.A.
Write arguments focused on discipline-specific content.

- Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence.
- Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases.
- Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.
- Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.
- Provide a concluding statement or section that follows from or supports the argument presented.

CC.3.6.11-12. B *Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

- Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.
- Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic.
- Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts.

- Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers.
- Provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic)

CC.3.6.11-12.C.
Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

CC.3.6.11-12.D.
Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

CC.3.6.11-12.E.
Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.

CC.3.6.11-12.F.
Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

CC.3.6.11-12.G.
Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.

CC.3.6.11-12.H.
Draw evidence from informational texts to support analysis, reflection, and research.

CC.3.6.11-12.I.
Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

Appendix: A			
IEP Enhancements			
General Topic:	**Specially Designed Instruction:**	**Additional Vocabulary:**	**Assessments/Suggested Time:**
Science and the Environment	• **Manipulatives** • **Preferential Seating** • **Computer use (when available)** • **Calculator use** • **Access to formula sheet** • **Interactive Videos** • **Visual Aids** • **Highlighter** • **Breaking down tasks to more manageable increments** • **Breaking down directions with one directive given at a time** • **Scrap paper provided** • **Assessments adapted in accordance to student's IEP** • **Extra time to complete assignments** • **Additional textbook sent home** • **Multi-modality instruction including modeling, explicit instruction, repetition, rephrasing, visual cues, and chunking material** • **Sample problems provided** • **Directions clarified** • **Enlarged text, notes, worksheets** • **Closed captioning**		**Assessments:** • **Extended time to complete** • **Questions and answers read aloud** • **Use of a highlighter** • **Assessments adapted in accordance to student's IEP** **Suggested Time:** **15 days as specified in curriculum with additional time as needed per individual student**

Dunmore School District
Curriculum Guide

General Topic:	Specially Designed Instruction:	Additional Vocabulary:	Assessments/Suggested Time:
Tools of Environmental Science	• **Manipulatives** • **Preferential Seating** • **Computer use (when available)** • **Calculator use** • **Access to formula sheet** • **Interactive Videos** • **Visual Aids** • **Highlighter** • **Breaking down tasks to more manageable increments** • **Breaking down directions with one directive given at a time** • **Scrap paper provided** • **Assessments adapted in accordance to student's IEP** • **Extra time to complete assignments** • **Additional textbook sent home** • **Multi-modality instruction including modeling, explicit instruction, repetition, rephrasing, visual cues, and chunking material** • **Sample problems provided** • **Directions clarified** • **Enlarged text, notes, worksheets** • **Closed captioning**		**Assessments:** • **Extended time to complete** • **Questions and answers read aloud** • **Use of a highlighter** • **Assessments adapted in accordance to student's IEP** **Suggested Time:** **11 days as specified in curriculum with additional time as needed per individual student**

Dunmore School District
Curriculum Guide

General Topic:	Specially Designed Instruction:	Additional Vocabulary:	Assessments/Suggested Time:
The Dynamic Earth	• **Manipulatives** • **Preferential Seating** • **Computer use (when available)** • **Calculator use** • **Access to formula sheet** • **Interactive Videos** • **Visual Aids** • **Highlighter** • **Breaking down tasks to more manageable increments** • **Breaking down directions with one directive given at a time** • **Scrap paper provided** • **Assessments adapted in accordance to student's IEP** • **Extra time to complete assignments** • **Additional textbook sent home** • **Multi-modality instruction including modeling, explicit instruction, repetition, rephrasing, visual cues, and chunking material** • **Sample problems provided** • **Directions clarified** • **Enlarged text, notes, worksheets** • **Closed captioning**		**Assessments:** • **Extended time to complete** • **Questions and answers read aloud** • **Use of a highlighter** • **Assessments adapted in accordance to student's IEP** **Suggested Time:** **20 days as specified in curriculum with additional time as needed per individual student**

Dunmore School District
Curriculum Guide

General Topic:	Specially Designed Instruction:	Additional Vocabulary:	Assessments/Suggested Time:
The Organization of Life	• **Manipulatives** • **Preferential Seating** • **Computer use (when available)** • **Calculator use** • **Access to formula sheet** • **Interactive Videos** • **Visual Aids** • **Highlighter** • **Breaking down tasks to more manageable increments** • **Breaking down directions with one directive given at a time** • **Scrap paper provided** • **Assessments adapted in accordance to student's IEP** • **Extra time to complete assignments** • **Additional textbook sent home** • **Multi-modality instruction including modeling, explicit instruction, repetition, rephrasing, visual cues, and chunking material** • **Sample problems provided** • **Directions clarified** • **Enlarged text, notes, worksheets** • **Closed captioning**		**Assessments:** • **Extended time to complete** • **Questions and answers read aloud** • **Use of a highlighter** • **Assessments adapted in accordance to student's IEP** **Suggested Time:** **17 days as specified in curriculum with additional time as needed per individual student**

General Topic:	Specially Designed Instruction:	Additional Vocabulary:	Assessments/Suggested Time:
How Ecosystems Work	• **Manipulatives** • **Preferential Seating** • **Computer use (when available)** • **Calculator use** • **Access to formula sheet** • **Interactive Videos** • **Visual Aids** • **Highlighter** • **Breaking down tasks to more manageable increments** • **Breaking down directions with one directive given at a time** • **Scrap paper provided** • **Assessments adapted in accordance to student's IEP** • **Extra time to complete assignments** • **Additional textbook sent home** • **Multi-modality instruction including modeling, explicit instruction, repetition, rephrasing, visual cues, and chunking material** • **Sample problems provided** • **Directions clarified** • **Enlarged text, notes, worksheets** • **Closed captioning**		**Assessments:** • **Extended time to complete** • **Questions and answers read aloud** • **Use of a highlighter** • **Assessments adapted in accordance to student's IEP** **Suggested Time:** **20 days as specified in curriculum with additional time as needed per individual student**

General Topic:	Specially Designed Instruction:	Additional Vocabulary:	Assessments/Suggested Time:
Biomes	• **Manipulatives** • **Preferential Seating** • **Computer use (when available)** • **Calculator use** • **Access to formula sheet** • **Interactive Videos** • **Visual Aids** • **Highlighter** • **Breaking down tasks to more manageable increments** • **Breaking down directions with one directive given at a time** • **Scrap paper provided** • **Assessments adapted in accordance to student's IEP** • **Extra time to complete assignments** • **Additional textbook sent home** • **Multi-modality instruction including modeling, explicit instruction, repetition, rephrasing, visual cues, and chunking material** • **Sample problems provided** • **Directions clarified** • **Enlarged text, notes, worksheets** • **Closed captioning**		**Assessments:** • **Extended time to complete** • **Questions and answers read aloud** • **Use of a highlighter** • **Assessments adapted in accordance to student's IEP** **Suggested Time:** **15 days as specified in curriculum with additional time as needed per individual student**

General Topic:	Specially Designed Instruction:	Additional Vocabulary:	Assessments/Suggested Time:
Aquatic Ecosystems	• **Manipulatives** • **Preferential Seating** • **Computer use (when available)** • **Calculator use** • **Access to formula sheet** • **Interactive Videos** • **Visual Aids** • **Highlighter** • **Breaking down tasks to more manageable increments** • **Breaking down directions with one directive given at a time** • **Scrap paper provided** • **Assessments adapted in accordance to student's IEP** • **Extra time to complete assignments** • **Additional textbook sent home** • **Multi-modality instruction including modeling, explicit instruction, repetition, rephrasing, visual cues, and chunking material** • **Sample problems provided** • **Directions clarified** • **Enlarged text, notes, worksheets** • **Closed captioning**		**Assessments:** • **Extended time to complete** • **Questions and answers read aloud** • **Use of a highlighter** • **Assessments adapted in accordance to student's IEP** **Suggested Time:** **15 days as specified in curriculum with additional time as needed per individual student**

General Topic:	Specially Designed Instruction:	Additional Vocabulary:	Assessments/Suggested Time:
Understanding Populations	• **Manipulatives** • **Preferential Seating** • **Computer use (when available)** • **Calculator use** • **Access to formula sheet** • **Interactive Videos** • **Visual Aids** • **Highlighter** • **Breaking down tasks to more manageable increments** • **Breaking down directions with one directive given at a time** • **Scrap paper provided** • **Assessments adapted in accordance to student's IEP** • **Extra time to complete assignments** • **Additional textbook sent home** • **Multi-modality instruction including modeling, explicit instruction, repetition, rephrasing, visual cues, and chunking material** • **Sample problems provided** • **Directions clarified** • **Enlarged text, notes, worksheets** • **Closed captioning**		**Assessments:** • **Extended time to complete** • **Questions and answers read aloud** • **Use of a highlighter** • **Assessments adapted in accordance to student's IEP** **Suggested Time:** **17 days as specified in curriculum with additional time as needed per individual student**

Dunmore School District
Curriculum Guide

General Topic:	Specially Designed Instruction:	Additional Vocabulary:	Assessments/Suggested Time:
The Human Population	• **Manipulatives** • **Preferential Seating** • **Computer use (when available)** • **Calculator use** • **Access to formula sheet** • **Interactive Videos** • **Visual Aids** • **Highlighter** • **Breaking down tasks to more manageable increments** • **Breaking down directions with one directive given at a time** • **Scrap paper provided** • **Assessments adapted in accordance to student's IEP** • **Extra time to complete assignments** • **Additional textbook sent home** • **Multi-modality instruction including modeling, explicit instruction, repetition, rephrasing, visual cues, and chunking material** • **Sample problems provided** • **Directions clarified** • **Enlarged text, notes, worksheets** • **Closed captioning**		**Assessments:** • **Extended time to complete** • **Questions and answers read aloud** • **Use of a highlighter** • **Assessments adapted in accordance to student's IEP** **Suggested Time:** **12 days as specified in curriculum with additional time as needed per individual student**

General Topic:	Specially Designed Instruction:	Additional Vocabulary:	Assessments/Suggested Time:
Biodiversity	• **Manipulatives** • **Preferential Seating** • **Computer use (when available)** • **Calculator use** • **Access to formula sheet** • **Interactive Videos** • **Visual Aids** • **Highlighter** • **Breaking down tasks to more manageable increments** • **Breaking down directions with one directive given at a time** • **Scrap paper provided** • **Assessments adapted in accordance to student's IEP** • **Extra time to complete assignments** • **Additional textbook sent home** • **Multi-modality instruction including modeling, explicit instruction, repetition, rephrasing, visual cues, and chunking material** • **Sample problems provided** • **Directions clarified** • **Enlarged text, notes, worksheets** • **Closed captioning**		**Assessments:** • **Extended time to complete** • **Questions and answers read aloud** • **Use of a highlighter** • **Assessments adapted in accordance to student's IEP** **Suggested Time:** **18 days as specified in curriculum with additional time as needed per individual student**

General Topic:	Specially Designed Instruction:	Additional Vocabulary:	Assessments/Suggested Time:
Water	• **Manipulatives** • **Preferential Seating** • **Computer use (when available)** • **Calculator use** • **Access to formula sheet** • **Interactive Videos** • **Visual Aids** • **Highlighter** • **Breaking down tasks to more manageable increments** • **Breaking down directions with one directive given at a time** • **Scrap paper provided** • **Assessments adapted in accordance to student's IEP** • **Extra time to complete assignments** • **Additional textbook sent home** • **Multi-modality instruction including modeling, explicit instruction, repetition, rephrasing, visual cues, and chunking material** • **Sample problems provided** • **Directions clarified** • **Enlarged text, notes, worksheets** • **Closed captioning**		**Assessments:** • **Extended time to complete** • **Questions and answers read aloud** • **Use of a highlighter** • **Assessments adapted in accordance to student's IEP** **Suggested Time:** **10 days as specified in curriculum with additional time as needed per individual student**

Dunmore School District
Curriculum Guide

General Topic:	Specially Designed Instruction:	Additional Vocabulary:	Assessments/Suggested Time:
Keystones and PSAT's Review and Final Exam	• **Manipulatives** • **Preferential Seating** • **Computer use (when available)** • **Calculator use** • **Access to formula sheet** • **Interactive Videos** • **Visual Aids** • **Highlighter** • **Breaking down tasks to more manageable increments** • **Breaking down directions with one directive given at a time** • **Scrap paper provided** • **Assessments adapted in accordance to student's IEP** • **Extra time to complete assignments** • **Additional textbook sent home** • **Multi-modality instruction including modeling, explicit instruction, repetition, rephrasing, visual cues, and chunking material** • **Sample problems provided** • **Directions clarified** • **Enlarged text, notes, worksheets** • **Closed captioning**		**Assessments:** • **Extended time to complete** • **Questions and answers read aloud** • **Use of a highlighter** • **Assessments adapted in accordance to student's IEP** **Suggested Time:** **5 days as specified in curriculum with additional time as needed per individual student**
Review and Final Exam	**As listed above**		