



Alignment Document
State of Pennsylvania
And
Aventa Learning Earth Science Grades 11-12

Earth Science Grades 11-12
 2005-2007 Benchmark Blueprint

State Standard Number	State Standard Area / Description	Unit Name	Course Topic Description
3.1.12	Unifying Themes		
3.1.12.A	Apply concepts of systems, subsystems, feedback and control to solve complex technological problems.		
3.1.12.A.1	Apply knowledge of control systems concept by designing and modeling control systems that solve specific problems.		
3.1.12.A.2	Apply systems analysis to predict results.		
3.1.12.A.3	Analyze and describe the function, interaction and relationship among subsystems and the system itself.		
3.1.12.A.4	Compare and contrast several systems that could be applied to solve a single problem.		
3.1.12.A.5	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.		
3.1.12.B.1	Evaluate technological processes by collecting data and applying mathematical models (e.g., process control).		
3.1.12.B.2	Apply knowledge of complex physical models to interpret data and apply mathematical models.		
3.1.12.B.3	Appraise the importance of computer models in interpreting science and technological systems.		

3.1.12.C	Assess and apply patterns in science and technology.		
3.1.12.C.1	Assess and apply recurring patterns in natural and technological systems.		
3.1.12.C.2	Compare and contrast structure and function relationships as they relate to patterns.		
3.1.12.C.3	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.		
3.1.12.D.1	Compare and contrast various forms of dimensional analysis.		
3.1.12.D.2	Assess the use of several units of measurement to the same problem.		
3.1.12.D.3	Analyze and apply appropriate measurement scales when collecting data.		
3.1.12.E	Evaluate change in nature, physical systems and man made systems.		
3.1.12.E.1	Evaluate fundamental science and technology concepts and their development over time (e.g., DNA, cellular respiration, unified field theory, energy measurement, automation, miniaturization, Copernican and Ptolemaic universe theories).	Planet Earth	Astronomy
3.1.12.E.2	Analyze how models, systems and technologies have changed over time (e.g., germ theory, theory of evolution, solar system, cause of fire).	Planet Earth	Astronomy
3.1.12.E.3	Explain how correlation of variables does not necessarily imply causation.		
3.1.12.E.4	Evaluate the patterns of change within a technology (e.g., changes in engineering in the automotive industry).		
3.2.12	Inquiry and Design		
3.2.12.A	Evaluate the nature of scientific and technological knowledge.		
3.2.12.A.1	Know and use the ongoing scientific processes to continually improve and better understand how things work.		
3.2.12.A.2	Critically evaluate the status of existing theories (e.g., germ theory of disease, wave theory of light, classification of subatomic particles, theory of evolution, epidemiology of aids).		

3.2.12.B	Evaluate experimental information for appropriateness and adherence to relevant science processes.		
3.2.12.B.1	Evaluate experimental data correctly within experimental limits.		
3.2.12.B.2	Judge that conclusions are consistent and logical with experimental conditions.		
3.2.12.B.3	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.		
3.2.12.C.1	Generate questions about objects, organisms and/or events that can be answered through scientific investigations.		
3.2.12.C.2	Evaluate the appropriateness of questions.		
3.2.12.C.3	Design an investigation with adequate control and limited variables to investigate a question.		
3.2.12.C.4	Organize experimental information using analytic and descriptive techniques.		
3.2.12.C.5	Evaluate the significance of experimental information in answering the question.		
3.2.12.C.6	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.		
3.2.12.D.1	Assess all aspects of the problem, prioritize the necessary information and formulate questions that must be answered.		
3.2.12.D.2	Propose, develop and appraise the best solution and develop alternative solutions.		
3.2.12.D.3	Implement and assess the solution.		
3.2.12.D.4	Evaluate and assess the solution, redesign and improve as necessary.		
3.2.12.D.5	Communicate and assess the process and evaluate and present the impacts of the solution		
3.5.12	Earth Sciences		
3.5.12.A	Analyze and evaluate earth features and processes that change the earth.	Plate Tectonics, Volcanoes, Earthquakes, and Deformation of Earth's Crust	Internal Structure of the Earth

3.5.12.A.1	Apply knowledge of geophysical processes to explain the formation and degradation of earth structures (e.g., mineral deposition, cave formations, soil composition).	Weathering, Erosion and Deformation	Erosion, Deposition and Landscape Development
3.5.12.A.2	Interpret geological evidence supporting evolution.		
3.5.12.A.3	Apply knowledge of radioactive decay to assess the age of various earth features and objects.	The History of the Earth and Atmosphere	The History of Earth
3.5.12.B	Analyze the availability, location and extraction of earth resources.		
3.5.12.B.1	Describe how the location of earth's major resources has affected a country's strategic decisions.		
3.5.12.B.2	Compare locations of earth features and country boundaries.	Plate Tectonics, Volcanoes, Earthquakes, and Deformation of Earth's Crust	Internal Structure of the Earth
3.5.12.B.3	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.	Planet Earth	Earth as a Complex System
3.5.12.C.1	Describe how weather and climate involve the transfer of energy in and out of the atmosphere.	Changes in the Atmosphere	Weather and Forecasting
		Changes in the Atmosphere	Heating the Atmosphere
3.5.12.C.2	Explain how unequal heating of the air, ocean and land produces wind and ocean currents.	Changes in the Atmosphere	Wind
3.5.12.C.3	Analyze the energy transformations that occur during the greenhouse effect and predict the long-term effects of increased pollutant levels in the atmosphere.		
3.5.12.C.4	Analyze the mechanisms that drive a weather phenomena (e.g., El Nino, hurricane, tornado) using the correlation of three methods of heat energy transfer.	Changes in the Atmosphere	Weather and Forecasting
		Changes in the Atmosphere	Heating the Atmosphere
3.5.12.D	Analyze the principles and history of hydrology.		



3.5.12.D.1	Analyze the operation and effectiveness of a water purification and desalination system.		
3.5.12.D.2	Evaluate the pros and cons of surface water appropriation for commercial and electrical use.		
3.5.12.D.3	Analyze the historical development of water use in Pennsylvania (e.g., recovery of Lake Erie).		
3.5.12.D.4	Compare the marine life and type of water found in the intertidal, neritic and bathyal zones.		