AVENTA LEARNING

Alignment Document

State of Pennsylvania
And
Aventa Learning Physical Science Grades 11-12

Physical 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.	Doing Science	Experimental set up
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.	Doing Science	Experimental set up
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).		
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).		
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.	Doing Science	Scientific Method
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.	Doing Science	Experimental set up
3.2.12.C.1	Generate questions about objects, organisms and/or events that can be answered through scientific investigations.	Doing Science	Experimental set up
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		
3.4.12	Physical Science, Chemistry and Physics		
3.4.12.A	Apply concepts about the structure and properties of matter.	Matter	Matter
3.4.12.A.1	Apply rules of systematic nomenclature and formula writing to chemical substances.		
3.4.12.A.2	Classify and describe, in equation form, types of chemical and nuclear reactions.		
3.4.12.A.3	Explain how radioactive isotopes that are subject to decay can be used to estimate the age of materials.		
3.4.12.A.4	Explain how the forces that bind solids, liquids and gases affect their properties.	Matter	States of Matter
3.4.12.A.5	Characterize and identify important classes of compounds (e.g., acids, bases, salts).	Matter	Elements and Compounds
3.4.12.A.6	Apply the conservation of energy concept to fields as diverse as mechanics, nuclear particles and studies of the origin of the universe.		
3.4.12.A.7	Apply the predictability of nuclear decay to estimate the age of materials that contain radioactive isotopes.		
3.4.12.A.8	Quantify the properties of matter (e.g., density, solubility coefficients) by applying mathematical formulas.		

3.4.12.B	Apply and analyze energy sources and conversions and their relationship to heat and temperature.		
3.4.12.B.1	Determine the heat involved in illustrative chemical reactions.		
3.4.12.B.2	Evaluate mathematical formulas that calculate the efficiency of specific chemical and mechanical systems.		
3.4.12.B.3	Use knowledge of oxidation and reduction to balance complex reactions		
3.4.12.B.4	Apply appropriate thermodynamic concepts (e.g., conservation, entropy) to solve problems relating to energy and heat.		
3.4.12.C	Apply the principles of motion and force.	Forces	Newton's Second Law of Motion
		Energy and Motion	Newton's First Law of Motion
3.4.12.C.1	Evaluate wave properties of frequency, wavelength and speed as applied to sound and light through different media.	Waves	Waves
3.4.12.C.2	Propose and produce modifications to specific mechanical power systems that will improve their efficiency.		
3.4.12.C.3	Analyze the principles of translational motion, velocity and acceleration as they relate to free fall and projectile motion.	Forces	Projectile motion
3.4.12.C.4	Analyze the principles of rotational motion to solve problems relating to angular momentum, and torque.		
3.4.12.C.5	Interpret a model that illustrates circular motion and acceleration.		
3.4.12.C.6	Describe inertia, motion, equilibrium, and action/reaction concepts through words, models and mathematical symbols.		
3.4.12.D	Analyze the essential ideas about the composition and structure of the universe.		

3.4.12.D.1	Analyze the Big Bang Theory's use of gravitation and nuclear reaction to explain a possible origin of the universe.		
3.4.12.D.2	Compare the use of visual, radio and x-ray telescopes to collect data regarding the structure and evolution of the universe.		
3.4.12.D.3	Correlate the use of the special theory of relativity and the life of a star.		