



Alignment Document
State of Kansas and Aventa Learning Physical Science

Physical Science
2005-2007 Benchmark Blueprint

Standards	Topics	Benchmarks	Unit Name	Course Topic Description
1 The student will develop the abilities necessary to do scientific inquiry and develop an understanding of scientific inquiry.	1.1 The student will demonstrate the abilities necessary to do scientific inquiry.	1.1.1 actively engages in asking and evaluating research questions.		
		1.1.2 actively engages in investigations, including developing questions, gathering and analyzing data, and designing and conducting research	Doing Science	Introductory Physical Science Lab
			Doing Science	Bouncing Ball Lab
			Motion	Inertia Lab
			Forces	Acceleration of Gravity Lab
			Simple Machines	Bike Lab
		1.1.3 actively engages in using technological tools and mathematics in their own scientific investigations.	Doing Science	Introductory Physical Science Lab
			Doing Science	Bouncing Ball Lab
			Motion	Inertia Lab
			Forces	Acceleration of Gravity Lab
Simple Machines	Bike Lab			
1.1.4 actively engages in conducting an inquiry, formulating and revising his or her scientific explanations and models	Doing Science	Introductory Physical Science Lab		

		(physical, conceptual, or mathematical) using logic and evidence, and recognizing that potential alternative explanations and models should be considered.	Doing Science Motion Forces Simple Machines	Bouncing Ball Lab Inertia Lab Acceleration of Gravity Lab Bike Lab
		1.1.5 actively engages in communicating and defending the design, results, and conclusion of his/her investigation.	Doing Science Doing Science Motion Forces Simple Machines	Introductory Physical Science Lab Bouncing Ball Lab Inertia Lab Acceleration of Gravity Lab Bike Lab
2A The student will develop an understanding of the structure of atoms, compounds, chemical reactions, and the interactions of energy and matter.	2A.1 The student will understand the structure of the atom.	2A.1.1 understands atoms, the fundamental organizational unit of matter, are composed of subatomic particles. Chemists are primarily interested in the protons, electrons, and neutrons found in the atom.	Atomic Structure and the Periodic Table Atomic Structure and the Periodic Table	The Discovery of the Atom Atomic Model
		2A.1.2 understands isotopes are atoms with the same atomic number (same number of protons) but different numbers of neutrons. The nuclei of some atoms are radioactive isotopes that spontaneously decay, releasing radioactive energy.	Atomic Structure and the Periodic Table Atomic Structure and the Periodic Table	Determining the Mass of an Atom Determining Atomic Mass for Different Elements
	2A.2 The students will understand the states and properties of matter.	2A.2.1 understands chemists use kinetic and potential energy to explain the physical and chemical properties of matter on earth that may exist in any of these three states: solids, liquids, and gases.	Energy Energy Matter	Potential Energy Kinetic Energy Properties of Matter

			Matter	States of Matter	
		<p>2A.2.2 understands the periodic table lists elements according to increasing atomic number. This table organizes physical and chemical trends by groups, periods, and sub-categories.</p>	Atomic Structure and the Periodic Table	Development of the Modern Periodic Table	
			Atomic Structure and the Periodic Table	The Structure of the Periodic Table	
			Atomic Structure and the Periodic Table	Periodic Trends	
		<p>2A.2.3 understands chemical bonds result when valence electrons are transferred or shared between atoms. Breaking a chemical bond requires energy. Formation of a chemical bond releases energy. Ionic compounds result from atoms transferring electrons. Molecular compounds result from atoms sharing electrons. For example, carbon atoms can bond to each other in chains, rings, and branching networks. Branched network and metallic solids also result from bonding.</p>	Chemical Bonding	Bonding	
			Chemical Bonding	Ionic Bonds	
			Chemical Bonding	Covalent Bonds	
			Chemical Bonding	Metallic Bonding	
	<p>2A.3 The student will gain a basic concept of chemical reactions.</p>	<p>2A.3.1 understands a chemical reaction occurs when one or more substances (reactants) react to form a different chemical substance(s) (products). There are different types of chemical reactions all of which demonstrate the Law of Conservation of Matter and Energy.</p>	Energy	Conservation of Energy	
				Chemical Reactions	Chemical Equations and Reactions
				Chemical Reactions	Balancing Reactions
				Chemical Reactions	Moles and Reactions
				Chemical Reactions	Types of Reactions
				Chemical Reactions	Energy and Chemical Reactions

		2A.3.2 understands how to perform mathematical calculations regarding the Law of Conservation of Matter, i.e., through stoichiometric relationships.	Chemical Reactions Chemical Reactions Chemical Reactions	Chemical Equations and Reactions Balancing Reactions Moles and Reactions
		2A.3.3 understands the differences and reactions between acids, bases, and salts. Perform calculations to determine the concentration of ions in solutions.		
2B The student will develop an understanding of the structure of atoms, compounds, chemical reactions, and the interactions of energy and matter.	2B.1 The student will understand the relationships between force and motion.	2B.1.1 understands Newton's Laws and the variables of time, position, velocity, and acceleration can be used to describe the position and motion of particles.	Motion Motion Motion Motion Forces Forces Forces Forces	Motion Calculating Speed Acceleration Newton's First Law of Motion Newton's Second Law of Motion Gravity Projectile Motion Newton's Third Law
		2B.1.2 understands physicists use conservation laws to analyze the motion of objects.	Motion Motion Motion Motion Forces Forces	Motion Calculating Speed Acceleration Newton's First Law of Motion Newton's Second Law of Motion Gravity

			Forces	Projectile Motion
			Forces	Newton's Third Law
			Energy	Conservation of Energy
2B.2 The student will understand the conservation of mass and energy, and the First and Second Laws of Thermodynamics.		2B.2.1 understands matter has energy. Mass and energy can be interchanged. The total energy in the universe is constant, but the type of energy may vary.	Energy	Conservation of Energy
		2B.2.2 understands the first law of thermodynamics states the total internal energy of a substance (the sum of all the kinetic and potential energies of its constituent molecules) will change only if heat is exchanged with the environment or work is done on or by the substance. In any physical interaction, the total energy in the universe is conserved.	Chemical Reactions	Energy and Chemical Reactions
		2B.2.3 understands the second law of thermodynamics that states the entropy of the universe is increasing.	Energy	Conservation of Energy
2B.3 The student will understand the nature of the fundamental interactions of matter and energy.		2B.3.1 There are four fundamental forces in nature: strong nuclear force, weak nuclear force, electromagnetic force, and gravitational force.		
		2B.3.1 There are four fundamental forces in nature: strong nuclear force, weak nuclear force, electromagnetic force, and gravitational force.	Forces	Gravity
		2B.3.2 understands waves have energy and can transfer energy when they interact with matter.	Waves	Waves
		2B.3.2 understands waves have energy and can transfer energy when they interact with matter.	Waves	Sound Waves
		2B.3.3 The student understands interference - how waves interact with other waves.	Waves	Interference
2B.3.4 The student will understand the principles of reflection and refraction.	Waves	Wave Properties of Light		
2B.3.5 understands electromagnetic waves result when a charged particle is accelerated or decelerated.	Waves	Electromagnetic Radiation		

		2B.3.6 The student understands basic electrostatics and circuits.	Electricity & Magnetism	Electrical Current
5 The student will develop understandings about the relationship between science and technology.	5.1 The student will develop an understanding that technology is applied science.	5.1.1 understands technology is the application of scientific knowledge for functional purposes.		
		5.1.2 understands creativity, imagination, and a broad scientific knowledge base are required to produce useful results.		
		5.1.3 understands science advances new technologies. New technologies open new areas for scientific inquiry.		
7 The student will develop understanding of science as a human endeavor, the nature of scientific knowledge, and historical perspectives.	7.1 The student will develop an understanding that science is a human endeavor that uses models to describe and explain the physical universe.	7.1.1 demonstrates an understanding of science as both vocation and avocation.		
		7.1.2 explains how science uses peer review, replication of methods, and norms of honesty.		
		7.1.3 recognizes the universality of basic science concepts and the influence of personal and cultural beliefs that embed science in society.		
		7.1.4 recognizes that society helps create the ways of thinking (mindsets) required for scientific advances, both toward training scientists and educating a populace to utilize benefits of science (e.g., standards of hygiene, attitudes toward forces of nature, etc.).		
		7.1.5 understands there are many issues which involve morals, ethics, values or spiritual beliefs that go beyond what science can explain, but for which solid scientific literacy is useful.		
		7.1.6 recognizes society's role in supporting topics of research and determining institutions where research is conducted.		

	7.2 The student will develop an understanding of the nature of scientific knowledge.	7.2.1 understands scientific knowledge describes and explains the physical world in terms of matter, energy, and forces. Scientific knowledge is provisional and is subject to change as new evidence becomes available.	Doing Science Doing Science	Scientific Laws The Scientific Method
		7.2.2 understands scientific knowledge begins with empirical observations, which are the data (also called facts or evidence) upon which further scientific knowledge is built.	Doing Science	The Scientific Method
		7.2.3 understands scientific knowledge consists of hypotheses, inferences, laws, and theories.	Doing Science Doing Science	Scientific Laws The Scientific Method
		7.2.4 understands a testable hypothesis or inference must be subject to confirmation by empirical evidence	Doing Science	Scientific Laws
	7.3 The student will understand science from historical perspectives.	7.3.1 demonstrates an understanding of the history of science.	Motion	Sir Isaac Newton
			Atomic Structure and the Periodic Table	The Discovery of the Atom
			Atomic Structure and the Periodic Table	Light as a Particle
		Atomic Structure and the Periodic Table	Development of the Modern Periodic Table	
		7.3.2 demonstrates a knowledge that scientific method historically proceeded from an inductive approach rather than a deductive approach.	Doing Science Doing Science	Scientific Laws The Scientific Method