



Alignment Document

State of Washington And Aventa Learning Chemistry

Chemistry 2005-2007 Benchmark Blueprint

State Standard Number	State Standard Area / Description	Unit Name	Course Topic Description
1	The student understands and uses scientific concepts and principles		
1.1	use properties to identify, describe, and categorize substances, materials, and objects, and use characteristics to categorize living things		
1.1.1	Physical Science		
1.1.1.a	use properties to sort natural and manufactured materials and objects, for example size, weight, shape, color, texture, and hardness		
1.1.1.b	describe the relative position and motion of objects		
1.1.1.c	describe experiences with sound, for example vibrations, echoes, and pitch; describe experiences with light in terms of bouncing off, passing through, and changes in path direction		
1.1.2	Earth/Space Science		
1.1.2.a	observe and examine physical properties of earth materials such as rocks and soil, water (as liquid, solid, and vapor) and the gases of the atmosphere		
1.1.3	Life Science		
1.1.3.a	distinguish living organisms from nonliving objects, and use characteristics to sort common organisms into plant and animal groups		

1.2	recognize the components, structure, and organization of systems and the interconnections within and among them		
1.2.1	Systems		
1.2.1.a	identify the parts of a system, how the parts go together, and how they depend on each other	Thermodynamics	Thermodynamics
1.2.2	Physical Science		
1.2.2.a	understand that energy keeps things running and comes in many forms	Thermodynamics	Thermodynamics
		Nuclear Chemistry	Nuclear Chemistry
1.2.2.b	know that energy can be transferred between various forms	The Scientific Method	Energy
		Thermodynamics	Thermodynamics
		Thermodynamics	Conservation of Energy-- Calorimetry
1.2.2.c	know that matter is made of small particles	Atoms/Period Table	Atom
1.2.2.d	know that matter can undergo changes of state such as evaporation, condensation, or freezing and thawing	Chemistry Fundamentals	Physical Change
		Chemistry Fundamentals	Phase Change
		Solids, Liquids, and Gases	Change of State
1.2.3	Earth/Space Science		
1.2.3.a	recognize that the earth is a spherical planet with a mainly solid interior and a surface composed of landforms, bodies of water, and an atmosphere		
1.2.3.b	know that the earth is one of several planets that orbits the sun, and the moon orbits the earth		
1.2.4	Life Science		
1.2.4.a	know that living things are composed of parts made of cells		
1.2.4.b	describe the life cycles of plants and animals, and recognize the differences between inherited and acquired characteristics		
1.2.4.c	understand the organization and function of human body structures and internal organs, and how they work together		
1.3	understand how interactions within and among systems cause changes in matter and energy		



1.3.1	Physical Science		
1.3.1.a	describe forces in terms of strength and direction		
1.3.1.b	investigate and recognize factors which determine the effects of a push or pull on the motion of objects		
1.3.2	Earth/Space Science		
1.3.2.a	identify processes that slowly change the surface of the earth such as erosion and weathering, and those that rapidly change the surface of the earth such as landslides, volcanic eruptions, and earthquakes		
1.3.2.b	recognize that fossils provide evidence of plants, animals, and environments that existed long ago		
1.3.2.c	observe and measure weather indicators such as temperature, wind direction and speed, and precipitation, noting changes and patterns of change from day to day and over the seasons		
1.3.2.d	observe and describe the patterns of movement of the sun and moon relative to each other and the earth, and relate them to the earth's rotation		
1.3.3	Life Science		
1.3.3.a	recognize that living things need constant energy supplied from food or light and that, in ecosystems, substances such as air, water, nutrients, and the chemicals in food are continually recycled		
1.3.3.b	know that fossil records show patterns of structural change in organisms over time		
1.3.3.c	describe how an organism's behavior and ability to survive is influenced by its environment, other life forms, and availability of food and/or other resources		
1.3.3.d	know humans and other living things depend on the natural environment, and can cause changes in their environment that affect their ability to survive		
2	The student knows and applies the skills and processes of science and technology.		
2.1	develop abilities necessary to do scientific inquiry		
2.1.1	ask questions about objects, organisms, and events in the environment		Labs Throughout Course



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2.1.2	plan and conduct simple investigations, using appropriate tools, measures, and safety rules		Labs Throughout Course
2.1.3	use data to construct reasonable explanations		Labs Throughout Course
2.1.4	model objects, events, or processes by representing them with concrete objects, metaphors, analogies, or other conceptual or physical constructs		Labs Throughout Course
2.1.5	record and report observations, explanations, and conclusions using oral, written, and mathematical expression		Labs Throughout Course
2.2	apply science knowledge and skills to solve problems or meet challenges		
2.2.1	identify problems found in familiar contexts in which science/technology can be or has been used to design solutions	Atoms/Period Table	Atom (Brief discussion on technology used in historical discoveries).
2.2.2	propose, design, and test a solution to a problem		
2.2.3	evaluate how well a design or a product solves a problem		
3	The student understands the nature and contexts of science and technology.		
3.1	understand the nature of scientific inquiry		
3.1.1	understand that all scientific observations should be reported accurately even when they contradict expectations	The Scientific Method	Accuracy and Precision
			Labs (Reporting Percent Error in Labs)
3.1.2	distinguish between questions that can be answered with science and technology and those that cannot		
3.1.3	explain why similar investigations may not produce similar results		
3.1.4	recognize that results of scientific investigations can come from expected and unexpected sources	Scientific Method	Scientific Method
3.1.5	know that ideas in science change as new scientific thinking, theories, and evidence arise	Scientific Method	Scientific Method
3.2	know that science and technology are human endeavors, interrelated to each other, to society, and to the workplace		
3.2.1	know that science and technology have been practiced by all peoples throughout history	Chemistry Fundamentals	Atoms (Examples of uses in history are discussed).



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3.2.2	recognize that people have invented tools for everyday life and for scientific investigations	Chemistry Fundamentals	Atoms
3.2.3	identify the knowledge and skills of science, mathematics, and technology used in common occupations		
1	The student understands and uses scientific concepts and principles		
1.1	use properties to identify, describe, and categorize substances, materials, and objects, and use characteristics to categorize living things		
1.1.1	Physical Science		
1.1.1.a	use physical and chemical properties to sort and identify substances, for example density, boiling point, and solubility	Chemistry Fundamentals	Chemical versus Physical Change
		Scientific Method	Qualitative versus Quantitative
1.1.1.b	describe the positions, relative speeds, and changes in speed of objects		
1.1.1.c	describe sound, water waves, and light, using wave properties such as, wave length, reflection, refraction, transmission, absorption, scattering, and interference		
1.1.2	Earth/Space Science		
1.1.2.a	classify rocks and soils into groups based on their chemical and physical properties; describe the processes by which rocks and soils are formed		
1.1.3	Life Science		
1.1.3.a	categorize plants and animals into groups according to how they accomplish life processes and by similarities and differences in external and internal structures		
1.2	recognize the components, structure, and organization of systems and the interconnections within and among them		
1.2.1	Systems		
1.2.1.a	describe how the parts of a system interact and influence each other	Thermodynamics	Thermodynamics
1.2.2	Physical Science		



1.2.2.a	understand that energy is a property of substances and systems and comes in many forms, including stored energy, energy of motion, and heat energy such as heat, light, electrical, mechanical, sound, nuclear, and chemical	Thermodynamics	Thermodynamics
		Thermodynamics	Conservation of Energy-- Calorimetry
		Nuclear Chemistry	Nuclear Chemistry (The course doesn't cover electrical or sound energy).
1.2.2.b	determine factors that affect rate and amount of energy transfer; associate a decrease in one form of energy with an increase in another	Thermodynamics	Conservation of Energy-- Calorimetry
1.2.2.c	understand that all matter is made up of atoms, which may be combined in various kinds, ways, and numbers	Atoms/Period Table	Atom
1.2.2.d	understand physical and chemical changes at the particle level, and know that matter is conserved	Chemistry Fundamentals	Atoms
		Solids, Liquids, and Gases	Change of State
1.2.3	Earth/Space Science		
1.2.3.a	describe the components and relationships of the earth system, including the solid earth (crust, hot convecting mantle and dense metallic core), the hydrosphere (oceans, seas, lakes, rivers, and streams), and the atmosphere (a mixture of gases)		
1.2.3.b	describe the relationships of the earth to the sun, the moon, the other planets and their moons, and smaller objects such as asteroids and comets		
1.2.4	Life Science		
1.2.4.a	know that specialized cells within multicellular organisms form different kinds of tissues, organs, and organ systems to carry out life functions		
1.2.4.b	understand that all living things reproduce and pass on genetic information, and that an organism's characteristics are determined by both genetic and environmental influences		



1.2.4.c	identify and describe human life functions, and the interconnecting organ systems necessary to maintain human life such as digestion, respiration, reproduction, circulation, excretion, movement, disease prevention, control, and coordination		
1.3	understand how interactions within and among systems cause changes in matter and energy		
1.3.1	Physical Science		
1.3.1.a	know the factors that determine the strength of the various forces		
1.3.1.b	understand the effects of balanced and unbalanced forces on the motion of objects along a straight line		
1.3.2	Earth/Space Science		
1.3.2.a	describe the processes of constructive and destructive forces and how they continually change landforms on earth		
1.3.2.b	know the importance of fossils in documenting life and environmental changes over time		
1.3.2.c	relate global atmospheric movement and the formation of ocean currents to weather and climate		
1.3.2.d	describe how the regular and predictable motions of most objects in the solar system account for such phenomena as the day, year, phases of the moon, eclipses, seasons, and ocean tides		
1.3.3	Life Science		
1.3.3.a	understand that individual organisms use matter and energy for life processes, and the mechanisms accomplishing these processes are complex, integrated, and regulated		
1.3.3.b	describe how biological evolution accounts for species diversity, adaptation, natural selection, extinction, and change in organisms over time		
1.3.3.c	explain how organisms interact with their environment and with other organisms to acquire energy, cycle matter, influence behavior, and establish competitive or mutually beneficial relationships		



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1.3.3.d	explain how human societies' use of natural resources affects quality of life and the health of ecosystems		
2	The student knows and applies the skills and processes of science and technology.		
2.1	develop abilities necessary to do scientific inquiry		
2.1.1	generate questions that can be answered through scientific investigations		Labs Throughout course
2.1.2	design, conduct, and evaluate scientific investigations, using appropriate equipment, mathematics, and safety procedures		Labs Throughout course
2.1.3	use evidence from scientific investigations to think critically and logically to develop descriptions, explanations, and predictions		Labs Throughout course
2.1.4	correlate models of the behavior of objects, events, or processes to the behavior of the actual things; test models by predicting and observing actual behaviors or processes		Labs Throughout course (Ex: Specific Heat Lab)
2.1.5	communicate scientific procedures, investigations, and explanations orally, in writing, with computer-based technology, and in the language of mathematics		Labs Throughout course (Ex: Specific Heat Lab)
2.2	apply science knowledge and skills to solve problems or meet challenges		
2.2.1	identify and examine common, everyday challenges or problems in which science/technology can be or has been used to design solutions		
2.2.2	identify, design, and test alternative solutions to a challenge or problem		
2.2.3	compare and contrast multiple solutions to a problem or challenge		
3	The student understands the nature and contexts of science and technology.		
3.1	understand the nature of scientific inquiry		
3.1.1	understand the operational and ethical traditions of science and technology such as skepticism, cooperation, intellectual honesty, and proprietary discovery		
3.1.2	understand that scientific investigation is limited to the natural world		
3.1.3	provide more than one explanation for events or phenomena; defend or refute the explanations using evidence		



3.1.4	describe how methods of investigation relate to the validity of scientific, experiments, observations, theoretical models, and explanation	Scientific Method	Scientific Method
3.1.5	explain how scientific theory, hypothesis generation, experimentation, and observation are interrelated and may lead to changing ideas	Scientific Method	Scientific Method
3.2	know that science and technology are human endeavors, interrelated to each other, to society, and to the workplace		
3.2.1	know that science and technology have been developed, used, and affected by many diverse individuals, cultures, and societies throughout human history	Chemistry Fundamentals	Atoms
3.2.2	compare and contrast scientific inquiry and technological design in terms of activities, results, and influence on individuals and society; know that science enables technology and vice versa	Chemistry Fundamentals	Atoms
3.2.3	investigate the use of science, mathematics, and technology within occupational/career areas of interest		
1	The student understands and uses scientific concepts and principles		
1.1	use properties to identify, describe, and categorize substances, materials, and objects, and use characteristics to categorize living things		
1.1.1	Physical Science		
1.1.1.a	examine the basis for the structure and use of the periodic table	Atoms/Period Table	Atomic Number, Mass Number, and Isotopes
		Atoms/Period Table	Quantum Theory
		Atoms/Period Table	History of the Periodic Table
		Atoms/Period Table	Group Names
		Atoms/Period Table	Trends in the Periodic Table
1.1.1.b	describe the average speed, direction of motion, and average acceleration of objects, for example increasing, decreasing, or constant acceleration		
1.1.1.c	describe water waves and sound, relating the ideas of frequency, wave length, and speed, and by relating energy to amplitude		
1.1.2	Earth/Space Science		



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1.1.2.a	correlate the chemical composition of earth materials - rocks, soils, water, gases of the atmosphere - with properties that determine their use to humans		
1.1.3	Life Science		
1.1.3.a	classify organisms into distinct groups according to structural, cellular, biochemical, and genetic characteristics		
1.2	recognize the components, structure, and organization of systems and the interconnections within and among them		
1.2.1	Systems	Thermodynamics	Thermodynamics (Brief discussion of system in terms of heat transfer).
1.2.1.a	analyze systems, including the inputs and outputs of a system and its subsystems		
1.2.2	Physical Science		
1.2.2.a	understand many forms of energy as they are found in common situations on earth and in the universe	Thermodynamics	Thermodynamics
		Thermodynamics	Conservation of Energy-- Calorimetry
1.2.2.b	understand that total energy is conserved; analyze decreases and increases in energy during transfers, in terms of total energy conservation	Thermodynamics	Thermodynamics
		Thermodynamics	Conservation of Energy-- Calorimetry
1.2.2.c	relate the structural characteristics of atoms to the principles of atomic bonding	Ionic Compounds	Ionic and Covalent Compounds
1.2.2.d	analyze and explain the factors that affect physical and chemical changes, and how matter and energy are conserved in a closed system	Chemistry Fundamentals	Fundamentals
		Chemistry Fundamentals	Physical Change
		Chemistry Fundamentals	Chemical Change
		Thermodynamics	Thermodynamics
		Thermodynamics	Conservation of Energy-- Calorimetry
		Solids, Liquids, and Gases	Change of State
1.2.3	Earth/Space Science		



1.2.3.a	explain how patterns and arrangements of landforms, oceans, and atmosphere are determined by natural forces and how the theory of plate tectonics accounts for movement over time		
1.2.3.b	understand that the solar system is in a galaxy in an expanding universe composed of immense numbers of stars and celestial bodies		
1.2.4	Life Science		
1.2.4.a	understand that specific genes regulate the functions performed by structures within the cells of multicellular organisms		
1.2.4.b	describe how genetic information (DNA) in the cell is controlled at the molecular level, and provides genetic continuity between generations		
1.2.4.c	compare and contrast the specialized structural and functional systems that regulate human growth and development, and maintain health		
1.3	understand how interactions within and among systems cause changes in matter and energy		
1.3.1	Physical Science		
1.3.1.a	identify various forces and their relative magnitudes, and explain everyday situations in terms of force		
1.3.1.b	explain the effects of unbalanced forces in changing the direction of motion of objects		
1.3.2	Earth/Space Science		
1.3.2.a	understand that patterns of movement in the plates that comprise the earth's surface are the result of outward transfer of the earth's internal heat, and that historical patterns of movement can be identified from clues in rock formations; describe how volcanoes and earthquakes in Washington State occur because of this interaction		
1.3.2.b	understand that fossils and radioactive elements can be used to correlate and determine the sequence of geologic events		
1.3.2.c	correlate global climate to energy transfer by the sun, cloud cover, the earth's rotation, and positions of mountain ranges and oceans		



1.3.2.d	understand that the earth, planets, sun, and the rest of the celestial bodies in the universe are continuing to evolve because of interactions between matter and forces of nature		
1.3.3	Life Science		
1.3.3.a	explain how organisms can sustain life by obtaining, transporting, transforming, releasing, and eliminating matter and energy		
1.3.3.b	investigate and examine the scientific evidence used to develop theories for evolution, speciation, adaptation, and biological diversity		
1.3.3.c	compare and contrast the complex factors (biotic and abiotic) that affect living organisms' interactions in biomes, ecosystems, communities, and populations		
1.3.3.d	analyze the effects of natural events and human activities on the earth's capacity to sustain biological diversity		
2	The student knows and applies the skills and processes of science and technology.		
2.1	develop abilities necessary to do scientific inquiry		
2.1.1	study and analyze questions and related concepts that guide scientific investigations		Labs Throughout course
2.1.2	design, conduct, and evaluate systematic and complex scientific investigations, using appropriate technology, multiple measures, and safe approaches		Labs Throughout course
2.1.3	formulate and revise scientific explanations and models using logic and evidence; recognize and analyze alternative explanations and predictions		
2.1.4	use mathematics, computers and/or related technology to model the behavior of objects, events, or processes		Labs Throughout course (Ex: Specific Heat Lab)
2.1.5	research, interpret, and defend scientific investigations, conclusions, or arguments; use data, logic, and analytical thinking as investigative tools; express ideas through oral, written, and mathematical expression		Labs Throughout course (Ex: Specific Heat Lab)
2.2	apply science knowledge and skills to solve problems or meet challenges		



2.2.1	study and analyze challenges or problems from local, regional, national, or global contexts in which science/technology can be or has been used to design a solution		
2.2.2	research, model, simulate, and test alternative solutions to a problem		
2.2.3	propose, revise, and evaluate the possible constraints, applications, and consequences of solutions to a problem or challenge		
3	The student understands the nature and contexts of science and technology.		
3.1	understand the nature of scientific inquiry		
3.1.1	analyze and explain why curiosity, honesty, openness, and skepticism are integral to scientific inquiry		
3.1.2	identify and analyze factors that limit the extent of scientific investigation		
3.1.3	compare, contrast, and critique divergent results from scientific investigations based on scientific arguments and explanations		
3.1.4	analyze and evaluate the quality and standards of investigative design, processes, and procedures		
3.1.5	know that science involves testing, revising, and occasionally discarding theories; understand that scientific inquiry and investigation lead to a better understanding of the natural world and not to absolute truth		
3.2	know that science and technology are human endeavors, interrelated to each other, to society, and to the workplace		
3.2.1	analyze how scientific knowledge and technological advances discovered and developed by individuals and communities in all cultures of the world contribute to changes in societies	Chemistry Fundamentals	Atoms
3.2.2	analyze how the scientific enterprise and technological advances influence and are influenced by human activity, for example societal, environmental, economical, political, or ethical considerations		
3.2.3	investigate the scientific, mathematical, and technological knowledge, training, and experience needed for occupational/career areas of interest		

