



Alignment Document

State of South Carolina And Aventa Learning Physical Science

Physical Science 2005-2007 Benchmark Blueprint

State Standard Number	State Standard Area / Description	Unit Name	Course Topic Description
PS	Physical Science		
0	Scientific Inquiry		
PS-1	The student will demonstrate an understanding of how scientific inquiry and technological design, including mathematical analysis, can be used appropriately to pose questions, seek answers, and develop solutions.		
PS-1.1	Generate hypotheses on the basis of credible, accurate, and relevant sources of scientific information.	Doing Science	Scientific method
PS-1.2	Use appropriate laboratory apparatuses, technology, and techniques safely and accurately when conducting a scientific investigation.		
PS-1.3	Use scientific instruments to record measurement data in appropriate metric units that reflect the precision and accuracy of each particular instrument.	Matter	System Units
PS-1.4	Design a scientific investigation with appropriate methods of control to test a hypothesis (including independent and dependent variables), and evaluate the designs of sample investigations.	Doing Science	Scientific method

PS-1.5	Organize and interpret the data from a controlled scientific investigation by using mathematics (including formulas and dimensional analysis), graphs, models, and/or technology.		
PS-1.6	Evaluate the results of a controlled scientific investigation in terms of whether they refute or verify the hypothesis.	Doing Science	Scientific method
PS-1.7	Evaluate a technological design or product on the basis of designated criteria (including cost, time, and materials).		
PS-1.8	Compare the processes of scientific investigation and technological design.		
PS-1.9	Use appropriate safety procedures when conducting investigations.		
0	Chemistry: Structure and Properties of Matter		
PS-2	The student will demonstrate an understanding of the structure and properties of atoms.		
PS-2.1	Compare the subatomic particles (protons, neutrons, electrons) of an atom with regard to mass, location, and charge, and explain how these particles affect the properties of an atom (including identity, mass, volume, and reactivity).	Atomic Structure	Protons, Neutrons, and Electrons
PS-2.2	Illustrate the fact that the atoms of elements exist as stable or unstable isotopes.	Atomic Structure	Protons, Neutrons, and Electrons
PS-2.3	Explain the trends of the periodic table based on the elements' valence electrons and atomic numbers.	Atomic Structure	The Periodic Table
		Atomic Structure	Protons, Neutrons, and Electrons
		Matter	Elements and Compounds
PS-2.4	Use the atomic number and the mass number to calculate the number of protons, neutrons, and/or electrons for a given isotope of an element.	Atomic Structure	Protons, Neutrons, and Electrons

PS-2.5	Predict the charge that a representative element will acquire according to the arrangement of electrons in its outer energy level.		
PS-2.6	Compare fission and fusion (including the basic processes and the fact that both fission and fusion convert a fraction of the mass of interacting particles into energy and release a great amount of energy).	Atomic Structure	Nuclear Process
PS-2.7	Explain the consequences that the use of nuclear applications (including medical technologies, nuclear power plants, and nuclear weapons) can have.		
PS-3	The student will demonstrate an understanding of various properties and classifications of matter.		
PS-3.1	Distinguish chemical properties of matter (including reactivity) from physical properties of matter (including boiling point, freezing/melting point, density [with density calculations], solubility, viscosity, and conductivity).	Matter	Characteristic Properties
		Matter	Changes in Matter
PS-3.2	Infer the practical applications of organic and inorganic substances on the basis of their chemical and physical properties.	Matter	Changes in Matter
PS-3.3	Illustrate the difference between a molecule and an atom.	Atomic Structure	Protons, Neutrons, and Electrons
PS-3.4	Classify matter as a pure substance (either an element or a compound) or as a mixture (either homogeneous or heterogeneous) on the basis of its structure and/or composition.	Matter	Elements and Compounds
		Matter	Mixtures
PS-3.5	Explain the effects of temperature, particle size, and agitation on the rate at which a solid dissolves in a liquid.	Matter	States of Matter

PS-3.6	Compare the properties of the four states of matter-solid, liquid, gas, and plasma-in terms of the arrangement and movement of particles.	Matter	Matter
		Matter	States of Matter
PS-3.7	Explain the processes of phase change in terms of temperature, heat transfer, and particle arrangement.	Matter	Changes in Matter
PS-3.8	Classify various solutions as acids or bases according to their physical properties, chemical properties (including neutralization and reaction with metals), generalized formulas, and pH (using pH meters, or pH paper, and litmus paper).	Matter	Changes in Matter
PS-4	The student will demonstrate an understanding of chemical reactions and the classifications, structures, and properties of chemical compounds.		
PS-4.1	Explain the role of bonding in achieving chemical stability.	Chemical Bond	Ionic Bonds
PS-4.2	Explain how the process of covalent bonding provides chemical stability through the sharing of electrons.	Atomic Structure	Protons, Neutrons, and Electrons
		Chemical Bond	Covalent Bonds
PS-4.3	Illustrate the fact that ions attract ions of opposite charge from all directions and form crystal lattices.	Atomic Structure	Protons, Neutrons, and Electrons
		Chemical Bond	Ionic Bonds
PS-4.4	Classify compounds as crystalline (containing ionic bonds) or molecular (containing covalent bonds) based on whether their outer electrons are transferred or shared.	Chemical Bond	Ionic Bonds
		Atomic Structure	Protons, Neutrons, and Electrons
PS-4.5	Predict the ratio by which the representative elements combine to form binary ionic compounds, and represent that ratio in a chemical formula.	Matter	Elements and Compounds

PS-4.6	Distinguish between chemical changes (including the formation of gas or reactivity with acids) and physical changes (including changes in size, shape, color, and/or phase).	Matter	Changes in Matter
PS-4.7	Summarize characteristics of balanced chemical equations (including conservation of mass and changes in energy in the form of heat-that is, exothermic or endothermic reactions).	Chemical Reactions	Endothermic and exothermic reactions
PS-4.8	Summarize evidence (including the evolution of gas; the formation of a precipitate; and/or changes in temperature, color, and/or odor) that a chemical reaction has occurred.	Chemical Reactions	Chemical Reactions
		Chemical Reactions	Chemical Reactions and Energy
PS-4.9	Apply a procedure to balance equations for a simple synthesis or decomposition reaction.		
PS-4.10	Recognize simple chemical equations (including single replacement and double replacement) as being balanced or not balanced.		
PS-4.11	Explain the effects of temperature, concentration, surface area, and the presence of a catalyst on reaction rates.	Chemical Reactions	Chemical Reactions
		Chemical Reactions	Reaction Rates
0	Physics: The Interactions of Matter and Energy		
PS-5	The student will demonstrate an understanding of the nature of forces and motion.		
PS-5.1	Explain the relationship among distance, time, direction, and the velocity of an object.	Energy and Motion	Motion
PS-5.2	Use the formula $v = d/t$ to solve problems related to average speed or velocity.	Energy and Motion	Motion
		Energy and Motion	Acceleration



PS-5.3	Explain how changes in velocity and time affect the acceleration of an object.	Energy and Motion	Acceleration
		Forces	Newton's Second Law of Motion
PS-5.4	Use the formula $a = (v_f - v_i)/t$ to determine the acceleration of an object.	Energy and Motion	Acceleration
		Forces	Newton's Second Law of Motion
PS-5.5	Explain how acceleration due to gravity affects the velocity of an object as it falls.	Forces	Newton's Second Law of Motion
PS-5.6	Represent the linear motion of objects on distance-time graphs.	Energy and Motion	Motion
PS-5.7	Explain the motion of objects on the basis of Newton's three laws of motion: inertia; the relationship among force, mass, and acceleration; and action and reaction forces.	Forces	Newton's Second Law of Motion
		Forces	Newton's Third Law
		Energy and Motion	Newton's First Law of Motion
PS-5.8	Use the formula $F = ma$ to solve problems related to force.	Forces	Newton's Second Law of Motion
PS-5.9	Explain the relationship between mass and weight by using the formula $FW = mag$.		
PS-5.10	Explain how the gravitational force between two objects is affected by the mass of each object and the distance between them.		
PS-6	The student will demonstrate an understanding of the nature, conservation, and transformation of energy.		
PS-6.1	Explain how the law of conservation of energy applies to the transformation of various forms of energy (including mechanical energy, electrical energy, chemical energy, light energy, sound energy, and thermal energy).		

PS-6.2	Explain the factors that determine potential and kinetic energy and the transformation of one to the other.	Energy	Potential energy
PS-6.3	Explain work in terms of the relationship among the force applied to an object, the displacement of the object, and the energy transferred to the object.	Energy	Potential energy
PS-6.4	Use the formula $W = Fd$ to solve problems related to work done on an object.	Energy	Potential energy
PS-6.5	Explain how objects can acquire a static electric charge through friction, induction, and conduction.	Simple Machines	Overcoming gravity and friction
		Electricity and Magnetism	Conductors and insulators
		Forces	Newton's Second Law of Motion
PS-6.6	Explain the relationships among voltage, resistance, and current in Ohm's law.	Electricity and Magnetism	Electrical Current
		Electricity and Magnetism	Ohm's law
PS-6.7	Use the formula $V = IR$ to solve problems related to electric circuits.	Electricity and Magnetism	Ohm's law
PS-6.8	Represent an electric circuit by drawing a circuit diagram that includes the symbols for a resistor, switch, and voltage source.	Electricity and Magnetism	Electrical Current
PS-6.9	Compare the functioning of simple series and parallel electrical circuits.	Electricity and Magnetism	Electrical Current
PS-6.10	Compare alternating current (AC) and direct current (DC) in terms of the production of electricity and the direction of current flow.		
PS-6.11	Explain the relationship of magnetism to the movement of electric charges in electromagnets, simple motors, and generators.	Electricity and Magnetism	Magnetism
PS-7	The student will demonstrate an understanding of the nature and properties of mechanical and electromagnetic waves.		

PS-7.1	Illustrate ways that the energy of waves is transferred by interaction with matter (including transverse and longitudinal/compressional waves).	Waves	Waves
PS-7.2	Compare the nature and properties of transverse and longitudinal/compressional mechanical waves.	Waves	Waves
PS-7.3	Summarize characteristics of waves (including displacement, frequency, period, amplitude, wavelength, and velocity as well as the relationships among these characteristics).	Waves	Waves
		Atomic Structure	Electromagnetic Radiation
PS-7.4	Use the formulas $v = f$ and $v = d/t$ to solve problems related to the velocity of waves.	Waves	Waves
PS-7.5	Summarize the characteristics of the electromagnetic spectrum (including range of wavelengths, frequency, energy, and propagation without a medium).	Waves	Electromagnetic Radiation
		Waves	Waves
		Atomic Structure	Electromagnetic Radiation
PS-7.6	Summarize reflection and interference of both sound and light waves and the refraction and diffraction of light waves.	Waves	Waves
		Waves	Electromagnetic Radiation
		Waves	Wave Properties of Light
PS-7.7	Explain the Doppler effect conceptually in terms of the frequency of the waves and the pitch of the sound.		