

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page		Volume 2 Investigation Manual Page	
ChemHS.01.a Chemistry	Atomic and Molecular Structure	The periodic table displays the elements in increasing atomic number and shows how periodicity of the physical and chemical properties of the elements relates to atomic structure.	Students know how to relate the position of an element in the periodic table to its atomic number and atomic mass.	278	atoms are made up of protons and neutrons and electrons	67	atomic symbol and atomic number and mass number
				282	understand how atomic structure determines the identity of elements—atomic number	67	understand the structure of an atom based on protons and neutrons and electrons
				283	structure of an atom and three smaller particles	69	identify symbols and atomic number and mass number
				291	recognizing groups or families on the periodic table	70	periodic table
				291	describe periodic table	71	build and describe periodic table
				291	idea of atomic mass	73	identify symbol and atomic number and mass number of elements
				292	identify metals and nonmetals on the periodic table	74	identify metals and nonmetals and metalloids
				293	atomic number on the periodic table	74	recognizing groups or families
				294	recognizing metals and nonmetals and metalloids	74	periodic table
				294	recognizing groups and families of periodic table	75	periodic table
				294	describing periodic table	76	review subatomic particles
				296	recognizing groups and families and periodic table		
				296	describe periodic table		
				298	describe periodic table		
				299	groups on periodic table		

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page		Volume 2 Investigation Manual Page	
ChemHS.01.b Chemistry	Atomic and Molecular Structure	The periodic table displays the elements in increasing atomic number and shows how periodicity of the physical and chemical properties of the elements relates to atomic structure.	Students know how to use the periodic table to identify metals, semimetals, non-metals, and halogens.	291	recognizing groups or families on the periodic table	74	recognizing groups or families
				292	identify metals and nonmetals on the periodic table	74	identify metals and nonmetals and metalloids
				294	recognizing groups and families of periodic table		
				294	recognizing metals and nonmetals and metalloids		
				296	recognizing groups and families and periodic table		
				299	groups on periodic table		

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page	Volume 2 Investigation Manual Page		
ChemHS.01.c Chemistry	Atomic and Molecular Structure	The periodic table displays the elements in increasing atomic number and shows how periodicity of the physical and chemical properties of the elements relates to atomic structure.	Students know how to use the periodic table to identify alkali metals, alkaline earth metals and transition metals, trends in ionization energy, electronegativity, and the relative sizes of ions and atoms.	294	common chemical properties of elements based on relation to periodic table	76	chemical bonds and electrons
				295	explain common chemical properties in relation to placement on periodic table	77	build model of Na and Cl atoms and explain why they bond to form a molecule
				298	how electron interactions create bonds	77	modeling chemical bonds and valence electrons
				298	properties in relation to periodic table	78	determining oxidation numbers
				299	chemical properties in relation to periodic table		
				303	describe characteristics based on place in periodic table		
				308	how electrons are involved in bonds		
				309	how ions are formed		
				309	how electrons are involved in bonds		
				310	how electron interactions help create chemical bonds		
				310	properties of elements in relation to the periodic table		
				311	explain the chemical properties of elements in relation to periodic table		
				311	how electrons are involved in bonds		

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page	Volume 2 Investigation Manual Page
				312	
				explain chemical properties based on location in periodic table	
				312	
				how electrons are involved in bonding	
				313	
				how electrons are involved in bonding	
				315	
				electron transfer and oxidation number	
				316	
				periodic table and oxidation numbers	
				316	
				chemical bonding and the periodic table	
				317	
				explain why ions are formed	
				317	
				bonding and electronegativity	
				322	
				electronegativity	
				322	
				qualitative understanding of how electron interactions create bonds	
				531	
				water is a polar molecule	
				532	
				hydrogen bonding in water	
				548	
				how ions are formed	

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page		Volume 2 Investigation Manual Page	
ChemHS.01.d Chemistry	Atomic and Molecular Structure	The periodic table displays the elements in increasing atomic number and shows how periodicity of the physical and chemical properties of the elements relates to atomic structure.	Students know how to use the periodic table to determine the number of electrons available for bonding.	286	idea that electrons are in set energy levels	67	Bohr model
				287	quantum theory explained	74	recognizing groups or families
				288	quantum theory—idea that electrons are in fixed energy levels	76	chemical bonds and electrons
				289	energy levels	77	modeling chemical bonds and valence electrons
				289	electron shells	78	determining oxidation numbers
				290	quantum theory—electrons in specific energy levels		
				291	recognizing groups or families on the periodic table		
				294	recognizing groups and families of periodic table		
				295	relate quantum theory to the idea that electrons exist at set energy levels		
				296	quantum theory to the idea that electrons at energy levels		
				296	recognizing groups and families and periodic table		
				298	how electron interactions create bonds		
				299	groups on periodic table		
				308	how electrons are involved in bonds		
				309	how ions are formed		
				309	how electrons are involved in bonds		

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page	Volume 2 Investigation Manual Page
				310	
				311	
				311	
				312	
				312	
				313	
				313	
				313	
				314	
				314	
				315	
				316	
				317	
				317	

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page	Volume 2 Investigation Manual Page
				322 qualitative understanding of how electron interactions create bonds 322 electronegativity 531 water is a polar molecule 532 hydrogen bonding in water 548 how ions are formed	
ChemHS.01.e Chemistry	Atomic and Molecular Structure	The periodic table displays the elements in increasing atomic number and shows how periodicity of the physical and chemical properties of the elements relates to atomic structure.	Students know the nucleus of the atom is much smaller than the atom yet contains most of its mass.	278 atoms are made up of protons and neutrons and electrons 279 Rutherford's gold foil experiment 279 Thomson's discovery of electron 279 history of atomic theory 279 protons neutrons and electrons 280 basic properties of an atom and the three subatomic particles 283 structure of an atom and three smaller particles 284 three subatomic particles and their charge 286 Bohr's model of the atom 287 Quantum theory	67 understand the structure of an atom based on protons and neutrons and electrons 76 review subatomic particles

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page		Volume 2 Investigation Manual Page	
ChemHS.01.f Chemistry	Atomic and Molecular Structure	The periodic table displays the elements in increasing atomic number and shows how periodicity of the physical and chemical properties of the elements relates to atomic structure.	Students know how to use the periodic table to identify the lanthanide, actinide, and transactinide elements and know that the transuranium elements were synthesized and identified in laboratory experiments through the use of nuclear accelerators.	287	contributions of Heisenberg	72	lanthanide and actinide series identified
				292	lanthanide and actinide series		
				295	lanthanide and actinide series		
				297	lanthanide and actinide series		

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page	Volume 2 Investigation Manual Page		
ChemHS.01.g Chemistry	Atomic and Molecular Structure	The periodic table displays the elements in increasing atomic number and shows how periodicity of the physical and chemical properties of the elements relates to atomic structure.	Students know how to relate the position of an element in the periodic table to its quantum electron configuration and to its reactivity with other elements in the table.	289	electron shells	67	Bohr model
				294	common chemical properties of elements based on relation to periodic table	77	build model of Na and Cl atoms and explain why they bond to form a molecule
				295	explain common chemical properties in relation to placement on periodic table	80	predict chemical formulas
				298	properties in relation to periodic table		
				299	chemical properties in relation to periodic table		
				303	describe characteristics based on place in periodic table		
				308	difference between covalent and ionic bonds		
				309	understand that elements combine in constant proportions to form compounds		
				309	how ions are formed		
				310	properties of elements in relation to the periodic table		
				311	explain the chemical properties of elements in relation to periodic table		
				312	explain chemical properties based on location in periodic table		

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page	Volume 2 Investigation Manual Page
				315 electron transfer and oxidation number 316 periodic table and oxidation numbers 317 explain why ions are formed 317 bonding and electronegativity 317 distinguish between ionic compounds and covalent molecules 318 apply rules for writing formulas of simple chemical compounds 322 electronegativity 323 rules for writing formulas 531 water is a polar molecule 532 hydrogen bonding in water 548 how ions are formed	
ChemHS.01.h Chemistry	Atomic and Molecular Structure	The periodic table displays the elements in increasing atomic number and shows how periodicity of the physical and chemical properties of the elements relates to atomic structure.	Students know the experimental basis for Thomson's discovery of the electron, Rutherford's nuclear atom, Millikan's oil drop experiment and Einstein's explanation of the photoelectric effect.	279 Rutherford's gold foil experiment 279 Thomson's discovery of electron 279 history of atomic theory 286 Bohr's model of the atom 287 Quantum theory	

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page		Volume 2 Investigation Manual Page	
ChemHS.01.1 Chemistry	Atomic and Molecular Structure	The periodic table displays the elements in increasing atomic number and shows how periodicity of the physical and chemical properties of the elements relates to atomic structure.	Students know the experimental basis for the development of the quantum theory of atomic structure and the historical importance of the Bohr model of the atom.	279	history of atomic theory	67	Bohr model
				279	Thomson's discovery of electron		
				279	Rutherford's gold foil experiment		
				286	idea that electrons are in set energy levels		
				286	Bohr's model of the atom		
				287	Quantum theory		
				287	contributions of Heisenberg		
				287	quantum theory explained		
				288	quantum theory		
				288	quantum theory—idea that electrons are in fixed energy levels		
				289	energy levels		
				289	electron shells		
				290	quantum theory—electrons in specific energy levels		
				295	relate quantum theory to the idea that electrons exist at set energy levels		
				296	quantum theory to the idea that electrons at energy levels		
				311	relate the term quantum theory to the idea that electrons exist at set energy levels		

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page	Volume 2 Investigation Manual Page
				312 313 314	
ChemHS.01.j Chemistry	Atomic and Molecular Structure	The periodic table displays the elements in increasing atomic number and shows how periodicity of the physical and chemical properties of the elements relates to atomic structure.	Students know that spectral lines are results of transitions of electrons between energy levels and that these lines correspond to photons with a frequency related to the energy spacing between levels by using Planck's relationship ($E=h\nu$).	285 286 290 302	

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page	Volume 2 Investigation Manual Page		
ChemHS.02.a Chemistry	Chemical Bonds	Biological, chemical and physical properties of matter result from the ability of atoms to form bonds from electrostatic forces between electrons and protons and between atoms and molecules.	Students know atoms combine to form molecules by sharing electrons to form covalent or metallic bonds or by exchanging to form ionic bonds.	294	common chemical properties of elements based on relation to periodic table	76	chemical bonds and electrons
				295	explain common chemical properties in relation to placement on periodic table	77	build model of Na and Cl atoms and explain why they bond to form a molecule
				298	properties in relation to periodic table	77	modeling chemical bonds and valence electrons
				298	how electron interactions create bonds	78	determining oxidation numbers
				299	chemical properties in relation to periodic table		
				303	describe characteristics based on place in periodic table		
				308	how electrons are involved in bonds		
				309	how electrons are involved in bonds		
				309	how ions are formed		
				310	how electron interactions help create chemical bonds		
				310	properties of elements in relation to the periodic table		
				311	explain the chemical properties of elements in relation to periodic table		
				311	how electrons are involved in bonds		

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page	Volume 2 Investigation Manual Page
				312	
				312	
				313	
				315	
				316	
				316	
				317	
				322	
				548	

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page	Volume 2 Investigation Manual Page		
ChemHS.02.b Chemistry	Chemical Bonds	Biological, chemical and physical properties of matter result from the ability of atoms to form bonds from electrostatic forces between electrons and protons and between atoms and molecules.	Students know chemical bonds between atoms in molecules such as , H ₂ , CH ₄ , NH ₃ , H ₂ CCH ₂ , N ₂ , Cl ₂ and many large biological molecules are covalent.	294	common chemical properties of elements based on relation to periodic table	77	build model of Na and Cl atoms and explain why they bond to form a molecule
				295	explain common chemical properties in relation to placement on periodic table	234	explain how special bonding properties of carbon make possible the great variety and complexity of biomolecules
				298	properties in relation to periodic table		
				299	chemical properties in relation to periodic table	234	understand that carbon and hydrogen and nitrogen and oxygen combine to form biomolecules
				303	describe characteristics based on place in periodic table		
				310	properties of elements in relation to the periodic table	234	carbon and hydrogen and nitrogen and oxygen combine to form biomolecules
				311	explain the chemical properties of elements in relation to periodic table		
				312	explain chemical properties based on location in periodic table		
				316	periodic table and oxidation numbers		
				329	how special properties of carbon make the great variety of biomolecules		

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page		Volume 2 Investigation Manual Page
ChemHS.02.c Chemistry	Chemical Bonds	Biological, chemical and physical properties of matter result from the ability of atoms to form bonds from electrostatic forces between electrons and protons and between atoms and molecules.	Students know salt crystals such as NaCl, are repeating patterns of positive and negative ions held together by electrostatic attraction.	281	compare and contrast the strong force and the electromagnetic force	
				309	how ions are formed	
				315	electron transfer and oxidation number	
				317	explain why ions are formed	
				548	how ions are formed	
ChemHS.02.e Chemistry	Chemical Bonds	Biological, chemical and physical properties of matter result from the ability of atoms to form bonds from electrostatic forces between electrons and protons and between atoms and molecules.	Students know how to draft Lewis dot structure	313	know how to draw Lewis dot structures	
				314	Lewis dot structure	

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page	Volume 2 Investigation Manual Page		
ChemHS.02.g Chemistry	Chemical Bonds	Biological, chemical and physical properties of matter result from the ability of atoms to form bonds from electrostatic forces between electrons and protons and between atoms and molecules.	Students know how electronegativity and ionization energy relate to bond formation.	278	atoms are made up of protons and neutrons and electrons	67	understand the structure of an atom based on protons and neutrons and electrons
				283	structure of an atom and three smaller particles	76	review subatomic particles
				298	how electron interactions create bonds	76	chemical bonds and electrons
				308	how electrons are involved in bonds	77	modeling chemical bonds and valence electrons
				309	how ions are formed	78	determining oxidation numbers
				309	how electrons are involved in bonds		
				310	how electron interactions help create chemical bonds		
				311	how electrons are involved in bonds		
				312	how electrons are involved in bonding		
				313	how electrons are involved in bonding		
				315	electron transfer and oxidation number		
				316	chemical bonding and the periodic table		
				317	explain why ions are formed		
				322	qualitative understanding of how electron interactions create bonds		
				548	how ions are formed		

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page	Volume 2 Investigation Manual Page
ChemHS.03.a Chemistry	Conservation of Matter and Stoichiometry	The conservation of atoms in chemical reactions leads to the principle of conservation of matter and the ability to calculate the mass of products and reactants.	Students know how to describe chemical reactions by writing balanced equations.	337 history of law of conservation of mass 338 chemical equations 338 balanced chemical equations 339 balancing chemical equations	84 investigate and recognize that the chemical reactions can be represented as systems with reactants and products 86 chemical equations 87 practice balancing equations
ChemHS.04.a Chemistry	Gases and Their Properties	The kinetic molecular theory describes the motion of atoms and molecules and explains the properties of gasses.	Students know the random motion of molecules and their collisions with a surface create the observable pressure on that surface.	227 how pressure is created on a molecular level 228 atomic level explanation of pressure 229 Bernouilli's principle and the airfoil 230 Boyle's law and the behavior of gases 239 importance of Charles's law 265 pressure 268 pressure 270 concept of pressure	
ChemHS.04.b Chemistry	Gases and Their Properties	The kinetic molecular theory describes the motion of atoms and molecules and explains the properties of gasses.	Students know the random motion of molecules explain the diffusion of gases.	190 phases of matter 227 explain matter states based on arrangement of atoms	

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page		Volume 2 Investigation Manual Page
ChemHS.04.c Chemistry	Gases and Their Properties	The kinetic molecular theory describes the motion of atoms and molecules and explains the properties of gasses.	Students know how to apply the gas laws to relations between the pressure, temperature and volume of any amount of an ideal gas or any mixture of ideal gases.	230 239	Boyle's law and the behavior of gases importance of Charles's law	
ChemHS.04.g Chemistry	Gases and Their Properties	The kinetic molecular theory describes the motion of atoms and molecules and explains the properties of gasses.	Students know the kinetic theory of gases relates the absolute temperature of a gas to the average kinetic energy of its molecules or atoms.	186 203 251	kinetic theory and temperature kinetic theory average kinetic energy equals temperature	135 kinetic theory
ChemHS.05.a Chemistry	Acids and Bases	Acids, bases, and salts are three classes of compounds that form ions in water solution.	Students know the observable properties of acids, bases and salt solution.	546 547 549 550 551 552 553 553	differentiate between acids and bases differentiate between acids and bases determine pH ranges of solutions pH range pH ranges acids and bases pH ranges differentiate between acids and bases	258 create a pH scale

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page		Volume 2 Investigation Manual Page
ChemHS.05.b Chemistry	Acids and Bases	Acids, bases, and salts are three classes of compounds that form ions in water solution.	Students know acids are hydrogen-ion-donating and bases are hydrogen-ion-accepting substances.	546	acids donate H- ions	258 create a pH scale
				546	differentiate between acids and bases	
				547	bases accept H- ions	
				547	differentiate between acids and bases	
				548	acids donate H- ions and bases accept H- ions	
				552	acids and bases	
				553	differentiate between acids and bases	
ChemHS.05.d Chemistry	Acids and Bases	Acids, bases, and salts are three classes of compounds that form ions in water solution.	Students know how to use the pH scale to characterize acid and base solutions.	546	differentiate between acids and bases	258 create a pH scale
				547	differentiate between acids and bases	
				549	determine pH ranges of solutions	
				550	pH range	
				551	pH ranges	
				552	acids and bases	
				553	pH ranges	
				553	differentiate between acids and bases	

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page	Volume 2 Investigation Manual Page		
ChemHS.06.a Chemistry	Solutions	Solutions are homogenous mixtures of two or more substances.	Students know the definitions of solute and solvent.	530	water structure and its function as a solvent	134	describe properties of true solutions
				530	why water is a nearly universal solvent	135	how various factors influence solubility—including temperature
				530	a water molecule is v-shaped	136	role of solute and solvent
				534	solvent affects solubility	136	solubility and temperature
				536	understanding solutions	137	solubility curve
				538	factors such as particle size that influence rate of dissolving		
				538	properties of solutions—including roles of solvent and solute		
				538	various factors influence solubility—including temperature		
				539	identify how factors influence solubility—including nature of solvent		
				539	factors that affect solubility—including the solute		
				541	solubility curve		
				542	factors that affect solubility		
				543	various factors affect solubility—temperature		
				543	factors that affect solubility—solute		

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page	Volume 2 Investigation Manual Page
				543 various factors affect solubility—including pressure 545 factors that affect solubility—temperature 545 properties of solutions—solvent and solute 545 water as universal solvent 548 water as universal solvent	
ChemHS.06.b Chemistry	Solutions	Solutions are homogenous mixtures of two or more substances.	Students know how to describe the dissolving process at the molecular level by using the concept of random molecular motion.	538 factors such as particle size that influence rate of dissolving	

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page		Volume 2 Investigation Manual Page			
ChemHS.06.c Chemistry	Solutions	Solutions are homogenous mixtures of two or more substances.	Students know temperature, pressure and surface area affect the dissolving process.	530	why water is a nearly universal solvent	135	how various factors influence solubility—including temperature		
				534	solvent affects solubility				
				538	various factors influence solubility—including temperature			136	solubility and temperature
				539	identify how factors influence solubility—including nature of solvent			137	solubility curve
				539	factors that affect solubility—including the solute				
				541	solubility curve				
				542	factors that affect solubility				
				543	factors that affect solubility—solute				
				543	various factors affect solubility—including pressure				
				543	various factors affect solubility—temperature				
545	factors that affect solubility—temperature								
ChemHS.06.f Chemistry	Solutions	Solutions are homogenous mixtures of two or more substances.	Students know how molecules in a solution are separated or purified by the methods of chromatography and distillation.	180	understanding mixtures				
				314	mixtures can be separated by physical means				

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page	Volume 2 Investigation Manual Page
ChemHS.07.a Chemistry	Chemical Thermodynamics	Energy is exchanged or transformed in all chemical reactions and physical changes of matter.	Students know how to describe temperature and heat flow in terms of the motion of molecules or atoms).	36 objects at different temperatures reach an intermediate temperature 184 converting between Fahrenheit and Celsius 184 measuring temperature 186 kinetic theory and temperature 188 Kelvin and Celsius scales 201 heat and work 201 the British thermal unit 203 kinetic theory 206 thermal equilibrium 251 average kinetic energy equals temperature 251 change in temperature is evidence of energy transfer	135 kinetic theory

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page		Volume 2 Investigation Manual Page	
CHEMHS.07.b Chemistry	Chemical Thermodynamics	Energy is exchanged or transformed in all chemical reactions and physical changes of matter.	Students know chemical processes can either release (exothermic) or absorb (endothermic) thermal energy.	310	energy changes that accompany chemical reactions	235	investigating chemical reaction energy and hot packs
				348	explain how energy is manifested in chemical reactions—exothermic and endothermic	236	investigating chemical reaction energy and cold packs
				349	analyze energy changes that accompany chemical reactions	237	identifying energy in a chemical reaction
				349	how energy is manifested in chemical reactions		
				350	endothermic reactions		
ChemHS.07.c Chemistry	Chemical Thermodynamics	Energy is exchanged or transformed in all chemical reactions and physical changes of matter.	Students know energy is released when a material condenses or freezes and is absorbed when a material evaporates or melts.	192	phase changes	44	phase change graphs
				533	hydrogen bonding and the gaseous state of water		
ChemHS.07.d Chemistry	Chemical Thermodynamics	Energy is exchanged or transformed in all chemical reactions and physical changes of matter.	Students know how to solve problems involving heat flow and temperature changes, using known values of specific heat and latent heat of phase change.	202	specific heat explained	49	concept of specific heat
				203	specific heat	61	investigations that develop idea of specific heat
						223	investigate specific heat
						224	specific heat

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page	Volume 2 Investigation Manual Page	
ChemHS.10.a Chemistry	Organic Chemistry and Biochemistry	The bonding characteristics of carbon allow the formation of many different organic molecules of varied sizes, shapes, and chemical properties and provide the biochemical basis of life.	Students know large molecules (polymers), such as proteins, nucleic acids, and starch, are formed by repetitive combinations of simple subunits.	325	general understanding of chemical composition of living cells	234 explain how special bonding properties of carbon make possible the great variety and complexity of biomolecules 234 understand that carbon and hydrogen and nitrogen and oxygen combine to form biomolecules 234 carbon and hydrogen and nitrogen and oxygen combine to form biomolecules
				326	general understanding of chemical composition of cells	
				326	identifying foods as being made up complex molecules	
				327	simple molecules are rearranged in body	
				327	simple molecules are rearranged in body	
				328	DNA	
				328	DNA make up and nucleic acids	
				329	how special properties of carbon make the great variety of biomolecules	
				329	general understanding of chemical composition of cells	
				329	DNA make up and nucleic acids	
				329	food is composed of complex molecules	

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page	Volume 2 Investigation Manual Page
ChemHS.10.b Chemistry	Organic Chemistry and Biochemistry	The bonding characteristics of carbon allow the formation of many different organic molecules of varied sizes, shapes, and chemical properties and provide the biochemical basis of life.	Students know the bonding characteristics of carbon that result in the formation of a large variety of structures ranging from simple hydrocarbons to complex polymers and biological molecules.	329 how special properties of carbon make the great variety of biomolecules	234 explain how special bonding properties of carbon make possible the great variety and complexity of biomolecules
ChemHS.11.a Chemistry	Nuclear Processes	Nuclear processes are those in which an atomic nucleus changes, including radioactive decay of naturally occurring and human-made isotopes, nuclear fission, and nuclear fusion.	Students know protons and neutrons in the nucleus are held together by nuclear forces that overcome the electromagnetic repulsion between the protons.	279 protons neutrons and electrons 280 basic properties of an atom and the three subatomic particles 281 compare and contrast the strong force and the electromagnetic force 284 three subatomic particles and their charge	

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page		Volume 2 Investigation Manual Page	
ChemHS.11.c Chemistry	Nuclear Processes	Nuclear processes are those in which an atomic nucleus changes, including radioactive decay of naturally occurring and human-made isotopes, nuclear fission, and nuclear fusion.	Students know some naturally occurring isotopes of elements are radioactive, as are isotopes formed in nuclear reactions.	293	explain what isotopes are	67	what isotopes are
				355	explain what isotopes are	68	radioactivity
				355	basic concepts of radioactivity and decay of one atom into another	69	what isotopes are
				357	radioisotopes in science and medicine	69	radioactivity

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page		Volume 2 Investigation Manual Page	
ESHS.01.a Earth Science	Earth's Place in the Universe	Astronomy and planetary exploration reveal the solar system's structure, scale, and change over time.	Students know how the difference and similarities among the sun, the terrestrial planets, and the gas planets may have been established during the formation of the solar system.	158	compare Earth with the other planets with respect to supporting life	278	position of Earth among planets
				203	Earth compared with other planets with respect to supporting life		
				247	comparison of Earth's atmosphere to other planets		
				662	describe compare and explain the orbits of moons and planets		
				664	relative sizes and distances within the solar system		
				676	how the moon was formed		
				681	orbits of other bodies in the solar system		
				682	other bodies in solar system		
				683	orbits on bodies in solar system		
				729	evidence for the existence of planets orbiting other stars		
				729	how the solar system was formed		

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page		Volume 2 Investigation Manual Page
ESHS.01.b Earth Science	Earth's Place in the Universe	Astronomy and planetary exploration reveal the solar system's structure, scale, and change over time.	Students know the evidence from Earth and moon rocks indicates that the solar system was formed from a nebular cloud of dust and gas approximately 4.6 billion years ago.	676 729	how the moon was formed how the solar system was formed	
ESHS.01.c Earth Science	Earth's Place in the Universe	Astronomy and planetary exploration reveal the solar system's structure, scale, and change over time.	Students know the evidence from geological studies of Earth and other planets suggest that the early Earth was very different from Earth today	378 466 490 702 703	global climate change and you forces like volcanoes and erosion form and shape Earth forces like volcanoes and erosion form and shape Earth compare Sun with other stars compare Sun with other stars	116 determining the relative ages of rock formations 117 sequencing events in a geologic cross-section 148 predict evolution of land features resulting from erosion 150 predict results of erosion 151 predict results of erosion 226 mountain building 265 climate change over time and what it would do to currents

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page		Volume 2 Investigation Manual Page	
ESHS.01.d Earth Science	Earth's Place in the Universe	Astronomy and planetary exploration reveal the solar system's structure, scale, and change over time.	Students know the evidence indicating that the planets are much closer to Earth than the stars are.	664	relative sizes and distances within the solar system	278	general characteristics of universe
				718	general characteristics of universe—galaxies	278	position of Earth among planets
				719	features of universe as we currently understand it		
				720	characteristics of the universe		
				721	characteristics of the universe		
				724	description of galaxy as we know it		
				734	research and describe astronomical objects		

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page		Volume 2 Investigation Manual Page	
ESHS.01.e Earth Science	Earth's Place in the Universe	Astronomy and planetary exploration reveal the solar system's structure, scale, and change over time.	Students know the sun is a typical star and is powered by nuclear reactions, primarily the fusion of hydrogen to form helium.	695	how stars produce energy	179	using a spectrometer to identify elements
				695	explain how stars produce energy	180	analyzing light from different light sources
				696	brightness of a star	181	analyzing light from a star
				697	general features of the life cycle of stars	182	star life cycle and H-R diagram
				698	how stars form and how they produce energy and stars' life cycle	183	graphing star data
				699	how stars form and features of life cycle	184	groupings on the H-R diagram
				700	formation of stars		
				701	evidence that elements with atomic numbers greater than lithium have been found in stars		
				701	life cycle of a star		
				703	star's life cycle		
				727	how stars form		
				728	evidence that elements with atomic number higher than lithium were made in stars		
				728	star life cycle		

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page	Volume 2 Investigation Manual Page
ESHS.01.f Earth Science	Earth's Place in the Universe	Astronomy and planetary exploration reveal the solar system's structure, scale, and change over time.	Students know the evidence for the dramatic effects that asteroid impacts have had in shaping the surface of planets and their moons and in mass extinctions of life on Earth.	681 asteroid impact of 65 million years ago	116 determining the relative ages of rock formations 117 sequencing events in a geologic cross-section
ESHS.01.g Earth Science	Earth's Place in the Universe	Astronomy and planetary exploration reveal the solar system's structure, scale, and change over time.	Students know the evidence for the existence of planets orbiting other stars.	729 evidence for the existence of planets orbiting other stars	
ESHS.02.a Earth Science	Earth's Place in the Universe	Earth-based and space-based astronomy reveal the structure, scale, and changes in stars, galaxies, and the universe over time.	Students know the solar system is located in an outer edge of the disc-shaped Milky Way galaxy, which spans 100,000 light years.	662 describe compare and explain the orbits of moons and planets 681 orbits of other bodies in the solar system 682 other bodies in solar system 683 orbits on bodies in solar system	

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page		Volume 2 Investigation Manual Page	
ESHS.02.b Earth Science	Earth's Place in the Universe	Earth-based and space-based astronomy reveal the structure, scale, and changes in stars, galaxies, and the universe over time.	Students know galaxies are made of billions of stars and comprise most of the visible mass of the universe.	718	general characteristics of universe—galaxies	278	general characteristics of universe
				719	features of universe as we currently understand it		
				720	characteristics of the universe		
				721	characteristics of the universe		
				724	description of galaxy as we know it		
				734	research and describe astronomical objects		
ESHS.02.c Earth Science	Earth's Place in the Universe	Earth-based and space-based astronomy reveal the structure, scale, and changes in stars, galaxies, and the universe over time.	Students know the evidence indicating that all elements with an atomic number greater than that of lithium have been formed by nuclear fusion stars.	701	evidence that elements with atomic numbers greater than lithium have been found in stars		
				728	evidence that elements with atomic number higher than lithium were made in stars		

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page		Volume 2 Investigation Manual Page	
ESHS.02.d Earth Science	Earth's Place in the Universe	Earth-based and space-based astronomy reveal the structure, scale, and changes in stars, galaxies, and the universe over time.	Students know that stars differ in their life cycles and that visual, radio, and X-ray telescopes may be used to collect data reveal those differences.	681	how astronomical instruments help us understand the universe	192	measuring apparent brightness to calculate the distance to stars and galaxies
				712	history of the telescope		
				713	types and uses of telescopes		
				716	spacecraft as tools of astronomy		
				719	how astronomical instruments helped us learn about the universe		
				724	astronomical instruments		
ESHS.02.e Earth Science	Earth's Place in the Universe	Earth-based and space-based astronomy reveal the structure, scale, and changes in stars, galaxies, and the universe over time.	Students know accelerators boost subatomic particles to energy levels that simulate conditions in the stars and in the early history of the universe before stars formed.	681	how astronomical instruments help us understand the universe	192	measuring apparent brightness to calculate the distance to stars and galaxies
				712	history of the telescope		
				713	types and uses of telescopes		
				716	spacecraft as tools of astronomy		
				719	how astronomical instruments helped us learn about the universe		
				724	astronomical instruments		

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page		Volume 2 Investigation Manual Page
ESHS.02.f Earth Science	Earth's Place in the Universe	Earth-based and space-based astronomy reveal the structure, scale, and changes in stars, galaxies, and the universe over time.	Students know the evidence indicating that the color, brightness, and evolution of a star are determined by a balance between gravitational collapse and nuclear fusion.	696	brightness of a star	
ESHS.02.g Earth Science	Earth's Place in the Universe	Earth-based and space-based astronomy reveal the structure, scale, and changes in stars, galaxies, and the universe over time.	Students know how the red-shift from distant galaxies and the cosmic background radiation provide evidence for the "big bang" model that suggests that the universe has been expanding for 10 to 20 billion years.	726 727 728 731	how doppler shift and cosmic background radiation are evidence for Big Bang evidence for Big Bang evidence for Big Bang evidence for Big Bang	

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page		Volume 2 Investigation Manual Page	
ESHS.03.a Earth Science	Dynamic Earth Processes	Plate tectonics operating over geologic time has changed the patterns of land, sea, and mountains on Earth's surface.	Students know features of the ocean floor (magnetic patterns, age, and sea-floor topography) provide evidence of plate tectonics.	67	students know that ocean floor gives evidence for plate tectonics	120	types of features found along plate boundaries
				466	structures formed at types of plate boundaries	121	three types of plate boundaries and features associated with them
				489	plate boundaries	123	structures that form at certain plate boundaries
				490	structures formed at types of plate boundaries	124	students know the structures that form at plate boundaries
				494	types of formations found at different plate boundaries	124	types of features at plate boundaries
				494	sea floor characteristics show evidence of plate tectonics	132	know what forms at different types of plate boundaries
				518	types of plate boundaries	132	students know structures that form at the three different plate boundaries

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page		Volume 2 Investigation Manual Page	
ESHS.03.b Earth Science	Dynamic Earth Processes	Plate tectonics operating over geologic time has changed the patterns of land, sea, and mountains on Earth's surface.	Students know the principal structures that form at the three different kinds of plate boundaries.	466	structures formed at types of plate boundaries	120	types of features found along plate boundaries
				490	structures formed at types of plate boundaries	121	three types of plate boundaries and features associated with them
				494	types of formations found at different plate boundaries	123	structures that form at certain plate boundaries
				518	types of plate boundaries	124	students know the structures that form at plate boundaries
					124	types of features at plate boundaries	
					132	know what forms at different types of plate boundaries	
					132	students know structures that form at the three different plate boundaries	
ESHS.03.c Earth Science	Dynamic Earth Processes	Plate tectonics operating over geologic time has changed the patterns of land, sea, and mountains on Earth's surface.	Students know how to explain the properties of rocks based on the physical and chemical conditions in which they formed, including plate tectonic processes.	69	types of rock and how they are formed	133	how rocks are formed
				466	how rocks are formed	146	types of rocks and how they are formed
				490	how rocks are formed		

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page		Volume 2 Investigation Manual Page	
ESHS.03.d Earth Science	Dynamic Earth Processes	Plate tectonics operating over geologic time has changed the patterns of land, sea, and mountains on Earth's surface.	Students know why and how earthquakes occur and the scales used to measure their intensity and magnitude.	505	relationship between seismic waves and earthquakes	122	students know why earthquakes occur
				506	earthquake scale	125	students know why earthquakes occur
						125	students know why earthquakes occur
						128	students understand how earthquakes occur
						131	students know why and how earthquakes occur and the scales used to measure their intensity
ESHS.03.e Earth Science	Dynamic Earth Processes	Plate tectonics operating over geologic time has changed the patterns of land, sea, and mountains on Earth's surface.	Students know there are two kinds of volcanoes: one kind with violent eruptions producing steep slopes and the other kind with voluminous lava flows producing gentle slopes.	511	volcanoes vary in shape and type of eruption	132	students know that there are two kinds of volcanoes
				514	shield and composite volcanoes	132	two types of volcanoes violent and gentle
						133	types of volcanoes
ESHS.03.f Earth Science	Dynamic Earth Processes	Plate tectonics operating over geologic time has changed the patterns of land, sea, and mountains on Earth's surface.	Students know the explanation for the location and properties of volcanoes that are due to hot spots and the explanation for those that are due to subduction.	508	ring of fire	123	geologic basis for earthquakes
				512	volcanoes at divergent boundaries	123	explanation for placement and properties of volcanoes
				515	source of silica-rich magma	125	students know geologic basis for earthquakes
						133	explanation of location of volcanoes

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page		Volume 2 Investigation Manual Page	
ESHS.04.a Earth Science	Energy in the Earth System	Energy enters the Earth system primarily as solar radiation and eventually escapes as heat.	Students know the relative amount of incoming solar energy compared with Earth's internal energy and the energy used by society.	251	fate of incoming solar radiation	119	model Earth
				261	fate of incoming solar radiation	120	model inner layers of Earth
				473	diagram inner Earth		
				475	diagram inner structure of Earth		
				500	diagram inner Earth		
				501	diagram inner structure of Earth		
				522	inner workings of volcano		
				671	relative amount of solar radiation		
ESHS.04.b Earth Science	Energy in the Earth System	Energy enters the Earth system primarily as solar radiation and eventually escapes as heat.	Students know the fate of incoming solar radiation in terms of reflection, absorption, and photosynthesis.	251	fate of incoming solar radiation		
				261	fate of incoming solar radiation		
ESHS.04.c Earth Science	Energy in the Earth System	Energy enters the Earth system primarily as solar radiation and eventually escapes as heat.	Students know the different atmospheric gases that absorb the Earth's thermal radiation and the mechanism and significance of the greenhouse effect.	373	greenhouse gases		
				374	how greenhouse gases work		

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page	Volume 2 Investigation Manual Page
ESHS.04.d Earth Science	Energy in the Earth System	Energy enters the Earth system primarily as solar radiation and eventually escapes as heat.	Students know the differing greenhouse conditions on Earth, Mars, and Venus; the origins of those conditions; and the climatic consequences of each.	375 greenhouse gases and the atmosphere 376 understanding global climate change 677 greenhouse conditions on Venus	
ESHS.05.a Earth Science	Energy in the Earth System	Heating of Earth's surface and atmosphere by the sun drives convection within the atmosphere and oceans, producing winds and ocean currents.	Students know how differential heating of Earth results in circulation patterns in the atmosphere and oceans that globally distribute the heat.	254 how differential heating of Earth causes air movements 255 differential heating of Earth results in circulation of air 265 differential heating of Earth leads to distribution of heat	260 global winds and ocean currents 261 exploring salinity and temperature-dependent layering 263 understanding the North Atlantic gyre 264 thermohaline currents 264 differential heating causes circulation of currents
ESHS.05.b Earth Science	Energy in the Earth System	Heating of Earth's surface and atmosphere by the sun drives convection within the atmosphere and oceans, producing winds and ocean currents.	Students know the relationship between the rotation of Earth and the circular motions of ocean currents and air in pressure centers.	254 know the relationship between rotation of Earth and the circular motion of air currents 254 Coriolis effect 255 Coriolis effect 265 Coriolis effect 269 Coriolis effect	

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page		Volume 2 Investigation Manual Page	
ESHS.05.c Earth Science	Energy in the Earth System	Heating of Earth's surface and atmosphere by the sun drives convection within the atmosphere and oceans, producing winds and ocean currents.	Students know the origin and effects of temperature inversions.	246	composition of Earth's atmosphere	50	modeling convection in Earth's atmosphere
				250	water vapor as part of the atmosphere	52	exploring sea and land breezes
				251	fate of incoming solar radiation	61	heating land and water
				253	large scale movement of air and how it affects weather		
				255	how air movement affects weather		
				256	water vapor as part of atmosphere		
				256	movement of air affects weather		
				261	fate of incoming solar radiation		
				263	large scale movement of air causes weather changes		
				264	movement of air affects weather		
				267	water vapor as part of atmosphere		
				269	movement of air affects weather		
				302	describe components of the atmosphere such as oxygen and nitrogen and water vapor		

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page	Volume 2 Investigation Manual Page
ESHS.05.d Earth Science	Energy in the Earth System	Heating of Earth's surface and atmosphere by the sun drives convection within the atmosphere and oceans, producing winds and ocean currents.	Students know properties of ocean water, such as temperature and salinity, can be used to explain the layered structure of the oceans, the generation of horizontal and vertical ocean currents, and the geographic of distribution of marine organisms.	250 effect of elevation on climate 254 how differential heating of Earth causes air movements 255 effect of latitude on climate 255 differential heating of Earth results in circulation of air 261 mountains affect climate 264 things that affect climate and weather 265 differential heating of Earth leads to distribution of heat 573 effects of climate based on warm or cold ocean currents	260 global winds and ocean currents 261 exploring salinity and temperature-dependent layering 261 differences between fresh and salty water 263 understanding the North Atlantic gyre 264 thermohaline currents 264 differential heating causes circulation of currents
ESHS.05.e Earth Science	Energy in the Earth System	Heating of Earth's surface and atmosphere by the sun drives convection within the atmosphere and oceans, producing winds and ocean currents.	Students know rain forests and deserts on Earth are distributed in bands at specific latitudes.	259 latitudes affect where biomes occur	

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page		Volume 2 Investigation Manual Page
ESHS.05.f Earth Science	Energy in the Earth System	Heating of Earth's surface and atmosphere by the sun drives convection within the atmosphere and oceans, producing winds and ocean currents.	Students know the interaction of wind patterns, ocean currents, and mountain ranges results in the global pattern of latitudinal bands of rain forests and deserts.	259	distribution of deserts and rain forests because of oceans	
ESHS.06.a Earth Science	Energy in the Earth System	Climate is the long-term average of a region's weather and depends on many factors.	Students know weather (in the short run) and climate (in the long run) involve the transfer of energy into and out of the atmosphere.	253 265 270	weather involves transfer of energy weather is due to energy transfer know weather has to do with energy transfer	61 investigate solar radiation and its effect on heating and cooling of land and water 62 modeling incoming solar radiation
ESHS.06.b Earth Science	Energy in the Earth System	Climate is the long-term average of a region's weather and depends on many factors.	Students know the effects on climate of latitude, elevation, topography, and proximity to large bodies of water and cold or warm ocean currents.	250 255 261 264 573	effect of elevation on climate effect of latitude on climate mountains affect climate things that affect climate and weather effects of climate based on warm or cold ocean currents	

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page	Volume 2 Investigation Manual Page
ESHS.06.c Earth Science	Energy in the Earth System	Climate is the long-term average of a region's weather and depends on many factors.	Students know how Earth's climate has changed over time, corresponding to changes in Earth's geography, atmospheric composition, and other factors, such as solar radiation and plate movement.	378 global climate change and you 702 compare Sun with other stars 703 compare Sun with other stars	265 climate change over time and what it would do to currents
ESHS.06.d Earth Science	Energy in the Earth System	Climate is the long-term average of a region's weather and depends on many factors.	Students know how computer models are used to predict the effects of the increase in greenhouse gases on climate for the planet as a whole and for specific regions.	251 fate of incoming solar radiation 261 fate of incoming solar radiation 373 greenhouse gases 374 how greenhouse gases work	
ESHS.07.a Earth Science	Biogeochemical Cycles	Each element on Earth moves among reservoirs, which exist in the solid earth, in oceans, in the atmosphere, and within and among organisms as part of biogeochemical cycles.	Students know the carbon cycle of photosynthesis and respiration and the nitrogen cycle.	246 nitrogen cycle 329 how special properties of carbon make the great variety of biomolecules 643 photosynthesis	90 photosynthesis 234 explain how special bonding properties of carbon make possible the great variety and complexity of biomolecules

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page		Volume 2 Investigation Manual Page	
ESHS.07.b Earth Science	Biogeochemical Cycles	Each element on Earth moves among reservoirs, which exist in the solid earth, in oceans, in the atmosphere, and within and among organisms as part of biogeochemical cycles.	Students know the global carbon cycle: the different physical and chemical forms of carbon in the atmosphere, oceans, biomass, fossil fuels, and the movement of carbon among these reservoirs.	246 436 436	nitrogen cycle effects of human activity on natural resources how human activity affects resources—renewable and nonrenewable	150 151	draw conclusions about effects of human activity on resources draw conclusions about effects of human activity on resources
ESHS.07.c Earth Science	Biogeochemical Cycles	Each element on Earth moves among reservoirs, which exist in the solid earth, in oceans, in the atmosphere, and within and among organisms as part of biogeochemical cycles.	Students know the movement of matter among reservoirs is driven by Earth's internal and external sources of energy.	671	relative amount of solar radiation	142 143	explain relationship between solar energy and precipitation and rivers and oceans understand relationship between solar energy and water cycle
ESHS.07.d Earth Science	Biogeochemical Cycles	Each element on Earth moves among reservoirs, which exist in the solid earth, in oceans, in the atmosphere, and within and among organisms as part of biogeochemical cycles.	Students know the relative residence times and flow characteristics of carbon in and out of its different reservoirs.	436 436	effects of human activity on natural resources how human activity affects resources—renewable and nonrenewable	150 151	draw conclusions about effects of human activity on resources draw conclusions about effects of human activity on resources

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page	Volume 2 Investigation Manual Page
ESHS.08.a Earth Science	Structure and Composition of the Atmosphere	Life has changed Earth's atmosphere, and changes in the atmosphere affect conditions for life.	Students know the thermal structure and chemical composition of the atmosphere.	246 composition of Earth's atmosphere 248 definition of atmospheric pressure 250 water vapor as part of the atmosphere 256 water vapor as part of atmosphere 267 water vapor as part of atmosphere 302 describe components of the atmosphere such as oxygen and nitrogen and water vapor	
ESHS.08.b Earth Science	Structure and Composition of the Atmosphere	Life has changed Earth's atmosphere, and changes in the atmosphere affect conditions for life.	Students know how the composition of Earth's atmosphere has evolved over geologic time and know the effect of outgassing, the variations of carbon dioxide concentration, and the origin of atmospheric oxygen.		265 climate change over time and what it would do to currents

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page		Volume 2 Investigation Manual Page	
ESHS.08.c Earth Science	Structure and Composition of the Atmosphere	Life has changed Earth's atmosphere, and changes in the atmosphere affect conditions for life.	Students know the location of the ozone layer in the upper atmosphere, its role in absorbing ultraviolet radiation, and the way in which this layer varies both naturally and in response to human activities.	373 374	greenhouse gases how greenhouse gases work		
ESHS.09.b Earth Science	California Geology	The geology of California underlies the state's wealth of natural resources as well as its natural hazards.	Students know the principal natural hazards in different California regions and the geologic basis of those hazards.			123 125	geologic basis for earthquakes students know geologic basis for earthquakes
ESHS.09.c Earth Science	California Geology	The geology of California underlies the state's wealth of natural resources as well as its natural hazards.	Students know the importance of water to society, the origins of California's fresh water, and the relationship between supply and need.	465 582 598	rock cycle rock cycle rock cycle	248 249 250	exploring the rock cycle modeling rock types to study rock cycle geologic transformation scenarios

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page		Volume 2 Investigation Manual Page	
InqHS.01.a High School Science	Investigation and Experimentation	Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other four strands, students should develop questions and perform investigations.	Select and use appropriate tools and technology (such as computer-linked probes, spreadsheets, and graphing calculators) to perform tests, collect data, analyze relationships, and display data.	6 13	measurement and units measurement	1 3 112 112 125 128 155 202 225 256 256 278	selecting tools of measurement precision and accuracy collect quantitative data making measurements measurements collect quantitative data collect mass and amplitude data collect quantitative data measurements collect qualitative data measurement measuring
InqHS.01.b High School Science	Investigation and Experimentation	Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other four strands, students should develop questions and perform investigations.	Identify and communicate sources of unavoidable experimental error.	36	understand sensitivity of measuring tools	3 13 23 27 134 155	precision and accuracy analysis of errors calculate percent error understand the sensitivity of a measuring tool measure densities collect mass and amplitude data

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page	Volume 2 Investigation Manual Page
InqHS.01.c High School Science	Investigation and Experimentation	Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other four strands, students should develop questions and perform investigations.	Identify possible reasons for inconsistent results, such as sources of error or uncontrolled conditions.		13 analysis of errors 23 calculate percent error

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page		Volume 2 Investigation Manual Page	
InqHS.01.d High School Science	Investigation and Experimentation	Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other four strands, students should develop questions and perform investigations.	Formulate explanations by using logic and evidence.	28	identifying cause and effect relationships	6	identify cause and effect relationships
				35	construct explanations supported by direct and indirect evidence	13	cause and effect relationships
				82	identify cause and effect relationships—real and hypothesized	13	interpreting observations
				457	interpreting observations	17	interpret observations and propose explanations
						22	explain any differences you see
						34	interpret observations
						35	construct reasonable explanations back by scientific evidence
						51	interpret observations
						52	construction reasonable explanations based on direct and indirect data
						62	interpret observations
78	build models of Na and Cl and use them to explain bonding						
84	interpret observations						
89	explanation based on data						
108	constructing explanations						
110	interpret observations and pose explanations						
114	interpreting observations						
114	interpreting observations						
115	sequencing events						
124	interpret observations						

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page	Volume 2 Investigation Manual Page
					127 interpret observations
					130 construct reasonable explanations supported by evidence
					132 construct explanations based on evidence
					133 identify cause and effect relationships
					145 interpret observations
					146 construct explanations supported by evidence
					146 identifying cause and effect relationships
					203 construct reasonable explanations based on scientific evidence
					216 interpret observations
					253 interpret observations
					255 interpret observations
					257 construct explanations supported by scientific evidence
					268 interpret observations
					280 make explanations

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page	Volume 2 Investigation Manual Page
InqHS.01.e High School Science	Investigation and Experimentation	Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other four strands, students should develop questions and perform investigations.	Solve scientific problems by using quadratic equations and simple trigonometric, exponential, and logarithmic functions.	15 calculating light year using scientific notation 104 using algebraic formulas 118 using algebraic model 133 using algebraic models 161 kinetic energy formula 170 the power equation 204 the heat equation 239 pressure and temperature relationship 395 equation for Ohm's law 614 calculating wave speeds 675 scientific notation 708 astronomic numbers expressed in scientific notation 733 converting numbers to scientific notation	195 calculating solar brightness units (SBU) from kilometers in scientific notation 201 unit canceling 218 derive a formula

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page	Volume 2 Investigation Manual Page		
InqHS.01.f High School Science	Investigation and Experimentation	Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other four strands, students should develop questions and perform investigations.	Distinguish between hypothesis and theory as scientific terms.	36	review theories based on observations	7	formulate hypothesis
				37	review scientific hypothesis based on comparison with evidence	8	make hypothesis
				38	describe steps of the scientific method	8	conducting scientific inquiry by asking questions and formulating hypotheses
				39	formulate a testable hypothesis	12	formulate a testable hypothesis
				39	critique based on evidence	13	analyze scientific hypothesis based on scientific evidence
				40	analyze hypothesis based on data	20	make a hypothesis
				49	steps of scientific method	30	formulate a testable hypothesis
				676	theories of origin of the moon	31	analyze hypothesis based on comparison with evidence
						35	analyze hypothesis based on data
						60	conduct scientific vocabulary
		85	do the data support the hypothesis				
		85	review your hypothesis				
		91	scientific inquiry				
		110	formulate testable hypothesis				
		155	plan three experiments to determine which variable affects the period of a pendulum				

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page	Volume 2 Investigation Manual Page
					155 perform self-designed experiment 171 make a hypothesis 202 formulate testable hypothesis 239 formulate testable hypothesis 240 formulate testable hypothesis 241 analyze hypothesis based on data

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page		Volume 2 Investigation Manual Page	
InqHS.01.g High School Science	Investigation and Experimentation	Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other four strands, students should develop questions and perform investigations.	Recognize the usefulness and limitations of models and theories as scientific representations of reality.	25	making graphical model from data	3	how close were predictions
				26	creating graphical model from data	11	making and evaluating a graphical model
				28	constructing graph from data	22	create a graph
				28	know that scientific knowledge can be in the form of models	24	predict what graph will look like
				29	constructing a graph	26	compare prediction to graph
				81	graphs	28	make graph from data
				82	making and evaluating graphs	34	graphical models
				104	using algebraic formulas	48	compare prediction to results
				118	using algebraic model	52	human arm model
				133	using algebraic models	53	graph mass vs. volume
				161	kinetic energy formula	62	constructing and evaluating graphical models from data
				170	the power equation	75	modeling an atom
				204	the heat equation	86	modeling a chemical bond
				239	pressure and temperature relationship	96	modeling a reaction
				395	equation for Ohm's law	113	creating and evaluating graphical model from data
				610	harmonic motion graphs	119	science is often in the form of models
				614	calculating wave speeds	137	create a solubility curve
						190	construct graphical model from data and evaluate
						201	unit canceling

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page		Volume 2 Investigation Manual Page	
					203 construct and evaluate a quantitative graphical model 218 create a graph 218 derive a formula 219 which model is supported? 230 construct graphical model from data and evaluate 240 construct and evaluate graphical models		
InqHS.01.j High School Science	Investigation and Experimentation	Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other four strands, students should develop questions and perform investigations.	Recognize the issues of statistical variability and the need for controlled tests.	40 recognizing and controlling variables in observations and experiments 41 writing lab procedures 52 variables	4 find average time 11 recognizing and controlling variables 13 recognizing controlling variables 15 design a procedure others can follow 34 recognizing and controlling variables 241 recognize and control variables		

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page		Volume 2 Investigation Manual Page
InqHS.01.k High School Science	Investigation and Experimentation	Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other four strands, students should develop questions and perform investigations.	Recognize the cumulative nature of scientific evidence.	34	recognizing that scientific knowledge is a process of learning	
				38	recognition that science is a process	
				38	evaluate how research shapes scientific knowledge	
				64	science is a process of investigation of learning about the natural world	
InqHS.01.l High School Science	Investigation and Experimentation	Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other four strands, students should develop questions and perform investigations.	Analyze situations and solve problems that require combining and applying concepts from more than one area of science.	200	flow of thermal energy is heat	90 photosynthesis
				256	cooling and heating processes	130 theory of plate tectonics
				257	processes that cause substances to gain energy	252 plate tectonics
				466	plate tectonics	253 plate tectonics
				570	processes that cause water to gain energy	
				643	photosynthesis	

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page		Volume 2 Investigation Manual Page	
InqHS.01.m High School Science	Investigation and Experimentation	Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other four strands, students should develop questions and perform investigations.	Investigate a science-based societal issue by researching the literature, analyzing data, and communicating the findings. Examples of issues include irradiation of food, cloning of animals by somatic cell nuclear transfer, choice of energy sources...	346	research economic impact of fuel cells	241	environmental impact of using different energy sources
				346	research environmental impact of fuel cells	281	solar energy can be used to generate electricity without producing pollution
				369	fossil fuels and carbon dioxide emissions		
				437	environmental impact of fossil fuel use		
				438	compare economic and environmental impacts of using different energy sources		

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page		Volume 2 Investigation Manual Page																			
InqHS.01.n High School Science	Investigation and Experimentation	Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other four strands, students should develop questions and perform investigations.	Know that when an observation does not agree with an accepted scientific theory, the observation is sometimes mistaken or fraudulent and that the theory is sometimes wrong.	457	interpreting observations	8 testing explanations against observations	13 analysis of errors	13 interpreting observations	17 interpret observations and propose explanations	23 calculate percent error	23 test your prediction	34 interpret observations	51 interpret observations	62 interpret observations	78 build models of Na and Cl and use them to explain bonding	84 interpret observations	85 perform the experiment you designed	91 testing hypothesis	110 interpret observations and pose explanations	114 interpreting observations	114 interpreting observations	124 interpret observations	127 interpret observations	145 interpret observations	155 evaluate statistical significance

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page	Volume 2 Investigation Manual Page
					155 investigate variables that affect the period of a pendulum 216 interpret observations 253 interpret observations 255 interpret observations 268 interpret observations
PhysHS.01.a Physics	Motion and Forces	Newton's law predicts the motion of most objects.	Students know how to solve problems that involve constant speed and average speed.	76 concept of speed 76 calculating speed 76 average vs instantaneous speed 78 speed 81 calculating speed 83 calculating speed 85 constant velocity 85 calculations for speed 114 compare and contrast constant and changing velocity 126 compare and contrast constant and changing velocity	19 finding speed 21 find speed of car 30 compare speeds of cars 32 calculate speed of car 38 find speed of car 205 calculate speed 207 calculate speed 208 speed calculations 231 calculate speed

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page		Volume 2 Investigation Manual Page	
PhysHS.01.b Physics	Motion and Force	Newton's law predicts the motion of most objects.	Students know that when forces are balanced, no acceleration occurs; thus an object continues to move at a constant speed or stays at rest (Newton's first law).	87	quantitative understanding of acceleration as a rate of change of velocity	33	explore Newtons' first law of motion
				98	forces needed to change motion	34	explore the effect of inertia on a cart's motion
				109	changes in motion require application of force		
				115	balanced and unbalanced forces		
				116	change in motion require force		
				117	use concepts of balanced or unbalanced forces		
				117	quantitative understanding of force changing motion		
				119	unbalanced forces cause motion		
				126	changes in motion require force		
				127	change in motion requires force		
				136	understand and use concept of balanced and unbalanced forces to create motion		
				137	balanced and unbalanced forces		

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page		Volume 2 Investigation Manual Page	
PhysHS.01.c Physics	Motion and Force	Newton's law predicts the motion of most objects.	Students know how to apply the law $F=ma$ to solve one-dimensional motion problems that involve constant forces (Newton's second law).	93	Newton's second law	33	second law of motion
				131	Newton's second law	36	qualitative understanding of Newton's third law
				132	Newton's second law—qualitative	37	Newton's second law
				132	Newton's second law—qualitative	216	Newton's second law
				132	Newton's second law—qualitative		
PhysHS.01.d Physics	Motion and Force	Newton's law predicts the motion of most objects.	Students know that when one object exerts a force on a second object, the second object always exerts a force of equal magnitude and in the opposite direction (Newton's third law).	137	Newton's third law—action and reaction	33	qualitative understanding of $F = ma$
				138	Newton's third law—qualitative	37	Newton's third law—action and reaction
				143	Newton's third law	216	Newton's third law—action and reaction

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page		Volume 2 Investigation Manual Page	
PhysHS.01.e Physics	Motion and Force	Newton's law predicts the motion of most objects.	Students know the relationship between the universal law of gravitation and the effect of gravity on an object at the surface of the Earth.	90 92 103 103 116 127 234 235 661 661 720	effect of gravity on motion projectile explained difference between weight and mass effect of gravity on objects effects of gravity difference between weight and mass qualitative understanding of the differences between weight and mass qualitative understanding of mass and weight are different weight vs. mass Newton's universal law of gravitation effect of gravity	58	mass vs weight
PhysHS.01.m Physics	Motion and Force	Newton's law predicts the motion of most objects.	Students know how to solve problems involving the forces between two electric charges at a distance (Coulomb's law) or the forces between two masses at a distance (universal gravitation).	278 284 661	Coulomb's law Coulomb's law Newton's universal law of gravitation		

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page		Volume 2 Investigation Manual Page	
PhysHS.02.a Physics	Conservation of Energy and Momentum	The laws of conservation of energy and momentum provide a way to predict and describe the movement of objects.	Students know how to calculate kinetic energy by using the formula $E=(1/2)mv^2$.	160 160 161 161 161 164 164	potential energy explained calculating potential energy potential to kinetic energy conversions kinetic energy explained calculating kinetic energy potential to kinetic energy conversions law of conservation of energy	39 42 217 217 219	investigate energy changes with energy car system exploring energy and work in the energy car system potential and kinetic energy compare potential and kinetic energy of car conservation of energy
PhysHS.02.c Physics	Conservation of Energy and Momentum	The laws of conservation of energy and momentum provide a way to predict and describe the movement of objects.	Students know how to solve problems involving conservation of energy in simple systems, such as falling objects.	160 161 164 166	potential energy explained kinetic energy explained law of conservation of energy conservation of energy in a broader context	39 217 219 224	energy in a system potential and kinetic energy conservation of energy conservation of energy
PhysHS.02.e Physics	Conservation of Energy and Momentum	The laws of conservation of energy and momentum provide a way to predict and describe the movement of objects.	Students know momentum is separately conserved quantity different from energy.	140 140	collisions explained momentum	213 215	investigate collisions relate collisions to action/reaction forces

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page		Volume 2 Investigation Manual Page	
PhysHS.02.f Physics	Conservation of Energy and Momentum	The laws of conservation of energy and momentum provide a way to predict and describe the movement of objects.	Students know an unbalanced force on an object produces a change in its momentum.	115	balanced and unbalanced forces		
				117	use concepts of balanced or unbalanced forces		
				119	unbalanced forces cause motion		
				136	understand and use concept of balanced and unbalanced forces to create motion		
				137	balanced and unbalanced forces		
PhysHS.03.a Physics	Heat and Thermodynamics	Energy cannot be created or destroyed although in many processes energy is transferred to the environment as heat.	Students know heat flow and work are two forms of energy transfer between systems.	108	friction as a source of energy dissipation	50	movement of heat—convection
				109	friction as a source of energy dissipation	51	convection
				112	friction	51	convection
				201	heat and work	61	heat transfer through radiation
				206	heat conduction		
				208	natural and forced convection		
				209	thermal radiation		
				210	apply knowledge of heat transfer to different situations		
				251	change in temperature is evidence of energy transfer		
				436	conversion of energy from one form to another		

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page	Volume 2 Investigation Manual Page
PhysHS.03.c Physics	Heat and Thermodynamics	Energy cannot be created or destroyed although in many processes energy is transferred to the environment as heat.	Students know the internal energy of an object includes the energy of random motion of the object's atoms and molecules, often referred to as thermal energy. The greater the temperature of the object energy of motion of the atoms and molecules...	200 understanding the difference between heat and temperature 200 flow of thermal energy is heat 201 heat and work 202 specific heat explained 203 specific heat 251 change in temperature is evidence of energy transfer 256 cooling and heating processes 257 processes that cause substances to gain energy 570 processes that cause water to gain energy	49 concept of specific heat 61 investigations that develop idea of specific heat 223 investigate specific heat 224 specific heat
PhysHS.03.g Physics	Heat and Thermodynamics	Energy cannot be created or destroyed although in many processes energy is transferred to the environment as heat.	Students know how to solve problems involving heat flow, work, and efficiency in a heat engine and know that all real engines lose some heat to their surroundings.	152 calculating work 168 efficiency explained 170 calculating power 170 maximum power output of a person	40 investigating work done on energy car 217 energy exchange and efficiency 218 energy conservation and efficiency 282 calculate the power output of a photovoltaic cell

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page		Volume 2 Investigation Manual Page	
PhysHS.04.a Physics	Waves	Waves have characteristic properties that do not depend on the type of wave.	Students know waves carry energy from one place to another.	613	waves transmit energy		
PhysHS.04.b Physics	Waves	Waves have characteristic properties that do not depend on the type of wave.	Students know how to identify transverse and longitudinal waves in mechanical media, such as springs and ropes, and on the earth (seismic waves).	617 617	transverse waves longitudinal waves	159 159	categorize waves by how they move making circular waves in a ripple tank
PhysHS.04.c Physics	Waves	Waves have characteristic properties that do not depend on the type of wave.	Students know how to solve problems involving wavelength, frequency, and wave speed.	613 624 626	frequency and amplitude and wavelength of waves wavelength of sound wavelength and frequency	157 158	wavelength and frequency and speed of waves wavelength and frequency and speed of waves
PhysHS.04.d Physics	Waves	Waves have characteristic properties that do not depend on the type of wave.	Students know sound is a longitudinal wave whose speed depends on the properties of the medium in which it propagates.	623	speed of sound	157 158 205	wave as oscillation in a medium wave as oscillation in a medium concept of a medium in terms of supporting waves

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page	Volume 2 Investigation Manual Page
PhysHS.04.e Physics	Waves	Waves have characteristic properties that do not depend on the type of wave.	Students know radio waves, light, and X-rays are different wavelength bands in the spectrum of electromagnetic waves whose speed in a vacuum is approximately 3×10^8 m/s (186,000 miles/second).	632 speed of light 635 nature of light in terms of waves and energy info flow 636 electromagnetic spectrum 636 properties of electromagnetic waves with different wavelengths	
PhysHS.04.f Physics	Waves	Waves have characteristic properties that do not depend on the type of wave.	Students know how to identify the characteristic properties of waves: interference (beats), diffraction, refraction, Doppler effect, and polarization.	67 reflection of sound 616 refracted waves 616 reflected waves 618 destructive interference 626 Doppler effect 646 absorption 646 refraction 725 the Doppler effect	158 reflection 205 waves in different materials 207 transmission of waves in water 228 reflection of waves 228 Doppler effect 229 interference 229 Doppler effect

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page		Volume 2 Investigation Manual Page	
PhysHS.05.a Physics	Electric and Magnetic Phenomena	Electric and magnetic phenomena are related and have many practical applications.	Students know how to predict the voltage or current in simple direct current(DC) electric circuits constructed from batteries, wires, resistors, and capacitors.	268	electrical potential causes lightning	98	construct simple circuits
				385	electric circuits	99	circuit diagrams
				385	examples of electric circuits in nature	99	series circuit
				386	circuit diagrams	99	simple circuits
				387	open and closed circuits	100	explore the concept of voltage
				387	battery circuits	245	build a parallel circuit
				390	how batteries work		
				390	understanding voltage		
				401	series circuits		
				404	voltage in a series circuit		
				407	parallel circuits		
				408	voltage in a parallel circuit		
				409	understanding short circuits		
				409	parallel circuits in homes		
				PhysHS.05.b Physics	Electric and Magnetic Phenomena	Electric and magnetic phenomena are related and have many practical applications.	Students know how to solve problems involving Ohm's law.
405	Ohm's law and voltage drops						

Correlation to California Science Content Standards
Foundations of Physical Science with Earth and Space Science
Student Text and Investigation Manual

Standard #: Subject	Topic	Standard	Benchmark	Volume 1 Student Text Page		Volume 2 Investigation Manual Page	
PhysHS.05.c Physics	Electric and Magnetic Phenomena	Electric and magnetic phenomena are related and have many practical applications.	Students know any resistive element in a DC circuit dissipates energy, which heats the resistor. Students can calculate the power (rate of energy dissipation) in any resistive circuit element by using the formula $P = IR$.	386	resistors	102	apply the concept of electrical resistance
				393	understanding electrical resistance		
				394	measuring resistance		
				397	resistance of common objects		
				402	resistance in a series circuit		
				434	direct current		