

Publisher:	Glencoe/McGraw-Hill
Program Title:	© 2002 Chemistry: Matter and Change
Components:	Student Edition/Teacher's Wraparound Edition
Grade Level(s):	9th - 12th Grade
Intended Audience:	Science 9th-12th Grade Standards Map for the Discipline CHEMISTRY

**Standards Map - Basic Comprehensive Program
Grades Nine Through Twelve - Science**

Pursuant to the State Board approved, *Science Content Standards for California Public Schools, Kindergarten Through Grade Twelve*
Standards that all students are expected to achieve in the course of their studies are unmarked.
Standards that all students should have the opportunity to learn are marked with an asterisk (*).

Grade	Standard #	Text of Standard	PUBLISHER CITATIONS**			Meets Standard		FOR LEA USE ONLY Local Education Agency Evaluator Notes
			Introduced	Practiced	Taught to Mastery	Y	N	
DISCIPLINE		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. As a basis for understanding this concept:	SE/TWE: 92-99, 102-104, 123-134, 136-139, 140-141, 155-158, 167-169 TWE: 94, 137, 182	SE/TWE: 99, 113, 124, 130, 139, 141, 142-143, 162, 165, 174, 175, 186, 281 TWE: 97, 123, 128, 133, 167, 169, 212	SE/TWE: 92-99, 102-104, 123-124, 127-134, 159-162, 163-169, 197, 201, 815 TWE: 93, 95, 136-137			
9-12	1a	Students know how to relate the position of an element in the periodic table to its atomic number and atomic mass.	SE/TWE: 98-99, 102-104	SE/TWE: 99, 113	SE/TWE: 98-99, 102-104			
9-12	1b	Students know how to use the periodic table to identify metals, semimetals, non-metals, and halogens.	SE/TWE: 155-158, 194-195	SE/TWE: 158, 196 TWE: 186, 281	SE/TWE: 158, 196			

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9-12	1c	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.	SE/TWE: 155-158, 163-169	SE/TWE: 165, 175 TWE: 167	SE/TWE: 163-169			
9-12	1d	Students know how to use the periodic table to determine the number of electrons available for bonding.	SE/TWE: 140-141	SE/TWE: 141, 162, 174 TWE: 212	SE/TWE: 159-162			
9-12	1e	Students know the nucleus of the atom is much smaller than the atom yet contains most of its mass.	SE/TWE: 95	SE/TWE: 97	SE/TWE: 97			
9-12	1f*	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.	SE/TWE: 156-158	SE/TWE: 197, 201, 815	SE/TWE: 197, 201, 815			
9-12	1g*	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.	SE/TWE: 136-139, 167-168 TWE: 166, 182	SE/TWE: 139, 162 TWE: 169	SE/TWE: 159-162			
9-12	1h*	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.	SE/TWE: 92, 97, 123-124 TWE: 94	SE/TWE: 124 TWE: 97, 123	SE/TWE: 92-97, 123-124 TWE: 93, 95			
9-12	1i*	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.	SE/TWE: 127-134	SE/TWE: 130 TWE: 133	SE/TWE: 127-134			
9-12	1j*	Students know that spectral lines are the result 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 ($E = hv$).	SE/TWE: 125-126 TWE: 136-137	SE/TWE: 130, 142-143 TWE: 128	SE/TWE: 127-128 TWE: 136-137			

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		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. As a basis for understanding this concept:	SE/TWE: 58, 59, 140-141, 167-169, 215-218, 228-229, 241-247, 259-262, 264-266 TWE: 243, 248-249	SE/TWE: 141, 217, 232-233, 236, 244, 255, 258, 261, 262, 267, 273 TWE: 245, 247, 254, 263, 265, 397	SE/TWE: 215-217, 228-229, 241-247, 252-258, 259-266, 393-399 TWE: 231, 243, 257, 260, 394			
9-12	2a	Students know atoms combine to form molecules by sharing electrons to form covalent or metallic bonds or by exchanging electrons to form ionic bonds.	SE/TWE: 215-217, 228-229, 241-247 TWE: 248-249	SE/TWE: 217, 232-233, 236 TWE: 247	SE/TWE: 215-217, 228-229, 241-247 TWE: 231, 243			
9-12	2b	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.	SE/TWE: 242-246, 266 TWE: 243	SE/TWE: 247 TWE: 245, 263	SE/TWE: 247 TWE: 243			
9-12	2c	Students know salt crystals, such as NaCl, are repeating patterns of positive and negative ions held together by electrostatic attraction.	SE/TWE: 217-218	SE/TWE: 220	SE/TWE: 220			
9-12	2d	Students know the atoms and molecules in liquids move in a random pattern relative to one another because the intermolecular forces are too weak to hold the atoms or molecules in a solid form.	SE/TWE: 58, 59	TWE: 397	SE/TWE: 396-399			
9-12	2e	Students know how to draw Lewis dot structures.	SE/TWE: 140-141	SE/TWE: 141, 244, 255, 258, 273 TWE: 245, 254	SE/TWE: 243-244, 252-258 TWE: 257			
9-12	2f*	Students know how to predict the shape of simple molecules and their polarity from Lewis dot structures.	SE/TWE: 259-262, 264-266	SE/TWE: 261, 262 TWE: 265	SE/TWE: 259-262, 264-266 TWE: 260			
9-12	2g*	Students know how electronegativity and ionization energy relate to bond formation.	SE/TWE: 167-169	TWE: 263	SE/TWE: 263-266			

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9-12	2h*	Students know how to identify solids and liquids held together by Van der Waals forces or hydrogen bonding and relate these forces to volatility and boiling/melting point temperatures.	SE/TWE: 266	SE/TWE: 267	SE/TWE: 393-395 TWE: 394			
		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. As a basis for understanding this concept:	SE/TWE: 278-283, 309, 310, 313-319, 322-327, 361-363, 370-373, 436-437, 635-643, 644-649 TWE: 282, 315, 370	SE/TWE: 282, 289, 294, 296, 311, 312, 314, 316, 318, 362, 372, 375, 380, 381, 437, 635, 646, 647, 649, 654-655, 658-659 TWE: 283, 287, 293, 317, 322, 323, 360, 363, 648	SE/TWE: 284-291, 292-299, 311, 313-319, 322-327, 361-363, 370-373, 436-437, 643, 644-649, 650-653, 758-659 TWE: 759 TWE: 286, 310, 312, 316, 371, 652, 653, 758			
9-12	3a	Students know how to describe chemical reactions by writing balanced equations.	SE/TWE: 278-283 TWE: 282	SE/TWE: 282, 289, 294, 296 TWE: 283, 287, 293	SE/TWE: 284-291, 292-299 TWE: 286			
9-12	3b	Students know the quantity one mole is set by defining one mole of carbon 12 atoms to have a mass of exactly 12 grams.	SE/TWE: 310	SE/TWE: 312	SE/TWE: 312			
9-12	3c	Students know one mole equals 6.02×10^{23} particles (atoms or molecules).	SE/TWE: 309, 310	SE/TWE: 311, 312	SE/TWE: 311 TWE: 310, 312			
9-12	3d	Students know how to determine the molar mass of a molecule from its chemical formula and a table of atomic masses and how to convert the mass of a molecular substance to moles, number of particles, or volume of gas at standard temperature and pressure.	SE/TWE: 313-319, 322-327, 436-437 TWE: 315	SE/TWE: 314, 316, 318, 437 TWE: 317, 322, 323	SE/TWE: 313-319, 322-327, 436-437 TWE: 316			

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9-12	3e	Students know how to calculate the masses of reactants and products in a chemical reaction from the mass of one of the reactants or products and the relevant atomic masses.	SE/TWE: 361-363	SE/TWE: 362, 380 TWE: 360, 363	SE/TWE: 361-363			
9-12	3f*	Students know how to calculate percent yield in a chemical reaction.	SE/TWE: 370-373 TWE: 370	SE/TWE: 372, 375, 381 TWE: 373	SE/TWE: 370-373 TWE: 371			
9-12	3g*	Students know how to identify reactions that involve oxidation and reduction and how to balance oxidation-reduction reactions.	SE/TWE: 635-643, 644-649	SE/TWE: 635, 646, 647, 649, 654-655, 658-659 TWE: 648	SE/TWE: 635-643, 644-649, 650-653, 758-759 TWE: 652, 758			
		Gases and their Properties The kinetic molecular theory describes the motion of atoms and molecules and explains the properties of gases. As a basis for understanding this concept:	SE/TWE: 30, 385-386, 387, 388, 391-392, 421-427, 428-430, 431, 434-438 TWE: 420, 435	SE/TWE: 388, 392, 415, 422, 425, 427, 430, 437, 438, 444-445, 448-449 TWE: 30, 387, 391	SE/TWE: 30, 387-388, 391-392, 419-420, 421-427, 428-430, 434-438 TWE: 426, 439			
9-12	4a	Students know the random motion of molecules and their collisions with a surface create the observable pressure on that surface.	SE/TWE: 388-389	SE/TWE: 392 TWE: 388	SE/TWE: 392 TWE: 388			
9-12	4b	Students know the random motion of molecules explains the diffusion of gases.	SE/TWE: 387	TWE: 388	TWE: 388			
9-12	4c	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.	SE/TWE: 421-427, 428-430 TWE: 420	SE/TWE: 422, 425, 427, 430, 448-449	SE/TWE: 421-427, 428-430 TWE: 426			
9-12	4d	Students know the values and meanings of standard temperature and pressure (STP).	SE/TWE: 431	SE/TWE: 433	SE/TWE: 433			
9-12	4e	Students know how to convert between the Celsius and Kelvin temperature scales.	SE/TWE: 30	SE/TWE: 425, 427, 430 TWE: 30	SE/TWE: 30, 424-426, 429			

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						Y	N	
9-12	4f	Students know there is no temperature lower than 0 Kelvin.	SE/TWE: 423-424	SE/TWE: 425	SE/TWE: 425			
9-12	4g*	Students know the kinetic theory of gases relates the absolute temperature of a gas to the average kinetic energy of its molecules or atoms.	SE/TWE: 385-386	TWE: 391	SE/TWE: 419-420, 423			
9-12	4h*	Students know how to solve problems by using the ideal gas law in the form $PV = nRT$.	SE/TWE: 434-438 TWE: 435	SE/TWE: 437, 438, 444-445, 449	SE/TWE: 434-438 TWE: 439			
9-12	4i*	Students know how to apply Dalton's law of partial pressures to describe the composition of gases and Graham's law to predict diffusion of gases.	SE/TWE: 387-388, 391-392	SE/TWE: 388, 392, 415 TWE: 387	SE/TWE: 387-388, 391-392			
		Acids and Bases Acids, bases, and salts are three classes of compounds that form ions in water solutions. As a basis for understanding this concept:	SE/TWE: 595-596, 597, 598-599, 602-604, 606, 610-611, 621-625 TWE: 600, 622-623	SE/TWE: 599, 601, 604, 624, 630, 611, 631 TWE: 594	SE/TWE: 595-599, 601, 602-604, 606, 610-611, 614, 621-625 TWE: 605, 612, 615			
9-12	5a	Students know the observable properties of acids, bases, and salt solutions.	SE/TWE: 595-596, 621-622, 629	SE/TWE: 601 TWE: 594	SE/TWE: 595-596, 601, 621-622			

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						Y	N	
9-12	5b	Students know acids are hydrogen-ion-donating and bases are hydrogen-ion-accepting substances.	SE/TWE: 598-599	SE/TWE: 599	SE/TWE: 598-599			
9-12	5c	Students know strong acids and bases fully dissociate and weak acids and bases partially dissociate.	SE/TWE: 602-604, 606	SE/TWE: 604	SE/TWE: 602-604, 606 TWE: 605			
9-12	5d	Students know how to use the pH scale to characterize acid and base solutions.	SE/TWE: 610-611, 629	TWE: 611, 612	SE/TWE: 610-611 TWE: 612			
9-12	5e*	Students know the Arrhenius, Brønsted-Lowry, and Lewis acid–base definitions.	SE/TWE: 597-599 TWE: 600	SE/TWE: 630 TWE: 600	SE/TWE: 597-599, 630			
9-12	5f*	Students know how to calculate pH from the hydrogen-ion concentration.	SE/TWE: 610-611	SE/TWE: 611, 631	SE/TWE: 610-611, 614 TWE: 615			
9-12	5g*	Students know buffers stabilize pH in acid–base reactions.	SE/TWE: 622-625 TWE: 622-623	SE/TWE: 624	SE/TWE: 622-625			
		Solutions Solutions are homogenous mixtures of two or more substances. As a basis for understanding this concept:	SE/TWE: 69, 453-454, 455-456, 458-470, 472-475 TWE: 459, 468	SE/TWE: 68, 268-269, 461, 463, 464, 465, 466, 473, 475, 484-485 TWE: 467, 469	SE/TWE: 455-456, 458-470, 472-475, 484 TWE: 457			
9-12	6a	Students know the definitions of solute and solvent.	SE/TWE: 453-454	SE/TWE: 484 TWE: 461	SE/TWE: 484 TWE: 461			
9-12	6b	Students know how to describe the dissolving process at the molecular level by using the concept of random molecular motion.	SE/TWE: 455-456 TWE: 455		SE/TWE: 455-456, 458			
9-12	6c	Students know temperature, pressure, and surface area affect the dissolving process.	SE/TWE: 456, 458-461 TWE: 459	SE/TWE: 461, 484	SE/TWE: 458-461 TWE: 457			

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						Y	N	
9-12	6d	Students know how to calculate the concentration of a solute in terms of grams per liter, molarity, parts per million, and percent composition.	SE/TWE: 462-470 TWE: 468	SE/TWE: 463, 464, 465, 466, 484-485 TWE: 467, 469	SE/TWE: 462-470			
9-12	6e*	Students know the relationship between the molality of a solute in a solution and the solution's depressed freezing point or elevated boiling point.	SE/TWE: 472-475	SE/TWE: 473, 475, 485	SE/TWE: 472-475			
9-12	6f*	Students know how molecules in a solution are separated or purified by the methods of chromatography and distillation.	SE/TWE: 69	SE/TWE: 68, 268-269	SE/TWE: 68, 269			
		Chemical Thermodynamics Energy is exchanged or transformed in all chemical reactions and physical changes of matter. As a basis for understanding this concept:	SE/TWE: 247, 386, 404-408, 492-495, 502-505, 506-508, 517-519 TWE: 406, 492-493	SE/TWE: 410-411, 453, 489, 495, 503, 504, 505, 508, 519, 520-521, 525, 526 TWE: 406, 499, 517	SE/TWE: 404-408, 492-495, 496-498, 498-500, 502-508, 517-519 TWE: 505			
9-12	7a	Students know how to describe temperature and heat flow in terms of the motion of molecules (or atoms).	SE/TWE: 386, 404-408 TWE: 406	SE/TWE: 410-411	SE/TWE: 404-408			
9-12	7b	Students know chemical processes can either release (exothermic) or absorb (endothermic) thermal energy.	SE/TWE: 247 TWE: 492-493	SE/TWE: 453, 489, 520-521 TWE: 499	SE/TWE: 498-500			

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						Y	N	
9-12	7c	Students know energy is released when a material condenses or freezes and is absorbed when a material evaporates or melts.	SE/TWE: 404-408	SE/TWE: 503, 505 TWE: 406	SE/TWE: 404-408, 502-503 TWE: 505			
9-12	7d	Students know how to solve problems involving heat flow and temperature changes, using known values of specific heat and latent heat of phase change.	SE/TWE: 492-495, 502-505	SE/TWE: 495, 503, 504, 505, 520-521, 525	SE/TWE: 492-495, 496-498, 502-505			
9-12	7e*	Students know how to apply Hess's law to calculate enthalpy change in a reaction.	SE/TWE: 506-508	SE/TWE: 508, 525	SE/TWE: 506-508			
9-12	7f*	Students know how to use the Gibbs free energy equation to determine whether a reaction would be spontaneous.	SE/TWE: 517-519	SE/TWE: 519, 526 TWE: 517	SE/TWE: 517-519			
		Reaction Rates Chemical reaction rates depend on factors that influence the frequency of collision of reactant molecules. As a basis for understanding this concept:	SE/TWE: 529-531, 533-534, 536-538, 539-541 TWE: 536-537	SE/TWE: 531, 539, 550-551, 555 TWE: 531, 534, 541	SE/TWE: 529-531, 533-534, 536-538, 539-541, 778-779			
9-12	8a	Students know the rate of reaction is the decrease in concentration of reactants or the increase in concentration of products with time.	SE/TWE: 529-531	SE/TWE: 531, 555	SE/TWE: 529-531			
9-12	8b	Students know how reaction rates depend on such factors as concentration, temperature, and pressure.	SE/TWE: 536-538 TWE: 537	SE/TWE: 539, 550-551 TWE: 541	SE/TWE: 536-538			
9-12	8c	Students know the role a catalyst plays in increasing the reaction rate.	SE/TWE: 539-541, 553	SE/TWE: 541, 554	SE/TWE: 539-541, 554, 778-779			
9-12	8d*	Students know the definition and role of activation energy in a chemical reaction.	SE/TWE: 533-534, 553	SE/TWE: 533, 554 TWE: 534	SE/TWE: 533-534, 554			

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		Chemical Equilibrium Chemical equilibrium is a dynamic process at the molecular level. As a basis for understanding this concept:	SE/TWE: 561-568, 569-574 TWE: 571	SE/TWE: 565, 567, 568, 599, 573, 591 TWE: 566, 574	SE/TWE: 561-568, 569-574, 584-585, 588			
9-12	9a	Students know how to use LeChatelier's principle to predict the effect of changes in concentration, temperature, and pressure.	SE/TWE: 569-574 TWE: 571	SE/TWE: 573, 591 TWE: 574	SE/TWE: 569-574, 584-585, 588			
9-12	9b	Students know equilibrium is established when forward and reverse reaction rates are equal.	SE/TWE: 561-563, 589	SE/TWE: 590 TWE: 561, 561	SE/TWE: 561-563, 590			
9-12	9c*	Students know how to write and calculate an equilibrium constant expression for a reaction.	SE/TWE: 563-568	SE/TWE: 565, 567, 568, 591 TWE: 566	SE/TWE: 563-568			
		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. As a basis for understanding this concept:	SE/TWE: 244, 245, 699-705, 711-715, 723-724, 743-746, 747-751, 761-764, 775-778 TWE: 697, 762-763	SE/TWE: 705, 714, 732-734, 737, 746, 751, 753, 771 TWE: 245, 701, 724, 764	SE/TWE: 698-705, 706, 710, 711-715, 717-718, 722-724, 737-738, 743-746, 747-751, 761-764, 775-778			
9-12	10a	Students know large molecules (polymers), such as proteins, nucleic acids, and starch, are formed by repetitive combinations of simple subunits.	SE/TWE: 761-764 TWE: 762-763	SE/TWE: 771 TWE: 764	SE/TWE: 761-764			
9-12	10b	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.	SE/TWE: 244, 245 TWE: 697	SE/TWE: 737 TWE: 245, 701	SE/TWE: 698-701, 706, 710, 717-718, 722-723, 737-738, 762-764			
9-12	10c	Students know amino acids are the building blocks of proteins.	SE/TWE: 775-776, 799	SE/TWE: 780, 800	SE/TWE: 775-776, 777, 800			

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9-12	10d*	Students know the system for naming the ten simplest linear hydrocarbons and isomers that contain single bonds, simple hydrocarbons with double and triple bonds, and simple molecules that contain a benzene ring.	SE/TWE: 699-705, 711-715, 723-724	SE/TWE: 705, 714, 732-734 TWE: 724	SE/TWE: 699-705, 711-715, 723-724			
9-12	10e*	Students know how to identify the functional groups that form the basis of alcohols, ketones, ethers, amines, esters, aldehydes, and organic acids.	SE/TWE: 743-746, 747-751	SE/TWE: 746, 751, 753	SE/TWE: 743-746, 747-751			
9-12	10f*	Students know the R-group structure of amino acids and know how they combine to form the polypeptide backbone structure of proteins.	SE/TWE: 776-778, 799	TWE: 780	SE/TWE: 776-778 TWE: 780			
		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. As a basis for understanding this concept:	SE/TWE: 97, 105-107, 808-809, 810, 817-819, 821-822 TWE: 100	SE/TWE: 814, 819, 837 TWE: 809, 820, 821	SE/TWE: 807-809, 810-811, 813-814, 817-819, 829-831			
9-12	11a	Students know protons and neutrons in the nucleus are held together by nuclear forces that overcome the electromagnetic repulsion between the protons.	SE/TWE: 810	SE/TWE: 814, 836	SE/TWE: 814, 836			
9-12	11b	Students know the energy release per gram of material is much larger in nuclear fusion or fission reactions than in chemical reactions. The change in mass (calculated by $E = mc^2$) is small but significant in nuclear reactions.	SE/TWE: 821-822, 826, 835	SE/TWE: 826 TWE: 821	SE/TWE: 826 TWE: 821			
9-12	11c	Students know some naturally occurring isotopes of elements are radioactive, as are isotopes formed in nuclear reactions.	SE/TWE: 105-106 TWE: 100	SE/TWE: 814	SE/TWE: 810-811, 814			
9-12	11d	Students know the three most common forms of radioactive decay (alpha, beta, and gamma) and know how the nucleus changes in each type of decay.	SE/TWE: 106-107	SE/TWE: 814, 837 TWE: 809	SE/TWE: 807-809, 813-814			
9-12	11e	Students know alpha, beta, and gamma radiation produce different amounts and kinds of damage in matter and have different penetrations.	SE/TWE: 808-809	SE/TWE: 809, 380, 831	SE/TWE: 809, 829-831			

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9-12	11f*	Students know how to calculate the amount of a radioactive substance remaining after an integral number of half lives have passed.	SE/TWE: 817-819	SE/TWE: 819, 837 TWE: 820	SE/TWE: 817-819			
9-12	11g*	Students know protons and neutrons have substructures and consist of particles called quarks.	SE/TWE: 97					
DISCIPLINE	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 their own questions and perform investigations. Students will:	SE/TWE: 18-19, 46-47, 78-79, 108-109, 142-143, 170-171, 202-203, 232-233, 268-269, 300-301, 342-343, 374-375, 410-411, 444-445, 480-481, 520-521, 550-551, 586-587, 626-627, 654-655, 688-689, 728-729, 766-767, 796-797, 832-833, 862-863	SE/TWE: 18-19, 46-47, 78-79, 108-109, 142-143, 170-171, 202-203, 232-233, 268-269, 300-301, 342-343, 374-375, 410-411, 444-445, 480-481, 520-521, 550-551, 586-587, 626-627, 654-655, 688-689, 728-729, 766-767, 796-797, 832-833, 862-863	SE/TWE: 19, 47, 79, 109, 143, 203, 233, 269, 301, 343, 375, 411, 445, 481, 521, 551, 587, 627, 655, 689, 729, 767, 797, 833, 863			

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			Introduced	Practiced	Taught to Mastery	Y	N	Local Education Agency Evaluator Notes
9-12	1a	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.	SE/TWE: 18-19, 46-47, 78-79, 108-109, 142-143, 170-171, 202-203, 232-233, 268-269, 300-301, 342-343, 374-375, 410-411, 444-445, 480-481, 520-521, 550-551, 586-587, 626-627, 654-655, 688-689, 728-729, 766-767, 796-797, 832-833, 862-863	SE/TWE: 18-19, 46-47, 78-79, 108-109, 142-143, 170-171, 202-203, 232-233, 268-269, 300-301, 342-343, 374-375, 410-411, 444-445, 480-481, 520-521, 550-551, 586-587, 626-627, 654-655, 688-689, 728-729, 766-767, 796-797, 832-833, 862-863	SE/TWE: 19, 47, 79, 109, 143, 171, 203, 233, 269, 301, 343, 375, 411, 445, 481, 521, 551, 587, 627, 655, 689, 729, 767, 797, 833, 863			

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Grade	Standard #	Text of Standard	Introduced	Practiced	Taught to Mastery	Y	N	Local Education Agency Evaluator Notes
9-12	1b	Identify and communicate sources of unavoidable experimental error.	SE/TWE: 46, 47, 108-109, 202-203, 232-233, 268-269, 300-301, 342-343, 374-375, 410-411, 444-445, 480-481, 520-521, 550-551, 586-587, 626-627, 654-655, 688-689, 728-729, 766-767, 796-797, 832-833, 862-863	SE/TWE: 47, 109, 203, 233, 269, 301, 343, 375, 411, 445, 481, 521, 551, 587, 627, 655, 689, 729, 767, 797, 833, 863	SE/TWE: 47, 109, 203, 233, 269, 301, 343, 375, 411, 445, 481, 521, 551, 587, 627, 655, 689, 729, 767, 797, 833, 863			

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			Introduced	Practiced	Taught to Mastery	Y	N	
9-12	1c	Identify possible reasons for inconsistent results, such as sources of error or uncontrolled conditions.	SE/TWE: 46, 47, 108-109, 202-203, 232-233, 268-269, 300-301, 342-343, 374-375, 410-411, 444-445, 480-481, 520-521, 550-551, 586-587, 626-627, 654-655, 688-689, 728-729, 766-767, 796-797, 832-833, 862-863	SE/TWE: 47, 109, 203, 233, 269, 301, 343, 375, 411, 445, 481, 521, 551, 587, 627, 655, 689, 729, 767, 797, 833, 863	SE/TWE: 47, 109, 203, 233, 269, 301, 343, 375, 411, 445, 481, 521, 551, 587, 627, 655, 689, 729, 767, 797, 833, 863			
9-12	1d	Formulate explanations by using logic and evidence.	SE/TWE: 8, 44, 60, 96, 130, 155, 191, 219, 267, 288, 314, 372, 390, 424, 478, 503, 533, 583, 624, 647, 679, 720, 757, 790, 830, 860	SE/TWE: 8, 44, 60, 96, 130, 155, 191, 219, 267, 288, 314, 372, 390, 424, 478, 503, 533, 583, 624, 647, 679, 720, 757, 790, 830, 860	SE/TWE: 8, 44, 60, 96, 130, 155, 191, 219, 267, 288, 314, 372, 390, 424, 478, 503, 533, 583, 624, 647, 679, 720, 757, 790, 830, 860			
9-12	1e	Solve scientific problems by using quadratic equations and simple trigonometric, exponential, and logarithmic functions.	SE/TWE: 43, 45, 614-616, 802, 817-818, 903-907, 910-911	SE/TWE: 45, 616, 802, 819, 907, 911	SE/TWE: 45, 616, 802, 819, 907, 911			

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Grade	Standard #	Text of Standard	Introduced	Practiced	Taught to Mastery	Meets Standard		Local Education Agency Evaluator Notes
						Y	N	
9-12	1f	Distinguish between hypothesis and theory as scientific terms.	SE/TWE: 11, 13, 21, 87-91, 957, 962	SE/TWE: 13, 15, 23, 52, 91 TWE: 90	SE/TWE: 13, 15, 23, 91			
9-12	1g	Recognize the usefulness and limitations of models and theories as scientific representations of reality.	SE/TWE: 8, 13, 21, 48, 144, 172, 204, 270, 302, 376, 522, 552, 628, 656, 699, 864, 958, 962	SE/TWE: 8, 22, 48, 144, 172, 204, 270, 302, 376, 522, 552, 628, 656, 864 TWE: 189, 386	SE/TWE: 8, 22, 48, 144, 172, 204, 270, 302, 376, 522, 552, 628, 656, 864 TWE: 189, 386			
9-12	1h	Read and interpret topographic and geologic maps.	SE/TWE: 834	SE/TWE: 834	SE/TWE: 834			

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			Introduced	Practiced	Taught to Mastery	Y	N	
9-12	1i	Analyze the locations, sequences, or time intervals that are characteristic of natural phenomena (e.g., relative ages of rocks, locations of planets over time, and succession of species in an ecosystem).	SE/TWE: 810-814, 855-857, 858-861, 865	SE/TWE: 814, 857, 861	SE/TWE: 814, 857, 861			
9-12	1j	Recognize the issues of statistical variability and the need for controlled tests.	SE/TWE: 46, 47, 108-109, 202-203, 232-233, 268-269, 300-301, 342-343, 374-375, 410-411, 444-445, 480-481, 520-521, 550-551, 586-587, 626-627, 654-655, 688-689, 728-729, 766-767, 796-797, 832-833, 862-863	SE/TWE: 47, 109, 203, 233, 269, 301, 343, 375, 411, 445, 481, 521, 551, 587, 627, 655, 689, 729, 767, 797, 833, 863	SE/TWE: 47, 109, 203, 233, 269, 301, 343, 375, 411, 445, 481, 521, 551, 587, 627, 655, 689, 729, 767, 797, 833, 863			
9-12	1k	Recognize the cumulative nature of scientific evidence.	SE/TWE: 87, 91, 151-153, 434, 806-807, 835	SE/TWE: 91, 158, 809, TWE: 93, 100, 386	SE/TWE: 91, 158, 809, TWE: 93, 100, 386			
9-12	1l	Analyze situations and solve problems that require combining and applying concepts from more than one area of science.	SE/TWE: 14, 131, 152, 226, 281, 366, 408, 457, 517, 544, 563, 600, 637, 701, 726, 739, 785, 808, 847, 851	SE/TWE: 238, 862-863, 867, TWE: 100, 131, 843, 845, 851, 855	SE/TWE: 238, 862-863, 867, TWE: 100, 131, 843, 845, 851, 855			

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						Y	N	
9-12	1m	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, and land and water use decisions in California.	SE/TWE: 20, 80, 110, 482, 834, 847-848, 860 TWE: 827	SE/TWE: 20, 80, 110, 482, 834, 860, 861 TWE: 823, 849, 853	SE/TWE: 20, 80, 110, 482, 834, 860 TWE: 823, 849, 853			
9-12	1n	Know that when an observation does not agree with an accepted scientific theory, the observation is sometimes mistaken or fraudulent (e.g., the Piltdown Man fossil or unidentified flying objects) and that the theory is sometimes wrong (e.g., the Ptolemaic model of the movement of the Sun, Moon, and planets).	SE/TWE: 89, 90, 94-97, 597-599	SE/TWE: 97, 93, 822	SE/TWE: 89, 97 TWE: 89, 93, 822			

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