

Publisher:	Glencoe/McGraw-Hill
Program Title:	© 2003 Biology: An Everyday Experience
Components:	Student Edition/Teacher's Wraparound Edition
Grade Level(s):	9th - 12th Grade
Intended Audience:	Science 9-12th Grade Standards Map for the Discipline <b>BIOLOGY</b>

**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**			FOR LEA USE ONLY		
			Introduced	Practiced	Taught to Mastery	Meets Standard		Local Education Agency Evaluator Notes
DISCIPLINE						Y	N	
<b>BIOLOGY/LIFE SCIENCES</b>								
		<b>Cell Biology</b> The fundamental life processes of plants and animals depend on a variety of chemical reactions that occur in specialized areas of the organism's cells. As a basis for understanding this concept:	SE/TWE: 24, 32-35, 36, 37, 38-41, 61-63, 72-75, 77, 206-207, 405-408, 592-593 TWE: 33, 38, 39, 204	SE/TWE: 36-40, 42-43, 78, 88, 116, 207, 213, 218-219, 409, 417, 594 TWE: 35, 80, 408	SE/TWE: 32-34, 35, 36-40, 61-63, 72-75, 77, 206, 264-265, 405-409, 592-593			
9-12	1a	Students know cells are enclosed within semipermeable membranes that regulate their interaction with their surroundings.	SE/TWE: 32-34, 36-40 TWE: 33, 38, 39	SE/TWE: 36-40, 42-43 TWE: 35	SE/TWE: 32-34, 36-40			
9-12	1b	Students know enzymes are proteins that catalyze biochemical reactions without altering the reaction equilibrium and the activities of enzymes depend on the temperature, ionic conditions, and the pH of the surroundings.	SE/TWE: 206-207 TWE: 204	SE/TWE: 207, 213, 218-219	SE/TWE: 206, 218-219			

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						Y	N	
9-12	1c	Students know how prokaryotic cells, eukaryotic cells (including those from plants and animals), and viruses differ in complexity and general structure.	SE/TWE: 32-35, 61-63, 72-75, 77 TWE: 32-33, 61, 73	SE/TWE: 36, 76, 78, 88 TWE: 80	SE/TWE: 32-35, 61-63, 72-75, 77 TWE: 32-33, 61, 73			
9-12	1d	Students know the central dogma of molecular biology outlines the flow of information from transcription of ribonucleic acid (RNA) in the nucleus to translation of proteins on ribosomes in the cytoplasm.	SE/TWE: 592-593, 602	SE/TWE: 594, 602	SE/TWE: 592-593, 594, 602			
9-12	1e	Students know the role of the endoplasmic reticulum and Golgi apparatus in the secretion of proteins.						
9-12	1f	Students know usable energy is captured from sunlight by chloroplasts and is stored through the synthesis of sugar from carbon dioxide.	SE/TWE: 35, 114, 405, 408, 416	SE/TWE: 116, 409, 417 TWE: 408	SE/TWE: 405-408, 417			

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						Y	N	
9-12	1g	Students know the role of the mitochondria in making stored chemical-bond energy available to cells by completing the breakdown of glucose to carbon dioxide.	SE/TWE: 34, 34, 264-265, 408-409	SE/TWE: 37, 44, 45 TWE: 34, 35	SE/TWE: 34, 37, 44, 45, 264-265, 408-409			
9-12	1h	Students know most macromolecules (polysaccharides, nucleic acids, proteins, lipids) in cells and organisms are synthesized from a small collection of simple precursors.	SE/TWE: 592-593	SE/TWE: 594	SE/TWE: 594			
9-12	1i*	Students know how chemiosmotic gradients in the mitochondria and chloroplast store energy for ATP production.						
9-12	1j*	Students know how eukaryotic cells are given shape and internal organization by a cytoskeleton or cell wall or both.	SE/TWE: 33, 35	SE/TWE: 36 TWE: 35	SE/TWE: 36 TWE: 35			
		<b>Genetics</b> Mutation and sexual reproduction lead to genetic variation in a population. As a basis for understanding this concept:	SE/TWE: 471-475, 546-548, 551-554, 568-570, 595-596, 609-610, 624	SE/TWE: 475, 480, 481, 551, 562 TWE: 471, 548, 611	SE/TWE: 471-475, 546-548, 562, 563 TWE: 471, 548, 611			
9-12	2a	Students know meiosis is an early step in sexual reproduction in which the pairs of chromosomes separate and segregate randomly during cell division to produce gametes containing one chromosome of each type.	SE/TWE: 471-475, 480	SE/TWE: 475, 481 TWE: 471	SE/TWE: 471-475, 481			
9-12	2b	Students know only certain cells in a multicellular organism undergo meiosis.	SE/TWE: 471-474, 480	SE/TWE: 480	SE/TWE: 471, 474, 480			
9-12	2c	Students know how random chromosome segregation explains the probability that a particular allele will be in a gamete.	SE/TWE: 475, 546-548, 551	SE/TWE: 551 TWE: 548	SE/TWE: 475, 546-548, 551			
9-12	2d	Students know new combinations of alleles may be generated in a zygote through the fusion of male and female gametes (fertilization).	SE/TWE: 474-475, 546-548	SE/TWE: 548	SE/TWE: 474-475, 546-548			

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9-12	2e	Students know why approximately half of an individual's DNA sequence comes from each parent.	SE/TWE: 548, 551-554 TWE: 552-553	SE/TWE: 554, 556	SE/TWE: 548, 551-554 TWE: 552-553			
9-12	2f	Students know the role of chromosomes in determining an individual's sex.	SE/TWE: 568-570 TWE: 568	SE/TWE: 570, 571, 583	SE/TWE: 568-570 TWE: 568			
9-12	2g	Students know how to predict possible combinations of alleles in a zygote from the genetic makeup of the parents.	SE/TWE: 552-553	SE/TWE: 554 TWE: 553, 557	SE/TWE: 552-553			
9-12		3 A multicellular organism develops from a single zygote, and its phenotype depends on its genotype, which is established at fertilization. As a basis for understanding this concept:	SE/TWE: 548-553, 555, 557-558-562, 572-577 TWE: 546	SE/TWE: 561, 563, 565, 576 TWE: 546, 557, 560, 572, 573	SE/TWE: 548-553, 555, 557-558, 572-577 TWE: 560			
9-12	3a	Students know how to predict the probable outcome of phenotypes in a genetic cross from the genotypes of the parents and mode of inheritance (autosomal or X-linked, dominant or recessive).	SE/TWE: 548-553, 555, 557-558, 562, 572-577	SE/TWE: 561, 563, 576 TWE: 557, 572, 573	SE/TWE: 548-553, 555, 557-558, 572-577			
9-12	3b	Students know the genetic basis for Mendel's laws of segregation and independent assortment.	SE/TWE: 558-561 TWE: 559	SE/TWE: 561, 562 TWE: 560	TWE: 560			
9-12	3c*	Students know how to predict the probable mode of inheritance from a pedigree diagram showing phenotypes.	SE/TWE: 580-581, 595	SE/TWE: 581				
9-12	3d*	Students know how to use data on frequency of recombination at meiosis to estimate genetic distances between loci and to interpret genetic maps of chromosomes.	SE/TWE: 462-463, 471-475					
9-12		4 Genes are a set of instructions encoded in the DNA sequence of each organism that specify the sequence of amino acids in proteins characteristic of that organism. As a basis for understanding this concept:	SE/TWE: 544-545, 547, 564-565, 584-585, 586, 594-596, 722	SE/TWE: 545, 565, 585, 592, 594, 603	SE/TWE: 592, 594, 595-596			

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9-12	4a	Students know the general pathway by which ribosomes synthesize proteins, using tRNAs to translate genetic information in mRNA.	SE/TWE: 585, 592	SE/TWE:	SE/TWE: 592			
9-12	4b	Students know how to apply the genetic coding rules to predict the sequence of amino acids from a sequence of codons in RNA.	SE/TWE: 585					
9-12	4c	Students know how mutations in the DNA sequence of a gene may or may not affect the expression of the gene or the sequence of amino acids in an encoded protein.	SE/TWE: 585, 595-596	SE/TWE: 596	SE/TWE: 595-596			
9-12	4d	Students know specialization of cells in multicellular organisms is usually due to different patterns of gene expression rather than to differences of the genes themselves.	SE/TWE: 585, 592					
9-12	4e	Students know proteins can differ from one another in the number and sequence of amino acids.	SE/TWE: 585, 592					
9-12	4f*	Students know why proteins having different amino acid sequences typically have different shapes and chemical properties.	SE/TWE: 585, 592					
9-12	5	The genetic composition of cells can be altered by incorporation of exogenous DNA into the cells. As a basis for understanding this concept:	SE/TWE: 585, 586-587, 589-594, 600-601, 602	SE/TWE: 588, 594, 601, 603 TWE: 85, 590	SE/TWE: 586-587, 589-594, 601, 603			
9-12	5a	Students know the general structures and functions of DNA, RNA, and protein.	SE/TWE: 585, 586-587, 589-594, 602	SE: 588, 594, 603 TWE: 590	SE/TWE: 586-587, 589-594, 603			
9-12	5b	Students know how to apply base-pairing rules to explain precise copying of DNA during semiconservative replication and transcription of information from DNA into mRNA.	SE/TWE: 592-594 TWE: 593	TWE: 594	SE/TWE: 593-594			
9-12	5c	Students know how genetic engineering (biotechnology) is used to produce novel biomedical and agricultural products.	SE/TWE: 85, 600-601	SE/TWE: 603 TWE: 85	SE/TWE: 85, 600-601, 603			

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9-12	5d*	Students know how basic DNA technology (restriction digestion by endonucleases, gel electrophoresis, ligation, and transformation) is used to construct recombinant DNA molecules.	SE/TWE: 600-601, 602	SE/TWE: 601	SE/TWE: 601			
9-12	5e*	Students know how exogenous DNA can be inserted into bacterial cells to alter their genetic makeup and support expression of new protein products.	SE/TWE: 599-601 TWE: 600	SE/TWE: 601, 603	SE/TWE: 600-601, 603			
		<b>Ecology</b> Stability in an ecosystem is a balance between competing effects. As a basis for understanding this concept:	SE/TWE: 652-653, 654-659, 660-669, 670	SE/TWE: 653, 658, 659, 662, 666, 667, 671	SE/TWE: 653, 658, 659, 662, 666, 667, 671			
9-12	6a	Students know biodiversity is the sum total of different kinds of organisms and is affected by alterations of habitats.	SE/TWE: 29, 606-612, 638	SE/TWE: 608 TWE: 607	TWE: 607, 665			
9-12	6b	Students know how to analyze changes in an ecosystem resulting from changes in climate, human activity, introduction of nonnative species, or changes in population size.	SE/TWE: 661-662, 663-664, 670 TWE: 642	SE/TWE: 637, 651, 661, 671 TWE: 662	SE/TWE: 661-662 TWE: 642			
9-12	6c	Students know how fluctuations in population size in an ecosystem are determined by the relative rates of birth, immigration, emigration, and death.	SE/TWE: 631, 634	SE/TWE: 631, 636, 637 TWE: 634	TWE: 634			
9-12	6d	Students know how water, carbon, and nitrogen cycle between abiotic resources and organic matter in the ecosystem and how oxygen cycles through photosynthesis and respiration.	SE/TWE: 655-658 TWE: 654	SE/TWE: 657, 659, 671 TWE: 654	SE/TWE: 655-658, 659, 671 TWE: 654			
9-12	6e	Students know a vital part of an ecosystem is the stability of its producers and decomposers.	SE/TWE: 638-640, 650 TWE: 639	SE/TWE: 639, 640, 651	SE/TWE: 638-640, 651 TWE: 639			
9-12	6f	Students know at each link in a food web some energy is stored in newly made structures but much energy is dissipated into the environment as heat. This dissipation may be represented in an energy pyramid.	SE/TWE: 642, 643, 650	SE/TWE: 643, 651 TWE: 642	SE/TWE: 643, 651			

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9-12	6g*	Students know how to distinguish between the accommodation of an individual organism to its environment and the gradual adaptation of a lineage of organisms through genetic change.	SE/TWE: 606-607, 609-612, 624 TWE: 610	TWE: 607	SE/TWE: 606-607, 609-612 TWE: 610			
		<b>Evolution</b> The frequency of an allele in a gene pool of a population depends on many factors and may be stable or unstable over time. As a basis for understanding this concept:	SE/TWE: 564-565, 580, 595-596, 604-605, 606-607, 609-610, 615-616	SE/TWE: 565, 605 TWE: 607	SE/TWE: 580, 595-596, 606-607, 609-610, 615-616			
9-12	7a	Students know why natural selection acts on the phenotype rather than the genotype of an organism.	SE/TWE: 605, 606-607, 609	SE/TWE: 605 TWE: 607	SE/TWE: 606-607, 609			
9-12	7b	Students know why alleles that are lethal in a homozygous individual may be carried in a heterozygote and thus maintained in a gene pool.	SE/TWE: 565, 580	SE/TWE: 565	SE/TWE: 580			
9-12	7c	Students know new mutations are constantly being generated in a gene pool.	SE/TWE: 565, 595-596, 605, 609-610	SE/TWE: 565, 605	SE/TWE: 595-596, 609-610			
9-12	7d	Students know variation within a species increases the likelihood that at least some members of a species will survive under changed environmental conditions.	SE/TWE: 604-605, 615-616	SE/TWE: 605	SE/TWE: 615-616			
9-12	7e*	Students know the conditions for Hardy-Weinberg equilibrium in a population and why these conditions are not likely to appear in nature.	Biology Online: science.glencoe.com	Biology Online: science.glencoe.com	Biology Online: science.glencoe.com			
9-12	7f*	Students know how to solve the Hardy-Weinberg equation to predict the frequency of genotypes in a population, given the frequency of phenotypes.	Biology Online: science.glencoe.com	Biology Online: science.glencoe.com	Biology Online: science.glencoe.com			
9-12		8 Evolution is the result of genetic changes that occur in constantly changing environments. As a basis for understanding this concept:	SE/TWE: 606-607, 609, 610-612, 615-616, 622-623, 624 TWE: 611	SE/TWE: 608, 622-623 TWE: 607, 612	SE/TWE: 606-607, 609, 615-616, 622-623 TWE: 611			

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9-12	8a	Students know how natural selection determines the differential survival of groups of organisms.	SE/TWE: 605, 606-607, 609, 616, 624 TWE: 615	SE/TWE: 608, 621 TWE: 607, 616	SE/TWE: 606-607, 609, 621 TWE: 616			
9-12	8b	Students know a great diversity of species increases the chance that at least some organisms survive major changes in the environment.	SE/TWE: 605, 615-616	SE/TWE: 605	SE/TWE: 615-616			
9-12	8c	Students know the effects of genetic drift on the diversity of organisms in a population.	SE/TWE: 605 TWE: 609	SE/TWE: 605	TWE: 609			
9-12	8d	Students know reproductive or geographic isolation affects speciation.	SE/TWE: 605, 610-612 TWE: 611	SE/TWE: 605, 614 TWE: 612	SE/TWE: 610-612, 614 TWE: 611			
9-12	8e	Students know how to analyze fossil evidence with regard to biological diversity, episodic speciation, and mass extinction.	SE/TWE: 617, 619, 624, 626	TWE: 626	SE/TWE: 617, 619			
9-12	8f*	Students know how to use comparative embryology, DNA or protein sequence comparisons, and other independent sources of data to create a branching diagram (cladogram) that shows probable evolutionary relationships.	SE/TWE: 585, 605					
9-12	8g*	Students know how several independent molecular clocks, calibrated against each other and combined with evidence from the fossil record, can help to estimate how long ago various groups of organisms diverged evolutionarily from one another.	SE/TWE: 622-623	SE/TWE: 622-623	SE/TWE: 622-623			
		<b>Physiology</b> As a result of the coordinated structures and functions of organ systems, the internal environment of the human body remains relatively stable (homeostatic) despite changes in the outside environment. As a basis for understanding this concept:	SE/TWE: 206-210, 230, 264-265, 275-277, 310-318, 320-321 TWE: 277, 312-316	SE/TWE: 265, 280, 298, 317, 318, 319, 326-327 TWE: 312, 314	SE/TWE: 230, 264-265, 295-297, 310-318, 320-321 TWE: 277, 313-314			

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						Y	N	
9-12	9a	Students know how the complementary activity of major body systems provides cells with oxygen and nutrients and removes toxic waste products such as carbon dioxide.	SE/TWE: 221, 230-231, 264-265, 267-271, 282 TWE: 277	SE/TWE: 221, 231, 265, 271	SE/TWE: 230, 264-265 TWE: 231, 277			
9-12	9b	Students know how the nervous system mediates communication between different parts of the body and the body's interactions with the environment.	SE/TWE: 309, 310-318 TWE: 313-314	SE/TWE: 309, 319 TWE: 312, 314	SE/TWE: 310-318 TWE: 313-314			
9-12	9c	Students know how feedback loops in the nervous and endocrine systems regulate conditions in the body.	SE: 318, 326-327	SE: 317, 326-327 TWE: 318	SE: 318 TWE: 327			
9-12	9d	Students know the functions of the nervous system and the role of neurons in transmitting electrochemical impulses.	SE/TWE: 309, 310-318 TWE: 295, 312-316	SE/TWE: 309 TWE: 314, 318	SE/TWE: 310-318 TWE: 295, 312-316			
9-12	9e	Students know the roles of sensory neurons, interneurons, and motor neurons in sensation, thought, and response.	SE/TWE: 309, 315, 317-318	SE/TWE: 318	SE/TWE: 315, 317-318			
9-12	9f*	Students know the individual functions and sites of secretion of digestive enzymes (amylases, proteases, nucleases, lipases), stomach acid, and bile salts.	SE/TWE: 203, 206, 208-210	SE/TWE: 203, 206	SE/TWE: 206, 208-210			
9-12	9g*	Students know the homeostatic role of the kidneys in the removal of nitrogenous wastes and the role of the liver in blood detoxification and glucose balance.	SE/TWE: 275-277, 282	SE/TWE: 280, 283	SE/TWE: 275-277, 283			
9-12	9h*	Students know the cellular and molecular basis of muscle contraction, including the roles of actin, myosin, Ca <sup>+2</sup> , and ATP.	SE/TWE: 295-297	SE/TWE: 297, 298	SE/TWE: 295-297			
9-12	9i*	Students know how hormones (including digestive, reproductive, osmoregulatory) provide internal feedback mechanisms for homeostasis at the cellular level and in whole organisms.	SE/TWE: 309, 320-321	SE/TWE: 309, 322 TWE: 321	SE/TWE: 320-321, 322			

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						Y	N	
9-12	10	Organisms have a variety of mechanisms to combat disease. As a basis for understanding the human immune response:	SE/TWE: 73-75, 77-78, 80-87, 256, 257-258, 259, 260 TWE: 81, 82, 83, 84, 85	SE/TWE: 83, 259, 261, 280 TWE: 77, 78, 80, 81, 82, 84, 85	SE/TWE: 73-75, 77-78, 80-87, 257-258, 259, 280 TWE: 81, 82, 83, 84, 85			
9-12	10a	Students know the role of the skin in providing nonspecific defenses against infection.	SE/TWE: 256, 279	SE/TWE: 280	SE/TWE: 280			
9-12	10b	Students know the role of antibodies in the body's response to infection.	SE/TWE: 257-258, 260	SE/TWE: 259 TWE: 258	SE/TWE: 257-258			
9-12	10c	Students know how vaccination protects an individual from infectious diseases.	SE/TWE: 258 TWE: 257	SE/TWE: 259	SE/TWE: 258 TWE: 257			
9-12	10d	Students know there are important differences between bacteria and viruses with respect to their requirements for growth and replication, the body's primary defenses against bacterial and viral infections, and effective treatments of these infections.	SE/TWE: 73-75, 77-78, 80-87 TWE: 81, 82, 83, 84, 85	SE/TWE: 83 TWE: 77, 78, 80, 81, 82, 84, 85	SE/TWE: 73-75, 77-78, 80-87 TWE: 81, 82, 83, 84, 85			
9-12	10e	Students know why an individual with a compromised immune system (for example, a person with AIDS) may be unable to fight off and survive infections by microorganisms that are usually benign.	SE/TWE: 259, 260	SE/TWE: 259, 261	SE/TWE: 259, 260			
9-12	10f*	Students know the roles of phagocytes, B-lymphocytes, and T-lymphocytes in the immune system.	SE/TWE: 257-258					

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<b>DISCIPLINE</b>		<b>INVESTIGATION AND EXPERIMENTATION</b> 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: 9, 17, 28, 36, 49, 52, 76, 89, 101, 109, 119, 123, 141, 148, 162, 172, 187, 194, 207, 213, 224, 235, 246, 253, 266, 278, 290, 298, 319, 325, 337, 338, 355, 358, 373, 387, 400, 415, 432, 434, 442, 445, 467, 477, 495, 497, 511, 512, 531, 534, 554, 556, 571, 577, 588, 598, 608, 618, 637, 649, 659, 667, 682, 686	SE/TWE: 9, 17, 28, 36, 49, 52, 76, 89, 101, 109, 119, 123, 141, 148, 162, 172, 187, 194, 207, 213, 224, 235, 246, 253, 266, 278, 290, 298, 319, 325, 337, 338, 355, 358, 373, 387, 400, 415, 432, 434, 442, 445, 467, 477, 495, 497, 511, 512, 531, 534, 554, 556, 571, 577, 588, 598, 608, 618, 637, 649, 659, 667, 682, 686	SE/TWE: 9, 17, 28, 36, 49, 52, 76, 89, 101, 109, 119, 123, 141, 148, 162, 172, 187, 194, 207, 213, 224, 235, 246, 253, 266, 278, 290, 298, 319, 325, 337, 338, 355, 358, 373, 387, 400, 415, 432, 434, 442, 445, 467, 477, 495, 497, 511, 512, 531, 534, 554, 556, 571, 577, 588, 598, 608, 618, 637, 649, 659, 667, 682, 686			

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						Y	N	
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: 9, 17, 28, 36, 49, 52, 76, 89, 101, 109, 119, 123, 141, 148, 162, 172, 187, 194, 207, 213, 224, 235, 246, 253, 266, 278, 290, 298, 319, 325, 337, 338, 355, 358, 373, 387, 400, 415, 432, 434, 442, 445, 467, 477, 495, 497, 511, 512, 531, 534, 554, 556, 571, 577, 588, 598, 608, 618, 637, 649, 659, 667, 682, 686	SE/TWE: 9, 17, 28, 36, 49, 52, 76, 89, 101, 109, 119, 123, 141, 148, 162, 172, 187, 194, 207, 213, 224, 235, 246, 253, 266, 278, 290, 298, 319, 325, 337, 338, 355, 358, 373, 387, 400, 415, 432, 434, 442, 445, 467, 477, 495, 497, 511, 512, 531, 534, 554, 556, 571, 577, 588, 598, 608, 618, 637, 649, 659, 667, 682, 686	SE/TWE: 9, 17, 28, 36, 49, 52, 76, 89, 101, 109, 119, 123, 141, 148, 162, 172, 187, 194, 207, 213, 224, 235, 246, 253, 266, 278, 290, 298, 319, 325, 337, 338, 355, 358, 373, 387, 400, 415, 432, 434, 442, 445, 467, 477, 495, 497, 511, 512, 531, 534, 554, 556, 571, 577, 588, 598, 608, 618, 637, 649, 659, 667, 682, 686			
9-12	1b	Identify and communicate sources of unavoidable experimental error.	SE/TWE: 11, 14, 18-20, 704-705	SE/TWE: 23 TWE: 11, 14	SE/TWE: 23 TWE: 11, 14			
9-12	1c	Identify possible reasons for inconsistent results, such as sources of error or uncontrolled conditions.	SE/TWE: 11, 14, 18-20, 704-705	SE/TWE: 23 TWE: 11, 14, 104	SE/TWE: 23 TWE: 11, 14			

\* For more information, see Notes.  
 Science 9-12th Grade Standards Map  
 Approved by the State Board  
 of Education on Feb. 6, 2002.

Grade	Standard #	Text of Standard	PUBLISHER CITATIONS**			FOR LEA USE ONLY		
			Introduced	Practiced	Taught to Mastery	Meets Standard		Local Education Agency Evaluator Notes
						Y	N	
9-12	1d	Formulate explanations by using logic and evidence.	SE/TWE: 15-16, 42-43, 152-153, 198-199, 326-327, 454-455, 498-499, 622-623, 668-669	SE/TWE: 17, 43, 153, 199, 327, 455, 499, 623, 669 TWE: 88	SE/TWE: 43, 153, 199, 327, 455, 499, 623, 669			
9-12	1e	Solve scientific problems by using quadratic equations and simple trigonometric, exponential, and logarithmic functions.	SE/TWE: 637, 718-719	SE/TWE: 637, 718-719 TWE: 589	SE/TWE: 718-719 TWE: 589			
9-12	1f	Distinguish between hypothesis and theory as scientific terms.	SE/TWE: 16-18, 19, 704-705	SE/TWE: 17, 20, 22, 23	SE/TWE: 20, 22, 23			
9-12	1g	Recognize the usefulness and limitations of models and theories as scientific representations of reality.	SE/TWE: 19, 588, 711	SE/TWE: 20, 588	SE/TWE: 20, 22, 23, 588			
9-12	1h	Read and interpret topographic and geologic maps.	SE/TWE: 633, 657, 664	SE/TWE: 633, 664 TWE: 658	TWE: 664			

			PUBLISHER CITATIONS**			FOR LEA USE ONLY		
Grade	Standard #	Text of Standard	Introduced	Practiced	Taught to Mastery	Meets Standard		Local Education Agency Evaluator Notes
						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: 617, 619, 622-623, 660-662, 729	SE/TWE: 621, 622-623, 662	SE/TWE: 621, 623, 662			
9-12	1j	Recognize the issues of statistical variability and the need for controlled tests.	SE/TWE: 11-14, 18-20, 704-705	SE/TWE: 23 TWE: 11, 14	SE/TWE: 23 TWE: 11, 14			
9-12	1k	Recognize the cumulative nature of scientific evidence.	SE/TWE: 20, 281, 593, 680 TWE: 42	SE/TWE: 281, 593, 680	SE/TWE: 281, 593, 680			
9-12	1l	Analyze situations and solve problems that require combining and applying concepts from more than one area of science.	SE/TWE: 198-199, 426, 622-623, 680	SE/TWE: 199, 622-623 TWE: 426, 680	SE/TWE: 199, 622-623 TWE: 426, 680			
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: 21, 127, 175, 281, 389, 413, 517, 569, 597-599, 635	SE/TWE: 21, 127, 175, 281, 389, 413, 517, 569, 601, 603, 635 TWE: 85	SE/TWE: 21, 127, 175, 281, 389, 413, 517, 569, 601, 603, 635 TWE: 85			
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: 19, 31, 61	TWE: 31, 61	TWE: 31, 61			

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