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Intended Audience:	Science 9-12th Grade Standards Map for the Discipline BIOLOGY

**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		BIOLOGY/LIFE SCIENCES				Y	N	
		Cell Biology 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: 142-143, 144, 145- 173, 174, 175-199, 200, 201- 225, 226, 227-249, 250-254	SE/TWE: 149, 155, 159, 160, 167, 169, 172, 173, 177, 180, 182, 184, 186, 187, 193, 195, 196, 198, 199, 204, 206, 209, 215, 216, 219, 221, 224, 225, 230, 236, 243, 245, 248, 249, 255	SE/TWE: 155, 160, 167, 169, 172, 173, 180, 184, 193, 195, 196, 198, 199, 206, 216, 219, 221, 224, 225, 230, 236, 243, 245, 248, 249, 255			
9-12	1a	Students know cells are enclosed within semipermeable membranes that regulate their interaction with their surroundings.	SE/TWE: 181-184	SE/TWE: 182, 184 TWE: 181, 183, 252	SE/TWE: 181-184, 252			

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						Y	N	
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: 165, 167 TWE: 164-165	SE/TWE: 168-169 TWE: 164-165, 166	SE/TWE: 165, 166, 167, 168-169			
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: 177, 180, 185-193, 251, 489-490	SE/TWE: 193, 194-195, 255 TWE: 180, 251, 491	SE/TWE: 177, 180, 192, 255, 489-490 TWE: 251			
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: 187-188, 294-301	SE/TWE: 299, 301, 308-309 TWE: 298, 300, 370	SE/TWE: 187-188, 299, 301, 309 TWE: 370-371			
9-12	1e	Students know the role of the endoplasmic reticulum and Golgi apparatus in the secretion of proteins.	SE/TWE: 188-189, 252	SE/TWE: 193 TWE: 188-189, 193	SE/TWE: 193 TWE: 188-189, 252			
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: 190, 231-236, 247, 254	SE/TWE: 232, 244-245, 248 TWE: 233	SE/TWE: 190, 236, 249, 254			

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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: 191, 238-240, 252 TWE: 190	SE/TWE: 193, 255 TWE: 191, 240	SE/TWE: 238-240, 255 TWE: 191			
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: 162-165, 167, 171	SE/TWE: 172 TWE: 161, 165, 167	SE/TWE: 162-165, 167, 172			
9-12	1i*	Students know how chemiosmotic gradients in the mitochondria and chloroplast store energy for ATP production.	SE/TWE: 232-233, 240	SE/TWE: 233, 244-245	SE/TWE: 232-233, 240, 245			
9-12	1j*	Students know how eukaryotic cells are given shape and internal organization by a cytoskeleton or cell wall or both.	SE/TWE: 185-186, 191	SE/TWE: 255 TWE: 186, 191, 252	SE/TWE: 185-186, 191, 255 TWE: 252			
		Genetics Mutation and sexual reproduction lead to genetic variation in a population. As a basis for understanding this concept:	SE/TWE: 256-257, 258, 259-285, 286, 287-313, 314, 315-341, 368-372	SE/TWE: 260, 268, 270, 274, 279, 280-281, 284, 285, 289, 293, 301, 307, 308-309, 312, 313, 320, 328, 335, 340, 341, 373 TWE: 263, 264, 265, 272-273, 304	SE/TWE: 268, 279, 281, 284, 285, 293, 301, 307, 309, 312, 313, 320, 328, 335, 340, 341, 373 TWE: 275, 292, 304			
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: 269-272, 275-276, 283, 369	SE/TWE: 270, 279 TWE: 271, 272	SE/TWE: 279 TWE: 272, 369			
9-12	2b	Students know only certain cells in a multicellular organism undergo meiosis.	SE/TWE: 269, 275-276	SE/TWE: 279 TWE: 276	SE/TWE: 279, 653, 1033			

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						Y	N	
9-12	2c	Students know how random chromosome segregation explains the probability that a particular allele will be in a gamete.	SE/TWE: 263-264, 267-268	TWE: 262, 267, 268	SE/TWE: 263, 267-268 TWE: 262			
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: 259-260, 271-272	TWE: 266, 267	SE/TWE: 259-260, 271-272			

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9-12	2e	Students know why approximately half of an individual's DNA sequence comes from each parent.	SE/TWE: 258, 259-260, 271-272, 283	SE/TWE: 258, 279	SE/TWE: 259-260, 271-272, 279			
9-12	2f	Students know the role of chromosomes in determining an individual's sex.	SE/TWE: 324-325	TWE: 324, 325, 340, 341	SE/TWE: 324-325, 340, 341			
9-12	2g	Students know how to predict possible combinations of alleles in a zygote from the genetic makeup of the parents.	SE/TWE: 266-267, 324	SE/TWE: 284, 324 TWE: 266, 267, 325	SE/TWE: 284, 324 TWE: 266, 267, 325			
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: 259, 264-265, 271-272	SE/TWE: 280-281	SE/TWE: 259, 264-265, 271-272, 281			
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: 264-265	SE/TWE: 317, TWE: 264, 266, 267, 321	SE/TWE: 321-326, 368, 371-372			
9-12	3b	Students know the genetic basis for Mendel's laws of segregation and independent assortment.	SE/TWE: 263, 266, 283	SE/TWE: 262, 268	SE/TWE: 263, 266, 368			
9-12	3c*	Students know how to predict the probable mode of inheritance from a pedigree diagram showing phenotypes.	SE/TWE: 315-317	SE/TWE: 316, 320, 332 TWE: 318	SE/TWE: 315-317, 320			
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: 277, 357-358, 362-363	SE/TWE: 362-363 TWE: 277	SE/TWE: 277, 357-358, 363			
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: 217, 297-299, 299-301, 302-305	SE/TWE: 287, 299, 308-309 TWE: 299	SE/TWE: 217, 294-301, 370-371			

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						Y	N	
9-12	4a	Students know the general pathway by which ribosomes synthesize proteins, using tRNAs to translate genetic information in mRNA.	SE/TWE: 299-301	SE/TWE: 299, 301 TWE: 300	SE/TWE: 299-301, 371			
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: 297-299	SE/TWE: 299, TWE: 298	SE/TWE: 297-299			
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: 302-305	SE/TWE: 305, 306	SE/TWE: 302-305, 307			
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: 286, 300	SE/TWE: 309	SE/TWE: 309, 313			
9-12	4e	Students know proteins can differ from one another in the number and sequence of amino acids.	SE/TWE: 164-165, 297-298	TWE: 165, 298	SE/TWE: 164-165, 300			
9-12	4f*	Students know why proteins having different amino acid sequences typically have different shapes and chemical properties.	SE/TWE: 164-165, 297-298	TWE: 165	SE/TWE: 164-165			
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: 349-356	SE/TWE: 351, 356 TWE: 352	SE/TWE: 349-356, 372-373			
9-12	5a	Students know the general structures and functions of DNA, RNA, and protein.	SE/TWE: 164, 167, 286, 287-293	SE/TWE: 293 TWE: 288, 292	SE/TWE: 164, 167, 287-289, 293, 294-295			
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: 291, 292-293	SE/TWE: 292, 293 TWE: 291	SE/TWE: 291, 292-293, 370			
9-12	5c	Students know how genetic engineering (biotechnology) is used to produce novel biomedical and agricultural products.	SE/TWE: 349-353	SE/TWE: 351, 362-363, TWE: 352	SE/TWE: 349-353, 355-356, 360			

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					Y	N		
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: 349-353, 354	SE/TWE: 351, 362-363, TWE: 352	SE/TWE: 349-353, 354, 372			
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: 351-352	SE/TWE: 351 TWE: 353	SE/TWE: 351-352 TWE: 353			
		Ecology Stability in an ecosystem is a balance between competing effects. As a basis for understanding this concept:	SE/TWE: 34, 36, 37-47, 48-65, 66, 67-71, 72-93, 136-141	SE/TWE: 38, 39, 47, 52, 56, 59, 60, 61, 62, 64, 65 TWE: 43	SE/TWE: 47, 59, 61, 62, 64, 65 TWE: 43			
9-12	6a	Students know biodiversity is the sum total of different kinds of organisms and is affected by alterations of habitats.	SE/TWE: 34, 35, 114, 115, 124	SE/TWE: 116, 119 TWE: 116, 117	SE/TWE: 115-124, 141			
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: 94, 95, 98, 100-101, 119	SE/TWE: 119 TWE: 119, 130-123	SE/TWE: 119, 130-131 TWE: 98			
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: 60, 61, 94, 95, 96-103	SE/TWE: 60, 61, 96, 105, 106 TWE: 102	SE/TWE: 61, 96-103, 104-107, 139			
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: 55, 59, 63	SE: 59, 65 TWE: 55, 57, 58	SE/TWE: 55, 59, 65			
9-12	6e	Students know a vital part of an ecosystem is the stability of its producers and decomposers.	SE/TWE: 48, 50	TWE: 53, 65, 509	SE/TWE: 48, 50, 65, 509-510			
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: 48, 50-54, 63	SE/TWE: 52 TWE: 54, 55	SE/TWE: 50, 54, 138			
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: 9-10	SE/TWE: 413	SE/TWE: 9-10, 412-413			

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						Y	N	
		Evolution 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: 400, 401-411, 412-421, 423	SE/TWE: 406, 407, 411, 415, 421 TWE: 410	SE/TWE: 411, 421, 424, 425			
9-12	7a	Students know why natural selection acts on the phenotype rather than the genotype of an organism.	SE/TWE: 403, 412-413	SE/TWE: 422-423	SE/TWE: 403, 412-413, 423			
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: 317-320	SE/TWE: 422-423	SE/TWE: 317-320, 338			
9-12	7c	Students know new mutations are constantly being generated in a gene pool.	SE/TWE: 302-306	SE/TWE: 305, 306 TWE: 307, 424	SE/TWE: 302-306, 413-414			
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: 9-10	SE/TWE: 407 TWE: 413	SE/TWE: 9-10, 415 TWE: 413			
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.	SE/TWE: 424	SE/TWE: 424	SE/TWE: 424			
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.	SE/TWE: 424	TWE: 424	SE/TWE: 424			
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: 10, 420-421	SE/TWE: 421 TWE: 404, 405, 409	SE/TWE: 10, 401-404, 412-417, 421, 482			

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9-12	8a	Students know how natural selection determines the differential survival of groups of organisms.	SE/TWE: 403-407	SE/TWE: 407 TWE: 408, 420	SE/TWE: 403-407, 482 TWE: 420			
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: 118, 420-421 TWE: 375	SE/TWE: 421 TWE: 375	SE/TWE: 118, 385, 386			
9-12	8c	Students know the effects of genetic drift on the diversity of organisms in a population.	SE/TWE: 414-415, 425	TWE: 413, 414	SE/TWE: 414, 483 TWE: 413			
9-12	8d	Students know reproductive or geographic isolation affects speciation.	SE/TWE: 417-419, 425	SE/TWE: 421 TWE: 417, 418	SE/TWE: 417-419, 421			
9-12	8e	Students know how to analyze fossil evidence with regard to biological diversity, episodic speciation, and mass extinction.	SE/TWE: 376, 378-380, 386, 392	SE/TWE: 379, 380 TWE: 417	SE/TWE: 378-380, 383-387, 482			
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: 391-393, 466-467	SE/TWE: 393, 467 TWE: 466	SE/TWE: 467 TWE: 466			
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: 465, 476	SE/TWE: 476	SE/TWE: 465, 476			
		Physiology 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: 920-921, 946, 947-971, 972, 973-987, 1002, 1003-1016	SE/TWE: 953, 958, 964, 965, 970, 971, 982, 987, 1000, 1001, 1006, 1016, 1024, 1025	SE/TWE: 953, 958, 965, 970, 971, 982, 987, 1000, 1001, 1006, 1016, 1024, 1025			
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: 947, 1003-1005, 1007-1008	SE/TWE: 1005 TWE: 1009, 1085	SE/TWE: 1003-1005, 1007-1008, 1085, 1087			

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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: 976-977, 980-982	SE/TWE: 980 TWE: 980-981, 1084	SE/TWE: 976-977, 980-982, 1084			
9-12	9c	Students know how feedback loops in the nervous and endocrine systems regulate conditions in the body.	SE/TWE: 959-962	SE/TWE: 962, 965	SE/TWE: 959-962, 965			
9-12	9d	Students know the functions of the nervous system and the role of neurons in transmitting electrochemical impulses.	SE/TWE: 973-976	SE/TWE: 982 TWE: 974, 975	SE/TWE: 973-976, 982, 1084			
9-12	9e	Students know the roles of sensory neurons, interneurons, and motor neurons in sensation, thought, and response.	SE/TWE: 972, 973-975	SE/TWE: 972	SE/TWE: 973-975, 980-982, 1084			
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: 948, 951-952	SE/TWE: 952 TWE: 948, 950-951, 953	SE/TWE: 948, 951-952, 1083			
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: 1017-1019	SE/TWE: 1019 TWE: 1017	SE/TWE: 1017-1019, 1086			
9-12	9h*	Students know the cellular and molecular basis of muscle contraction, including the roles of actin, myosin, Ca ²⁺ , and ATP.	SE/TWE: 936-937	SE/TWE: 937 TWE: 938	SE/TWE: 936-937, 938			
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: 960-965	SE/TWE: 962, 1048-1049 TWE: 961, 964, 1030-1031	SE/TWE: 960-965, 1029-1030, 1034-1036, 1084			
9-12	10	Organisms have a variety of mechanisms to combat disease. As a basis for understanding the human immune response:	SE/TWE: 1063-1071	SE/TWE: 1067, 1073 TWE: 1065	SE/TWE: 1063-1071, 1073, 1088			
9-12	10a	Students know the role of the skin in providing nonspecific defenses against infection.	SE/TWE: 927-928, 943, 1063	SE/TWE: 928 TWE: 927	SE/TWE: 928, 1063, 1066 TWE: 927			
9-12	10b	Students know the role of antibodies in the body's response to infection.	SE/TWE: 1069-1070	TWE: 1069	SE/TWE: 1069-1070, 1088			
9-12	10c	Students know how vaccination protects an individual from infectious diseases.	SE/TWE: 1071-1072	SE/TWE: 1072	SE/TWE: 1071-1072			

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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: 489-496, 511	SE/TWE: 512-513, 1072 TWE: 497, 1061, 1064-1065	SE/TWE: 489-496, 511, 514, 1061-1062, 1071-1072, 1076			
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: 496, 1088	SE/TWE: 1089 TWE: 1073, 1088	SE/TWE: 496, 1072-1073			
9-12	10f*	Students know the roles of phagocytes, B-lymphocytes, and T-lymphocytes in the immune system.	SE/TWE: 1064-1065	SE/TWE: 1067, 1071, 1073	SE/TWE: 1064-1065, 1066, 1068-1070, 1088			
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: 60, 61, 88-89, 108-109, 168-169, 194-195, 220-221, 308-309, 336-337, 362-363, 394-395, 446-447, 474-475, 512-513, 538-539, 618-619, 646-647, 678-679, 734-735, 754-755, 780-781, 800-801, 860-861, 904-905, 940-941, 966-967, 996-997, 1020-1021, 1048-1049	SE/TWE: 61, 89, 109, 169, 195, 221, 309, 337, 363, 395, 447, 475, 513, 539, 619, 647, 679, 735, 755, 781, 801, 861, 905, 941, 967, 997, 1021, 1049	SE/TWE: 61, 89, 109, 169, 195, 221, 309, 337, 363, 395, 447, 475, 513, 539, 619, 647, 679, 735, 755, 781, 801, 861, 905, 941, 967, 997, 1021, 1049			

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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: 26-27, 60-61, 88-89, 108-109, 168-169, 194-195, 220-221, 280-281, 308-309, 336-337, 362-363, 394-395, 446-447, 474-475, 512-513, 538-539, 618-619, 646-647, 678-679, 734-735, 754-755, 780-781, 800-801, 860-861, 904-905, 940-941, 966-967, 996-997, 1020-1021, 1048-1049	SE/TWE: 27, 61, 89, 109, 169, 195, 221, 280-281, 309, 337, 363, 395, 422-423, 447, 475, 513, 539, 619, 647, 679, 735, 755, 781, 801, 861, 905, 941, 967, 997, 1021, 1049, 1074-1075	SE/TWE: 27, 61, 89, 109, 169, 195, 221, 281, 309, 337, 363, 395, 423, 447, 475, 513, 539, 619, 647, 679, 735, 755, 781, 801, 861, 905, 941, 967, 997, 1021, 1049, 1075			
9-12	1b	Identify and communicate sources of unavoidable experimental error.	SE/TWE: 177, 538-539, 834-835, SH2	SE/TWE: 538-539, 834-835 TWE: 177	SE/TWE: 539, 647, 835 TWE: 177			
9-12	1c	Identify possible reasons for inconsistent results, such as sources of error or uncontrolled conditions.	SE/TWE: 244-245, 512-513, 538-539, SH3	SE/TWE: 245, 512-513, 538-539 TWE: 646, 835	SE/TWE: 245, 513, 539, 647			
9-12	1d	Formulate explanations by using logic and evidence.	SE/TWE: 244-245, 379, 586, 734-735	SE/TWE: 18, 244-245, 379, 586, 734-735 TWE: 396	SE/TWE: 18, 245, 379, 586, 735 TWE: 396			

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			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	1e	Solve scientific problems by using quadratic equations and simple trigonometric, exponential, and logarithmic functions.	SE/TWE: 97, 99, 111, 282, 646-647 TWE: 98	SE/TWE: 282, 647 TWE: 98	SE/TWE: 383, 647 TWE: 98			
9-12	1f	Distinguish between hypothesis and theory as scientific terms.	SE/TWE: 16, 17, 19, 20, 23, 176, 250, 389-391, SH2	SE/TWE: 16, 17, 19, 20, 33, 851	SE/TWE: 17, 19, 20, 33, 851			
9-12	1g	Recognize the usefulness and limitations of models and theories as scientific representations of reality.	SE/TWE: 16, 17, 19, 20, 274, 362-363, 419	SE/TWE: 17, 19, 20, 274, 363 TWE: 34-35	SE/TWE: 274, 363 TWE: 17, 34, 35			
9-12	1h	Read and interpret topographic and geologic maps.	SE/TWE: 55, 59, 62, 78-79, 448	SE/TWE: 55, 59, 62, 73, 78-79, 387, 448	SE/TWE: 55, 59, 62, 73, 78-79, 387, 448			

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						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: 88, 89, 378-380, 394-395	SE/TWE: 88, 89, 394-395 TWE: 24	SE/TWE: 89, 395 TWE:			
9-12	1j	Recognize the issues of statistical variability and the need for controlled tests.	SE/TWE: 60, 61, 108-109, 168-169, 242-245, 644, 646-647	SE/TWE: 61, 109, 169, 245 TWE: 644, 646	SE/TWE: 61, 109, 169, 245 TWE: 644, 646			
9-12	1k	Recognize the cumulative nature of scientific evidence.	SE/TWE: 136-141, 250-255, 368-373, 480-485, 566-571, 684-689, 806-813, 910-919, 1080-1088	SE/TWE: 136-141, 250-255, 368-373, 480-485, 566-571, 684-689, 806-813, 910-919, 1080-1088	SE/TWE: 141, 255, 373, 485, 571, 689, 813, 919, 1089			
9-12	1l	Analyze situations and solve problems that require combining and applying concepts from more than one area of science.	SE/TWE: 88, 89, 110, 136, 141, 246, 448, 756, 836, 942	SE/TWE: 89, 110, 141, 246, 802, 836, 942 TWE: 44, 977	SE/TWE: 89, 110, 141, 246, 802, 836, 942 TWE: 44			
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: 62, 170, 352, 353, 355-356, 364	SE/TWE: 62, 170, 364, 366 TWE: 353, 355, 360	SE/TWE: 62, 170 TWE: 353, 355, 360, 364			
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: 16, 17, 396, 419, 481 TWE: 389, 418, 1066	SE/TWE: 16, 17, 396 TWE: 388, 1088	SE/TWE: 16, 17 TWE: 388, 396, 1088			

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