



CHEMISTRY

MATTER AND CHANGE

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STANDARDS	PAGE REFERENCES
Strand 1: Properties and Principles of Matter and Energy	
1. Changes in properties and states of matter provide evidence of the atomic theory of matter	
A. Objects, and the materials they are made of, have properties that can be used to describe and classify them	
Scope and Sequence – Atomic Theory and Changes in Matter a. Compare the densities of regular and irregular objects using their respective measures of volume and mass	Student Edition: 36-38, 420, 456 <i>Chemlab</i> 60 <i>MiniLab</i> 39, 457 <i>Reference Tables</i> 971-973 Teacher Wraparound Edition: ICE 38
b. Identify pure substances by their physical and chemical properties (i.e., color, luster/reflectivity, hardness, conductivity, density, pH, melting point, boiling point, specific heat, solubility, phase at room temperature, chemical reactivity)	Student Edition: 36-38, 70-75, 177-181, 187-194, 212-217, 225-226 <i>Chemlab</i> 164 <i>Elements Handbook</i> 904-941 <i>How It Works</i> 125 <i>MiniLab</i> 39 <i>Reference Tables</i> 971-974 Teacher Wraparound Edition: CP 70; MIC 191; QD 74

STANDARDS	PAGE REFERENCES
c. Classify a substance as being made up of one kind of atom (element) or a compound when given the molecular formula or structural formula (or electron dot diagram) for the substance	Student Edition: 84-87, 182-186, 218-219, 253-256 Teacher Wraparound Edition: CJ 85; R 254
d. Compare and contrast the common properties of metals, nonmetals, metalloids, and noble gases	Student Edition: 177-181, 225-226 <i>Chemlab</i> 198 <i>Elements Handbook</i> 906-945 Teacher Wraparound Edition: AS 179; VL 225
B. Properties of mixtures depend upon the concentrations, properties, and interactions of particles	
Scope and Sequence – Atomic Theory and Changes in Matter	Student Edition: 81, 478-479, 480-488, 493-496
a. Classify solutions as dilute, concentrated, or saturated	Teacher Wraparound Edition: CD 493; CJ 482; DI 481; E 488; IM 477
b. Compare and contrast the properties of acidic, basic, and neutral solutions	Student Edition: 636-639, 652-658, 659-663 <i>Chemlab</i> 670 Teacher Wraparound Edition: E 537; QD 638
c. Predict the effect of the properties of the solvent or solute (e.g., polarity, temperature, surface area/particle size, concentration, agitation) on the solubility of a substance	Student Edition: 489-492, 495-496 <i>Chemlab</i> 506 Teacher Wraparound Edition: DE 492-493
C. Properties of matter can be explained in terms of moving particles too small to be seen without tremendous magnification	
Not assessed at this level	
D. Physical changes in states of matter due to thermal changes in materials can be explained by the Kinetic Theory of Matter	
Scope and Sequence – Atomic Theory and Changes in Matter	Student Edition: 415-419, 425-428
a. Using the Kinetic Theory model, explain the changes that occur in the distance between atoms/molecules and temperature of a substance as energy is absorbed or released during a phase change	Teacher Wraparound Edition: IM 426

STANDARDS	PAGE REFERENCES
b. Predict the effect of a temperature change on the properties (e.g., pressure, density) of a material (solids, liquids, gases)	Student Edition: 418-419, 444-451, 492-495 Teacher Wraparound Edition: AC 419; DE 492-493
c. Predict the effect of pressure changes on the properties (e.g., temperature, density) of a material (solids, liquids, gases)	Student Edition: 429-430, 442-443, 456, 495-496 <i>Chemistry & Health</i> 465 <i>Chemlab</i> 466 <i>Problem-Solving Lab</i> 72 Teacher Wraparound Edition: DE 442-443; IM 447; R 446
E. The atomic model describes the electrically neutral atom	
Scope and Sequence – Atomic Theory and Changes in Matter a. Describe the atom as having a dense, positive nucleus surrounded by a cloud of negative electrons	Student Edition: 111-114, 136, 146-148 Teacher Wraparound Edition: CJ 110; RC 112
b. Calculate the number of protons, neutrons, and electrons of an element (or isotopes) given its atomic mass (or mass number) and atomic number	Student Edition: 115-117, 178-179 Teacher Wraparound Edition: ICE 118; IM 117
c. Describe the information provided by the atomic number and the mass number (i.e., electrical charge, chemical stability)	Student Edition: 178-179, 191, 194, 265-266 Teacher Wraparound Edition: CU 194; IM 266; MIC 191; R 179
F. The periodic table organizes the elements according to their atomic structure and chemical reactivity	
Scope and Sequence – Atomic Theory and Changes in Matter a. Explain the structure of the periodic table in terms of the elements with common properties (groups/families) and repeating properties (periods)	Student Edition: 84-85, 177-181, 187-191 <i>Elements Handbook</i> 904-945 <i>MiniLab</i> 193 Teacher Wraparound Edition: CJ 192; MIC 191
b. Classify elements as metals, nonmetals, metalloids, and noble gases according to their location on the periodic table	Student Edition: 177-181 <i>Chemlab</i> 196 <i>Elements Handbook</i> 906-915, 922-925, 944-945 Teacher Wraparound Edition: R 179

STANDARDS	PAGE REFERENCES
c. Predict the chemical reactivity of elements, and the type of bonds that may result between them, using the periodic table	Student Edition: 191-194, 206-209, 218-219, 242-243, 265-266 <i>Elements Handbook</i> 906, 910, 916, 922, 926, 932, 936, 940 <i>MiniLab</i> 193 Teacher Wraparound Edition: CP 208; VL 192
G. Properties of objects and states of matter can change chemically and/or physically	
Scope and Sequence – Atomic Theory and Changes in Matter a. Distinguish between physical and chemical changes in matter	Student Edition: 76-79, 82-83, 87 Teacher Wraparound Edition: CU 79; MI 76
H. Chemical bonding is the combining of different pure substances (elements, compounds) to form new substances with different properties	
Scope and Sequence – Atomic Theory and Changes in Matter a. Describe how the valence electron configuration determines how atoms interact and may bond	Student Edition: 153-155, 161, 181-183; 206-207 Teacher Wraparound Edition: CB 161; R 207
b. Predict the reaction rates of different substances based on their properties (i.e., concentrations of reactants, pressure, temperature, state of matter, surface area, type of reactant material)	Student Edition: 568-570 <i>Chemistry & Health</i> 583 <i>Chemlab</i> 584 <i>MiniLab</i> 571 <i>Problem-Solving Lab</i> 566 Teacher Wraparound Edition: DE 568-569; MI 560
c. Compare and contrast the types of chemical bonds (i.e., ionic, covalent)	Student Edition: 210-217, 225-228, 240-247, 266, 269-270 <i>Chemlab</i> 230 <i>MiniLab</i> 242 <i>Real-World Chemistry</i> 220 Teacher Wraparound Edition: CD 245; CP 210; CU 228; DE 248-249; MIC 214; VL 241

STANDARDS	PAGE REFERENCES
<p>d. Identify the consequences of different types of reactions (i.e., oxidation/reduction reactions such as combustion, acid/base reactions) to humans and human activity</p>	<p>Student Edition: 290-292, 573, 718-732, 747-749, 810-812 <i>Chemistry & Health</i> 583 <i>Connection to Biology</i> 308 <i>Data Analysis Lab</i> 691 <i>Everyday Chemistry</i> 431, 669 <i>How It Works</i> 549 <i>MiniLab</i> 227, 457, 683</p> <p>Teacher Wraparound Edition: AC 296, 305; CB 290, 692; CP 292; E 303, 752; QD 293</p>
<p>1. Mass is conserved during any physical or chemical change</p>	
<p>Scope and Sequence – Atomic Theory and Changes in Matter</p> <p>a. Compare the mass of the reactants to the mass of the products in a chemical reaction or physical change as support for the Law of Conservation of Mass</p>	<p>Student Edition: 77-78, 105, 285, 288, 368-370</p> <p>Teacher Wraparound Edition: CJ 369; CP 78; E 77</p>
<p>b. Recognize whether the number of atoms of the reactants and products in a chemical equation are balanced</p>	<p>Student Edition: 285-288, 373-377, 380-384, 689-695, 728-732</p> <p><i>Problem-Solving Strategies</i> 374, 696</p> <p>Teacher Wraparound Edition: CD 373; IM 286, 380</p>
<p>2. Energy has a source, can be transferred, and can be transformed into various forms but is conserved between and within systems</p>	
<p>A. Forms of energy have a source, a means of transfer (work and heat), and a receiver</p>	
<p>Scope and Sequence – Energy Forms and Transfer</p> <p>a. Differentiate between thermal energy (the total internal energy of a substance which is dependent upon mass), heat (thermal energy that transfers from one object or system to another due to a difference in temperature), and temperature (the measure of average kinetic energy of molecules or atoms in a substance)</p>	<p>Student Edition: 402-403, 516-518, 523-528</p> <p><i>Chemlab</i> 550</p> <p>Teacher Wraparound Edition: IM 520; R 522, 528</p>
<p>b. Recognize chemical energy as the energy stored in the bonds between atoms in a compound</p>	<p>Student Edition: 516-518, 525-528</p> <p>Teacher Wraparound Edition: CD 523; MI 516</p>

STANDARDS	PAGE REFERENCES
c. Describe the relationship among wavelength, energy, and frequency as illustrated by the electromagnetic spectrum	Student Edition: 138-140, 142-143 Teacher Wraparound Edition: CJ 138; R 140
d. Differentiate between the properties and examples of conductors and insulators of different forms of energy (i.e., thermal, mechanical, electromagnetic)	Student Edition: 177, 180, 225-226 <i>Launch Lab</i> 205 Teacher Wraparound Edition: VL 225
e. Describe sources and common uses of different forms of energy (i.e., chemical, nuclear, thermal, mechanical, electromagnetic)	Student Edition: 516-518, 522, 710-711, 718-723, 729-732, 747-749, 846, 880-882 <i>How It Works</i> 309, 733 Teacher Wraparound Edition: CD 516, 718; CJ 846; E 519, 732, 883
f. Identify and evaluate advantages/disadvantages of using various sources of energy (e.g., wind, solar, geothermal, hydroelectric, biomass, fossil fuel) for human activity	Student Edition: 516-518, 522, 527-528, 710-711, 718-723, 726-727, 729-732, 747-749, 846, 880-882 <i>Chemlab</i> 550 <i>How It Works</i> 549, 733 <i>Launch Lab</i> 514 Teacher Wraparound Edition: CD 516, 718; CJ 517, 846; CP 729; E 519, 581, 732, 883
g. Describe the effect of different frequencies of electromagnetic waves on the Earth and living organisms (e.g., radio, infrared, visible, ultraviolet, gamma, cosmic rays)	Student Edition: 5-7, 138-139, 354, 522, 846, 888-889 Teacher Wraparound Edition: CD 6; CP 142; E 889; ICE 143
h. Interpret examples (e.g., land and sea breezes, home heating, plate tectonics) of heat transfer as convection, conduction, or radiation	Student Edition: 522 Teacher Wraparound Edition: ICE 143; QD 6
B. Mechanical energy comes from the motion (kinetic energy) and/or relative position (potential energy) of an object	
Scope and Sequence – Interactions between Energy, Force, and Motion a. Relate kinetic energy to an object’s mass and its velocity	Student Edition: 402-403, 516-517 Teacher Wraparound Edition: DI 402; MI 516

STANDARDS	PAGE REFERENCES
b. Relate an object's gravitational potential energy to its weight and height relative to the surface of the Earth	Student Edition: 516 Teacher Wraparound Edition: MI 516
c. Distinguish between examples of kinetic and potential energy (i.e., gravitational, elastic) within a system	Student Edition: 402-403, 516-517 Teacher Wraparound Edition: MI 516
d. Describe the effect of work on an object's kinetic and potential energy	Student Edition: 403-404 Teacher Wraparound Edition: MI 516
C. Electromagnetic energy from the Sun (solar radiation) is a major source of energy on Earth	
Scope and Sequence – Energy Forms and Transfer (Objects in the Universe and Their Motion) a. Identify stars as producers of electromagnetic energy	Student Edition: 138, 864 <i>Real-World Chemistry</i> 883 Teacher Wraparound Edition: E 883
b. Describe how electromagnetic energy is transferred through space as electromagnetic waves (radiating charged particles) of varying wavelength and frequency	Student Edition: 137-139, 864 Teacher Wraparound Edition: CP 139
D. Chemical reactions involve changes in the bonding of atoms with the release or absorption of energy	
Scope and Sequence – Energy Forms and Transfer/Atomic Theory and Changes in Matter a. Describe evidence of energy transfer and transformations that occur during exothermic and endothermic chemical reactions	Student Edition: 247, 282-283, 525-528, 533 <i>Chemlab</i> 550 <i>Launch Lab</i> 281 Teacher Wraparound Edition: E 519; QD 518, 564
E. Nuclear energy is a major source of energy throughout the universe	
Scope and Sequence – Energy Forms and Transfer a. Describe how changes in the nucleus of an atom during a nuclear reaction (i.e., nuclear decay, fusion, fission) result in emission of radiation	Student Edition: 860-864, 865-874, 875-878 Teacher Wraparound Edition: CD 875; MI 865; R 874

STANDARDS	PAGE REFERENCES
b. Identify the role of nuclear energy as it serves as a source of energy for the Earth, stars, and human activity (e.g., source of electromagnetic radiation, thermal energy within mantle, nuclear power plants, fuel for stars)	Student Edition: 354, 522, 877-882 <i>Real-World Chemistry</i> 883 Teacher Wraparound Edition: DI 880; E 881, 883; MIC 877
F. Energy can change from one form to another within and between systems, but the total amount remains the same	
Scope and Sequence – Energy Forms and Transfer a. Describe the transformations that occur as energy changes from kinetic to potential within a system (e.g., car moving on rollercoaster track, child swinging, diver jumping off a board) (Do NOT assess calculations)	Student Edition: 516-517, 710-711 Teacher Wraparound Edition: MI 516
b. Compare the efficiency of simple machines (recognizing that, as work is done, the amount of usable energy decreases with each transformation as it is transferred as heat due to friction)	Student Edition: 517 Teacher Wraparound Edition: E 519; VL 527
c. Classify the different forms of energy (i.e., chemical, nuclear, thermal, mechanical, electromagnetic) that can be observed as energy is transferred and transformed within a system when given a scenario (e.g., dynamite explosion, solar radiation interacting with the Earth, electromagnetic motor doing work, energy generated by nuclear reactor)	Student Edition: 516-517, 522, 523-524, 526-527, 708-711, 718-723, 877-882 <i>Chemlab</i> 550 <i>Data Analysis Lab</i> 691 <i>How It Works</i> 549 <i>Launch Lab</i> 707 Teacher Wraparound Edition: E 528; MIC 516, 877; QD 719
d. Explain how energy can be transferred (absorbed or released) or transformed between and within systems as the total amount of energy remains constant (i.e., Law of Conservation of Energy)	Student Edition: 516-517, 710-711 Teacher Wraparound Edition: MIC 516

STANDARDS	PAGE REFERENCES
Strand 7: Scientific Inquiry	
1. Science understanding is developed through the use of science process skills, scientific knowledge, scientific investigation, reasoning, and critical thinking	
A. Scientific inquiry includes the ability of students to formulate a testable question and explanation, and to select appropriate investigative methods in order to obtain evidence relevant to the explanation	
Scope and Sequence - All Units a. Formulate testable questions and hypotheses	Student Edition: 12-13 <i>Chemlab</i> 24, 60 <i>MiniLab</i> 39 <i>Problem-Solving Lab</i> 50, 150, 294, 531, 566, 842 Teacher Wraparound Edition: MIC 12
b. Analyzing an experiment, identify the components (i.e., independent variable, dependent variables, control of constants, multiple trials) and explain their importance to the design of a valid experiment	Student Edition: 14-15 <i>Chemlab</i> 24, 310, 356, 506, 734 Teacher Wraparound Edition: DI 14; E 16
c. Design and conduct a valid experiment	Student Edition: 14-15 <i>Chemlab</i> 92, 506, 850 <i>Data Analysis Lab</i> 408, 478, 768 Teacher Wraparound Edition: QD 14
d. Recognize it is not always possible, for practical or ethical reasons, to control some conditions (e.g., when sampling or testing humans, when observing animal behaviors in nature)	Student Edition: 20-21 <i>Chemistry & Health</i> 59 <i>Chemlab</i> 892 <i>How It Works</i> 271, 309, 733 Teacher Wraparound Edition: E 22
e. Acknowledge some scientific explanations (e.g., explanations of astronomical or meteorological phenomena) cannot be tested using the standard experimental “scientific method” due to the limits of the laboratory environment, resources, and/or technologies	Student Edition: 6-8, 18, 20-21 <i>Problem-Solving Lab</i> 180 Teacher Wraparound Edition: CP 20; E 151

STANDARDS	PAGE REFERENCES
f. Acknowledge there is no fixed procedure called “the scientific method”, but that some investigations involve systematic observations, carefully collected and relevant evidence, logical reasoning, and some imagination in developing hypotheses and other explanations	Student Edition: 12-15, 17-18 Teacher Wraparound Edition: MI 12; QD 14
g. Evaluate the design of an experiment and make suggestions for reasonable improvements	Student Edition: <i>Chemlab</i> 60, 272, 432, 624, 816 <i>Data Analysis Lab</i> 21, 478 Teacher Wraparound Edition: QD 6, 14
B. Scientific inquiry relies upon gathering evidence from qualitative and quantitative observations	
Scope and Sequence - All Units a. Make qualitative and quantitative observations using the appropriate senses, tools and equipment to gather data (e.g., microscopes, thermometers, analog and digital meters, computers, spring scales, balances, metric rulers, graduated cylinders)	Student Edition: 12-13, 34-35 <i>Chemlab</i> 60, 356, 432 <i>MiniLab</i> 13 Teacher Wraparound Edition: CJ 14; CU 16; DE 34-35; DI 36
b. Measure length to the nearest millimeter, mass to the nearest gram, volume to the nearest milliliter, force (weight) to the nearest Newton, temperature to the nearest degree Celsius, time to the nearest second	Student Edition: 34-37 <i>Math Handbook</i> 952 <i>MiniLab</i> 39 Teacher Wraparound Edition: DE 34-35; DI 36
c. Determine the appropriate tools and techniques to collect, analyze, and interpret data	Student Edition: 34-37 <i>Chemistry & Health</i> 163 <i>How It Works</i> 125 <i>MiniLab</i> 39 Teacher Wraparound Edition: DE 34-35; DI 36
d. Judge whether measurements and computation of quantities are reasonable	Student Edition: 18, 47-49 <i>MiniLab</i> 242 Teacher Wraparound Edition: AC 42; CU 8; E 52; IM 48

STANDARDS	PAGE REFERENCES
e. Calculate the range, average/mean, percent, and ratios for sets of data	Student Edition: 560-562 <i>Chemlab</i> 24, 60 <i>Problem-Solving Lab</i> 566 Teacher Wraparound Edition: ICE 562
f. Recognize observation is biased by the experiences and knowledge of the observer (e.g., strong beliefs about what should happen in particular circumstances can prevent the detection of other results)	Student Edition: 10, 13 <i>MiniLab</i> 13 Teacher Wraparound Edition: DE 12-13
C. Evidence is used to formulate explanations	
Scope and Sequence - All Units a. Use quantitative and qualitative data as support for reasonable explanations (conclusions)	Student Edition: 13 <i>Chemlab</i> 24, 60, 164, 310, 432, 584 <i>Problem-Solving Lab</i> 444, 622, 668 Teacher Wraparound Edition: CJ 14; E 52
b. Analyze experimental data to determine patterns, relationship, perspectives, and credibility of explanations (e.g., predict/extrapolate data, explain the relationship between the independent and dependent variable)	Student Edition: 14-15, 55-58 <i>Chemlab</i> 60 <i>Math Handbook</i> 958-963 <i>MiniLab</i> 193, 571, 648 Teacher Wraparound Edition: E 16, 58
c. Identify the possible effects of errors in observations, measurements, and calculations on the validity and reliability of data and resultant explanations (conclusions)	Student Edition: 48 <i>Chemlab</i> 60, 356, 390, 432, 734 Teacher Wraparound Edition: E 48
D. Scientific inquiry includes evaluation of explanations (hypotheses, laws, theories) in light of scientific principles (understandings)	
Scope and Sequence - All Units a. Analyze whether evidence (data) and scientific principles support proposed explanations (hypotheses, laws, theories)	Student Edition: 12-16, 20-21 <i>Data Analysis Lab</i> 216, 387, 691 <i>Problem-Solving Lab</i> 444, 622, 668, 842 Teacher Wraparound Edition: CP 20; IM 15

STANDARDS	PAGE REFERENCES
b. Evaluate the reasonableness of an explanation (conclusion)	Student Edition: 18, 47-49 <i>MiniLab</i> 242 Teacher Wraparound Edition: AC 42; CU 8; E 52; IM 48
E. The nature of science relies upon communication of results and justification of explanations	
Scope and Sequence - All Units a. Communicate the procedures and results of investigations and explanations through: <ul style="list-style-type: none"> _ oral presentations _ drawings and maps _ data tables (allowing for the recording and analysis of data relevant to the experiment such as independent and dependent variables, multiple trials, beginning and ending times or temperatures, derived quantities) _ graphs (bar, single, and multiple line) _ equations and writings 	Student Edition: 8, 55-58, 182-183, 187-194, 266, 379-380 <i>Chemistry & Health</i> 59, 195 <i>Chemlab</i> 60 <i>Data Analysis Lab</i> 21, 113, 216 <i>Problem-Solving Lab</i> 180 Teacher Wraparound Edition: CD 55; CJ 89; CP 20; ICE 116; E 20, 57
b. Communicate and defend a scientific argument	Student Edition: 12-16 <i>Chemistry & Health</i> 59, 583 <i>Chemlab</i> 24, 60, 230, 272, 310, 356, 432, 584, 776 <i>Everyday Chemistry</i> 229, 355 Teacher Wraparound Edition: DE 12-13; DI 74
c. Explain the importance of the public presentation of scientific work and supporting evidence to the scientific community (e.g., work and evidence must be critiqued, reviewed, and validated by peers; needed for subsequent investigations by peers; results can influence the decisions regarding future scientific work)	Student Edition: 15-16, 20-21 <i>In the Field</i> 505, 697, 849, 891 Teacher Wraparound Edition: CB 184, 876; DI 14; E 16, 22; TS 505, 697, 849, 891

STANDARDS	PAGE REFERENCES
Strand 8: Impact of Science, Technology, and Human Activity	
1. The nature of technology can advance, and is advanced by, science as it seeks to apply scientific knowledge in ways that meet human needs	
A. Designed objects are used to do things better or more easily and to do some things that could not otherwise be done at all	
Not assessed at this level	
B. Advances in technology often result in improved data collection and an increase in scientific information	
<p>Scope and Sequence - All Units</p> <p>a. Recognize the relationships linking technology and science (e.g., how technological problems may create a demand for new science knowledge, how new technologies make it possible for scientists to extend research and advance science)</p>	<p>Student Edition: 17-18, 718-727, 729-732, 747-749, 809-814, 877-882 <i>Data Analysis Lab</i> 216, 387, 691 <i>How It Works</i> 549, 733 <i>Problem-Solving Lab</i> 622 Teacher Wraparound Edition: AC 804; CD 718; CJ 721; CP 692; MI 17; QD 693, 747</p>
C. Technological solutions to problems often have drawbacks as well as benefits	
<p>Scope and Sequence - All Units</p> <p>a. Identify and evaluate the drawbacks (e.g., design constraints, unintended consequences, risks) and benefits of technological solutions to a given problem (e.g., damming a river for flood control, using pesticides to eliminate mosquitoes, genetic engineering of cells, use of satellite communications to gather information)</p>	<p>Student Edition: 718-727, 729-732, 747-749, 814, 877-882 <i>Data Analysis Lab</i> 216, 387, 691 <i>How It Works</i> 549, 733 Teacher Wraparound Edition: AC 804; CB 18, 692; CD 387, 718; CJ 721; DI 724; E 720, 883; MI 17, 885; QD 693, 747</p>
2. Historical and cultural perspectives of scientific explanations help to improve understanding of the nature of science and how science knowledge and technology evolve over time	
A. People of different gender and ethnicity have contributed to scientific discoveries and the invention of technological innovations	
<p>Scope and Sequence - All Units</p> <p>a. Recognize contributions to science are not limited to the work of one particular group, but are made by a diverse group of scientists representing various ethnic and gender groups</p>	<p>Student Edition: 102-104, 184-185, 842, 860-861 <i>Careers in Chemistry</i> 123, 185, 267 Teacher Wraparound Edition: CB 18, 89, 876; CD 33, 868; CJ 7, 290; CP 9, 78, 860</p>

STANDARDS	PAGE REFERENCES
b. Recognize gender and ethnicity of scientists often influence the questions asked and/or the methods used in scientific research and may limit or advance science knowledge and/or technology	Student Edition: 110-111, 882-883 Teacher Wraparound Edition: CB 18; CD 33, 110
B. Scientific theories are developed based on the body of knowledge that exists at any particular time and must be rigorously questioned and tested for validity	
Scope and Sequence - All Units a. Identify and describe how explanations (hypotheses, laws, theories) of scientific phenomena have changed over time as a result of new evidence (e.g., model of the solar system, basic structure of matter, structure of an atom, Theory of Plate Tectonics, Big Bang and nebular theory of the universe, explanation of electric current)	Student Edition: 102-114, 184-185 <i>In the Field</i> 849 Teacher Wraparound Edition: CD 110; DE 106-107, 112-113; E 108
b. Identify and analyze current theories that are being questioned, and compare them to new theories that have emerged to challenge older ones (e.g., Theory of Evolution, theories of extinction, global warming) (Assess Locally)	Student Edition: <i>Chemistry & Health</i> 163, 389 <i>How It Works</i> 549 Teacher Wraparound Edition: DI 14; E 16
3. Science and technology affect, and are affected by, society	
A. People, alone or in groups, are always making discoveries about nature and inventing new ways to solve problems and get work done	
Not assessed at this level	
B. Social, political, economic, ethical, and environmental factors strongly influence, and are influenced by, the direction of progress of science and technology	
Scope and Sequence - All Units a. Analyze the roles of science and society as they interact to determine the direction of scientific and technological progress (e.g., prioritization of and funding for new scientific research and technological development is determined on the basis of individual, political and social values and needs; understanding basic concepts and principles of science and technology influences debate about the economics, policies, politics, and ethics of various scientific and technological challenges)	Student Edition: 809-811, 814, 877-878, 880-884 <i>Chemistry & Health</i> 59, 389 <i>Chemlab</i> 24, 698 <i>Data Analysis Lab</i> 21, 387, 691, 768, 805 <i>How It Works</i> 549 <i>Problem-Solving Lab</i> 622 Teacher Wraparound Edition: AC 804; CB 876, 880; CD 806; CP 810

STANDARDS	PAGE REFERENCES
<p>b. Identify and describe major scientific and technological challenges to society and their ramifications for public policy (e.g., global warming, limitations to fossil fuels, genetic engineering of plants, space and/or medical research)</p>	<p>Student Edition: 747-749, 809-811, 814, 877-878, 880-884 <i>Chemistry & Health</i> 59, 389 <i>Chemlab</i> 24, 698 <i>Data Analysis Lab</i> 21, 387, 691, 768 <i>How It Works</i> 549 Teacher Wraparound Edition: CB 876, 880; CJ 748; CP 810</p>
<p>c. Analyze and evaluate the social, political, economic, ethical, and environmental factors affecting progress toward meeting major scientific and technological challenges (e.g., limitations placed on stem-cell research or genetic engineering, introduction of alien species, deforestation, bioterrorism, nuclear energy, genetic counseling, computer technology)</p>	<p>Student Edition: 747-749, 809-811, 814, 877-878, 880-884 <i>Chemistry & Health</i> 59, 389 <i>Chemlab</i> 24, 698 <i>Data Analysis Lab</i> 21, 387, 691, 768 <i>How It Works</i> 549 Teacher Wraparound Edition: CB 876, 880; CJ 748; CP 810, 879</p>
<p>C. Scientific ethics require that scientists must not knowingly subject people or the community to health or property risks without their knowledge and consent</p>	
<p>Scope and Sequence - All Units a. Identify and evaluate the need for informed consent in experimentation</p>	<p>Student Edition: 14-15 <i>Chemlab</i> 892 Teacher Wraparound Edition: CP 19; MI 17</p>
<p>b. Identify the ethical issues involved in experimentation (i.e., risks to organisms or environment)</p>	<p>Student Edition: <i>Chemlab</i> 892 Teacher Wraparound Edition: CU 22</p>
<p>c. Identify and evaluate the role of models as an ethical alternative to direct experimentation (e.g., using a model for a stream rather than pouring oil in an existing stream when studying the effects of oil pollution)</p>	<p>Student Edition: 10, 15 <i>Chemlab</i> 60 <i>MiniLab</i> 120, 457, 873 <i>Problem-Solving Lab</i> 326, 842</p>
<p>D. Scientific information is presented through a number of credible sources, but is at times influenced in such a way to become non-credible</p>	
<p>Scope and Sequence - All Units a. Evaluate a given source for its scientific credibility (e.g., articles in a new periodical quoting an “eyewitness”, a scientist speaking within or outside his/her area of expertise)</p>	<p>Student Edition: <i>Data Analysis Lab</i> 216 <i>In the Field</i> 505, 849 Teacher Wraparound Edition: CJ 17; DI 14; E 16, 22; TS 849</p>

STANDARDS	PAGE REFERENCES
b. Explain why accurate record-keeping, openness, and replication are essential for maintaining an investigator's credibility with other scientists and society	Student Edition: 14-16 <i>Careers in Chemistry</i> 56, 219, 604 Teacher Wraparound Edition: CB 184; CD 33; CP 729; IM 48