



LAB-AIDS Correlations for
Virginia Science Standards of Learning
MIDDLE SCHOOL, Grades 6-8

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This document is intended to show our alignment with the Virginia Science Standards of Learning for Grades 6-8.¹

ABOUT OUR PROGRAMS

LAB-AIDS Core Science Programs are developed to support current knowledge on the teaching and learning of science. All materials support an inquiry-driven pedagogy, with support for literacy skill development and with assessment programs that clearly show what students know and are able to do from using the programs. All programs have extensive support for technology in the school science classrooms, and feature comprehensive teacher support. For more information please visit www.lab-aids.com and navigate to the program of interest.

Materials from the Science Education for Public Understanding Program (SEPUP) are developed at the Lawrence Hall of Science, at the University of California, Berkeley, and distributed nationally by LAB-AIDS, Inc. SEPUP materials are supported by grants from the National Science Foundation. All other materials developed by LAB-AIDS. This correlation is intended to show selected locations in SEPUP 2nd Edition programs that support the Virginia Science Standards of Learning. It is not an exhaustive list; other locations may exist that are not listed here.

¹ http://www.doe.virginia.gov/testing/sol/standards_docs/science/



Key to SEPUP Core Science Programs:

SEPUP programs are available as full year courses, or separately, as units, each taking 3-9 weeks to complete, as listed below.

Issues and Earth Science, Second Edition (IAES)

Unit Title	Activity Number
Studying Soil Scientifically	1-11
Rocks and Minerals	12-23
Erosion and Deposition	24-35
Plate Tectonics	36-49
Weather and Atmosphere	50-70
The Earth in Space	71-84
Exploring Space	85-98

Issues and Life Science, Second Edition (IALS)

Unit Title	Activity Number
Experimental Design: Studying People Scientifically	1-10
Body Works	11-29
Cell Biology and Disease	30-53
Genetics	54-71
Ecology	72-88
Evolution	89-101
Bioengineering	102-109

Issues and Physical Science, Second Edition (IAPS)*

Unit Title	Activity Number
Studying Materials Scientifically	1-11
The Chemistry of Materials	12-29
Water	30-52
Energy	53-72
Force and Motion	73-88
Waves	89-99

**Simple Machines Kit #214 has been added to the Virginia Scope and Sequence.*

Each of the full year programs begins with a “starter” unit sequence on the scientific method in the context of each particular discipline. For example, the Issues and Life Science (IALS) course contains a ten-activity unit called “Experimental Design: Studying People Scientifically,” which uses the science behind clinical trials on human subjects, to frame the study of the life sciences. These are listed first in each course.

ABOUT THE LAB-AIDS CITATIONS

The following tables are presented in a grade-level arrangement following the Virginia Science Standards of Learning.

The citation: Earth in Space 72, 73, 75, 76, means the *Issues and Earth Science* Student Book, Earth in Space unit activities 72, 73, 75, and 76 combine to address the standard.

Grade 6 VA Science Standards of Learning	SEPUP Location
Standard 6.1 Strand: Scientific Investigation, Reasoning, and Logic The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which	
a) observations are made involving fine discrimination between similar objects and organisms;	IAES 88; IALS 36, 38, 44, 75; IAPS 17, 19, 27, 36
b) a classification system is developed based on multiple attributes;	IAPS 12, 15; IALS 12, 44, 75; IAES 88
c) precise and approximate measurements are recorded;	IAPS 8, 9, 10, 25, 35, 42, 51, 56, 59, 60, 61, 62, 63, 67, 69, 70, 74, 76, 77, 81, 82, 90; IALS 14, 17, 19, 22, 27, 40, 47, 54, 105; IAES 4, 10, 13, 21, 37, 38, 72, 90, 91, 93
d) scale models are used to estimate distance, volume, and quantity;	IALS 17, 21, 41, 51; IAES 38, 90, 91; IAPS 67, 69, 74
e) hypotheses are stated in ways that identify the independent (manipulated) and dependent (responding) variables;	IAPS 3, 38, 51, 54, 56A, 65, 66, 68, 74, 77, 98 IALS 5, 8, 14, 48, 64, 81, 83, 104, 105, 109 IAES 16, 55, 67, 72
f) a method is devised to test the validity of predictions and inferences;	IAPS 3, 38, 51, 54, 56A, 65, 66, 68, 74, 77, 98 IALS 5, 8, 14, 48, 64, 81, 83, 104, 105, 109 IAES 16, 55, 67, 72
g) one variable is manipulated over time, using many repeated trials;	IAPS 54, 56, 74, 76, 79, 82, 86, 98; IALS 5, 8, 14, 19, 27, 48, 64, 81, 83; IAES 37, 43, 72
h) data are collected, recorded, analyzed, and reported using appropriate metric measurements;	IAPS 6, 7, 8, 9, 10, 54, 56, 61, 62, 63, 67, 69, 70, 74, 76, 77, 82, 95, 97; IALS 22, 27, 47, 54, 104, 105, 109; IAES 21, 51, 52, 55, 64, 72, 90, 91, 92
i) data are organized and communicated through graphical representation (graphs, charts, and diagrams);	IAPS 12, 19, 22, 27, 41, 46, 92, 95; IALS 8, 17, 19, 30, 39, 40, 46, 47, 51, 54, 59, 64, 77, 84, 96, 98; IAES 27, 51
j) models are designed to explain a sequence; and	IAPS 17, 20, 36, 39, 49, 60, 70, 86; IALS 24, 30, 40, 41, 51, 58, 69, 84, 92, 95, 96; IAES 21, 28, 31, 37, 43, 46, 62, 73, 77, 80, 90
k) an understanding of the nature of science is developed and reinforced.	SEPUP materials support students' developing ideas about the nature of science,

Grade 6 VA Science Standards of Learning	SEPUP Location
	by using different types of activities, such as labs and investigations, but also modeling and ‘talking it over’ activities that support an empirical, hands on approach, but also meaning making. The assessment system tracks student progress on key nature of science skills, such as <i>Issues and Earth Science Activities</i> 16, 23, 35, 36, 49, 55, 67, 70, 72, 76, 82, 83, 89, 94, and 98.
Standard 6.2 Strand: Force, Motion, and Energy The student will investigate and understand basic sources of energy, their origins, transformations, and uses. Key concepts include	
a) potential and kinetic energy;	IAPS Energy 54, 55, 56, 58
b) the role of the sun in the formation of most energy sources on Earth;	IAPS Energy 58, 64, 68, 69, 70
c) nonrenewable energy sources (fossil fuels, including petroleum, natural gas, and coal);	IAPS Energy 64
d) renewable energy sources (wood, wind, hydro, geothermal, tidal, and solar); and	IAPS Energy 64
e) energy transformations (heat/light to mechanical, chemical, and electrical energy).	IAPS Energy 54, 55, 56, 57, 59, 60, 62, 63, 65A, 66, 67, 69
Standard 6.3 Strand: Force, Motion, and Energy The student will investigate and understand the role of solar energy in driving most natural processes within the atmosphere, the hydrosphere, and on the Earth’s surface. Key concepts include	
a) the Earth’s energy budget;	Plate Tectonics 38; Weather and Atmosphere 55, 57, 58; The Earth in Space 79, 81
b) the role of radiation and convection in the distribution of energy;	Plate Tectonics 48; Weather and Atmosphere 55, 57, 58, 60
c) the motion of the atmosphere and the oceans;	Weather and Atmosphere 57, 68
d) cloud formation; and	Weather and Atmosphere 60, 66
e) the role of heat energy in weather-related phenomena including thunderstorms and hurricanes.	Weather and Atmosphere 58, 66
Standard 6.4 Strand: Matter	

Grade 6	SEPUP Location
VA Science Standards of Learning	
The student will investigate and understand that all matter is made up of atoms. Key concepts include	
a) atoms are made up of electrons, protons, and neutrons;	IAPS Water 50
b) atoms of any element are alike but are different from atoms of other elements;	IAPS Chemistry of Materials 15, 16, 17,19; Water 36
c) elements may be represented by chemical symbols;	IAPS Chemistry of Materials 15, 16, 17, 19; Water 36, 50
d) two or more atoms may be chemically combined;	IAPS Chemistry of Materials 16, 17, 19; Water 36
e) compounds may be represented by chemical formulas;	IAPS Chemistry of Materials 16, 17, 19; Water 36, 50
f) chemical equations can be used to model chemical changes; and	IAPS Chemistry of Materials 19, 20, 27, 28; Water 50
g) a limited number of elements comprise the largest portion of the solid Earth, living matter, the oceans, and the atmosphere.	IAPS Chemistry of Materials 15, 16
Standard 6.5 Strand: Matter The student will investigate and understand the unique properties and characteristics of water and its roles in the natural and human-made environment. Key concepts include	
a) water as the universal solvent;	IAPS Water 38
b) the properties of water in all three states;	Water 35, 39
c) the action of water in physical and chemical weathering;	Studying Soil Scientifically 5; Erosion and Deposition 28, 29, 33
d) the ability of large bodies of water to store heat and moderate climate;	Weather and Atmosphere 55, 56, 57, 58
e) the origin and occurrence of water on Earth;	Weather and Atmosphere 65
f) the importance of water for agriculture, power generation, and public health; and	IAPS Water 44, 52; IAES Weather and Atmosphere 60
g) the importance of protecting and maintaining water resources.	IAPS Water 39, 42, 44, 51, 52; IAES Erosion and Deposition 30; Weather and Atmosphere 60
Standard 6.6 Strand: Matter The student will investigate and understand the properties of air and the structure and dynamics of the Earth's atmosphere. Key concepts include	
a) air as a mixture of gaseous elements and compounds;	Weather and Atmosphere 64, 65, 66
b) air pressure, temperature, and humidity;	Weather and Atmosphere 51, 53, 56, 64, 66, 68, 69, 70
c) how the atmosphere changes with altitude;	Weather and Atmosphere 64, 66
d) natural and human-caused changes to the atmosphere;	Weather and Atmosphere 65,

Grade 6 VA Science Standards of Learning	SEPUP Location
	66, 70
e) the relationship of atmospheric measures and weather conditions;	Weather and Atmosphere 66, 69, 70
f) basic information from the weather maps including fronts, systems, and basic measurements; and	Weather and Atmosphere 51, 69, 70
g) the importance of protecting and maintaining air quality.	Weather and Atmosphere 65, 66, 70
Standard 6.7 Strand: Living Systems The student will investigate and understand the natural processes and human interactions that affect watershed systems. Key concepts include	
a) the health of ecosystems and the abiotic factors of a watershed;	Erosion and Deposition 29, 30, 34, 35
b) the location and structure of Virginia’s regional watershed systems;	Local standard
c) divides, tributaries, river systems, and river and stream processes;	Erosion and Deposition 28, 29, 30
d) wetlands;	Erosion and Deposition 24, 27, 29, 30
e) estuaries;	Erosion and Deposition 24, 29, 30, 33, 34, 35
f) major conservation, health, and safety issues associated with watersheds; and	39, 40, 41, 42, 43, 44, 45, 46, 47, 50, 51, 52
g) water monitoring and analysis using field equipment including hand-held technology.	Not covered.
Standard 6.8 Strand: Interrelationships in Earth/Space Systems The student will investigate and understand the organization of the solar system and the relationships among the various bodies that comprise it. Key concepts include	
a) the sun, moon, Earth, other planets and their moons, meteors, asteroids, and comets;	Exploring Space 88, 89, 90, 91
b) relative size of and distance between planets;	Exploring Space 90, 91
c) the role of gravity;	Exploring Space 95, 96
d) revolution and rotation;	The Earth in Space 76, 78, 81, 84
e) the mechanics of day and night and the phases of the moon;	The Earth in Space 73, 74, 79, 80, 81, 82
f) the unique properties of Earth as a planet;	Exploring Space 88
g) the relationship of the Earth’s tilt and the seasons;	The Earth in Space 75, 76, 77, 78
h) the cause of tides; and	The Earth in Space 82
i) the history and technology of space exploration.	Exploring Space 85, 87
Standard 6.9 Strand: Resources The student will investigate and understand public policy decisions relating to the environment.	

Grade 6 VA Science Standards of Learning	SEPUP Location
Key concepts include	
a) management of renewable resources (water, air, soil, plant life, animal life);	IAPS Energy 64
b) management of nonrenewable resources (coal, oil, natural gas, nuclear power, mineral resources);	IAPS Energy 64
c) the mitigation of land-use and environmental hazards through preventative measures; and	IAPS Water 34, 39, 42, 43, 45, 51; Erosion and Deposition 29, 30, 35, 36
d) cost/benefit tradeoffs in conservation policies.	IALS Ecology 72

Grade 7 – Life Science VA Science Standards of Learning	SEPUP Location
Standard LS.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which	
a) data are organized into tables showing repeated trials and means;	Studying People Scientifically 5, 8; Body Works 14, 19, 27; Cell Biology and Disease 48; Genetics 59; Ecology 81, 83, 84; Evolution 95, 96
b) a classification system is developed based on multiple attributes;	Body Works 12, 14; Cell Biology and Disease 44; Ecology 75; Evolution 100
c) triple beam and electronic balances, thermometers, metric rulers, graduated cylinders, and probeware are used to gather data;	Body Works 14; Cell Biology and Disease 47; Ecology 81, 86; Evolution 91, 92, 93, 99; Bioengineering 105
d) models and simulations are constructed and used to illustrate and explain phenomena;	Body Works 24; Cell Biology and Disease 30, 40, 41, 51; Genetics 58, 69; Ecology 84; Evolution 92, 95, 96
e) sources of experimental error are identified;	Studying Materials Scientifically 10; Chemistry of Materials 25; Energy 54, 56, 63, 65, 66, 67, 68; Force and Motion 74, 77; Waves 90
f) dependent variables, independent variables, and constants are identified;	Studying People Scientifically 3, 5, 8, 14, Genetics 64, ; Ecology 77, 81, 83; Bioengineering 105, 109
g) variables are controlled to test hypotheses and trials are repeated;	Studying People Scientifically 5, 8; Body Works 14, 19; Cell Biology and Disease 48; Genetics 64; Ecology 81, 83; Bioengineering 109
h) data are organized, communicated through graphical representation, interpreted, and used to make predictions;	Studying People Scientifically 8; Body Works 17, 19; Cell Biology and Disease 30, 39, 40, 46, 47, 51; Genetics 54, 59, 64, 77, 84; Evolution 96, 98
i) patterns are identified in data and are interpreted and evaluated; and	Body Works 14, 17, 19, 27; Cell Biology and Disease 30, 31, 32, 51, 53; Genetics 54, 55, 59, 60, 65, 66; Ecology 72,

Grade 7 – Life Science VA Science Standards of Learning	SEPUP Location
	77, 84, 85; Evolution 92, 96, 98, 99
j) current applications are used to reinforce life science concepts.	Studying People Scientifically 3, 4; Body Works 27, 28, 29; Cell Biology and Disease 30, 31, 48, 51; Genetics 54, 56, 67, 68, 70, 71; Ecology 72, 73, 86, 88; Evolution 89, 101; Bioengineering 102, 104, 105, 107, 109
Standard LS.2 The student will investigate and understand that all living things are composed of cells. Key concepts include	
a) cell structure and organelles;	Cell Biology and Disease 38, 42, 43, 46; Ecology 82,
b) similarities and differences between plant and animal cells;	Cell Biology and Disease 38, 42; Ecology 82
c) development of cell theory; and	Cell Biology and Disease 37
d) cell division	Genetics 63
Standard LS.3 The student will investigate and understand that living things show patterns of cellular organization. Key concepts include	
a) cells, tissues, organs, and systems; and	Body Works 12, 13 (organ), 14 (digestive system), 15 (digestive system), 16 (musculoskeletal system), 17 (respiratory system), 18 (circulatory system), 21-24 (organ, circulatory system); Cell Biology and Disease 42
b) patterns of cellular organization and their relationship to life processes in living things.	Cell Biology and Disease 38, 39, 40, 41, 42; Genetics 57
Standard LS.4 The student will investigate and understand how organisms can be classified. Key concepts include	
a) the distinguishing characteristics of domains of organisms;	Cell Biology and Disease 45, Ecology 75
b) the distinguishing characteristics of kingdoms of organisms;	Cell Biology and Disease 44, 45; Ecology 73, 75, 76; Evolution 100
c) the distinguishing characteristics of major animal phyla and plant divisions; and	Ecology 75, 76 Evolution 90, 100
d) the characteristics that define a species.	Cell Biology and Disease 45; Genetics 58, Ecology 72, 73, 75, 76, 83; Evolution 90, 94, 97

Grade 7 – Life Science	SEPUP Location
VA Science Standards of Learning	
Standard LS.5 The student will investigate and understand the basic physical and chemical processes of photosynthesis and its importance to plant and animal life. Key concepts include	
a) energy transfer between sunlight and chlorophyll;	Cell Biology and Disease 42; Ecology 81, 82
b) transformation of water and carbon dioxide into sugar and oxygen; and	Cell Biology and Disease 42; Ecology 81, 82
c) photosynthesis as the foundation of virtually all food webs.	Ecology 78, 79, 81, 82
Standard LS.6 The student will investigate and understand that organisms within an ecosystem are dependent on one another and on nonliving components of the environment. Key concepts include	
a) the carbon, water, and nitrogen cycles;	IAPS Water 39; Carbon and nitrogen cycles not covered
b) interactions resulting in a flow of energy and matter throughout the system;	Ecology 78, 79, 80, 81
c) complex relationships within terrestrial, freshwater, and marine ecosystems; and	Ecology 83
d) energy flow in food webs and energy pyramids.	Ecology 73, 78, 79, 80, 86
Standard LS.7 The student will investigate and understand that interactions exist among members of a population. Key concepts include	
a) competition, cooperation, social hierarchy, territorial imperative; and	Ecology 77, 84, 85; Evolution 89, 95, 96
b) influence of behavior on a population.	Ecology 72, 73, 77; Evolution 89
Standard LS.8 The student will investigate and understand interactions among populations in a biological community. Key concepts include	
a) the relationships among producers, consumers, and decomposers in food webs;	Ecology 78, 79, 80, 81, 83, 86
b) the relationship between predators and prey;	Ecology 78, 79, 83, 84, 87; Evolution 95
c) competition and cooperation;	Ecology 83, 84; Evolution 95
d) symbiotic relationships; and	Ecology 83 extension
e) niches.	Ecology 83
Standard LS.9 The student will investigate and understand how organisms adapt to biotic and abiotic factors in an ecosystem. Key concepts include	
a) differences between ecosystems and biomes;	Ecology 83
b) characteristics of land, marine, and freshwater ecosystems; and	Ecology 83
c) adaptations that enable organisms to survive within a specific ecosystem.	Evolution 95, 96, 97
Standard LS.10	

Grade 7 – Life Science VA Science Standards of Learning	SEPUP Location
The student will investigate and understand that ecosystems, communities, populations, and organisms are dynamic, change over time, and respond to daily, seasonal, and long-term changes in their environment. Key concepts include	
a) phototropism, hibernation, and dormancy;	Not covered
b) factors that increase or decrease population size; and	Ecology 72, 77, 78, 79, 83, 84, 85, 87; Evolution 89
c) eutrophication, climate changes, and catastrophic disturbances.	Ecology 72, 83; Evolution 89,
Standard LS.11 The student will investigate and understand the relationships between ecosystem dynamics and human activity. Key concepts include	
a) food production and harvest;	Ecology 72, 83; Evolution 89
b) change in habitat size, quality, or structure;	Ecology 72, 73, 83, 88; Evolution 89
c) change in species competition;	Ecology 72, 73, 77, 78, 79, 84, 88
d) population disturbances and factors that threaten or enhance species survival; and	Ecology 72, 73, 77, 83, 87, 88; Evolution 89
e) environmental issues.	The societal issue embedded in the <i>Issues and Life Science Ecology</i> unit is introduced species and their relation to ecosystem dynamics.
Standard LS.12 The student will investigate and understand that organisms reproduce and transmit genetic information to new generations. Key concepts include	
a) the structure and role of DNA;	Genetics 63, 69, 70
b) the function of genes and chromosomes;	Genetics 54, 55, 56, 57, 58, 59, 61, 62, 63, 64, 65, 66
c) genotypes and phenotypes;	Genetics 61, 62, 65, 66
d) characteristics that can and cannot be inherited;	Genetics 54, 55, 56, 57, 58, 59, 60, 62, 64, 65, 66
e) genetic engineering and its applications; and	Evolution 101
f) historical contributions and significance of discoveries related to genetics.	Genetics 60; Bioengineering 108
Standard LS.13 The student will investigate and understand that populations of organisms change over time. Key concepts include	
a) the relationships of mutation, adaptation, natural selection, and extinction;	Evolution 89, 94, 95, 96, 97, 99, 101
b) evidence of evolution of different species in the fossil record; and	Evolution 90, 91, 93, 98, 99
c) how environmental influences, as well as genetic variation, can lead to diversity of organisms.	Genetics 54; Evolution 94, 95, 96, 97

Grade 8 – Physical Science VA Science Standards of Learning	SEPUP Location
Standard PS.1 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations in which	
a) chemicals and equipment are used safely;	Safety notes and safe lab procedure are modeled in all activities, for example <i>Issues and Physical Science</i> activities found in the following: Studying Materials Scientifically 3, 5, 6, 7, 8, 9, 10; Chemistry of Materials 14, 18, 19, 23, 24, 25, 26, 27, 28; Water 30, 35, 37, 38, 40, 41, 42, 45, 46, 48, 51; Energy 54, 59, 60, 62, 63, 65, 67, 69
b) length, mass, volume, density, temperature, weight, and force are accurately measured;	Studying Materials Scientifically 6, 7, 8, 9, 10; Chemistry of Materials 14, 25; Water 35, 42; Energy 54, 56, 59, 60, 61, 62, 63, 65, 67, 69, 70; Force and Motion 74, 76, 77, 81, 82; Waves 95, 97
c) conversions are made among metric units, applying appropriate prefixes;	Science Skills Student Sheet 6a and b
d) triple beam and electronic balances, thermometers, metric rulers, graduated cylinders, probeware, and spring scales are used to gather data;	Studying Materials Scientifically 7, 8, 10; Chemistry of Materials 25; Water 35, 42; Energy 54, 56, 59, 60, 61, 62, 63, 65, 67, 69, 70; Force and Motion 81; Waves 95, 97
e) numbers are expressed in scientific notation where appropriate;	Not covered
f) independent and dependent variables, constants, controls, and repeated trials are identified;	Chemistry of Materials 24, 26, 27; Water 37, 41, 42, 45; Energy 54, 56, 59, 60, 67, 69; Force and Motion 74, 76, 82; Waves 97, 98
g) data tables showing the independent and dependent variables, derived quantities, and the number of trials are constructed and interpreted;	Studying Materials Scientifically 3; Water 38, 51; Energy 54, 56A, 65, 66, 68; Force and Motion 74, 77; Waves 98

h) data tables for descriptive statistics showing specific measures of central tendency, the range of the data set, and the number of repeated trials are constructed and interpreted;	Chemistry of Materials 19, 27; Water 41, 46; Waves 95
i) frequency distributions, scatterplots, line plots, and histograms are constructed and interpreted;	Chemistry of Materials 12, 22; Waves 92
j) valid conclusions are made after analyzing data;	Studying Materials Scientifically 6, 7, 10; Chemistry of Materials 18, 27, 28; Water 35, 37, 38, 41; Energy 63, 64, 67; Force and Motion 83, 87; Waves 90, 92, 94, 97
k) research methods are used to investigate practical problems and questions;	Chemistry of Materials 13 extension (ext), 24 ext; Water 31 ext, 32 ext, 34 ext, 43 ext, 44 ext; Energy 60 ext, 64 ext, 71 ext, 72 ext
l) experimental results are presented in appropriate written form;	Throughout all units but specifically assessed in Chemistry of Materials 27, 29; Water 52; Force and Motion 85
m) models and simulations are constructed and used to illustrate	Chemistry of Materials 17, 20, 23, 26; Water 36, 39, 49; Energy 60, 63, 65, 68, 69, 70; Force and Motion 74, 76, 77, 79, 82, 85, 86 Waves 90
n) current applications of physical science concepts are used.	SEPUP teaches science through personal and societal issues having current applications of science concepts consistently referenced and explored throughout each unit.
Standard PS.2	
The student will investigate and understand the nature of matter. Key concepts include	
a) the particle theory of matter;	Water 35
b) elements, compounds, mixtures, acids, bases, and salts;	Studying Materials Scientifically 1, 3, 5; Chemistry of Materials 15, 16, 17, 36, 46, 47, 48, 49, 50
c) solids, liquids, and gases;	Water 35
d) physical properties;	Studying Materials Scientifically 6, 7, 9, 10;

	Chemistry of Materials 12, 14, 15, 16, 18, 19, 20, 21; Water 35, 50
e) chemical properties; and	Studying Materials Scientifically 6, 7; Chemistry of Materials 14, 15, 16, 18, 19
f) characteristics of types of matter based on physical and chemical properties.	Studying Materials Scientifically 7, 9, 10; Chemistry of Materials 14, 18, 19; Water 35, 46, 47, 48, 49, 50
Standard PS.3	
The student will investigate and understand the modern and historical models of atomic structure. Key concepts include	
a) the contributions of Dalton, Thomson, Rutherford, and Bohr in understanding the atom; and	Not covered
b) the modern model of atomic structure.	Chemistry of Materials 16A
Standard PS.4	
The student will investigate and understand the organization and use of the periodic table of elements to obtain information. Key concepts include	
a) symbols, atomic number, atomic mass, chemical families (groups), and periods;	Chemistry of Materials 15, 16
b) classification of elements as metals, metalloids, and nonmetals; and	Chemistry of Materials 15, 16
c) formation of compounds through ionic and covalent bonding.	Chemistry of Materials 17; Water 36, 50
Standard PS.5	
The student will investigate and understand changes in matter and the relationship of these changes to the Law of Conservation of Matter and Energy. Key concepts include	
a) physical changes;	Water 35, 37, 45
b) chemical changes; and	Chemistry of Materials 19, 21, 24, 26, 27, 28; Energy 63, 65
c) nuclear reactions.	Energy 58, 64
Standard PS.6	
The student will investigate and understand forms of energy and how energy is transferred and transformed. Key concepts include	
a) potential and kinetic energy; and	Energy 54, 55, 56, 57, 58, 63, 64, 65, 65A
b) mechanical, chemical, electrical, thermal, radiant and nuclear energy.	Energy 55, 56, 56A, 57, 58, 59, 60, 61, 62, 63, 64, 65, 67, 69
Standard PS.7	
The student will investigate and understand temperature scales, heat, and thermal energy transfer. Key concepts include	
a) Celsius and Kelvin temperature scales and absolute zero;	Kelvin and absolute zero not covered

b) phase change, freezing point, melting point, boiling point, vaporization, and condensation;	Water 35, 39
c) conduction, convection, and radiation; and	Energy 59, 61, 66, 69, 70
d) applications of thermal energy transfer.	Energy 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65A, 66, 67, 69
Standard PS.8	
The student will investigate and understand the characteristics of sound waves. Key concepts include	
a) wavelength, frequency, speed, amplitude, rarefaction, and compression;	Waves 90, 91, 93
b) resonance;	Not covered
c) the nature of compression waves; and	Waves 91
d) technological applications of sound.	Waves 89, 90, 92, 93
Standard PS.9	
The student will investigate and understand the characteristics of transverse waves. Key concepts include	
a) wavelength, frequency, speed, amplitude, crest, and trough;	Waves 90, 91, 93
b) the wave behavior of light;	Waves 93,
c) images formed by lenses and mirrors;	Not covered
d) the electromagnetic spectrum; and	Waves 96
e) technological applications of light.	Waves 95, 97, 98, 99
Standard PS.10	
The student will investigate and understand the scientific principles of work, force, and motion. Key concepts include	
a) speed, velocity, and acceleration;	Force and Motion 74, 75, 76, 77, 78, 80, 81, 84
b) Newton's laws of motion;	Force and Motion 78, 79, 80, 81, 84
c) work, force, mechanical advantage, efficiency, and power; and	Simple Machines Kit 214
d) technological applications of work, force, and motion.	Force and Motion 73, 74, 76, 77, 79, 81, 82, 83, 84, 85, 87, 88
Standard PS.11	
The student will investigate and understand basic principles of electricity and magnetism. Key concepts include	
a) static electricity, current electricity, and circuits;	Energy 58, 65A, 66
b) relationship between a magnetic field and an electric current;	Energy 56A, 65A
c) electromagnets, motors, and generators and their uses; and	Energy 56A, 65A
d) conductors, semiconductors, and insulators.	Energy 59, 60, 66