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# STAAR Science

Readiness Standards - A Vertical Look  
Grades 5 and 8 and Biology, Chemistry, Physics  
Spring 2011

Reporting Category	Grade 5 Supporting Standards (from Grade 3)	Grade 5 Supporting Standards (from Grade 4)	Grade 5 Readiness Standards
1 Matter and Energy	3.5.C predict, observe, and record changes in the state of matter caused by heating or cooling		5.5.A classify matter based on physical properties, including mass, magnetism, physical state (solid, liquid, and gas), relative density (sinking and floating), solubility in water, and the ability to conduct or insulate thermal energy or electric energy
2 Force, Motion and Energy	3.6.B demonstrate and observe how position and motion can be changed by pushing and pulling objects to show work being done such as swings, balls, pulleys, and wagons		5.6.A explore the uses of energy, including mechanical, light, thermal, electrical, and sound energy  5.6.B demonstrate that the flow of electricity in circuits requires a complete path through which an electric current can pass and can produce light, heat, and sound  5.6.C demonstrate that light travels in a straight line until it strikes an object or travels through one medium to another and demonstrate that light can be reflected such as the use of mirrors or other shiny surfaces and refracted such as the appearance of an object when observed through water
3 Earth and Space	3.7.B investigate rapid changes in Earth's surface such as volcanic eruptions, earthquakes, and landslides  3.8.D identify the planets in Earth's solar system and their position in relation to the Sun	4.7.A examine properties of soils, including color and texture, capacity to retain water, and ability to support the growth of plants  4.7.C identify and classify Earth's renewable resources, including air, plants, water, and animals; and nonrenewable resources, including coal, oil, and natural gas; and the importance of conservation  4.8.A measure and record changes in weather and make predictions using weather maps, weather symbols, and a map key  4.8.B describe and illustrate the continuous movement of water above and on the surface of Earth through the water cycle and explain the role of the Sun as a major source of energy in this process  4.8.C collect and analyze data to identify sequences and predict patterns of change in shadows, tides, seasons, and the observable appearance of the Moon over time	5.7.A explore the processes that led to the formation of sedimentary rocks and fossil fuels  5.7.B recognize how landforms such as deltas, canyons, and sand dunes are the result of changes to Earth's surface by wind, water, and ice  5.7.C identify alternative energy resources such as wind, solar, hydroelectric, geothermal, and biofuels  5.8.C demonstrate that Earth rotates on its axis once approximately every 24 hours causing the day/night cycle and the apparent movement of the Sun across the sky

Reporting Category	Grade 5 Supporting Standards (from Grade 3)	Grade 5 Supporting Standards (from Grade 4)	Grade 5 Readiness Standards
4 Organisms and Environments	<p>3.9.A observe and describe the physical characteristics of environments and how they support populations and communities within an ecosystem</p> <p>3.10.C investigate and compare how animals and plants undergo a series of orderly changes in their diverse life cycles such as tomato plants, frogs, and lady bugs</p>		<p>5.9.A observe the way organisms live and survive in their ecosystem by interacting with the living and non-living elements</p> <p>5.9.B describe how the flow of energy derived from the Sun, used by producers to create their own food, is transferred through a food chain and food web to consumers and decomposers</p> <p>5.10.A compare the structures and functions of different species that help them live and survive such as hooves on prairie animals or webbed feet in aquatic animals</p> <p>5.10.B differentiate between inherited traits of plants and animals such as spines on a cactus or shape of a beak and learned behaviors such as an animal learning tricks or a child riding a bicycle</p>

## Grade 5 Scientific Investigation and Reasoning Skills

- 5.1.A demonstrate safe practices and the use of safety equipment as described in the Texas Safety Standards during classroom and outdoor investigations
- 5.1.B make informed choices in the conservation, disposal, and recycling of materials
- 5.2.A describe, plan, and implement simple experimental investigations testing one variable
- 5.2.B ask well-defined questions, formulate testable hypotheses, and select and use appropriate equipment and technology
- 5.2.C collect information by detailed observations and accurate measuring
- 5.2.D analyze and interpret information to construct reasonable explanations from direct (observable) and indirect (inferred) evidence
- 5.2.E demonstrate that repeated investigations may increase the reliability of results
- 5.2.F communicate valid conclusions in [both] written [and verbal] form[s]
- 5.2.G construct appropriate simple graphs, tables, maps, and charts using technology, including computers, to organize, examine, and evaluate information
- 5.3.A in all fields of science, analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, including examining all sides of scientific evidence of those scientific explanations, so as to encourage critical thinking by the student
- 5.3.B evaluate the accuracy of the information related to promotional materials for products and services such as nutritional labels
- 5.3.C draw or develop a model that represents how something works or looks that cannot be seen such as how a soda dispensing machine works
- 5.3.D connect grade-level appropriate science concepts with the history of science, science careers, and contributions of scientists
- 5.4.A collect, record, and analyze information using tools, including calculators, microscopes, cameras, computers, hand lenses, metric rulers, Celsius thermometers, prisms, mirrors, pan balances, triple beam balances, spring scales, graduated cylinders, beakers, hot plates, meter sticks, magnets, collecting nets, and notebooks; timing devices, including clocks and stopwatches; and materials to support observations of habitats or organisms such as terrariums and aquariums
- 5.4.B use safety equipment, including safety goggles and gloves

Reporting Category	Grade 5 Readiness Standards	Grade 8 Supporting Standards (from Grade 6)	Grade 8 Supporting Standards (from Grade 7)	Grade 8 Readiness Standards
<b>1</b> Matter and Energy	<p>5.5.A classify matter based on physical properties, including mass, magnetism, physical state (solid, liquid, and gas), relative density (sinking and floating), solubility in water, and the ability to conduct or insulate thermal energy or electric energy</p>	<p>6.5.C differentiate between elements and compounds on the most basic level</p> <p>6.6.A compare metals, nonmetals, and metalloids using physical properties such as luster, conductivity, or malleability</p> <p>6.6.B calculate density to identify an unknown substance</p>	<p>7.5.C diagram the flow of energy through living systems, including food chains, food webs, and energy pyramids</p> <p>7.6.A identify that organic compounds contain carbon and other elements such as hydrogen, oxygen, phosphorus, nitrogen, or sulfur</p> <p>7.6.B distinguish between physical and chemical changes in matter in the digestive system</p>	<p>8.5.A describe the structure of atoms, including the masses, electrical charges, and locations, of protons and neutrons in the nucleus and electrons in the electron cloud</p> <p>8.5.B identify that protons determine an element's identity and valence electrons determine its chemical properties, including reactivity</p> <p>8.5.C interpret the arrangement of the Periodic Table, including groups and periods, to explain how properties are used to classify elements</p> <p>8.5.D recognize that chemical formulas are used to identify substances and determine the number of atoms of each element in chemical formulas containing subscripts</p> <p>8.5.E investigate how evidence of chemical reactions indicate that new substances with different properties are formed</p>
<b>2</b> Force, Motion and Energy	<p>5.6.A explore the uses of energy, including mechanical, light, thermal, electrical, and sound energy</p> <p>5.6.B demonstrate that the flow of electricity in circuits requires a complete path through which an electric current can pass and can produce light, heat, and sound</p> <p>5.6.C demonstrate that light travels in a straight line until it strikes an object or travels through one medium to another and demonstrate that light can be reflected such as the use of mirrors or other shiny surfaces and refracted such as the appearance of an object when observed through water</p>	<p>6.8.A compare and contrast potential and kinetic energy</p> <p>6.8.C calculate average speed using distance and time measurements</p> <p>6.8.D measure and graph changes in motion</p> <p>6.9.C demonstrate energy transformations such as energy in a flashlight battery changes from chemical energy to electrical energy to light energy</p>	<p>7.7.A contrast situations where work is done with different amounts of force to situations where no work is done such as moving a box with a ramp and without a ramp, or standing still</p>	<p>8.6.A demonstrate and calculate how unbalanced forces change the speed or direction of an object's motion</p> <p>8.6.C investigate and describe applications of Newton's law of inertia, law of force and acceleration, and law of action-reaction such as in vehicle restraints, sports activities, amusement park rides, Earth's tectonic activities, and rocket launches</p>
<b>3</b> Earth and Space	<p>5.7.A explore the processes that led to the formation of sedimentary rocks and fossil fuels</p> <p>5.7.B recognize how landforms such as deltas, canyons, and sand dunes are the result of changes to Earth's surface by wind, water, and ice</p> <p>5.7.C identify alternative energy resources such as wind, solar, hydroelectric, geothermal, and biofuels</p> <p>5.8.C demonstrate that Earth rotates on its axis once approximately every 24 hours causing the day/night cycle and the apparent movement of the Sun across the sky</p>			<p>8.7.A model and illustrate how the tilted Earth rotates on its axis, causing day and night, and revolves around the Sun causing changes in seasons</p> <p>8.7.B demonstrate and predict the sequence of events in the lunar cycle</p> <p>8.8.A describe components of the universe, including stars, nebulae, and galaxies, and use models such as the Hertzsprung-Russell diagram for classification</p> <p>8.9.B relate plate tectonics to the formation of crustal features</p> <p>8.9.C interpret topographic maps and satellite views to identify land and erosional features and predict how these features may be reshaped by weathering</p>

Reporting Category	Grade 5 Readiness Standards	Grade 8 Supporting Standards (from Grade 6)	Grade 8 Supporting Standards (from Grade 7)	Grade 8 Readiness Standards
4 Organisms and Environments	<p>5.9.A observe the way organisms live and survive in their ecosystem by interacting with the living and non-living elements</p> <p>5.9.B describe how the flow of energy derived from the Sun, used by producers to create their own food, is transferred through a food chain and food web to consumers and decomposers</p> <p>5.10.A compare the structures and functions of different species that help them live and survive such as hooves on prairie animals or webbed feet in aquatic animals</p> <p>5.10.B differentiate between inherited traits of plants and animals such as spines on a cactus or shape of a beak and learned behaviors such as an animal learning tricks or a child riding a bicycle</p>	<p>6.12.D identify the basic characteristics of organisms, including prokaryotic or eukaryotic, unicellular or multicellular, autotrophic or heterotrophic, and mode of reproduction, that further classify them in the currently recognized Kingdoms</p>	<p>7.10.B describe how biodiversity contributes to the sustainability of an ecosystem</p> <p>7.10.C observe, record, and describe the role of ecological succession such as in a microhabitat of a garden with weeds</p> <p>7.11.A examine organisms or their structures such as insects or leaves and use dichotomous keys for identification</p> <p>7.11.C identify some changes in genetic traits that have occurred over several generations through natural selection and selective breeding such as the Galapagos Medium Ground Finch (<i>Geospiza fortis</i>) or domestic animals</p> <p>7.12.B identify the main functions of the systems of the human organism, including the circulatory, respiratory, skeletal, muscular, digestive, excretory, reproductive, integumentary, nervous, and endocrine systems</p> <p>7.12.D differentiate between structure and function in plant and animal cell organelles, including cell membrane, cell wall, nucleus, cytoplasm, mitochondrion, chloroplast, and vacuole</p> <p>7.12.F recognize that according to cell theory all organisms are composed of cells and cells carry on similar functions such as extracting energy from food to sustain life</p> <p>7.14.B compare the results of uniform or diverse offspring from sexual reproduction or asexual reproduction</p> <p>7.14.C recognize that inherited traits of individuals are governed in the genetic material found in the genes within chromosomes in the nucleus</p>	<p>8.11.A describe producer/consumer, predator/prey, and parasite/host relationships as they occur in food webs within marine, freshwater, and terrestrial ecosystems</p> <p>8.11.B investigate how organisms and populations in an ecosystem depend on and may compete for biotic and abiotic factors such as quantity of light, water, range of temperatures, or soil composition</p> <p>8.11.C explore how short-and long-term environmental changes affect organisms and traits in subsequent populations</p>

## Grade 8 Scientific Investigation and Reasoning Skills

- 8.1.A demonstrate safe practices during laboratory and field investigations as outlined in the Texas Safety Standards
- 8.1.B practice appropriate use and conservation of resources, including disposal, reuse, or recycling of materials
- 8.2.A plan and implement comparative and descriptive investigations by making observations, asking well-defined questions, and using appropriate equipment and technology
- 8.2.B design and implement comparative and experimental investigations by making observations, asking well-defined questions, formulating testable hypotheses, and using appropriate equipment and technology
- 8.2.C collect and record data using the International System of Units (SI) and qualitative means such as labeled drawings, writing, and graphic organizers
- 8.2.D construct tables and graphs, using repeated trials and means, to organize data and identify patterns
- 8.2.E analyze data to formulate reasonable explanations, communicate valid conclusions supported by the data, and predict trends
- 8.3.A in all fields of science, analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, including examining all sides of scientific evidence of those scientific explanations, so as to encourage critical thinking by the student
- 8.3.B use models to represent aspects of the natural world such as an atom, a molecule, space, or a geologic feature
- 8.3.C identify advantages and limitations of models such as size, scale, properties, and materials
- 8.3.D relate the impact of research on scientific thought and society, including the history of science and contributions of scientists as related to the content
- 8.4.A use appropriate tools to collect, record, and analyze information, including lab journals/notebooks, beakers, meter sticks, graduated cylinders, anemometers, psychrometers, hot plates, test tubes, spring scales, balances, microscopes, thermometers, calculators, computers, spectrosopes, timing devices, and other equipment as needed to teach the curriculum
- 8.4.B use preventative safety equipment, including chemical splash goggles, aprons, and gloves, and be prepared to use emergency safety equipment, including an eye/face wash, a fire blanket, and a fire extinguisher

Reporting Category	Biology Readiness Standards	Reporting Category	Chemistry Readiness Standards	Reporting Category	Physics Readiness Standards
1 Cell Structure and Function	B.4.B investigate and explain cellular processes, including homeostasis, energy conversions, transport of molecules, and synthesis of new molecules	1 Matter and the Periodic Table	C.4.A differentiate between physical and chemical changes and properties	1 Force and Motion	P.4.A generate and interpret graphs and charts describing different types of motion, including the use of real-time technology such as motion detectors or photogates
	B.4.C compare the structures of viruses to cells, describe viral reproduction, and describe the role of viruses in causing diseases such as human immunodeficiency virus (HIV) and influenza		C.4.D classify matter as pure substances or mixtures through investigation of their properties		P.4.B describe and analyze motion in one dimension using equations with the concepts of distance, displacement, speed, average velocity, instantaneous velocity, and acceleration
	B.5.A describe the stages of the cell cycle, including deoxyribonucleic acid (DNA) replication and mitosis, and the importance of the cell cycle to the growth of organisms		C.5.B use the Periodic Table to identify and explain the properties of chemical families, including alkali metals, alkaline earth metals, halogens, noble gases, and transition metals		P.4.D calculate the effect of forces on objects, including the law of inertia, the relationship between force and acceleration, and the nature of force pairs between objects
2 Mechanisms of Genetics	B.9.A compare the structures and functions of different types of biomolecules, including carbohydrates, lipids, proteins, and nucleic acids	2 Atomic Structure and Nuclear Chemistry	C.5.C use the Periodic Table to identify and explain periodic trends, including atomic and ionic radii, electronegativity, and ionization energy	2 Gravitational, Electrical, Magnetic, and Nuclear Forces	P.5.B describe and calculate how the magnitude of the gravitational force between two objects depends on their masses and the distance between their centers
	B.6.A identify components of DNA, and describe how information for specifying the traits of an organism is carried in the DNA		C.6.E express the arrangement of electrons in atoms through electron configurations and Lewis valence electron dot structures		P.5.F design, construct, and calculate in terms of current through, potential difference across, resistance of, and power used by electric circuit elements connected in both series and parallel combinations
	B.6.E identify and illustrate changes in DNA and evaluate the significance of these changes		C.12.B describe radioactive decay process in terms of balanced nuclear equations		
3 Biological Evolution and Classification	B.6.F predict possible outcomes of various genetic combinations such as monohybrid crosses, dihybrid crosses and non-Mendelian inheritance	3 Bonding and Chemical Reactions	C.7.A name ionic compounds containing main group or transition metals, covalent compounds, acids, and bases, using International Union of Pure and Applied Chemistry (IUPAC) nomenclature rules	3 Momentum and Energy	P.6.A investigate and calculate quantities using the work-energy theorem in various situations
	B.7.A analyze and evaluate how evidence of common ancestry among groups is provided by the fossil record, biogeography, and homologies, including anatomical, molecular, and developmental		C.7.B write the chemical formulas of common polyatomic ions, ionic compounds containing main group or transition metals, covalent compounds, acids		P.6.B investigate examples of kinetic and potential energy and their transformations
	B.7.E analyze and evaluate the relationship of natural selection to adaptation and to the development of diversity in and among species		C.7.C construct electron dot formulas to illustrate ionic and covalent bonds		P.6.C calculate the mechanical energy of, power generated within, impulse applied to, and momentum of a physical system
	B.8.B categorize organisms using a hierarchical classification system based on similarities and differences shared among groups		C.8.B use the mole concept to calculate the number of atoms, ions, or molecules in a sample of material		P.6.D demonstrate and apply the laws of conservation of energy and conservation of momentum in one dimension
			C.8.D use the law of conservation of mass to write and balance chemical equations		



## Science STAAR Readiness Standards - A Side-by-Side Look (High School)

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Reporting Category	Biology Readiness Standards
4 Biological Processes and Systems	<p>B.10.A describe the interactions that occur among systems that perform the functions of regulation, nutrient absorption, reproduction, and defense from injury or illness in animals</p> <p>B.10.B describe the interactions that occur among systems that perform the functions of transport, reproduction, and response in plants</p>
5 Interdependence within Environmental Systems	<p>B.11.D describe how events and processes that occur during ecological succession can change populations and species diversity</p> <p>B.12.A interpret relationships, including predation, parasitism, commensalism, mutualism, and competition among organisms</p> <p>B.12.C analyze the flow of matter and energy through trophic levels using various models, including food chains, food webs, and ecological pyramids</p> <p>B.12.F describe how environmental change can impact ecosystem stability</p>

Reporting Category	Chemistry Readiness Standards
4 Gases and Thermochemistry	<p>C.9.A describe and calculate the relations between volume, pressure, number of moles, and temperature for an ideal gas as described by Boyle's law, Charles' law, Avogadro's law, Dalton's law of partial pressure, and the ideal gas law</p> <p>C.11.C use thermochemical equations to calculate energy changes that occur in chemical reactions and classify reactions as exothermic or endothermic</p>
5 Solutions	<p>C.10.B develop and use general rules regarding solubility through investigations with aqueous solutions</p> <p>C.10.E distinguish between types of solutions such as electrolytes and nonelectrolytes and unsaturated, saturated, and supersaturated solutions</p> <p>C.10.F investigate factors that influence solubilities and rates of dissolution such as temperature, agitation, and surface area</p> <p>C.10.H understand and differentiate among acid-base reactions, precipitation reactions, and oxidation-reduction reactions</p>

Reporting Category	Physics Readiness Standards
4 Waves and Quantum Phenomena	<p>P.7.B investigate and analyze characteristics of waves, including velocity, frequency, amplitude, and wavelength, and calculate using the relationship between wavespeed, frequency, and wavelength</p> <p>P.7.D investigate behaviors of waves, including reflection, refraction, diffraction, interference, resonance, and the Doppler effect</p> <p>P.8.A describe the photoelectric effect and the dual nature of light</p>

Biology	
Scientific Process Skills	
B.1.A	demonstrate safe practices during laboratory and field investigations
B.1.B	demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials
B.2.A	know the definition of science and understand that it has limitations, as specified in chapter 112.34, subsection (b)(2) of 19 TAC
B.2.B	know that hypotheses are tentative and testable statements that must be capable of being supported or not supported by observational evidence. Hypotheses of durable explanatory power which have been tested over a wide variety of conditions are incorporated into theories
B.2.C	know scientific theories are based on natural and physical phenomena and are capable of being tested by multiple independent researchers. Unlike hypotheses, scientific theories are well-established and highly-reliable explanations, but they may be subject to change as new areas of science and new technologies are developed;
B.2.D	distinguish between scientific hypotheses and scientific theories
B.2.E	plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology
B.2.F	collect and organize qualitative and quantitative data and make measurements with accuracy and precision using tools such as calculators, spreadsheet software, data-collecting probes, computers, standard laboratory glassware, microscopes, various prepared slides, stereoscopes, metric rulers, electronic balances, gel electrophoresis apparatuses, micropipettors, hand lenses, Celsius thermometers, hot plates, lab notebooks or journals, timing devices, cameras, Petri dishes, lab incubators, dissection equipment, meter sticks, and models, diagrams, or samples of biological specimens or structures
B.2.G	analyze, evaluate, make inferences, and predict trends from data
B.2.H	communicate valid conclusions supported by the data through methods such as lab reports, labeled drawings, graphic organizers, journals, summaries, oral reports, and technology-based reports
B.3.A	in all fields of science, analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, including examining all sides of scientific evidence of those scientific explanations, so as to encourage critical thinking by the student
B.3.B	communicate and apply scientific information extracted from various sources such as current events, news reports, published journal articles, and marketing materials
B.3.C	draw inferences based on data related to promotional materials for products and services
B.3.D	evaluate the impact of scientific research on society and the environment
B.3.E	evaluate models according to their limitations in representing biological objects or events
B.3.F	research and describe the history of biology and contributions of scientists

Chemistry	
Scientific Process Skills	
C.1.A	demonstrate safe practices during laboratory and field investigations, including the appropriate use of safety showers, eyewash fountains, safety goggles, and fire extinguishers
C.1.B	know specific hazards of chemical substances such as flammability, corrosiveness, and radioactivity as summarized on the Material Safety Data Sheets (MSDS)
C.1.C	demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials
C.2.A	know the definition of science and understand that it has limitations, as specified in chapter 112.35, subsection (b)(2) of 19 TAC
C.2.B	know that scientific hypotheses are tentative and testable statements that must be capable of being supported or not supported by observational evidence. Hypotheses of durable explanatory power which have been tested over a wide variety of conditions are incorporated into theories
C.2.C	know that scientific theories are based on natural and physical phenomena and are capable of being tested by multiple independent researchers. Unlike hypotheses, scientific theories are well-established and highly-reliable explanations, but they may be subject to change as new areas of science and new technologies are developed;
C.2.D	distinguish between scientific hypotheses and scientific theories
C.2.E	plan and implement investigative procedures, including asking questions, formulating testable hypotheses, and selecting equipment and technology, including graphing calculators, computers and probes, sufficient scientific glassware such as beakers, Erlenmeyer flasks, pipettes, graduated cylinders, volumetric flasks, safety goggles, and burettes, electronic balances, and an adequate supply of consumable chemicals
C.2.F	collect data and make measurements with accuracy and precision
C.2.G	express and manipulate chemical quantities using scientific conventions and mathematical procedures, including dimensional analysis, scientific notation, and significant figures
C.2.H	organize, analyze, evaluate, make inferences, and predict trends from data
C.2.I	communicate valid conclusions supported by the data through methods such as lab reports, labeled drawings, graphs, journals, summaries, oral reports, and technology-based reports
C.3.A	in all fields of science, analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, including examining all sides of scientific evidence of those scientific explanations, so as to encourage critical thinking by the student
C.3.B	communicate and apply scientific information extracted from various sources such as current events, news reports, published journal articles, and marketing materials
C.3.C	draw inferences based on data related to promotional materials for products and services
C.3.D	evaluate the impact of research on scientific thought, society, and the environment
C.3.E	describe the connection between chemistry and future careers
C.3.F	research and describe the history of chemistry and contributions of scientists

Physics	
Scientific Process Skills	
P.1.A	demonstrate safe practices during laboratory and field investigations
P.1.B	demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials
P.2.A	know the definition of science and understand that it has limitations, as specified in chapter 112.39, subsection (b)(2) of 19 TAC
P.2.B	know that scientific hypotheses are tentative and testable statements that must be capable of being supported or not supported by observational evidence. Hypotheses of durable explanatory power which have been tested over a wide variety of conditions are incorporated into theories
P.2.C	know that scientific theories are based on natural and physical phenomena and are capable of being tested by multiple independent researchers. Unlike hypotheses, scientific theories are well-established and highly-reliable explanations, but they may be subject to change as new areas of science and new technologies are developed
P.2.D	distinguish between scientific hypotheses and scientific theories
P.2.E	design and implement investigative procedures, including making observations, asking well-defined questions, formulating testable hypotheses, identifying variables, selecting appropriate equipment and technology, and evaluating numerical answers for reasonableness
P.2.F	demonstrate the use of course apparatus, equipment, techniques, and procedures, including multimeters (current, voltage, resistance), triple beam balances, batteries, clamps, dynamics demonstration equipment, collision apparatus, data acquisition probes, discharge tubes with power supply (H, He, Ne, Ar), hand-held visual spectroscopes, hot plates, slotted and hooked lab masses, bar magnets, horseshoe magnets, plane mirrors, convex lenses, pendulum support, power supply, ring clamps, ring stands, stopwatches, trajectory apparatus, tuning forks, carbon paper, graph paper, magnetic compasses, polarized film, prisms, protractors, resistors, friction blocks, mini lamps (bulbs) and sockets, electrostatics kits, 90-degree rod clamps, metric rulers, spring scales, knife blade switches, Celsius thermometers, meter sticks, scientific calculators, graphing technology, computers, cathode ray tubes with horseshoe magnets, ballistic carts or equivalent, resonance tubes, spools of nylon thread or string, containers of iron filings, rolls of white craft paper, copper wire, Periodic Table, electromagnetic spectrum charts, slinky springs, wave motion ropes, and laser pointers
P.2.G	use a wide variety of additional course apparatus, equipment, techniques, materials, and procedures as appropriate such as ripple tank with wave generator, wave motion rope, micrometer, caliper, radiation monitor, computer, ballistic pendulum, electroscopes, inclined plane, optics bench, optics kit, pulley with table clamp, resonance tube, ring stand screen, four-inch ring, stroboscope, graduated cylinders, and ticker timer
P.2.H	make measurements with accuracy and precision and record data using scientific notation and International System (SI) units
P.2.I	identify and quantify causes and effects of uncertainties in measured data
P.2.J	organize and evaluate data and make inferences from data, including the use of tables, charts, and graphs
P.2.K	communicate valid conclusions supported by the data through various methods such as lab reports, labeled drawings, graphic organizers, journals, summaries, oral reports, and technology-based reports
P.2.L	express and manipulate relationships among physical variables quantitatively, including the use of graphs, charts, and equations
P.3.A	in all fields of science, analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, including examining all sides of scientific evidence of those scientific explanations, so as to encourage critical thinking by the student
P.3.B	communicate and apply scientific information extracted from various sources such as current events, news reports, published journal articles, and marketing materials
P.3.C	draw inferences based on data related to promotional materials for products and services
P.3.D	explain the impacts of the scientific contributions of a variety of historical and contemporary scientists on scientific thought and society
P.3.E	research and describe the connections between physics and future careers
P.3.F	express and interpret relationships symbolically in accordance with accepted theories to make predictions and solve problems mathematically, including problems requiring proportional reasoning and graphical vector addition