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| <p>1. <b>Scientific processes. The student, for at least 40% of instructional time, conducts laboratory and field investigations using safe, environmentally appropriate, and ethical practices. The student is expected to:</b></p> <ul style="list-style-type: none"> <li>A. demonstrate safe practices during laboratory and field investigations, including the appropriate use of safety showers, eyewash fountains, safety goggles or chemical splash goggles, as appropriate, and fire extinguishers;</li> <li>B. know specific hazards of chemical substances such as flammability, corrosiveness, and radioactivity as summarized on the Safety Data Sheets (SDS); and</li> <li>C. demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials.</li> </ul> <p>2. <b>Scientific processes. The student uses scientific practices during laboratory and field investigations. The student is expected to:</b></p> <ul style="list-style-type: none"> <li>A. know the definition of science and understand that it has limitations, as specified in subsection (b)(2) of this section;</li> <li>B. plan and implement investigative procedures, including asking questions, formulating testable hypotheses, and selecting equipment and technology;</li> <li>C. collect data and make measurements with accuracy and precision;</li> <li>D. organize, analyze, evaluate, make inferences, and predict trends from data; and</li> <li>E. communicate valid conclusions supported by the data through methods such as lab reports, labeled drawings, graphs, journals, summaries, oral reports, and technology-based reports.</li> </ul> <p>3. <b>Scientific processes. The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions. The student is expected to:</b></p> <ul style="list-style-type: none"> <li>A. analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, so as to encourage critical thinking by the student;</li> <li>B. communicate and apply scientific information extracted from various sources such as current events, published journal articles, and marketing materials;</li> <li>C. draw inferences based on data related to promotional materials for products and services;</li> <li>D. evaluate the impact of research on scientific thought, society, and the environment;</li> <li>E. describe connections between physics and chemistry and future careers; and</li> <li>F. research and describe the history of physics and chemistry and contributions of scientists.</li> </ul> | <p>4. <b>Science concepts. The student knows concepts of force and motion evident in everyday life. The student is expected to:</b></p> <ul style="list-style-type: none"> <li>A. describe and calculate an object's motion in terms of position, displacement, speed, and acceleration;</li> <li>B. measure and graph distance and speed as a function of time;</li> <li>C. investigate how an object's motion changes only when a net force is applied, including activities and equipment such as toy cars, vehicle restraints, sports activities, and classroom objects;</li> <li>D. describe and calculate the relationship between force, mass, and acceleration using equipment such as dynamic carts, moving toys, vehicles, and falling objects;</li> <li>E. explain the concept of conservation of momentum using action and reaction forces;</li> <li>F. describe the gravitational attraction between objects of different masses at different distances; and</li> <li>G. examine electrical force as a universal force between any two charged objects.</li> </ul> <p>5. <b>Science concepts. The student recognizes multiple forms of energy and knows the impact of energy transfer and energy conservation in everyday life. The student is expected to:</b></p> <ul style="list-style-type: none"> <li>A. recognize and demonstrate that objects and substances in motion have kinetic energy such as vibration of atoms, water flowing down a stream moving pebbles, and bowling balls knocking down pins;</li> <li>B. recognize and demonstrate common forms of potential energy, including gravitational, elastic, and chemical, such as a ball on an inclined plane, springs, and batteries;</li> <li>C. demonstrate that moving electric charges produce magnetic forces and moving magnets produce electric forces;</li> <li>D. investigate the law of conservation of energy;</li> <li>E. investigate and demonstrate the movement of thermal energy through solids, liquids, and gases by convection, conduction, and radiation such as in weather, living, and mechanical systems;</li> <li>F. evaluate the transfer of electrical energy in series and parallel circuits and conductive materials;</li> <li>G. explore the characteristics and behaviors of energy transferred by waves, including acoustic, seismic, light, and waves on water, as they reflect, refract, diffract, interfere with one another, and are absorbed by materials;</li> <li>H. analyze energy transformations of renewable and nonrenewable resources; and</li> <li>I. critique the advantages and disadvantages of various energy sources and their impact on society and the environment.</li> </ul> | <p>6. <b>Science concepts. The student knows that relationships exist between the structure and properties of matter. The student is expected to:</b></p> <ul style="list-style-type: none"> <li>A. examine differences in physical properties of solids, liquids, and gases as explained by the arrangement and motion of atoms or molecules;</li> <li>B. relate chemical properties of substances to the arrangement of their atoms;</li> <li>C. analyze physical and chemical properties of elements and compounds such as color, density, viscosity, buoyancy, boiling point, freezing point, conductivity, and reactivity;</li> <li>D. relate the placement of an element on the Periodic Table to its physical and chemical behavior, including bonding and classification;</li> <li>E. relate the structure of water to its function as a solvent; and</li> <li>F. investigate the properties of water solutions and factors affecting solid solubility, including nature of solute, temperature, and concentration.</li> </ul> <p>7. <b>Science concepts. The student knows that changes in matter affect everyday life. The student is expected to:</b></p> <ul style="list-style-type: none"> <li>A. investigate changes of state as it relates to the arrangement of particles of matter and energy transfer;</li> <li>B. recognize that chemical changes can occur when substances react to form different substances and that these interactions are largely determined by the valence electrons;</li> <li>C. demonstrate that mass is conserved when substances undergo chemical change and that the number and kind of atoms are the same in the reactants and products;</li> <li>D. classify energy changes that accompany chemical reactions such as those occurring in heat packs, cold packs, and glow sticks as exothermic or endothermic reactions;</li> <li>E. describe types of nuclear reactions such as fission and fusion and their roles in applications such as medicine and energy production; and</li> <li>F. research and describe the environmental and economic impact of the end-products of chemical reactions such as those that may result in acid rain, degradation of water and air quality, and ozone depletion.</li> </ul> |
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