Texas Essential Knowledge and Skills (TEKS)

1. **Scientific and engineering practices. The student, for at least 40% of instructional time, asks questions, identifies problems, and plans and safely conducts classroom, laboratory, and field investigations to answer questions, explain phenomena, or design solutions using appropriate tools and models. The student is expected to:**
   - A. ask questions and define problems based on observations or information from text, phenomena, models, or investigations;
   - B. apply scientific practices to plan and conduct descriptive, comparative, and experimental investigations and use engineering practices to design solutions to problems;
   - C. use appropriate safety equipment and practices during laboratory, classroom, and field investigations as outlined in Texas Education Agency-approved safety standards;
   - D. use appropriate tools such as data-collecting probes, software applications, the internet, standard laboratory glassware, metric rulers, meter sticks, spring scales, multimeters, Gauss meters, wires, batteries, light bulbs, switches, magnets, electronic balances, mass sets, Celsius thermometers, hot plates, an adequate supply of consumable chemicals, lab notebooks or journals, timing devices, models, and diagrams;
   - E. collect quantitative data using the International System of Units (SI) and qualitative data as evidence;
   - F. organize quantitative and qualitative data using labeled drawings and diagrams, graphic organizers, charts, tables, and graphs;
   - G. develop and use models to represent phenomena, systems, processes, or solutions to engineering problems;
   - H. distinguish between scientific hypotheses, theories, and laws.
2. **Scientific and engineering practices. The student analyzes and interprets data to derive meaning, identify features and patterns, and discover relationships or correlations to develop evidence-based arguments or evaluate designs. The student is expected to:**
   - A. identify advantages and limitations of models such as their size, scale, properties, and materials;
   - B. analyze data by identifying significant statistical features, patterns, sources of error, and limitations;
   - C. use mathematical calculations to assess quantitative relationships in data;
   - D. evaluate experimental and engineering designs.
3. **Scientific and engineering practices. The student develops evidence-based explanations and communicates findings, conclusions, and proposed solutions. The student is expected to:**
   - A. develop explanations and propose solutions supported by data and models and consistent with scientific ideas, principles, and theories;
   - B. communicate explanations and solutions individually and collaboratively in a variety of settings and formats;
   - C. engage respectfully in scientific argumentation using applied scientific explanations and empirical evidence.
4. **Scientific and engineering practices. The student knows the contributions of scientists and recognizes the importance of scientific research and innovation on society. The student is expected to:**
   - A. analyze, evaluate, and critique scientific explanations and solutions by using empirical evidence, logical reasoning, and experimental and observational testing, so as to encourage critical thinking by the student;
   - B. relate the impact of past and current research on scientific thought and society, including research methodology, cost-benefit analysis, and contributions of diverse scientists as related to the content;
   - C. research and explore resources such as museums, libraries, professional organizations, private companies, online platforms, and mentors employed in a science, technology, engineering, and mathematics (STEM) field in order to investigate STEM careers.
5. **Science concepts. The student knows the relationship between force and motion in everyday life. The student is expected to:**
   - A. investigate, analyze, and model motion in terms of position, velocity, acceleration, and time using tables, graphs, and mathematical relationships;
   - B. analyze data to explain the relationship between mass and acceleration in terms of the net force on an object in one dimension using force diagrams, tables, and graphs;
   - C. apply the concepts of momentum and impulse to design, evaluate, and refine a device to minimize the net force on objects during collisions such as those that occur during vehicular accidents, sports activities, or the dropping of personal electronic devices;
   - D. describe the nature of the four fundamental forces: gravitation; electromagnetic; the strong and weak nuclear forces, including fission and fusion; and mass-energy equivalency;
   - E. construct and communicate an explanation based on evidence for how changes in mass, charge, and distance affect the strength of gravitational and electrical forces between two objects.
6. **Science concepts. The student knows the impact of energy transfer and energy conservation in everyday life. The student is expected to:**
   - A. design and construct series and parallel circuits that model real-world circuits such as inhome wiring, automobile wiring, and simple electrical devices to evaluate the transfer of electrical energy;
   - B. design, evaluate, and refine a device that generates electrical energy through the interaction of electric charges and magnetic fields;
   - C. plan and conduct an investigation to provide evidence that energy is conserved within a closed system;
   - D. investigate and demonstrate the movement of thermal energy through solids, liquids, and gases by convection, conduction, and radiation such as weather, living, and mechanical systems;
   - E. plan and conduct an investigation to evaluate the transfer of energy or information through different materials by different types of waves such as wireless signals, ultraviolet radiation, and microwaves;
   - F. construct and communicate an evidence-based explanation for how wave interference, reflection, and refraction are used in technology such as medicine, communication, and scientific research;
   - G. evaluate evidence from multiple sources to critique the advantages and disadvantages of various renewable and nonrenewable energy sources and their impact on society and the environment.
7. **Science concepts. The student knows that relationships exist between the structure and properties of matter. The student is expected to:**
   - A. model basic atomic structure and relate an element's atomic structure to its bonding, reactivity, and placement on the Periodic Table;
   - B. use patterns within the Periodic Table to predict the relative physical and chemical properties of elements;
   - C. explain how physical and chemical properties of substances are related to their usage in everyday life such as in sunscreen, cookware, industrial applications, and fuels;
   - D. explain how electrons can transition from a high energy level to a low energy state, emitting photons at different frequencies for different energy transitions;
   - E. explain how atomic energy levels and emission spectra present evidence for the wave particle duality;
   - F. plan and conduct an investigation to provide evidence that the rate of reaction or dissolving is affected by multiple factors such as particle size, stirring, temperature, and concentration.
8. **Science concepts. The student knows that changes in matter affect everyday life. The student is expected to:**
   - A. investigate how changes in properties are indicative of chemical reactions such as hydrochloric acid with a metal, oxidation of metal, combustion, and neutralizing an acid with a base;
   - B. develop and use models to balance chemical equations and support the claim that atoms, and therefore mass, are conserved during a chemical reaction;
   - C. research and communicate the uses, advantages, and disadvantages of nuclear reactions in current technologies;
   - D. construct and communicate an evidence-based explanation of the environmental impact of the end-products of chemical reactions such as those that may result in degradation of water, soil, air quality, and global climate change.