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. use 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 graduated cylinders, metric rulers, periodic tables, balances, scales, thermometers, temperature probes, laboratory ware, timing devices, pH indicators, hot plates, models, microscopes, slides, life science models, petri dishes, dissecting kits, magnets, spring scales or force sensors, tools that model wave behavior, satellite images, hand lenses, and lab notebooks or journals;
   - E. collect quantitative data using the International System of Units (SI) and qualitative data as evidence;
   - F. construct appropriate tables, graphs, maps, and charts using repeated trials and means to organize data;
   - 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 any significant descriptive statistical features, patterns, sources of error, or 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. relate the impact of past and current research on scientific thought and society, including the process of science, cost-benefit analysis, and contributions of diverse scientists as related to the content;
   - B. make informed decisions by evaluating evidence from multiple appropriate sources to assess the credibility, accuracy, cost-effectiveness, and methods used;
   - 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 to investigate STEM careers.
5. **Recurring themes and concepts. The student understands that recurring themes and concepts provide a framework for making connections across disciplines. The student is expected to:**
   - A. identify and apply patterns to understand and connect scientific phenomena or to design solutions;
   - B. identify and investigate cause-and-effect relationships to explain scientific phenomena or analyze problems;
   - C. analyze how differences in scale, proportion, or quantity affect a system's structure or performance;
   - D. examine and model the parts of a system and their interdependence in the function of the system;
   - E. analyze and explain how energy flows and matter cycles through systems and how energy and matter are conserved through a variety of systems;
   - F. analyze and explain the complementary relationship between structure and function of objects, organisms, and systems;
   - G. analyze and explain how factors or conditions impact stability and change in objects, organisms, and systems.
6. **Matter and energy. The student distinguishes between elements and compounds, classifies changes in matter, and understands the properties of solutions. The student is expected to:**
   - A. compare and contrast elements and compounds in terms of atoms and molecules, chemical symbols, and chemical formulas;
   - B. use the periodic table to identify the atoms and the number of each kind within a chemical formula;
   - C. distinguish between physical and chemical changes in matter;
   - D. describe aqueous solutions in terms of solute and solvent, concentration, and dilution;
   - E. investigate and model how temperature, surface area, and agitation affect the rate of dissolution of solid solutes in aqueous solutions.
7. **Force, motion, and energy. The student describes the cause-and-effect relationship between force and motion. The student is expected to:**
   - A. calculate average speed using distance and time measurements from investigations;
   - B. distinguish between speed and velocity in linear motion in terms of distance, displacement, and direction;
   - C. measure, record, and interpret an object's motion using distance-time graphs;
   - D. analyze the effect of balanced and unbalanced forces on the state of motion of an object using Newton's First Law of Motion.
8. **Force, motion, and energy. The student understands the behavior of thermal energy as it flows into and out of systems. The student is expected to:**
   - A. investigate methods of thermal energy transfer into and out of systems, including conduction, convection, and radiation;
   - B. investigate how thermal energy moves in a predictable pattern from warmer to cooler until all substances within the system reach thermal equilibrium;
   - C. explain the relationship between temperature and the kinetic energy of the particles within a substance.
9. **Earth and space. The student understands the patterns of movement, organization, and characteristics of components of our solar system. The student is expected to:**
   - A. describe the physical properties, locations, and movements of the Sun, planets, moons, meteors, asteroids, comets, Kuiper belt, and Oort cloud;
   - B. describe how gravity governs motion within Earth's solar system;
   - C. analyze the characteristics of Earth that allow life to exist such as the proximity of the Sun, presence of water, and composition of the atmosphere.
10. **Earth and space. The student understands the causes and effects of plate tectonics. The student is expected to:**
    - A. describe the evidence that supports that Earth has changed over time, including fossil evidence, plate tectonics, and superposition;
    - B. describe how plate tectonics causes ocean basin formation, earthquakes, mountain building, and volcanic eruptions, including supervolcanoes and hot spots.
11. **Earth and space. The student understands how human activity can impact the hydrosphere. The student is expected to:**
    - A. analyze the beneficial and harmful influences of human activity on groundwater and surface water in a watershed;
    - B. describe human dependence and influence on ocean systems and explain how human activities impact these systems.
12. **Organisms and environments. The student understands that ecosystems are dependent upon the cycling of matter and the flow of energy. The student is expected to:**
    - A. diagram the flow of energy within trophic levels and describe how the available energy decreases in successive trophic levels in energy pyramids;
    - B. describe how ecosystems are sustained by the continuous flow of energy and the recycling of matter and nutrients within the biosphere.
13. **Organisms and environments. The student knows how systems are organized and function to support the health of an organism and how traits are inherited. The student is expected to:**
    - A. identify and model the main functions of the systems of the human organism, including the circulatory, respiratory, skeletal, muscular, digestive, urinary, reproductive, integumentary, nervous, immune, and endocrine systems;
    - B. describe the hierarchical organization of cells, tissues, organs, and organ systems within plants and animals;
    - C. compare the results of asexual and sexual reproduction of plants and animals in relation to the diversity of offspring and the changes in the population over time;
    - D. describe and give examples of how natural and artificial selection change the occurrence of traits in a population over generations.
14. **Organisms and environments. The student knows how the taxonomic system is used to describe relationships between organisms. The student is expected to:**
    - A. describe the taxonomic system that categorizes organisms based on similarities and differences shared among groups;
    - B. describe the characteristics of the recognized kingdoms and their importance in ecosystems such as bacteria aiding digestion or fungi decomposing organic matter.

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