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 the 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 knows that matter is made of atoms, can be classified according to its properties, and can undergo changes. The student is expected to:**
   - A. compare solids, liquids, and gases in terms of their structure, shape, volume, and kinetic energy of atoms and molecules;
   - B. investigate the physical properties of matter to distinguish between pure substances, homogeneous mixtures (solutions), and heterogeneous mixtures;
   - C. identify elements on the periodic table as metals, nonmetals, metalloids, and rare Earth elements based on their physical properties and importance to modern life;
   - D. compare the density of substances relative to various fluids;
   - E. identify the formation of a new substance by using the evidence of a possible chemical change, including production of a gas, change in thermal energy, production of a precipitate, and color change.
7. **Force, motion, and energy. The student knows the nature of forces and their role in systems that experience stability or change. The student is expected to:**
   - A. identify and explain how forces act on objects, including gravity, friction, magnetism, applied forces, and normal forces, using real-world applications;
   - B. calculate the net force on an object in a horizontal or vertical direction using diagrams and determine if the forces are balanced or unbalanced;
   - C. identify simultaneous force pairs that are equal in magnitude and opposite in direction that result from the interactions between objects using Newton's Third Law of Motion
8. **Force, motion, and energy. The student knows that the total energy in systems is conserved through energy transfers and transformations. The student is expected to:**
   - A. compare and contrast gravitational, elastic, and chemical potential energies with kinetic energy;
   - B. describe how energy is conserved through transfers and transformations in systems such as electrical circuits, food webs, amusement park rides, or photosynthesis;
   - C. explain how energy is transferred through transverse and longitudinal waves.
9. **Earth and space. The student models the cyclical movements of the Sun, Earth, and Moon and describes their effects. The student is expected to:**
   - A. model and illustrate how the tilted Earth revolves around the Sun, causing changes in seasons;
   - B. describe and predict how the positions of the Earth, Sun, and Moon cause daily, spring, and neap cycles of ocean tides due to gravitational forces.
10. **Earth and space. The student understands the rock cycle and the structure of Earth. The student is expected to:**
    - A. differentiate between the biosphere, hydrosphere, atmosphere, and geosphere and identify components of each system;
    - B. model and describe the layers of Earth, including the inner core, outer core, mantle, and crust;
    - C. describe how metamorphic, igneous, and sedimentary rocks form and change through geologic processes in the rock cycle.
11. **Earth and space. The student understands how resources are managed. The student is expected to:**
    - A. research and describe why resource management is important in reducing global energy, poverty, malnutrition, and air and water pollution,
    - B. explain how conservation, increased efficiency, and technology can help manage air, water, soil, and energy resources.
12. **Organisms and environments. The student knows that interdependence occurs between living systems and the environment. The student is expected to:**
    - A. investigate how organisms and populations in an ecosystem depend on and may compete for biotic factors such as food and abiotic factors such as availability of light and water, range of temperatures, or soil composition;
    - B. describe and give examples of predatory, competitive, and symbiotic relationships between organisms, including mutualism, parasitism, and commensalism;
    - C. describe the hierarchical organization of organism, population, and community within an ecosystem.
13. **Organisms and environments. The student knows that organisms have an organizational structure and variations can influence survival of populations. The student is expected to:**
    - A. describe the historical development of cell theory and explain how organisms are composed of one or more cells, which come from pre-existing cells and are the basic unit of structure and function;
    - B. identify and compare the basic characteristics of organisms, including prokaryotic and eukaryotic, unicellular and multicellular, and autotrophic and heterotrophic;
    - C. describe how variations within a population can be an advantage or disadvantage to the survival of a population as environments change.

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