

1. **Scientific investigation and reasoning. The student, for at least 40% of instructional time, conducts laboratory and field investigations following safety procedures and environmentally appropriate and ethical practices. The student is expected to:**
  - A. demonstrate safe practices during laboratory and field investigations as outlined in Texas Education Agency-approved safety standards; and
  - B. practice appropriate use and conservation of resources, including disposal, reuse, or recycling of materials.
2. **Scientific investigation and reasoning. The student uses scientific practices during laboratory and field investigations. The student is expected to:**
  - A. plan and implement comparative and descriptive investigations by making observations, asking well defined questions, and using appropriate equipment and technology;
  - B. design and implement experimental investigations by making observations, asking well defined questions, formulating testable hypotheses, and using appropriate equipment and technology;
  - C. collect and record data using the International System of Units (SI) and qualitative means such as labeled drawings, writing, and graphic organizers;
  - D. construct tables and graphs, using repeated trials and means, to organize data and identify patterns; and
  - E. analyze data to formulate reasonable explanations, communicate valid conclusions supported by the data, and predict trends.
3. **Scientific investigation and reasoning. The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions and knows the contributions of relevant scientists. The student is expected to:**
  - 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;
  - B. use models to represent aspects of the natural world such as an atom, a molecule, space, or a geologic feature;
  - C. identify advantages and limitations of models such as size, scale, properties, and materials; and
  - 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.
4. **Scientific investigation and reasoning. The student knows how to use a variety of tools and safety equipment to conduct science inquiry. The student is expected to:**
  - A. use appropriate tools, 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 necessary equipment to collect, record, and analyze information; and
  - 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.

5. **Matter and energy. The student knows that matter is composed of atoms and has chemical and physical properties. The student is expected to:**
  - 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;
  - B. identify that protons determine an element's identity and valence electrons determine its chemical properties, including reactivity;
  - C. interpret the arrangement of the Periodic Table, including groups and periods, to explain how properties are used to classify elements;
  - D. recognize that chemical formulas are used to identify substances and determine the number of atoms of each element in chemical formulas containing subscripts; and
  - E. investigate how evidence of chemical reactions indicates that new substances with different properties are formed and how that relates to the law of conservation of mass.
6. **Force, motion, and energy. The student knows that there is a relationship between force, motion, and energy. The student is expected to:**
  - A. demonstrate and calculate how unbalanced forces change the speed or direction of an object's motion;
  - B. differentiate between speed, velocity, and acceleration; and
  - C. investigate and describe applications of Newton's three laws of motion such as in vehicle restraints, sports activities, amusement park rides, Earth's tectonic activities, and rocket launches.
7. **Earth and space. The student knows the effects resulting from cyclical movements of the Sun, Earth, and Moon. The student is expected to:**
  - 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;
  - B. demonstrate and predict the sequence of events in the lunar cycle; and
  - C. relate the positions of the Moon and Sun to their effect on ocean tides.
8. **Earth and space. The student knows characteristics of the universe. The student is expected to:**
  - A. describe components of the universe, including stars, nebulae, and galaxies, and use models such as the Hertzsprung-Russell diagram for classification;
  - B. recognize that the Sun is a medium-sized star located in a spiral arm of the Milky Way galaxy and that the Sun is many thousands of times closer to Earth than any other star;
  - C. identify how different wavelengths of the electromagnetic spectrum such as visible light and radio waves are used to gain information about components in the universe; and
  - D. research how scientific data are used as evidence to develop scientific theories to describe the origin of the universe.

9. **Earth and space. The student knows that natural events can impact Earth systems. The student is expected to:**
  - A. describe the historical development of evidence that supports plate tectonic theory;
  - B. relate plate tectonics to the formation of crustal features; and
  - C. interpret topographic maps and satellite views to identify land and erosional features and predict how these features may be reshaped by weathering.
10. **Earth and space. The student knows that climatic interactions exist among Earth, ocean, and weather systems. The student is expected to:**
  - A. recognize that the Sun provides the energy that drives convection within the atmosphere and oceans, producing winds;
  - B. identify how global patterns of atmospheric movement influence local weather using weather maps that show high and low pressures and fronts; and
  - C. identify the role of the oceans in the formation of weather systems such as hurricanes.
11. **Organisms and environments. The student knows that interdependence occurs among living systems and the environment and that human activities can affect these systems. 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 quantity of light, water, range of temperatures, or soil composition;
  - B. explore how short- and long-term environmental changes affect organisms and traits in subsequent populations; and
  - C. recognize human dependence on ocean systems and explain how human activities such as runoff, artificial reefs, or use of resources have modified these systems.