

## §112.23. Science, Grade 7.

### (a) Introduction.

(1) In Grade 7, the study of science includes conducting field and laboratory investigations using scientific methods, critical-thinking, problem-solving, and using tools such as weather instruments and calculators to collect and analyze information to explain a phenomenon. Students also use computers and information technology tools to support scientific investigations.

(2) As students learn science skills, they identify gravity and phases of the moon as components of the solar system and explore the effects of events such as hurricanes on the Earth. Students use pulleys and levers to understand the relationship between force and motion. Students then relate the concept to processes in the human organism such as the

movement of blood. In addition, students study chemical and physical properties of substances by examining the tarnishing of metal or burning of wood as examples of chemical processes, and by identifying physical properties used to place elements on the periodic table.

(3) Students learn about kinetic and potential energy and identify photosynthesis as an example of the transformation of radiant energy from the Sun into chemical energy for use by plants. Students investigate systems in humans to identify their structures and functions. Student compare asexual and sexual reproduction to illustrate that genetic materials are responsible for both dominant and recessive traits in organisms.

(4) Science is a way of learning about the natural world. Students should know how science has built a vast body of changing and increasing knowledge described by physical, mathematical, and conceptual models, and also should know that science may not answer all questions.

(5) A system is a collection of cycles, structures, and processes that interact. Students should understand a whole in terms of its components and how these components relate to each other and to the whole. All systems have basic properties that can be described in terms of space, time, energy, and matter. Change and constancy occur in systems and can be observed and measured as patterns. These patterns help to predict what will happen next and can change over time.

(6) Investigations are used to learn about the natural world. Students should understand that certain types of questions can be answered by investigations, and that methods, models, and conclusions built from these investigations change as new observations are made. Models of objects and events are tools for understanding the natural world and can show how systems work. They have limitations and based on new discoveries are constantly being modified to more closely reflect the natural world.

(b) Knowledge and skills.

(1) Scientific processes. The student conducts field and laboratory investigations using safe, environmentally appropriate, and ethical practices. The student is expected to:

(A) demonstrate safe practices during field and laboratory investigations; and

(B) make wise choices in the use and conservation of resources and the disposal or recycling of materials.

(2) Scientific processes. The student uses scientific inquiry methods during field and laboratory investigations. The student is expected to:

- (A) plan and implement investigative procedures including asking questions, formulating testable hypotheses, and selecting and using equipment and technology;
- (B) collect data by observing and measuring;
- (C) organize, analyze, make inferences, and predict trends from direct and indirect evidence;
- (D) communicate valid conclusions; and
- (E) construct graphs, tables, maps, and charts using tools including computers to organize, examine, and evaluate data.

(3) Scientific processes. The student uses critical thinking and scientific problem solving to make informed decisions. The student is expected to:

- (A) analyze, review, and critique scientific explanations, including hypotheses and theories, as to their strengths and weaknesses using scientific evidence and information;
- (B) draw inferences based on data related to promotional materials for products and services;
- (C) represent the natural world using models and identify their limitations;
- (D) evaluate the impact of research on scientific thought, society, and the environment; and
- (F) connect Grade 7 science concepts with the history of science and contributions of scientists.

(4) Scientific processes. The student knows how to use tools and methods to conduct science inquiry. The student is expected to:

- (A) collect, analyze, and record information to explain a phenomenon using tools including beakers, petri dishes, meter sticks, graduated cylinders, weather instruments, hot plates, dissecting equipment, test tubes, safety goggles, spring scales,

balances, microscopes, telescopes, thermometers, calculators, field equipment, computers, computer probes, timing devices, magnets, and compasses; and

(B) collect and analyze information to recognize patterns such as rates of change.

(5) Science concepts. The student knows that an equilibrium of a system may change. The student is expected to:

(A) describe how systems may reach an equilibrium such as when a volcano erupts; and

(B) observe and describe the role of ecological succession in maintaining an equilibrium in an ecosystem.

(6) Science concepts. The student knows that there is a relationship between force and motion. The student is expected to:

(A) demonstrate basic relationships between force and motion using simple machines including pulleys and levers;

(B) demonstrate that an object will remain at rest or move at a constant speed and in a straight line if it is not being subjected to an unbalanced force; and

(C) relate forces to basic processes in living organisms including the flow of blood and the emergence of seedlings.

(7) Science concepts. The student knows that substances have physical and chemical properties. The student is expected to:

(A) identify and demonstrate everyday examples of chemical phenomena such as rusting and tarnishing of metals and burning of wood;

(B) describe physical properties of elements and identify how they are used to position an element on the periodic table; and

(C) recognize that compounds are composed of elements.

(8) Science concepts. The student knows that complex interactions occur between matter and energy. The student is expected to:

(A) illustrate examples of potential and kinetic energy in everyday life such as objects at rest, movement of geologic faults, and falling water; and

(B) identify that radiant energy from the Sun is transferred into chemical energy through the process of photosynthesis.

(9) Science concepts. The student knows the relationship between structure and function in living systems. The student is expected to:

(A) identify the systems of the human organism and describe their functions; and

(B) describe how organisms maintain stable internal conditions while living in changing external environments.

(10) Science concepts. The student knows that species can change through generations and that the instructions for traits are contained in the genetic material of the organisms. The student is expected to:

(A) identify that sexual reproduction results in more diverse offspring and asexual reproduction results in more uniform offspring;

(B) compare traits of organisms of different species that enhance their survival and reproduction; and

(C) distinguish between dominant and recessive traits and recognize that inherited traits of an individual are contained in genetic material.

(11) Science concepts. The student knows that the responses of organisms are caused by internal or external stimuli. The student is expected to:

(A) analyze changes in organisms such as a fever or vomiting that may result from internal stimuli; and

(B) identify responses in organisms to external stimuli found in the environment such as the presence or absence of light.

(12) Science concepts. The student knows that there is a relationship between organisms and the environment. The student is expected to:

- (A) identify components of an ecosystem;
- (B) observe and describe how organisms including producers, consumers, and decomposers live together in an environment and use existing resources;
- (C) describe how different environments support different varieties of organisms; and
- (D) observe and describe the role of ecological succession in ecosystems.

(13) Science concepts. The student knows components of our solar system. The student is expected to:

- (A) identify and illustrate how the tilt of the Earth on its axis as it rotates and revolves around the Sun causes changes in seasons and the length of a day; and
- (B) relate the Earth's movement and the moon's orbit to the observed cyclical phases of the moon.

(14) Science concepts. The student knows that natural events and human activity can alter Earth systems. The student is expected to:

- (A) describe and predict the impact of different catastrophic events on the Earth;
- (B) analyze effects of regional erosional deposition and weathering; and
- (C) make inferences and draw conclusions about effects of human activity on Earth's renewable, non-renewable, and inexhaustible resources.

*Source: The provisions of this §112.23 adopted to be effective September 1, 1998, 22 TexReg 7647.*