

# Texas Administrative Code

TITLE 19

PART 2

CHAPTER 112

SUBCHAPTER A

RULE §112.16

EDUCATION

TEXAS EDUCATION AGENCY

TEXAS ESSENTIAL KNOWLEDGE AND SKILLS FOR SCIENCE

ELEMENTARY

Science, Grade 5, Adopted 2017

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## (a) Introduction.

(1) In Grade 5, scientific 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.

(A) Within the physical environment, students learn about the physical properties of matter, including magnetism, mass, physical states of matter, relative density, solubility in water, and the ability to conduct or insulate electrical and thermal energy. Students explore the uses of light, thermal, electrical, mechanical, and sound energies.

(B) Within the natural environment, students learn how changes occur on Earth's surface and that predictable patterns occur in the sky. Students learn that the natural world consists of resources, including nonrenewable and renewable.

(C) Within the living environment, students learn that structure and function of organisms can improve the survival of members of a species. Students learn to differentiate between inherited traits and learned behaviors.

(2) Science, as defined by the National Academy of Sciences, is the "use of evidence to construct testable explanations and predictions of natural phenomena, as well as the knowledge generated through this process."

(3) Recurring themes are pervasive in sciences, mathematics, and technology. These ideas transcend disciplinary boundaries and include patterns, cycles, systems, models, and change and constancy.

(4) The study of elementary science includes planning and safely implementing classroom and outdoor investigations using scientific processes, including inquiry methods, analyzing information, making informed decisions, and using tools to collect and record information, while addressing the major concepts and vocabulary, in the context of physical, earth, and life sciences. Districts are encouraged to facilitate classroom and outdoor investigations for at least 50% of instructional time.

(5) Statements containing the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.

## (b) Knowledge and skills.

(1) Scientific investigation and reasoning. The student conducts classroom and outdoor investigations following home and school safety procedures and environmentally appropriate and ethical practices. The student is expected to:

(A) demonstrate safe practices and the use of safety equipment as outlined in Texas Education Agency-approved safety standards during classroom and outdoor investigations using safety equipment, including safety goggles or chemical splash goggles, as appropriate, and gloves, as appropriate; and

(B) make informed choices in the conservation, disposal, and recycling of materials.

(2) Scientific investigation and reasoning. The student uses scientific practices during laboratory and outdoor investigations. The student is expected to:

(A) describe, plan, and implement simple experimental investigations testing one variable;

(B) ask well defined questions, formulate testable hypotheses, and select and use appropriate equipment and technology;

(C) collect and record information using detailed observations and accurate measuring;

(D) analyze and interpret information to construct reasonable explanations from direct (observable) and indirect (inferred) evidence;

(E) demonstrate that repeated investigations may increase the reliability of results;

(F) communicate valid conclusions in both written and verbal forms; and

(G) construct appropriate simple graphs, tables, maps, and charts using technology, including computers, to organize, examine, and evaluate information.

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

- (A) analyze, evaluate, and critique scientific explanations by using evidence, logical reasoning, and experimental and observational testing;
- (B) draw or develop a model that represents how something that cannot be seen such as the Sun, Earth, and Moon system and formation of sedimentary rock works or looks; and
- (C) connect grade-level appropriate science concepts with the history of science, science careers, and contributions of scientists.
- (4) Scientific investigation and reasoning. The student knows how to use a variety of tools and methods to conduct science inquiry. The student is expected to collect, record, and analyze information using tools, including calculators, microscopes, cameras, computers, hand lenses, metric rulers, Celsius thermometers, prisms, mirrors, balances, spring scales, graduated cylinders, beakers, hot plates, meter sticks, magnets, collecting nets, and notebooks; timing devices; and materials to support observations of habitats or organisms such as terrariums and aquariums.
- (5) Matter and energy. The student knows that matter has measurable physical properties and those properties determine how matter is classified, changed, and used. The student is expected to:
- (A) classify matter based on measurable, testable, and observable physical properties, including mass, magnetism, physical state (solid, liquid, and gas), relative density (sinking and floating using water as a reference point), solubility in water, and the ability to conduct or insulate thermal energy or electric energy;
- (B) demonstrate that some mixtures maintain physical properties of their ingredients such as iron filings and sand and sand and water; and
- (C) identify changes that can occur in the physical properties of the ingredients of solutions such as dissolving salt in water or adding lemon juice to water.
- (6) Force, motion, and energy. The student knows that energy occurs in many forms and can be observed in cycles, patterns, and systems. The student is expected to:
- (A) explore the uses of energy, including mechanical, light, thermal, electrical, and sound energy;
- (B) demonstrate that the flow of electricity in closed circuits can produce light, heat, or sound;
- (C) demonstrate that light travels in a straight line until it strikes an object and is reflected or travels through one medium to another and is refracted; and
- (D) design a simple experimental investigation that tests the effect of force on an object.
- (7) Earth and space. The student knows Earth's surface is constantly changing and consists of useful resources. The student is expected to:
- (A) explore the processes that led to the formation of sedimentary rocks and fossil fuels; and
- (B) recognize how landforms such as deltas, canyons, and sand dunes are the result of changes to Earth's surface by wind, water, or ice.
- (8) Earth and space. The student knows that there are recognizable patterns in the natural world and among the Sun, Earth, and Moon system. The student is expected to:
- (A) differentiate between weather and climate;
- (B) explain how the Sun and the ocean interact in the water cycle;
- (C) demonstrate that Earth rotates on its axis once approximately every 24 hours causing the day/night cycle and the apparent movement of the Sun across the sky; and
- (D) identify and compare the physical characteristics of the Sun, Earth, and Moon.
- (9) Organisms and environments. The student knows that there are relationships, systems, and cycles within environments. The student is expected to:
- (A) observe the way organisms live and survive in their ecosystem by interacting with the living and nonliving components;
- (B) describe the flow of energy within a food web, including the roles of the Sun, producers, consumers, and decomposers;
- (C) predict the effects of changes in ecosystems caused by living organisms, including humans, such as the overpopulation of grazers or the building of highways; and
- (D) identify fossils as evidence of past living organisms and the nature of the environments at the time using models.
- (10) Organisms and environments. The student knows that organisms have structures and behaviors that help them survive within their environments. The student is expected to:
- (A) compare the structures and functions of different species that help them live and survive in a specific environment such as hooves on prairie animals or webbed feet in aquatic animals; and
- (B) differentiate between inherited traits of plants and animals such as spines on a cactus or shape of a beak and learned behaviors such as an animal learning tricks or a child riding a bicycle.
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