

## To the Student:

After your registration is complete and your proctor has been approved, you may take the Credit by Examination for SCI 7A.

## WHAT TO BRING

- a pencil

## ABOUT THE EXAM

The examination for the first semester of Science, Grade 7, consists of multiple-choice, matching, fill-in-the-blank, true/false, short-answer, and essay questions (you will choose two essay questions to answer out of three). The exam is based on the Texas Essential Knowledge and Skills (TEKS) for this subject. The full list of TEKS is included in this document (it is also available online at the Texas Education Agency website, <http://www.tea.state.tx.us/>). The TEKS outline specific topics covered in the exam, as well as more general areas of knowledge and levels of critical thinking. Use the TEKS to focus your study in preparation for the exam.

The examination will take place under supervision, and the recommended time limit is three hours. You may not use any notes or books. A percentage score from the examination will be reported to the official at your school.

In preparation for the examination, review the TEKS for this subject. All TEKS are assessed. A list of review topics is included in this document to focus your studies. It is important to prepare adequately. Since questions are not taken from any one source, you can prepare by reviewing any of the state-adopted textbooks that are used at your school. The textbook used with our SCI 7A course is:

Biggs, Alton, et al.(2008). *Science, Level Green*. New York: Glencoe/McGraw-Hill.  
ISBN 978-0-07-877808-7

The practice exam included in this document will give you a model of the types of questions that will be asked on your examination. It is **not** a duplicate of the actual examination. It is provided to illustrate the format of the exam, not to serve as a complete review sheet.

Good luck on your examination!

## **SCI 7A Review Topics**

Topics covered in the SCI 7A CBE are:

- the scientific method;
- laboratory safety;
- ecosystems;
- energy flow through ecosystems and organisms;
- structure and function of human body systems: digestive, excretory, respiratory, circulatory, skeletal, endocrine, immune, nervous, reproductive, muscular, and integumentary;
- structure and function of plant and animal cells.

## SCI 7A Practice Exam

**Multiple Choice.** Choose the best answer to complete each statement or answer each question.

1. A defining characteristic of plant cells is that they provide \_\_\_\_\_ to the plant by means of their cell walls.
  - A. warmth
  - B. nourishment
  - C. calories
  - D. structure
2. Which of the following data are most appropriately displayed on a bar graph?
  - A. the percentages of oxygen, hydrogen, carbon dioxide, and nitrogen in the air
  - B. the decrease in temperature of boiling water over time
  - C. comparing daylight hours to plant growth
  - D. the number of paper clips picked up by magnets of different strengths

**Short Answer.** Answer each question in one or two complete sentences.

3. Identify the main parts of the human circulatory system and describe what the system does for the body.
4. Describe three appropriate safety measures to be used in outdoor collection of specimens.

**True/False.** Write the whole word *true* or the whole word *false* on your answer sheet.

5. The Earth and its Moon form a “closed system,” with no energy coming in or going out.
6. Every human cell has 46 chromosomes.

**Essay.** Answer the following question in one or two well-structured paragraphs.

7. Describe how genetic diversity arises in a population, and the advantages and disadvantages, if any, of diversity.

## SCI 7A Practice Exam Answer Key

1. D (A: plants don't generate warmth; B: circulation of nutrients happens in the organism, not in individual cells; C: production of calories comes from internal cell parts)
2. D (A: pie chart; B: line graph; C: line graph)
3. Heart, veins, arteries, capillaries; distribute oxygen and nutrients to all the cells of the body and remove waste products from cells. (correct full sentence/s)
4. long sleeves, long pants tucked into socks, closed shoes, hair tied back; flashlight, net, tweezers, jars for specimens, etc. (three for correct answer, and correct full sentence/s)
5. False. Energy comes in from the Sun. Earth, Moon, and Sun form a closed system for all practical purposes.
6. False. Reproductive cells have 23 chromosomes.
7. Genetic diversity comes from sexual reproduction of organisms in a population. Advantages: better survival rates because of resistance to challenges such as weather, disease, decreased food supply, etc. Disadvantages: slower reproduction rate in most organisms. (Write well-formed paragraph/s with topic sentence, development, closing sentence.)

## Texas Essential Knowledge and Skills SCI 7: Science, Grade 7

### §112.19. Science, Grade 7, Beginning with School Year 2010-2011.

(a) Introduction.

(1) 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." This vast body of changing and increasing knowledge is described by physical, mathematical, and conceptual models. Students should know that some questions are outside the realm of science because they deal with phenomena that are not scientifically testable.

(2) Scientific hypotheses are tentative and testable statements that must be capable of being supported or not supported by observational evidence. Hypotheses of durable explanatory power that have been tested over a wide variety of conditions become theories. Scientific theories are based on natural and physical phenomena and are capable of being tested by multiple, independent researchers. Students should know that scientific theories, unlike hypotheses, are well-established and highly reliable, but they may still be subject to change as new information and technologies are developed. Students should be able to distinguish between scientific decision-making methods and ethical/social decisions that involve the application of scientific information.

(3) Grade 7 science is interdisciplinary in nature; however, much of the content focus is on organisms and the environment. National standards in science are organized as a multi-grade blocks such as Grades 5-8 rather than individual grade levels. In order to follow the grade level format used in Texas, the various national standards are found among Grades 6, 7, and 8. Recurring themes are pervasive in sciences, mathematics, and technology. These ideas transcend disciplinary boundaries and include change and constancy, patterns, cycles, systems, models, and scale.

(4) The strands for Grade 7 include:

(A) Scientific investigation and reasoning.

(i) To develop a rich knowledge of science and the natural world, students must become familiar with different modes of scientific inquiry, rules of evidence, ways of formulating questions, ways of proposing explanations, and the diverse ways scientists study the natural world and propose explanations based on evidence derived from their work.

(ii) Scientific investigations are conducted for different reasons. All investigations require a research question, careful observations, data gathering, and analysis of the data to identify the patterns that will explain the findings. Descriptive investigations are used to explore new phenomena such as conducting surveys of organisms or measuring the abiotic components in a given habitat. Descriptive statistics include frequency, range, mean, median, and mode. A hypothesis is not required in a descriptive investigation. On the other hand, when conditions can be controlled in order to focus on a single variable, experimental research design is used to determine causation. Students should experience both types of investigations and understand that different scientific research questions require different research designs.

(iii) Scientific investigations are used to learn about the natural world. Students should understand that certain types of questions can be answered by investigations, and the 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. Models have limitations and based on new discoveries are constantly being modified to more closely reflect the natural world.

(B) Matter and energy. Matter and energy are conserved throughout living systems. Radiant energy from the Sun drives much of the flow of energy throughout living systems due to the process of photosynthesis in organisms described as producers. Most consumers then depend on producers to meet their energy needs. Decomposers play an important role in recycling matter. Organic compounds are composed of carbon and other elements that are recycled due to chemical changes that rearrange the elements for the particular needs of that living system. Large molecules such as carbohydrates are composed of chains of smaller units such as sugars, similar to a train being composed of multiple box cars. Subsequent grade levels will learn about the differences at the molecular and atomic level.

(C) Force, motion, and energy. Force, motion, and energy are observed in living systems and the environment in several ways. Interactions between muscular and skeletal systems allow the body to apply forces and transform energy both internally and externally. Force and motion can also describe the direction and growth of seedlings, turgor pressure, and geotropism. Catastrophic events of weather systems such as hurricanes, floods, and tornadoes can shape and restructure the environment through the force and motion evident in them. Weathering, erosion, and deposition occur in environments due to the forces of gravity, wind, ice, and water.

(D) Earth and space. Earth and space phenomena can be observed in a variety of settings. Both natural events and human activities can impact Earth systems. There are characteristics of Earth and relationships to objects in our solar system that allow life to exist.

(E) Organisms and environments.

(i) Students will understand the relationship between living organisms and their environment. Different environments support different living organisms that are adapted to that region of Earth. Organisms are living systems that maintain a steady state with that environment and whose balance may be disrupted by internal and external stimuli. External stimuli include human activity or the environment. Successful organisms can reestablish a balance through different processes such as a feedback mechanism. Ecological succession can be seen on a broad or small scale.

(ii) Students learn that all organisms obtain energy, get rid of wastes, grow, and reproduce. During both sexual and asexual reproduction, traits are passed onto the next generation. These traits are contained in genetic material that is found on genes within a chromosome from the parent. Changes in traits sometimes occur in a population over many generations. One of the ways a change can occur is through the process of natural selection. Students extend their understanding of structures in living systems from a previous focus on external structures to an understanding of internal structures and functions within living things.

(iii) All living organisms are made up of smaller units called cells. All cells use energy, get rid of wastes, and contain genetic material. Students will compare plant and animal cells and understand the internal structures within them that allow them to obtain energy, get rid of wastes, grow, and reproduce in different ways. Cells can organize into tissues, tissues into organs, and organs into organ systems. Students will learn the major functions of human body systems such as the ability of the integumentary system to protect against infection, injury, and ultraviolet (UV) radiation; regulate body temperature; and remove waste.

(b) Knowledge and skills.

(1) Scientific investigation and reasoning. The student, for at least 40% of the 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 the Texas 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 inquiry methods 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) in all fields of science, analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, including examining all sides of scientific evidence of those scientific explanations, so as to encourage critical thinking by the student;

(B) use models to represent aspects of the natural world such as human body systems and plant and animal cells;

(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) Science 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 to collect, record, and analyze information, including life science models, hand lens, stereoscopes, microscopes, beakers, Petri dishes, microscope slides, graduated cylinders, test tubes, meter sticks, metric rulers, metric tape measures, timing devices, hot plates, balances, thermometers, calculators, water test kits, computers, temperature and pH probes, collecting nets, insect traps, globes, digital cameras, journals/notebooks, and other equipment as needed to teach the curriculum; and

(B) use preventive 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 interactions occur between matter and energy. The student is expected to:

(A) recognize that radiant energy from the Sun is transformed into chemical energy through the process of photosynthesis;

(B) demonstrate and explain the cycling of matter within living systems such as in the decay of biomass in a compost bin; and

(C) diagram the flow of energy through living systems, including food chains, food webs, and energy pyramids.

(6) Matter and energy. The student knows that matter has physical and chemical properties and can undergo physical and chemical changes. The student is expected to:

(A) identify that organic compounds contain carbon and other elements such as hydrogen, oxygen, phosphorus, nitrogen, or sulfur;

(B) distinguish between physical and chemical changes in matter in the digestive system; and

(C) recognize how large molecules are broken down into smaller molecules, as carbohydrates can be broken down into sugars.

(7) Force, motion, and energy. The student knows that there is a relationship among force, motion, and energy. The student is expected to:

(A) contrast situations where work is done with different amounts of force to situations where no work is done such as moving a box with a ramp and without a ramp, or standing still;

(B) illustrate the transformation of energy within an organism such as the transfer from chemical energy to heat and thermal energy in digestion; and

- (C) demonstrate and illustrate forces that affect motion in everyday life such as emergence of seedlings, turgor pressure, and geotropism.
- (8) Earth and space. The student knows that natural events and human activity can impact Earth systems. The student is expected to:
- (A) predict and describe how different types of catastrophic events impact ecosystems such as floods, hurricanes, or tornadoes;
  - (B) analyze the effects of weathering, erosion, and deposition on the environment in ecoregions of Texas; and
  - (C) model the effects of human activity on groundwater and surface water in a watershed.
- (9) Earth and space. The student knows components of our solar system. The student is expected to:
- (A) analyze the characteristics of objects in our solar system that allow life to exist such as the proximity of the Sun, presence of water, and composition of the atmosphere; and
  - (B) identify the accommodations, considering the characteristics of our solar system, that enabled manned space exploration.
- (10) Organisms and environments. The student knows that there is a relationship between organisms and the environment. The student is expected to:
- (A) observe and describe how different environments, including microhabitats in schoolyards and biomes, support different varieties of organisms;
  - (B) describe how biodiversity contributes to the sustainability of an ecosystem; and
  - (C) observe, record, and describe the role of ecological succession such as in a microhabitat of a garden with weeds.
- (11) Organisms and environments. The student knows that populations and species demonstrate variation and inherit many of their unique traits through gradual processes over many generations. The student is expected to:
- (A) examine organisms or their structures such as insects or leaves and use dichotomous keys for identification;
  - (B) explain variation within a population or species by comparing external features, behaviors, or physiology of organisms that enhance their survival such as migration, hibernation, or storage of food in a bulb; and
  - (C) identify some changes in genetic traits that have occurred over several generations through natural selection and selective breeding such as the Galapagos Medium Ground Finch (*Geospiza fortis*) or domestic animals.
- (12) Organisms and environments. The student knows that living systems at all levels of organization demonstrate the complementary nature of structure and function. The student is expected to:
- (A) investigate and explain how internal structures of organisms have adaptations that allow specific functions such as gills in fish, hollow bones in birds, or xylem in plants;
  - (B) identify the main functions of the systems of the human organism, including the circulatory, respiratory, skeletal, muscular, digestive, excretory, reproductive, integumentary, nervous, and endocrine systems;
  - (C) recognize levels of organization in plants and animals, including cells, tissues, organs, organ systems, and organisms;
  - (D) differentiate between structure and function in plant and animal cell organelles, including cell membrane, cell wall, nucleus, cytoplasm, mitochondrion, chloroplast, and vacuole;
  - (E) compare the functions of a cell to the functions of organisms such as waste removal; and
  - (F) recognize that according to cell theory all organisms are composed of cells and cells carry on similar functions such as extracting energy from food to sustain life.
- (13) Organisms and environments. The student knows that a living organism must be able to maintain balance in stable internal conditions in response to external and internal stimuli. The student is expected to:
- (A) investigate how organisms respond to external stimuli found in the environment such as phototropism and fight or flight; and
  - (B) describe and relate responses in organisms that may result from internal stimuli such as wilting in plants and fever or vomiting in animals that allow them to maintain balance.
- (14) Organisms and environments. The student knows that reproduction is a characteristic of living organisms and that the instructions for traits are governed in the genetic material. The student is expected to:
- (A) define heredity as the passage of genetic instructions from one generation to the next generation;
  - (B) compare the results of uniform or diverse offspring from sexual reproduction or asexual reproduction; and
  - (C) recognize that inherited traits of individuals are governed in the genetic material found in the genes within chromosomes in the nucleus.

*Source: The provisions of this §112.19 adopted to be effective August 4, 2009, 34 TexReg 5063.*