Grade 8 Science

EA/CBE Content Study Guide

This Exam for Acceleration/Credit by Exam Study Guide can help you prepare for the exam by giving you an idea of what you need to study, review, and learn. To succeed, you should be thoroughly familiar with the subject matter before you attempt to take the exam.

Every question that appears on the Exam for Acceleration/Credit by Exam is grounded in the knowledge and skills statements and student expectations within the state-mandated standards, the Texas Essential Knowledge and Skills (TEKS). It should be noted that an exam will not test every student expectation. However, it is important that students study and know the entire scope of the TEKS so that they can develop a complete understanding of the content. The EA/CBEs are a global exam grounded in the TEKS and are not designed to be a final exam. **For a specific listing of the knowledge and skills for this grade level and subject area, please reference the TEKS online at http://www.tea.state.tx.us/index2.aspx?id=6148.** Since questions are not taken from any one source, you can prepare by reviewing any of the state-adopted textbooks.

General Introduction

What is the EA/CBE science based on?

The EA/CBE is based on the state-mandated science standards, the TEKS. All science assessments will be developed using selected knowledge and skills statements and student expectations from the science TEKS. The middle school science test is based on selected science TEKS from grades 6–8.

How were the TEKS chosen to be on the science test?

The science TEKS knowledge and skills statements and student expectations eligible for assessment were determined to be appropriate based on the blueprint for the TAKS test. Although some student expectations within the TEKS are not assessed, educators teach the entire science curriculum so that students can develop a complete understanding of critical science concepts.

How are the TEKS organized within the CBE?

The knowledge and skills statements, with their associated student expectations, are organized under objectives on the CBE. These objectives group the eligible student expectations into categories with similar content. The middle school test has five objectives.

What is the question format for the science tests?

All items should be in a multiple-choice format with four options. Some multiple-choice items can be written as part of a cluster. A cluster should have a stimulus, which may be a diagram, a brief passage, a chart, or a combination of these, followed by a series of items that should involve the application of knowledge and analysis of the given information.

Can any of the science questions be performance based?
The only direct performance testing on the science tests is using a ruler to measure with precision. Some items should require students to physically use a ruler to measure a drawing of an object in centimeters or millimeters. Although precise measurement is the direct performance-based requirement, many items are based on lab or field activities that students should have experienced. These lab and field experiences should include the use of lab and field equipment.

What about the untested TEKS in the middle school assessment?
Because of the constraints of a single assessment, not all TEKS can be assessed. While some student expectations are not tested, all the TEKS are critical for students' overall understanding of science. For example, (7.11), "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," is not directly tested, but students must understand this concept in order to successfully answer items testing (8.6), "The student knows that interdependence occurs among living systems. The student is expected to (A) describe interactions among systems in the human organism; (B) identify feedback mechanisms that maintain equilibrium of systems such as body temperature, turgor pressure, and chemical reactions; and (C) describe interactions within ecosystems." The relationship between organisms that are composed of several systems maintaining homeostasis (equilibrium) and their role in the environment is not fully understood until eighth grade, when it is assessed in the middle school test. This concept is then more fully explored in high school through Biology (10), "The student knows that, at all levels of nature, living systems are found within other living systems, each with its own boundary and limits. The student is expected to (A) interpret the functions of systems in organisms including circulatory, digestive, nervous, endocrine, reproductive, integumentary, skeletal, respiratory, muscular, excretory, and immune."

What types of equipment may be referenced on the middle school science test?
Students should be expected to have experience using all of the tools and equipment commonly used in first through eighth grades. This includes beakers, test tubes, Petri dishes, graduated cylinders, microscopes (dissecting and compound), safety goggles (splash-proof), spring scales, triple-beam balances, meter sticks, hot plates, thermometers, models (such as topographic maps and globes), computers, computer probes (for temperature and pH), calculators, timing devices, weather instruments, telescopes, and field equipment such as binoculars, dip nets for collection, and water test kits.

Objective 1

Student demonstrates an understanding of the nature of science.
Students should:

- focus on the study of science as an intellectual and social endeavor that helps students learn how the world works.
- perform the activities of scientists, which include making observations, collecting data, and drawing conclusions.
- collect data by observing and measuring.
- have the opportunity to work in lab and field settings that allow students to discover the nature of science and learn scientific processes firsthand.

- develop critical-thinking skills and problem-solving abilities, which is the primary goal of science education.
- learn the many methods in scientific research, such as descriptive investigation, simple mathematical and engineering modeling and design, and controlled experiments.
- participate in laboratory and field activities. Classrooms, hallways, school grounds, and community resources can be used for these investigations.
- learn about and use safe practices in the classroom, laboratory, and field.
- make inferences, to recognize meaningful data, to use evidence and data to evaluate the strengths and weaknesses of scientific explanations, and to analyze possible unexpected results from an investigation.
- interpret and evaluate graphs, charts, and maps. Maps may include topographic contour maps, in which each line on the map represents a change in elevation and differences in spacing between lines indicate relative steepness of slopes.
- recognize tools such as a beaker, graduated cylinder, or thermometer and know how to properly use the most common ones.
- apply basic science concepts to questions that assess scientific process skills, such as testing a hypothesis, predicting trends, and communicating conclusions.
- understand that models have limitations and are not perfect representations because of their size and scope but that they are still useful for study.
- extrapolate from collected information to make predictions and identify patterns.
- use mathematical skills in lab and field investigations, as in determining the average number of plants in a field sample.

For a specific listing of the knowledge and skills for this grade level and subject area, please reference the TEKS online at http://www.tea.state.tx.us/index2.aspx?id=6148.

Objective 2

Student demonstrates an understanding of living systems and the environment.

Students should:

- understand how living organisms function and interact within the environment.
- understand how the traits and behaviors of living organisms work together to function as a living system.
- know that living organisms form complex relationships with other living organisms and how organisms interconnect with living and nonliving components within the ecosystem.
- understand the role of genetics and adaptation in evolutionary change.
- understand that DNA contains all genetic information but do not need to know details of DNA's molecular structure, which is taught in high school biology.
- understand that the nucleus of the cell contains the chromosomes, which are composed of DNA, but that DNA can be inherited only through the sex cells (sperm and egg).
- predict genetic outcomes and single-trait punnett squares may be used. For example, selective breeding, such as in purebred dogs, may be used.
- know that human activity, both negative and positive, may result in environmental consequences but that there may be degrees of consequences.

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Objective 3

Student demonstrates an understanding of the structures and properties of matter.

Student should:

- know the basic parts of an atom and be introduced to the periodic table and common chemical formulas that represent compounds.
- use the periodic table to find information such as element names, symbols, atomic mass, number of protons and neutrons, and the physical and chemical properties of elements.
- understand how the properties of the elements are used to place them in columns as groups or families.
- recognize the elements that make up common compounds, such as water, sugar, and salt.
- use the periodic table to identify chemical symbols and other information about elements.
- determine when a chemical reaction has occurred.
- know chemical equations focus on identifying rearrangement of atoms; students should not be required to balance chemical equations.
- understand the basic concept of conservation of mass (mass is neither lost nor destroyed in a regular chemical reaction).
- recognize specific heat as a property of a substance and understand how it affects the world around us.
- know the difference between exothermic and endothermic reactions.

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Objective 4

Student demonstrates an understanding of motion, forces, and energy.

Students should:

- be familiar with the relationships of forces, motion, and energy in geologic and physical energy can also result in the flow of heat or the production of different types of waves, such as sound and light.
- understand that various forces can generate or interfere with motion and that energy can be transformed from one form to another.
- know the general characteristics of waves, including wavelength, frequency, and amplitude.
- understand that waves come in different forms, such as electromagnetic, water, seismic, and sound, and that waves can travel through different media.
- know that energy takes various forms, such as thermal, chemical, mechanical, and electrical.
- know that an object at rest has potential energy and an object in motion has kinetic energy.
- understand that energy transformations occur in energy production, as in the conversion of wind energy to electrical energy.
- solve simple speed and motion calculations.

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Objective 5

Student demonstrates an understanding of earth and space systems.

Students should:

- understand the relationships between Earth, the sun, and the moon; other components in the universe may also be included, such as stars, nebulae, and comets.
- know characteristics of the universe such as stars and galaxies.
- analyze information about stars from this data table.
- know all the various cycles found on Earth, including the lunar, rock, nitrogen, water, and carbon cycles, and predict the results of modifying these cycles.
- understand how natural and human activity can alter earth systems, including natural disasters, gradual land changes, and human impacts on soil, water, and air quality.
- know and predict the effects of modifications on Earth's most important cycles, such as the water, rock, nitrogen, and carbon cycles.
- know the importance of the alteration of earth systems from both human interaction and catastrophic natural events is assessed. Human alteration can include endangerment of species and use of natural resources as well as changes to soil, water, and air. Natural events can include volcanic eruptions, hurricanes, and gradual processes such as weathering, erosion, and deposition.
- understand the basic movements of Earth's plates and features of tectonics, such as rift valleys, trenches, seafloor spreading, and mountain building.
- identify the general phases of the moon, such as full moon and quarter moon, as well as general characteristics of the universe, such as stars, galaxies, nebulae, and comets.
- be familiar with interactions between matter and energy in solar, weather, and ocean systems are complex. These interactions may be addressed separately or jointly.

For a specific listing of the knowledge and skills for this grade level and subject area, please reference the TEKS online at http://www.tea.state.tx.us/index2.aspx?id=6148.

About the Exam

The EA/CBE consists of 100 objective questions that are equally weighted. The exam may consist of multiple-choice and true-false questions. The exams will include an exam booklet and a separate computer graded answer sheet. Enough room is left around each item in the booklet for students to work each problem. Student responses **must** be recorded on the computer graded answer sheet. Students will be allowed **3 hours** to take the exam and will **NOT** be allowed to use a calculator.

Formula Sheets with the Exam

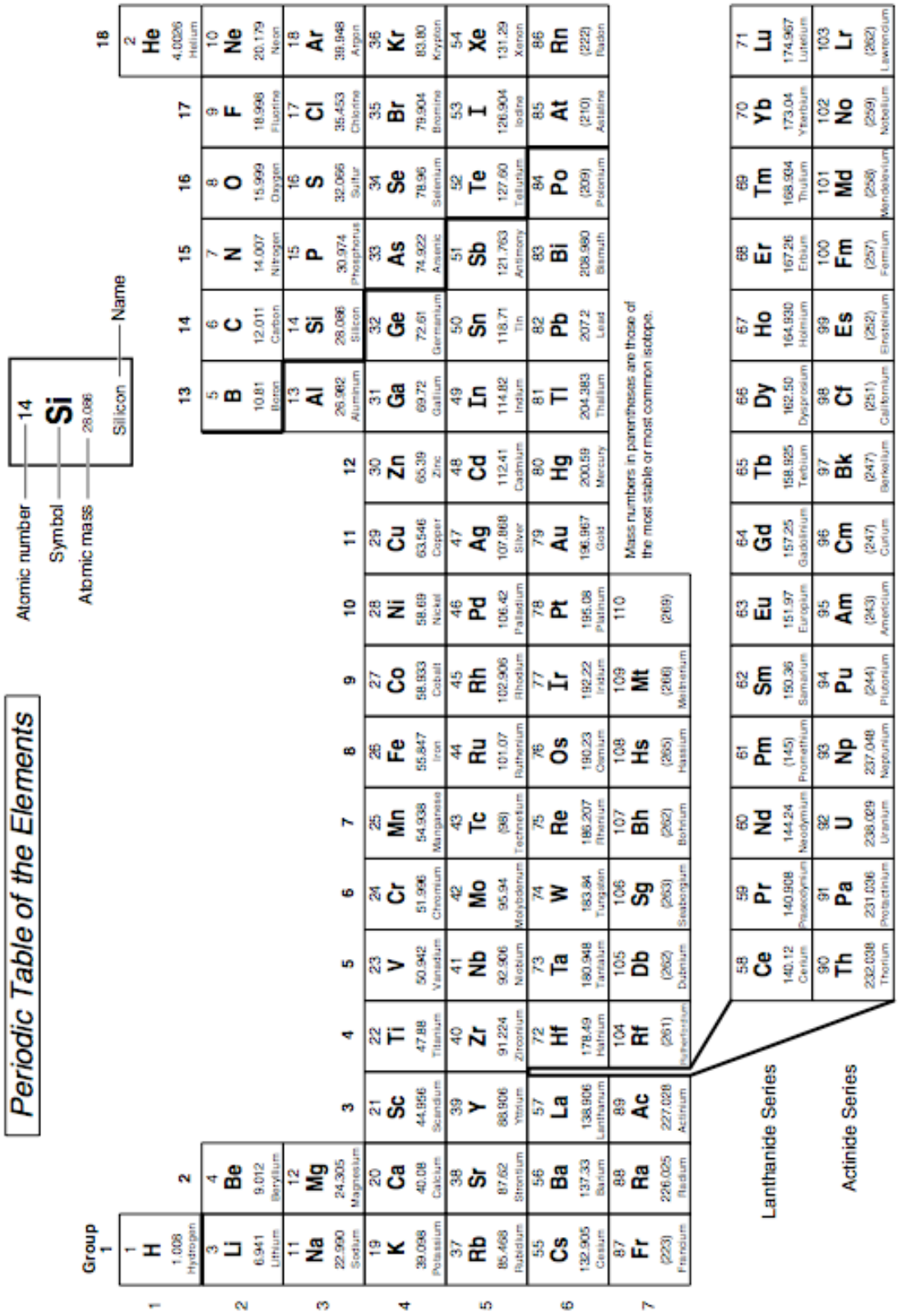
For paper-based exams, a formula sheet and periodic table will be provided with your test. For computer-based exams, the proctor will provide to you a paper copy of the formula sheet and periodic table immediately prior to testing. You will return the sheets after the exam. The following formulas will be on the formula sheet.

Work = force x distance	$W = Fd$
Speed = $\frac{\text{distance}}{\text{time}}$	$s = \frac{d}{t}$
Force = mass x acceleration	$F = ma$
Weight = mass x acceleration due to gravity	$Weight = mg$
Density = $\frac{\text{mass}}{\text{volume}}$	$D = \frac{m}{v}$

CONSTANTS/CONVERSIONS

g = *acceleration due to gravity* = 9.8 $\frac{m}{s^2}$
Speed of light = 3 x 10^8 $\frac{\text{m}}{\text{s}}$
Speed of sound = 343 $\frac{\text{m}}{\text{s}}$ at sea level and 20^0C
1 cm^3 = 1 mL

You will be provided this Periodic Table of Elements with your exam.



Sample Questions

These sample questions will give you a better idea of the types of questions you can expect on the EA/CBE. These are provided to illustrate the format of the exam. They are not the actual exam. In order to be successful on the exam, you must study the TEKS for this grade level and subject area.

1. When lifting weights (barbells), you exert a force of a 200 Newtons upward through a distance of half a meter. How much potential energy was given to the barbells by lifting them?

   A 100 Joules
   B 200 Joules
   C 400 Joules
   D 1600 Joules

2. To see if a certain material has a density less than 1 g/cc, a quick method might be to

   A extract one cubic centimeter of the material and find its mass.
   B measure both the mass and volume, then divide mass by volume.
   C put the material in water to see if it floats.
   D put the material in vegetable oil to see if it floats.

3. Which of these chemical equations represents what happens when you burn methane gas (CH_4)?

   A $CH_4 + Cl_2 \rightarrow CCl_2 + H_2$
   B $CH_4 + N_2 \rightarrow CN + H_2$
   C $CH_4 + O_2 \rightarrow CO_2 + H_2O$
   D $CH_4 + F_2 \rightarrow CF_2 + H_2$

Answer Key

Item Number	Correct Answer
1	A
2	C
3	C