Certification Examinations
for Oklahoma Educators™

Oklahoma Subject Area Tests™

STUDY GUIDE

026 Middle Level Science

Oklahoma Commission
for Teacher Preparation

OK-SG-FLD026-05

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STUDY GUIDE INTRODUCTION AND GENERAL INFORMATION ABOUT THE CERTIFICATION EXAMINATIONS FOR OKLAHOMA EDUCATORS

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INTRODUCTION

This section includes a list of the test competencies, as well as a set of practice selected-response (multiple-choice) questions and one or more practice constructed-response assignments (if applicable), for the test field included in this study guide.

Test Competencies

The test competencies are broad, conceptual statements that reflect the subject-matter skills, knowledge, and understanding an entry-level educator needs to teach effectively in Oklahoma public schools. The list of test competencies for each test field represents the **only** source of information about what a specific test will cover and therefore should be reviewed carefully.

The descriptive statements that follow the competencies are included to provide examples of possible content covered by each competency. These descriptive statements are neither exhaustive nor exclusionary.

Practice Test Questions

The practice selected-response questions and any practice constructed-response assignments included in this section are designed to give you an introduction to the nature of the questions included in this OSAT test field. The practice test questions represent the various types of questions you may expect to see on an actual test; however, they are **not** designed to provide diagnostic information to help you identify specific areas of individual strengths and weaknesses or to predict your performance on the test as a whole.

To help you prepare for your OSAT, each practice selected-response question in this section is preceded by the competency it measures and followed by a brief explanation of the correct response. On the actual test, the competencies, correct responses, and explanations will **not** be given.

If the test field included in this guide has a constructed-response assignment, a sample response is provided immediately following the practice constructed-response assignment. The sample response in this guide is for illustrative purposes only. Your written response should be your original work, written in your own words, and not copied or paraphrased from some other work.

A description of the process that is used for scoring the constructed-response assignment is provided in addition to the OSAT performance characteristics and score scale.

When you are finished with the practice test questions, you may wish to go back and review the entire list of test competencies and descriptive statements for your test field.

SUBAREAS:

I. Foundations of Scientific Inquiry
II. Life Science
III. Physical Science
IV. Earth and Space Science

SUBAREA I—FOUNDATIONS OF SCIENTIFIC INQUIRY

Competency 0001

Understand the process of scientific inquiry.

The following topics are examples of content that may be covered under this competency.

Recognize the characteristics of different types of scientific investigations (e.g., observations, controlled experiments).

Analyze the processes by which scientific knowledge and hypotheses are generated.

Demonstrate knowledge of the principles of experimental design (e.g., dependent and independent variables, experimental controls and constants).

Recognize appropriate questions to ask in a given scientific context and the appropriateness of a given experimental design to test a hypothesis.

Competency 0002

Understand the historical and contemporary contexts of the study of science and the common themes that connect science and technology.

The following topics are examples of content that may be covered under this competency.

Analyze the significance of key events, theories, and experiments in the history of science.

Identify the scientific contributions of individuals and societies of different periods and cultures.

Identify ethical, environmental, and health issues associated with scientific developments and new technologies.

Analyze the interrelationship of science and technology in scientific investigations and in daily life.

Recognize the characteristics and uses of different types of models (e.g., scale models, simulations, formulas) in science and technology.

Identify general concepts common to science and technology (e.g., order, scale, modeling, cause and effect, systems, constancy).

Competency 0003

Understand the principles of measurement and the processes of gathering, organizing, reporting, and interpreting scientific data.

The following topics are examples of content that may be covered under this competency.

Identify procedures for gathering and collecting relevant and reliable data in a given situation.

Analyze procedures and formats used in organizing, reporting, and interpreting scientific data (e.g., tables, charts, graphs).

Solve problems involving measurement and basic computation, using the International System of Units (SI) and scientific notation.

Apply descriptive statistics in the analysis of data.

Competency 0004

Understand the equipment, materials, and chemicals used in scientific inquiry; and apply procedures for their proper, safe, and legal use.

The following topics are examples of content that may be covered under this competency.

Recognize procedures for the safe and proper use of common laboratory equipment (e.g., balances, glassware, thermometers, microscopes) and materials in various types of scientific investigations.

Identify procedures for the safe storage, use, and disposal of common laboratory chemicals according to material safety data sheet (MSDS) guidelines.

Identify procedures for the ethical treatment and safe handling of organisms (e.g., animals, specimens both in and out of the classroom).

Apply procedures for promoting laboratory safety and appropriately responding to accidents and injuries in the science laboratory.

Recognize how computers are used in scientific investigations.

SUBAREA II—LIFE SCIENCE

Competency 0005

Understand the basic concepts of cell biology.

The following topics are examples of content that may be covered under this competency.

Identify the components and principles of the cell theory.

Recognize structures in prokaryotic and eukaryotic cells and their functions (e.g., plant cells, animal cells, bacteria).

Identify the role of organic molecules (e.g., proteins, DNA, carbohydrates) in cells and organisms.

Competency 0006

Understand the diversity of life and life processes.

The following topics are examples of content that may be covered under this competency.

Recognize the characteristics and classification of major groups of organisms.

Analyze the processes of photosynthesis and cellular respiration.

Recognize how organisms grow, reproduce, and maintain homeostasis.

Identify the structure, components, functions, and physiological processes of organs and systems in plants and animals, including humans.

Competency 0007

Understand genetics and biological adaptation.

The following topics are examples of content that may be covered under this competency.

Identify the structure and function of genes and chromosomes.

Analyze processes by which characteristics are passed on from parents to offspring.

Analyze the roles of variation, natural selection, and adaptation in biological evolution.

Recognize the paleontological and genetic evidence for biological evolution.

Competency 0008

Understand populations, communities, ecosystems, and biomes.

The following topics are examples of content that may be covered under this competency.

Identify the characteristics of populations, communities, and ecosystems.

Analyze factors that affect population growth and community interactions.

Analyze the movement of energy and materials through the trophic levels of an ecosystem.

Recognize the physical and biological characteristics of the earth's biomes (e.g., grassland, tundra, rainforest).

Competency 0009

Understand the effect of humans on the environment.

The following topics are examples of content that may be covered under this competency.

Identify sources of environmental pollutants and strategies for controlling pollution.

Analyze the effects of humans on natural processes and environments.

Analyze techniques and procedures for protecting the environment.

Recognize the characteristics of natural resources and strategies for their management.

SUBAREA III—PHYSICAL SCIENCE

Competency 0010

Understand the structure and nature of matter.

The following topics are examples of content that may be covered under this competency.

Recognize historic and contemporary theories of the atom and the kinetic theory of matter.

Identify the physical and chemical characteristics of matter (e.g., density, mass, volume, state, reactivity).

Recognize the characteristics of elements, pure substances, compounds, mixtures, and solutions.

Recognize types and characteristics of chemical bonding and its relationship to molecular structures.

Analyze the organization of the periodic table in terms of its relationship to atomic structure and both chemical and physical properties of elements.

Competency 0011

Understand physical, chemical, and nuclear changes in matter.

The following topics are examples of content that may be covered under this competency.

Distinguish between physical and chemical changes and their characteristics.

Apply knowledge of the conservation of mass to balance chemical equations.

Demonstrate knowledge of chemical formulas, the mole concept, and chemical notation to solve problems.

Recognize the characteristics of different types of chemical reactions (e.g., acid-base, oxidation-reduction).

Analyze phase changes and the characteristics of the different states of matter.

Identify characteristics of nuclear changes in matter.

Competency 0012

Understand the basic concepts of force, motion, and work.

The following topics are examples of content that may be covered under this competency.

Identify the forces (e.g., gravity, the normal force, friction, buoyant force) affecting an object.

Apply Newton's laws of motion to interpret and predict the motion of objects in a variety of situations.

Analyze simple machines and the principles of work and power.

Competency 0013

Understand energy and its forms and transformations.

The following topics are examples of content that may be covered under this competency.

Identify forms of energy (e.g., electrical, mechanical, thermal, nuclear) and their characteristics.

Demonstrate knowledge of the law of conservation of energy in various situations, including physical and chemical changes.

Analyze the transfer of thermal energy through conduction, convection, and radiation.

Recognize the characteristics of mechanical energy and the relationship between kinetic and potential energy.

Competency 0014

Understand waves, sound, and light.

The following topics are examples of content that may be covered under this competency.

Interpret concepts associated with waves, sound, and light (e.g., frequency, amplitude, wavelength, pitch, loudness, color).

Apply knowledge of refraction, reflection, and constructive and destructive interference to explain the behavior of light and sound waves.

Analyze the properties and propagation of sound and light in a variety of real-world situations (e.g., rainbows, echoes, Doppler effect, shadows).

Recognize the characteristics of the electromagnetic spectrum.

Competency 0015

Understand electricity, magnets, and electromagnetism.

The following topics are examples of content that may be covered under this competency.

Identify the characteristics of static electricity and current electricity.

Demonstrate knowledge of the properties of permanent magnets and the relationship between electricity and magnetism.

Recognize the characteristics of parallel and series circuits.

Recognize how electricity is generated (e.g., wind, water, sun, fossil fuel) and used in everyday life.

SUBAREA IV—EARTH AND SPACE SCIENCE

Competency 0016

Understand geology and geologic processes.

The following topics are examples of content that may be covered under this competency.

Demonstrate knowledge of the characteristics of rocks, minerals, and soils and their formation.

Analyze the structure and composition of the earth and the evidence supporting the theory of plate tectonics.

Analyze processes of the rock cycle and the effect of these processes on the earth's systems.

Recognize major events in the earth's history and principles and methods of relative and absolute dating techniques.

Interpret maps commonly used in earth science (e.g., topographic maps, globes, map projections) and geologic cross sections.

Competency 0017

Understand the hydrosphere.

The following topics are examples of content that may be covered under this competency.

Identify the chemical and physical characteristics of freshwater and seawater (e.g., specific heat, density, salinity).

Identify characteristics and processes of the water cycle (e.g., condensation, precipitation, transpiration).

Recognize the characteristics of freshwater systems, including factors that affect the movement of surface water and groundwater (e.g., soil characteristics, wells, water budgets).

Identify factors that affect the biological productivity of bodies of water.

Demonstrate knowledge of ocean basins, ocean circulation, and coastal processes.

Competency 0018

Understand weather, climate, and the earth's atmosphere.

The following topics are examples of content that may be covered under this competency.

Identify the structure, functions, and characteristics of the earth's atmosphere.

Analyze the role of air masses, fronts, and the jet stream in producing different weather conditions, including hazardous weather.

Recognize processes related to precipitation and cloud formation.

Identify equipment and methods used to predict and interpret weather and climate changes.

Recognize the potential effects of climate change and weather events on societies and ecosystems.

Competency 0019

Understand basic astronomy.

The following topics are examples of content that may be covered under this competency.

Analyze theories of the structure, origin, and evolution of the solar system and universe.

Recognize the interactions and motions of the earth, sun, and moon that produce seasons, tides, and eclipses.

Identify the components of the solar system (e.g., sun, planets, moons, asteroids) and their characteristics, interactions, and movements.

Identify the characteristics of stars and galaxies (e.g., types, life cycles).

Identify equipment used to study space and the effect that space exploration has had on society and technological developments.

Practice Selected-Response Questions

Competency 0001

Understand the process of scientific inquiry.

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1. Which of the following is a fundamental principle of experimental design?

   A. Dependent variables in an experiment must be held constant.

   B. Controls are nonessential in field-based experiments.

   C. A single independent variable is manipulated during an experiment.

   D. An experiment's primary goal is to support the underlying hypothesis.

Correct Response: C. In the design of a scientific experiment a single independent variable is manipulated, while the dependent variable is observed to see how it responds to the manipulation of that independent variable. Other independent variables are held constant during the experiment so the experimenter can determine the relationship of the manipulated independent variable to the dependent variable.

Competency 0003

Understand the principles of measurement and the processes of gathering, organizing, reporting, and interpreting scientific data.

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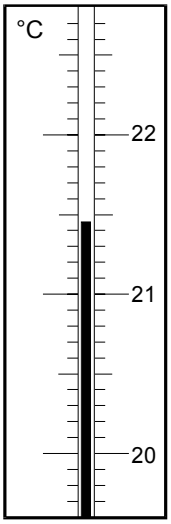
2. **Use the diagram below of a portion of a thermometer to answer the question that follows.**



According to the principles of uncertainty applied in scientific measurement, which of the following would be the most appropriate way to report the temperature reading indicated on the thermometer above as part of a scientific investigation?

A. ≈21°C

B. 21.4°C

C. 21.41°C

D. 21.45°C

Correct Response: D. There is uncertainty in making any measurement. In science, the accuracy of a measurement is indicated by the number of significant figures included in the reported value. When significant figures are used, the last digit is understood to be an estimate. In this situation, the smallest unit on the scale of the thermometer is 0.1°C, which means that the reported temperature is certain to a tenth of a degree and needs to be estimated to the hundredths of a degree. The best estimate of the thermometer's reading is that the temperature is halfway between the units on the scale that indicates 21.4°C and 21.5°, so the temperature is recorded as 21.45°C.

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3. During strenuous exercise, a person's heart rate and breathing rate increase dramatically and the person begins to sweat. Such changes in body function help:

   A. reduce the amount of effort that must be expended by muscle cells to maintain such activity for an extended period.

   B. maintain internal environmental conditions that are favorable for normal cell functioning in all body tissues.

   C. protect sensitive internal organs against damage that may occur during falls, impacts, and strains that often occur during such activity.

   D. allow skeletal muscles to work more efficiently by causing all body systems that are in contact with the muscles to act in synchrony.

Correct Response: B. Increased heart and breathing rates and sweating are all mechanisms that help maintain the body's homeostasis during exercise. Strenuous exercise increases both the body's demand for oxygen and the production of cellular waste products. The increased heart and breathing rates together help deliver greater amounts of oxygen to the cells and remove the carbon dioxide and other waste products produced by the cells. Exercise also causes the cells to generate more heat. Sweating facilitates cooling of the body, preventing the internal temperature from rising dangerously high.

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4. The number of trophic levels in an ecosystem is primarily limited by which of the following factors?

   A. the inefficiency of energy transfer from one level to the next

   B. the rate at which decomposers are able to break down materials from organisms at each level

   C. the types of predators in the topmost level of the food web

   D. the amount of competition between species at the bottommost level of the food web

Correct Response: A. The trophic levels in an ecosystem are any of the several levels of a food chain in that ecosystem. Plants are the lowest trophic level in most food chains. Plants convert energy from the sun to biomass that then becomes available for consumption by the next trophic level, the primary consumers. The energy in this second trophic level is then available to the next trophic level of secondary consumers, the carnivores. Since only a fraction of the energy used by a trophic level is converted to biomass, significantly less energy is available for the next highest trophic level of consumers that will consume that biomass. It is this relative inefficiency of the transfer of energy between trophic levels that limits how many trophic levels a particular ecosystem can support.

Competency 0009

Understand the effect of humans on the environment.

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5. Which of the following is a primary function of catalytic converters in automobiles?

   A. oxidation of unburned hydrocarbons

   B. combustion of carbon dioxide

   C. trapping of unburned gasoline fumes

   D. reducing sulfur dioxide in exhaust

Correct Response: A. One of the ways that catalytic converters reduce the toxicity of automobile emissions is by oxidizing unburned hydrocarbons in a chemical reaction that produces water and carbon dioxide as products. Additionally, catalytic converters oxidize carbon monoxide and reduce nitrogen oxides. Like the oxidation of unburned hydrocarbons, these chemical reactions generate nontoxic products, thereby reducing the toxicity of automobile exhaust.

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6. **Use the passage below to answer the question that follows.**

   In the 1700s, chemists discovered that the world is made up of many different substances and that each substance is unique and readily distinguished from all the others. They named these discrete substances elements. They also found that different elements could be combined to form new substances, which they called compounds. After many experiments, scientists realized that a given compound always contains the same elements in the same proportions. For example, the compound copper carbonate always contains the same three elements—copper, carbon, and oxygen—and always in the same proportions by weight: 5.3 parts of copper to 4 parts of oxygen to 1 part of carbon. The scientists discovered that the types and proportions of elements in a compound remained constant whether the compound was made in a laboratory or occurred naturally.

   The discoveries described in this passage provide the best and most direct supporting evidence for which of the following statements?

   A. All elements are made up of tiny, indivisible particles called atoms. The atoms of a given element are identical, but the atoms of one element are different from those of other elements.

   B. In a chemical reaction, the total mass of all the products must be equal to the mass of the elements that reacted.

   C. The physical properties of each element are determined by the number and arrangement of protons, neutrons, and electrons in atoms of that element.

   D. The particles in matter are electrically charged and their interactions are governed by electrical forces.

Correct Response: A. The fact that a given compound always consists of the same elements in the same proportions provides evidence that the elements are made up of discrete units that cannot be broken down any further. The predictable, yet unique, properties of each element are best explained by the conclusion that the atoms of a given element are identical to one another but differ from the atoms that make up other elements.

Competency 0012

Understand the basic concepts of force, motion, and work.

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7. A 3 kg mass traveling with a velocity of v meters per second strikes a 9 kg object at rest. The two objects stick together and continue moving in the same direction that the first mass had been moving, with a new velocity of 0.5 meter per second. What was the initial velocity of the 3 kg mass?

   A. 0.5 meter/second

   B. 1 meter/second

   C. 1.5 meters/second

   D. 2 meters/second

Correct Response: D. In a one-dimensional collision, the momentum after the interaction is equal to the momentum before the collision. This is given by $m_1 v_1 + m_2 v_2 = (m_1 + m_2) v_f$. In this problem, the momentum before the collision is given by (3 kg)(v m/s) + (9 kg)(0 m/s). This is equal to the product of the combined mass and velocity after the collision, which is given by (12 kg)(0.5 m/s). Therefore, (3 kg)(v m/s) + (9 kg)(0 m/s) = (12 kg)(0.5 m/s), and solving for the unknown initial velocity v gives

$$\frac{(12 \text{ kg})(0.5 \text{ m/s}) - (9 \text{ kg})(0 \text{ m/s})}{3 \text{ kg}} = 2 \text{ m/s}.$$

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8. Sound waves are refracted when:

   A. parts of the wave front travel at different speeds.

   B. waves are broken up as they pass through turbulent air.

   C. parts of the wave front are amplified moving over irregular surfaces.

   D. waves are inverted as they bounce off solid surfaces.

Correct Response: A. Sound waves are mechanical waves that propagate through a medium such as air. Sound travels at different speeds in warm air and cold air. As a propagating sound wave encounters a boundary between warm and cold air (e.g., a relatively thin layer of cool air directly over a lake on a summer evening), the part of the wave front that propagates in the cold air will travel more slowly than the part of the wave front that is traveling through the warmer air overlying the layer of cold air. This causes the sound wave to bend toward the cooler air, resulting in the unusually effective sound transmission across the surface of the lake on a summer evening. The bending of the sound waves at the temperature boundary is an example of the refraction of sound waves.

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9. Which of the following is a major reason that power companies generate alternating current instead of direct current for use in homes and businesses?

   A. It costs substantially less to produce current with higher amperage.

   B. Less energy is lost in transmission and the voltage is easily changed.

   C. Less mechanical energy is needed to produce the same wattage.

   D. It is significantly less likely to cause electric shocks or overload circuits.

Correct Response: B. A major advantage of alternating current over direct current for electrical power transmission is the ease with which the voltage or current can be changed by a transformer. Because the transmitted power is equal to the product of the current and the voltage, the same amount of power can be transmitted with a lower current by increasing the voltage. Since energy loss during transmission is directly related to current, low-current electricity loses less power during transmission. Alternating current can then be stepped-down by a transformer where it enters businesses and homes to a lower voltage, higher current transmission that is suitable for electricity use in the home.

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10. The massive volcanic eruption of Mt. Pinatubo in the Philippines in 1991 changed the environment in which of the following ways?

    A. Particulates from the volcano entered the troposphere, causing a global increase in precipitation.

    B. Greenhouse gases released by the eruption raised average global temperatures for over a year.

    C. Sulfur dioxide from the eruption combined with water vapor to form aerosols that caused global cooling.

    D. Ash erupted from the volcano stayed in the stratosphere for years, raising global temperatures.

Correct Response: C. Scientific evidence collected following the eruption of Mt. Pinatubo in the Philippines showed that the eruption released over 25 million tons of sulfur dioxide into the stratosphere. The sulfur dioxide was oxidized to eventually produce a haze of sufuric acid droplets throughout the stratosphere. In the year following the eruption, the haze of aerosols reduced the sunlight reaching Earth's surface by approximately 10 percent, cooling surface temperatures significantly.

11. **Read the information below; then complete the exercise that follows.**

A middle level science teacher is preparing an investigation on electricity and magnetism. Students will construct a simple electromagnet, make observations of its properties, and evaluate factors that affect its strength. Write an essay describing how to carry out this investigation. In your essay:

- describe the materials required for the activity;
- identify the variables that affect the strength of the electromagnet;
- describe an appropriate experimental design for testing one of these variables and show how data from the investigation will be recorded and analyzed; and
- identify two basic physical science concepts that are related to the investigation and explain how the results of the investigation can be used to illustrate these two concepts.

A Very Good Response to the Practice Constructed-Response Assignment

Prior to this investigation, students will have had an introduction to magnets, electricity, and electromagnetism. In the investigation, the students will experiment by making an electromagnet out of simple materials.

To make a simple electromagnet requires a 1.5-V battery, a 50-cm length of insulated copper wire, and a large iron nail. The relative strength of electromagnets the students make could be measured by determining how many paperclips their electromagnet can lift. The independent variables that would likely affect the strength of the electromagnet are the length of the wire used to make the coil, the size (e.g., mass) of the iron nail used, and the voltage used to produce a current in the wire. Depending on what independent variable they intend to manipulate, the students would need either a 100-cm length of insulated copper wire, a second 1.5-V battery, or a different size iron nail. Approximately 10 small metal paperclips would be needed to measure the strength of the electromagnet as they vary the length of the wire, the amount of voltage supplied, or the size/mass of the iron nail.

To test how changing one of the independent variables will affect the strength of their electromagnet, students must first chose the independent variable that will be manipulated during the test. In this example, the wire length will be the manipulated variable. The other independent variables (i.e., the amount of voltage supplied to the circuit and the size/mass of the nail) will be held constant. The dependent variable to be measured would be the number of paperclips the electromagnet can lift with the paperclips being lifted end to end from the tip of the magnified iron nail. With wire length as the independent variable to be changed, the experiment would be designed as follows: First, the control electromagnet is constructed with a 1.5-V battery, a 50-cm length of wire, and the iron nail. The wire is tightly wrapped around the nail (leaving the tip exposed) to create the coil, one end of the wire is attached to the positive battery terminal and the other end is attached to the negative battery terminal. Since this is now a closed circuit, the wire will heat up and care should be taken in handling the electromagnet. Making sure the coil is still tightly wrapped around the nail, the tip of the iron nail will now be able to lift a few paperclips. The number of paperclips the electromagnet lifts is now recorded. This part of the experiment should be conducted several times to make sure that the electromagnet picks up a consistent number of paperclips during each trial. After this step, the circuit is disconnected and the wire is unwrapped. The new 100-cm section of insulated copper wire is now tightly wrapped around the hail. If the 50-cm wire completely covered most of the nail, the 100-cm section of wire will

(continued)

A Very Good Response to the Practice Constructed-Response Assignment *(continued)*

require a second layer of coils that is wrapped over the first layer of coils. The battery is hooked to the circuit and the experimenter again measures how many paperclips the new electromagnet can lift. As in the first control experiment, this procedure should be repeated several times to accurately determine how many paperclips the electromagnet can lift. The data from both the control experiment and the second experiment can then be compared on a chart or graph.

A basic physical principal involved in this experiment is that the flow of charge (i.e., electric current) through a circuit produces an electromagnetic field. This is the phenomenon that makes electric motors and generators work. Another important principal at work in this simple electromagnet is that the electromagnetic field produced by the current in the wire magnetizes the iron nail even though the wire is insulated and not physically in contact with the nail. This happens because the electromagnetic field generated by the current-carrying wire aligns the iron atoms in the nail in one direction, making the iron nail into a magnet. The nail will retain some magnetic properties for a short while after the circuit is disconnected because of the alignment of the atoms in the nail. Tapping the nail on a hard surface several times will cause it to loose its magnetic properties as the iron atoms will be knocked out of alignment with each other.

CONSTRUCTED-RESPONSE ASSIGNMENT SCORING

All responses to OSAT constructed-response assignments (written and oral) are scored using scoring scales that describe varying levels of performance. These scales were approved by committees of Oklahoma educators who reviewed both the performance characteristics and the scoring scales.

Each response is scored by multiple scorers according to standardized procedures during scoring sessions held immediately after each administration of the CEOE. Scorers with relevant professional backgrounds are oriented to these procedures before the scoring session and are carefully monitored during the scoring sessions.

A constructed-response assignment response is designated unscorable if it is blank, not on the assigned topic, illegible or unintelligible, not in the appropriate language, or of insufficient length to score. If you do not provide a scorable response for each constructed-response assignment on your test, you cannot pass the test regardless of your scores on the other section(s) of the test.

Sample Performance Characteristics for Constructed-Response Assignments

PURPOSE	The extent to which the response achieves the purpose of the assignment
SUBJECT MATTER KNOWLEDGE	Accuracy and appropriateness in the application of subject matter knowledge
SUPPORT	Quality and relevance of supporting details
RATIONALE	Soundness of argument and degree of understanding of the subject matter

Sample Scoring Scale for Constructed-Response Assignments

SCORE POINT	SCORE POINT DESCRIPTION
4	**The "4" response reflects a thorough knowledge and understanding of the subject matter.** • The purpose of the assignment is fully achieved. • There is a substantial, accurate, and appropriate application of subject matter knowledge. • The supporting evidence is sound; there are high-quality, relevant examples. • The response reflects an ably reasoned, comprehensive understanding of the topic.
3	**The "3" response reflects a general knowledge and understanding of the subject matter.** • The purpose of the assignment is largely achieved. • There is a generally accurate and appropriate application of subject matter knowledge. • The supporting evidence generally supports the discussion; there are some relevant examples. • The response reflects a general understanding of the topic.
2	**The "2" response reflects a partial knowledge and understanding of the subject matter.** • The purpose of the assignment is partially achieved. • There is a limited, possibly inaccurate or inappropriate application of subject matter knowledge. • The supporting evidence is limited; there are few relevant examples. • The response reflects a limited, poorly reasoned understanding of the topic.
1	**The "1" response reflects little or no knowledge and understanding of the subject matter.** • The purpose of the assignment is not achieved. • There is little or no appropriate or accurate application of subject matter knowledge. • The supporting evidence, if present, is weak; there are few or no relevant examples. • The response reflects little or no reasoning about or understanding of the topic.
U	**The response is unscorable because it is illegible, not written to the assigned topic, written in a language other than English, or of insufficient length to score.**
B	**There is no response to the assignment.**

CERTIFICATION EXAMINATIONS FOR OKLAHOMA EDUCATORS
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