

# Illinois Licensure Testing System

## STUDY GUIDE

Science:  
Environmental Science  
(112)

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as a computer-based test.**

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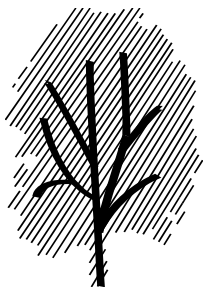
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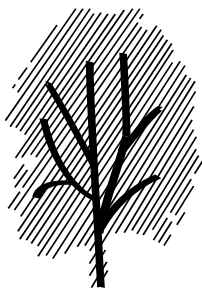
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## **General Information About the Illinois Licensure Testing System**

The first section of the study guide is available in a separate PDF file. Click the link below to view or print this section.

[General Information About the Illinois Licensure Testing System](#)



## Field-Specific Information

- **Test Subareas and Objectives**
- **Practice Test Questions**
- **Explanation of the Test Score Report**

## INTRODUCTION

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The content tests are designed to assess a candidate's knowledge of content in the specific teaching, school service personnel, or administrative field in which licensure is sought. The tests are based on current and relevant expectations for teacher preparation students and for teachers in Illinois as defined by the Illinois Content Area Standards for Educators. This study guide is designed to focus your preparation by helping you become familiar with the format and content to be covered on the tests.

This section includes a list of the test subareas and objectives, practice test questions for the field covered by this study guide, an answer key, and an explanation of the test score report.

### TEST SUBAREAS AND OBJECTIVES

The content covered by the test is organized into subareas. You will find a list of subareas at the beginning of the list of test objectives. Within each subarea, the content is further defined by a set of objectives. Each objective comprises two major parts:

1. the *objective statement*, which broadly defines the knowledge and skills that an entry-level educator needs to know; and
2. the *descriptive statements*, which describe in greater detail the types of knowledge and skills covered by the test objective.

The test objectives are broad, conceptual, and meaningful statements, written in language that reflects the skills, knowledge, and understanding that an entry-level teacher needs in order to teach effectively in an Illinois classroom. A test consists of test questions that measure an examinee's mastery of these test objectives.

Below is an example of a test objective statement and its accompanying descriptive statements for the Elementary/Middle Grades test.

#### *Objective Statement*

**Understand word analysis strategies and vocabulary development and how to use effective, developmentally appropriate approaches to promote students' word analysis and vocabulary skills.**

### *Descriptive Statements*

- Demonstrate knowledge of phonics and its role in decoding; of ways to assess students' phonic skills; and of effective instructional strategies, activities, and materials for promoting students' phonetic analysis skills.
- Demonstrate knowledge of word analysis strategies, including syllabication, morphology (e.g., use of affixes and roots), and context clues; of ways to assess students' use of word analysis strategies; and of effective instructional strategies, activities, and materials for promoting students' word analysis and contextual analysis skills.
- Demonstrate knowledge of the role of vocabulary development in reading; of ways to assess students' vocabulary development; and of effective instructional strategies, activities, and materials for promoting students' vocabulary development.

### **SPECIAL NOTE REGARDING SCIENCE TEST FIELDS**

The test objectives for each of the science fields (i.e., Biology, Chemistry, Earth and Space Science, Environmental Science, and Physics) contain a set of common objectives in addition to objectives unique to the specialty field. The set of common objectives measures the candidate's core knowledge across all science fields. The test questions matched to these common objectives are identical across all science fields.

### **CALCULATORS**

Examinees taking Science: Biology, Science: Chemistry, Science: Earth and Space Science, Science: Environmental Science, and Science: Physics will be provided with a scientific calculator at the test administration. Please consult the current version of the ILTS Registration Bulletin for more information on scientific calculators.

### **PRACTICE TEST QUESTIONS**

The practice test questions included in this section are designed to give the examinee an introduction to the nature of the test questions included on the ILTS test for each field. The practice test questions represent the various types of test 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 predict your performance on the test as a whole. Use the answer key located after the practice test questions to check your answers.

To help you identify which test objective is being assessed, the objective statement to which the question corresponds is listed in the answer key. When you are finished with the practice test questions, you may wish to go back and review the entire list of test objectives and descriptive statements once again.

# SCIENCE: ENVIRONMENTAL SCIENCE TEST OBJECTIVES

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- I. Science and Technology
- II. Life Science
- III. Physical Science
- IV. Earth Systems and the Universe
- V. The Physical and Living Environment
- VI. Environmental Issues

## SUBAREA I—SCIENCE AND TECHNOLOGY

### **0001 Understand and apply knowledge of science as inquiry.**

- Recognize the assumptions, processes, purposes, requirements, and tools of scientific inquiry.
- Use evidence and logic in developing proposed explanations that address scientific questions and hypotheses.
- Identify various approaches to conducting scientific investigations and their applications.
- Use tools and mathematical and statistical methods for collecting, managing, analyzing (e.g., average, curve fit, error determination), and communicating results of investigations.
- Demonstrate knowledge of ways to report, display, and defend the results of an investigation.

### **0002 Understand and apply knowledge of the concepts, principles, and processes of technological design.**

- Recognize the capabilities, limitations, and implications of technology and technological design and redesign.
- Identify real-world problems or needs to be solved through technological design.
- Apply a technological design process to a given problem situation.
- Identify a design problem and propose possible solutions, considering such constraints as tools, materials, time, costs, and laws of nature.
- Evaluate various solutions to a design problem.

### **0003 Understand and apply knowledge of accepted practices of science.**

- Demonstrate an understanding of the nature of science (e.g., tentative, replicable, historical, empirical) and recognize how scientific knowledge and explanations change over time.
- Compare scientific hypotheses, predictions, laws, theories, and principles and recognize how they are developed and tested.
- Recognize examples of valid and biased thinking in reporting of scientific research.
- Recognize the basis for and application of safety practices and regulations in the study of science.

**0004 Understand and apply knowledge of the interactions among science, technology, and society.**

- Recognize the historical and contemporary development of major scientific ideas and technological innovations.
- Demonstrate an understanding of the ways that science and technology affect people's everyday lives, societal values and systems, the environment, and new knowledge.
- Analyze the processes of scientific and technological breakthroughs and their effects on other fields of study, careers, and job markets.
- Analyze issues related to science and technology at the local, state, national, and global levels (e.g., environmental policies, genetic research).
- Evaluate the credibility of scientific claims made in various forums (e.g., the media, public debates, advertising).

**0005 Understand and apply knowledge of the major unifying concepts of all sciences and how these concepts relate to other disciplines.**

- Identify the major unifying concepts of the sciences (e.g., systems, order, and organization; constancy, change, and measurement) and their applications in real-life situations.
- Recognize connections within and among the traditional scientific disciplines.
- Apply fundamental mathematical language, knowledge, and skills at the level of algebra and statistics in scientific contexts.
- Recognize the fundamental relationships among the natural sciences and the social sciences.

**SUBAREA II—LIFE SCIENCE**

**0006 Understand and apply knowledge of cell structure and function.**

- Compare and contrast the structures of viruses and prokaryotic and eukaryotic cells.
- Identify the structures and functions of cellular organelles.
- Describe the processes of the cell cycle.
- Explain the functions and applications of the instruments and technologies used to study the life sciences at the molecular and cellular level.

**0007 Understand and apply knowledge of the principles of heredity and biological evolution.**

- Recognize the nature and function of the gene, with emphasis on the molecular basis of inheritance and gene expression.
- Analyze the transmission of genetic information (e.g., Punnett squares, sex-linked traits, pedigree analysis).
- Analyze the processes of change at the microscopic and macroscopic levels.
- Identify scientific evidence from various sources, such as the fossil record, comparative anatomy, and biochemical similarities, to demonstrate knowledge of theories about processes of biological evolution.



**0008 Understand and apply knowledge of the characteristics and life functions of organisms.**

- Identify the levels of organization of various types of organisms and the structures and functions of cells, tissues, organs, and organ systems.
- Analyze the strategies and adaptations used by organisms to obtain the basic requirements of life.
- Analyze factors (e.g., physiological, behavioral) that influence homeostasis within an organism.
- Demonstrate an understanding of the human as a living organism with life functions comparable to those of other life forms.

**0009 Understand and apply knowledge of how organisms interact with each other and with their environment.**

- Identify living and nonliving components of the environment and how they interact with one another.
- Recognize the concepts of populations, communities, ecosystems, and ecoregions and the role of biodiversity in living systems.
- Analyze factors (e.g., ecological, behavioral) that influence interrelationships among organisms.
- Develop a model or explanation that shows the relationships among organisms in the environment (e.g., food web, food chain, ecological pyramid).
- Recognize the dynamic nature of the environment, including how communities, ecosystems, and ecoregions change over time.
- Analyze interactions of humans with their environment.
- Explain the functions and applications of the instruments and technologies used to study the life sciences at the organism and ecosystem level.

**SUBAREA III—PHYSICAL SCIENCE**

**0010 Understand and apply knowledge of the nature and properties of energy in its various forms.**

- Describe the characteristics of and relationships among thermal, acoustical, radiant, electrical, chemical, mechanical, and nuclear energies through conceptual questions.
- Analyze the processes by which energy is exchanged or transformed through conceptual questions.
- Apply the three laws of thermodynamics to explain energy transformations, including basic algebraic problem solving.
- Apply the principle of conservation as it applies to energy through conceptual questions and solving basic algebraic problems.

**0011 Understand and apply knowledge of the structure and properties of matter.**

- Describe the nuclear and atomic structure of matter, including the three basic parts of the atom.
- Analyze the properties of materials in relation to their chemical or physical structures (e.g., periodic table trends, relationships, and properties) and evaluate uses of the materials based on their properties.
- Apply the principle of conservation as it applies to mass and charge through conceptual questions.
- Analyze bonding and chemical, atomic, and nuclear reactions (including endothermic and exothermic reactions) in natural and man-made systems and apply basic stoichiometric principles.
- Apply kinetic theory to explain interactions of energy with matter, including conceptual questions on changes in state.
- Explain the functions and applications of the instruments and technologies used to study matter and energy.

**0012 Understand and apply knowledge of forces and motion.**

- Demonstrate an understanding of the concepts and interrelationships of position, time, velocity, and acceleration through conceptual questions, algebra-based kinematics, and graphical analysis.
- Demonstrate an understanding of the concepts and interrelationships of force (including gravity and friction), inertia, work, power, energy, and momentum.
- Describe and predict the motions of bodies in one and two dimensions in inertial and accelerated frames of reference in a physical system, including projectile motion but excluding circular motion.
- Analyze and predict motions and interactions of bodies involving forces within the context of conservation of energy and/or momentum through conceptual questions and algebra-based problem solving.
- Describe the effects of gravitational and nuclear forces in real-life situations through conceptual questions.
- Explain the functions and applications of the instruments and technologies used to study force and motion in everyday life.

**0013 Understand and apply knowledge of electricity, magnetism, and waves.**

- Recognize the nature and properties of electricity and magnetism, including static charge, moving charge, basic RC circuits, fields, conductors, and insulators.
- Recognize the nature and properties of mechanical and electromagnetic waves (e.g., frequency, source, medium, spectrum, wave-particle duality).
- Describe the effects and applications of electromagnetic forces in real-life situations, including electric power generation, circuit breakers, and brownouts.
- Analyze and predict the behavior of mechanical and electromagnetic waves under varying physical conditions, including basic optics, color, ray diagrams, and shadows.

## **SUBAREA IV—EARTH SYSTEMS AND THE UNIVERSE**

### **0014 Understand and apply knowledge of Earth's land, water, and atmospheric systems and the history of Earth.**

- Identify the structure and composition of Earth's land, water, and atmospheric systems and how they affect weather, erosion, fresh water, and soil.
- Recognize the scope of geologic time and the continuing physical changes of Earth through time.
- Evaluate scientific theories about Earth's origin and history and how these theories explain contemporary living systems.
- Recognize the interrelationships between living organisms and Earth's resources and evaluate the uses of Earth's resources.

### **0015 Understand and apply knowledge of the dynamic nature of Earth.**

- Analyze and explain large-scale dynamic forces, events, and processes that affect Earth's land, water, and atmospheric systems, including conceptual questions about plate tectonics, El Niño, drought, and climatic shifts.
- Identify and explain Earth processes and cycles and cite examples in real-life situations, including conceptual questions on rock cycles, volcanism, and plate tectonics.
- Analyze the transfer of energy within and among Earth's land, water, and atmospheric systems, including the identification of energy sources of volcanoes, hurricanes, thunderstorms, and tornadoes.
- Explain the functions and applications of the instruments and technologies used to study the earth sciences, including seismographs, barometers, and satellite systems.

### **0016 Understand and apply knowledge of objects in the universe and their dynamic interactions.**

- Describe and explain the relative and apparent motions of the sun, the moon, stars, and planets in the sky.
- Recognize properties of objects (e.g., comets, asteroids) within the solar system and their dynamic interactions.
- Recognize the types, properties, and dynamics of objects external to the solar system (e.g., black holes, supernovas, galaxies).

### **0017 Understand and apply knowledge of the origins of and changes in the universe.**

- Identify scientific theories dealing with the origin of the universe (e.g., big bang).
- Analyze evidence relating to the origin and physical evolution of the universe (e.g., microwave background radiation, expansion).
- Compare the physical and chemical processes involved in the life cycles of objects within galaxies.
- Explain the functions and applications of the instruments, technologies, and tools used in the study of the space sciences, including the relative advantages and disadvantages of earth-based versus space-based instruments and optical versus non-optical instruments.

## SUBAREA V—THE PHYSICAL AND LIVING ENVIRONMENT

### **0018 Understand and apply knowledge of the cycling of matter and flow of energy through the biotic and abiotic components of various ecosystems.**

- Describe how the laws of thermodynamics apply to habitats, individual organisms, and community dynamics.
- Analyze the flow of energy from the sun on a global scale and its effects on climate and the distribution of ecosystems.
- Analyze the flow of energy through diverse ecosystems.
- Apply knowledge of the hydrologic cycle to explain its effects on natural systems and human society.
- Analyze the phosphorous, sulphur, nitrogen, and carbon dioxide/oxygen cycles and their effects at the local, regional, and global levels.
- Recognize the impact of biodiversity on the cycling of matter and the flow of energy.

### **0019 Understand and apply knowledge of the interactions and interdependence of Earth's biotic and abiotic systems.**

- Analyze the interactions of biotic and abiotic factors in the environment and the interrelatedness of organisms to each other and to their environment.
- Analyze how population dynamics, principles of natural selection, and human activity determine the biodiversity and distribution of organisms in various environments.
- Analyze ways in which the environment has been changed by natural occurrences (e.g., catastrophic events, species migrations, disease epidemics, climate change), differentiating between short- and long-term effects.
- Analyze how changes in the physical and chemical characteristics of the lithosphere, atmosphere, and hydrosphere affect ecosystems.

### **0020 Understand and apply knowledge of how social, cultural, political, and economic systems affect local, regional, and global environments.**

- Analyze how social, cultural, political, and economic processes impact the environment and alter the use and management of resources.
- Analyze the effects of international competition and trade on local, regional, and global environments.
- Identify ways in which the environment has been changed by human intervention (e.g., introduction of exotics, water purification).
- Apply knowledge of the procurement and use of renewable (e.g., alternative energy, water) and nonrenewable (e.g., minerals, fossil fuels) resources to explain the ecological consequences of varying strategies for managing resources.
- Evaluate the ecological implications of various land use patterns and urban development.
- Identify natural resource conservation (e.g., source reduction, recycling) and management methods (e.g., solid waste, bioremediation) and sustainable practices that have been proposed or implemented.

## **SUBAREA VI—ENVIRONMENTAL ISSUES**

### **0021 Understand and apply knowledge of the societal, economic, and cultural influences on environmental research and the environmental decision-making process.**

- Apply research and analytical skills to investigate environmental issues in a social, political, and economic context.
- Evaluate the validity of information sources related to environmental issues by identifying bias and boundaries of evidence.
- Analyze how differing values (e.g., political, cultural, economic) influence decisions regarding environmental issues.
- Recognize the historical basis for positions regarding environmental rights and responsibilities.
- Evaluate proposed or implemented citizen actions with respect to their influence on achieving and/or maintaining a mutually beneficial relationship between humans and the environment.
- Identify strategies for recognizing, evaluating, and clarifying personal value positions related to specific environmental issues and their associated solutions.

### **0022 Understand and apply knowledge of trends in national and global societies related to environmental quality, resource management, health issues, and environmental awareness.**

- Analyze the effects of human population growth and distribution on local and global environments.
- Analyze the effects of economic development and industrialization on environmental quality and resource management.
- Analyze ways that resource management methods and technology can be used to accommodate population trends and industrial development.
- Recognize the relationship between environmental literacy and the ability to make informed decisions regarding environmental issues.
- Analyze the health effects of hazardous substances (e.g., mercury, dioxin, asbestos) in the environment.

### **0023 Understand and apply knowledge of the scientific strategies and criteria used to investigate environmental questions and evaluate environmental studies.**

- Demonstrate knowledge of how to design scientific investigations of environmental phenomena.
- Demonstrate an understanding of the use and evaluation of models (e.g., algebraic, geometric, computer) to interpret environmental phenomena.
- Recognize procedures for the use of equipment and technologies necessary to conduct safe and appropriate studies of environmental phenomena.
- Analyze criteria used to evaluate sources of environmental information.
- Recognize degrees of bias in claims derived from scientific studies used in advertising and marketing strategies.

**0024 Understand and apply knowledge of Illinois, United States, and world environmental history.**

- Identify significant historical environmental events in Illinois, the United States, and the world.
- Analyze how given scientific discoveries have influenced environmental policy and public attitudes.
- Identify state, national, and world agencies that are involved in establishing or enforcing environmental regulations and policies.
- Identify significant national and global policies (e.g., Clean Water Act, Wilderness Act) on environmental issues.

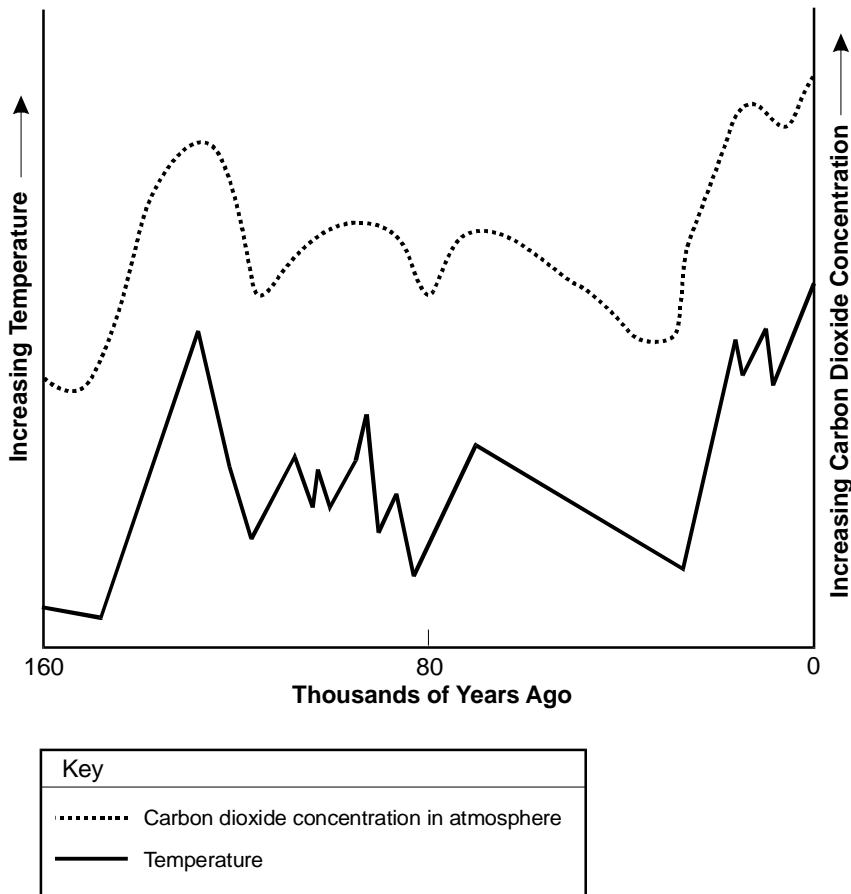
**0025 Understand and apply knowledge of the actual and potential effects of local, state, national, and global policies on environmental issues.**

- Compare and contrast the prevention and correction of health-threatening environmental problems by individuals and by governments.
- Analyze the arguments for and against various pollution-control policies and conservation measures.
- Analyze the environmental consequences of government energy policies.
- Evaluate the political and economic difficulties confronting ecosystem protection and pollution control in industrialized and nonindustrialized countries.

## SCIENCE: ENVIRONMENTAL SCIENCE PRACTICE TEST QUESTIONS

The periodic table provided with this test can be found on page 2-22.

1. Use the graph below to answer the question that follows.



The graph above shows the variation in the concentration of carbon dioxide in the atmosphere over the past 160,000 years and the average global temperature change during that same period. Which of the following is the best logical conclusion that can be drawn relying exclusively on these two data sets?

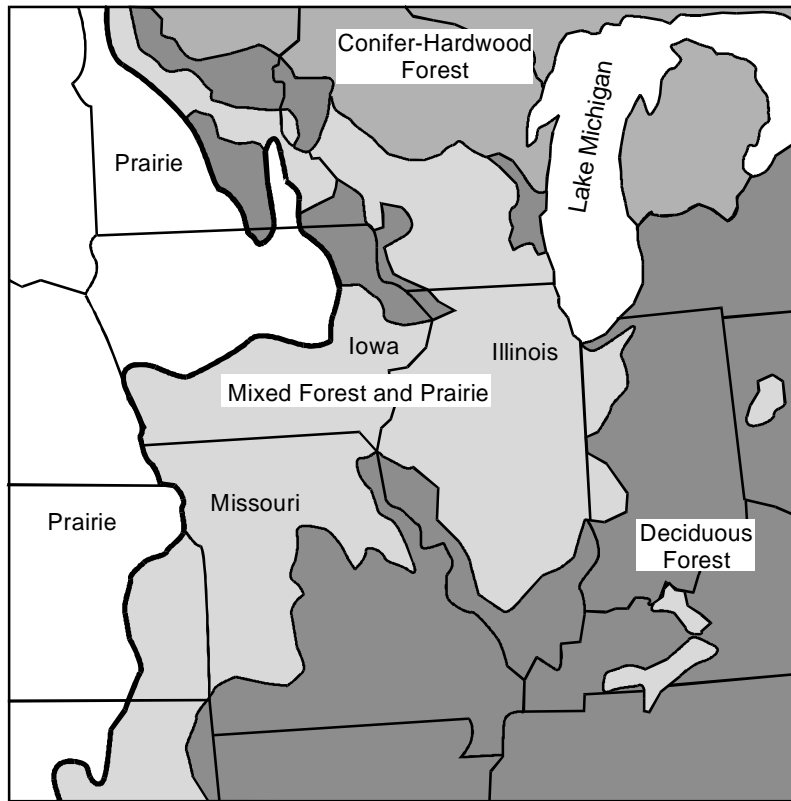
- A. Increased global temperatures correlate with increases in atmospheric carbon dioxide, suggesting a connection between the two phenomena.
- B. Increased atmospheric carbon dioxide promotes a general warming of the global climate through its role as a greenhouse gas.
- C. Increased global temperatures increase the production of carbon dioxide from a variety of natural sources, including photosynthesis and erosion of carbonate rocks.
- D. Increased carbon dioxide concentrations in the atmosphere are not related to the warming in the global climate.

2. Which of the following is a fundamental challenge in the design of complex systems?
- A. Feedback mechanisms in complex systems decrease the overall stability of the system.
  - B. The more parts and connections that a complex system has, the more ways the system can fail.
  - C. The cost of designing complex systems is excessive.
  - D. The construction of complex systems is time consuming.
3. Newton's laws are considered laws and not theories because:
- A. they describe natural phenomena with unvarying uniformity under certain conditions.
  - B. they can be used to explain the outcome of natural phenomena.
  - C. over time, theories become laws.
  - D. they are all true for all frames of reference discovered so far.
4. Major breakthroughs in science and technology during the nineteenth century were primarily the result of:
- A. inventions designed to solve a specific problem.
  - B. basic research into the workings of the physical and natural world.
  - C. accidental discoveries made when conducting research on other topics.
  - D. grant-funded research projects seeking to reach a particular goal.
5. For an unordered system, such as a mixture of salt and pepper, to become more ordered, which of the following is required?
- A. the addition of heat
  - B. an increase in the size of the system
  - C. the expenditure of energy
  - D. a decrease in the pressure in the system



6. Ribosomes are involved in which of the following cellular processes?
- A. maintaining structural integrity
  - B. transporting waste
  - C. digesting nutrients
  - D. synthesizing proteins
7. There are four characteristic phenotypes for a feather color trait in parrots. The phenotypes exhibited by the parrots depend on two genes that assort independently. A cross between an individual of genotype AABb and an individual of genotype aaBb would result in which of the following phenotypic ratios?
- A. 3:1
  - B. 9:3:3:1
  - C. 1:2:1
  - D. 2:1:1
8. A pitcher plant traps insects in a pitcher-shaped leaf from which the insect cannot escape. This strategy is best described as an evolutionary adaptation that:
- A. discourages insect predation.
  - B. provides the plant with complex carbohydrates.
  - C. attracts insect-eating pollinators.
  - D. helps the plant survive in a nutrient-poor environment.
9. In order to maintain homeostasis, mammals require significantly higher metabolic rates per gram of body weight than fish. This is primarily because mammals have:
- A. more complex circulatory systems.
  - B. internal thermoregulation.
  - C. water-conserving excretory systems.
  - D. proportionally larger hearts.

10. Use the map below to answer the question that follows.



The map above shows vegetation in the Midwest prior to the 1800s. Which of the following factors was critical in determining the extent of prairie in this region?

- A. soil type
- B. character of bedrock
- C. precipitation
- D. temperature

11. When hydrochloric acid reacts with calcium carbonate in a flask, the flask becomes noticeably warm to the touch. Which of the following best describes why this occurs?

A. The high rate at which the chemical reaction occurs generates infrared radiation.

B. The number of protons in the products is greater than the number of protons in the reactants.

C. The friction produced by the agitation of the reactants creates thermal energy.

D. The bond energies of the reactants are greater than the bond energies of the products.

12. A ball rolls down an incline and then across a flat, smooth surface until it stops. Which of the following best describes why the ball comes to a stop?

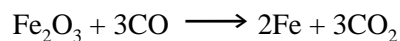
A. The ball's acceleration is balanced by its inertia.

B. Gravity no longer affects the ball's mass.

C. The ball's kinetic energy is changed into potential energy.

D. Frictional forces overcome the ball's inertia.

13. Use the chemical equation below to answer the question that follows.



Which of the following formulas represents the approximate number of grams of CO required to react completely with 200 g of  $\text{Fe}_2\text{O}_3$ ?

A.  $\frac{(200)(3)}{(28)(160)} \text{ g}$

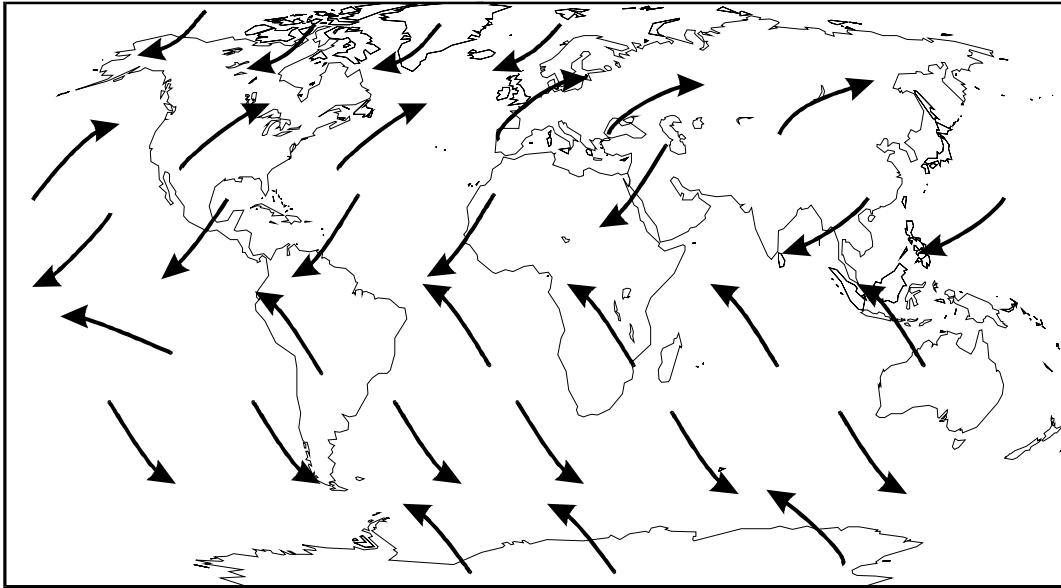
B.  $\frac{(200)(3)(28)}{160} \text{ g}$

C.  $\frac{(200)(28)}{(3)(160)} \text{ g}$

D.  $\frac{160}{(200)(28)(3)} \text{ g}$

14. Two trains pass each other. One train is going 70 km/h toward the east; the other train is traveling 50 km/h toward the west. A passenger on the eastbound train walks toward the back of the train at 5 km/h. Relative to the walking passenger, what is the speed of the westbound train?
- A. 75 km/h
  - B. 115 km/h
  - C. 120 km/h
  - D. 125 km/h
15. An object that becomes charged by frictional contact with another object gains electric charge as a result of:
- A. the repulsion of positive charges in one object by the positive charges in the other object.
  - B. magnetic fields produced by the relative motion of electrons and protons.
  - C. the induction of charge in both objects by the generation of heat energy.
  - D. the transfer of electrons from the surface of one object to the surface of the other object.
16. The composition of soils in Illinois is primarily the result of:
- A. the sediments covering the region from the Pleistocene glaciations.
  - B. the abundance of granitic bedrock in the state.
  - C. the various kinds of vegetation in the region.
  - D. the climatic zones found within the state.

17. Use the map below to answer the question that follows.



As shown in the map above, major air currents in the Northern Hemisphere are always deflected toward the right, while in the Southern Hemisphere they are always deflected to the left. Which of the following causes this deflection?

- A. the frictional drag on the atmosphere as Earth orbits the sun
- B. the differences in atmospheric heating and wind flow caused by the proportion of land to water
- C. the movement of Earth's spherical surface around its axis of rotation
- D. the existence of semistable pressure systems in the middle and upper levels of the atmosphere

18. Which of the following is used to determine the location and magnitude of an earthquake?
- A. the frequency and amplitude of earthquake waves recorded at a seismograph station
  - B. the size and direction of incoming earthquake waves recorded at two different seismograph stations
  - C. the arrival times and amplitudes of earthquake waves at three separate seismograph stations
  - D. the arrival times of three different kinds of earthquake waves at a seismograph station
19. Which of the following best explains why only one side of the moon is visible from Earth?
- A. The moon does not rotate on its axis during its orbit of Earth.
  - B. The moon rotates at the same rate as Earth rotates.
  - C. The periods of the moon's rotation and revolution are the same.
  - D. The moon's axis of rotation is parallel to the plane of its orbit.
20. Which of the following is the major advantage of using space-based telescopes, rather than Earth-based telescopes, to observe extremely distant objects in the universe?
- A. There is no distortion from gas and dust in the atmosphere.
  - B. They are closer to the objects being viewed.
  - C. There is no light pollution to disrupt x-ray and radio-wave signals.
  - D. They are easier to maintain in the low-gravity, dust-free conditions of space.
21. Which of the following best explains why continual infusions of solar radiation are required to supply the energy needs of most ecosystems?
- A. Each energy conversion that occurs between trophic levels in an ecological pyramid results in some loss of energy.
  - B. Because dead plant material and animal wastes are inert, they represent the ongoing destruction of energy contained in the system.
  - C. Each organism in an ecosystem uses all the energy it receives without passing energy on to other organisms in the system.
  - D. As the total biomass generated by an ecosystem increases, ever-increasing energy is required to sustain the various life-giving functions of the system.

22. Which of the following best describes a major ecological function of the hydrologic cycle?
- A. maintaining temperature differences between adjacent environments
  - B. dissolving rocks to make energy available to consumers
  - C. removing built-up waste and debris that reduce primary productivity
  - D. transporting minerals and nutrients within and between environments
23. Which of the following is associated with increased concentrations of atmospheric nitrogen oxides in some parts of the United States?
- A. increased plant growth from nitrogen-rich precipitation
  - B. reduced regional temperatures due to absorption of sunlight by airborne nitrogen compounds
  - C. increased stress on trees and fish from nitric acid in precipitation
  - D. reduced ozone levels from the bonding of free oxygen with nitrogen compounds
24. Which of the following factors is most responsible for the loss of agricultural acreage in Illinois?
- A. natural disasters
  - B. inefficient irrigation
  - C. overgrazing
  - D. urban development
25. Which of the following best explains why it is often difficult to promote sustainable development in developing countries?
- A. Sustainable development practices create excessive hardship for communities with limited material resources.
  - B. Demands to meet present-day needs often overshadow concerns about implementing long-term sustainable development policies.
  - C. Developing countries generally lack large, undeveloped tracts of land suitable for sustainable development projects.
  - D. The technological infrastructure needed to support sustainable development is lacking in most developing countries.

26. Which of the following is likely to be the most significant challenge for the expanding population of the southwestern United States?
- A. lack of housing
  - B. high cost of fossil fuels
  - C. limited availability of water
  - D. poor transportation infrastructure
27. A pesticide manufacturer advertises its product in an agricultural journal as "the best choice for improving your crop production!" The advertisement further states that this superiority is proven by a study comparing the leading pesticide brands on the market. The claim that this product is the best choice for improving production is misleading to consumers because it:
- A. fails to present information on the source and nature of the study that evaluated the pesticide.
  - B. neglects to state how the price of the pesticide compares with that of its competitors.
  - C. omits information from other studies that demonstrate the negative effects of pesticide use in agriculture.
  - D. fails to consider less costly production management alternatives to pesticide use.
28. A scientist trying to determine what is causing the die-off of aquatic vegetation at the bottom of a saltwater bay notices that the water is turbid. The scientist hypothesizes that the turbidity is harming the plant growth in the bay by blocking light. Which of the following would be the most appropriate next step for the scientist to take to verify this hypothesis?
- A. Make careful observations to determine the source of the water's turbidity.
  - B. Perform an experiment to measure how photosynthesis in the aquatic plants is affected by light penetration.
  - C. Analyze the dying plants to determine whether other factors may be causing the problem.
  - D. Assess how the reduced quantity of aquatic vegetation is likely to affect the bay's ecosystem.



29. The studies of the Illinois Natural History Survey have most influenced state environmental policy by generating the knowledge needed to:
- A. minimize the environmental impact of natural hazards.
  - B. protect endangered species and biologically important watersheds.
  - C. develop effective methods of pest control.
  - D. enhance the aesthetic and recreational value of wildlife areas.

30. Which of the following points would an environmental scientist most likely make to argue that reforestation reduces global warming?
- A. Trees capture water from the atmosphere and then return it through transpiration.
  - B. Trees scrub particulate pollutants from the atmosphere.
  - C. Trees remove carbon dioxide from the atmosphere and then store it until they decay or are burned.
  - D. Trees increase the amount of oxygen in the atmosphere.

## PERIODIC TABLE OF THE ELEMENTS

1	18																VIIIA
IA																	
1 H 1.01	2 He 4.00																
3 Li 6.94	4 Be 9.01																
11 Na 23.0	12 Mg 24.3																
19 K 39.1	20 Ca 40.1	3 IIIB	4 IVB	5 VB	6 VIB	7 VIIB	8 VIIIB	9 VIIIB	10 VIIIB	11 IB	12 IIB	13 IIIA	14 IVA	15 VA	16 VIA	17 VIIA	18 VIIIA
37 Rb 85.5	38 Sr 87.6	21 Sc 45.0	22 Ti 47.9	23 V 50.9	24 Cr 52.0	25 Mn 54.9	26 Fe 55.8	27 Co 58.9	28 Ni 58.7	29 Cu 63.5	30 Zn 65.4	31 Ga 69.7	32 Ge 72.6	33 As 74.9	34 Se 79.0	35 Br 79.9	36 Kr 83.8
55 Cs 132.9	56 Ba 137.3	39 Y 88.9	40 Zr 91.2	41 Nb 92.9	42 Mo 95.9	43 Tc (98.9)	44 Ru 101.1	45 Rh 102.9	46 Pd 106.4	47 Ag 107.9	48 Cd 112.4	49 In 114.8	50 Sn 118.7	51 Sb 121.8	52 Te 127.6	53 I 126.9	54 Xe 131.3
87 Fr (223)	88 Ra (226)	57–71 Lanthanide Series	72 Hf 178.5	73 Ta 180.9	74 W 183.9	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197.0	80 Hg 200.6	81 Tl 204.4	82 Pb 207.2	83 Bi 209.0	84 Po (209)	85 At (210)	86 Rn (222)
		89–103 Actinide Series	104 Rf (261)	105 Db (262)	106 Sg (266)	107 Bh (264)	108 Hs (277)	109 Mt (268)	110 Ds (271)	111	112	113	114	115	116	117	118

Lanthanide Series	57 La 138.9	58 Ce 140.1	59 Pr 140.9	60 Nd 144.2	61 Pm (145)	62 Sm 150.4	63 Eu 152.0	64 Gd 157.3	65 Tb 158.9	66 Dy 162.5	67 Ho 164.9	68 Er 167.3	69 Tm 168.9	70 Yb 173.0	71 Lu 175.0
Actinide Series	89 Ac (227)	90 Th 232.0	91 Pa 231.0	92 U 238.0	93 Np (237)	94 Pu (244)	95 Am (243)	96 Cm (247)	97 Bk (247)	98 Cf (251)	99 Es (252)	100 Fm (257)	101 Md (258)	102 No (259)	103 Lr (262)

Some of the elements 111 and above have been reported but not fully authenticated and named.

## ANSWER KEY

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This section contains the answers to the practice test questions in the previous section.

After you have worked through the practice test questions, check the answers given in this section to see which questions you answered correctly.

Question Number	Correct Response	Test Objective
1.	A	Understand and apply knowledge of science as inquiry.
2.	B	Understand and apply knowledge of the concepts, principles, and processes of technological design.
3.	A	Understand and apply knowledge of accepted practices of science.
4.	B	Understand and apply knowledge of the interactions among science, technology, and society.
5.	C	Understand and apply knowledge of the major unifying concepts of all sciences and how these concepts relate to other disciplines.
6.	D	Understand and apply knowledge of cell structure and function.
7.	A	Understand and apply knowledge of the principles of heredity and biological evolution.
8.	D	Understand and apply knowledge of the characteristics and life functions of organisms.
9.	B	Understand and apply knowledge of the characteristics and life functions of organisms.
10.	C	Understand and apply knowledge of how organisms interact with each other and with their environment.
11.	D	Understand and apply knowledge of the nature and properties of energy in its various forms.
12.	D	Understand and apply knowledge of the nature and properties of energy in its various forms.
13.	B	Understand and apply knowledge of the structure and properties of matter.
14.	B	Understand and apply knowledge of forces and motion.
15.	D	Understand and apply knowledge of electricity, magnetism, and waves.
16.	A	Understand and apply knowledge of Earth's land, water, and atmospheric systems and the history of Earth.
17.	C	Understand and apply knowledge of the dynamic nature of Earth.
18.	C	Understand and apply knowledge of the dynamic nature of Earth.

*(continued on next page)*

<b>Question Number</b>	<b>Correct Response</b>	<b>Test Objective</b>
19.	C	Understand and apply knowledge of objects in the universe and their dynamic interactions.
20.	A	Understand and apply knowledge of the origins of and changes in the universe.
21.	A	Understand and apply knowledge of the cycling of matter and flow of energy through the biotic and abiotic components of various ecosystems.
22.	D	Understand and apply knowledge of the cycling of matter and flow of energy through the biotic and abiotic components of various ecosystems.
23.	C	Understand and apply knowledge of the interactions and interdependence of Earth's biotic and abiotic systems.
24.	D	Understand and apply knowledge of how social, cultural, political, and economic systems affect local, regional, and global environments.
25.	B	Understand and apply knowledge of the societal, economic, and cultural influences on environmental research and the environmental decision-making process.
26.	C	Understand and apply knowledge of trends in national and global societies related to environmental quality, resource management, health issues, and environmental awareness.
27.	A	Understand and apply knowledge of the scientific strategies and criteria used to investigate environmental questions and evaluate environmental studies.
28.	B	Understand and apply knowledge of the scientific strategies and criteria used to investigate environmental questions and evaluate environmental studies.
29.	B	Understand and apply knowledge of Illinois, United States, and world environmental history.
30.	C	Understand and apply knowledge of the actual and potential effects of local, state, national, and global policies on environmental issues.

### OVERVIEW

The score report indicates whether or not you passed the test and how you performed on each test subarea. The passing scores for the Illinois Licensure Testing System were established by the Illinois State Board of Education based on recommendations from panels of Illinois educators. The passing score for each content-area test is designed to reflect the level of content knowledge and skills required to perform the job of an educator receiving an initial license in Illinois.

### Passing Score

To pass a content-area test you must obtain a scaled total test score of 240 or above.

### Total Test Score

The total test score is based on your performance on the entire test, specifically the number of multiple-choice questions you answered correctly.

### Subarea Scores

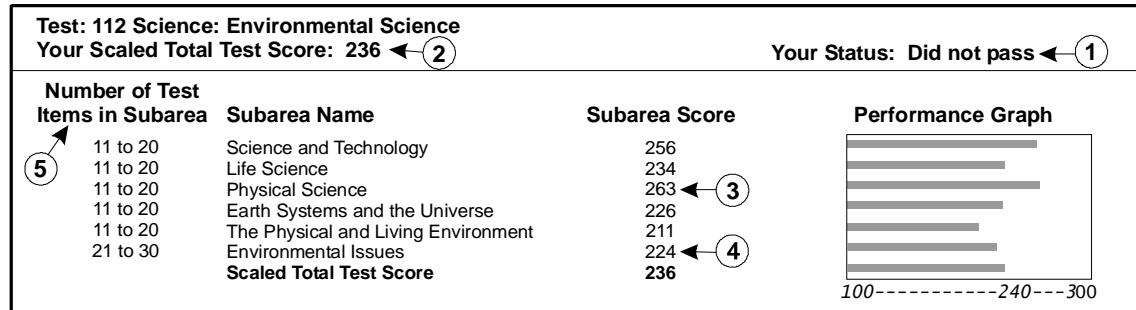
- Subarea scores are presented on the same scale as the total test score.
- Subarea scores contain different numbers of questions and are weighted differently in the computation of the total test score; therefore, the average of the subarea scaled scores generally will not equal the scaled total test score.
- Subarea scores will help you assess your areas of relative strength and weakness.

### Reporting of Scores

Your results will be forwarded to the Illinois State Board of Education and to the Illinois institution(s) you indicate during the registration process. You should keep the score report you receive for your own records.

## READING YOUR REPORT: A SAMPLE

A sample of a Science: Environmental Science test score report is provided below.



According to the above sample, the examinee did not pass the Science: Environmental Science test ①, because the examinee's total test score of 236 ② is below the passing score of 240.

The examinee did better on the Physical Science section ③ of the test than on the Environmental Issues section ④. The examinee will need to retake the test and achieve a total test score of 240 or higher to pass the test. The score report indicates the number of items for each subarea on the test ⑤.