

The *Praxis*™ Study Companion

Environmental Education

0831



Welcome to *The Praxis™ Study Companion*

Prepare to Show What You Know

You have gained the knowledge and skills you need for your teaching career. Now you are ready to demonstrate your abilities by taking a *Praxis™* test.

Using *The Praxis Study Companion* is a smart way to prepare for the test so you can do your best on test day. This guide can help keep you on track and make the most efficient use of your study time.

The Study Companion contains practical information and helpful tools including:

- An overview of the tests
- Specific information on the *Praxis* test you are taking
- A template study plan
- Practice questions and explanations of correct answers
- Test-taking tips and strategies
- Frequently asked questions
- Links to more detailed information

So where should you start? Begin by reviewing this guide in its entirety and note those sections that you need to revisit. Then you can create your own personalized study plan and schedule based on your individual needs and how much time you have before test day.

Keep in mind that study habits are individual. There are many different ways to successfully prepare for your test. Some people study better on their own, while others prefer a group dynamic. You may have more energy early in the day, but another test taker may concentrate better in the evening. So use this guide to develop the approach that works best for you.

Your teaching career begins with preparation. Good luck!

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1. Know What to Expect

Familiarize yourself with the Praxis tests so you know what to expect

Which test should I take?

Each state or agency that uses the *Praxis* tests sets its own requirements for which test or tests you must take for the teaching area you wish to pursue.

Before you register for a test, confirm your state or agency's testing requirements at www.ets.org/praxis/states.

How are the *Praxis* tests given?

Praxis tests are given in both computer and paper formats. **Note:** Not all *Praxis* tests are offered in both formats.

Should I take the computer- or paper-delivered test?

You should take the test in whichever format you are most comfortable. Some test takers prefer taking a paper-and-pencil test, while others are more comfortable on a computer. Please note that not all tests are available in both formats.

If I'm taking more than one *Praxis* test, do I have to take them all in the same format?

No. You can take each test in the format in which you are most comfortable.

Is there a difference between the subject matter covered on the computer-delivered test and the paper-delivered test?

No. The computer-delivered test and paper-delivered test cover the same content.

Where and when are the *Praxis* tests offered?

You can select the test center that is most convenient for you. The *Praxis* tests are administered through an international network of test centers, which includes some universities, high schools, Prometric® Testing Centers, and other locations throughout the world.

Testing schedules depend on whether you are taking computer-delivered tests or paper-delivered tests. See the *Praxis* website for more detailed test registration information at www.ets.org/praxis/register.

2. Familiarize Yourself with Test Questions

Become comfortable with the types of questions you'll find on the Praxis tests

The *Praxis* tests include two types of questions — **multiple-choice** (for which you select your answers from a list of choices) and **constructed-response** (for which you write a response of your own). You may be familiar with these question formats from taking other standardized tests. If not, familiarize yourself with them so you don't spend time during the test figuring out how to answer them.

Understanding Multiple-choice Questions

Many multiple-choice questions begin with the phrase “which of the following.” Take a look at this example:

Which of the following is a flavor made from beans?

- (A) Strawberry
- (B) Cherry
- (C) Vanilla
- (D) Mint

How would you answer this question?

All of the answer choices are flavors. Your job is to decide which of the flavors is the one made from beans.

Try following these steps to select the correct answer.

- 1) **Limit your answer to one of the choices given.** You may know that chocolate and coffee are also flavors made from beans, but they are not listed. Rather than thinking of other possible answers, focus only on the choices given (“which of the following”).
- 2) **Eliminate incorrect answers.** You may know that strawberry and cherry flavors are made from fruit and that mint flavor is made from a plant. That leaves vanilla as the only possible answer.
- 3) **Verify your answer.** You can substitute “vanilla” for the phrase “which of the following” and turn the question into this statement: “Vanilla is a flavor made from beans.” This will help you be sure that your answer is correct. If you're still uncertain, try substituting the other choices to see if they make sense. You may want to use this technique as you answer multiple-choice questions on the practice tests.

Try a more challenging example

The vanilla bean question is pretty straightforward, but you'll find that more challenging questions have a similar structure. For example:

Entries in outlines are generally arranged according to which of the following relationships of ideas?

- (A) Literal and inferential
- (B) Concrete and abstract
- (C) Linear and recursive
- (D) Main and subordinate

You'll notice that this example also contains the phrase "which of the following." This phrase helps you determine that your answer will be a "relationship of ideas" from the choices provided. You are supposed to find the choice that describes how entries, or ideas, in outlines are related.

Sometimes it helps to put the question in your own words. Here, you could paraphrase the question in this way: "How are outlines usually organized?" Since the ideas in outlines usually appear as main ideas and subordinate ideas, the answer is (D).

QUICK TIP: Don't be intimidated by words you may not understand. It might be easy to be thrown by words like "recursive" or "inferential." Read carefully to understand the question and look for an answer that fits. An outline is something you are probably familiar with and expect to teach to your students. So slow down, and use what you know.

Watch out for multiple-choice questions containing "NOT," "LEAST," and "EXCEPT."

This type of question asks you to select the choice that does not fit. You must be very careful because it is easy to forget that you are selecting the negative. This question type is used in situations in which there are several good solutions or ways to approach something, but also a clearly wrong way.

How to approach questions about graphs, tables, or reading passages

When answering questions about tables, graphs, or reading passages, provide only the information that the question asks for. In the case of a map or graph, you might want to read the questions first, and then look at the map or graph. In the case of a long reading passage, you might want to go ahead and read the passage, marking places you think are important, and then answer the questions. Again, the important thing is to be sure you answer the question as it refers to the material presented. So read the question carefully.

How to approach unfamiliar formats

New question formats are developed from time to time to find new ways of assessing knowledge. If you see a format you are not familiar with, read the directions carefully. Then read and approach the question the way you would any other question, asking yourself what you are supposed to be looking for, and what details are given in the question that help you find the answer.

Here is an example of a format you might not have encountered before:

Directions: The following question asks you to analyze teacher goals and actions intended to lead to the achievement of the goal. Decide whether the action makes it likely or unlikely to lead to the achievement of the goal.

GOAL: To increase the participation of low-achieving middle-school students in whole-class discussions.

ACTION: Instead of asking for volunteers, the teacher randomly calls on students to discuss homework assignments.

- (A) Likely, because students who feel anxiety about being called on will be more at ease and will pay more attention to class discussion.
- (B) Likely, because low-achieving students often hesitate to volunteer and random questioning will increase responses from these students.
- (C) Unlikely, because students in the middle-school grades prefer to have a choice in responding to discussions.
- (D) Unlikely, because students' positive feelings toward the teacher will decrease.

To answer this question correctly you must read the directions, which explain how the paragraph marked "GOAL," the paragraph marked "ACTION" and the answer choices fit together. The answer is (B) because it is the only action that is both "likely" to be successful and "likely" to be the right reason. To answer this question, first decide whether or not the action was likely to achieve the desired goal. Then select the reason. This two-part selection process brings you to your answer.

QUICK TIP: Don't make the questions more difficult than they are. Don't read for "hidden meanings" or "tricks." There are no "trick questions" on *Praxis* tests. They are intended to be serious, straightforward tests of your knowledge.

Understanding Constructed-response Questions

Constructed-response questions require you to demonstrate your knowledge in a subject area by providing in-depth explanations on particular topics. Essay and problem-solving are types of constructed-response questions.

For example, an essay question might present you with a topic and ask you to discuss the extent to which you agree or disagree with the opinion stated. You must support your position with specific reasons and examples from your own experience, observations, or reading.

Take a look at a few sample essay topics:

- "Celebrities have a tremendous influence on the young, and for that reason, they have a responsibility to act as role models."
- "We are constantly bombarded by advertisements—on television and radio, in newspapers and magazines, on highway signs and the sides of buses. They have become too pervasive. It's time to put limits on advertising."
- "Advances in computer technology have made the classroom unnecessary, since students and teachers are able to communicate with each other from computer terminals at home or at work."

A problem-solving question might ask you to solve a mathematics problem such as the one below and show how you arrived at your solution:

- a) In how many different ways can 700 be expressed as the product of two positive integers? Show how you arrived at your answer.
- b) Among all pairs of positive integers whose product is 700, which pair has the maximum greatest common divisor? Explain how you arrived at your answer.

Keep these things in mind when you respond to a constructed-response question

- 1) **Answer the question accurately.** Analyze what each part of the question is asking you to do. If the question asks you to describe or discuss, you should provide more than just a list.
- 2) **Answer the question completely.** If a question asks you to do three distinct things in your response, you should cover all three things for the best score. Otherwise, no matter how well you write, you will not be awarded full credit.
- 3) **Answer the question that is asked.** Do not change the question or challenge the basis of the question. You will receive no credit or a low score if you answer another question or if you state, for example, that there is no possible answer.
- 4) **Give a thorough and detailed response.** You must demonstrate that you have a thorough understanding of the subject matter. However, your response should be straightforward and not filled with unnecessary information.
- 5) **Reread your response.** Check that you have written what you thought you wrote. Be sure not to leave sentences unfinished or omit clarifying information.

QUICK TIP: You may find that it helps to circle each of the details of the question in your test book or take notes on scratch paper so that you don't miss any of them. Then you'll be sure to have all the information you need to answer the question.

For more detailed information on constructed-response scoring, see the Scoring Guide in the Test at a Glance section.

3. Understand Your Scores

Understand how tests are scored and how to interpret your test scores

Of course, passing the *Praxis* test is important to you so you need to understand what those scores mean and what your state requirements are.

What are the score requirements for my state?

States, institutions, and associations that require the tests set their own passing scores. Visit www.ets.org/praxis/states for the most up-to-date information.

If I move to another state, will my new state accept my scores?

The *Praxis Series* tests are part of a national testing program, meaning that they are required in more than one state for licensure. The advantage of a national program is that if you move to another state that also requires *Praxis* tests, you can transfer your scores. Each state has specific test requirements and passing scores that you can find at www.ets.org/praxis/states.

How do I know if I passed the test?

You will receive passing score information on your score report for the score recipients that you listed when you registered. If you test in a state with automatic score reporting, you will receive passing score information for that state.

A list of states and their passing scores for each test are available online at www.ets.org/praxis/states.

What your *Praxis* scores mean

You received your score report. Now what does it mean? It's important to interpret your score report correctly and to know what to do if you have questions about your scores.

Visit http://www.ets.org/s/praxis/pdf/sample_score_report.pdf to see a sample score report.

To access *Understanding Your Praxis Scores*, a document which provides additional information on how to read your score report, visit www.ets.org/praxis/scores/understand.

Put your scores in perspective

Your score report indicates:

- Your score and whether you passed
- The range of possible scores
- The raw points available in each content category
- The range of the middle 50 percent of scores on the test
- Your Recognition of Excellence (ROE) Award status, if applicable
(found at www.ets.org/praxis/scores/understand/roe)

If you have taken the same test or other tests in *The Praxis Series* over the last 10 years, your score report also lists the highest score you earned on each test taken.

Content category scores and score interpretation

On many of the *Praxis* tests, questions are grouped into content categories. To help you in future study or in preparing to retake the test, your score report shows how many “raw points” you earned in each content category. Compare your “raw points earned” with the maximum points you could have earned (“raw points available”). The greater the difference, the greater the opportunity to improve your score by further study.

Score scale changes

ETS updates *Praxis* tests on a regular basis to ensure they accurately measure the knowledge and skills that are required for licensure. Updated tests cover the same content as the previous tests. However, scores might be reported on a different scale, so requirements may vary between the new and previous versions. All scores for previous, discontinued tests are valid and reportable for 10 years.

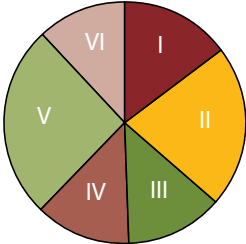
These resources may also help you interpret your scores:

- *Understanding Your Praxis Scores* (PDF), found at www.ets.org/praxis/scores/understand
- *The Praxis Series Passing Scores* (PDF), found at www.ets.org/praxis/scores/understand
- State requirements, found at www.ets.org/praxis/states

4. Learn About Your Test

Learn about the specific test you will be taking

Environmental Education (0831)

Test at a Glance			
Test Name	Environmental Education		
Test Code	0831		
Time	2 hours		
Number of Questions	130		
Format	Multiple-choice questions		
Test Delivery	Paper delivered		
	Content Categories	Approximate Number of Questions	Approximate Percentage of Examination
	I. Nature of Environmental Science Education: Inquiry, Methodology, and Techniques	20	15%
	II. Principles of Ecology	29	22%
	III. Life Sciences as Relevant to Environmental Science Education	17	13%
	VI. Earth and Physical Sciences as Relevant to Environmental Science Education	17	13%
	V. Humans and the Environment	32	25%
	VI. Environmental Laws, Regulations, and Socioeconomic Factors	15	12%

About This Test

The Environmental Education test is designed to assess the knowledge and understanding of the fundamental concepts, principles, phenomena, and their interrelationships necessary for a beginning teacher of Environmental Education (K-12).

The 130 multiple-choice questions are derived from topics typically covered in introductory college-level Environmental Science and related courses. The questions require a variety of abilities, including definition of terms, comprehension of critical concepts, and application and analysis of information to address and solve problems.

This test may contain some questions that do not count toward your score.

Topics Covered

Representative descriptions of topics covered in each category are provided below.

I. Nature of Environmental Science Education: Inquiry, Methodology, and Techniques

1. Understands the processes involved in scientific inquiry

- Identify scientific problems
- Develop testable hypotheses
- Design controlled experiments to test hypotheses
- Knows the difference between independent and dependent variables
- Understands the importance of observational data and/or peer-reviewed research as a basis for continued experimentation
- Distinguish between observation, inference, and prediction
- Assess the value of data from a variety of sources (e.g., validity, reliability)
- Draw valid conclusions from the interpretation of data collected during scientific investigations

2. Knows how to interpret and use scientific models to explain complex phenomena (e.g., global climate change, weather patterns)

- Scientists use data to develop models
- Interpretation of scientific models are based on the quality of the data and the process of analysis
- Models can be used to understand complex systems and generate hypotheses and predictions

3. Understands the differences between facts, hypotheses, theories, and laws

- Theories are derived from interpretation of multiple datasets over time
- Scientific law is a statement that holds true through continuous scientific observation/investigation
- Distinguish between a fact, hypothesis, theory, and law

4. Understands how scientific ideas develop over time (e.g., continental drift, evolution)

- Basic scientific premises such as:
 - Understands that scientific ideas change as new ideas and information come to light
 - Knows that technological advances often bring about major changes in scientific knowledge
 - Describes the contributing evidence that supports scientific ideas

5. Understands the appropriate use of scientific measurement and scientific notation

- Understands how to use metric units for scientific measurements, such as:
 - Mass/Gram; Length/Meter; Volume/Liter; Time/Sec; similar smaller units in milli, micro, nano, and pico for all
 - Recognize English and Metric Units of measurement
 - Use appropriate mathematical operations, scientific measurements, and scientific notation to gather and analyze data
 - Knows that the metric system (e.g., SI units) is universally used in science

6. Understands how to collect, evaluate, and interpret both field and laboratory data

- Understands the advantages and disadvantages of observational and experimental research
- Recognizes the importance of an unbiased evaluation/interpretation of data
- Applies statistical methods to make predictions and analyze results
- Applies appropriate methods of data collection in field and laboratory settings
- Knows how to access and use technology-related resources (e.g., computer software, Internet resources)
- Can use, interpret, and evaluate valid websites related to environmental science such as NOAA, USGS, NASA, and EPA

7. Understands how to construct and interpret tables, graphs, and charts

- Use basic statistics: mean, median, variance, and standard deviation of the dataset
- Interpret, draw valid conclusions, and make predictions from data analysis
- Construct an appropriate graph, table or chart to demonstrate data gathered from a scientific investigation
- Understand that line graphs are visual representations of research results that show trends and identify how variables relate to one another
- Knows the difference between independent and dependent variables and is able to assign variables to the correct axes
- Understands the difference between correlation and causation

8. Knows how to safely and appropriately prepare and use standard materials and equipment in the classroom, the laboratory, and the field

- Knows the meaning of:
 - Safe use, storage, and disposal of chemicals
 - Safe handling of field equipment
 - Is familiar with standard lab safety procedures
 - Is familiar with the MSDS safety manual
 - Recognizes the unique concerns of field work (e.g., student allergies, exposure to the elements, and protection of the environment)
 - Knows basic safety procedures to ensure safety in the classroom, the laboratory, and the field
 - Anticipates unsafe lab and field situations and proactively works to prevent them

9. Understands that environmental science education is interdisciplinary (e.g., math, natural, and social sciences)

- Understands that environmental science integrates physical sciences and biological sciences to the study of the environment
- Recognizes that social sciences explain how human relationships to, perceptions of, and policies toward the environment affect the health and well being of the environment
- Realizes that a multidisciplinary approach is necessary for finding solutions to environmental problems

II. Principles of Ecology

1. Understands the role of biotic and abiotic factors in influencing population growth and carrying capacity

- Biotic potential and environmental resistance
- Exponential growth, logistic growth, carrying capacity (k)
- Density dependent and Independent factors
- Adaptability—ability to migrate, invade new habitats, coping with adverse conditions, and predation
- Interpret age structure diagrams
- Understands minimum viable population
- Calculate population growth rate if given natality, mortality, immigration, and emigration rates
- Common limiting factors such as nitrogen, phosphorus, nutrients, sunlight, water

2. Understands the potential impact of invasive species

- Intentional and inadvertent introductions
- Excessive population growth due to lack of predators, lack of competition, and ability to out-compete native species
- Differentiate between native, exotic, and invasive species
- Invasive species cause environmental and economic damages

3. Understands the ecological relationships that occur within and between species

- Symbiosis (e.g., mutualism, commensalism, parasitism)
- Competition (intra- and interspecific)
- Predation (e.g., predator/prey dynamics)
- Co-evolution
- Competitive exclusion principle

4. Understands organizational levels of ecosystems, including individuals, populations, and communities

- Define species, population, community, ecosystems, and biomes
- Biological hierarchy: atom, molecule, cell, tissue, organ, organism, population, community, ecosystem, landscape, biome, biosphere

5. Understands factors influencing biodiversity and why biodiversity is important

- Define biodiversity, species diversity, genetic diversity, ecosystem diversity
- Abiotic factors (e.g., temperature, precipitation,)
- Ranges of tolerance
- Limiting factors
- Changes with latitude and altitude
- Physical barriers
- Microclimate
- Speciation extinction, mass extinction, rates of extinction over geologic time
- Major causes of loss of biodiversity (e.g., invasive species, pollution, over harvesting, habitat alteration, and climate change)
- Relationship between biodiversity and stability within ecosystems

6. Understands the difference between the concepts of niche and habitat

- Habitat—simply location
- Niche—all aspects of species' life
- Niche restriction/resource partitioning

7. Understands the concept of energy flow in the environment

- Autotroph and heterotroph
- Biomass pyramids (terrestrial and aquatic)
- Energy pyramids
- Food chain, food web, trophic levels
- Producers, consumers (primary, secondary, etc.)
- Decomposers/detritivores
- Primary productivity
- Chemosynthesis (e.g., thermal vents)

8. Understands the nature of biogeochemical cycles

- Knows chemical, biological, geological processes, sources, and sinks
 - Phosphorus cycle
 - Nitrogen cycle
 - Carbon cycle
 - Water cycle
 - Human impacts on biogeochemical cycles

9. Understands that ecosystems change over time

- Pioneer species
- Climax community
- Difference between and examples of primary and secondary succession
- Aquatic succession
- Natural versus man-made disturbances
- Role of fire in some ecosystems

10. Understands the concept of a biome (e.g., determining factors, types, characteristics)

- Temperature and precipitation are the major determinants of terrestrial biomes
- Climatogram interpretation
- The location of terrestrial biomes, the main climate variables that predict where they are found, and the dominant vegetation types associated with each
- How vegetation types change with elevation
- The major aquatic ecosystems
- Aquatic determining factors such as temperature, salinity, depth

11. Understands the interactions of aquatic and terrestrial ecosystems

- Functions of wetlands (e.g., filtering ability, source of biodiversity, flood control)
- Functions of estuaries such as nurseries, fisheries, source of biodiversity
- Importance of ecotones and general characteristics (e.g., riparian zone)

12. Understands the importance of keystone species

- Define keystone species
- Contributes to the stability and species diversity within ecosystems
- Loss of keystone species would consequently lead to the loss of other species

13. Understands the process of biomagnification

- Increase in concentrations of persistent toxins at higher trophic levels
- DDT story
- Bioaccumulation and biomagnification of toxins (heavy metals, pesticides, etc.)

14. Understands reproductive strategies of plants and animals

- Advantages/disadvantages of asexual versus sexual reproduction
- Characteristics of K strategists (e.g., large, long lived, low reproductive rate, etc.)
- Characteristics of r strategists (e.g., short lifespan, high reproductive rate, low parental care, etc.)

15. Understands the physical aspects of the water cycle, groundwater, watersheds, and wetlands

- Infiltration, evaporation, condensation, precipitation, runoff
- Rain shadow effect
- Watershed/drainage basins
- Water table
- Surface and groundwater interactions
- Recharge zone/aquifers
- Relative amounts of ocean water versus freshwater
- Locations and amounts of available (e.g., groundwater, surface water) and unavailable (e.g., ice caps and glaciers) fresh water
- Potable water

III. Life Sciences as Relevant to Environmental Science Education

1. Understands the basic concepts of growth and development of organisms

- Organisms mature at different rates and in different ways. (e.g., age of sexual maturity)
- Explain how growth can occur by cell division and cell enlargement
- Explain how environmental factors affect growth and development, including pollution, temperature, breeding ground degradation/depletion, access to breeding grounds

2. Understands the processes of and the relationship between photosynthesis and respiration

- Compare and contrast the basic reactions of photosynthesis and respiration
- Conservation of energy as it relates to photosynthesis and respiration
- Distinguish between aerobic and anaerobic respiration

- Recognize that most photosynthesis occurs in the ocean (e.g., phytoplankton sequesters carbon)

3. Understands different methods of reproduction

- External versus internal fertilization
- Asexual methods (e.g., binary fission, budding, vegetative propagation, etc.)
- Sexual reproduction involves the exchange of genetic information between two individuals
- Identify advantages and disadvantages of asexual and sexual reproduction

4. Understands the basic concepts of genetic variability and inheritance

- Sexual reproduction is a source of genetic variability
- Explain the concept of a gene as a segment of DNA
- Explain that mutation is change in the sequence of the DNA molecule and results in new genetic variations
- Know the genetic concepts of dominance and recessiveness
- Identify examples of mutagens (e.g., UV light, asbestos, cigarette tar, radioisotopes, radiation)

5. Understands basic types of adaptations in plants and animals

- Explain how adaptations lead to greater “fitness” and allow for better survival and/or reproduction
- Give examples of survival adaptations (e.g., camouflage, mimicry, warning coloration, hiding, fleeing, “playing dead,” chemical defense, behavioral defense)
- Describe adaptations for attracting mates (e.g., mating calls, mating dances, pheromones, visual signals, male dominance/fighting, sexual selections)
- Describe plant adaptations (e.g., attraction of pollinators and seed dispersal mechanisms)
- Describe adaptations to habitat (e.g., coloration, heat retention/generation, warm-blooded versus cold-blooded, structural adaptations)

6. Understands the defining characteristics of life

- The following are required characteristics of living things:
 - All organisms are made of one or more cells
 - Individuals are organized on molecular and cellular levels
 - All organisms use energy for growth and maintenance
 - Organisms can react to stimuli
 - Organisms grow as a result of cell division and/or enlargement
 - Organisms reproduce sexually or asexually
 - Organisms can adapt to their environment
- Define and give examples of homeostasis (e.g., thermoregulation)
- Understands that living things are classified (i.e., taxonomy)

7. Understands the mechanisms and outcomes of evolution

- Speciation may occur from competition or reproductive isolation
- Natural selection can alter the relative frequencies of gene pool alleles
- Populations tend not to evolve if all of the following occur: 1) random mating, 2) large population, 3) no mutations, 4) no natural selection, and 5) no movement in or out of the population
- Genetic drift is change that occurs by chance in small populations and is not natural selection
- Explain natural selection as the mechanism that drives evolution
- Understands the concept of “fitness”
- Identification of forms of reproductive isolation (e.g., geographical, temporal, behavioral)

IV. Earth and Physical Sciences as Relevant to Environmental Science Education

1. Understands atmospheric layers and their basic composition

- The structure of the atmosphere including the troposphere, stratosphere, mesosphere, thermosphere
- Understand the temperature distribution and composition of the layers of the atmosphere
- Stratospheric ozone and the role it plays in protecting life on Earth

2. Understands how and why climate varies across the world

- Distribution of solar radiation with respect to latitude
- Atmospheric wind circulation patterns
- The Coriolis effect on ocean current and wind patterns
- Seasonal changes due to tilt and revolution (orbit) of Earth around the Sun
- How the differential heating of Earth results in circulation patterns in the atmosphere and oceans that globally distribute heat

3. Understands weather patterns and how they impact the environment

- Differentiate between weather and climate
- How warm fronts, cold fronts, high pressure air masses, and low pressure air masses affect weather
- Global weather patterns and oscillations
- Causes and consequences of El Nino and La Nina (e.g., upwellings, surface temperature changes)
- Relationship between temperature inversion, local geography, particulates in air, and development of smog
- The impact of weather patterns on the environment (e.g., temperature inversion, drought, flooding)

4. Understands basic soil types, composition, and formation

- The role of the rock cycle in soil formation
- The soil horizons and their basic composition
- How sand, silt, and clay contribute to soil texture and type
- How humus (organic material) and pH contribute to soil fertility
- The role of organisms in soil

5. Understands basic principles of geology as they relate to environmental science (e.g., rock cycle erosion, plate tectonics)

- Plate tectonics, earthquakes, volcanoes
- The rock cycle
- Layers of Earth
- Processes and importance of weathering
- Processes and importance of erosion
- Geologic Earth history (e.g., age of Earth, fossilization, major events)

6. Understands basic principles of chemistry as they relate to environmental science

- Structure of atoms
- Chemical bonding (e.g., ionic, covalent, hydrogen)
- Familiar with the pH scale
- Understands properties of water
- Phases of matter
- Simple chemical reactions (e.g., acid rain formation)
- Various types of mixtures (solutions, suspensions)
- Conservation of matter
- Basic understanding of periodic table

7. Is familiar with how catastrophic events impact the environment

- Understands that natural disasters alter habitats and impact the environment
- Understands the role of volcanoes (e.g., temperature changes, ring of fire)
- Meteor collisions
- Tsunamis

V. Humans and the Environment

A. Interactions

1. Knows how the sustainable use of natural resources is critical to the sustainability of society

- Patterns of resource use
- Sustainable resource management
- Renewable resources, non-renewable resources

2. Understands how human consumption and human population growth have caused changes in the environment

- Human population trends
- Desertification
- Deforestation
- Impacts of urbanization/urban sprawl
- Human consumption of goods
- Human ecological footprint (per capita use, food chain implications)
- Environmental impact results from interactions among population size, affluence, and technology

3. Understands how individual organisms and populations respond to environmental changes caused by human interaction with natural systems

- Migration (emigration and immigration)
- Changes in population sizes
- Development of pesticide and antibiotic resistance
- Changes in population characteristics

4. Knows the major types of pollutants in the environment

- Water (e.g., sediments, nutrients, heavy metals, pharmaceuticals, pathogens)
- Air (e.g., particulates, sulphur compound, carbon compounds, nitrogen compounds, ozone)
- Soil (e.g., pesticides, heavy metals)
- Primary pollutants versus secondary pollutants

5. Understands the difference between point and nonpoint sources of pollution

- Identify different sources of point and nonpoint pollutants
- Differentiate between point source and non-point source and explain why the difference is relevant
- Difference in effectiveness of regulating point and nonpoint pollution

6. Is familiar with the various ways in which pollutants are detected

- Physical measurements (e.g., temperature, turbidity, sediment, etc.)
- Biological measurements (e.g., biotic index, bioassays)
- Chemical measurements, (e.g., dissolved oxygen, nitrates, phosphates)

7. Knows the advantages and disadvantages of common disposal methods for wastes (e.g., municipal solid waste, hazardous waste)

- Identify impact on the environment of the following:
 - Landfills and open dumps
 - Incineration and cogeneration
 - Open burning
 - Recycling, reuse, composting
 - Deep-well injection and surface impoundments
 - Radioactive waste (high and low levels) disposal
 - Exportation of wastes
 - Ocean dumping

8. Knows a variety of ways in which pollution impacts human health

- Identify human systems at risk (e.g., respiratory, reproductive, endocrine, nervous)
- Mutagens, teratogens, carcinogens
- Toxins, toxicity, LD 50
- Water borne diseases (e.g., cholera, dysentery, etc.)
- Respiratory problems (e.g., allergy and asthma)
- Food safety
- Indoor air pollution (e.g., mold, VOCs, radon)
- Specific population's susceptibility to certain pollutants

9. Understands how the production, use, and disposal of consumer goods impact the environment

- Is familiar with the connection between pollution and the economy (e.g., remediation versus prevention)
- Interaction of supply and demand on environmental and economic decisions
- Positive and negative impact of new technologies
- Source reduction (e.g., over packaging)

10. Knows ways in which human-induced environmental change leads to loss of biodiversity and species' becoming threatened, endangered, or extinct

- Habitat loss/fragmentation
- Invasive species
- Population growth of humans
- Pollution
- Climate change
- Overexploitation of resources (e.g., overfishing)

11. Is familiar with local, national, and global environmental health issues

- Hot spots for cancer and birth defects (e.g., Love Canal, Minamata, Chernobyl)
- Pandemics, epidemics, endemics
- Consequences of human travel or migration
- Antibiotic resistance
- Infectious diseases (e.g., HIV/AIDS, TB)
- Vector borne diseases (e.g., West Nile, malaria, Lyme)
- Specific population's susceptibility to certain environmental stressors

12. Understands the general factors involved in global change

- Sources of greenhouse gases
- Greenhouse effect
- Explain causes and potential impacts of climate change
- Ozone depletion

B. Natural Resources

1. Understands trends in energy consumption in developed and developing countries

- Relate current consumption to developing countries to historic times (pioneer household)
- Developed countries use more nonrenewable natural resources (coal, oil, natural gas)
- Future needs: less reliance on nonrenewables and greater emphasis on renewable forms of energy

2. Understands the formation, composition, and locations of fossil fuel resources and the advantages and disadvantages of fossil fuel use

- Sources/formation of fossil fuels
- By-products of fossil fuel consumption
- Fossil fuel locations
- Advantages
- Disadvantages

3. Understands the nature of major alternative energy resources

- Advantages and disadvantages of the following:
 - Nuclear
 - Solar
 - Hydroelectric
 - Wind
 - Biomass (e.g., wood, trash, biofuels)
 - Geothermal

4. Understands how ecosystem services benefit humans

- Identify ecosystem goods and services and how they impact society
 - Forests
 - Soil
 - Water purification, regulation, and supply
 - Crop pollination
 - Nutrient cycling
 - Climate regulation
 - Biodiversity
 - Air purification and resources
 - Recreation

5. Understands the advantages and disadvantages of recycling

- Reduction of landfills (ecological and economic)
- Conservation of natural resources
- Energy costs (raw versus recycled)
- Collection and sorting costs
- Economic effect of recycling/recycled products

C. The Use of Habitat

1. Understands challenges/solutions associated with feeding a growing population

- Technologies of the green revolution
- Changing eating habits to eat lower on food chain
- Food and water distribution difficulties
- Land limitations
- Improved farming techniques
- Genetically modified organisms
- Biotechnology

2. Understands the environmental impacts of agriculture

- Industrial versus traditional food production methods
- Integrated pest management
- Loss of soil fertility
- Soil erosion
- Agricultural runoff (e.g., pesticides, cultural eutrophication)
- Aquifer and ground water depletion

3. Understands sustainable approaches in forestry and fisheries

- Selective forest cutting
- Re-planting forests
- Preservation of forest areas high in biodiversity
- Marine reserves
- Fishery regulations (e.g., catch limits, size limit, seasons)
- Harvesting techniques that avoid by-catch
- Aquaculture and tree plantations

4. Understands best-management practices in agriculture

- Crop rotation
- Integrated pest management
- Soil conservation
- Contour plowing
- Strip farming
- Terracing
- Cover crops
- No-till cultivation
- Buffers

5. Understands the major environmental issues associated with urban development and transportation systems

- Stormwater management
- Creation of impervious surfaces
- City planning and smart growth
- Crowding and pollution
- Lack of green spaces
- Social justice
- Mass transit
- Sewage and waste disposal
- Air quality

6. Understands issues associated with different types of drilling and mining practices

- Extraction techniques (e.g., strip mining, deep mining, open pit, offshore drilling)
- Water pollution
- Acid mine drainage
- Mining and drilling accidents and health hazards
- Mine waste
- Oil spills
- Soil contamination
- Processing and transporting
- Natural habitat destruction

7. Understands the major issues associated with preservation, mitigation, and restoration of habitats

- Restoration ecology (e.g., artificial versus natural wetlands)
- Remediation

- Reclamation
- Mitigation
- Conservation versus preservation

VI. Environmental Laws, Regulations, and Socioeconomic Factors Influencing Environmental Decisions and Ecosystems

1. Is familiar with major federal and international environmental laws, regulations and treaties and their impacts on ecosystems

- The main goals, requirements, and/or results of:
 - Clean Air Act, Clean Water Act, Endangered Species Act
 - Surface Mining, Control and Reclamation Act
 - NEPA—National Environmental Protection Act
 - CERCLA—superfund
 - RCRA—Resource Conservation and Recovery Act
 - CITES—Convention on International Trade in Endangered Species
 - Montreal Protocol—ozone depletion
 - Kyoto Protocol—global climate change

2. Is familiar with how individuals and economic, political, and social institutions can affect decisions related to ecosystems and the environment

- Understands that public advocacy, financial support, and voting can affect decisions related to ecosystems and the environment
- Major historical figures of environmental movement (e.g., Aldo Leopold, John Muir, Rachel Carson)
- The “Green Revolution” industrialization of agriculture to increase crop yields
- The “Green” movement
- Cap and trade
- Cost-benefit analysis model of environmental decision making
- Concept of “real cost (externalities)” (“cradle to grave”)

3. Understands how societal attitudes, values, and philosophies regarding the environment interact with law and culture

- Recognize that societal attitudes, values, and philosophies interact to varying degrees among different individuals and groups (e.g., generations, geographical, socioeconomic)
- Environmental justice/racism
- Environmental ethics
- NIMBY—not in my back yard attitude
- “Throw-away” society
- “Spaceship Earth”

4. Understands the relationship between personal rights (e.g., use of resources, shared water access, survival) and civic responsibility as it relates to the environment

- “Tragedy of the Commons” (e.g., national parks, water rights, mineral rights)
- Concept of ecological footprint
- Issues associated with private land ownership and development

5. Understands how addressing environmental issues requires the consideration of multiple perspectives and long-term consequences

- In addressing environmental issues, one should consider possible short- and long-term consequences
- Identify stakeholders and their beliefs and values
- Interconnected nature of environmental issues
- Environmental Impact statements
- Direct and indirect causes of environmental issues
- Lag-time between cause and effect can complicate the evaluation and solution of environmental issues

6. Understands how individuals’ actions can help solve environmental problems and impact sustainability

- Examples of individual actions to solve environmental problems could include: tree planting, removing invasive species, recycling, etc.
- Collectively, individuals can make a significant difference if focused on same goals
- Individual lifestyle choices versus sustainability

5. Determine Your Strategy for Success

Set clear goals and deadlines so your test preparation is focused and efficient

Effective *Praxis* test preparation doesn't just happen. You'll want to set clear goals and deadlines for yourself along the way. Otherwise, you may not feel ready and confident on test day.

1) Learn what the test covers.

You may have heard that there are several different versions of the same test. It's true. You may take one version of the test and your friend may take a different version a few months later. Each test has different questions covering the same subject area, but both versions of the test measure the same skills and content knowledge.

You'll find specific information on the test you're taking in the Test at a Glance section, which outlines the content categories that the test measures and what percentage of the test covers each topic.

Visit www.ets.org/praxis/testprep for information on other *Praxis* tests.

2) Assess how well you know the content.

Research shows that test takers tend to overestimate their preparedness—this is why some test takers assume they did well and then find out they did not pass.

The *Praxis* tests are demanding enough to require serious review of likely content, and the longer you've been away from the content the more preparation you will most likely need. If it has been longer than a few months since you've studied your content area, make a concerted effort to prepare.

3) Collect study materials.

Gathering and organizing your materials for review are critical steps in preparing for the *Praxis* tests. Consider the following reference sources as you plan your study:

- Did you take a course in which the content area was covered? If yes, do you still have your books or your notes?
- Does your college library have a good introductory college-level textbook in this area?
- Does your local library have a high school-level textbook?

Study guides are available for purchase for many *Praxis* tests at www.ets.org/praxis/testprep. Each guide provides a combination of test preparation and practice, including sample questions and answers with explanations.

4) Plan and organize your time.

You can begin to plan and organize your time while you are still collecting materials. Allow yourself plenty of review time to avoid cramming new material at the end. Here are a few tips:

- Choose a test date far enough in the future to leave you plenty of preparation time at www.ets.org/praxis/register/centers_dates.
- Work backward from that date to figure out how much time you will need for review.
- Set a realistic schedule—and stick to it.

5) Practice explaining the key concepts.

Praxis tests with constructed-response questions assess your ability to explain material effectively. As a teacher, you'll need to be able to explain concepts and processes to students in a clear, understandable way. What are the major concepts you will be required to teach? Can you explain them in your own words accurately, completely, and clearly? Practice explaining these concepts to test your ability to effectively explain what you know.

6) Understand how questions will be scored.

Scoring information can be found in the Learn About Your Test section on page 11.

7) Develop a study plan.

A study plan provides a roadmap to prepare for the *Praxis* tests. It can help you understand what skills and knowledge are covered on the test and where to focus your attention. Use the study plan template on page 25 to organize your efforts.

And most important—get started!

Would a Study Group Work for You?

Using this guide as part of a study group

People who have a lot of studying to do sometimes find it helpful to form a study group with others who are working toward the same goal. Study groups give members opportunities to ask questions and get detailed answers. In a group, some members usually have a better understanding of certain topics, while others in the group may be better at other topics. As members take turns explaining concepts to each other, everyone builds self-confidence.

If the group encounters a question that none of the members can answer well, the group can go to a teacher or other expert and get answers efficiently. Because study groups schedule regular meetings, members study in a more disciplined fashion. They also gain emotional support. The group should be large enough so that multiple people can contribute different kinds of knowledge, but small enough so that it stays focused. Often, three to six members is a good size.

Here are some ways to use this guide as part of a study group:

- **Plan the group's study program.** Parts of the study plan template on page 25 can help to structure your group's study program. By filling out the first five columns and sharing the worksheets, everyone will learn more about your group's mix of abilities and about the resources, such as textbooks, that members can share with the group. In the sixth column ("Dates planned for study of content"), you can create an overall schedule for your group's study program.
- **Plan individual group sessions.** At the end of each session, the group should decide what specific topics will be covered at the next meeting and who will present each topic. Use the topic headings and subheadings in the Test at a Glance on page 12 to select topics and then select practice questions, beginning on page 31.
- **Prepare your presentation for the group.** When it's your turn to present, prepare something that is more than a lecture. Write two or three original questions to pose to the group. Practicing writing actual questions can help you better understand the topics covered on the test as well as the types of questions you will encounter on the test. It will also give other members of the group extra practice at answering questions.

- **Take the practice test together.** The idea of the practice test is to simulate an actual administration of the test, so scheduling a test session with the group will add to the realism and may also help boost everyone's confidence. Remember, complete the practice test using only the time that will be allotted for that test on your administration day.
- **Learn from the results of the practice test.** Score each other's answer sheets. For the constructed-response questions, look at the Sample Test Questions, which also contain sample responses to those questions and shows how they were scored. Then try to follow the same guidelines that the test scorers use.
- **Be as critical as you can.** You're not doing your study partner(s) any favors by letting them get away with an answer that does not cover all parts of the question adequately.
- **Be specific.** Write comments that are as detailed as the comments about the sample responses. Indicate where and how your study partner(s) are doing an inadequate job of answering the question. Writing notes in the margins of the answer sheet may also help.
- **Be supportive.** Include comments that point out what your study partner(s) got right and therefore earned points.

Then plan one or more study sessions based on aspects of the questions on which group members performed poorly. For example, each group member might be responsible for rewriting one paragraph of a response in which someone else did an inadequate job.

Whether you decide to study alone or with a group, remember that the best way to prepare is to have an organized plan. The plan should set goals based on specific topics and skills that you need to learn, and it should commit you to a realistic set of deadlines for meeting these goals. Then you need to discipline yourself to stick with your plan and accomplish your goals on schedule.

6. Develop Your Study Plan

Develop a personalized study plan and schedule

Planning your study time is important because it will help ensure that you review all content areas covered on the test. Use the sample study plan below as a guide. It shows a plan for the *Middle School: Mathematics* test. Following that is a study plan template that you can fill out to create your own plan. Use the Test at a Glance and Topics Covered information beginning on page 11 to help complete it.

Use this worksheet to:

- 1. Define Content Areas:** List the most important content areas for your test as defined in the Test at a Glance and Topics Covered sections.
- 2. Determine Strengths and Weaknesses:** Identify your strengths and weaknesses in each content area.
- 3. Identify Resources:** Identify the books, courses, and other resources you plan to use for each content area.
- 4. Study:** Create and commit to a schedule that provides for regular study periods.

Praxis Test Name: Middle School: Mathematics
Praxis Test Code: 0069
Test Date: 11/15/12

Content covered	Description of content	How well do I know the content? (scale 1–5)	What resources do I have/need for the content?	Where can I find the resources I need?	Dates I will study the content	Date completed
Literal Comprehension						
Main Ideas	Identify summaries or paraphrases of main idea or primary purpose of reading selection	2	Middle school English text book	College library, middle school teacher	9/15/12	9/15/12
Supporting Ideas	Identify summaries or paraphrases of supporting ideas and specific details in reading selection	2	Middle school English text book	College library, middle school teacher	9/17/12	9/17/12
Organization	Identify how reading selection is organized in terms of cause/ effect and compare/ contrast	3	Middle and high school English text book	College library, middle and high school teachers	9/20/12	9/21/12
Organization	Identify key transition words/phrases in reading selection and how used	4	Middle and high school English text book	College library, middle and high school teachers	9/25/12	9/26/12
Vocabulary in Context	Identify meanings of words as used in context of reading selection	3	Middle and high school English text book, dictionary	College library, middle and high school teachers	9/25/12	9/27/12

(continued on next page)

Content covered	Description of content	How well do I know the content? (scale 1–5)	What resources do I have/need for the content?	Where can I find the resources I need?	Dates I will study the content	Date completed
Critical and Inferential Comprehension						
Evaluation	Determine whether evidence strengthens, weakens, or is relevant to arguments in reading selection	5	High school text book, college course notes	College library, course notes, high school teacher, college professor	10/1/12	10/1/12
Evaluation	Determine role that an idea, reference, or piece of information plays in author's discussion/argument	5	High school text book, college course notes	College library, course notes, high school teacher, college professor	10/1/12	10/1/12
Evaluation	Determine if information presented is fact or opinion	4	High school text book, college course notes	College library, course notes, high school teacher, college professor	10/1/12	10/1/12
Evaluation	Identify relationship among ideas presented in reading selection	2	High school text book, college course notes	College library, course notes, high school teacher, college professor	10/1/12	10/1/12
Inferential Reasoning	Draw inferences/ implications from directly stated content of reading selection	3	High school text book, college course notes	College library, course notes, high school teacher, college professor	10/8/12	10/8/12
Inferential Reasoning	Determine logical assumptions on which argument or conclusion is based	2	High school text book, college course notes	College library, course notes, high school teacher, college professor	10/8/12	10/8/12
Inferential Reasoning	Determine author's attitude toward materials discussed in reading selection	1	High school text book, college course notes	College library, course notes, high school teacher, college professor	10/15/12	10/17/12
Generalization	Recognize or predict ideas/situations that are extensions of, or similar to, what has been presented in reading selection	2	High school text book, college course notes	College library, course notes, high school teacher, college professor	10/22/12	10/24/12
Generalization	Draw conclusions from materials presented in reading selection	3	High school text book, college course notes	College library, course notes, high school teacher, college professor	10/24/12	10/24/12
Generalization	Apply ideas presented in a reading selection to other situations	3	High school text book, college course notes	College library, course notes, high school teacher, college professor	10/27/12	10/27/12

My Study Plan

Use this worksheet to:

- 1. **Define Content Areas:** List the most important content areas for your test as defined in the Test at a Glance and Topics Covered sections.
- 2. **Determine Strengths and Weaknesses:** Identify your strengths and weaknesses in each content area.
- 3. **Identify Resources:** Identify the books, courses, and other resources you plan to use for each content area.
- 4. **Study:** Create and commit to a schedule that provides for regular study periods.

Praxis Test Name: _____

Praxis Test Code: _____

Test Date: _____

Content covered	Description of content	How well do I know the content? (scale 1–5)	What resources do I have/need for the content?	Where can I find the resources I need?	Dates I will study the content	Date completed

(continued on next page)

Content covered	Description of content	How well do I know the content? (scale 1–5)	What resources do I have/need for the content?	Where can I find the resources I need?	Dates I will study the content	Date completed

7. Review Smart Tips for Success

Follow test-taking tips developed by experts

Learn from the experts. Take advantage of these answers to questions you may have and practical tips to help you navigate the *Praxis* test and make the best use of your time.

Should I Guess?

Yes. Your score is based on the number of questions you answer correctly, with no penalty or subtraction for an incorrect answer. When you don't know the answer to a question, try to eliminate any obviously wrong answers and then guess at the correct one. Try to pace yourself so that you have enough time to carefully consider every question.

Can I answer the questions in any order?

Yes. You can go through the questions from beginning to end, as many test takers do, or you can create your own path. Perhaps you will want to answer questions in your strongest area of knowledge first and then move from your strengths to your weaker areas. On computer-delivered tests, you can use the "Skip" function to skip a question and come back to it later. There is no right or wrong way. Use the approach that works best for you.

Are there trick questions on the test?

No. There are no hidden meanings or trick wording. All of the questions on the test ask about subject matter knowledge in a straightforward manner.

Are there answer patterns on the test?

No. You might have heard this myth: the answers on multiple-choice tests follow patterns. Another myth is that there will never be more than two questions with the same lettered answer following each other. Neither myth is true. Select the answer you think is correct based on your knowledge of the subject.

Can I write in the test booklet or, for a computer-delivered test, on the scratch paper I am given?

Yes. You can work out problems right on the pages of the booklet or scratch paper, make notes to yourself, mark questions you want to review later or write anything at all. Your test booklet or scratch paper will be destroyed after you are finished with it, so use it in any way that is helpful to you. But make sure to mark your answers on the answer sheet or enter them on the computer.

Smart Tips for Taking the Test

1. **For a paper-delivered test, put your answers in the right "bubbles."** It seems obvious, but be sure that you fill in the answer "bubble" that corresponds to the question you are answering. A significant number of test takers fill in a bubble without checking to see that the number matches the question they are answering.
2. **Skip the questions you find extremely difficult.** Rather than trying to answer these on your first pass through the test, leave them blank and mark them in your test booklet. Pay attention to the time as you answer the rest of the questions on the test, and try to finish with 10 or 15 minutes remaining so that you

can go back over the questions you left blank. Even if you don't know the answer the second time you read the questions, see if you can narrow down the possible answers, and then guess.

3. **Keep track of the time.** Bring a watch to the test, just in case the clock in the test room is difficult for you to see. Keep the watch as simple as possible—alarms and other functions may distract others or may violate test security. If the test center supervisor suspects there could be an issue with your watch, they will ask you to remove it, so simpler is better! You will probably have plenty of time to answer all of the questions, but if you find yourself becoming bogged down in one section, you might decide to move on and come back to that section later.
4. **Read all of the possible answers before selecting one.** Then reread the question to be sure the answer you have selected really answers the question. Remember, a question that contains a phrase such as “Which of the following does NOT ...” is asking for the one answer that is NOT a correct statement or conclusion.
5. **Check your answers.** If you have extra time left over at the end of the test, look over each question and make sure that you have answered it as you intended. Many test takers make careless mistakes that they could have corrected if they had checked their answers.
6. **Don't worry about your score when you are taking the test.** No one is expected to answer all of the questions correctly. Your score on this test is not analogous to your score on the *GRE*® or other similar-looking (but in fact very different) tests. It doesn't matter on the *Praxis* tests whether you score very high or barely pass. If you meet the minimum passing scores for your state and you meet the state's other requirements for obtaining a teaching license, you will receive a license. In other words, what matters is meeting the minimum passing score. You can find passing scores for all states that use *The Praxis Series* tests at http://www.ets.org/s/praxis/pdf/passing_scores.pdf or on the website of the state for which you are seeking certification/licensure.
7. **Use your energy to take the test, not to get angry at it.** Getting angry at the test only increases stress and decreases the likelihood that you will do your best. Highly qualified educators and test development professionals, all with backgrounds in teaching, worked diligently to make the test a fair and valid measure of your knowledge and skills. Your state painstakingly reviewed the test before adopting it as a licensure requirement. The best thing to do is concentrate on answering the questions.

8. Practice with Sample Test Questions

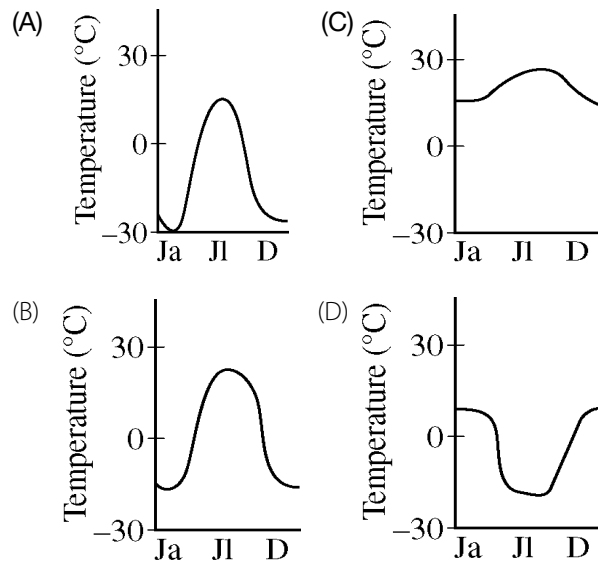
Answer practice questions and find explanations for correct answers

Sample Test Questions

The sample questions that follow illustrate the kinds of questions you will find on the test. They are not, however, representative of the entire scope of the test in either content or difficulty. Answers with explanations follow the questions.

Directions: Each of the questions or statements below is followed by four suggested answers or completions. Select the one that is best in each case.

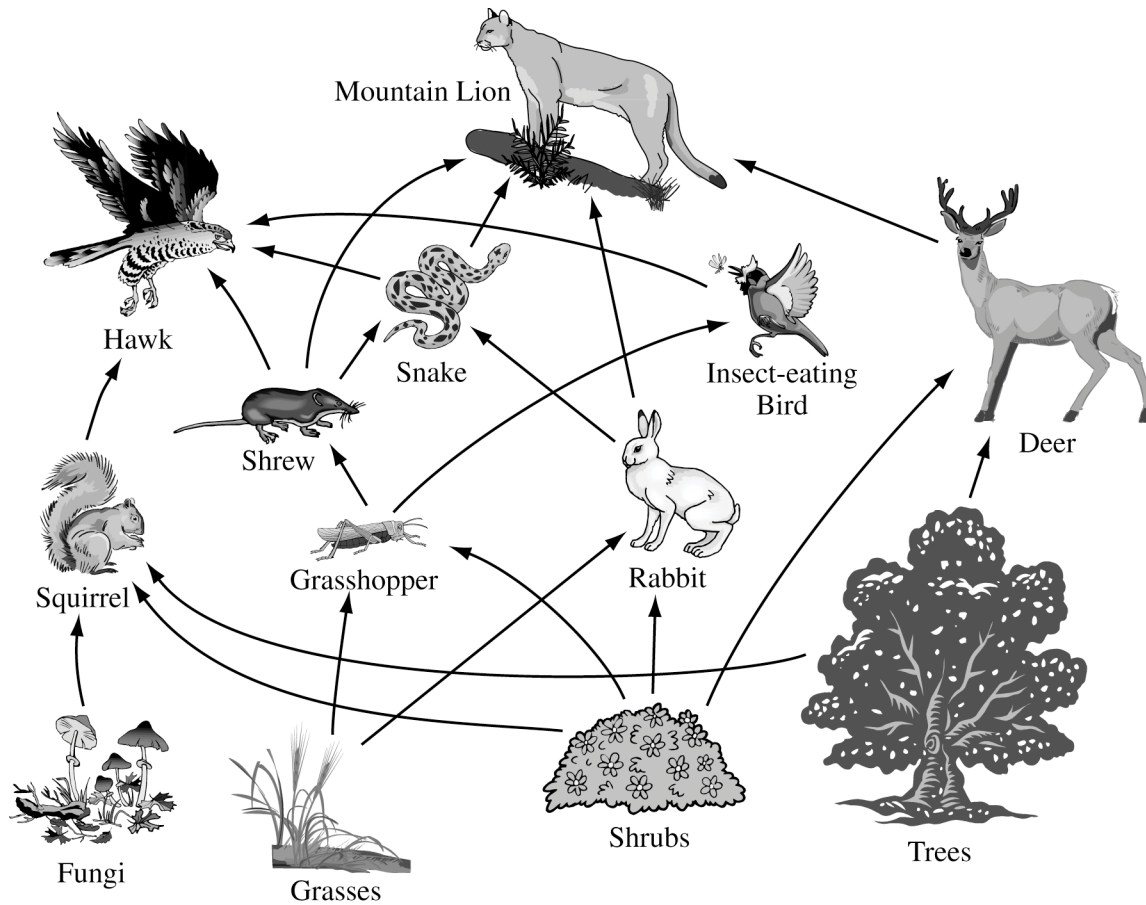
Questions 1-2 refer to the following diagrams.



1. Which diagram best represents the average monthly temperature changes during a year for a tundra in the Northern Hemisphere?
2. Which diagram best represents the average monthly temperature changes during a year for a location in the Great Plains of the United States?

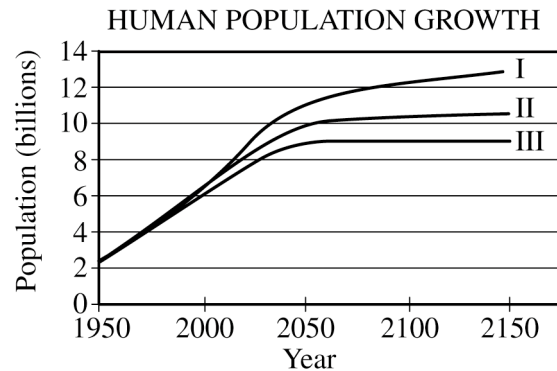
Directions: Each of the questions or statements below is followed by four suggested answers or completions. Select the one that is best in each case.

Questions 3-6 refer to the following diagram:



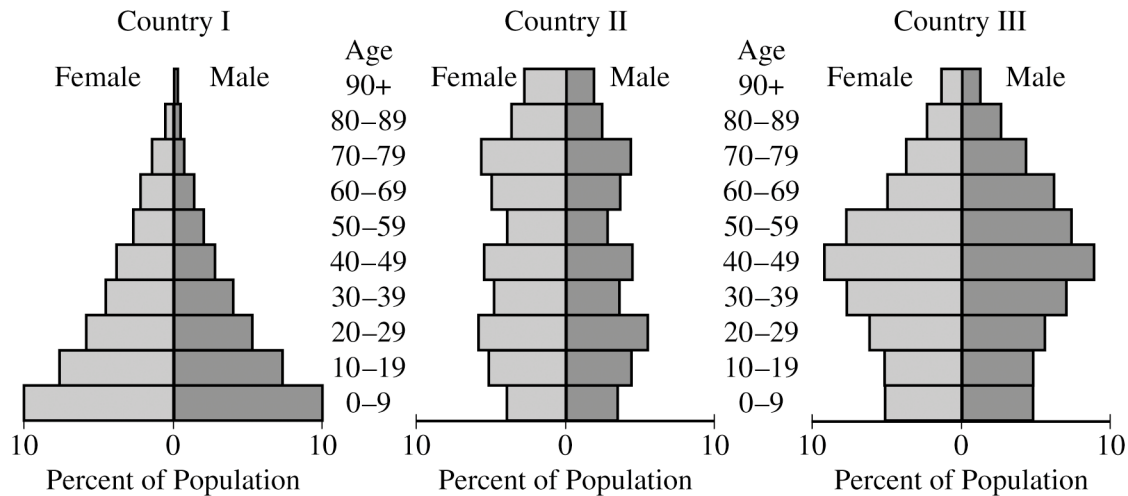
3. Which of the following is a food chain represented in the diagram?
 - (A) Grasses → rabbit → snake → hawk
 - (B) Grasshopper → shrew → rabbit → hawk
 - (C) Grasses → rabbit → deer → mountain lion
 - (D) Fungi → shrubs → rabbit → snake
4. In the diagram, which trophic level is represented by the shrew?
 - (A) Producer
 - (B) Primary consumer
 - (C) Secondary consumer
 - (D) Tertiary consumer
5. If a disease kills most of the grasshoppers, which of the following is most likely to result?
 - (A) The grass biomass would increase while the rabbit biomass would decrease.
 - (B) The grass biomass would increase while the shrew biomass would decrease.
 - (C) The grass biomass would decrease while the snake biomass would increase.
 - (D) The grass biomass would decrease while the deer biomass would decrease.
6. Where do the fungi obtain nutrients and energy?
 - (A) The Sun
 - (B) The primary producers only
 - (C) The consumers only
 - (D) All members of the community

Questions 7–8 refer to the following graph showing three different predictions regarding future human populations of Earth.



7. If the world birthrate becomes equal to the world death rate between the years 2020 and 2070, the graph indicates that the world population will stabilize at about
 - (A) 34.0 billion
 - (B) 13.5 billion
 - (C) 10.7 billion
 - (D) 8.9 billion
8. For the time period between the years 2010 and 2050, which of the curves represents the population growth with the LEAST difference between annual birthrates and death rates?
 - (A) I
 - (B) II
 - (C) III
 - (D) Curves II and III show equal differences.
9. A lichen is best characterized as a symbiosis between which of the following?
 - (A) A liverwort and a fungus
 - (B) A moss and a liverwort
 - (C) An alga and a moss
 - (D) An alga and a fungus
10. Continued high agricultural production by farms in the United States depends most on which of the following natural resources?
 - (A) Coal
 - (B) Limestone
 - (C) Gypsum
 - (D) Petroleum
11. Of the following, the major cause of infant mortality worldwide is
 - (A) starvation
 - (B) waterborne diseases
 - (C) toxic chemicals
 - (D) nuclear radiation
12. All of the following are likely to increase after large areas of tropical rain forests are cut down EXCEPT the
 - (A) species diversity of the areas
 - (B) erosion by rivers flowing through the areas
 - (C) rate of nutrient loss from the areas
 - (D) average surface temperature of the soil in the areas
13. Observations of lakes in areas with granitic bedrock indicate that the lakes are becoming depleted of living organisms. The primary cause is considered to be
 - (A) nuclear waste
 - (B) lowered water levels
 - (C) acid rain
 - (D) garbage dumping
14. Which of the following is a true statement about the flow of energy in an ecosystem?
 - (A) Smaller organisms need less energy per gram of body weight than do larger organisms.
 - (B) Energy transfer between organisms normally involves conservation of heat energy.
 - (C) Energy flow between trophic levels is inefficient.
 - (D) Chemical energy is converted into radiant energy, which is then converted into chemical energy at the next trophic level.

15. Which of the following is likely to represent countries undergoing rapid population growth?



- (A) I only
(B) II only
(C) III only
(D) II and III

16. Which of the following best describes an effect of the Green Revolution in the 1960s?

- (A) Increase in the varieties of each crop planted
(B) Increased use of fertilizers
(C) Decreased use of mechanization
(D) Decreased use of pesticides

17. Which of the following is most likely the result of decreasing levels of ozone in the stratosphere?

- (A) A decrease in the levels of smog in major cities
(B) A decrease in the rate of global warming
(C) An increase in the occurrence of skin cancer in humans
(D) An increase in photosynthetic activity of phytoplankton

18. Weather events characterized by heavy rain, thunderstorms, and a sharp temperature drop followed by clearing are most likely related to which of the following?

- (A) The passage of a cold front
(B) The passage of a warm front
(C) The action of a stationary front
(D) The heat island effect

19. Both the venomous coral snake and the nonvenomous scarlet king snake have red, yellow, and black banding on their bodies. Which of the following best identifies the scarlet king snake's survival strategy?

- (A) Camouflage
(B) Imprinting
(C) Mimicry
(D) Kin selection

20. Which of the following substances is found in the runoff of chemically fertilized lawns and is most likely to cause eutrophication in streams and lakes?
- (A) Sodium
 - (B) Carbonate
 - (C) Phosphate
 - (D) Sulfate
21. Methane, a gas that can be trapped and used for energy, is most likely to be produced by which of the following?
- (A) Decomposition of organic materials in landfills
 - (B) Burning of organic materials in incinerators
 - (C) Heating of inorganic materials in a high-oxygen atmosphere
 - (D) Recycling of metals in recycling plants
22. In the discussion of the nature of and solution to environmental problems, it is most important for students to understand that
- (A) science is constantly advancing, and technology will be developed to solve current problems
 - (B) changes in the abiotic portion of the biosphere are self-correcting and result in evolution of the biotic portion of the biosphere
 - (C) once pollution has been stopped, communities will revert to their preindustrial status
 - (D) cultural, political, and economic issues must all be considered, in addition to scientific issues
23. Which of the following hypotheses is LEAST amenable to verification by experimentation?
- (A) Using compound X to control insect pests that damage crops also reduces the population levels of pollinator insects.
 - (B) Building a new factory in a town with high unemployment is more important than preserving the habitat the factory will destroy.
 - (C) Applying chemical fertilizers above recommended amounts increases the concentration of inorganic nutrients in runoff.
 - (D) Humans and chimpanzees share some of the same genes.

Answers to Sample Questions

1. The correct answer is (A). A tundra is a level or undulating, treeless plain characteristic of arctic and subarctic regions with long, cold winters and short, cool summers.

2. The correct answer is (B). Continental interiors are characterized by hot summers and cold winters.

3. The correct answer is (A). The choice showing hawks eating snakes, snakes eating rabbits, and rabbits eating grass is the only choice showing a food chain represented in the diagram.

4. The correct answer is (C). Since grasses and shrubs are producers and grasshoppers are primary consumers, the shrews are secondary consumers.

5. The correct answer is (B). If the grasshopper population declined, then the shrew population, which eats the grasshoppers, would also decline. There would be more grass biomass without grasshoppers eating the grass. Since there would be more grass biomass available for rabbits to eat, it is likely that the rabbit biomass would increase.

6. The correct answer is (D). Fungi, as a group, are heterotrophic organisms with an absorptive mode of nutrition. They can obtain energy and nutrients from all members of the community.

7. The correct answer is (D). As can be seen from the graph, curve III is the only curve that reaches a level population (8.9 billion) by 2070.

8. The correct answer is (C). The least difference between birthrate and death rate is the same as the lowest net rate of population growth, that is, III.

9. The correct answer is (D). A lichen represents a symbiotic relationship between an alga and a fungus.

10. The correct answer is (D). The United States agricultural system is based on energy derived from petroleum products: first, fuels for mechanization; second, petroleum-based pesticides and herbicides; and third, dependence on petroleum-based products for fertilizers.

11. The correct answer is (B). Water is used for sewage systems, drinking, washing activities, and food production. Cross contamination of drinking and washing water with sewage is a serious problem worldwide that leads to the spread of waterborne diseases and infant mortality.

12. The correct answer—the exception—is (A). The continuing loss of the diverse habitats found in tropical rain forests will cause a decrease in species diversity, not an increase.

13. The correct answer is (C). Rain combines with various types of air pollution to form acid rain. Lakes formed in limestone bedrock can neutralize the acidity of the rain, but lakes with granitic bedrock have limited capacity to do so. The increasing acidity of such lakes has had a negative impact on the organisms normally inhabiting them.

14. The correct answer is (C). Biologists estimate that approximately 90 percent of the energy is lost between levels of an energy pyramid. Thus, it is true that energy is transferred between trophic levels inefficiently.

15. The correct answer is (A). Only country I has the pyramid-shaped age-structure diagram that is characteristic of rapid population growth. Country II does not show significant population growth. Country III was growing rapidly over 40 years ago, but now a greater percent of the population is post reproductive.

16. The correct answer is (B). The Green Revolution was characterized by increased crop production as a result of the use of specific varieties of crops, fertilizers, and pesticides. Therefore, mechanization increased in order to deliver the fertilizers and pesticides, and a few specific varieties of crop plants replaced the larger number of varieties that had been previously planted.

17. The correct answer is (C). Ground-level ozone is involved with smog formation, not ozone in the stratosphere. While tropospheric ozone is considered a greenhouse gas, stratospheric ozone is not thought to have a significant effect on global warming. Decreasing levels of stratospheric ozone result in increased levels of ultraviolet radiation reaching the ocean, which may inhibit phytoplankton photosynthetic activity in surface waters. The increased levels of ultraviolet radiation can also negatively affect human health.

18. The correct answer is (A). The passage of a cold front is often accompanied by rain and sometimes thunder. There is generally a sharp decrease in temperature while the front is passing and a continuing decrease in temperature after it has passed. Passage of the front also typically brings a decrease in precipitation followed by clearing. The other choices are not consistent with this set of conditions.

19. The correct answer is (C). The similar color patterns of the scarlet king snake and the venomous coral snake are an example of mimicry. A color pattern that would help a snake blend into the background would be an example of camouflage. Imprinting and kin selection are not directly related to color patterns.

20. The correct answer is (C). Excess phosphates from lawn fertilizers can be carried by runoff into streams and lakes, causing rapid plant growth and algal blooms. Sodium, carbonate, and sulfate are less likely to be limiting nutrients and supplied by chemical lawn fertilizers.

21. The correct answer is (A). Methanogenic microorganisms can produce methane from organic material in landfills. Burning of organic material will not produce methane. Heating of inorganic materials in a high-oxygen atmosphere or the recycling of metals are not likely to produce significant methane.

22. The correct answer is (D). Understanding and finding solutions to environmental problems requires a consideration of scientific, economic, political, and cultural issues. Humans cannot assume that advances in science and technology alone will solve current environmental problems. There is no evidence that organisms will be able to evolve and “self-correct” in response to the rapidly changing environment. Since a number of organisms have gone extinct and large amounts of habitat have been destroyed, simply stopping pollution cannot guarantee that communities will revert to their preindustrial status.

23. The correct answer—the LEAST amenable to verification by experimentation—is choice (B). The hypothesis that jobs are more important than habitat cannot be tested by experimentation. The effects of chemicals on insects and of fertilizers on nutrients in runoff, as well as the incidence of the same genes occurring in different species, can all be measured and tested by experimentation.

9. Check on Testing Accommodations

See if you qualify for accommodations that may make it easier to take the Praxis test

What if English is not my primary language?

Praxis tests are given only in English. If your primary language is not English (PLNE), you may be eligible for extended testing time. For more details, visit www.ets.org/praxis/register/accommodations/plne.

What if I cannot take the paper-based test on Saturday?

Monday is the alternate paper-delivered test day for test takers who can't test on Saturday due to:

- religious convictions
- duties as a member of the U.S. Armed Forces

Online registration is not available for Monday test takers. You must complete a registration form and provide a photocopy of your military orders or a letter from your cleric. You'll find details at www.ets.org/praxis/register/accommodations/monday_testing.

What if I have a disability or other health-related need?

The following accommodations are available for *Praxis* test takers who meet the Americans with Disabilities Act (ADA) Amendments Act disability requirements:

- Extended testing time
- Additional rest breaks
- Separate testing room
- Writer/recorder of answers
- Test reader
- Sign language interpreter for spoken directions only
- Perkins Braille
- Braille slate and stylus
- Printed copy of spoken directions
- Oral interpreter
- Audio test
- Braille test
- Large print test book (14 pt.)
- Large print answer sheet
- Listening section omitted

For more information on these accommodations, visit www.ets.org/praxis/register/disabilities.

Note: Test takers who have health-related needs requiring them to bring equipment, beverages, or snacks into the testing room or to take extra or extended breaks must request these accommodations by following the procedures described in the *Bulletin Supplement for Test Takers with Disabilities or Health-related Needs* (PDF), which can be found at <http://www.ets.org/praxis/register/disabilities>.

You can find additional information on available resources for test takers with disabilities or health-related needs at www.ets.org/disabilities.

10. Do Your Best on Test Day

Get ready for test day so you will be calm and confident

You followed your study plan. You are prepared for the test. Now it's time to prepare for test day.

Plan to end your review a day or two before the actual test date so you avoid cramming. Take a dry run to the test center so you're sure of the route, traffic conditions and parking. Most of all, you want to eliminate any unexpected factors that could distract you from your ultimate goal—passing the *Praxis* test!

On the day of the test, you should:

- be well rested
- wear comfortable clothes and dress in layers
- eat before you take the test and bring food with you to eat during break to keep your energy level up
- bring an acceptable and valid photo identification with you
- bring a supply of well-sharpened No. 2 pencils (at least 3) and a blue or black pen for the essay or constructed-response tests
- be prepared to stand in line to check in or to wait while other test takers check in
- select a seat away from doors, aisles, and other high-traffic areas

You can't control the testing situation, but you can control yourself. Stay calm. The supervisors are well trained and make every effort to provide uniform testing conditions, but don't let it bother you if the test doesn't start exactly on time. You will have the necessary amount of time once it does start.

You can think of preparing for this test as training for an athletic event. Once you've trained, prepared, and rested, give it everything you've got.

What items am I restricted from bringing into the test center?

You cannot bring into the test center personal items such as:

- handbags, knapsacks, or briefcases
- water bottles or canned or bottled beverages
- study materials, books, or notes
- scrap paper
- any electronic, photographic, recording, or listening devices

Note: All cell phones, smartphones (e.g., BlackBerry® devices, iPhones, etc.), PDAs, and other electronic, photographic, recording, or listening devices are strictly prohibited from the test center. If you are seen with such a device, you will be dismissed from the test, your test scores will be canceled, and you will forfeit your test fees. If you are seen USING such a device, the device will be confiscated and inspected. For more information on what you can bring to the test center, visit www.ets.org/praxis/test_day/bring.

Are You Ready?

Complete this checklist to determine if you're ready to take your test.

- ☐ Do you know the testing requirements for the license or certification you are seeking in the state(s) where you plan to teach?
- ☐ Have you followed all of the test registration procedures?
- ☐ Do you know the topics that will be covered in each test you plan to take?
- ☐ Have you reviewed any textbooks, class notes, and course readings that relate to the topics covered?
- ☐ Do you know how long the test will take and the number of questions it contains?
- ☐ Have you considered how you will pace your work?
- ☐ Are you familiar with the types of questions for your test?
- ☐ Are you familiar with the recommended test-taking strategies?
- ☐ Have you practiced by working through the practice questions in this Study Companion or in a Study Guide or Practice Test?
- ☐ If constructed-response questions are part of your test, do you understand the scoring criteria for these items?
- ☐ If you are repeating a *Praxis* test, have you analyzed your previous score report to determine areas where additional study and test preparation could be useful?

If you answered “yes” to the questions above, your preparation has paid off. Now take the *Praxis* test, do your best, pass it—and begin your teaching career!

Appendix: Other Questions You May Have

Here is some supplemental information that can give you a better understanding of the *Praxis* tests.

What do the *Praxis* tests measure?

The *Praxis* tests measure the specific pedagogical skills and knowledge that beginning teachers need. The tests do not measure an individual's disposition toward teaching or potential for success. The assessments are designed to be comprehensive and inclusive, but are limited to what can be covered in a finite number of questions and question types.

What are the *Praxis I* tests?

The *Praxis I* tests measure basic skills in reading, writing, and mathematics. All these tests include multiple-choice questions and the Writing test also includes an essay question. *Praxis I* tests are designed to evaluate whether you have the academic skills needed to prepare for a career in education.

What are the *Praxis II* tests?

Praxis II Subject Assessments measure knowledge of specific subjects that K–12 educators teach, as well as general and subject-specific teaching skills and knowledge. Ranging from Agriculture to World Languages, there are more than 130 *Praxis II* tests, which contain multiple-choice or constructed-response questions, or a combination of both.

What is the difference between *Praxis* multiple-choice and constructed-response tests?

Multiple-choice tests measure a broad range of knowledge across your content area. Constructed-response tests measure your ability to provide in-depth explanations of a few essential topics in a given subject area. Content-specific *Praxis II* pedagogy tests, most of which are constructed-response, measure your understanding of how to teach certain fundamental concepts in a subject area.

The tests do not measure your actual teaching ability, however. Teaching combines many complex skills that are typically measured in other ways, including classroom observation, videotaped practice, or portfolios not included in the *Praxis* test.

Who takes the tests and why?

Some colleges and universities use the *Praxis I* tests to evaluate individuals for entry into teacher education programs. The assessments are generally taken early in your college career. Many states also require *Praxis I* scores as part of their teacher licensing process.

Individuals entering the teaching profession take the *Praxis II* tests as part of the teacher licensing and certification process required by many states. In addition, some professional associations and organizations require *Praxis II* tests for professional licensing.

Do all states require these tests?

The *Praxis Series* tests are currently required for teacher licensure in approximately 40 states and U.S. territories. These tests are also used by several professional licensing agencies and by several hundred colleges and universities. Teacher candidates can test in one state and submit their scores in any other state that requires *Praxis* testing for licensure. You can find details at www.ets.org/praxis/states.

What is licensure/certification?

Licensure in any area—medicine, law, architecture, accounting, cosmetology—is an assurance to the public that the person holding the license possesses sufficient knowledge and skills to perform important occupational activities safely and effectively. In the case of teacher licensing, a license tells the public that the individual has met pre-defined competency standards for beginning teaching practice.

Because a license makes such a serious claim about its holder, licensure tests are usually quite demanding. In some fields, licensure tests have more than one part and last for more than one day. Candidates for licensure in all fields plan intensive study as part of their professional preparation. Some join study groups, others study alone. But preparing to take a licensure test is, in all cases, a professional activity. Because it assesses the entire body of knowledge for the field you are entering, preparing for a licensure exam takes planning, discipline, and sustained effort.

Why does my state require *The Praxis Series* tests?

Your state chose *The Praxis Series* tests because they assess the breadth and depth of content—called the “domain”—that your state wants its teachers to possess before they begin to teach. The level of content knowledge, reflected in the passing score, is based on recommendations of panels of teachers and teacher educators in each subject area. The state licensing agency and, in some states, the state legislature ratify the passing scores that have been recommended by panels of teachers.

How were the tests developed?

ETS consulted with practicing teachers and teacher educators around the country during every step of *The Praxis Series* test development process. First, ETS asked them which knowledge and skills a beginning teacher needs to be effective. Their responses were then ranked in order of importance and reviewed by hundreds of teachers.

After the results were analyzed and consensus was reached, guidelines, or specifications, for the multiple-choice and constructed-response tests were developed by teachers and teacher educators. Following these guidelines, teachers and professional test developers created test questions that met content requirements and ETS Standards for Quality and Fairness.*

When your state adopted the research-based *Praxis* tests, local panels of teachers and teacher educators evaluated each question for its relevance to beginning teachers in your state. During this “validity study,” the panel also provided a passing-score recommendation based on how many of the test questions a beginning teacher in your state would be able to answer correctly. Your state’s licensing agency determined the final passing-score requirement.

ETS follows well-established industry procedures and standards designed to ensure that the tests measure what they are intended to measure. When you pass the *Praxis* tests your state requires, you are proving that you have the knowledge and skills you need to begin your teaching career.

*ETS Standards for Quality and Fairness (2003, Princeton, NJ) are consistent with the “Standards for Educational and Psychological Testing,” industry standards issued jointly by the American Educational Research Association, the American Psychological Association, and the National Council on Measurement in Education (1999, Washington, DC).

How are the tests updated to ensure the content remains current?

Praxis tests are reviewed regularly. During the first phase of review, ETS conducts an analysis of relevant state and association standards and of the current test content. State licensure titles and the results of relevant job analyses are also considered. Revised test questions are then produced following the standard test development methodology. National advisory committees may also be convened to review existing test specifications and to evaluate test forms for alignment with the specifications.

How long will it take to receive my scores?

Scores for computer-delivered tests are available faster than scores for paper-delivered tests. Scores for most computer-delivered multiple-choice tests are reported on the screen immediately after the test. Scores for tests that contain constructed-response questions or essays aren't available immediately after the test because of the scoring process involved. Official scores for computer-delivered tests are reported to you and your designated score recipients approximately two to three weeks after the test date. Scores for paper-delivered tests will be available within four weeks after the test date. See the Test Dates and Deadlines calendar at www.ets.org/praxis/register/centers_dates for exact score reporting dates.

Can I access my scores on the web?

All test takers can access their test scores via their *Praxis* account free of charge for one year from the posting date. This online access replaces the mailing of a paper score report.

The process is easy—simply log in to your *Praxis* account at www.ets.org/praxis and click on your score report. If you do not already have a *Praxis* account, you must create one to view your scores.

Note: You must create a *Praxis* account to access your scores, even if you registered by mail or phone.

Your teaching career is worth preparing for, so start today!
Let the *Praxis*™ *Study Companion* guide you.



To search for the *Praxis* test prep resources
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