



*Michigan*

TEST FOR TEACHER CERTIFICATION  
**STUDY GUIDE**

**49 Environmental  
Studies**



# TABLE OF CONTENTS

## **PART 1: General Information About the MTTC Program and Test Preparation**

---

<b>OVERVIEW OF THE TESTING PROGRAM .....</b>	<b>1-1</b>
Contact Information	
Test Development Process	
Characteristics of the Tests	
Test Administration	
Score Reporting	
<b>HOW TO PREPARE FOR THE TESTS .....</b>	<b>1-4</b>
Plan Your Course of Study	
<b>THE DAY OF THE TEST: HELPFUL HINTS.....</b>	<b>1-5</b>
Preparing for the Test Administration	
Test-Taking Tips	
Test Directions	

## **PART 2: Test Objectives and Sample Test Questions**

---

<b>INTRODUCTION .....</b>	<b>2-1</b>
<b>TEST OBJECTIVES .....</b>	<b>2-3</b>
<b>SAMPLE MULTIPLE-CHOICE TEST QUESTIONS.....</b>	<b>2-9</b>
<b>ANSWER KEY FOR THE SAMPLE MULTIPLE-CHOICE TEST QUESTIONS.....</b>	<b>2-13</b>

*Readers should be advised that this study guide, including many of the excerpts used herein, is protected by federal copyright law.*

Copyright © 2007 Pearson Education, Inc. or its affiliate(s). All rights reserved.  
National Evaluation Systems, P.O. Box 226, Amherst, MA 01004

## **PART 1: General Information About the MTTC Program and Test Preparation**

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

[General Information About the MTTC Program and Test Preparation](#)

## PART 2: Test Objectives and Sample Test Questions

---

### INTRODUCTION

This section includes a list of the test objectives, immediately followed by sample test questions and an answer key for the field covered by this study guide.

#### Test Objectives

As noted, the test objectives are broad, conceptual statements that reflect the knowledge, skills, and understanding an entry-level teacher needs in order to teach effectively in a Michigan classroom. Each field's list of test objectives represents the **only** source of information about what a specific test will cover and, therefore, should be studied carefully.

The test objectives are organized into groups known as "subareas." These subareas define the major content areas of the test. You will find a list of subareas at the beginning of the test objective list. The percentages shown in the list of subareas indicate the approximate weighting of the subareas on the test.

#### Sample Multiple-Choice Test Questions

The sample multiple-choice test questions included in this section are designed to give the test-taker an introduction to the nature of the test questions included on the MTTC test for each field. The sample test questions represent the various types of test questions you may expect to see on an actual test; however, they are **not** designed to provide diagnostic information to help you identify specific areas of individual strengths and weaknesses or predict your performance on the test as a whole. Use the answer key that follows the sample test questions to check your answers.

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

## TEST OBJECTIVES

Subarea	Approximate Percentage of Questions on Test
Foundations and Skills	20%
Physical Geography	20%
Ecological Concepts	20%
Energy and Natural Resources	16%
Human Interactions with the Environment	24%

### FOUNDATIONS AND SKILLS

#### **Understand the history of environmental studies.**

Includes important individuals and events in the history of environmental studies.

#### **Apply research skills in environmental studies.**

Includes interpretation of information from reference sources, maps, charts, and tables; identifying sources of information appropriate for various purposes; and appropriate methods and procedures for conducting research.

#### **Apply the scientific processes of hypothesis formation and testing to solve problems and interpret the natural world.**

Includes the application of scientific processes to solve problems; the construction of operational definitions; the prediction of outcomes of situations and experiments using cause-and-effect relationships, inference, and extrapolation; and the use of experimental results and data to confirm predictions.

#### **Apply the scientific processes of observation, organization, and classification.**

Includes the recognition of patterns, cycles, and relationships in the natural world; the classification of objects, events, and phenomena using various criteria; the organization of data; and the categorization of observations and groups.

#### **Understand procedures and principles of experimental research.**

Includes principles and techniques of scientific experimentation and investigation; differences among variables, constants, experimental groups, and control groups; and the effectiveness of experimental designs and techniques in various situations.

#### **Understand methods and equipment used in measurement, computation, and quantification.**

Includes units and systems of measurement; equipment and methods used in measurement and computation; problem solving using units of measure; and problem solving involving the metric system.

#### **Understand methods used in collecting, analyzing, and reporting data.**

Includes techniques used in collecting data; the interpretation of data; statistical concepts and their application to data; and methods of reporting data.

**Apply critical thinking skills in environmental studies.**

Includes the development of hypotheses for various problems; analysis of the validity of information in relation to a problem; and the construction of valid arguments and conclusions.

**PHYSICAL GEOGRAPHY**

**Understand the global energy budget.**

Includes the methods of heat transfer to, from, and within the atmosphere; and the relationships among insolation, latitudes, and seasons.

**Understand characteristics and properties of the earth's atmosphere.**

Includes the structure and composition of the atmosphere; the processes of radiation and convection in the atmosphere; and air pressure and the movement of air in the atmosphere.

**Analyze the earth's weather and climate.**

Includes cloud formation and precipitation; storms and fronts and their characteristics; characteristics and locations of climatic zones; and factors that affect weather and climate.

**Understand the hydrologic cycle.**

Includes the movement of water in the hydrologic cycle between the atmosphere, surface water systems, and ground water systems.

**Understand characteristics of oceans.**

Includes the components and properties of ocean water; characteristics of ocean currents; and the role of oceans in heat transfer around the globe.

**Understand types and characteristics of freshwater systems.**

Includes types and characteristics of ground water, moving water systems, and bodies of fresh water; and the processes by which they are formed and changed.

**Analyze the earth's dynamic geologic processes.**

Includes processes of structural change in the earth's crust; the theory of plate tectonics; and the effects of catastrophic phenomena (e.g., volcanoes, earthquakes) on the earth and its inhabitants.

**Understand types of land formations.**

Includes types and characteristics of various land formations; and the ways in which they were formed and altered over time.

**Identify types of soil and their composition.**

Includes characteristics, classification, and components of soil; biological, chemical, physical, and other factors affecting soil; and soil maps.

**ECOLOGICAL CONCEPTS****Understand the role of energy in living systems.**

Includes forms of energy; and ways in which energy is stored, changed from one form to another, and transferred from one level of a food chain to another.

**Understand biogeochemical cycles.**

Includes the water, carbon dioxide-oxygen, and nitrogen cycles; the role of cycles in the maintenance of ecosystems; and the effects of human activity on the cycles.

**Understand populations and population dynamics.**

Includes characteristics of populations and factors that affect population structure and size.

**Understand ecological communities.**

Includes relationships among organisms in a community; the concept of niche; and the role of producers, consumers, and decomposers in food chains and food webs.

**Understand ecosystems.**

Includes abiotic factors that affect ecosystems; biotic factors that affect ecosystems; and the interaction of abiotic and biotic factors in ecosystems.

**Understand the process of ecological succession.**

Includes factors that determine and influence successional patterns in various types of ecosystems.

**Analyze species extinctions and their effects.**

Includes the causes of extinctions of organisms; and the effects of extinctions upon genetic diversity, food chains and food webs, and the ecological balance within a community or ecosystem.

**Understand world biomes.**

Includes types, characteristics, and locations of world biomes; and the organisms typically found in the various biomes.

**ENERGY AND NATURAL RESOURCES****Understand nonrenewable energy resources.**

Includes types and characteristics of nonrenewable energy resources (e.g., fossil fuels, nuclear fuels); how they were formed; where they are found; how they are used; and their advantages and disadvantages.

**Understand perpetual and renewable energy resources.**

Includes types and characteristics of perpetual energy resources (e.g., solar, wind, and geothermal energy) and renewable energy resources (e.g., hydropower, biomass); how they are used; and their advantages and disadvantages.

**Understand nonrenewable mineral resources.**

Includes types, characteristics, and uses of mineral resources and where they are found; mining methods; and the economic importance of various minerals.

**Understand the characteristics and importance of land resources.**

Includes the classification and characteristics of various land resources (e.g., forests, rangeland); how they are used; and the importance of land resources to plants, animals, and humans.

**Understand water resources and their importance.**

Includes characteristics of water resources (e.g., surface water, ground water); how they are used; processes by which water resources are renewed; and the consequences of insufficient or depleted water resources.

**Understand the types and characteristics of food resources.**

Includes the classification and characteristics of food resources (e.g., grain, livestock); the comparative energy yield from various food resources; and methods used to increase the overall yield of food resources.

**HUMAN INTERACTIONS WITH THE ENVIRONMENT**

**Analyze the interrelationship between humans and the environment.**

Includes land use patterns; how environmental factors affect human activities; and the effects of various types of human activities on biotic and abiotic environments.

**Understand human population growth and distribution patterns.**

Includes factors that influence population growth and distribution patterns; issues related to population growth control; and the effects of human population growth and distribution on the local and global environments.

**Understand air pollution and methods of controlling air pollution.**

Includes types, sources, and effects of air pollution; chemical reactions involving air pollutants; factors affecting air pollution levels; and methods and technologies used to control air pollution.

**Understand land and water pollution and methods of controlling them.**

Includes types, sources, and effects of land and water pollution (e.g., sewage, hazardous waste, pesticides); factors affecting pollution levels; and methods and technologies used to control land and water pollution.

**Understand the principles of conservation.**

Includes issues related to and methods of conserving and managing the earth's natural resources and living organisms.

**Identify U.S. federal laws, regulations, and policies related to environmental protection and management.**

Includes U.S. laws and acts related to pollution control, land use, and endangered species.

**Identify Michigan laws, regulations, and policies related to environmental protection and management.**

Includes Michigan laws and acts related to pollution control, land use, and endangered species.

**Identify government agencies responsible for the protection and management of the environment and wildlife.**

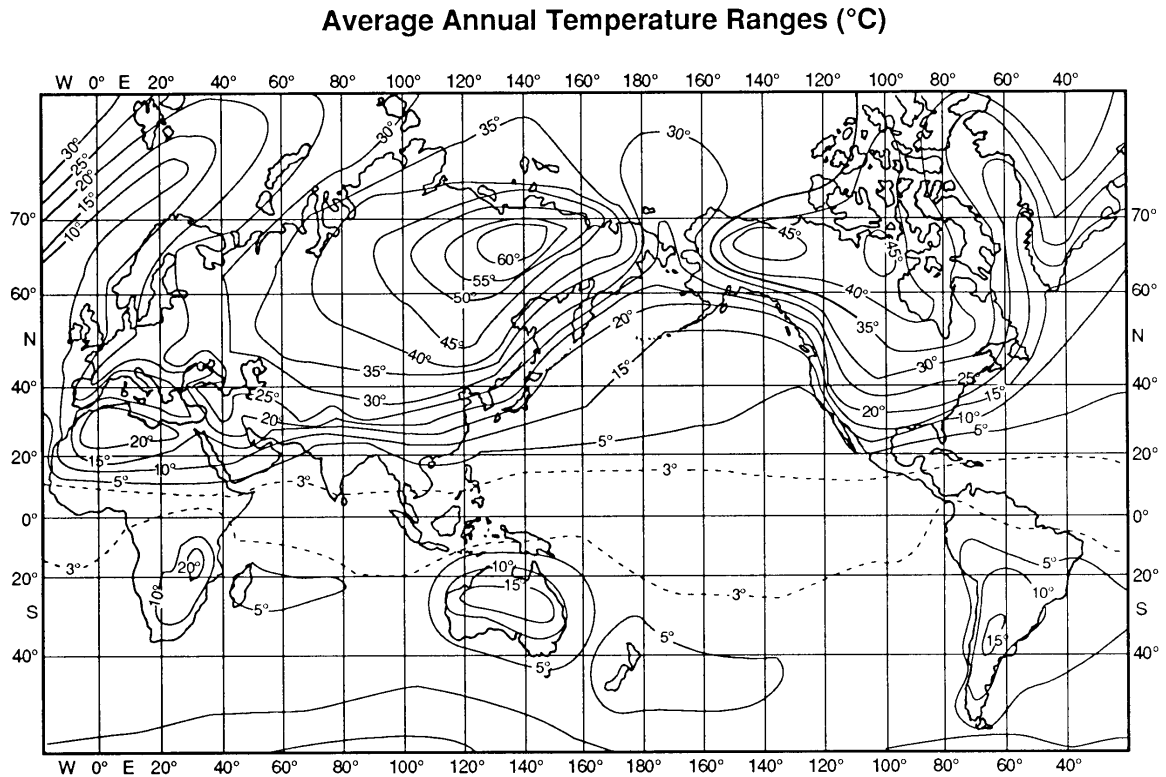
Includes agencies responsible for promoting environmental conservation and enforcing environmental laws and policies (e.g., National Park Service, EPA, Department of Agriculture); and their duties and responsibilities.

**Understand the principles of sustainable societies.**

Includes the characteristics of sustainable societies; reasons and goals for developing them; and the relationship between humans and the environment in sustainable societies.

## SAMPLE MULTIPLE-CHOICE TEST QUESTIONS

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



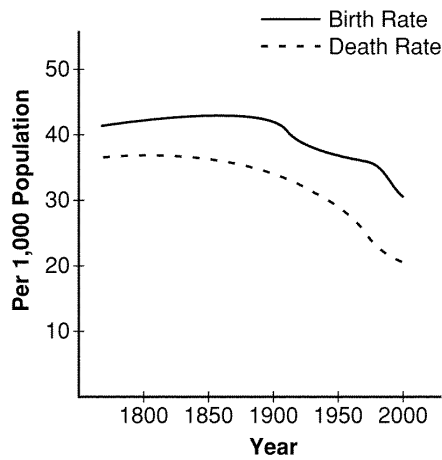
According to this map, the average annual temperature range at 40° south latitude, 70° west longitude is approximately equal to the average annual temperature range at:

- A. 20° south latitude, 60° west longitude.
- B. 20° north latitude, 60° west longitude.
- C. 20° south latitude, 60° east longitude.
- D. 20° north latitude, 60° east longitude.

2. A researcher has documented a decline in the population of wood frogs from an area in which bullfrogs have been introduced. According to the researcher's data, the wood frog population began to decline soon after the introduction of the bullfrogs, and the decline has accelerated since the bullfrog population began growing more rapidly. The researcher notes that bullfrogs are much larger and more aggressive than wood frogs and concludes that the wood frogs are being driven from their breeding areas. This conclusion is questionable because the researcher:
- A. has not shown a correlation between the size of bullfrogs and the size of wood frogs.
  - B. has not shown a causal relationship between the establishment of the bullfrog population and the decline of the wood frog population.
  - C. has not proposed a mechanism for the proposed effect of the bullfrog population on the wood frog population.
  - D. lacks a testable hypothesis.
3. Which of the following is the primary reason for the decrease in available solar energy reaching the earth at higher latitudes?
- A. The sun's rays strike the earth at an oblique angle.
  - B. More energy is converted into heat by the atmosphere at higher latitudes.
  - C. There are fewer hours of daylight than there are near the equator.
  - D. The sun is farther from the earth at higher latitudes.
4. Each fall, the thermocline that separates a eutrophic lake's warm surface water from the cold bottom water disappears. Which of the following usually occurs as a result of this change?
- A. Most of the phytoplankton migrate to the bottom of the lake.
  - B. Nutrient-rich water from the lake bottom mixes with oxygen-rich water from the surface.
  - C. The water becomes clearer as organic matter is able to settle to the lake bottom.
  - D. The lake loses heat more rapidly to the air, and the surface freezes.

5. Populations of species fail to reach their biotic potential primarily because of:
- A. a decrease in death rates over time.
  - B. limited environmental carrying capacities.
  - C. an increase in immigration as populations increase.
  - D. population-density-independent factors.
6. Usable energy is lost at each level of a food chain in the form of:
- A. heat.
  - B. chemical energy.
  - C. light.
  - D. mechanical energy.
7. Which of the following is a major advantage of using nuclear fission to produce electricity?
- A. No carbon dioxide or particulate matter is released into the atmosphere.
  - B. The construction and operating costs of nuclear power plants are relatively low.
  - C. Nuclear reactors do not contribute to thermal pollution.
  - D. Nuclear fuel rods are self-renewing and never need to be replaced.
8. Which of the following is most likely to result in severe flooding of low-lying areas?
- A. tilling land in the flood plain
  - B. digging subsurface mines in nearby mountains
  - C. using grassland for cattle grazing
  - D. clear-cutting forests at higher elevations

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



On this graph, population increase is represented by the:

- A. solid line.
- B. dotted line.
- C. sum of the solid and dotted lines.
- D. distance between the solid and dotted lines.

10. The concept of a sustainable society is based on the idea that:

- A. the earth has unlimited natural resources.
- B. recycling can solve most of the earth's environmental problems.
- C. solutions to environmental problems can be found by working with nature.
- D. the earth has natural mechanisms for maintaining an environmental equilibrium.

**ANSWER KEY FOR THE SAMPLE MULTIPLE-CHOICE TEST QUESTIONS**

<b>Item Number</b>	<b>Correct Response</b>	<b>Objective</b>
1.	<b>A</b>	Apply research skills in environmental studies.
2.	<b>B</b>	Apply critical thinking skills in environmental studies.
3.	<b>A</b>	Understand the global energy budget.
4.	<b>B</b>	Understand types and characteristics of freshwater systems.
5.	<b>B</b>	Understand populations and population dynamics.
6.	<b>A</b>	Understand the role of energy in living systems.
7.	<b>A</b>	Understand nonrenewable energy resources.
8.	<b>D</b>	Understand the characteristics and importance of land resources.
9.	<b>D</b>	Understand human population growth and distribution patterns.
10.	<b>C</b>	Understand the principles of sustainable societies.