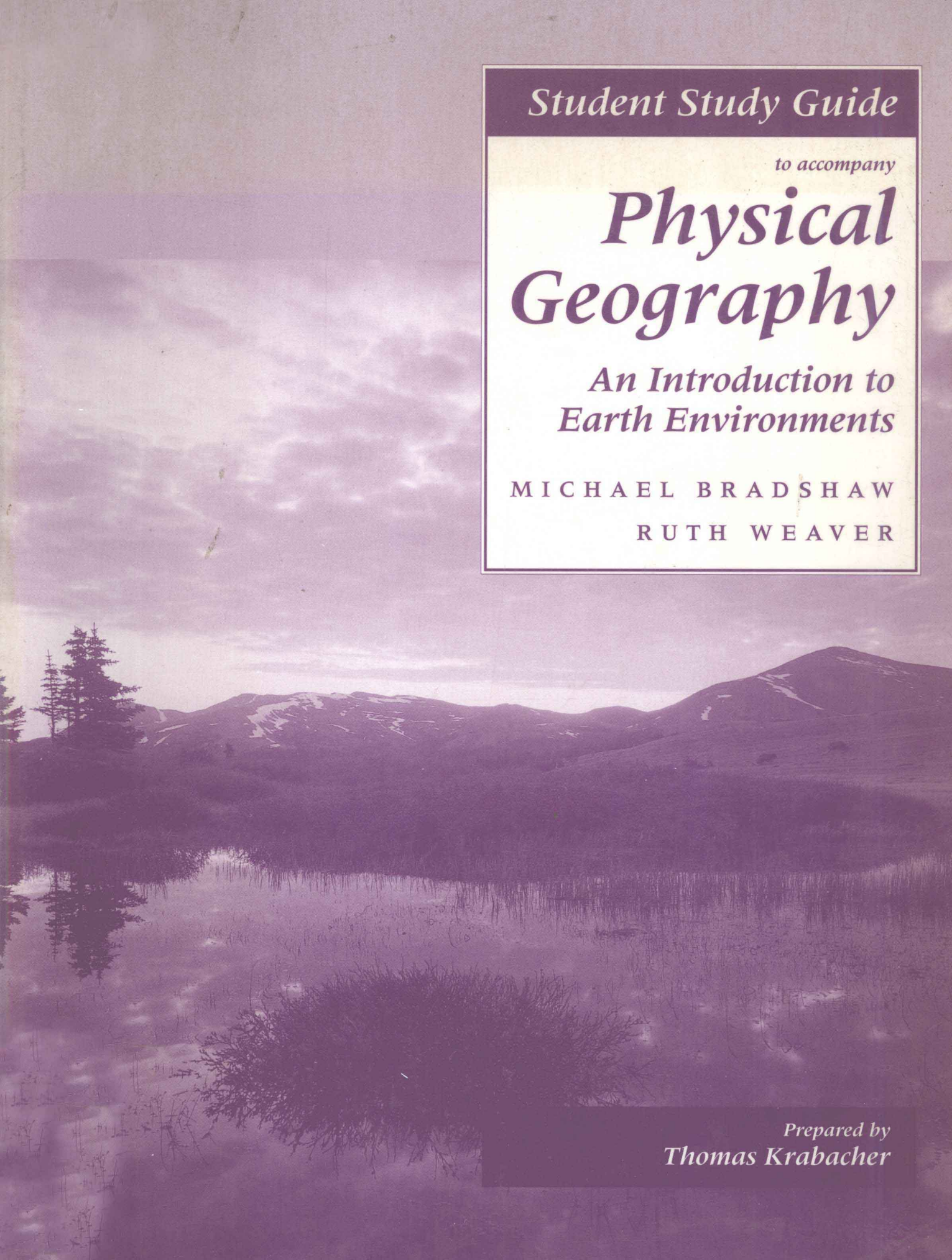

Student Study Guide

to accompany

Physical Geography

An Introduction to Earth Environments

MICHAEL BRADSHAW
RUTH WEAVER

Prepared by
Thomas Krabacher

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Preface

This study guide accompanies your text, *Physical Geography: An Introduction to Earth Environments*, by Michael Bradshaw and Ruth Weaver. Written in a clear, readable style and accompanied by a wide range of supporting illustrtations in the form of photographs, maps, and diagrams, it is one of the most up-to-date and sophisticated introductory physical geography texts available today. The textbook contains a number of features that will be particularly useful to you as a student: key terms and concepts in the text are highlighted in **boldface** for easy identification, and they are listed again at the conclusion of each chapter and in a glossary at the end of the book; the impact of human intervention on the physical environment is stressed throughout the text; and "linkage boxes" highlight the connections that exist between concepts presented in different chapters, emphasizing the book's theme of the "oneness" of Earth's physical environments.

The purpose of this study guide is to help you make the most efficient use of the textbook. Each chapter corresponds to a particular chapter of the text and consists of five basic sections: a CHAPTER OVERVIEW, which summarizes the main points covered in the chapter; a set of LEARNING OBJECTIVES that identify what you should have learned after thoroughly reading the chapter; a review of the KEY TERMS AND CONCEPTS by means of matching and fill-in questions; a set SAMPLE QUESTIONS -- some in multiple choice and some in matching form; and a series of SHORT ANSWER QUESTIONS to test your overall comprehension of the material covered in the chapter. ANSWERS to the multiple choice and matching questions are provided at the end of each chapter.

To make the most effective use of this study guide, it is recommended that before reading the text, you first should read the CHAPTER OVERVIEW and LEARNING OBJECTIVES sections in order to get a feel for the important concepts you will encounter in the chapter. Following this you should thoroughly read the chapter. Afterwards, you should then proceed to answer the questions in the KEY TERMS AND CONCEPTS and SAMPLE QUESTIONS sections, checking your answers against correct answers that are provided. When you satisfactorily understand the answers to these questions, you should attempt the SHORT ANSWER QUESTIONS provided for each chapter. Finally, it is suggested that you once again review the LEARNING OBJECTIVES section, to determine whether you now understand the main ideas presented in the chapter.

You should note that there is a close correspondence between the organization of physical geography textbooks such as this one and the way most instructors teach the subject. Thus, use of this study guide is likely to increase your understanding of course lectures, as well. Moreover, the fill-in, matching, and multiple-choice questions in the study guide are similar to the exam format used by many university instructors, making the study guide a useful tool when preparing for exams.

This guide is designed to aid you in your study of physical geography, and we appreciate any suggestions you might have for its improvement in future editions. Please feel free to send them to me at the address below.

Welcome to the fascinating world of physical geography!

Thomas Krabacher
Assistant Professor
Department of Geography
California State University
Sacramento, CA 95819-6003

CONTENTS

CHAPTER ONE

THE STUDY OF EARTH ENVIRONMENTS

CHAPTER OVERVIEW

This chapter and the one that follows provide you with a general introduction to the field of physical geography. Physical geography studies Earth's environments, focusing on their structure and processes, their distribution, and how they change over time. Physical geography also focuses on Earth's environments as the home of humanity, the ways in which humans can affect their environment, and the responsibility humans have for conserving and protecting their environment. The main points covered in this chapter include:

1. Physical geography is part of the broader field of geography, which is concerned with the spatial aspects of how humans use Earth's surface. This involves both the study of interactions among different parts of the natural environment and the study of interactions between people and their environment.

2. Although physical geography stresses the oneness of Earth's environments, individual physical geographers frequently focus their research on selected aspects of the environment such as climate (climatology), landforms (geomorphology), soils (pedology), or the distribution of lifeforms (biogeography).

3. Physical geography often draws on the work done by scientists in related fields such as geology, chemistry, botany, meteorology, or economics. When physical geographers do this, however, they tend to integrate the work of these separate disciplines in order to answer broader questions about the global environment.

4. *Spatial* characteristics of the natural environment involve consideration of *where* a natural phenomenon exists, *how much area* it covers, and the *causes* and *significance* of its distribution. *Temporal* characteristics concern the *frequency* with which natural events occur and the *rate* at which change takes place.

5. Variations in Earth environments can be identified at different scales: the global, the regional, and the local. At the global scale, four major natural environments are recognized: the *Atmosphere-Ocean Environment*, the *Solid-Earth Environment*, the *Surface-Relief Environment*, and the *Living-Organism Environment*. Each of the major environments, in turn, has its own distinctive subdivisions, shown in Table 1.1 in the text.

6. Each environment is organized in terms of structure and processes. *Structure* includes the physical components of an environment and the forms they take. *Processes* consist of the flows of energy and materials that produce, maintain, and link together these structures.

7. Change is fundamental to each of Earth's environments. Changes take place over various time scales. For example, climatic variations may take place on the order of just a few years (such as year-to-year variations in rainfall), or on a scale of hundreds of thousands or even millions of years (as in the case of ice ages).

8. Earth's major environments are complex and fragile, and did not develop instantly. They evolved gradually over the course of Earth's 4 billion-year history.

9. Earth is unique among the planets in the solar system in that it is the only one on which the combination of special conditions necessary to support life has occurred. From the human perspective, Earth is unique in that it is, realistically, the only possible home for humanity. If Earth's environment is ruined, there is nowhere else to go.

LEARNING OBJECTIVES

After carefully reading Chapter One, you should be able to:

1. define the field of physical geography in terms of both its subject matter and the special perspective it brings to its study of Earth environments.

2. recognize that while physical geography takes all of Earth's environments as its subject of study, individual physical geographers usually focus on more specialized topics in their own research.

3. define the term *environment* and recognize that environments may be identified at a variety of scales -- global, regional, and local.

4. understand that any environment consists of a *structure* made up of various components and a set of *processes* -- energy and material flows -- that link the parts of the structure and are responsible for changes.

5. identify the four major natural global-scale environments.

6. recognize that each of these major natural global-scale environments can be subdivided into more specific, localized environments.

7. appreciate that all natural environments are constantly subject to change, which takes place at different rates over varying time scales.

8. recognize that, in recent centuries, human beings have become increasingly important as agents of environmental change, but that human intervention affects different environments to different degrees.

9. list the basic characteristics of the solar system's principal planetary bodies, and identify their similarities and differences when compared to Earth.

10. identify those characteristics that make Earth unique among the planets of the solar system.

KEY TERMS AND CONCEPTS

The following concepts were introduced in this chapter. As a review, fill in the blank spaces in the sentences that follow with the appropriate term.

Physical geography	*Atmosphere-ocean environment*	*Process*
Environment	*Solid-earth environment*	*Biome*
Global scale	*Surface-relief environment*	*Oblate spheroid*
Regional scale	*Living-organism environment*	*Volatiles*
Local scale	*Structure*	

1. _____ is the term for a global-scale assemblage of plants and animals.

2. The constituent elements of an environment and the form that environment takes are referred to as its _____ .

3. Environments that cover only a few tens or hundreds of square kilometers occur at the _____ , those covering thousands of square kilometers exist at the _____ , while those that include the whole earth are said to occur at the _____ .

4. _____ is the study of Earth's natural environment, with particular emphasis on its spatial and temporal characteristics.

5. The narrow zone of Earth's environment where hills, valleys, and other landforms are produced is the _____ .

6. _____ is the surrounding set of conditions that act on a place, object, or person and give it a particular character.

7. _____ are substances that usually exist as a gas because they evaporate at relatively low temperatures.

8. The flows of materials and energy that link the various elements of an environment fall under the heading of _____ .

9. _____ is the term for a sphere that is slightly flattened at the poles -- the shape of Earth.

10. The _____ is the term for the arena where plants and animals exist, produced by the interaction of the other three environments.

11. The atmosphere, the world ocean, and the interactions between them form the _____

12. The _____ consists of the rocky part of the planet that has its own internal source of energy.

SAMPLE QUESTIONS: MATCHING

Match the planet with the appropriate description. Planets may be used more than once.

1. _____ It has a dense atmosphere that is largely transparent.
2. _____ Has a "fossil" landscape that has been relatively unchanged for billions of years.
3. _____ Composed of frozen gaseous material surrounding a small rocky core, environments here are least similar to Earth.
4. _____ The only planet other than Earth to have ice caps.
5. _____ Nearest to the sun; surface temperatures reach several hundred degrees Celsius.
6. _____ It is characterized by a "runaway greenhouse effect."
7. _____ Like Earth's moon, it has no atmosphere.
8. _____ Surface is dominated by craters and smooth areas called *maria* or "seas."
9. _____ About the same size as Earth, it also has active ocean-atmosphere, solid-earth and surface relief environments (but no life!).
10. _____ It has volcanoes and canyons larger than those found on Earth.

A. *Moon*
B. *Mercury*
C. *Venus*
D. *Earth*
E. *Mars*
F. *Outer Planets*

SAMPLE QUESTIONS: MULTIPLE CHOICE

1. Which of the following is most likely to study the global distribution of natural phenomena?
   a. a geographer
   b. a geologist
   c. a soil scientist
   d. a biologist

2. A biome is a subdivision of which of the following major global environments?
   a. the atmosphere-ocean environment
   b. the solid-earth environment
   c. the surface-relief environment
   d. the living organism environment

3 The principal source of energy for the atmosphere-ocean environment is:
   a. heat from the earth's interior.
   b. gravity.
   c. kinetic energy
   d. the sun.

4. An example of a temporal characteristic of the natural environment is:
   a. the worldwide distribution of black and dark brown soils.
   b. the frequency of tornado occurrence.
   c. the interaction between vegetation and soils in a region.
   d. the presence or absence of grasslands in a particular location.

5. The high surface temperatures on Venus (500°C/950°F) are due to:
   a. intense volcanic activity.
   b. its proximity to the sun.
   c. heat trapped by its atmosphere.
   d. energy released by ancient meteor impacts.

6. Earth's 24-hour rotation period:
   a. makes Earth unique as the only planet that rotates.
   b. is the longest among the planets of the solar system.
   c. is the shortest among the planets of the solar system.
   d. keeps temperatures from falling very low at night.

7. One reason huge craters are a prominent feature on the moon but not Earth is:
   a. volcanic eruptions still occur regularly on the moon.
   b. Earth has an atmosphere but the moon does not.
   c. the moon's gravity is less than Earth's.
   d. the moon was struck by a greater number of meteors than the Earth.

8. An example of environmental change occurring on a scale of a few hundred years is:
   a. the renewal of rocks on the ocean floor.
   b. the evolution of earth's oxygen atmosphere environment.
   c. the "Little Ice Age."
   d. the evolution of the first microscopic aquatic plants.

9. The reason Earth and Venus have volcanic activity but the moon and Mercury do not is:
   a. Earth and Venus are large enough to have internal energy sources.
   b. Earth and Venus are closer to the sun.
   c. Earth and Venus are large enough to have an atmosphere that traps energy.
   d. Earth and Venus formed at an earlier point in the solar system's history.

10. An example of the way humans modified their environment in prehistoric times is:
   a. by altering vegetation patterns through the use of fire.
   b. by decreasing the flow of river systems.
   c. by large-scale deforestation in the tropics.
   d. by modifying local rainfall patterns.

SHORT ANSWER QUESTIONS

In the spaces provided, briefly answer each of the following questions.

1. What does your text mean when it says physical geography emphasizes *spatial* and *temporal* characteristics in the study of Earth's natural environments? How might this differ from approaches taken in other natural sciences such as geology or biology?

2. Differentiate among *local*, *regional*, and *global scale* features in the study of Earth's environments. Give an example, different from those used in the text, of an environmental feature at each of these scales.

3. What is the difference between *structure* and *process* as these terms apply to the environment?

4. On which of Earth's four major global environments have human impacts been the most obvious? On which the least? Offer some reasons for why this is so.

5. What are the "significant coincidences" that have made it possible for life to develop on Earth, alone among all the planets in the solar system?

ANSWERS

Matching:

1. d
2. a
3. f
4. e
5. b
6. c
7. b
8. a
9. c
10. e

Multiple Choice:

1. a
2. d
3. d
4. b
5. c
6. d
7. b
8. c
9. a
10. a

CHAPTER TWO

THE PHYSICAL GEOGRAPHER AT WORK

CHAPTER OVERVIEW

This chapter examines how physical geographers go about studying and understanding Earth environments. It discusses the underlying principles and approaches applied to scientific research, the types of data used by physical geographers, how these data are analyzed and interpreted, and how the results are evaluated. The chapter also introduces the system of latitude and longitude used to indicate global location, and describes some of the basic tools used by the physical geographer. The main points covered in this chapter include:

1. Physical geography takes three basic approaches in its study of the natural environment; they are 1) *comparison and classification* of environmental features, 2) study of how geographical features have *changed over time*, and 3) examination of the *spatial arrangement* of environmental features.

2. Research in physical geography is conducted in three stages: first, the problem is identified and an appropriate methodology is devised; second, relevant data is collected; third, the data are analyzed and the results are presented to other scientists for evaluation and review.

3. Geographical studies usually involve oberservation, explanation, and prediction. *Observation* involves simple description of what one finds, either in the field or the laboratory; *explanation* is the attempt to account for what it is one observes; and *prediction* is the attempt, based on observation and explanation, to describe future changes in the environment. The ability to predict some of the actions and interactions of Earth environment gives people limited control over their natural environment.

4. Explanation in physical geography involves the devising and testing of a *hypothesis*. A hypothesis can never absolutely be proven correct. The best we can do is either 1) prove it incorrect, or 2) say that "maybe" it is right.

5. Laboratory work is useful to physical geographers in two ways: first, it can provide a controlled imitation of the natural environment in which one can simulate and measure natural processes; second, it permits a more detailed examination of samples collected in the field.

6. Latitude and longitude is the reference system used to locate features on Earth's surface. Location is expressed in terms of the number of degrees a place is located away from some reference point. *Latitude* gives location in terms of how far north or south of the equator a place is. *Longitude* indicates how far east or west a place is of the prime meridian.

7. The highest value of latitude is 90^{o} north or south (the north and south poles are at these respective locations), while the highest value of longitude is 180^{o} east or west (this location is referred to as the 180th meridian).
8. Time zones and the international date line are devised to bring clock time and the calendar in line with solar time. Both are based around the system of longitude.

9. Map projections are systems of representing the spherical earth on a flat surface. All map projections contain some sort of distortion or inaccuracy. There is no single "best" map

projection; the appropriateness of a given map projection depends on the purpose for which it is used.

10. Remote sensing involves the use of aerial photographs or satellite images to collect data about Earth's surface.

11. Evaluation of geographic data often makes use of computer techniques such as a *Geographic Information System* (GIS) and statistical analysis.

LEARNING OBJECTIVES

After carefully reading Chapter Two, you should be able to:

1. identify the differences among the three basic approaches adopted by physical geographers -- comparison and classification, study of change over time, and study of the spatial arrangement of environmental features.

2. understand the role of *observation*, *explanation*, and *prediction* in geographical studies.

3. describe the role of experimentation and hypothesis testing in geographic study.

4. appreciate the two ways laboratory work is useful in physical geography.

5. distinguish between primary and secondary data, and identify the principal sources of each.

6. understand how the system of latitude and longitude works, and explain the related concepts of time zones and the International Date Line.

7. explain what a map projection is and summarize the properties of equal-area, conformal, and azimuthal map projections.

8. understand what is mean by *scale*, *representative fraction*, and *contour line* as these terms apply to maps.

9. describe, in general terms, what a Geographic Information System (GIS) is.

10. understand the properties and uses of aerial photographs and digital satellite data, two important forms of remote sensing.

11. explain what is mean by *descriptive statistics* and *inferential statistics*.