

Teacher's Guide For

Core Meteorology: Climates

For grade 7 - College

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MATERIALS IN THE PROGRAM

Teacher's Guide -This Teacher's Guide has been prepared to aid the teacher in utilizing materials contained within this program. In addition to this introductory material, the guide contains the following:

- Suggested Instructional Notes
- Student Learning Goals
- Test Questions on Blackline Masters 1A for duplication and handout to students

INSTRUCTIONAL NOTES

It is suggested that you preview the program and read the related Student Goals and Teacher Points. By doing so, you will become familiar with the materials and be better prepared to adapt the program to the needs of your class. You will probably find it best to follow the program in the order in which they are presented in this Teacher's Guide, but this is not necessary. The program can be divided into chapters accessed through the DVD's Menu Screen under Chapter Selects. It is also suggested that the program presentation take place before the entire class and under your direction. As you review the instructional program outlined in the Teacher's Guide, you may find it necessary to make some changes, deletions, or additions to fit the specific needs of your students. After viewing the program you may wish to copy the Test Questions on Blackline Master 1A and distribute to your class to measure their comprehension of the events.

INTRODUCTION AND SUMMARY OF PROGRAM

Meteorology is the study of the changes in temperature, air pressure, moisture, and wind direction in the troposphere. Presented in an effective format designed to promote successful student learning, *Core Meteorology: Climates* is a unique approach to presenting in a logical way the scientific study of the Earth's climates in relationship to the weather and atmosphere. It begins with the relationships between climates and ecosystems, people and weather extremes and concludes with climate change's effects on biomes and people.

Below is a list of the program and its chapters. Using this program, teachers can create a lesson plan to cover the specific concepts and themes discussed.

Core Meteorology: Climates

- What are Climates
- Climates and People
- Measuring Global Temperatures and Precipitation
- Climates and Weather Extremes
- Climate Types
- Climates and Biomes

- Climate Change and Biomes
- Climate Change and People

LINKS TO CURRICULUM STANDARDS

The design for this program includes the following curriculum correlations: National Science Educations Standards, Content Standard Grades (6-12) California State Board of Education Content Standards for Earth Sciences (Grades 6-12) and the State of New Jersey Department of Education Core Curriculum Content Standards for 5.8 Earth Science, section B, (Grades 7 – 12); and 5.10, Environmental Studies, Sections A and B, (Grades 7 – 12). The content of this program presents the foundational discoveries and principles of core meteorology, weather in an easy to follow, step-by-step format.

SUMMARY OF PROGRAM

Core Meteorology: Climates

This program on *Core Meteorology* presents the key concept of climate dynamics and its relationship to living systems.

Chapter one defines what a climate is and explains how long term patterns of temperature, precipitation are the defining factors of climates.

Chapter two discusses the importance of climate to people.

Chapter three examines the patterns of precipitation and temperature that go into defining a climate and how they are measured.

The importance of weather extremes in climates is looked at in chapter four.

The different climate types are laid out in Chapter five.

Biomes come onto existence as a result of climates. How biomes are defined and their relationship to climates are looked at in chapter six.

Chapter seven discusses the link between climate change and biomes.

Chapter eight looks at climate changes and their effect on people.

Chapter 1 Core Meteorology: Climates - What Are Climates?

Student Goals - In this *Core Meteorology: Climates* chapter the students will learn:

- Atmosphere is the air we breathe and medium we live in
- Weather is what’s happening in the atmosphere
- Climate is more difficult to understand
- Climate is a pattern over time
- People living in Nebraska have a different climate than folks living in Florida
- The differences are patterns of temperature and precipitation

- Nighttime temperatures in Florida never get as cold as nighttime temperatures in Nebraska
- It rains more in Florida than in Nebraska
- Florida has palm trees, mangroves and reed grasses, while Nebraska has prairies and scattered oak trees

Chapter 2 Core Meteorology: Climates - Climates and People

Student Goals - In this *Core Meteorology: Climates* chapter the students will learn:

- Climates are important to humans, because humans and human populations are adapted to stable climate patterns
- Farmers grow certain crops that are adapted to the climate the farmers live in
- Shifting climates can destroy crops and bring diseases and pests that affect people

Chapter 3 Core Meteorology: Climates - Measuring Global Temperatures and Precipitation

Student Goals - In this *Core Meteorology: Climates* chapter the students will learn:

- Climate study started around 130 years ago when scientists around the world started keeping records - measuring precipitation and temperature over the course of days, months and years
 - Meteorologists started erecting weather stations designed to record precipitation amounts and measure temperature variations at a particular place
 - Using the data collected over time, climatologists put together a pattern to represent the climate at each of these weather stations
- Weather data gathering began in 1873 and the first weather balloon launch was 1892
 - The invention of the *radiosonde* in 1930 made weather data gathering from balloons even easier
 - In 1960 the first weather satellite, TIROS was launched from Cape Canaveral
 - Today 187 nations and territories participate in gathering information in many ways, including land-based observation stations, radar systems, weather balloons, airplanes, ships, and satellites

Chapter 4 Core Meteorology: Climates - Climates and Weather Extremes

Student Goals - In this *Core Meteorology: Climates* chapter the students will learn:

- What hundred years of weather data showed was that both temperature and precipitation varied a great deal over the planet, not only in averages, but in extremes
 - Temperature varies from night to day and from season to season
 - The hottest temperature in the world ever recorded was El Azizia in Libya -136 degrees Fahrenheit on Sept. 13, 1922
 - The coldest temperature ever 129 degrees below zero Fahrenheit at Vostok, Antarctica, on July 21, 1983

- Weather extremes such as these play a major role in the adaptation of biomes to climates
- The west coast of Chile experiences no precipitation for years on end, while Ketchikan, Alaska, once received 202 inches in a single year; and Mt. Baker in the state of Washington nearly 100 feet of snow in 1998
- What climatologists found when they analyzed all that data from the thousands of weather stations is that patterns of precipitation and temperature emerged

Chapter 5 Core Meteorology: Climates - Climate Types

Student Goals - In this *Core Meteorology: Climates* chapter the students will learn:

- In the early part of the 20th-century, geographers and ecologists began to notice an interesting pattern: ecosystems repeated themselves
- Eventually, it became possible to map the Global distribution of what is now called biomes
- In 1928 German ecologist and climatologist, Vladimir Koppen, discovered there was a relationship between ecosystems and climates
- Koppen revolutionized the study of climates when he proposed a classification system, identifying five basic climate types
 - Starting at the equator, there is the tropical climate designation
 - Next is the dry type subdivided into deserts and arid plains
 - Then come the mesothermal or mid latitude climates, which include the Mediterranean climates
 - Closer to the polar regions are the microthermal or severe middle latitude climates; they have cold winters and range from warm to cool summers
 - The last of Koppen's climate types he called polar; these climates have very cold winters and no true summer and they divide into the Arctic tundra and polar ice sheet
 - Later a sixth category was added for highlands and mountain chains such as the Rocky Mountains and the Himalayas
- All life is adapted primarily to climates and so is the distribution of human populations and the sources of their food supplies

Chapter 6 Core Meteorology: Climates - Climates and Biomes

Student Goals - In this *Core Meteorology: Climates* chapter the students will learn:

- Biomes come into existence as a result of climates
- Biomes are the largest scale groupings of interconnected animal and plant species
- Within each biome there are many smaller ecosystems and microenvironments
 - See a polar bear, and you think of tundra
 - Today the boreal forests and timber wolf go together
 - The signature animal of the American grassland biome, the Great American prairie, is the buffalo
 - Coyotes and jackrabbits are two of the primary animal constituents of the American chaparral biome
 - The signature animal in America's Desert Southwest is the rattlesnake
 - The signature animals the tropical rainforest biome are the crocodilians and many monkey species

Chapter 7 Core Meteorology: Climates - Climate Change and Biomes

Student Goals - In this *Core Meteorology: Climates* chapter the students will learn:

- Climates are constantly changing
 - At one time the Arctic Climate extended all the way down into the middle of the United States during the middle of the last ice age
 - The arid, cold Rocky Mountain region was once a tropical rainforest
- When climates change rapidly, mass extinctions occur
- Climate change is often led by a shift in weather extremes long before the average change occurs

Chapter 8 Core Meteorology: Climates - Climate Change and People

Student Goals - In this *Core Meteorology: Climates* chapter the students will learn:

- The dramatic rise of human civilization and population growth has occurred during an eight thousand year period of benign, stable climate patterns for humans
- The rise in CO₂ is producing a general warming in the lower atmosphere as a result of the greenhouse effect, and it is now predicted that climates will once again begin to shift across the globe
- We will need to understand how these climate changes will impact human civilization and population, as well as the agriculture, which sustains them

Answers to Blackline Master 1A Quiz

1-b; 2-a; 3-a; 4-c; 5-b; 6-d; 7-a; 8-a & d; 9-a; 10-d; 11-b