

Integrating Meteorology and Geography

Grade Level: Seventh

Presented by: Jane Barricelli, Arlene Knittel, Frank J. Dugan Elementary, Marlboro, NJ

Length of Unit: 6-8 weeks

I. ABSTRACT

This unit teaches basic climatic conditions and how these conditions are measured and mapped. These climatic conditions are then applied to the study of world geography with emphasis on the United States. Students build a house suited to a particular environment within the US. This unit encourages students to use critical thinking skills.

II. OVERVIEW

- A. Concept Objectives: Students will gain knowledge about meteorology and the geography of the United States and be able to relate them to a real life situation.
- B. Content: Seventh grade *Core Knowledge Sequence* for weather emphasizing fronts and storms, weather and the water cycle, and the atmosphere; geography emphasizing physical features, population, and regions.
- C. Skills:
 - 1. to use the scientific method
 - 2. to interpret data from observations, maps, graphs, and written material
 - 3. to make predictions based on weather patterns
 - 4. to identify cause and effect

III. BACKGROUND KNOWLEDGE

- A. Teacher Resources
 - 1. *Windows on Science*. Optical Data, 1998, Vol. II, "Air and Weather."
 - 2. *Science Insights-Exploring Earth and Space*. Scott Foresman-Addison Wesley, 1999.
 - 3. *Map Skills the World 7-9*. Milliken Publishing Co., St. Louis, MO. 1984
- B. Prior knowledge
 - 1. Grade 4 – meteorology
 - 2. Grade 5 – US geography
 - 3. Grade 6 – world geography
 - 4. Grade 6 – great deserts of the world

IV. RESOURCES

- 1. *Wonders of Weather*. A Learning Channel/Ambrose, 1996.
- 2. *Hurricanes: Earth's Mightiest Storms*. Lauber – Scholastic, 1996.
- 3. *Simple Weather Experiments with Everyday Materials*. Mandell-Sterling, 1991.
- 4. *Weather Watch*. Wyatt – Addison Wesley, 1990.
- 5. *Cyclone!* National Geographic Home Video, 1995.
- 6. *Discovering Our Earth's Atmosphere*. Scott Resources, 1989.
- 7. *Regions of the US*. United Learning, 1995.

V. LESSONS

A. Lesson One: What is Meteorology?

- 1. Objectives
 - a. Explain the water cycle.
 - b. Explain how rain and snowflakes form.
 - c. Identify weather instruments and demonstrate their use.

- d. Identify types of precipitation.
- e. Identify careers associated with weather.
- 2. Materials
 - a. water spray bottles
 - b. piece of glass (or classroom window)
 - c. thermometer
 - d. anemometer
 - e. barometer
 - f. activity handout (*Science Insights*, Scott Foresman-Addison Wesley, p. 429)
 - g. *Windows on Science*, Optical Data, 1988, Vol. II, “Air and Weather”
- 3. Key vocabulary: precipitation, meteorology, meteorologist, thermometer, anemometer, barometer, barometer, cycle
- 4. Procedures/Activities
 - a. Brainstorm types of precipitation.
 - b. Review the water cycle by drawing a chart illustrating components and sequences of the water cycle.
 - c. Hand out weather instruments to each cooperative learning group and demonstrate their use.
 - d. Use each instrument outside (10 min.).
 - e. View laser disk frames 711 –7263 and discuss.
 - f. Distribute water spray bottles and glass to each group.
 - g. Discuss careers associated with meteorology.
 - h. Assign homework – read pgs. 428 – 434 in text.
- 5. Evaluation/Assessment
 - a. Grade on class participation and group activity

B. LESSON 2-4: The Atmosphere

- 1. Objectives:
 - a. Describe the composition of air.
 - b. Identify the causes of uneven heating of the Earth’s surface.
 - c. Collect and interpret data.
 - d. Collect a bar graph showing differences in heating.
- 2. Materials:
 - a. *Windows on Science*, Optical Data, 1988, Vol. II, “Air and Weather” lab handouts; “Differences in Heating,” “Data Charts,” “How to Make a Bar Graph”
 - b. graph paper
 - c. crayons, markers, or colored pencils
 - d. meter sticks
 - e. thermometers
 - f. tape
- 3. Key Vocabulary: atmosphere, DTT (Differential Temperature Tester)
- 4. Procedures/Activities

Day One

 - a. Quiz based on homework reading.
 - b. Read p. 393 in text and interpret the pie graph on air composition.
 - c. Create a DTT (Differential Temperature Tester) using lab handout “Differences in Heating.”

Day Two

- a. Working in cooperative learning groups, students will go outside and take temperature readings at various heights (ground level, 35 cm above ground, and 100 cm above ground), and at different ground coverings (asphalt, sand, grass, soil, etc.).

- b. Collect data and record on lab handout “Data Charts.”

Day Three

- a. Using the data collected, students will create bar graphs on lab handout “How to Make a Bar Graph.”

- b. Interpret and discuss findings.

5. Evaluation/Assessment

- a. Grade on class participation; quiz on Lesson 1 homework assignment, graph

C. Lesson 5: Water in the Atmosphere

1. Objectives

- a. Explain relative humidity.
- b. Describe how humidity effects life.
- c. Calculate relative humidity using a sling psychrometer and a relative humidity table.
- d. Determine dew point.

2. Materials

- a. sling psychrometers
- b. relative humidity tables
- c. small metal cans
- d. thermometers
- e. spoons
- f. crushed ice
- g. lab handout “Determine the Dew point” p. 421 text

3. Key Vocabulary: humidity, relative humidity, dew point, sling psychrometer

4. Procedures/Activities

- a. Read and discuss pages 415-420 in text.
- b. Hand out lab worksheet and follow directions to find dew point.
- c. Set up sling psychrometers with and wet and dry bulb; go outside to get temperature readings. Calculate the temperature difference between the dry and wet bulb. Using the difference and the dry bulb temperature, locate the relative humidity on the relative humidity table.

5. Evaluation/Assessment

- a. Grade on group work and relative humidity findings

D. Lesson 6: Air Masses and Their Movement

1. Objectives:

- a. Identify the six types of air masses.
- b. Compare and contrast the four kinds of fronts that occur when air masses move.
- c. Describe the Coriolus Effect.

2. Materials:

- a. laser disk
- b. world maps
- c. oaktag cards with a specific air mass on each card

3. Key Vocabulary: Air mass, Coriolus Effect

4. Procedures/Activities

- a. View laser disk frames 7319-8753 and discuss.

- b. Working in cooperative groups, place each type of air mass on a world map where it could form.
- c. Illustrate each of the four kinds of fronts.
- 5. Evaluation/Assessment
 - a. teacher observation, group participation grades

E. Lesson 7: Storms

- 1. Objectives:
 - a. Recognize and distinguish the following storms: tornadoes, hurricanes, thunderstorms
- 2. Materials
 - a. 2 liter soda bottles (2 per group)
 - b. tornado tubes (1 per group)
- 3. Key Vocabulary: tornadoes, hurricanes, thunderstorms
- 4. Procedures/Activities
 - a. View laser disk sequence on storms (frames 8754-15022)
 - b. List storm characteristics and compare each.
 - c. Create a tornado in a bottle using 1 tornado tube and 2 2-liter bottles per group.
 - d. Describe the vortex action seen in the “tornadoes.”
- 5. Evaluation/Assessment
 - a. Grade on work in notebook and group participation

F. Lessons 8-9: Forecasting the Weather

- 1. Objectives:
 - a. Read a weather map using Weather Bureau Symbols.
 - b. Given a US weather map, give today’s weather and predict weather conditions.
- 2. Materials:
 - a. Internet: www.weathermap.com
 - b. Weather maps from local newspapers
 - c. Lab activity: *Windows on Science* Optical Data, 1988, Vol. II “Junior Meteorologist.”
- 3. Key Vocabulary: thermobar, isobar
- 4. Procedures/Activities
 - Day One
 - a. View laser disk frames 15021-15038.
 - b. Develop a chart to identify various weather symbols.
 - c. Make weather predictions.
 - Day Two
 - a. Performance Test—Given a US weather map, students will find today’s weather and predict the weather for the next two days for three US cities (Junior Meteorologist).
- 5. Evaluation/Assessment
 - Graded performance test

G. Lessons 11-13: The Two Americas

- 1. Objectives:
 - a. Identify and locate the physical features on North and South America.
 - b. Compare North and South America.
- 2. Materials
 - a. Outline maps of North and South America.
 - b. Wall maps of North and South America showing physical features of each continent.

- c. Transparencies showing physical features of each continent
- d. Student atlases
- 3. Key Vocabulary: strait, plains, basin, rainforest, desert, tundra, plateau, grasslands, gulf
- 4. Procedures/Activities
 - Day One
 - a. Identify and label major physical features of the continents.
 - North America: See *Core Knowledge Sequence* grade 7 page 166.
 - South America: Amazon River and Basin, Andes Mountains, Guiana Highlands, Brazilian Highlands, Panama River, Sao Francisco River, Strait of Magellan
 - Day Two
 - a. Compare the two continents. How are they alike? How are they different?
 - Day Three
 - a. Test on locating physical features of North and South America.
- 5. Evaluation/Assessment
 - a. Test student's ability to locate physical features of the US.
 - b. Observe student's ability to compare the two continents.

H. Lessons 14-17: Population in the United States

- 1. Objectives:
 - a. Identify areas of greatest population density in the United States.
 - b. Identify areas of least population.
 - c. Analyze causes of population density.
- 2. Materials
 - a. Political maps of the US showing major cities
 - b. Physical maps of the US
 - c. Outline maps of the US
- 3. Key Vocabulary: population, density, resource
- 4. Activities/Procedures
 - Day One
 - a. Locate and identify major cities of the United States. Label them on the outline map.
 - b. Using population maps, color code the outline maps to indicate greatest and least population density. Note natural resources in densely populated areas.
 - Day Two
 - a. Using both physical and political maps, students will analyze the causes for large population centers. What reasons would there be for major changes in population density?
 - Day Three
 - a. Test on location of major cities in the United States.
 - Day Four
 - a. Write an essay to explain the needs of large population centers and what might cause population shifts.
- 5. Evaluation/Assessment
 - a. Test on location and label to indicate the location of major cities in the US.
 - b. Write an essay explaining what resources are needed to support large centers of population and what might cause major shifts in population.

I. Lessons 18-20: Regions of the United States

1. Objectives:
 - a. To locate and identify the major regions of the US.
 - b. To identify and explain nicknames applied to those regions.
2. Materials
 - a. Maps indicating regions for the US as outlined in the *Core Knowledge Sequence* for grade 7, page 167.
 - b. Wall maps indicating physical features of the US
 - c. Climate and vegetation maps of the US or North America
 - d. Outline maps of the US
3. Key Vocabulary: Dixie, Mason-Dixon Line
4. Activities/Procedures

Day One

 - a. Locate and label the regions of the US on outline map.
 - b. Using geography books or atlases, students will research nicknames for each region.
 - c. Discuss the terms Dixie and Mason-Dixon Line and their origins.

Day Two

 - a. Using climate, physical, and vegetation maps, students will analyze the nicknames given to these regions (examples: Corn Belt, Sun Belt, Mountain states). They will try to discover the reasons for the names.

Day Three

 - a. Students will take a test showing their ability to label each region in the US
5. Evaluation/Assessment
 - a. Test student's ability to label regions of the US on an outline map.

J. Lessons 21-23: Architecture

1. Objectives:
 - a. Identify various architectural styles.
 - b. Research a particular geographic area (environment, climate, special features).
2. Materials
 - a. Pictures from magazines of house shapes, styles, windows, roof types
3. Key Vocabulary: architecture, ranch, colonial, split-level, hip roof, gable roof, mansard roof, gambrel roof, shed roof
4. Activities/Procedures

Day One

 - a. Looking at pictures from magazines, students will learn to identify different styles of houses, roofs, windows, etc.
 - b. Identify common materials used to build houses using magazine pictures.
 - c. Discuss the importance of the orientation of a house (north, south, east, west, etc.)

Day Two

 - a. Quiz on architecture
 - b. Explain how to research a particular geographic area in preparation of house essay.

Day Three

 - a. Write an essay describing a particular geographic area and design a house that is well suited for that area (see Appendix A).
5. Evaluation/Assessment

- a. Quiz on architecture
- b. Essay

VI. Culminating Activity: Parent/Student Workshop

Workshop #1

Objective: Using knowledge of an area previously researched, working in small groups, students will design a house well suited to this area.

Procedure: Discuss area with group. Design house. Get approval from teachers and a building permit.

Workshop #2

Objective: Using the design developed in Workshop #1, students will construct a model house for their area.

Procedure: Students will build the house they designed using the materials provided by the teachers. Parents will supervise the use of building tools.

Workshop #3

Objective: Students will present their completed models to the entire group explaining the rationale for their design.

Procedure: Students will prepare presentation and present house.

VII. Handouts/Worksheets

Appendix A Meteorology/Geography Essay

Appendix B Parent Letter

Appendix C Planning Board Application

Appendix D Building Permit

Appendix E Criteria for Evaluation