

# MAD ABOUT METEOROLOGY

**Grade Level:** Fourth Grade

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**Length of Unit:** Approximately two weeks

## I. ABSTRACT

This presentation consists of a two week integrated unit on the Core Knowledge topic of Meteorology. Literature, writing, math, and easy hands-on activities will be used to reinforce the following concepts: water cycle, clouds, air movement, fronts, precipitation, and forecasting.

## II. OVERVIEW

- A. The concept objectives for this unit: air movement, atmosphere, air pressure, high and low pressure, wind direction and speed, prevailing winds.
- B. The specific content from the *Core Knowledge Sequence* is the fourth grade unit on Meteorology, including the concepts of atmosphere and air movement, clouds, water cycle, storms, and forecasting.
- C. The skills to be taught: recognizing story elements, explaining, comparing, contrasting, identifying details, identifying cause and effect, summarizing, analyzing characters, collecting and recording data, observing, predicting, cooperative learning, writing creatively, expository writing, classifying, choral reading, inferring, interpreting, constructing, applying map and study skills, following directions, dramatizing, comparing fractions.

## III. BACKGROUND KNOWLEDGE

- A. Teacher resources
  1. Hirsch, E. D. *What Your 4<sup>th</sup> Grader Needs to Know*. New York: Bantam Doubleday Dell Publishing Group, Inc., 1992. ISBN: 0-385-31260-1.
  2. Mandel, M. *Simple Weather Experiments with Everyday Materials*. New York: Sterling Publishing Co., Inc. 1990. ISBN: 0-8069-7295-5.
  3. Moore, N. *Weather*. St. Louis, MO: Milliken Publishing Company, 1984. ISBN: 0-88335-808-5.
  4. Watt, F. and Wilson, F. *Usborne Science and Experiments: Weather and Climate*. New York: Scholastic, Inc., 1992. ISBN: 0-590-48704-3.
  5. *Wind and Weather* (Scholastic Voyages of Discovery Series). New York: Scholastic, Inc., 1994. ISBN: 0-590-47646-7.
  6. Wyatt, V. *Weatherwatch*. Reading, MA: Addison-Wesley Publishing Company, 1990. ISBN: 0-201-15404-8.
  7. Wyma, B. *Weather*. Cypress, CA: Creative Teaching Press, Inc., 1995.
- B. Student resources
  1. *Core Knowledge Sequence* units on weather in Kindergarten and Grade Two.
  2. *Core Knowledge Sequence* units on measurement in Grades One, Two, and Three.
  3. *Core Knowledge Sequence* units on spatial sense in Grades One, Two, and Three.

## IV. RESOURCES

- A. Literature
  1. Aardema, V. *Bringing the Rain to Kapiti Plain*. New York: Dial Books for Young Readers, 1991. ISBN: 0-8037-0809-2.
  2. Adams, A. *The Great Valentine's Day Balloon Race*. New York: Macmillan Publishing Company, 1980. ISBN: 0-689-71085-2.
  3. Branley, F. *Tornado Alert*. New York: HarperCollins Publishers, 1988. ISBN: 0-690-04686.

4. Coerr, E. *The Big Balloon Race*. New York: HarperCollins Publishers, 1981. ISBN: 0-06-444053-2.
  5. Hopping, J. *Wild Weather: Tornadoes!* New York: Scholastic, Inc., 1994. ISBN: 0-590-463381.
  6. Milord, S. *Tales of the Shimmering Sky: Ten Global Folktales with Activities*. Charlotte, VT: Williamson Publishing, 1996.
  7. McCloskey, R. *Time of Wonder*. New York: Viking Penguin Inc., 1989. ISBN: 0-14-050201.
  8. Polacco, P. *Thunder Cake*. New York: Scholastic, Inc., 1990. ISBN: 0-590-45426-9.
  9. Wiesner, D. *Hurricane*. New York: Clarion Books, 1990. ISBN: 0-395-62974-8.
- B. Supplemental Resources
1. Cutts, D. *Thunder and Lightning*. U.S.: Troll Communications L.L.C., 1998. ISBN: 0-8167-4445-9.
  2. Hopping, L. J. *Wild Weather: Hurricanes!* New York: Scholastic, Inc., 1995. ISBN: 0-590-46378-0.
  3. Lambert, D. *Our Planet: Weather*. Mahwah, NJ: Troll Associates, Inc., 1990. ISBN: 0-8167-1980-2.
  4. Markle, S. *Windy Weather Science*. New York: Scholastic, Inc., 1998. ISBN: 0-590-76270-2.

## V. LESSONS

### Lesson One: Air Movement and Atmosphere (Day One)

- A. Daily Objectives
1. Lesson Content: air movement, atmosphere, air pressure, low and high pressure
  2. Concept Objective: The student will learn about air movements and the atmosphere around the earth.
  3. Skill Objectives: recognizing story elements, understanding and explaining science concepts, recording data, constructing a visual or diagram, observing, predicting, working in cooperative groups, following directions
- B. Materials:
1. Literature: *The Great Valentine's Day Balloon Race*
  2. Science: chart paper, transparent container, warm and cold water, cold milk
  3. Writing: each student needs two pieces of construction paper, one Popsicle stick, one rubber band, several sheets of paper (minimum of 15)
  4. Math: two weather observation charts per student for journal (Appendix C)
- C. Key Vocabulary: barometer, high pressure, low pressure, air pressure, atmosphere, warm front, cold front, stationary front, occluded front, troposphere, stratosphere, mesosphere, ionosphere
- D. Procedures/Activities:
1. Literature  
Read the story *The Great Valentine's Day Balloon Race*. Using a story map format, discuss and list the following: main characters, setting, beginning, middle, end, problem, and solution of the story.
  2. Science
    - a. Build an attribute web (also called a concept map) from the story using the concept objectives as subtopics. Elicit responses from the students and record on the web.
    - b. Discuss the weather as being an interaction between the sun, the atmosphere, and the earth.
    - c. Discuss the ocean of air we call "the atmosphere." Describe and list the layers of the atmosphere and their location. Have the students work in groups using the information to make an atmosphere visual on long chart paper. See Appendix A.

- d. Explain that air pressure is the weight of air molecules pressing down on the earth due to gravity. The heavier weight of the air creates more pressure on the earth's surface resulting in high pressure. Explain that an instrument called a barometer measures air pressure. Show pictures or examples of a barometer if possible.
  - e. Describe how the air in the hot air balloon is similar to the earth's air pressure. As the air inside the balloon is heated, it expands, gets lighter, and rises. When the air in the balloon cools, it gets smaller and lowers. Explain that warm air has molecules that spread apart making them light enough to rise. Cold air has molecules that are closer together and become denser, thus making cold air heavier. Relate this information to high and low air pressures by explaining that the lighter warm air creates less (lower) pressure on the earth, while the heavier cold air creates higher pressure. Discuss and explain that this cycle of moving air helps to create winds.
  - f. Explain how boundaries between cold and warm air masses are called fronts. Cold fronts are formed when cold air moves under a mass of warm air. Warm fronts are formed when warm air moves over a mass of cold air. Stationary fronts are made when a cold air mass and a warm air mass meet and neither one advances. Occluded fronts are formed when a cold front moves toward a warm front, lifting it and trapping the warm air above the cold air mass.
  - g. Demonstrate this experiment to show what happens when cold meets warm. Discuss advancing cold air meeting warm air. Explain how the heavier cold air displaces the warm air by pushing it upward. Follow these procedures for the activity:
    - (1) Fill a transparent container two-thirds full with warm tap water.
    - (2) Have students sketch what they predict will happen to the cold milk when it is poured into the warm water.
    - (3) At one side of the container, pour a small amount of cold milk into the warm water. Watch carefully. Have students note the movement and shape of the milk in the water.
    - (4) Have students sketch the observations.
    - (5) Try the experiment again, but this time use cold milk and cold tap water.
    - (6) Have students sketch predictions and actual results.
3. Writing
- a. Create a daily journal. See Appendix B for directions. The topic for the first journal entry is: "How does the fact that warm air rises affect you?"
  - b. Discuss the meaning of the weather phrase "blow hot and cold." Have students create a complete sentence or story to illustrate the phrase in their journals.
4. Math
- Add the weather chart to the journal during construction. Chart the weather and temperature daily. See Appendix C.
- E. Evaluation/Assessment: teacher observations of student products and participation during activities.
- F. Standardized Test/State Test Connections: strategies for standardized and state and tests are incorporated within the daily lessons.

### **Lesson Two: Air Movement and Atmosphere (Day 2)**

#### **A. Daily Objectives**

- 1. Lesson Content: wind direction, wind speed, prevailing winds
- 2. Concept Objective: The students will learn that climates around the world help to influence winds.
- 3. Skill Objectives: understanding story dialogue, dramatizing, sequencing, writing to explain, following directions, using map skills, making observations, recording data.

- B. Materials:
1. Literature: *The Big Balloon Race*
  2. Science: student copies of Spinning Wind Scale (Appendix D), scissors, round head fasteners (brads)
  3. Social Studies: world map
  4. Writing: student made journals
  5. Math: weather observation chart
- C. Key Vocabulary: prevailing winds, doldrums, polar winds, trade winds, westerlies
- D. Procedures/Activities:
1. Literature
    - a. Read aloud the story *The Big Balloon Race*.
    - b. Discuss the sequence of events that make the balloon rise and fall. Incorporate some of the story words such as: aeronaut, updraft, altimeter, hydrogen, ripcord, valve rope, toggles, and compass. Talk about how the weather, especially the wind, affected the balloon.
    - c. Discuss how dialogue and quotation marks are used in the story.
    - d. Have students work in small groups to dramatize a part of the story.
  2. Writing
 

Use the journal to write responses to the following: "Explain why you would or would not like to ride in a balloon."
  3. Science
    - a. Review the previous day's lesson on air movement, fronts, and air pressure. Emphasize the concept of rising warm air and lowering cool air as a cause of wind.
    - b. Explain that an English man named Sir Francis Beaufort developed a way to estimate wind speed.
    - c. Construct a (Beaufort) Spinning Wind Scale. See Appendix D.
    - d. Allow students time outside to use their scales and determine wind speed.
    - e. Students may record wind speed observations in journals
  4. Social Studies
    - a. Using a world map, locate and mark the Tropic of Cancer, the Tropic of Capricorn, the polar regions, and the equator. Discuss the climate of these zones and how they influence weather patterns around the world.
    - b. Locate on the map the prevailing winds and the regions in which they flow.
      - (1) Doldrums: the windless zone at the equator.
      - (2) Polar winds: the winds that occur between the poles and 60 degrees north and south latitude.
      - (3) Trade winds: the winds located between 0 and 30 degrees north and south latitude.
      - (4) Westerlies: winds located between 30 and 60 degrees north and south latitude.
    - c. Discuss how early sailing ships might have taken advantage of the trade winds in their journeys and why it was to their advantage to use them.
    - d. Discuss how airplane pilots are affected by the winds and how they plan around these winds.
  5. Math: Chart weather and temperature in daily journal.
- E. Evaluation/Assessment: teacher observations of student products and participation during class activities.
- F. Standardized Test/State Test Connections: Expository writing prompt. Additional strategies for standardized and state and tests are incorporated within the daily lessons.

**Lesson Three: Water Cycle and Water Vapor**

- A. Daily Objective

1. Lesson Content: water cycle, water vapor
  2. Concept Objective: The students will learn about the water cycle.
  3. Skill Objective: comparing, contrasting, choral reading, writing creatively, predicting, observing, recording data, measuring, inferring, applying artistic and musical skills
- B. Materials:
1. Literature: *Bringing The Rain to Kapiti Plain*
  2. Writing: student made journals
  3. Science: quart-size plastic bag (self-sealing type), water, blue food coloring, student-made journals, directions for rain gauges (Appendix F), funnels, jars (olive jars work well), permanent marking pens, masking tape, rulers.
  4. Social Studies: world map
  5. Music: materials found around the classroom or home for instruments
  6. Art: water, salt, white paper, food coloring, jars, paint brushes
  7. Math: weather observation chart, rain graphs (Appendix E)
- C. Key Vocabulary: water cycle, water vapor, drought, evaporation, condensation, coalescence, humidity, sleet, hail, snow, rain
- D. Procedures/Activities:
1. Literature
    - a. Read aloud *Bringing the Rain to Kapiti Plain*.
    - b. Use a Venn diagram to compare and contrast Kapiti Plain before and after the rain. If enough copies are available, have students practice choral reading. Model to students how to practice fluent reading by watching the punctuation, reading at an appropriate rate, and using expression. Allow the students time to practice in small groups.
  2. Writing (You may opt to use one or more of the following ideas.)
    - a. Have students use their journals to write a list of questions that they might ask Ki-pat and write what his responses might be. Have them use questions about his feelings when his herd was thirsting for rain and when he released the rain from the cloud.
    - b. Use journals to write a sequel of the story from little Ki-pat's point of view after some time has passed.
    - c. Discuss the meaning of the weather phrase "when it rains, it pours." Have students create a complete sentence or story to illustrate the phrase in their journals.
  3. Science
    - a. Water cycle activity. (This may take several hours to show results. A hot, sunny window works best.)
      - (1) Fill a quart size plastic (self-sealing type) bag one-third full of water.
      - (2) Add a few drops of blue food coloring.
      - (3) Close completely and tape to a sunny window. (It works well to rest the bottom of the bag on a windowsill.)
      - (4) Have students write what you did in their journals. They may draw pictures to match. Then have them predict what they think might occur if the bag were left up for the next few days.
      - (5) Students should record their predictions in their journals.
      - (6) Observe the water droplets form on the inside surface of the bag. (Advise the students to not disturb the bag.)
      - (7) Discuss how the droplets grow into each other to form larger droplets (coalescence) and what occurs when the drops become big. (They fall to the bottom of the bag like rain.)
      - (8) Discuss earlier predictions and actual observations. Explain that water vapor (humidity) falls back to the earth in the form of rain, snow, sleet, or hail.

- b. Allow students time to illustrate either how the water cycle works in nature or their observations of the water cycle activity.
4. Math
- a. Chart the day's weather and temperature.
  - b. Display a rain gauge to the students.
  - c. Explain how to read the measurements on a variety of rain gauges.
  - d. Set up a rain gauge for students to record possible rainfall for the next few days. (If no rain occurs, fill gauge up manually with tap water.)
  - e. Use measurements from rain gauge to make a bar graph. (See Appendix E.)
  - f. Follow directions on Appendix F to make student rain gauges.
5. Social Studies
- a. Locate Kenya on a map. Locate and discuss the three major regions of Kenya.
    - (1) The plains in Kenya cover about 75% of the country. It receives little rain and the soil is dry. It is home to most of Kenya's wildlife; however, few people live in this area.
    - (2) The southwestern highland part of the country contains the green and fertile farmland where most of Kenya's crops are grown. About 80% of the population live in this region, which is also the home of Nairobi, the capital.
    - (3) The coastal area located along the Indian Ocean, which is known for its plants, beaches, lagoons, and swamps.
6. Music: Rain Music
- a. Ask students to recreate the sounds of rain by using objects that they find in the classroom or around the home. They may rattle a sheet of construction paper, put rice in a cardboard tube with secured ends, hit wooden blocks together to imitate thunder, etc.
  - b. Suggest that they vary tempos for effect.
  - c. When students have developed several rain instruments, have them join together for an improvisational performance. (Save instruments for Lesson Five.)
7. Art: Evaporation Paintings
- a. Make evaporation paintings by mixing  $\frac{1}{4}$  cup of warm water with 6 teaspoons of salt and 3 drops of food coloring in each jar.
  - b. Students paint pictures with the mixture on white paper.
  - c. Let the paintings dry. The water will evaporate, but the colored salt will remain.
- E. Evaluation/Assessment: teacher observations of student products and participation during activities.
- F. Standardized Test/State Test Connections: strategies for standardized and state and tests are incorporated within the daily lessons.

#### **Lesson Four: Clouds**

##### **A. Daily Objectives**

- 1. Lesson Content: types of clouds
- 2. Concept Objective: The students will be able to identify cloud types.
- 3. Skill Objective: analyzing characters, classifying cloud types, observing, predicting, applying artistic skills, writing creatively, creating visuals, recording data

##### **B. Materials**

- 1. Literature: *Tales of the Shimmering Sky*, chart paper (K-W-L), art paper, crayons or markers
- 2. Science: freezer, large plastic bag, student made journals
- 3. Writing: student made journals, Sample Cloud Poem (Appendix G)
- 4. Math: weather observation charts

5. Art: blue and black construction paper, City Skyline Pattern (Appendix H), Cloud Skyline Guide (Appendix I), glue scissors, cotton balls, black chalk (or markers)
- C. Key Vocabulary: cumulous, cirrus, stratus, cumulonimbus
- D. Procedures/Activities:
1. Literature
    - a. Start with a K-W-L chart for clouds. Elicit responses from students to show what they “Know” and “Want to Know” about clouds. Save “Learned” for the end of the day.
    - b. Read aloud the story “The Cloud Eater” from the book *Tales of the Shimmering Sky*.
    - c. Make a wanted poster for the Cloud Eater. Draw and write a description of the character. Make the poster similar to those used by law enforcement or for missing persons.
  2. Science
    - a. Discuss the different types of clouds and where they are found in the atmosphere.
    - b. Describe the characteristics of each cloud type. Be sure to explain the following types of clouds: cumulus, stratus, cirrus, and cumulonimbus.
    - c. If possible, take the students outside to make observations of the clouds.
    - d. Describe the clouds as a collection of tiny water droplets. (Refer to the water cycle activity from Lesson 3.)
    - e. Make a cloud activity. (Take students to an area with a freezer or allow them to do at home.)
      - (1) Open a large plastic bag and scoop some air from the room in it. Seal it tightly shut.
      - (2) Put the bag in a freezer for five minutes.
      - (3) After five minutes, take it out of the freezer, open it up, and blow into it.
      - (4) Quickly seal it shut again.
      - (5) Have students observe what happens.
      - (6) Have students explain why and how it formed a cloud.
      - (7) Have student write observations and explanations in journals.
  3. Writing
    - a. Write cloud poems for journals.
      - (1) Brainstorm words used to describe clouds, including the names for the different clouds.
      - (2) Have students use the following format to write poems. First line: name of cloud. Second line: three adjectives that describe the cloud. Third line: three verbs related to the cloud. Fourth line: a phrase that tells about the cloud. Fifth line: name of the cloud or a synonym.
      - (3) Draw a cloud around the words of the poem. See Appendix G.
  4. Math
 

Students should continue to chart the daily weather and temperature in the journal.
  5. Art
 

Cloud Skyline

    - a. Have students cut black construction paper using the pattern on the bottom of Appendix H.
    - b. Glue the cut pattern piece to the bottom of a long piece of blue construction paper.
    - c. Use cotton and glue to make the following layers of clouds starting from the ground level and working upward to the top of the paper.
      - (1) Cumulus: use fluffy balls of cotton in a group clustering above the skyline.

- (2) Cirrus: use cotton balls that have been stretched out flat and thin making them appear thin and wispy. Pull them apart so they are about 3 to 4 inches in length. Place these highest in the sky.
  - (3) Stratus: use cotton balls that have been stretched out flat and thin. Make a flat blanket layer across the sky between the cumulus and the cirrus clouds.
  - (4) Cumulonimbus: along the edge of the page, make thick layers of cotton balls that stretch from the cumulus layer almost to the cirrus layer. Use black chalk to darken the cotton.
- E. Evaluation/Assessment: Refer back to the K-W- L Chart at the beginning of the day. Allow students time to finish the “Learned” section of the chart. Use observations of student responses for evaluation. Additional evaluations may be assessed by teacher observation of student products and participation of activities.
- F. Standardized Test/State Test Connections: strategies for standardized and state and tests are incorporated within the daily lessons.

### **Lesson Five: Thunderstorms**

- A. Daily Objectives
- 1. Lesson Content: thunderstorms
  - 2. Concept Objective: The students will learn how thunderstorms develop and will understand the causes of thunder and lightning.
  - 3. Skill Objectives: analyzing character, observing, predicting, writing essays, following directions, writing to explain, recording data, comparing fractions
- B. Materials
- 1. Literature: *Thunder Cake*, student made journals or paper for report cards
  - 2. Writing: student made journals or paper for essays
  - 3. Math: weather observation charts, musical instruments from Lesson Three, recipe cards (optional: ingredients for recipe)
  - 4. Science: wintergreen LifeSavers
- C. Key Vocabulary: thunderheads, lightning, thunder, precipitation
- D. Procedures/Activities:
- 1. Literature  
Read aloud the story *Thunder Cake*. After the story, have students make a report card for the grandmother or the child by using the character’s traits as subjects. Assign grades based on the character’s actions, and provide comments on the reasoning for the grade given. Examples: subject- compassion; grade- A; comment- The grandmother showed a great deal of concern for the child when she was scared and tried to make her less frightened. Subject- knowledge of children; grade- A; comment- The grandmother seemed to know that a cake would make the child less afraid of the storm. Subject- safety; grade- F; comment- The grandmother put herself and the child in danger by going outside when the storm was getting closer.
  - 2. Writing
    - a. Have students write an expository essay explaining how to protect themselves during a thunderstorm.
    - b. Discuss the meaning of the weather phrase “lightning never strikes twice in the same place.” Have students create a complete sentence or story to illustrate the phrase in their journals.
  - 3. Science
    - a. Explain how thunderstorms develop from rising warm, moist air. As the humid air rises, the water vapor condenses forming huge cumulonimbus clouds. The strong air currents cause the water vapor and ice crystals in the cloud to rub up against each other creating a buildup of positive (at the top of the cloud) and negative (at the base of the cloud) charges. When the charge strengthens it is released into the

- air as lightning. This causes the air around the lightning strike to heat up and expand very quickly. This expanding air causes thunder.
- b. Darken the room and wait for eyes to adjust. Have students chew on wintergreen LifeSavers with their mouths open.
  - c. Observe the teeth crushing apart the sugar crystals and creating mini-electrical charges. (An electric spark leaps between the differently charged candy pieces and the wintergreen oil helps to see it.)
  - d. Discuss the process and explanation to the students and relate it to real lightning. If time allows, have students respond in their journals about this activity
4. Math
- a. Continue to chart the daily weather and temperature in journals.
  - b. Practice calculating the distance of lightning by counting the seconds from the flash to sound of the thunder. One student may flash the lights and another may make the sound of thunder using instruments made in Lesson Three. (It is best to count the seconds and divide by five.) Also note, sharp cracks of thunder mean that the lightning is nearby, while low, rumbling thunder usually means it is farther away.
  - c. Have students copy the recipe for Thunder Cake from the read aloud book on recipe cards or in journals. Review the mixed numbers and fractional parts of  $\frac{1}{2}$  and  $\frac{1}{4}$ . (Optional: try making the recipe as a classroom project or as an extra credit homework assignment.)
- E. Evaluation/Assessment: teacher observation of student products and participation during activities.
- F. Standardized Test/State Test Connections: Writing expository essay. Additional strategies for standardized and state and tests are incorporated within the daily lessons.

### **Lesson Six: Tornadoes**

- A. Daily Objectives
1. Lesson Content: tornadoes
  2. Concept Objective: The students will be able to describe when and where tornadoes occur most often and their formation.
  3. Skill Objectives: sequencing, identifying cause and effect, summarizing, observing, applying study skills, interpreting data, rewriting, following directions, recording data
- B. Materials
1. Literature: *Tornado Alert*
  2. Writing: student made journals
  3. Science: quart jars, dish detergent, food coloring, white vinegar
  4. Social Studies: *Tornadoes!*, U.S. map
  5. Math: weather observation charts
- C. Key Vocabulary: tornado, hail, funnel, Tornado Alley, cyclone, vortex, tornado warning, tornado watch
- D. Procedures/Activities:
1. Literature
    - a. Read aloud the book *Tornado Alert* by F. M. Branley. Build an attribute web (also called a concept map) from the information found in the book.
    - b. Have students reread pp.10-12 and create a list of the things that cause tornadoes. (The movement of cold and warm air in April, May, and June; cold and warm air meeting near the earth's surface; cold air pushing under warm air; warm air moving upward, spinning around, and spreading out; air around the funnel moving toward it; storm winds pushing the funnel along the earth.)

- c. Focus on the cause and effect relationships of the listed events and explain that the effect tells what happens in a selection and the cause explains why it happens. Allow students time to identify the events on the list as causes or effects.
  - d. Have students review the story and discuss how the map, the diagrams, and the illustrations help to explain the information in the story. Then have them create a list explaining how the pictures help them to understand the information.
2. Writing
- a. Have students respond in their journals to the following: “Suppose you were home and a tornado was coming toward your house. What would you do to try to capture it?” or “How does reading this selection make tornadoes less frightening?”
  - b. Students may rewrite the story, including details about how tornadoes are formed or they may redraw the pictures in the book and write corresponding captions.
  - c. Have students construct a word ladder using the word tornado. Write the word vertically, then write related words horizontally using the letters from the first word. (See Appendix J.)
3. Science: Pet Tornado
- a. Fill a one-quart jar (with lid)  $\frac{3}{4}$  with water.
  - b. Add 2 teaspoons of liquid dish detergent, two teaspoons of white vinegar, and two drops of blue or green food coloring.
  - c. Secure lid, hold the jar with both hands, and shake in a circular motion. Watch the tornado appear. (You may need to experiment with the amounts of detergent and vinegar. Some brands of detergent require different amounts of vinegar for best results. Small objects may also be added to the jar so students can easily observe the speed and direction.)
4. Social Studies
- Use the book *Tornadoes!*, by Lorraine Jean Hopping, to study the state averages of tornadoes (p. 21). Have students plot the average number of tornadoes on a map. Look for patterns of where they occur the most. Use this data to discuss Tornado Alley and to build background for possible research into the most destructive tornadoes.
5. Math
- Continue to chart daily weather and temperature.
- E. Evaluation/Assessment: teacher observation of student products and participation during activities.
- F. Standardized Test/State Test Connections: strategies for standardized and state and tests are incorporated within the daily lessons.

**Lesson Seven: Hurricanes**

- A. Daily Objectives
- 1. Lesson Content: hurricanes
  - 2. Concept Objective: The students will understand where and how hurricanes develop and learn how to track them.
  - 3. Skill Objective: comparing, contrasting, sequencing, analyzing, identifying details, dramatizing, observing, collecting data, applying map skills, designing, working cooperatively
- B. Materials
- 1. Literature: *Hurricane*
  - 2. Writing: student-made journals
  - 3. Math: weather observation charts
  - 4. Social Studies: hurricane tracking maps, hurricane coordinates (Appendix K)
  - 5. Art: drawing paper, colored pencils

- C. Key Vocabulary: eye (hurricane), tracking, hurricane warning, hurricane watch, tropical depression, tropical storm
- D. Procedures/Activities:
1. Literature
    - a. Read aloud the book *Hurricane* by David Wiesner. Sequence and analyze with the students the details in the story that showed how the family prepared for the hurricane. (They went to the store for supplies, secured things in the yard, taped the storm door, listened to weather reports on the radio, readied themselves with candles, flashlights, and hurricane lamps.)
    - b. Let each student pretend to be one of the characters and retell what happened in one part of the story.
  2. Writing

Have students respond in their journals to: “Explain how are tornadoes and hurricanes alike and different?” (Some responses may be that both have rotating winds, destructive power, and rain. Hurricanes start over ocean waters and cause flooding, where tornadoes start over land, are smaller, and usually have greater wind speeds.)
  3. Science

Explain that the causes of how hurricanes develop are not fully understood, but most scientists believe that they develop when moist air rises over warm seas. It is also thought that the extra low-pressure area moving in over the sea may set them off. As the pressure falls, strong surface winds are formed as air is sucked in toward the center of the low. The air in the center increases in speed and spirals upward. Large quantities of water vapor rise and condense to form massive cumulonimbus clouds. The center of the storm is a calm column of air called the eye. The movements of high level winds and the direction of sea currents influence the path of a hurricane. Usually a hurricane dies when it is no longer able to receive warmth and moisture, such as when it reaches cool water or land.
  4. Math

Continue to chart the daily weather.
  5. Social Studies

Hurricane Tracking

    - a. Divide the class into groups of three or four.
    - b. Each group needs to have a hurricane tracking map and four pens or pencils in different colors.
    - c. Review with the students how to read longitude and latitude on a map.
    - d. Provide the students the coordinates for tracking. Give them one pair of coordinates at a time. Have them try to predict if the hurricane will make landfall and if so, where it might be. See Appendix K.
  6. Art

Have students design and draw hurricane safety posters. Try to include the safety measures from the book *Hurricane* and general knowledge that some students may already have from experience.
- E. Evaluation/Assessment: teacher observation of student products and participation during activities.
- F. Standardized Test/State Test Connections: strategies for standardized and state and tests are incorporated within the daily lessons.

### **Lesson Eight: Forecasting**

- A. Daily Objectives
1. Lesson Content: forecasting
  2. Concept Objective: The student will understand how observation skills and weather instruments are used to forecast the weather.

3. Skill Objective: predicting, writing creatively, interpreting, constructing, recording data, observing
- B. Materials
  1. Literature: *Time of Wonder*
  2. Writing: student made journals
  3. Art: shoeboxes, glue, scissors, crayons, drawing paper
  4. Science: newspapers, weather observation charts
  5. Math: graph paper
- C. Key Vocabulary: satellites, meteorologist
- D. Procedures/Activities:
  1. Literature
    - a. Read the story *Time of Wonder*, by Robert McCloskey, aloud to the students. Discuss and generate a list of the different kinds of weather discussed in the book.
    - b. Have groups decide on a new setting for the story. Have them discuss how a new setting might change events in the beginning, middle, and end. Let them share their ideas with the class.
  2. Writing
    - a. Discuss with students the stories from long ago that helped to explain weather phenomenon. (Refer back to Lesson Four.) Have students think of a weather situation (tornadoes, hurricanes, thunder, lightning, etc.) and write a myth to explain the condition.
    - b. Discuss the meaning of the weather phrase “make hay while the sun shines.” Have students create a complete sentence or story to illustrate the phrase in their journals.
  3. Art
 

Use one of the weather conditions (may or may not be from the story *Time of Wonder*) and build a diorama using a shoebox, glue, scissors, crayons, and drawing paper.
  4. Science
    - a. Use local newspapers to read and interpret weather maps. Discuss the symbols used on the map. List the symbols in journals along with any other symbols that may be missing from the map. Look in the previous day’s newspaper to determine if the weather prediction was correct.
    - b. Discuss how satellites are used to help predict the weather.
  5. Math
    - a. Continue to add data to weather observation charts.
    - b. Use the temperatures recorded on weather observation charts to construct a line graph.
  6. Social Studies
 

Discuss and research careers in Meteorology. Students may interview weather forecasters and other support personnel that gather weather data. Students may wish to observe television meteorologists and practice giving mock weather reports. Have students discuss the other careers that are impacted by weather (farmers, pilots, PE teachers, NASA astronauts, etc.).
- E. Evaluation/Assessment: teacher observation of student products and participation during activities.
- F. Standardized Test/State Test Connections strategies for standardized and state and tests are incorporated within the daily lessons.

## VI. CULMINATING ACTIVITIES

The following are ideas for culminating activities:

1. Field trip to weather station or television station.

2. Field trip to a science museum with weather related exhibits.
3. Play music with weather or water themes.
4. Demonstration of hot air balloon.
5. Guest speakers.
6. Set up a school weather observation center.
7. Making record books of strange or unusual weather phenomenon.
8. Have groups write and perform a dramatic weather story (hurricane, tornado, etc.) as it might appear on local television. Have students act as television reporters, witnesses, and victims of the weather. Videotape and share with parents.
9. Send home a parent evaluation questionnaire. Ask parents to respond to questions like the following: Did your child discuss with you the weather unit? Have you observed your child discussing this unit with other children? What elements of this unit did your child seem to enjoy? What part of the unit was the most difficult for your child?