

# SCIENCE PACT



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## VITAL INFORMATION

**Subject(s):** Science

**Topic or Unit of Study:** Weather systems

**Lesson Type:** Group Investigation  
Direct Instruction  
Individual Presentations

**Grade/Level:** 6

**Language of Lesson:** English

**Prerequisites for Student(s):** None

**Source:** Adapted from a lesson given by sixth grade science staff at Hoover Middle School in the SFUSD. Lesson is based upon "The Weather Tomorrow", from Prentice Hall's "Focus on California Earth Science", p. 299

**Summary:** This lesson is built to be taught in conjunction with chapter 8 of Prentice Hall's "Focus on California Earth Science", Copyright 2008 by Pearson Education Inc. The lesson should be treated as supplementary to any other lessons taught during this unit.

Students will use direct observations to keep track of local weather. The students will connect their observations to the weather maps, and use appropriate terminology to present a daily "weather report" to the class. This will culminate in a weather log which shows student understanding of the vocabulary, weather map symbols, and local weather patterns.

## LESSON DESCRIPTION

**Description of Student Group:** Students speak English as a first language, all ELL students should be familiar with weather terminology or given direct instruction and supplemental materials to close any language gap that might exist.

**Objective:** Students will be able to use daily observations of local weather patterns to interpret scientific notation of weather patterns.

**Standards:**

 **USA- NAS- Science Education Standards**  
National Academy of Science

- **Type of Standard :** Science Content Standards
- **Grade Range :** Grades 5-8

- **Content Standard D:** Earth and Space Science

As a result of their activities in grades 5-8, all students should develop an understanding of

- **Area :** STRUCTURE OF THE EARTH SYSTEM

- **Fundamental Concept and Principle :** Clouds, formed by the condensation of water vapor, affect weather and climate.

- **Fundamental Concept and Principle :** Global patterns of atmospheric movement influence local weather. Oceans have a major effect on climate, because water in the oceans holds a large amount of heat.

## USA- AAAS- Benchmarks for Science Literacy

- **Area 4:** The Physical Setting

- **Key Concept B.:** The Earth

- **Grade Level :** Grades 6 through 8

- **Benchmark :** The cycling of water in and out of the atmosphere plays an important role in determining climatic patterns. Water evaporates from the surface of the earth, rises and cools, condenses into rain or snow, and falls again to the surface. The water falling on land collects in rivers and lakes, soil, and porous layers of rock, and much of it flows back into the ocean.

- **Key Concept C.:** Processes that Shape the Earth

- **Grade Level :** Grades 6 through 8

- **Benchmark :** Human activities, such as reducing the amount of forest cover, increasing the amount and variety of chemicals released into the atmosphere, and intensive farming, have changed the earth's land, oceans, and atmosphere. Some of these changes have decreased the capacity of the environment to support some life forms.

## CA- California K-12 Academic Content Standards

- **Subject :** Mathematics

- **Grade :** Grade Six

- By the end of grade six, students have mastered the four arithmetic operations with whole numbers, positive fractions, positive decimals, and positive and negative integers; they accurately compute and solve problems. They apply their knowledge to statistics and probability. Students understand the concepts of mean, median, and mode of data sets and how to calculate the range. They analyze data and sampling processes for possible bias and misleading conclusions; they use addition and multiplication of fractions routinely to calculate the probabilities for compound events. Students conceptually understand and work with ratios and proportions; they compute percentages (e.g., tax, tips, interest). Students know about  $\pi$  and the formulas for the circumference and area of a circle. They use letters for numbers in formulas involving geometric shapes and in ratios to represent an unknown part of an expression. They solve one-step linear equations.

- **Area :** Algebra and Functions

- **Sub-Strand 2.0:** Students analyze and use tables, graphs, and rules to solve problems involving rates and proportions:

- **Standard 2.1:** Convert one unit of measurement to another (e.g., from feet to miles, from centimeters to inches).

- **Standard 2.2 (Key Standard):** Demonstrate an understanding that rate is a measure of one quantity per unit value of another quantity.

- **Standard 2.3:** Solve problems involving rates, average speed, distance, and time.

- **Area :** Statistics, Data Analysis, and Probability

- **Sub-Strand 2.0:** Students use data samples of a population and describe the characteristics and limitations of the samples:

- **Standard 2.5 (Key Standard):** Identify claims based on statistical data and, in simple cases, evaluate the validity of the claims.

- **Subject :** Science

- **Grade :** Grade Six
  - **Area :** Focus on Earth Science
    - **Sub-Strand :** Shaping Earth's Surface
      - **Concept 2:** Topography is reshaped by the weathering of rock and soil and by the transportation and deposition of sediment. As a basis for understanding this concept:
        - **Standard d:** Students know earthquakes, volcanic eruptions, landslides, and floods change human and wildlife habitats.
    - **Sub-Strand :** Energy in the Earth System
      - **Concept 4:** Many phenomena on Earth's surface are affected by the transfer of energy through radiation and convection currents. As a basis for understanding this concept:
        - **Standard a:** Students know the sun is the major source of energy for phenomena on Earth's surface; it powers winds, ocean currents, and the water cycle.
        - **Standard e:** Students know differences in pressure, heat, air movement, and humidity result in changes of weather.
  - **Area :** Investigation and Experimentation
    - **Sub-Strand 7:** Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other three strands, students should develop their own questions and perform investigations. Students will:
      - **Standard a:** Develop a hypothesis.
      - **Standard b:** Select and use appropriate tools and technology (including calculators, computers, balances, spring scales, microscopes, and binoculars) to perform tests, collect data, and display data.
      - **Standard c:** Construct appropriate graphs from data and develop qualitative statements about the relationships between variables.
      - **Standard d:** Communicate the steps and results from an investigation in written reports and oral presentations.
      - **Standard e:** Recognize whether evidence is consistent with a proposed explanation.
      - **Standard f:** Read a topographic map and a geologic map for evidence provided on the maps and construct and interpret a simple scale map.
      - **Standard g:** Interpret events by sequence and time from natural phenomena (e.g., the relative ages of rocks and intrusions).
      - **Standard h:** Identify changes in natural phenomena over time without manipulating the phenomena (e.g., a tree limb, a grove of trees, a stream, a hillslope).

**Materials:** Focus on California Earth Science. New Jersey: Pearson Education Inc, 2008

Observation Worksheet (1 per student or group)  
 Daily Weather Maps (supplied by teacher)  
 Overhead projector or Digital Projector

Optional Equipment:  
 (these should be set up in advance by the teacher, or by the students as a separate lesson)  
 Thermometer  
 Barometer  
 Anemometer

**Procedure:**

This lesson is designed to take up the first ten minutes of science daily for three weeks.

**Day one:**

-The teacher will introduce the lesson on weather maps and weather patterns. They should tell the class that they will be taking observations (either individually or in small groups) daily over the course of three weeks. This introduction should also include the use of the barometer, thermometer, and anemometer if applicable.

-The teacher should model a quick observation of the weather including cloud cover, and if available, temperature, wind speed, and atmospheric pressure. Students on this day will copy the teacher's observations on their worksheet. The teacher should model appropriate use of the tools, and the notations and units used in recording their observations.

-The teacher should identify supplemental materials. Suggested materials are enlarged (or hand-made) charts of the graphics "Types of Clouds" (p. 304, Prentice Hall), "Clouds" (p. 305, Prentice Hall), "Reading a Weather Map" (p. 330, Prentice Hall), and the key from "Newspaper Weather Maps" (p. 331, Prentice Hall). (copies of the graphics are attached)

-The teacher should model a "Weather Report" at the end of the science period. This will be the job of the students starting on day two. The teacher will model using correct terminology to describe the current weather, and use their ongoing data collection to predict the weather on the following day. The teacher will keep a record of predictions so the class can evaluate their predictions daily.

**Daily routine on following days:**

-The teacher should allow 10 minutes at the beginning of each science period for the students to make observations. Expect that students will take longer to make these observations at first, but as the job becomes routine students should operate quickly. Students can work on their own or as a group. If students do not have access to thermometer, anemometer, or barometer, online statistics should be used to supplement available data.

-At the end of the period, students will be called up to use the overhead to predict the days weather. This weather report should include an analysis of the previous day's report, an evaluation of the current weather patterns, and a prediction for the following day's weather. The prediction should include a correct usage of symbols, written on a blank map of the area on the overhead projector. This should also take 10 to 15 minutes. This report should be student centered, with the teacher giving hints for vocabulary. If necessary, the teacher will use the overhead to place the symbols.

**Weekly activities:**

-For homework or classwork students should be expected to graph the ongoing changes in their data. They should be expected to show data in appropriate measurements and appropriate scale.

**Culminating Activity:**

-Students will create a mobile of cloud types. This mobile should be modeled by the teacher so the students have an idea of the finished product. This mobile should include two basic concepts: the cloud types have been drawn in a recognizable manner (according to ability), and the clouds are hung in a realistic arrangement, so that the lowest naturally occurring clouds have the longest string, and hang lowest on the mobile, while the highest have the shortest, and are highest up. The placement of the clouds should reflect the diagram "Clouds" on page 305 of Prentice Hall. This can be orchestrated as an in-class activity, or as a multi-day homework assignment.

**Accommodations for English Learners:**

ELL students should have access at all points during this lesson to visual aids. Suggested aids would be copies of all suggested charts. ELL students should also be heterogeneously paired to ensure that shared learning between students could further facilitate learning.

**Accommodations for Special Needs Students:**

Students with special needs should be accompanied by a paraprofessional, or grouped with competent, friendly students who can guide them through recoding observations on a daily basis.

**Research Base:****Technology:**

**Time Allotment:** 15 class periods. 20 Min. per class.

## **ASSESSMENT AND REFLECTION**

**Evaluation of Lesson:** Student success is defined by accurate observation and measurement of weather patterns. This will be reflected in the daily observation logs and the weekly graph created by the students. The students should also show evidence of knowledge of weather patterns through their daily weather reports and discussion surrounding the accuracy and efficacy of past predictions.

**Reflection:****Assessment/Rubrics:**