

2. Clouds

OBJECTIVES: After completing this lesson, a student should be able to:

- * **Define CLOUD and FOG**
- * **Describe how a cloud forms**
- * **Classify CLOUD TYPES (Grades 4-8)**

TEACHER BACKGROUND: (Grades 1-8)

Water is not strange to us. It covers more than 70% of the earth's surface. The science of weather forecasting deals with water not only in the liquid state, but the invisible (vapor) and the solid (ice) states as well.

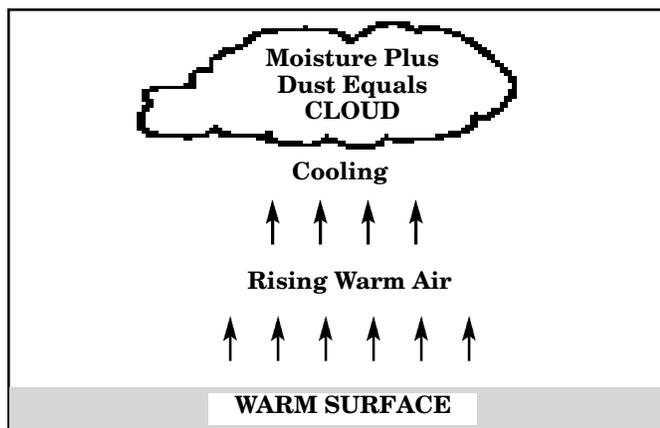
A CLOUD occurs when the invisible water vapor in the air becomes visible water droplets or ice crystals. The water vapor becomes visible by cooling. That's what happens on a cold winter afternoon when you "see your breath." Warm air leaving your mouth cools and forms visible droplets. The same process occurs when water is boiling on a stove. Warm air rising above the boiling water cools to form droplets commonly called steam. **FOG, a cloud in touch with the ground,** occurs when water droplets form on particles near the earth's surface. There are many ways to make air rise and cool to form clouds. For instance, mountains force air upward. The air that is forced to rise over the mountain cools and forms clouds. The second example is an approaching cold air mass which lifts the air ahead of it. A third process

is heat from the sun. Air heated by the sun rises, cools and forms clouds. (See figure.) Heat from the sun can provide enough lifting to produce a thunderstorm.

Additional notes for grades 4-8:

Once air rises and cools, why do clouds form and how do clouds remain suspended in the atmosphere? The answer is that the water droplets are not alone up there. As the droplets form, they need something to "hang on to," so they form on other tiny particles also suspended in air. Dust, pollution, ash from volcanoes or even salt particles from the sea allow water droplets to "grab on." Since all of the particles are tiny and light-weight, they remain suspended above us. The attraction of water droplets to salt particles explains why locations near salt-water seas generally experience more cloudy or foggy weather.

Clouds above the surface come in many different shapes and have unique names. Four types are presented for grades 4-8 students. **CUMULUS** are white, "puffy," fair weather clouds common on a warm summer afternoon. Cumulus clouds form when air, heated by the sun, rises and cools like bubbles rising in an aquarium. If conditions are right, a cumulus cloud can grow into the **CUMULONIMBUS, a towering storm.** The third type is **STRATUS, a grey "sheet-like" cloud layer that blankets the sky.** Finally, one easily identifies **CIRRUS** as thin "feather-like" clouds made of ice crystals high in the cold atmosphere. Sunlight reflecting through cirrus ice crystals can form what we see as a "ring" around the sun (or moon).



Clouds

**** WARNING **** Instruct your students never to look directly into the sun.

GRADES 1-3

INTRODUCTORY: CLOUD DREAM

On a dry day when the sky includes a variety of clouds, take the students outside and have them lie in a circle, their heads toward the inside of the circle, looking up. Have them observe the sky for one minute, then close their eyes to pretend **THEY** are a cloud. Have them share their ideas and stories aloud.

ADVANCED: CLASSROOM SKY

Post and discuss the color cloud chart included with this guide. Have students match today's clouds with those on the chart. Students should then draw, color and label a full page cloud. (If there are various clouds outside, assign specific clouds to specific students.) Post clouds on a large board or hang them from the ceiling on a string to make your own classroom sky.

GRADES 4-8

INTRODUCTORY: CLOUD CHART

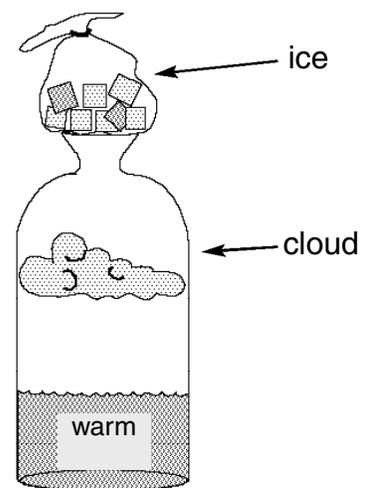
Locate the color chart that accompanies this guide and post it in the classroom. Ask students to identify today's clouds. (If your class composed the sky survey from lesson 1, have students identify all the clouds in their ads.) Have students draw and describe the main cloud types and assemble that work into their own cloud wall chart.

ADVANCED: CHALKBOARD CLOUD

Use two erasers to clean the chalkboard, turn off the lights and darken classroom windows. A student, holding a chalkboard eraser in each hand, should *briefly* "clap" the erasers together while another student shines a flashlight into the "cloud" of particles released by the erasers. Observe tiny particles suspended in air. How does this help to explain the formation of a cloud?

MAKE A CLASSROOM CLOUD (Time: 10-15 minutes) GRADES 1-8

- Materials:** A jar, warm water, a plastic bag of ice that fits over the jar opening, a sheet of black paper and matches (*WARNING: Only the teacher should handle the matches.*)
- Preparation:** Place the jar on black paper or tape the paper on back of the jar so you can't see through it. Fill one third of the jar with warm water. Have the bag of ice and matches nearby.
- Procedure:** Light the match and hold it over the jar opening. After a few seconds, drop the match in the jar and cover the top of the jar with the bag of ice. Observe the inside of the jar against the black paper background.
- Evaluation:** What process(es) led to cloud formation? Why was smoke from the match important to cloud formation? (It provided particles for vapor to "grab on.")
- Excursion:** Would cold water work as well? (no) Why? (Cool air does not rise.)



WEATHERSCHOOL QUESTION:

Obtain the question and correct answer from your local Weatherschool TV channel!