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## Revisit the Concept of Clouds

# Linking to Weather

After helping your students to understand the nature and composition of clouds, you can make a smooth transition to a discussion of precipitation. A thorough understanding of the physical conditions favoring various forms of precipitation is probably beyond the scope of the elementary science curriculum, but what they investigate here will provide some building blocks for this to happen at a later stage.

Here are some questions for your students to consider (with explanations in italics):

- Ask the students what would happen inside a cloud as droplets became larger and larger. (Soon, they would be too heavy to remain suspended in air. Slowly, at first, the droplets begin to fall toward the Earth. When larger droplets catch up with smaller droplets, they combine and begin to fall even faster. Soon large drops form and fall to the ground as rain.)
- Ask your students how snow, sleet and hail might form. (If raindrops fall through very cold air near the Earth's surface they may freeze. Then we get little grains of ice pellets or sleet. Snowflakes, however, form inside the clouds themselves when conditions are right for crystals to form. Hailstones travel downward through a cloud and pick up a coating of water that freezes on the surface, before being carried upward by strong drafts within the cloud. The hailstone will fall again, picking up another layer of ice, and be carried back up the cloud again, growing a bit each time, until it finally is too heavy for the draft to carry it upward. At that time, it falls to the ground.)

After developing a concept of clouds, you can show students pictures of all of the various types of clouds in the sky. Learning to observe these clouds and relating them to specific weather conditions is an interesting extension of this investigation. There are many excellent books and tables displaying all of the various cloud varieties. Many of these resources are available on the Web, for example the National Oceanic and Atmospheric Administration (NOAA).

You may also wish to have the students add information about cloud type and cloud cover to their daily weather journals.

## **Digging Deeper**

#### **Clouds and Precipitation**

Clouds are formed when moist air rises upward. As the air rises, it becomes colder. Eventually the air can't hold all of the water vapor in it, and some of the water vapor condenses to form tiny water droplets. When moist air is cooled at the ground, fog is formed in the same way.

Clouds form at a wide range of altitudes, from near the ground to very high in the atmosphere. The appearance of clouds varies a lot, depending on the motions of the air as the clouds are formed. Other important things to observe about clouds are the percentage of the sky they cover, where they are located in the sky, how much of the sky they cover, and their direction of movement. A good way to find their direction of movement is to stand under a tree branch or an overhang on a building and watch the clouds move relative to that stationary object.

Raindrops are formed when the cloud droplets grow big enough to fall out of the clouds. Most of the rain that falls in the winter, and even a lot of it that falls in the summer, is from melting of snowflakes as they fall through warmer air. Rainfall is measured by the depth of water that falls on a level surface without soaking in. Rainfall is measured with a rain gauge. A basic rain gauge is nothing more than a cylindrical container, like a metal can, with a flat bottom. The only problem is to get an accurate measurement of the depth of water that has fallen. Accurate rain gauges are arranged so that the water that falls into the container is funneled into a much narrow container inside. That way, the height of the water is magnified, and is easier to read.

If you live in a part of the United States where it snows in winter, you can easily measure the snow depth with a ruler. The best time to make the measurement is right after the snow stops falling. The measurement can be tricky, because wind can blow snow from one place to another. The best place to measure snow depth is on level ground far away from buildings and trees.

## Weather Unit Sections

Introduction Air Temperature Wind Clouds How can we see if water is in the air? How can clouds form? **Revisit the concept of Clouds** Weather