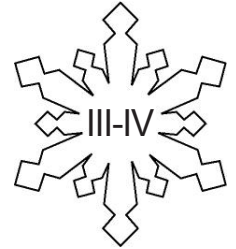


Clouds

Levels



Grades 5-8

Overview:

In this activity, students will watch condensation occur. They will learn the main stages of the water cycle and understand cloud formation and types and what they mean for weather prediction.

Objectives:

The student will:

- identify cloud types;
- make weather predictions based on cloud type; and
- create an artistic representation of a cloud.

GLEs Addressed:

Science

- [5-8] SA1.1 The student demonstrates an understanding of the processes of science by asking questions, predicting, observing, describing, measuring, classifying, making generalizations, inferring, and communicating.
- [6] SD3.1 The student demonstrates an understanding of cycles influenced by energy from the sun and by Earth's position and motion in our solar system by connecting the water cycle to weather phenomena.
- [7] SD3.1 The student demonstrates an understanding of cycles influenced by energy from the sun and by Earth's position and motion in our solar system by describing the weather using accepted meteorological terms (e.g., pressure systems, fronts, precipitation).

Whole Picture:

Clouds are formed when water on Earth evaporates and forms water vapor held in the air. As warm air rises, cooling occurs. The cooler the air, the smaller the amount of water vapor it can hold, therefore some of the water vapor is forced to condense onto tiny particles (dust, pollution) floating in the atmosphere. A small drop of water forms around each particle. A cloud is a visible *mass* of such water in the form of small droplets or ice crystals that are small enough to stay suspended in the atmosphere.

Clouds can be categorized into three *basic* types: cirrus, cumulus and stratus.

Cirrus clouds are characterized by thin, wispy strands that appear high in the sky, generally between 20,000 and 40,000 feet (6 to 12 kilometers), but may be even higher. This is the equivalent of several miles, as one mile equals 5,280 ft. Here the water droplets freeze and form ice crystals. High winds blow the clouds into long streamers thin enough for sunlight and moonlight to pass through. Airplanes traveling at such heights leave condensation trails that can turn into cirrus clouds. A thickening, or abundance, of cirrus clouds can be an indication of an approaching frontal system. In Latin cirrus means "curl of hair."

Cumulus clouds are characterized by puffy, billowing towers of white that can extend for thousands of feet, usually beginning with flat bases ranging from 4,000 to 8,000 feet (1.2 to 2.5 kilometers) in altitude. Such clouds are formed when warm, moist air rises. As it rises, the air cools and condensation occurs. The size of a cumulus cloud depends on the force of the upward movement of the air and the amount of moisture in the air.

The presence of cumulus clouds indicates fair weather; however, when such clouds continue to grow

larger and taller, forming cumulonimbus clouds, they can produce heavy rain, lightning, winds, hail, and even tornadoes. In Latin, cumulus means “heap.”

Stratus clouds are characterized by their uniform look, blanketing the sky with white and grey. Such clouds are often formed when a layer of warm, moist air passes over a layer of cool air. As the two layers meet, the warm air cools to the point of condensation, forming a blanket-like cloud. These flat, featureless clouds are low in altitude (usually 2,000 to 7,000 feet or 2 to .5 kilometers) and obscure the sun.

Stratus clouds can reach the ground. When this happens these clouds are called fog. Above-ground, stratus clouds may bring light mist, drizzle, or light snow. In Latin, stratus means “layer.”

Terms such as altostratus, stratocumulus and cirrostratus help further define cloud types based on a combination of structure and height. The term “nimbus” is added as a prefix or suffix to indicate the presence of precipitation. A nimbostratus cloud is a stratus cloud that is producing rain or snow. A cumulonimbus cloud is a cumulus cloud producing stormy, wet weather.

Clouds appear white because the water droplets and ice crystals reflect sunlight. Light is composed of a spectrum of colors that, when added together, appear white to the human eye. Clouds appear gray when the droplets begin to crowd together so that the sunlight cannot pass through. This can also be an indication the cloud is becoming oversaturated and will produce rain, snow, or hail.

Materials:

- Construction paper (1 sheet per student)
- Cotton balls
- Clear container (Tupperware) w/clear lid, small but big enough for tin can lid
- Salt
- Tin can lid
- Soda bottle lids
- Warm water
- GLOBE Cloud Chart
- STUDENT WORKSHEET: “Cloud Forecasting”

Activity Procedure:

1. Explain that the water cycle includes evaporation, condensation, and precipitation.
2. The condensation stage is where clouds are formed. Water vapor evaporates into the air, forms tiny droplets, and condenses. However, clouds can only form when there is a surface for the tiny droplets of water to gather. Microscopic particles (particulates), such as dust, usually serve this purpose.
3. Perform the following demonstration:
 - a. Fill a soda bottle lid with water and place it on the bottom of the clear container.
 - b. Place a few salt grains onto the lid of a tin can.
 - c. Set on top of the soda bottle cap.
 - d. Carefully add warm water to the dish so that the bottom is covered. Do not wet the tin can lid.
 - e. Cover the container with a lid or saran wrap. Make sure it is tightly covered.
 - f. Wait 20 minutes. While waiting, continue with the activity.
 - g. After 20 minutes, you should see water gathered around the salt. The water evaporated off the bottom of the container, but instead of escaping into the air, it attached itself to the salt, just like it does to dust and other microscopic particles in the air.
4. There are several different types of clouds. Knowing the types of clouds can help one to determine what the weather is going to be like in the near future. Combining this information with wind direction

can help one to make a more accurate prediction. Use the GLOBE Cloud Chart to help demonstrate the different types of clouds and what they mean for the weather.

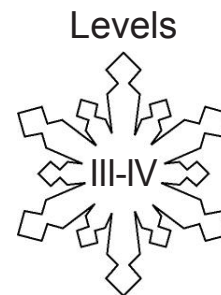
- Cirrocumulus – high clouds with puffy, patchy appearance, often with wave-like patterns, the clouds indicate rain, thunder, lightning, and wind, never produce rain or snow
 - Cirrostratus – high clouds, light gray or white, often thin with light seen through them; usually covers much of the sky; never produce rain or snow
 - Cirrus – high clouds, thin wispy and feathery, composed of ice crystals, never produce rain or snow
 - Alto cumulus – middle clouds with puffy, patchy appearance
 - Altostratus – middle clouds, light gray and uniform in appearance, generally covering most of the sky, they indicate the likelihood of precipitation
 - Cumulus – low clouds, puffy and look like cotton balls, popcorn, or cauliflower
 - Stratus – low clouds, light or dark gray, generally uniform in appearance, cover most of the sky, often accompanied by mist, fog is a stratus cloud
 - Stratocumulus – low clouds with irregular masses, rolling or puffy in appearance, sometimes space between clouds, they often form after a rainstorm
 - Nimbostratus – low and middle dark gray clouds with precipitation falling from them
 - Cumulonimbus – large clouds with dark bases and tall billowing towers, can have sharp well defined edges or anvil shape at the top, can be accompanied by thunder, usually are seen when there is a storm or storm coming
5. Instruct students to identify the clouds that mean there will be rain.
 6. Instruct students to identify the clouds that signal clear weather.
 7. Hand out the construction paper and cotton balls. Ask each student to pick a cloud type and using a pen, write the name of the cloud at the top of the paper. Instruct students to create a representation of the cloud by stretching and gluing the cotton balls to the construction paper.
 8. Hang the cloud pictures up in the room so students will remember their names.
 9. Hand out the STUDENT WORKSHEET: “Cloud Forecasting” and work as a class to brainstorm and write a hypothesis. Instruct students to complete the Data Section for Day 1.
 10. Each day for the remainder of the week, complete the Data Section for that day. At the end of the 5 days, instruct students to complete the remainder of their worksheets.

Answers:

Answers will vary.

Name: _____

Cloud Forecasting Student Worksheet



Testable Question:

Are clouds a predictable method of forecasting the weather for the next day?

Hypothesis:

Write a hypothesis that will test the “testable question” above.

Data:

Each day, list the type of clouds you see and what you predict the weather will be on the next day. Then, on the following day, list the general state of the weather (warm or cold; rain, snow, or clear).

Day	Cloud(s)	Weather Prediction		Actual Weather
		Warmer or Colder	Rain, Snow or Clear	
1				
2				
3				
4				
5				

Analysis of Data:

1. How many of your predictions were correct? _____

Conclusion:

1. Write your conclusion in complete sentences below.

2. Was your hypothesis proved or disproved? Explain your answer.

3. How did you come to your conclusion?
