

### Follow-up Discussion

The most important part of this segment is to examine both the facts and beliefs generated by the class in their "Everything We Know About..." list.

Research indicates that students will retain their previous misconceptions — in preference to the new information — until they actively recognize and correct their own errors. Because of this, it is important to lead students to the correct ideas while identifying and correcting any misconceptions from the class list. After reviewing the list, encourage students to share the answers they got to the questions raised, before viewing the program.

Raising a thought-provoking question is a good way to assess the overall depth of understanding. A couple of suggestions are listed below:

- Why does it rain? What happens to rain after it falls?
- How are rain, snow, sleet and hail each formed?

### Follow-up Activities

- The class should gather around a common work place where they can all view a hot pot of water and a bowl of ice. Explain to the class that you are going to hold the bowl of ice over the boiling water. Place a pie tin so that the water that drips from the bottom of the bowl will collect in the tin. The class should observe and share what they observe happening.
- Divide the class into partners. Give each pair a plate and three different colored crayons. Each pair should make a shallow puddle of water on their plate and use a purple crayon to make a circle around their puddle. Have students choose different places in the room to place their plate (i.e. in the sun, in the shade, near a heat register, etc.). Let the plates sit for about an hour. During that time, make some predictions about what will happen to the puddles of water. After about one hour has passed, have each pair check their puddles. Each pair should make an orange circle around their puddles. After another hour or overnight, re-check the puddles. Each group should make a black circle around the new puddle and compare the puddles again. Have a discussion about what happened to the water.

### Suggested Internet Resources

Periodically, Internet Resources are updated on our web site at [www.LibraryVideo.com](http://www.LibraryVideo.com)

- [eo.ucar.edu/webweather](http://eo.ucar.edu/webweather)  
"Web Weather for Kids" describes basic weather concepts and provides some great experiments, activities and games.
- [www.k12.atmos.washington.edu/k12/pilot/water\\_cycle](http://www.k12.atmos.washington.edu/k12/pilot/water_cycle)  
"Water: A Never-Ending Story" is an interactive educational module sponsored by NASA and developed by K-12 educators. It is part of the "Live From Earth and Mars" web site.
- [www.erh.noaa.gov/er/cae/svrwx/hail.htm](http://www.erh.noaa.gov/er/cae/svrwx/hail.htm)  
This site from the National Weather Service offers facts on hail and provides a diagram explaining how it forms.

### Suggested Print Resources

- DiSpezio, Michael. *Weather Mania: Discovering What's Up and What's Coming Down*. Sterling Publishing Company, New York, NY; 2003.
- Simon, Seymour. *Weather*. Harper Collins Publishers, New York, NY; 2006.
- Singer, Marilyn. *On the Same Day in March: A Tour of the World's Weather*. Harper Collins Publishers, New York, NY; 2002.

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### TITLES

- ALL ABOUT CLIMATE & SEASONS
- ALL ABOUT METEOROLOGY
- ALL ABOUT RAIN, SNOW, SLEET & HAIL
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## All About Rain, Snow, Sleet & Hail

Grades K-4

This guide is a supplement, designed for educators to use when presenting this program in an instructional setting.

**Before Viewing:** Research in learning suggests that it is important for the teacher to discover what the students know — or think they know — about a topic, at the start of a new unit, so that their accurate conceptions can be validated and reinforced, and their misconceptions identified and corrected. Therefore, after reviewing the pre-viewing discussion questions provided for your class, create an "Everything We Know About..." list. Preview key vocabulary words and have students raise additional questions they hope will be answered by this program. Most importantly, students should be told that as "science detectives" they must listen closely, so that after viewing the program, they will be able to tell whether or not the facts/beliefs they put on their list were scientifically accurate.

**After Viewing:** After a brief discussion about the program, challenge your "science detectives" to prove or disprove the accuracy of the facts they put on their "Everything We Know About..." list. Discuss what else they learned and use the follow-up questions and activities to inspire further discussion. Encourage students to research the topic further with the Internet and reading resources provided.



## Program Summary

The three basic ingredients that make up our weather are air, sunshine and water. Without these ingredients, it would never rain or snow. All of our weather takes place within our atmosphere, which is a blanket of air surrounding the Earth. Though invisible to us, the atmosphere is made of tiny particles that take up space and press down on everything on Earth. More air particles means heavier air; this is known as high pressure. Less air particles mean lighter air, or low pressure.

The sun warms the Earth and the air, and turns liquid water into a gas called water vapor. The change from liquid to vapor is called evaporation. Warm air tends to rise over cooler air, carrying this invisible water high up into the atmosphere. As the water vapor rises, it begins to cool, and tiny liquid water droplets form around dust particles in the sky, creating clouds. This cooling back into a liquid is called condensation. The droplets grow larger and eventually get too heavy to stay in the sky and fall as rain, snow, sleet or hail. Scientists who study the weather call this precipitation. Evaporation, condensation and precipitation are all part of a process called the water cycle.

Precipitation usually starts as frozen water in the form of snow or ice high in the sky. It can fall as rain when the temperature of the air near the Earth's surface is above freezing. Freezing rain results if the rain falls through a very cold layer of air close to the ground. When the rain hits anything on the surface, it immediately turns to ice, creating a slippery glaze over everything. Snow is the result if the moisture in the clouds freezes into six-sided water crystals that we call snowflakes, and the air all the way from the clouds to the ground remains very cold. Sleet is the result when snow falls and starts to melt, and then refreezes as slushy ice pellets. Finally, hail is precipitation that results from summer thunderstorms when frozen water leaving the thunderclouds begins to melt as it falls. At that point, strong winds blow it back up into the cloud, where it collects more water, that refreezes and increases the size of the ice ball. Hailstones are balls of ice (from the size of a pea to the size of a softball), which eventually become too heavy to stay up in the air, and fall as hail. Precipitation in all of its forms is part of Earth's water cycle and a part of weather.

## Vocabulary

The following words are included for teacher reference or for use with students. They are listed in the order in which they appear in the video.

**weather** — The changes in temperature and precipitation caused by the interaction of air, sunshine and water in the Earth's atmosphere.

**atmosphere** — The layer of air that surrounds the Earth.

**air pressure** — The weight of the air. Air that is heavier has high pressure, and lighter air has low pressure.

**wind** — Air moving from high to low pressure areas. Wind moves at different speeds, from gentle breezes to hurricane force winds.

**water vapor** — Water in the form of an invisible gas.

**evaporation** — The change of liquid water into an invisible gas called water vapor.

**condensation** — The change of water vapor from a gas to a liquid.

**water cycle** — The never-ending process that recycles Earth's water supply by using energy from the sun. The water cycle has three stages: evaporation, condensation and precipitation.

**rain** — Liquid water that condenses in clouds as tiny droplets and falls back to Earth when heavy and warm enough.

**freezing rain** — Rain that develops when falling snow encounters a layer of warm air and melts. As the rain continues to fall, it passes through another layer of cold air just above the surface and cools to a temperature below freezing. This type of precipitation freezes upon impact with cold surfaces.

**meteorologists** — Scientists who study the weather.

**snow** — Water that condenses in clouds as tiny droplets and freezes into solid crystals or snowflakes when the temperature of the air around the cloud is below freezing. This liquid falls back to Earth as snow when the air from the cloud all the way to the ground is also below freezing.

**sleet** — Frozen raindrops that leave a cloud as snow, melt as they pass through a layer of warm air and refreeze as they pass through a cold air layer near the ground.

**hail** — Ice pellets (from the size of a pea to the size of a softball), that are usually formed in thunderstorms. The water leaving the thunderclouds, high in the air, is frozen as it falls, but starts to melt when it hits warm air. At that point, strong winds blow it back up into the cloud, where it freezes again and collects more water that increases the size of the ice ball. Eventually it becomes too heavy to stay up in the air, and falls as hail.

## Pre-viewing Discussion

Before students generate their list of "Everything We Know About..." this topic, stimulate and focus their thinking by raising these questions so that their list will better reflect the key ideas in this show:

- What is rain? How is rain made?
- Why is water so important to life on Earth?

After the class has completed their "Everything We Know About..." list, and before watching the show, ask them what other questions they have that they hope will be answered during this program. Have students listen closely to learn if everything on their class list is accurate and to hear if any of their own questions are answered.

## Focus Questions

You may wish to ask your class the following questions to assess their comprehension of key points presented in the program:

1. What are the basic ingredients that go into making Earth's weather?
2. How does the atmosphere make life possible on the Earth?
3. What is air pressure? How can air pressure change?
4. What causes the wind to blow?
5. What is evaporation?
6. What causes liquid water or moisture on the Earth's surface to change into water vapor?
7. What is condensation?
8. When does water vapor in the atmosphere become visible to us?
9. How do clouds form?
10. What examples of condensation do we see on the Earth?
11. What is precipitation?
12. What does the temperature of the air at cloud level have to do with precipitation?
13. Why is Earth known as the water planet?
14. What happens when huge masses of warm air and cold air run into each other?
15. Why does precipitation fall from the clouds?
16. Is it possible that rain could start out as snow? Explain.
17. What is freezing rain?
18. What does it take for precipitation to hit the Earth's surface as snow?
19. What is sleet?
20. How is hail formed? How big can hail get?