

Snowball Fight

Objective

Students will learn how snow helps crops grow and play a game using facts and words about snow.

Background

Weather is the condition of the air that surrounds the earth. The air that surrounds the earth is called the atmosphere. So weather is the condition of the atmosphere. The atmosphere contains the gases of nitrogen, oxygen and small amounts of other gases. The atmosphere also contains water vapor and particles of dust. The lowest layer of the atmosphere is called the troposphere. The troposphere is where most of the weather occurs. The troposphere begins at the surface of the earth and extends to 6-10 miles from the surface. The weather conditions in the troposphere and surface of the earth depend upon temperature, air pressure, wind and moisture.

Precipitation occurs when the cooling of the air causes moisture to fall in the form of rain, snow, sleet or hail. Rain will fall when the clouds formed by drops of water become so heavy that the air cannot hold it up any longer. Ice crystals form when the temperature of the clouds is below freezing. If the air temperature near the ground is as low as 37 degrees F., the ice crystals can turn to snow. The crystals will change to sleet if the air temperature is between 37 degrees F. and 39 degrees F.

Weather conditions have a huge impact on agriculture. Producers need clear weather to plant and harvest crops. The crops need sunlight and rain to grow. A frost or storm can damage and/or kill some of a crop. But some kinds of cold weather are good for certain kinds of crops. Snow can help protect the soil and plants from severe freezing and heaving (expansion that causes the soil to buckle and crack). In some cases, the gradual thawing of snow improves the soil's texture.

Oklahoma's number one crop is winter wheat. Winter wheat is planted in the fall and sprouts and grows until winter weather sets in. It lies dormant (stops growing) through the winter, matures in the spring, and is harvested early in the summer.

The weather can affect winter wheat in many ways. If the weather is too wet in the fall, farmers have trouble getting the wheat planted. Wet weather at flowering or harvest can also cause problems. Hail can beat the wheat down. But snow can be good for winter wheat. Snow helps protect winter wheat from a major enemy: fluctuating temperatures.

When the thermometer shifts above and below freezing, the ground expands and contracts, dislodging the roots from the soil. That won't happen if there is a nice blanket of snow. Some scientists also believe snow that falls late in the spring can help fertilize crops. Snow contains nitrogen and other nutrients plants need. It also has quite a bit of moisture. If it falls on ground that is not frozen, the nutrients and moisture in the snow can penetrate the soil.

Oklahoma Academic Standards

GRADE 3

Speaking and Listening:
R.1,2,3; W.1,2. Reading and
Writing Process: R.1. Critical
Writing: W.1

Life Science: 1-1; 3-2;
4-2,3,4. Earth Systems: 2-1,2
Social Studies: 3.1E

GRADE 4

Speaking and Listening:
R.1,2,3; W.1,2. Reading and
Writing Process: R.4. Critical
Writing: W.1

Life Science: 1-1
Social Studies: 1.3,4,5

GRADE 5

Speaking and Listening:
R.1,2,3; W.1,2. Reading and
Writing Process: R.3. Critical
Writing: W.1

Life Science: 2-2. Earth
Systems: 2-1,2

Materials

assorted books about snow

white paper

pencils

Music player with winter-
theme music

Vocabulary

air—the invisible mixture of odorless tasteless gases (as nitrogen and oxygen) that surrounds the earth

atmosphere—the whole mass of air surrounding the earth

dormant—having growth or other biological activity much reduced or suspended

nitrogen—a colorless tasteless odorless element that occurs as a gas which makes up 78 percent of the atmosphere and that forms a part of all living tissues

oxygen—a colorless tasteless odorless gaseous element that constitutes 21 percent of the atmosphere and is found in water, in most rocks and minerals, and in numerous organic compounds

precipitation—water or the amount of water that falls to the earth as hail, mist, rain, sleet, or snow

rain—water falling in drops from clouds

snow—small white ice crystals formed directly from the water vapor of the air

troposphere—the portion of the atmosphere which extends from the earth's surface to the bottom of the stratosphere and in which temperature generally decreases rapidly with altitude

weather—the state of the atmosphere in regard to heat or cold, wetness or dryness, calm or storm, clearness or cloudiness

Food and Fun

On a snowy day, make Snow Ice Cream. (Go to “Food and Fun” on the website for a recipe.)

English Language Arts

1. Read and discuss background and vocabulary.
 - Provide books about snow for students to read. Books are listed in the “Additional Reading” section included with this lesson.
 - Hand out white sheets of paper.
 - Each student will write one word or fact about snow, either from the discussion of background or from their own research.
2. Play “Snowball Fight.”
 - Students will wad up their sheets of paper with facts about snow.
 - Turn on music.
 - Students will toss (not throw) their paper wads from student to student, in no particular order.
 - After a few minutes, stop the music.
 - Each student will smooth out the “snowball” he or she is holding, write another word or fact related to snow, and wad the paper up again.
 - Start the music, and repeat two or three times.
3. Each student will write a story, using all the words or facts on the last snowball caught. Students may also work together in groups to write their stories.

Science

1. Use this experiment to show students how raindrops form:
 - Pour just enough water into a quart jar to cover the bottom.
 - Turn the jar lid upside down, and set it over the mouth of the jar. Place 3-4 ice cubes on top of the upturned lid on the outside of the jar.
 - Students will observe the underside of the lid for 10 minutes.

Explain: The lid will look wet, and finally water drops will form on the underside of the lid. That is because some of the liquid water in the bottom of the jar evaporates. The water vapor condenses and then changes back to a liquid when it hits the cool underside of the lid. As the amount of liquid increases, drops form on the underside of the lid. In nature, liquid water evaporates from open areas such as streams, lakes and oceans. This vapor rises and condenses as it hits the cooler upper air.
2. Fill a quart jar about half full with water. Place a strip of masking tape to mark the water level.
 - Put the jar in the freezer overnight.
 - Students will look at the jar and report their observations. (Note: If you are using a glass jar, make sure you do NOT cap it.)
3. Is five centimeters of snow the same as five centimeters of rain? Ask students and record answers on the board.
 - Students will conduct an experiment to test their answers.
 - Students will measure two inches from the bottom on a container and mark.

—Students will place snow in the container up to the mark.

—After the snow has melted, students will measure again and record the results. What is the answer to the original question?

4. Students will design a chart to keep track of sunny, rainy and snowy weather and draw conclusions about the different seasons.
5. Students will track Oklahoma temperature and precipitation across the winter months and represent the data in tables and graphs.
6. Students will conduct experiments growing wheat with and without water and record results.

Social Studies

1. Students will use online or library resources to research Oklahoma weather patterns and best weather conditions for growing winter wheat.
—Students will research best weather conditions for growing winter wheat.
—Students will research patterns of Oklahoma weather.
—Students will design a chart to determine if Oklahoma weather is suitable for growing winter wheat.
2. Students will construct an argument with evidence to show why winter wheat will grow in Oklahoma while oranges will not.
3. Students will conduct online or library research to explain why Oklahoma's wheat crop fails in certain years. What weather conditions cause it to succeed?
4. Students will use online or library resources to determine why we grow mostly winter wheat in Oklahoma while farmers in other parts of the country grow other kinds of wheat? Students will research to find conditions necessary for different kinds of wheat.
5. Students will use online or library resources to find weather similar to Oklahoma's in different parts of the world.
6. Students will suggest ways to protect Oklahoma wheat crops from the damaging effects of freezing weather.

Extra Reading

Branley, Franklin M., *Sunshine Makes the Seasons*, Collins, 2005.

Lackey, Jennifer D.B., *The Biography of Wheat*, Crabtree, 2007.

Locker, Thomas, *Water Dance*, Sandpiper, 2002.

McKneally, Ranida, and Grace Lin, *Our Seasons*, Charlesbridge, 2007.

Paulsen, Gary, *Winter Room*, Scholastic, 2009.

Randall, Alison L., and Bill Farnsworth, *The Wheat Doll*, Peachtree, 2008.

Yolen, Jane, and Greg Shed, *Harvest Home*, Harcourt, 2002.

Ag Career: Atmospheric Scientist

Atmospheric science is the study of the physics and chemistry of gases, clouds, and aerosols that surround the planetary bodies of the solar system. Research in atmospheric science focuses upon such areas as:
Climatology—the study of long-term weather and temperature trends,
Dynamic meteorology—the study of the motions of the atmosphere,
Cloud Physics—the formation and evolution of clouds and precipitation,
Atmospheric chemistry: the study of atmospheric chemical reactions,
Oceanography—the study of the Earth's oceans and how they affect the atmosphere.
Some atmospheric scientists study the atmospheres of the planets in our solar system, while others study the Earth's atmosphere.

Atmospheric scientists may work in field research, laboratory studies and/or computer analysis and modeling. Good communication skills (oral and written) are necessary.

Most atmospheric scientists in the US work for the federal government—for the National Weather Service and other branches of the National Oceanic and Atmospheric Administration (NOAA); as well as NASA; the Environmental Protection Agency; the Forest Service; the Department of Defense; and the Department of Energy. Atmospheric scientists may also work for private weather services, television and radio stations, state governments, colleges and universities, and public utilities. They often work in groups where their different skills and backgrounds can be combined to study specific scientific questions. These multidisciplinary teams may include aerospace engineers, electronics engineers, computer and communications technicians, photographers, science writers, data systems analysts, astronauts, pilots, astronomers, physicists, geologists, oceanographers, and biologists