



4th - 8th Grade
4-H PROJECT
LESSON
PLANS:

4-H Helps
YOUTH
into the
21st Century



Series **2**

**“Mad About Meteorology -
Cloud Connections”**



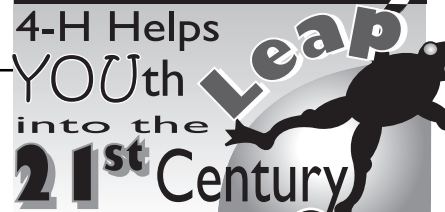
Dear Project Helper,

This lesson, “Mad About Meteorology – Cloud Connections,” is a part of an effort by the 4-H Youth Development Department of the LSU AgCenter to provide teaching activities that are fun as well as educational. We are pleased that you have agreed to work with youth as they learn and grow. You will help them learn scientific concepts that they will use for many years. This lesson focuses on meteorology and addresses Louisiana Content Standard Science Benchmarks as follows:

- ESS-M-A10: Explaining (illustrating) how water circulates—on and through the crust, in the oceans and in the atmosphere—in the water cycle (1, 4)
- ESS-M-A11: Understanding that the atmosphere interacts with the hydrosphere to affect weather and climate conditions (1, 4)
- SI-E-A2: Planning and/or designing and conducting a scientific investigation (2, 3)
- SI-E-A3: Communicating that observations are made with one’s senses (1, 3)
- SI-E-B6: Reviewing and asking questions about the results of investigations (1, 3, 4)

Therefore, this lesson and its activities should strengthen students for LEAP testing. We appreciate your being a part of this effort.





Learning Activity: Mad About Meteorology – Cloud Connections

Key Concepts:

Clouds can be important predictors of the weather

How Can Members Apply this Information?

1. Observe clouds to predict weather patterns, and make daily plans accordingly.
2. Teach what they have learned about the connection between clouds and weather patterns to others.

Getting Ready:

1. Gather supplies needed for the “Make a Cloud” experiment. Practice the experiment.
2. Read the background information and lesson plan.
3. Reproduce (and laminate if you wish) Cloud Connections game cards.
4. Reproduce Cloud Chart handout.

What You Need for the Lesson:

1. one quart or gallon glass jar, depending on size of group
2. warm tap water
3. matches
4. flashlight
5. sheet of black paper
6. tape
7. bag of ice large enough to fit over mouth of jar
8. game cards for Cloud Connections matching game

Track:

Meteorology

Life Skills:

Communication,
Decision-making,
Problem-solving

Character Focus:

Citizenship and
Responsibility

Project Skill:

Becoming aware of weather and cloud terminology, gaining the ability to observe and classify types of clouds, identifying components required for a cloud to form, recognizing effects of clouds on weather patterns

Louisiana Content Standards

Benchmarks:

ESS-M-A10, ESS-M-A11
SI-E-A2, SI-E-A3, SI-E-B6

Delivery Mode:

4-H Club meetings, science class, school enrichment, after-school programs

Time Allotted:

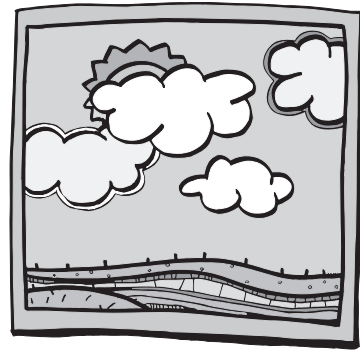
25 minutes: Cloud Connections matching activity only
45 minutes: All activities

Minimum Number of Participants:

6 participants

Background:

Clouds form from water that has evaporated (caused by sunlight) from lakes, oceans and rivers, or from moist soil and plants. The evaporated water, called water vapor, mixes with the air. Clouds form when warm, humid air rises and cools, causing the water vapor in the air to condense and form clouds. Clouds are water, either small liquid water drops or tiny pieces of ice that are spread out from each other. The droplets of water have the ability to change from a vapor to a liquid to a solid, and back again. When water changes form, scientists say that it changes “phase.”



The types of clouds that form depend on the temperature of the air and how much water is in the air. Our air has to be just a little bit dirty for clouds to form. That’s because water vapor needs a surface on which to condense. Fortunately, even the cleanest air has some microscopic particles of dust, smoke or salt for water droplets to cling to, so the air is rarely too clean for clouds to form. In addition, clouds can disappear as quickly or slowly as they form. Some last 10 minutes, some 10 days. Some clouds last an entire season.

Clouds are an important part of the weather because clouds keep the Earth cool in the daytime and warm at night. Clouds are only one of the many factors, including fronts, winds and pressure systems, used to predict weather, but they are easily observed. A meteorologist is a scientist who studies the weather and atmosphere. The term meteorologist comes from the ancient Greek term “meteor” or “things in the air.”

Clouds are generally classified based on characteristics such as altitude, appearance or origin. In appearance, clouds may be thick or thin. The types of clouds that form depend on how cold the air is and how much water is in the air. Just by studying a cloud’s shape, a meteorologist can tell a great deal about the cloud. There are four main types of clouds: cumulus, stratus, cirrus and nimbus. Stratus clouds are a uniform gray and usually cover most of the sky. Cirrus clouds are thin and high in the sky. Cumulus clouds are lumpy and can stretch high into the sky.

The names of these four types of clouds can change by adding a prefix that designates their level in the atmosphere.

- Low-level clouds (generally found below 6,500 feet) are usually composed of liquid water droplets, but they can have snow and ice crystals in cold weather.
- Mid-level clouds (generally found between 6,500 and 23,000 feet) are composed of liquid water droplets in summer and a liquid droplet-ice crystal mix in winter. Mid-level cloud names are preceded by an “alto” prefix.
- High-level clouds: (generally found above 20,000 feet) are composed of ice crystals and tend to be very thin and wispy. High-level cloud names have a “cirro” prefix.

The type of cloud predicts the type of weather. For example, a stratus cloud depicts light rain, and a cumulus cloud foretells fair weather.

Fog is a cloud at ground level. It can form on clear nights when there is a lot of moisture in the air. A cloudless sky allows heat to escape up into space. Then the air near the ground cools enough for the moisture in the air to condense into a cloud (fog).



4th-8th Grade “Mad About Meteorology - Cloud Connections”

What You Say:	What You Show or Do:	What Participants Do:
<p>Have you ever heard the saying: “Red sky at morning, sailors take warning; red sky at night, sailor’s delight?” How about “rain before seven (in the morning), clear before eleven?” Have you ever counted the seconds between when you see lightning and when you hear thunder to predict how close it is? Do you think these are good ways to predict the weather?</p>	<p>Allow time for answers and discussion. Encourage participants to share their own weather forecasting wisdom. Answers will vary.</p>	<p>Discuss and respond to questions.</p>
<p>What do we call a scientist who studies the weather? (Meteorologist) Just by studying a cloud’s shape, a meteorologist can tell a great deal about the cloud and how it can help predict the weather. Can you think of other occupations that are directly related to weather? (TV weather forecaster, airport flight controller, fisherman, boat captain, farmer, pilot, environmentalist, soil and water conservation agent, ecologist, agronomist, geologist, oceanographer and climatologist)</p>	<p>Allow time for responses.</p>	<p>Respond and explain the connection between the careers and weather.</p>

4th-8th Grade “Mad About Meteorology - Cloud Connections”

What You Say:	What You Show or Do:	What Participants Do:
<p>(Experience) Have you ever wondered what is inside a cloud? Let’s find out. Can I have five volunteers? We will make our own cloud inside this jar. As we do this demonstration, see if you can identify what three things are needed to make a cloud.</p> <p>(After Demonstration) (Share) What did you see in the jar? (A cloud) Where did the cloud come from? (The water in the bottom of the jar) How did the heat of the water affect the cloud formation? (Caused the water to evaporate and warmed the air, causing it to rise) What did the ice cubes do to help the clouds form? (Cooled the air, which made the water vapor condense) What role did the match and its smoke play in the cloud formation? (Gave the water droplets a surface to condense or grab on to)</p> <p>(Process) Could you identify the three main ingredients needed for clouds to form?</p> <ol style="list-style-type: none"> 1. moisture – there must be sufficient water vapor in the air to build a cloud. 2. cooling air – the air temperature decreases enough for water vapor to condense. 3. condensation nuclei – tiny particles, invisible to the human eye, such as dust, dirt and pollutants, provide surfaces on which water molecules can gather and condense into water droplets. <p>In the experiment, what provided each of these ingredients?</p>	<p>(Have a different participant do each step of the demonstration. Narrate each step.)</p> <p>Step #1: Tape the black piece of paper onto one side of the jar.</p> <p>Step #2: Pour the warm water into the jar until it is one-third full.</p> <p>Step #3: Light a match, hold it in the jar for a few seconds, then drop it in.</p> <p>Step #4: Quickly cover the jar with the bag of ice.</p> <p>Step #5: Shine the flashlight on the jar while the participants record their observations. (You should see a cloud form.)</p> <p>Ask the “Share” and “Process” questions.</p> <p>.</p>	<p>Observe demonstration to identify three components that form a cloud. Help with cloud-making demonstration. Respond to questions using observations.</p>



4th-8th Grade “Mad About Meteorology - Cloud Connections”

What You Say:	What You Show or Do:	What Participants Do:
<p>Now we know how clouds are made. Does that mean all clouds are alike? Clouds are generally classified based on characteristics such as altitude, appearance or origin. The type of cloud that forms depends on how cold the air is and how much water is in the air. Can you name some different types of clouds? (Answers: cirrus, cumulus, stratus, nimbus) Cirrus means high, wispy. Cumulus means pile (puffy like whipped cream). Stratus means flat layer, and nimbus means rain cloud. Nimbus clouds can be either cumulus (puffy) or stratus (flat).</p> <p>The names of these four types of clouds can change by adding a prefix which designates their level in the atmosphere. “Alto” means mid-level altitude. For example, cumulus clouds are at lower levels of altitude. Altopcumulus clouds are at mid-level altitudes. Or, the names can be combined. For example, stratocumulus clouds are puffy like cumulus clouds but are dark and full of water droplets like stratus clouds. Boaters know a storm is coming if flat clouds are getting lower or puffy clouds are getting higher.</p> <p>(Experience) We are going to play a game called Cloud Connections. By playing this game, you will learn about the different types of clouds and what type of weather they predict. Each of you will get a card, and on that card will be either a type of cloud, a weather condition or an activity that can be done in specific weather.</p>	<p>Distribute the mixed cards among participants, and give them a 5-minute time limit. The team of three that finishes first should signal by raising its hands. Have each group share why it matched with each other in the group, and have groups describe their clouds and weather patterns to the whole group. Then, if needed, encourage the group members to help switch the cards around to make better matches.</p> <p>Game Tips—if you have large groups you may want to:</p> <ol style="list-style-type: none"> 1. Make some kids the observers with a clipboard or paper to record the observations. 2. Make more than one set of cards (blue, green, yellow) and divide up larger groups by colors, then have the matching component. 3. For even larger groups, have many kids be the “cloud” and only a few become the weather and activities to match up. 	<p>Participants will use information provided, observations and problem-solving skills to make connections among weather, cloud types and appropriate activities.</p> <hr/> <p>Answer Key</p> <p>Team 1 - Cirrus cloud Description: high, thin wispy and feathery. Blue skies & fair weather. Mostly sunny day. Family barbecue.</p> <p>Team 2 - Altopcumulus cloud Description: Thick blue- gray blanket of puffy clouds at mid-level altitude. Possible rain. Bike riding (but not too far from home) or cloud gazing.</p> <p>Team 3 - Cumulonimbus cloud Description: Towering thunderheads; dark and menacing. Thunderstorms with heavy rain and winds on the way! Head your fishing boat to a safe harbor.</p> <p>Team 4 - Cumulus cloud Description: low, puffy and cauliflower-like; changes shape. Fair weather (grow during sunny days). Mow the yard, play outside sports.</p>



4th-8th Grade “Mad About Meteorology - Cloud Connections”

What You Say:	What You Show or Do:	What Participants Do:
<p>You must match three things: (1) the type of cloud and its description with (2) the weather and (3) the type of activity that would be best for the weather condition.</p> <p>(Share) Was it hard to match the clouds with the weather they predict? Would you change any of these matches? What makes these types of clouds different from each other? (Particles in the air, amount of moisture, temperature, amount of sunlight, etc.)</p> <p>(Process) Why is it important to be able to predict the weather from cloud formations? (To plan activities, to get to safety, to take precautions when driving, etc.) Clouds are only one of the many factors – including fronts, winds, pressure systems, etc. – that meteorologists use to predict weather. Clouds are also an important part of the weather because clouds keep the Earth cool in the daytime and warm at night.</p> <p>(Generalize) How can clouds affect your everyday life? (Encourage responses to cover both problems and benefits related to clouds. Example: They can bring rain that can cancel a baseball game but can also bring much-needed water to a farmer’s crops.)</p>		<p>Answer Key (cont.) Team 5 - Stratus cloud Description: flat layer of low clouds. Rain, drizzle or flurries likely. Read a book, play a video games.</p> <p>Team 6 - Altostratus cloud Description: Dense veils or sheets of gray or blue at mid-level altitudes. They look slightly striped. The sun looks as if it is being seen through frosted glass. Warm front coming through; possible rain Go swimming or play tennis before the rain comes</p>

4th-8th Grade “Mad About Meteorology - Cloud Connections”

What You Say:	What You Show or Do:	What Participants Do:
<p>Have you ever wondered what it is like inside a cloud? Has anyone ever traveled through fog? Fog is really a cloud that is touching the ground. Although it might sound like fun to be inside a cloud, fog can be very dangerous for planes, trains and automobiles. As citizens, we have the responsibility to take precautions when traveling through fog.</p> <p>(Share) What are some precautions you can take?</p>	<p>Allow time for responses.</p>	<p>Respond with ways to travel safely in fog. (Drive with your headlights on; drive slower than recommended speed; take your time, leaving early if necessary; never switch on your high beams; avoid driving distractions like loud music, talking on the telephone, etc.)</p>
<p>(Apply) How would you use what you have learned today to teach others the connection between clouds and weather patterns? What kind of experiment could you do to see how well you can use clouds to predict the weather? How will you share with family, friends and neighbors what you have learned about being cautious while traveling through fog?</p>	<p>Allow time for responses. (For ideas see “Ways to Help Members Learn More”)</p>	<p>Respond</p>

Ways to Help Members Learn More:

1. Cloud Forecasting – Have participants make a chart with the titles: Date/Time, Cloud Type, AM Weather, and Predicted PM Weather. Have them observe the clouds and the weather in the morning and write down their afternoon weather predictions.

2. Weather Wisdom – Have participants research the origin of “old weather wisdom” or weather superstitions.

3. Cloud Narratives – Clouds can disappear as quickly — or slowly — as they form. Some clouds last 10 minutes, some 10 days, some an entire season. Have participants write a narrative about the life of a cloud.

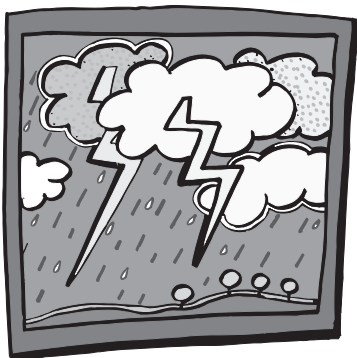
4. Cloud Painting – Have participants paint pictures using different shades of colors and different size brushes, sponges or art tools to make textures and types of clouds.

5. Cloud Construction – Have participants gather different materials that remind them of the types of clouds (cotton, feathers, dry pasta, tissues, pipe cleaners, puff paint etc.) and make cloud collages based on their imagination.

6. Cloud Gazing – Have participants study clouds and write descriptive adjectives about their observations.

7. Interview – Have participants research and interview someone with a weather-related occupation.

8. Poems – Have participants research and interpret poems related to clouds or have them compose their own.





Resources:

<http://www.weather.com/education/>
<http://www.weather.com/glossary/m.html#meteo>
http://www.uen.org/utahlink/weather/teacher_links.html
<http://www.proteacher.com/I10022.shtml>
<http://athena.wednet.edu/curric/weather/index.html>
<http://www.npac.syr.edu/textbook/kidsweb/weather.html>
<http://covis.atmos.uiuc.edu/guide/html/elementary.html>
<http://faldo.atmos.uiuc.edu/WEATHER/weather.html>
<http://www.nwlink.com/~wxdude/topics.html>
<http://www.wildwildweather.com>
<http://www.sln.org>
www.learningpage.com
<http://www.cln.org/themes/clouds.html>
<http://www.wildwildweather.com/>
<http://schoolscience.rice.edu/duker/weamakecld.html>
<http://teacher.scholastic.com/lessonrepro/reproducibles/profbooks/cloudkey.pdf> (This web site has the cloud key)



Career Options:

Meteorologist,
 TV weather forecaster,
 airport flight controller,
 fisherman,
 boat captain,
 farmer, pilot,
 environmentalist,
 soil and water
 conservation agent,
 ecologist agronomist,
 geologist,
 oceanographer and
 climatologist

Acknowledgments:

Louisiana Content Standards,
 published by Louisiana State
 Department of Education.

Developing Experientially
 Based 4-H Curriculum
 Materials, © 1999 by Purdue
 University, The Ohio State
 University.

*Sharing Science: Linking
 Students with Scientists and
 Engineers,* Published by the
 North Carolina Museum of
 Life and Science.

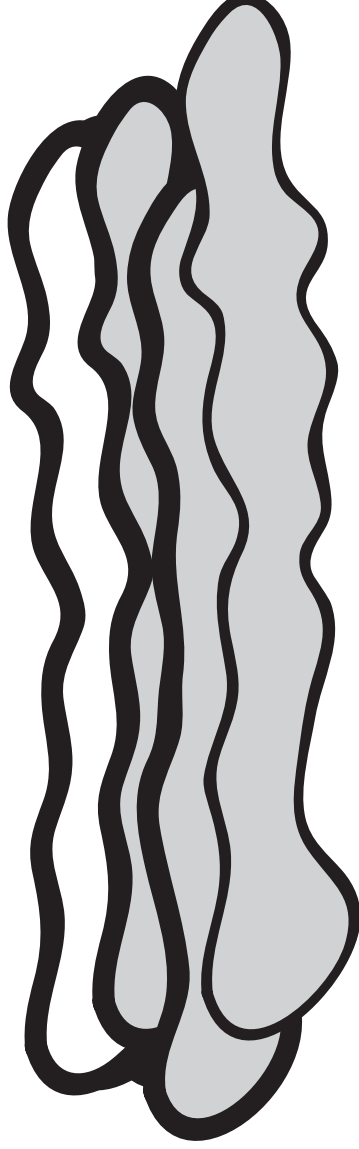


Cloud Connection Matching Game

**Blue skies
&
fair weather**

**Family
barbecue**

Cirrus Cloud



**Description: high, thin
wispy and feathery**

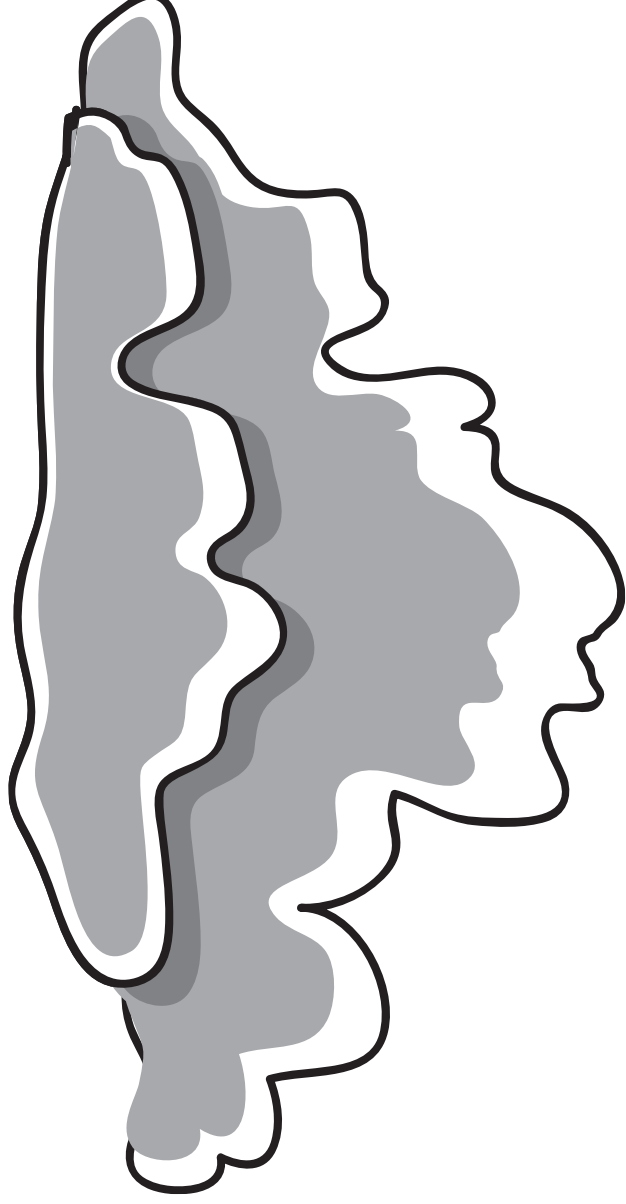
Cloud Connection Matching Game

Possible rain

**Bike riding (but not
too far from home)
or cloud gazing**



Alto cumulus Cloud



**Description: Thick blue-gray blanket
of puffy clouds at mid-level altitude**

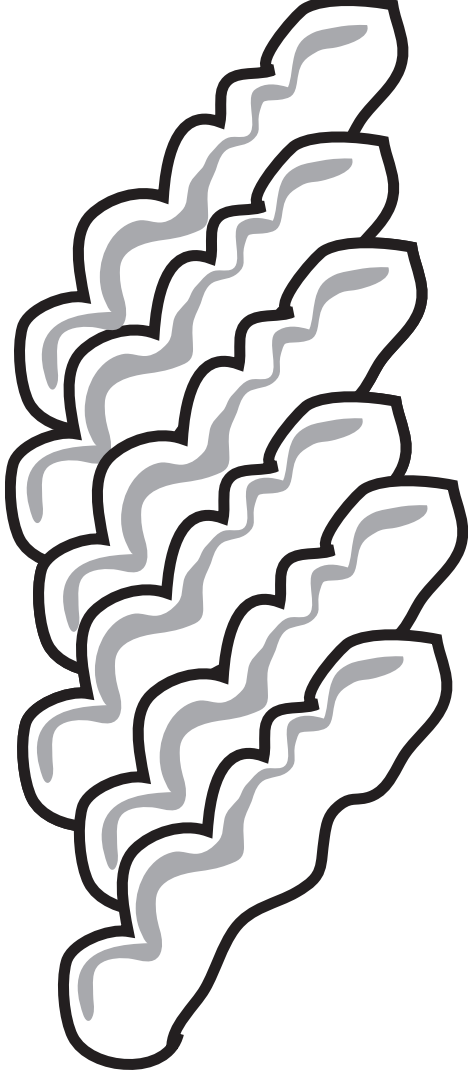
Cloud Connection Matching Game

**Thunderstorms
with heavy rain
and winds on
the way!**

**Head your
fishing boat to
a safe harbor**



Cumulonimbus Cloud



**Description: Towering thunderheads;
dark and menacing**

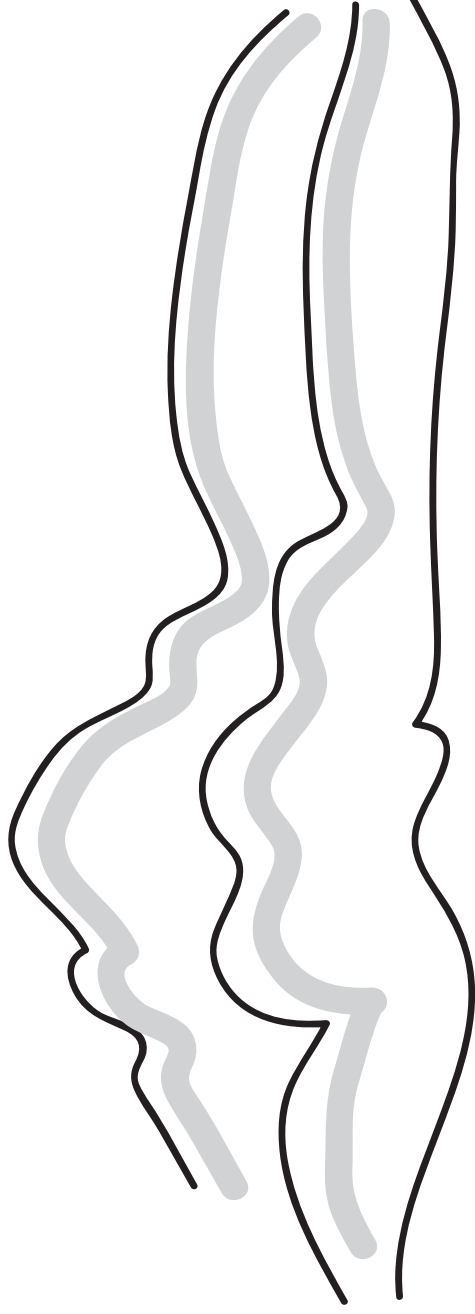
Cloud Connection Matching Game

**Fair weather
(grow during
sunny days)**

**Mow the yard,
play outside sports**



Cumulus Cloud



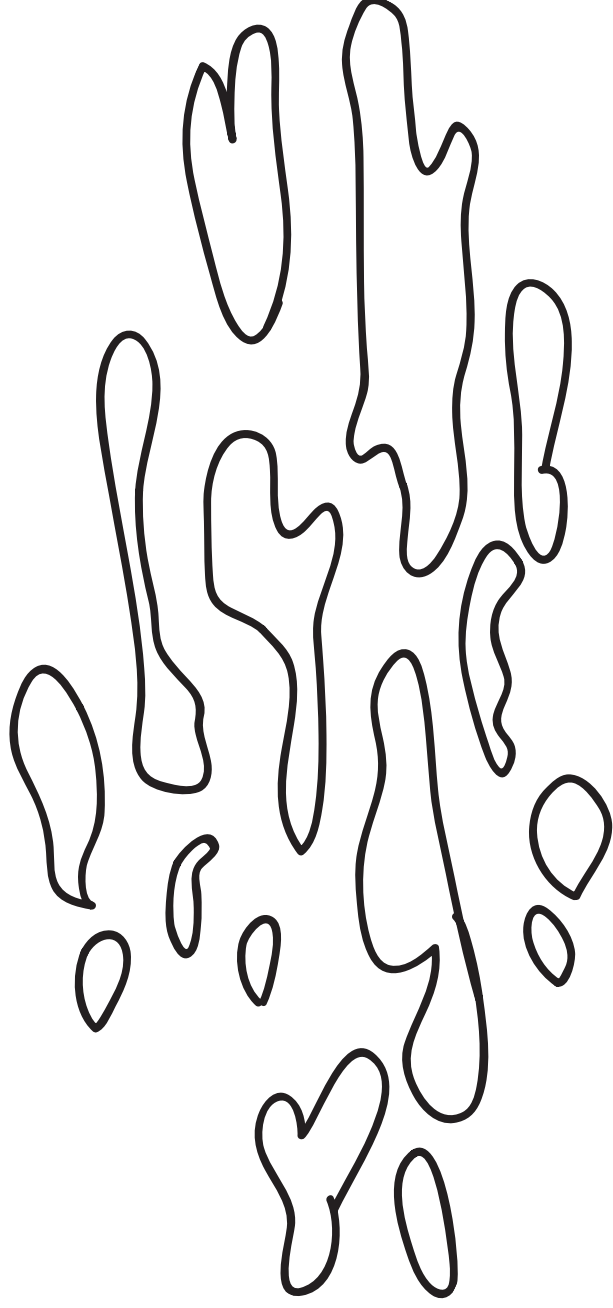
Description: low, puffy and cauliflower-like; changes shape

Cloud Connection Matching Game

**Rain, drizzle
or
flurries likely**

**Read a book,
play a
video game**

Stratus Cloud



Description: flat layer of low clouds

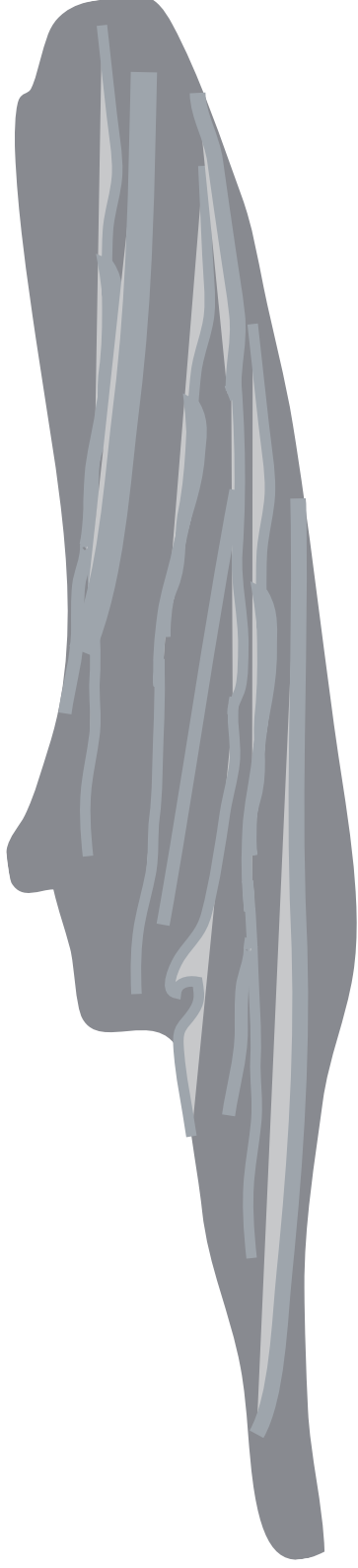
Cloud Connection Matching Game

**Warm front
coming through;
possible rain**

**Go swimming
or play tennis
before the
rain comes**



Altostratus Cloud



Description: Dense veils or sheets of gray or blue at mid-level altitudes. They look slightly striped. The sun looks as if it is being seen through frosted glass.



Cloud Chart



High Clouds: These clouds are composed of tiny ice crystals. Found at elevations of 20,000 to 40,000 feet.

Cirrus: thin, wispy and feathery; sometimes called “Mares’ Tails”	Sky blue: fair Sky gray-blue: warm front
Cirrostratus: thin and patchy, rarely seen.	Fair weather
Cirrocumulus: small, white flakes or ripples	Fair weather

Middle Clouds: This family of clouds occurs from 6,000 to 20,000 feet above the Earth, and they are either stratus or cumulus.

Allostratus: dense veils or sheets of gray or blue. They look slightly striped. The sun looks as if it is being seen through frosted glass.	Warm front Rain
Alto cumulus: patches or layers of puffy gray-whitish clouds	Possible weather change

Low Clouds: This family ranges from near the Warth to 6,500 feet in height.

Stratus: low and like fog. Only a tiny drizzle can fall from these clouds.	Fine drizzle
Nimbostratus: true rain clouds. They have a wet look, and often streaks of rain extend to the ground.	Rain
Stratocumulus: oddly shaped masses spreading out in a rolling or puffy layer. Gray with darker shadings.	Rain likely

Towering Clouds: These clouds form at almost any altitude.

Cumulonimbus: thunderheads	Thunderstorms
Cumulus: puffy and cauliflower-like, constantly changing in shape.	Fair weather cloud

This material is based on work supported by the Technology Assisting Louisiana Youth (TALY) project funded in part by the United States Department of Education through Online Louisiana, Inc.

Louisiana State University Agricultural Center, William B. Richardson, Chancellor
Louisiana Agricultural Experiment Station, David J. Boethel, Vice Chancellor and Director
Louisiana Cooperative Extension Service, Paul D. Coreil, Vice Chancellor and Director

Pub. 2898-D

(Online)

11/04

Issued in furtherance of Cooperative Extension work, Acts of Congress of May 8 and June 30, 1914, in cooperation with the United States Department of Agriculture. The Louisiana Cooperative Extension Service provides equal opportunities in programs and employment.

