Introduction

Do you enjoy rainy days? Maybe you prefer spending time outdoors in fresh snowdrifts. Checking the weather is a great way to make outdoor plans for warm, sunny days and to plan to stay indoors on cool, rainy days.

In Canada, weather patterns can vary widely from province to province, season to season, and day to day. Canada is home to mountains, deserts, rainforests, and prairies, each with unique weather patterns.

The CoCoRaHS (Community Collaborative Rain, Hail & Snow) network keeps a record of precipitation across the United States, Canada, and Puerto Rico. In partnership with 4-H Manitoba, CoCoRaHS provides 4-H members with a FREE rain gauge and a greater awareness of their environment.

Canadians are famous for talking about the weather. Your observations will lead to a greater understanding of the weather. This project will help you expand and share your weather knowledge. As part of this project you need to become a CoCoRaHS weather reporter. Contact the Manitoba Coordinator at Manitoba@cocorahs.org to order a rain gauge and visit http://www.cocorahs.org/Canada.aspx for more information about their collection process and to register your station.

Meet Misty!

Misty is a raindrop that knows a lot about weather. She will tell you important information throughout your manual and she has great fun facts and trivia for you.

Learning is 3D!

To help you get the most out of your learning, each project meeting has the following parts:

Dream it! Plan for success
Do it! Hands on learning
Dig it! What did you learn?
What Skills Will You Learn?

Each section or Skill Builder in this project has activities to do that will help your group learn to do by doing while learning new skills and having fun!

To complete this project, you must:
- Complete the activities in each Skill Builder OR a similar activity that focuses on the same skills, as you and your leader may plan other activities.
- Plan and complete the Showcase Challenge.
- Complete the Portfolio Page.
- Participate in your club’s Achievement (See the inside back cover for more information about 4-H Achievements).

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When you successfully complete your builders, you will showcase what you have learned.

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This project manual was adapted from the CoCoRaHS 4-H Lesson Plans in conjunction with CoCoRaHS Canada.
Welcome to the CoCoRaHS Network!

CoCoRaHS = Community Collaborative Rain, Hail & Snow

- CoCoRaHS is a non-profit, grass-roots volunteers network working together to measure precipitation across the nation.
- CoCoRaHS is a citizen science project with contributions from almost 1000 volunteers throughout Canada.
- CoCoRaHS began in the United States and has expanded to include Canada, Puerto Rico, and the U.S. Virgin Islands.
- The partnership between CoCoRaHS Manitoba and 4-H Manitoba equips 4-H members with a free rain gauge. Contact the Manitoba Coordinator at Manitoba@cocorahs.org to order your free rain gauge. You will need a CoCoRaHS 10 cm rain gauge for the upcoming Skill Builders. Please use a metric rain gauge to match the activities in the member manual.
- Data from CoCoRaHS stations has been used by Environment Canada, the US National Weather Service forecast offices, and NASA. It is also used by farmers, planners, airports, and mosquito control.
- Participation in the collection process takes only five minutes each day. Everyone in your family can do it. Your observations will lead to a greater understanding of the weather. Sign up online at http://www.cocorahs.org/CanadianApplication.aspx to be a volunteer precipitation reporter today.
- CoCoRaHS requires that you have an enthusiasm for watching and reporting weather conditions, a desire to learn more about how weather can effect and impact our lives, a willingness to take measurements between 6 a.m. and 10 a.m. when available, and a CoCoRaHS-approved rain gauge. Rain gauges are provided at no cost to 4-H members by contacting the Manitoba Coordinator at Manitoba@cocorahs.org.
When it rains, your rain gauge measures the amount of precipitation that falls through the area of the top of the rain gauge. When you read the gauge, you measure the depth of water that has fallen through the area and accumulated in the bottom, that is the depth of the water.

The funnel and the inner tube make it possible to measure rainfall to an accuracy of 0.2 mm. The funnel of the CoCoRaHS rain gauge squeezes the water into the area of the inner tube, which is 1/10th of the area of the outer cylinder. By reducing the area that the water falls into, the depth can be stretched by the same factor of ten. The total volume of water that fell through the top of the gauge and the total volume in the inner tube are the same. This stretching allows us to read the depth of water to an accuracy of 0.2 mm.

The metric rain gauge has increments marked every 0.2 mm. Each millimeter is marked by a longer dashed line. The numbers on the rain gauge mark every second full millimeter of precipitation.

**Points to remember when reading your rain gauge**

1. Your most common observation will be zero. It is important to please report all zeros.
2. When only a drop or two wet the gauge record a “T” for Trace
3. The inner tube holds **25.4 mm**.
4. Getting the decimal point correct is **ESSENTIAL**. There are big differences between 0.04 and 0.40 and 4.00
5. Measure rainfall of **less than 25.4 mm** from the inner tube. Measured amounts from the inner tube will be between a few tenths up to 25.4 mm.
6. When more than an inch of rain falls the precipitation will overflow into the outer cylinder. The whole gauge has a capacity to hold **279.4 mm**.
7. To measure **greater than 25.4 mm**
   - Pour out the first 25.4 mm from the inner tube and write it down.
   - Now pour the remaining water into the funnel and measure using the inner tube.
   - Continue until all of the water has been measured. Make sure you keep track of your amounts along the way.
   - Then, add up all of your measurements, for example: 25.4 mm + 24.8 mm + 8.8 mm = 59.0 mm
   - Report the Total = 59.0 mm
Skill Builder 1: Temperature

Misty Says....

In this project you will learn about many forms of weather. Temperature is something you will need to know about. Temperature tells how hot or cold it is outside each day. Both temperature and how we dress ourselves each day change with the seasons.

SKILLS CHECKLIST

- Define temperature
- Identify what causes substances to change states

Important words

Watch for these important words throughout this Skill Builder:
Temperature, Kinetic Energy, Molecule, Solid, Liquid, Gas

Dream it!

Temperature is the measure of the average kinetic energy of the molecules in a substance. Kinetic energy is the energy of motion (everything is made of tiny, moving particles called molecules). The more kinetic energy a molecule has, the faster it moves. Hot molecules move faster than cold molecules. As molecules warm up, substances change physical state. Solids, such as ice, will melt into liquid water. Liquids, such as water, will turn into a gas as steam (water vapour) if the water is warmed to a high enough temperature.

Meterorologists (weather forecasters) measure the temperatures in cities and towns across Canada. They predict the outdoor temperatures in your city or town for each day over the next week. In Canada, temperatures are measured in degrees Celsius (°C). In the United States temperatures are measured in degrees Fahrenheit (°F). Across Canada, temperatures have a range as large as 108 °C between summer and winter.

Too Cold, Too Hot

Write down what the weather would be like at each of the following temperatures. Name an activity you would participate in at each temperature.

-25 °C ____________________________________________
-10 °C __________________________________________
0 °C ____________________________________________
20 °C ____________________________________________
35 °C ____________________________________________

Changing States

At what temperature does water boil? __________  Freeze? __________
Do it!

**Solid, Liquid, Gas**

Your leader will explain how your group can demonstrate changing states using your bodies. Following this activity, label the highest and lowest kinetic energy states.

**Changing States**

Review your responses to Changing States in the Dream It section. We are going to perform a test to confirm the boiling point and freezing point of water.

1. Put water in a pot and heat on High on the stovetop.
2. When the water starts to boil, measure the temperature of the water.
3. Then put water in an ice cube tray in the freezer.
4. Check it periodically and record the temperature at which it first freezes.

The water boiled at _______.
The water froze at ________.

**Dig it!**

Do hot molecules or cold molecules have more kinetic energy?

What physical changes occurred when you boiled and froze water?

What do YOU think the perfect outdoor temperature is? Why?

**What’s next?**

The next Skill Builder will teach you how to measure and record rainfall and snowfall amounts. You will need your CoCoRaHS rain gauge for this activity.

On July 5, 1937 the temperature in Midale and Yellow Grass, SK reached 45 °C. The coldest temperature ever recorded in Canada was -63 °C in Snag, YT on February 3, 1947.

Visit [http://www.cocorahs.org/Canada.aspx](http://www.cocorahs.org/Canada.aspx) to view the CoCoRaHS Canada Intro Video. Also, contact your provincial coordinator to receive your rain gauge and more information.
Misty Says....

Rain helps our plants, grass, and crops grow. On planet Earth, all life depends on water. Too much or too little moisture can affect how many plants and animals are able to survive. For this Skill Builder you will need the rain gauge that you ordered from CoCoRaHS.

SKILLS CHECKLIST

- Understand the different types of precipitation
- Demonstrate how rain is measured using a rain gauge
- Explain how snowfall is measured

Important words

Watch for these important words throughout this Skill Builder: Measurement, Precipitation, Rain Gauge

Dream it!

What are some forms of precipitation? Describe some similarities and differences between these forms?

<table>
<thead>
<tr>
<th>Form of Precipitation</th>
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<tbody>
<tr>
<td>Similarities &amp; Differences</td>
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</table>

You will need your CoCoRaHS rain gauge for these activities!
Label the parts of the rain gauge using the following terms: funnel, outer tube, measuring tube, mounting bracket. Draw lines on the rain gauge to show that it will measure one inch of precipitation.

When collecting rain, compare readings in your CoCoRaHS rain gauge with other rain gauges.

Rain barrels are great for collecting rainwater from your roof and eavestroughs. Use this water for watering your garden and grass or for outdoor cleaning.

Do it!

Fun with Rainfall Measurements: Every Drop Counts

Directions:
1. Secure the CoCoRaHS rain gauge (standard 10 cm (4”) plastic gauge) to a pole or post in an open area where it can be easily accessed for measurements.
2. Take turns throwing water balloons at the rain gauge. Be careful not to damage the rain gauge. Variation: Using a water gun, see how much water you can squirt into the rain gauge.
3. For each balloon (or water gun squirt), record the amount of water in the rain gauge. Make sure to measure from the bottom of the meniscus, the lowest point of the curve on the surface of the column of water.
   - Measure the amount of water in the rain gauge by reading the values on the rain gauge.
   - Measure the amount of water in the rain gauge by using a ruler (in millimeters).
4. Keep a rain gauge outside at your house and record the next rainfall. Keep track for the entire season and record your observations on the CoCoRaHS website. You can also view the data that other sites across the continent have collected because “rain doesn’t fall the same on all.”

<table>
<thead>
<tr>
<th>Trial</th>
<th>Rain Gauge Value</th>
<th>Ruler Value</th>
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</thead>
<tbody>
<tr>
<td>1</td>
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<td>2</td>
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</table>

How much water do you think the rain gauge can hold? _________
See if you are correct by completely filling the rain gauge. _________
Measuring Snowfall

Directions:
1. Find an area of snow to sample. Don’t take your samples in areas sheltered from the wind or in snow drifts where snow has accumulated. You may need to collect from multiple locations and average them to obtain an accurate reading.
2. First, measure and record the depth of the snow at each site with a ruler.
3. Use the outer tube of the rain gauge. Turn it upside-down and push it into the snow to collect a core sample.
4. Bring your sample inside to melt.
5. Use the funnel and the inner tube to measure and record the Snow Water Equivalent (SWE).

<table>
<thead>
<tr>
<th>Trial</th>
<th>Depth</th>
<th>SWE</th>
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<tbody>
<tr>
<td>1</td>
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The Canadian record for the least precipitation in one year is held by Arctic Bay, NWT. It received only 12.7 mm (0.5”) of precipitation in all of 1949.

The Canadian record for the most precipitation in one year is held by Henderson Lake, B.C.. In 1997, the community received 9479 mm (373”) of precipitation.

Dig it!

Why is the 25 mm marking on the rain gauge much bigger than 25 mm on a ruler?

What could happen that would create a “bad reading”? How can this be prevented?

Why is recording precipitation amounts important to farmers?

What’s next?
In the next Skill Builder you will learn about cloud formation and you will make your own cloud.
Skill Builder 3: Cloud Formation

Misty Says....

Clouds can float high in the sky or on the surface of the Earth. Let’s learn about how clouds form in the sky and how they stay up in the air.

SKILLS CHECKLIST

- Understand the different ingredients in the formation of a cloud
- Explain water vapour
- Describe how clouds are created

Important words

Watch for these important words throughout this Skill Builder:

Water Vapour, Air Pressure, Cloud Seeds, Evaporation, Condensation

Dream it!

High in the sky, air cools and clouds form. The atmosphere requires three main ingredients to produce a cloud: **water vapour**, cooler air, and **cloud seeds**. Cloud seeds are small particles in the air such as dust or smoke. As the sun’s heat warms a body of water, moisture evaporates from the Earth, rises into the sky, and condenses on cloud seeds. As more particles and water stick together, a cloud forms.

**Recipe for Clouds**

Look outside. Are there many clouds in the sky?

Draw a cloud below. Inside the cloud, list all of the materials that were required for its formation. Below the cloud, draw and name a form of precipitation that would likely fall from your cloud.
Do it!

Cloud in a Jar

Directions:
1. Pour warm water into the bottom of the jar
2. Flip the lid of the jar upside down and fill it with ice. Place the lid (upside down) on top of the jar.
3. Carefully light a match and throw it into the jar. Quickly replace the lid.
4. Watch the cloud form. Notice the movement of the particles.
5. Remove the lid and let your cloud free.
6. As the cloud is leaving the jar, you can touch it to see what it feels like.

Cloud Colour: ________________

How did the cloud feel? ___________________________________________________________
Cloud in a Bottle

Directions:
1. Fill a clear plastic 2L pop bottle one-third full of very warm water. Place the cap on the bottle.
2. Squeeze and release the bottle and observe what happens. Why?
3. Remove the cap from the bottle.
4. Carefully light a match and drop it into the bottle. Quickly replace the cap to trap the smoke inside.
5. Slowly squeeze the bottle hard and release to change the air pressure. What happens?

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<th>What Happens?</th>
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<td>Without Smoke</td>
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<tr>
<td>With Smoke</td>
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</table>

Find a weather forecast on TV, radio, newspaper, or the internet. Does it include an air pressure report?
What type of weather should you expect tomorrow? ___________________________________________

Clouds can form more than 18 000 m above the Earth!
Fog is a cloud on the Earth’s surface.

Dig it!

What causes water to evaporate?
What does water vapour condense on in the sky?

How did smoke from the match help your cloud form?

What’s next?
In the next Skill Builder you will discover the different types of clouds. You will observe the shapes and forms of clouds in the sky.
Skill Builder 4: Cloud Types

Misty Says....

Many meteorologists say that clouds are the greatest free show on Earth, and for good reason. They are among nature's most beautiful creations, but can be among nature's deadliest enemies to the farmer, rancher and society in general depending on what the cloud is bringing us.

Dream it!

Clouds come in many different shapes and sizes. Clouds are classified based on their shape and height.

**Stratus** clouds are huge, gray, low-level clouds. These clouds often block the sun and will produce rainfall.

**Cumulus** clouds are puffy, fluffy, low-level clouds. They can appear alone or in clusters and don’t usually produce precipitation.

**Cumulonimbus** clouds can form from cumulus clouds. Cumulonimbus clouds are heaping rainstorm clouds associated with thunderstorms. They are often several kilometers wide and extend to great heights in the atmosphere.

**Cirrus** clouds are thin, wispy, high-level clouds and may signal a change in the weather.

**Meteorologist for a Day**

Describe an ideal forecast for one of the following activities: 4-H Beef Club Achievement and Picnic, harvesting a field of ripe wheat, or downhill skiing. Include at least five weather features such as temperature, precipitation (probability and amount), wind (speed and direction), visibility, cloud cover, air pressure, humidity, and humidex or windchill values (if applicable). Once you have prepared your forecast, share it with other members with the same enthusiasm as a televised meteorologist.

**SKILLS CHECKLIST**

- Identify at least three different cloud types
- Explain the weather associated with different cloud types

**Important words**

Watch for these important words throughout this Skill Builder:

- Stratus, Cumulus, Cumulonimbus, Cirrus

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Cloud Word Search

Find the hidden words:

- Condensation
- Evaporation
- Precipitation
- Storm
- Air pressure
- Water vapour
- Cloud seeds
- Fog
- Stratus
- Cumulus
- Cirrus
- Cumulonimbus
- Forecast
- Atmosphere
- Shape
- Direction

Do it!

Cloud Spotter

Directions:
1. Cut out and assemble the Cloud Spotter spinner included in the Leader Guide.
2. Head outdoors to observe the clouds. What shapes do you see in the clouds?
3. Using the Cloud Spotter, identify the cloud types in the sky.
4. Take pictures of the clouds.
5. Record the time of day, type(s) of clouds, current weather conditions, weather conditions following the picture, and your prediction of the weather that will follow.
6. Over the next month, observe, photograph, and record the clouds as you identify different cloud types.

Visit http://weather.gc.ca/satellite/index_e.html to see the Environment Canada satellite image showing which parts of North America have cloudy skies today!
Dig it!

What type of clouds were observed most often?

Is it possible to predict the next day’s weather by observing the clouds in the sky today?

Do you think you would like a career in meteorology? Why or why not?

Include a picture of a cloud that is a cool shape.

What’s next?

Next, we will discover what happens to warm and cold air masses when they meet. We will learn about the force that keeps rain and hail in the clouds.
Skill Builder 5: Updrafts and Rising Air

Misty Says....
Have you ever wondered what keeps the clouds in the sky? Some clouds are so very high. Storm clouds look like they are being pushed higher and higher into the sky.

SKILLS CHECKLIST

- Describe the ability of wind to suspend rain and hail in the clouds
- Identify which type of clouds have the strongest updrafts
- Understand how rising air affects clouds and precipitation

Important words
Watch for these important words throughout this Skill Builder:
Low pressure, Bernoulli Principle, Updraft, Jet Stream, Thermal Buoyancy

Dream it!

Wind can suspend rain and hail in the clouds. Air pushes in all directions at all times. The less tightly the air particles are packed, the lower the air pressure. Bernoulli’s Principle states that the slower the air moves, the greater the air pressure. Still air exerts more pressure than moving air. The jet stream is a fast-flowing, narrow stream of air moving through the atmosphere and circling the Earth. As matter becomes warmer, it has a tendency to float above colder matter. Thermal buoyancy explains why warmer clouds and air masses rise above cooler air masses.

5 Day Forecast

Research and record the forecast for the next five days in your area. Include the an illustration of the weather. Record the high and low temperatures, probability of precipitation, wind speed and direction, and any other important features of the forecast.

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<thead>
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<th>Day 2</th>
<th>Day 3</th>
<th>Day 4</th>
<th>Day 5</th>
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</table>
**Do it!**

**What’s With the Updrafts?**

**Directions:**
1. Point the nozzle of a hair dryer upwards and turn the power on Low.
2. Place a ping pong ball in the stream of air. The ball will be suspended by the air.
3. Slowly tilt the hair dryer until the ball falls.
4. Repeat, adding a second ping pong ball. Depending upon the power of the hair dryer, both ping pong balls will be suspended.
5. As you become more comfortable with the procedure you can turn the hair dryer up to High power.

What happened to the ping pong ball? ____________________________________________.

Raindrops eventually fall to the ground because ____________________________________
__________________________________________________________________________________.

**Rising Air**

**Directions:**
1. Fill a plastic container 2/3 full of room temperature water.
2. Let the water sit for 30 seconds or until it is completely still.
3. Place a blue ice cube at each end of the plastic container. These ice cubes represent the cold North and South poles of the Earth.
4. Add two drops of warm water with red food colouring to the center of the plastic container. This represents the warmth of the sun at the Equator.
5. Observe what happens.

The red goes ____________________________________________.

The blue goes ____________________________________________.

**Hot air balloons also float across the sky because of thermal buoyancy.**

**Dig it!**

Look at your 5 Day Forecast. Can you see how rising air and updrafts will impact your weather?

How does the Bernoulli Principle explain the suspension of the ping pong balls?

What type of clouds have the strongest updrafts?

How do the movements of the red and blue colours relate to the weather?

**What’s next?**

In the next Skill Builder we will research tornadoes. We will discover how tornadoes form and the effects they can have on Earth.
Misty Says....

Tornadoes are one of the most awesome sights in the natural world. As twisting columns of air, they can measure kilometers across and can reach winds speeds up to 500 km/h.

**SKILLS CHECKLIST**
- Explain what a tornado is
- Understand the dangers of tornadoes
- Describe a tornado precautionary plan

**Important words**
Watch for these important words throughout this Skill Builder:
- Tornado
- Vortex
- Meteorologist

**Dream it!**

A **tornado** is a **vortex** (a spiral motion of liquid or gas that sucks everything near it toward its center). A thunderstorm may draw air up from the ground, creating unstable combinations of rising and falling air and resulting in a violent rotating storm. If the storm touches the ground, a tornado is born. Tornadoes can cause devastating damage.

The winds of some tornadoes can reach 500 km/h. The intensity of a tornado is based on the Fujita Scale (F-scale). Categories range from F0 (minimal damage to shingles and roofs) to F5 (substantial damage, homes leveled).

**Tornado Trouble**

Research and write about a recent Canadian tornado. Be sure to include the date, location, F-scale rating, damage, and community impacts caused by the tornado.

To view severe weather in Manitoba, visit Manitoba Tornado Watch on Facebook at www.facebook.com/ManitobaTornado. Experience storm chasing from the safety of your home by following stormchasers such as @reedtimmerTVN.
Do it!

**How Do You Make a Tornado?**

**Directions:**
1. Fill a bottle with water to 2 cm from the top.
2. Add a teaspoon of salt.
3. Put the lid on the bottle and shake it until the salt is dissolved.
4. Add a drop of liquid detergent.
5. Add a drop of food colouring.
6. Cover the bottle tightly and move the bottle in a swirling motion.
7. You may wish to place small objects such as tiny houses or cars from a board game to see the destruction of a tornado.

What does the water in the bottle represent? ________________________________

**Safety Plan**

Tornadoes can be very dangerous. As humans, we need to take cover when any storm is approaching, especially if the storm has the potential to develop tornadoes. Part of a meteorologist’s job is to observe cloud forms and the direction of motion of a storm. A meteorologist must predict and warn us of tornadoes for our safety.

Write down your plan to stay safe from tornadoes. How will you know that a tornado is coming? What will you do? Where will you go? How will you know that the storm has passed? How can your community alert everyone that a tornado is approaching?

**Dig it!**

How does a tornado form?

Why are tornadoes dangerous?

Why is a safety plan important?

**What’s next?**

In the next Skill Builder we will learn why we see lightning and hear thunder during summer storms.
Skill Builder 7: Lightning and Thunder

Misty Says....
Each spark of lightning can extend over five miles in length, soar to temperatures of approximately 30 000°C, and contain 100 million electrical volts. For your own safety, remember “When thunder roars, go indoors.”

SKILLS CHECKLIST
- Understand what causes lightning
- Explain why lightning strikes
- Describe how to stay safe during a thunderstorm

Important words
Watch for these important words throughout this Skill Builder:
Electrical charge, Lightning

Dream it!

Lightning is an electric current just like electricity flowing to a light bulb. There are positive and negative electrical charges within a cloud. The positive charges are at the top of the cloud and the negative charges are at the bottom of the cloud. Since opposites attract, that causes positive charges to build up on the ground beneath the cloud. The negatively charged area in the cloud will send out a charge toward the ground called a stepped leader. This makes the first pathway to the ground and the charges flow in a zigzag behind it. You see the electricity moving in this channel as lightning.

Thunder is the result of the movement of air particles as the electric current of lightning passes through the sky. The heat from the lightning pushes the particles apart quickly, creating more movement. Light travels faster than sound; we see lightning before we hear thunder.

At any given moment there are 1800 thunderstorms in progress somewhere on the Earth. This amounts to 16 million storms each year.

Lightning detection systems in the United States monitor an average of 25 million flashes of lightning from cloud to ground every year.

Lightning can strike within a cloud, from one cloud to another, from a cloud to the ground, or from the ground to a cloud.
Thunderstorm Mix Up

Unscramble these weather words.

<table>
<thead>
<tr>
<th>RNTUDHE</th>
<th>LHIINGGTN</th>
</tr>
</thead>
<tbody>
<tr>
<td>OHT</td>
<td>STEEHLR</td>
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<tr>
<td>LAHI</td>
<td>TSFAYE</td>
</tr>
<tr>
<td>YITEERLICCT</td>
<td>CTTRATA</td>
</tr>
</tbody>
</table>

Do it!

What is Lightning?

Directions:
1. Blow up and tie a balloon.
2. Turn all of the lights off in the room (The darker the better!).
3. Have another member hold a fluorescent light bulb.
4. Rub the balloon on your hair for several seconds.
5. Quickly hold the statically charged balloon near the end of the light bulb.

What happened when you held the balloon close to the light bulb? ________________________________
_____________________________________________________________________________________

Lightning in Your Mouth

Directions:
1. Stand in front of a mirror in a really dark room.
2. Wait a few minutes until your eyes become accustomed to the darkness.
3. Place a mint Lifesaver in your mouth.
4. While keeping your mouth open, break the candy with your teeth and watch for sparks.

What did you see when you broke candy? Why? ____________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________.

RNTUDHE
LHIINGGTN
OHT
STEEHLR
LAHI
TSFAYE
YITEERLICCT
CTTRATA
Thunderstorm

Directions:
1. As a group, stand in a dark room.
2. Work together to create a room full of rain, thunder, and lightning.
3. Begin the rain storm by rubbing your hands together. Other members should gradually join in creating the storm.
4. Add finger snapping, thigh slapping, and feet stomping.
5. Be creative. Find items to make the crash of thunder and the flashes of lightning.
6. Think about how the storm will gradually come to an end.

Dig it!

What are positive and negative charges?

Explain why the lightning was visible in your experiments. Use the terms “Positive Charge” and “Negative Charge”.

How can you stay safe during a thunderstorm?

You can track severe weather using forecasts and radar imagery from www.theweathernetwork.com.

What’s next?

Now that you have finished all the Skill Builders in this project, it is time to think about and plan for the Showcase Challenge. The Portfolio Page is where you can make sure your CoCoRaHS Project Skills Chart is complete. There will also be space for you to write down some thoughts and reflections on the project (what you liked and didn’t like, etc.).
Now that you have finished this project, it is time to think about how you will share your experiences and knowledge with others. You may put your new skills to work by helping at a community event or at your club Achievement or teaching others about your topic. The goal of the Showcase Challenge is to help highlight your new skills and help you understand how you can use them. It can be an opportunity to receive feedback from others on your project. So go back through your manual and find some highlights of your learning (what you are proud of) and think about how you will “showcase” it.

### Dream It!

**Here are some Showcase Challenge Suggestions:**

- Demonstrate something you made or learned about
- Act out a play
- Create a game
- Use your new skills to help with the Club Achievement plans
- Make a poster or display
- Make a video or slideshow
- Compose a song
- Or come up with your own idea. It is up to you and your leader!

### My Showcase Challenge Plan

My showcase idea: __________________________________________________________

__________________________________________________________________________

What materials and resources do I need? ______________________________________

__________________________________________________________________________

Who do I need to help me? _____________________________________________

__________________________________________________________________________

When do I need to have things done by? _____________________________________

__________________________________________________________________________
Do It!

Insert or attach your finished product or a photo of you sharing your skills in your Showcase Challenge.

Dig It!

Now that you have showcased your project skills;
- How did your Showcase Challenge go?
- What would you do differently next time?
- How will you use your new skills in the future? (in different situations?)
Discovering CoCoRaHS: Tracking Weather and Precipitation
To be completed by the leader and the member based on observations and conversations throughout the project.

<table>
<thead>
<tr>
<th>Skill Builder</th>
<th>Members will be able to...</th>
<th>We know this because...</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Define temperature</td>
<td>Identify activities completed and record observations and information from discussions about activities.</td>
</tr>
<tr>
<td></td>
<td>Identify what causes substances to change states</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Understand the different types of precipitation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Demonstrate how rain is measured using a rain gauge</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Explain how snowfall is measured</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Understand the different ingredients in the formation of a cloud</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Describe water vapour</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Explain how clouds are created</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Identify at least three different cloud types</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Explain the weather associated with different cloud types</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Describe the ability of wind to suspend rain and hail in the clouds</td>
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</tr>
<tr>
<td></td>
<td>Identify which type of clouds have the strongest updrafts</td>
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</tr>
<tr>
<td></td>
<td>Understand how rising air affects clouds and precipitation</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Explain what a tornado is</td>
<td></td>
</tr>
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<td>Describe how to stay safe during a thunderstorm</td>
<td></td>
</tr>
<tr>
<td>Showcase Challenge</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Explain success in using the skills listed above</td>
<td></td>
</tr>
</tbody>
</table>

**Leader Point of Praise!**

I am most impressed by...

I acknowledge that the member has completed the 4-H project requirements.

Leader’s Signature: _____________________________
Above and Beyond!
In addition to project skills, 4-H also increases skills in meeting management, communications, leadership, community involvement through participation in club, area, or provincial 4-H events or activities. List below any activities you participated in this year in 4-H.
(Some examples include Executive Positions Held, Workshops, Communication, Community Service, Rally, Bonspiels, Conferences, Judging, Camps, Trips, Awards, Representation to Area or Provincial Councils, etc)

_____________________________________       _______________________________________
_____________________________________       _______________________________________
_____________________________________       _______________________________________
_____________________________________       _______________________________________
_____________________________________       _______________________________________ **Feel Free to add additional pages that include awards, certificates, new clippings, photos or other items that describe your 4-H involvement.

Member Point of Pride!

What I learned...

What I need to improve on...

What I want others to notice...

Member’s Signature: ________________________________

Point of Praise! Another’s perspective on your achievements in 4-H.
(commmunity professionals, 4-H club head leaders, friends of 4-H)

I am most impressed by...

I believe that you have learned...

In the future I encourage you to...

Signature: ________________________________
4-H Achievement

4-H Achievement is... a 4-H club celebration when members have completed their projects. Achievements are planned by the club to give recognition to members and leaders for their accomplishments in their 4-H projects and club activities.

A 4-H Achievement can take many different formats: from choosing a theme, to member project displays, to members using their new skills for the event (entertainment, food, decorating, photographer, etc.), to members presenting their project to the whole group, the options are endless and open to the creativity of the members and leaders in each club!

Clubs may also plan their Achievement to promote 4-H to the community or to recognize sponsors and others who have helped the club.

Members and leaders - be sure to check your project books for the project completion requirements, so you will be ready for your club’s Achievement celebration!

If you have any questions, comments or suggestions for this or other 4-H projects contact:

Manitoba 4-H Projects
Manitoba Agriculture Food and Rural Development
1129 Queens Avenue
Brandon, MB R7A 1L9

Email: 4h@gov.mb.ca

Phone: 204-726-6613
Fax: 204-726-6260

This manual is for educational use only and is not intended as professional advice.

For more information about 4-H and the many 4-H opportunities available please visit

http://www.gov.mb.ca/agriculture/4-h/
What is 4-H?

4-H is an international youth organization involving more than 7 million members in 80 countries around the world.

In Canada, 4-H began in 1913 in Roland, Manitoba as a community-based organization dedicated to growth and development of rural youth. Today’s 4-H program reaches both farm and non-farm youth across Canada. The motto of “Learn To Do By Doing” is embodied in the program, as 4-H focuses on skill development as well as personal development of life skills such as communications, leadership and citizenship.

4-H Motto

“Learn To Do By Doing”

4-H Pledge

I pledge,
My HEAD to clearer thinking,
My HEART to greater loyalty,
My HANDS to larger service,
My HEALTH to better living,
For my club, my community, and my country.

4-H Quality Equation Principles

Quality People
- Promote responsibility, respect, trust, honesty, fairness, sportsmanship, citizenship, teamwork and caring.

Quality Experiences
- Provide members with personal development and skill development experiences.

Quality Projects
- Promote and value quality effort.
- Promote high quality, safe food production within industry standards.

Manitoba 4-H project material is developed by
Manitoba Agriculture, Food and Rural Development (MAFRD)