
Grade 5

Cluster 4: Weather

Overview

In this cluster, students learn that daily weather conditions are not the result of random occurrences, but of global systems that can be predicted on a short-term and a seasonal basis. Through observations and measurements, students investigate the properties of air and other aspects of daily weather. Students learn to interpret public weather reports and investigate the usefulness of various ways of predicting the weather.

Understanding the meaning of severe weather forecasts and the preparations to ensure personal safety are emphasized.

Students recognize the role of technology in increasing scientific understanding of weather while appreciating the limitations in accurately predicting long-term weather trends. They also investigate factors that influence climate in Manitoba and across Canada.

PRESCRIBED LEARNING OUTCOMES

SUGGESTIONS FOR INSTRUCTION

Students will...

5-4-01 Use appropriate vocabulary related to their investigations of weather.

Include: weather; properties; volume; pressure; air masses; fronts; weather instrument; severe weather; forecast; accuracy; water cycle; climate; terms related to public weather reports, and cloud formations.

GLO: C6, D5

Teacher Notes

Prior Knowledge

Students have had previous experiences related to this cluster in Grade 1, Cluster 4: Daily and Seasonal Changes; in Grade 2, Cluster 2: Properties of Solids, Liquids, and Gases; and in Grade 2, Cluster 4: Air and Water in the Environment.

Planning Note

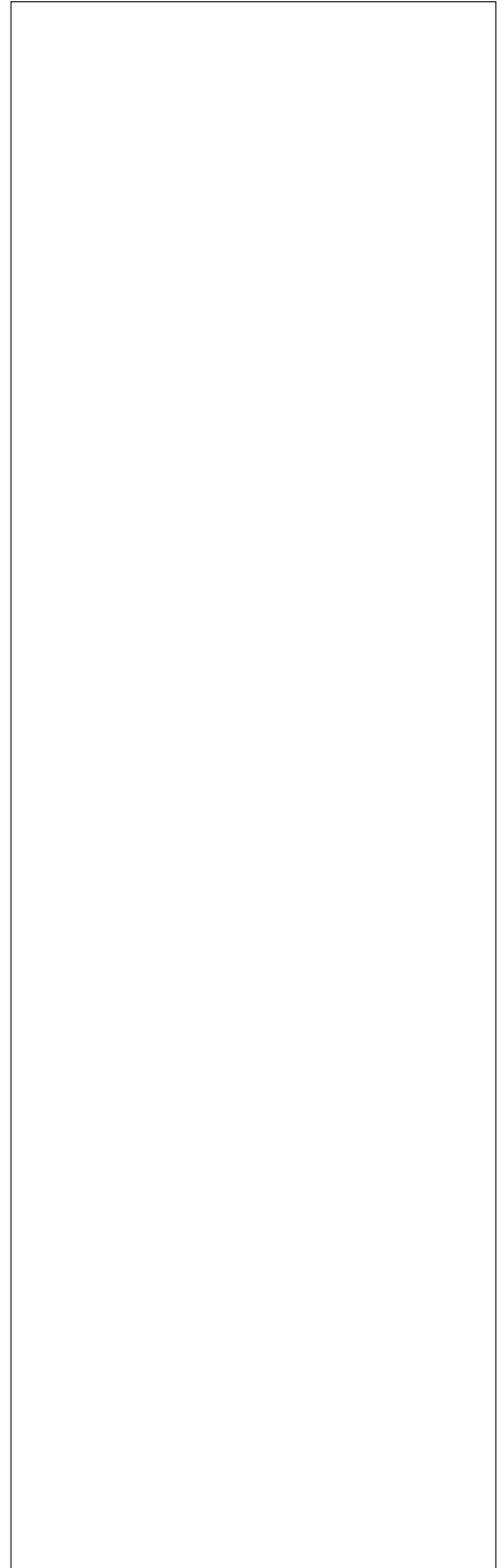
Before beginning study of this cluster, collect weather predictions and weather reports from a newspaper for a period of time. Use these in relation to learning outcome 5-4-11.



- Introduce, explain, use, and reinforce vocabulary throughout this cluster.
- **Science Word Wall**
Develop a Science Word Wall (Cunningham, 1991) with key vocabulary and related terms as the study of weather ensues. Place the Science Word Wall where students can readily view it, add to it, and use it as a means of referencing vocabulary. (For information about the Word Wall strategy, see *5-8 ELA, Strategies*, pp. 199-201).

SUGGESTIONS FOR ASSESSMENT

SUGGESTED LEARNING RESOURCES

A large, empty rectangular box with a thin black border, intended for listing suggested learning resources. It occupies the right half of the page below the header.

PRESCRIBED LEARNING OUTCOMES	SUGGESTIONS FOR INSTRUCTION
<p><i>Students will...</i></p>	
<p>5-4-02 Describe how weather conditions may affect the activities of humans and other animals.</p> <p><i>Examples: heavy rainfall may cause roads to wash out; stormy conditions may prevent a space shuttle launching; in excessive heat cattle may produce less milk...</i></p> <p>GLO: D5</p>	<p>➤ Weather Conditions</p> <p>Have students work in small groups to</p> <ul style="list-style-type: none"> • brainstorm possible ways that weather conditions affect the activities of humans and other animals • consider the effect that weather has on their own activities • display their ideas on a mind map
<p>5-0-4c Work cooperatively with group members to carry out a plan, and troubleshoot problems as they arise. GLO: C7 (ELA Grade 5, 5.2.2)</p> <p>5-0-5f Record and organize observations in a variety of ways. <i>Examples: point-form notes, sentences, labelled diagrams, charts, ordered lists of data, frequency diagrams, spread sheets...</i> GLO: C2, C6 (ELA Grade 5, 3.3.1; Math: SP-III.2.5)</p>	<div data-bbox="657 579 1406 1136" style="border: 1px solid black; padding: 10px;"> <pre> graph TD Weather[Weather] --> Rainy[Rainy] Weather --> Hot[Hot] Weather --> Cold[Cold] </pre> <p>Rainy</p> <ul style="list-style-type: none"> • wear raincoats • play in puddles • indoor recess • sports cancelled • birds bathe in puddles <p>Hot</p> <ul style="list-style-type: none"> • play summer sports • dogs pant • stay indoors in the hottest part of the day • wear light clothing • go swimming • water the garden <p>Cold</p> <ul style="list-style-type: none"> • stay indoors • play winter sports • dress warmly • some animals hibernate • some birds migrate </div>
	<p>➤ Making Connections</p> <p>Have students collect newspaper, magazine, and Internet articles related to the effects of weather on humans and other animals. Students can classify and sort the articles according to the type of weather being described, the part of the world affected, or the effect it is having on the people of that area.</p> <p>Examples:</p> <ul style="list-style-type: none"> • Rainstorms/flooding: Southern USA. People have lost their homes and animals. Crops have been destroyed. • Drought: Africa. People are starving. Animals are dying. Crops are being destroyed. <p>➤ Storm Alert</p> <p>Have students imagine they are an animal found in the wild in Manitoba. Describe the development of a storm using a passage from a book or a teacher-created description. Ask students to consider the options they have and determine the action they might take before the storm and during the storm. Have students reflect on their thoughts, feelings, and actions.</p>

SUGGESTIONS FOR ASSESSMENT

SUGGESTED LEARNING RESOURCES



Extended Response

Provide students with the following:



Effects of Weather

How do weather conditions affect the activities of humans and other animals? Identify at least six ways.

Scoring Rubric	
Score	Criteria
3	The student lists six or more different ways in which humans and other animals are affected.
2	The student lists four or five different ways in which humans and other animals are affected.
1	The student lists two or three different ways in which humans and other animals are affected.

Addison Wesley Science & Technology 5: *Weather* (Lesson 8)

Pan Canadian Science Place 5: *Weatherwise* (Lesson 9)

PRESCRIBED LEARNING OUTCOMES
<i>Students will...</i>
<p>5-4-03 Describe properties of air. Include: has mass/weight and volume; expands to fill a space; expands and rises when heated; contracts and sinks when cooled; exerts pressure; moves from areas of high pressure to areas of low pressure. GLO: D3</p>
<p>5-0-4e Use tools and materials in a manner that ensures personal safety and the safety of others. Include: keeping an uncluttered workspace; putting equipment away after its use; handling glassware with care. GLO: C1</p> <p>5-0-5a Make observations that are relevant to a specific question. GLO: A1, A2, C2</p> <p>5-0-5c Select and use tools and instruments to observe, measure, and construct. Include: balance, thermometer, spring scale, weather instruments. GLO: C2, C3, C5</p> <p>5-0-5f Record and organize observations in a variety of ways. <i>Examples: point-form notes, sentences, labelled diagrams, charts, ordered lists of data, frequency diagrams, spread sheets...</i> GLO: C2, C6 (ELA Grade 5, 3.3.1; Math: SP-III.2.5)</p> <p>5-0-7h Identify, with guidance, potential applications of investigation results. GLO: C4</p>
<p><i>(continued)</i></p>

SUGGESTIONS FOR INSTRUCTION

➤ **Investigating Air**

Have students investigate the properties of air by working through the learning activities at the following five stations. At each station, have students answer the following questions in their science notebooks:

- What did you observe?
- Why do you think this happened?
- Where do you see something like this happening in daily life?

Station 1: Effects of Temperature

a. Have students attach the open end of a balloon to the mouth of a 2-litre soda bottle. Set the bottle in a pan of hot water and observe what happens to the balloon. Now have students set the bottle into a pan of ice water and observe what happens to the balloon. (The hot water heats the air in the bottle. The air expands and inflates the balloon. In the cold water, the air in the bottle cools and contracts and the balloon deflates.)

AND/OR

b. Provide each group of students with a ping-pong ball and a glass of warm water. Have students make a dent in the ping-pong ball and then place the ball in the glass of warm water, observing what happens to the dent. (The air in the ping-pong ball expands and the dent disappears.)

AND/OR

c. Provide students with crushed ice and a 2-litre soda bottle. Have students put the crushed ice into the bottle and then put on the lid. Ask them to shake the bottle and then set it down, observing what happens to the bottle as the air inside cools. (The air in the bottle cools and contracts and the bottle collapses.)

Station 2: Air Pressure

- a. Have students:
- place a small board or table upside down on the floor
 - fill plastic freezer bags or balloons with air and seal them securely with twist-ties

Safety Precaution:
 Station 2 should be closely supervised or done as a demonstration. The teacher should stay close by to steady the table as needed.

(continued)

SUGGESTIONS FOR ASSESSMENT

SUGGESTED LEARNING RESOURCES

Pan Canadian Science Place 5:
Weatherwise (Lesson 2)

SUGGESTIONS FOR ASSESSMENT

SUGGESTED LEARNING RESOURCES

**Extended Response**

Provide students with the following:

Properties of Air

Answer the following questions in complete sentences.

1. The Grade 2 class is studying Solids, Liquids, and Gases. You have been asked to design experiments to demonstrate that air exerts pressure, warm air rises, and air has mass/weight. What experiments would you prepare?

Explain what materials you would need and the procedure you would follow for each experiment.

- a. Air exerts pressure.

- b. Warm air rises.

- c. Air has mass/weight.

2. How does high and low pressure affect the movement of air?

3. Which property of air do the following pictures show?



PRESCRIBED LEARNING OUTCOMES

SUGGESTIONS FOR INSTRUCTION

Students will...

5-4-03 *(continued)*

(continued)

- attach the deflated balloon to the other end of the spool, remove the clothespin from the inflated balloon and observe what happens

(The air in the inflated balloon moves into the deflated balloon because air moves from an area of high pressure [inflated balloon] to an area of low pressure [deflated balloon] until the pressure is equalized.)

Station 5: Mass/Weight

Provide students with an equal arm balance and two balloons of equal size, or deflated balls such as volleyballs or basketballs. Have students balance the scale with one balloon/deflated ball on either side. Now, fill one of the balloons with air and return it to the scale. What happens to the scale?

(The scale will become off balance because of the mass/weight of the air in the balloon.)

5-4-04 Recognize that warm and cold air masses are important components of weather, and describe what happens when these air masses meet along a front.

Include: in a cold front the cold air mass slides under a warm air mass, pushing the warm air upwards; in a warm front the warm moist air slides up over a cold air mass.

GLO: D5, E2

➤ **Cartoon Strip**

Provide instruction on the concept of warm and cold air masses and their importance to weather. Have students illustrate their understanding of this concept by creating a cartoon strip that shows what happens when a cold air mass meets a warm air mass (e.g., the cold air mass could be represented as a muscular, cloud-like character).

5-0-7g Communicate methods, results, conclusions, and new knowledge in a variety of ways. *Examples: oral, written, multimedia presentations...* GLO: C6 (ELA Grade 5, 4.4.1; TFS: 3.2.2, 3.2.3)

SUGGESTIONS FOR ASSESSMENT

SUGGESTED LEARNING RESOURCES



Extended Response

Provide students with the following:



The Trends Meet

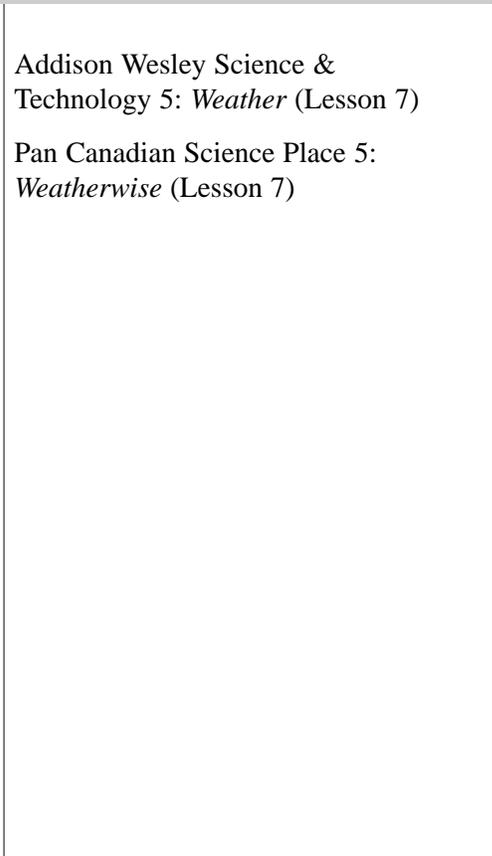
In your science notebook, explain what happens when warm and cold air masses meet along a front.

Look for:

- in a cold front, the cold air mass slides under a warm air mass and pushes the warm air upward
- in a warm front, the warm moist air slides up over the cold air mass

Addison Wesley Science & Technology 5: *Weather* (Lesson 7)

Pan Canadian Science Place 5: *Weatherwise* (Lesson 7)



PRESCRIBED LEARNING OUTCOMES
<i>Students will...</i>
<p>5-4-05 Use the design process to construct a weather instrument.</p> <p><i>Examples: an instrument that measures wind direction, wind speed, rainfall...</i></p> <p>GLO: C3, D5</p>
<p>5-0-1c Identify practical problems to solve. <i>Examples: How can I determine the mass of air? Which prepared pizza should I buy?... GLO: C3</i></p> <p>5-0-3d Develop criteria to evaluate a prototype or consumer product. Include: function, aesthetics, use of recycled materials, cost, reliability. GLO: C3</p> <p>5-0-3e Create a written plan to solve a problem. Include: materials, safety considerations, labelled diagrams of top and side views, steps to follow. GLO: C1, C3, C6</p> <p>5-0-4a Carry out, with guidance, procedures that comprise a fair test. Include: controlling variables, repeating measurements to increase accuracy and reliability. GLO: C2</p> <p>5-0-4b Construct a prototype. GLO: C3</p> <p>5-0-5b Test a prototype or consumer product, using predetermined criteria. GLO: C3, C5</p> <p>5-0-5c Select and use tools and instruments to observe, measure, and construct. Include: balance, thermometer, spring scale, weather instruments. GLO: C2, C3, C5</p> <p>5-0-5d Evaluate the appropriateness of units and measuring tools in practical contexts. GLO: C2, C5 (Math: SS-I.1.5)</p> <p>5-0-5e Estimate and measure mass/weight, length, volume, and temperature using SI and other standard units. GLO: C2, C5 (Math: SS-IV.1.5, SS-III.1.5, SS-I.1.5, SS-VIII.4.3)</p> <p>5-0-5f Record and organize observations in a variety of ways. <i>Examples: point-form notes, sentences, labelled diagrams, charts, ordered lists of data, frequency diagrams, spread sheets...</i> GLO: C2, C6 (ELA Grade 5, 3.3.1; Math: SP-III.2.5)</p> <p>5-0-6d Identify and make improvements to a prototype, and explain the rationale for the changes. GLO: C3, C4</p> <p>5-0-7d Propose and justify a solution to the initial problem. GLO: C3</p> <p>5-0-7e Identify new practical problems to solve. GLO: C3</p>

SUGGESTIONS FOR INSTRUCTION

➤ **Weather Components**

Have students brainstorm a list of common components of weather. Provide students with information (print or multimedia) on how these components are measured. Have students take notes summarizing the different measurement tools and techniques. (For strategies to aid students in recording information in their own words and referencing sources, refer to *5-8 ELA, Grade 5*, learning outcome 3.3.2, pp. 262–268.)

➤ **Design Process Scenario**

Refer to page 15 of this document for a description of the design process.

Provide students with a scenario such as the following:

You have been hired to construct a non-electrical device for measuring some aspect of the weather. The device is needed to determine weather conditions in the case of a power failure.

Have students follow the design process to construct their weather instrument. Students should present their prototype to the class.

Examples of criteria:

- measures the aspect of weather for which it is designed
- has some measurement system (scale if appropriate)
- must be reliable (give the same results in different trials)
- uses recycled materials
- is aesthetically pleasing

Note: To ensure that ideas come from students for this design process learning activity, do not provide them with a sheet of directions to follow. Students can draw on ideas from research they have done or samples they have seen. It is important for students to determine what tools to use, what scale to use, and what evaluation tools they will use to test their instrument.

Management Options:

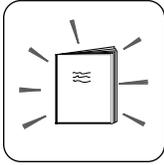
1. Have students bring in the materials necessary for their design. Alternatively, provide a variety of materials and have students select from them.
2. The design can be done in class or it can be done at home following the brainstorming, setting of criteria, and creating of a plan.

Students may use “Design Project Report” (BLM 5-H) to record their work.

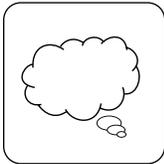
Math Link: (SS-1.1.5) Evaluates the appropriateness of units and measuring tools in practical contexts.

SUGGESTIONS FOR ASSESSMENT

SUGGESTED LEARNING RESOURCES



When assessing students' design process, refer to "Design Project Report: Assessment" (BLM 5-I).



Self-Assessment: Design Process

Provide students with the following self-assessment tool:

Weather Instrument Design Project

I chose to make _____

1. One problem I had was _____

2. One thing I did well was _____

3. If I did this project again I would _____

4. I would still like to learn more about _____

5. I think my design _____

Addison Wesley Science & Technology 5: *Weather* (Lesson 2)

Pan Canadian Science Place 5: *Weatherwise* (Lesson 5)

Design and Technology System (Design Process Reference and Tools)

Mathematics, Science, and Technology Connections (Design Process Reference and Tools)

PRESCRIBED LEARNING OUTCOMES	SUGGESTIONS FOR INSTRUCTION
<p><i>Students will...</i></p>	
<p>5-4-06 Observe and measure local weather conditions over a period of time, using student-constructed or standard instruments, and record and analyze these data. GLO: A2, C2, C5, D5</p> <p>5-4-07 Identify and describe components of public weather reports from a variety of sources. Include: temperature; relative humidity; wind speed and direction; wind chill; barometric pressure; humidex; cloud cover; ultraviolet index; warm and cold fronts; amount, types, and probability of precipitation. GLO: C6, D5</p>	<p>➤ Investigating Components of a Weather Report Have students read, view, and listen to different weather reports to identify and describe the components that they all have in common (see “include,” learning outcome 5-4-07). Weather reports can be obtained from newspapers, the Internet, television, and radio. For each component, students should become familiar with what it measures, the units used, and how it is reported. Ask students to summarize their findings in their science notebooks in an appropriate format.</p> <p>➤ Creating a Weather Report Have student groups take turns making a daily weather report summarizing the day’s weather as part of the school’s afternoon announcements. The report should include at least four student-selected components, such as temperature, wind speed and direction, barometric pressure, and humidity. Have students gather the data using student-made and standard instruments. (As student-constructed instruments may not be sturdy or reliable, have commercial instruments available.) A Friday afternoon report could also include a summary and/or an analysis of the weather for the week or month, and include recorded highs, lows, averages, and so on (see Weather Tracking below).</p>
<p>5-0-2a Access information using a variety of sources. <i>Examples: libraries, magazines, community resource people, outdoor experiences, videos, CD-ROMs, Internet...</i> GLO: C6 (ELA Grade 5, 3.2.3; Math: SP-II.3.1)</p> <p>5-0-4e Use tools and materials in a manner that ensures personal safety and the safety of others. Include: keeping an uncluttered workspace; putting equipment away after its use; handling glassware with care. GLO: C1</p> <p>5-0-5a Make observations that are relevant to a specific question. GLO: A1, A2, C2</p> <p>5-0-5c Select and use tools and instruments to observe, measure, and construct. Include: balance, thermometer, spring scale, weather instruments. GLO: C2, C3, C5</p> <p>5-0-5e Estimate and measure mass/weight, length, volume, and temperature using SI and other standard units. GLO: C2, C5 (Math: SS-IV.1.5, SS-III.1.5, SS-I.1.5, SS-VIII.4.3)</p> <p>5-0-5f Record and organize observations in a variety of ways. <i>Examples: point-form notes, sentences, labelled diagrams, charts, ordered lists of data, frequency diagrams, spread sheets...</i> GLO: C2, C6 (ELA Grade 5, 3.3.1; Math: SP-III.2.5)</p> <p>5-0-6a Construct graphs to display data, and interpret and evaluate these and other graphs. <i>Examples: bar graphs, frequency tallies, line plots, broken line graphs...</i> GLO: C2, C6 (ELA Grade 5, 3.3.1; Math: SP-II.1.5, SP-III.2.5, SP-IV.1.5; TFS: 4.2.2–4.2.6)</p>	<p>➤ Weather Tracking Have students keep a record of selected weather components (such as temperature) over the course of a month and record their findings on a graph or chart. Have them analyze the data and identify patterns, discrepancies, and possible explanations, and then write a descriptive paragraph summarizing the weather for the month. (For strategies and assessment suggestions to aid students in understanding the data collection process, grouping data, displaying data, and drawing conclusions from data, refer to 5-8 <i>Math, Statistics and Probability</i>, pp. C3-C15.)</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>5-0-7g Communicate methods, results, conclusions, and new knowledge in a variety of ways. <i>Examples: oral, written, multimedia presentations...</i> GLO: C6 (ELA Grade 5, 4.4.1; TFS: 3.2.2, 3.2.3)</p> </div>

SUGGESTIONS FOR ASSESSMENT

SUGGESTED LEARNING RESOURCES



Refer to “Weather Report Terminology” (BLM 5-D).

Teacher Notes

Safety Considerations

Thermometers containing mercury should be used with extreme caution in the classroom and appropriate clean-up procedures must be in place in case one breaks. (For more information refer to *Science Safety: A Kindergarten to Senior 4 Resource Manual for Teachers, Schools, and School Divisions* (1997). This resource is available in schools, online at <http://www2.edu.gov.mb.ca/metks4/curricul/k-s4curr/science> or from the Manitoba Text Book Bureau.)

Schools may choose to remove mercury thermometers from their classrooms to avoid potential hazards. Avoidance of mercury thermometers may be prudent in Grade 5 as access to formal science labs and/or resources for proper clean-up may not be available.



Addison Wesley Science & Technology 5: *Weather* (Lesson 5)

Pan Canadian Science Place 5: *Weatherwise* (Lessons 5, 8, 9)

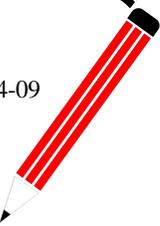
Science Safety: A Kindergarten to Senior 4 Resource Manual for Teachers, Schools, and School Divisions (Teacher Reference)

PRESCRIBED LEARNING OUTCOMES
<i>Students will...</i>
<p>5-4-08 Describe the key features of a variety of weather phenomena.</p> <p><i>Examples: wind speed and precipitation of blizzards...</i></p> <p>GLO: D5, E1, E2</p>
<p>5-0-2a Access information using a variety of sources. <i>Examples: libraries, magazines, community resource people, outdoor experiences, videos, CD-ROMs, Internet...</i> GLO: C6 (ELA Grade 5, 3.2.3; Math: SP-II.3.1)</p> <p>5-0-2b Review information to determine its usefulness, using predetermined criteria. GLO: C6, C8</p> <p>5-0-2c Record information in own words and reference sources appropriately. GLO: C6 (ELA Grade 5, 3.3.2)</p> <p>5-0-7g Communicate methods, results, conclusions, and new knowledge in a variety of ways. <i>Examples: oral, written, multimedia presentations...</i> GLO: C6 (ELA Grade 5, 4.4.1; TFS: 3.2.2, 3.2.3)</p>

SUGGESTIONS FOR INSTRUCTION

Teacher Notes

Learning experiences related to learning outcomes 5-4-08 and 5-4-09 could take place at the same time.



<p>5-4-09 Provide examples of severe weather forecasts, and describe preparations for ensuring personal safety during severe weather and related natural disasters.</p> <p><i>Examples: tornado, thunderstorm, blizzard, extreme wind chill, flood, forest fire...</i></p> <p>GLO: B3, C1, D5</p>
<p>5-0-2a Access information using a variety of sources. <i>Examples: libraries, magazines, community resource people, outdoor experiences, videos, CD-ROMs, Internet...</i> GLO: C6 (ELA Grade 5, 3.2.3; Math: SP-II.3.1)</p> <p>5-0-7g Communicate methods, results, conclusions, and new knowledge in a variety of ways. <i>Examples: oral, written, multimedia presentations...</i> GLO: C6 (ELA Grade 5, 4.4.1; TFS: 3.2.2, 3.2.3)</p>

- **Weather Phenomena Poster**

Have students work in groups to research the key features of a variety of weather phenomena. Each group could investigate a different phenomenon (such as tornadoes, thunderstorms, blizzards, chinooks, sun dogs, or wind shears) and try to identify its key components. Ensure that students use a variety of sources such as books, videos, CD-ROMs, and the Internet. Have students present their information as a poster. Have students do a Gallery Walk (Brownlie and Close, 1992) to view the posters. (For a discussion of a Gallery Walk, see 5-8 ELA, Strategies, pp. 202-203.)
- **Severe Weather Brainstorm**

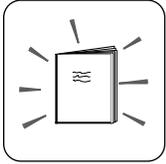
Have students brainstorm different types of severe weather. Have them list the conditions related to each type. (Some of this information can come from the Weather Phenomena Research learning activity associated with learning outcome 5-4-08.)
- **Severe Weather Forecasts**

Have students access Environment Canada resources to determine how severe weather is forecast. Ensure that students look at the terminology used in the forecasts, such as weather statement, watch, advisory, and warning.
- **Severe Weather Brochure**

Have students select one severe weather-related phenomenon of particular importance to Manitoba (e.g., wind chill, blizzard, flood, thunderstorm). Have them create a brochure that describes the conditions that surround this severe weather phenomenon and advises how people can best prepare for, and act during, these conditions.

SUGGESTIONS FOR ASSESSMENT

SUGGESTED LEARNING RESOURCES

**Weather Phenomena Poster**

Look for indications of the following in student work:

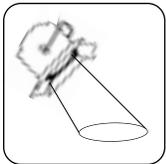
Checklist:

The poster includes

- precipitation
- temperature
- wind speed and direction
- barometric pressure
- other

Addison Wesley Science & Technology 5: *Weather* (Lesson 4)

Pan Canadian Science Place 5: *Weatherwise* (Lessons 4-6)

**Manitoba Winter Safety**

Provide students with the following scenario and have them respond in their science notebooks.

**Manitoba Winter Safety**

Environment Canada is forecasting a blizzard for your area tomorrow. What advice would you give to a person who is new to the area and has not experienced a Manitoba winter before?

Look for:

- appropriate safety issues are addressed
- advice is practical and accurate
- work is complete and thorough

PRESCRIBED LEARNING OUTCOMES

SUGGESTIONS FOR INSTRUCTION

Students will...

5-4-10 Investigate various ways of predicting weather, and evaluate their usefulness.

Examples: weather-related sayings, traditional knowledge, folk knowledge, observations of the natural environment...

GLO: A2, A4, B2, C8

➤ **Weather-Related Sayings**

Provide students with weather-related sayings. Have them discuss the possible meanings of these sayings and their usefulness (past and present) in predicting weather. Then present them with the intended meanings. Students may do research to determine the scientific validity of these sayings.

Examples:

- Red sky in the morning, sailor take warning. Red sky at night, a sailor's delight.
- Mare's tails and mackerel scales make tall ships take in their sails.
- Clear moon, frost soon.
- A year of snow, a year of plenty.
- Halo around the sun or moon, rain or snow soon.
- Rainbow in the morning gives you fair warning.

The Internet is a good source of information related to this topic.

➤ **Traditional Knowledge**

Have students investigate the accuracy of traditional knowledge related to animal behaviour and weather. Have them present their findings to the class.

➤ **Guest Speaker**

Invite professionals such as hunters, trappers, or fishers to speak to the class about how the weather affects their work and/or how their knowledge of the weather helps them in their jobs.

SUGGESTIONS FOR ASSESSMENT

SUGGESTED LEARNING RESOURCES

Teacher Notes

Background Information

Most animals are vulnerable to environmental changes that humans often can not detect. Examples:

- Swallows flying low indicate the air pressure is dropping.
 - Falling air pressure may affect the digestive system of cows, making them less willing to go to pasture and causing them to lie down.
 - Static electricity may increase the grooming activities of cats.
 - The calls of some birds, including crows and geese, become more frequent with falling air pressure.
 - Deer and elk react to wind and air pressure by coming down from the mountains and seeking shelter.
 - Some species feed more before a storm so they can seek shelter.
 - When the air pressure drops, flying insects are more active and stay closer to the ground, so they seem to be swarming before a rainstorm.
- 

Pan Canadian Science Place 5:
Weatherwise (Lesson 9)

*Native Science: Natural Laws of
Interdependence* (Teacher Reference)

*Keepers of the Earth: Native Stories
and Environmental Activities for
Children* (Teacher Reference)

*The Day Niagara Falls Ran Dry!
Canadian Weather Facts and Trivia*
(Teacher Reference)

PRESCRIBED LEARNING OUTCOMES
<i>Students will...</i>
<p>5-4-11 Contrast the accuracy of short- and long-term weather forecasts, and discuss possible reasons for the discrepancies.</p> <p>Include: long-term forecasts may not be accurate as weather is a complex natural phenomenon that science is not yet able to predict accurately.</p> <p>GLO: A1, C2</p>
<p>5-0-2a Access information using a variety of sources. <i>Examples: libraries, magazines, community resource people, outdoor experiences, videos, CD-ROMs, Internet...</i> GLO: C6 (ELA Grade 5, 3.2.3; Math: SP-II.3.1)</p> <p>5-0-8a Recognize that science is a way of answering questions about the world and that there are questions that science cannot answer. GLO: A1, A3</p> <p>5-0-8b Identify examples of scientific knowledge that have developed as a result of the gradual accumulation of evidence. GLO: A2</p>

SUGGESTIONS FOR INSTRUCTION

- **Determining Accuracy: Short-Term Weather Forecasts**
 1. Collect daily public weather forecasts from a newspaper, the Internet, the television, or the radio. Have students compare the daily forecast with the actual weather for a given day. Have them do this over several days, recording their findings on a chart. Ask students to determine the accuracy of short-term forecasts.
 2. Have students look at the extended forecast (e.g., a five-day forecast) and record their observations of the actual weather for each day. Ask them to determine how accurate extended forecasts are and give reasons why this might be so.

- **Comparing Weather Forecast Sources**

Ask students to collect weather forecasts from several sources, such as Internet sites, magazines, newspapers, television channels, and/or radio stations, and to compare the data. What might account for the differences?

- **Old Farmers' Almanac/Environment Canada: Long-Term Weather Forecasts**

Using either a copy of *The Old Farmers' Almanac* or The Old Farmers' Almanac Internet site available online at <http://www.almanac.com> and the Environment Canada long-range forecast, have students judge the accuracy of the extended seasonal outlook. Ask students to compare the weather predictions made with the actual conditions over a given time period.

Note: A long-term forecast is for six months. This learning activity could be done over the course of the school year.

SUGGESTIONS FOR ASSESSMENT

SUGGESTED LEARNING RESOURCES



Extended Response

Provide students with the following:



Long-Term Forecasts

In your science notebook, explain why long-term forecasts are often inaccurate.

Look for:

- weather is a complex natural phenomenon that science is not yet able to predict accurately
- any other reasonable explanation

Addison Wesley Science & Technology 5: *Weather* (Lesson 10)

Pan Canadian Science Place 5: *Weatherwise* (Lesson 8)

PRESCRIBED LEARNING OUTCOMES
<i>Students will...</i>
<p>5-4-12 Describe examples of technological advances that have enabled humans to deepen their scientific understanding of weather and improve the accuracy of weather predictions.</p> <p><i>Examples: satellites collect data that scientists analyze to increase understanding of global weather patterns; computerized models predict weather...</i></p> <p>GLO: A2, A5, B1, D5</p>
<p>5-0-8c Recognize that technology is a way of solving problems in response to human needs. GLO: A3, B2</p> <p>5-0-8d Provide examples of technologies from the past and describe how they have evolved over time. GLO: B1</p> <p>5-0-8e Describe hobbies and careers related to science and technology. GLO: B4</p>
<p>5-4-13 Explain how the transfer of energy from the Sun affects weather conditions.</p> <p>Include: the Sun’s energy evaporates water and warms the Earth’s land, water, and air on a daily basis.</p> <p>GLO: D4, D5, E4</p>
<p>5-0-5a Make observations that are relevant to a specific question. GLO: A1, A2, C2</p> <p>5-0-7f Use prior knowledge and experiences selectively to make sense of new information in a variety of contexts. GLO: A2, C4 (ELA Grade 5, 1.2.1)</p>

SUGGESTIONS FOR INSTRUCTION

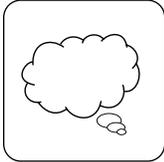
- **Identifying Weather Forecasting Technology**
Have students reflect on the weather reports they have recently viewed and/or play a television weather report for the class. Ask them to focus their attention on identifying examples of technological tools used by meteorologists in weather forecasting. It should be possible to identify satellites, radar, and computer models.
- **Impact of Technological Advances**
Based on the technology identified in the previous learning activity, have students work in groups to
 - select one type of technology and research the history of its development and how it helps us improve the accuracy of weather predictions
 - record information on a class timeline showcasing these developments
- **Transfer of Energy**
Provide small groups of students with small sealable (zippered) bags, small paper cups, and water. Have each group
 - prepare three bags in the following manner: place the cup upright in the bag, add a small amount of water to the bottom of the bag (not in the cup), and seal the bag
 - place each bag in a different location: one in direct sunlight, one in an area of the room that does not get direct sunlight, and one in a closet or any other dark, cooler location
 - record observations, noting the time and the changes taking place

In their science notebooks, have students

 - explain why there are differences in the bags. (The bag in direct sunlight will activate the water cycle sooner because the Sun can more directly transfer its energy to drive the cycle. The precipitation will evaporate from the bottom of the bag, condense on the bag, and then drip down and collect in the cup.)
 - synthesize their understandings by describing the role the Sun plays in weather, including the terms energy, air, water, land, evaporate, and warm.

SUGGESTIONS FOR ASSESSMENT

SUGGESTED LEARNING RESOURCES



Journal Reflection

Have students reflect on the following questions in their science journals:



Technology and Weather

1. Why is technology important in predicting weather?
2. What might the technology of the future allow us to do related to predicting weather?

Addison Wesley Science & Technology 5: *Weather* (Lesson 10)

Pan Canadian Science Place 5: *Weatherwise* (Lesson 8)

Addison Wesley Science & Technology 5: *Weather* (Lesson 6)

Pan Canadian Science Place 5: *Weatherwise* (Lesson 3)

PRESCRIBED LEARNING OUTCOMES
<i>Students will...</i>
<p>5-4-14 Explain how clouds form, and relate cloud formation and precipitation to the water cycle. GLO: D5, E2</p>
<p>5-0-4e Use tools and materials in a manner that ensures personal safety and the safety of others. Include: keeping an uncluttered workspace; putting equipment away after its use; handling glassware with care. GLO: C1</p> <p>5-0-5a Make observations that are relevant to a specific question. GLO: A1, A2, C2</p>
This area is intentionally left blank for student work or additional notes

SUGGESTIONS FOR INSTRUCTION

➤ **Making Clouds**

Demonstration: Use two identical wide-mouthed glass containers, three ice cubes, boiling water, and food colouring. Chill one of the containers. Fill half of the other container with boiling water and add two drops of food colouring. Place the chilled container on top of the container with hot water, fitting the mouths together carefully. Place the ice cubes on top of the chilled container. Have students observe what happens.
(The water will evaporate and then condense at the top of the container. The water vapour will appear cloudy.)

➤ **Water Cycle**

Have students make a model of the water cycle using a wide-mouthed container, a tin foil pan, a glass of hot water, and ice cubes. Ask students to

- pour the hot water into the wide-mouthed container
- place the tin foil pan over the mouth of the container
- add the ice cubes to the pan
- observe what happens

Have students compare their observations from the Making Clouds investigation in the previous learning activity and the water cycle model.

(The water evaporates and then condenses on the bottom of the foil pan. The drops become heavy and fall as precipitation.)

SUGGESTIONS FOR ASSESSMENT

SUGGESTED LEARNING RESOURCES



Extended Response

Provide students with the following:



Water Cycle

Explain how the water cycle works. Your explanation should include a labelled diagram.

Look for:

- a labelled diagram
- a clear explanation
- use of correct terminology
 - *evaporation*
 - *condensation*
 - *water vapour*
 - *precipitation*

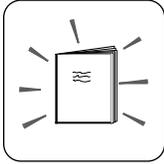
Addison Wesley Science & Technology 5: *Weather* (Lesson 6)

Pan Canadian Science Place 5: *Weatherwise* (Lesson 4)

PRESCRIBED LEARNING OUTCOMES	SUGGESTIONS FOR INSTRUCTION
<p><i>Students will...</i></p>	
<p>5-4-15 Identify and describe common cloud formations. Include: cumulus, cirrus, stratus. GLO: D5, E1</p>	<p>➤ Observing Clouds Have students go outdoors over the course of several days to observe the cloud formations. Ask them to draw the cloud formations they see. Provide students with labelled pictures of the three main cloud types and have them place their drawings under the cloud type that most resembles their pictures. As students are making their observations they could also keep a record of what the weather was like for that day.</p>
<p>5-0-2a Access information using a variety of sources. <i>Examples: libraries, magazines, community resource people, outdoor experiences, videos, CD-ROMs, Internet...</i> GLO: C6 (ELA Grade 5, 3.2.3; Math: SP-II.3.1) 5-0-5a Make observations that are relevant to a specific question. GLO: A1, A2, C2 5-0-7g Communicate methods, results, conclusions, and new knowledge in a variety of ways. <i>Examples: oral, written, multimedia presentations...</i> GLO: C6 (ELA Grade 5, 4.4.1; TFS: 3.2.2, 3.2.3)</p>	<p>➤ Cloud Models Have students make models or draw diagrams representing the three types of clouds.</p> <p>➤ Cloud Cinquain Have students select one of the common cloud formations and then use descriptive language to create a cinquain poem (a five-line stanza that has successive lines of two, four, six, eight, and two syllables).</p>
<p>5-4-16 Differentiate between weather and climate. Include: weather includes the atmospheric conditions existing at a particular time and place; climate describes the long-term weather trend of a particular region. GLO: D5, E1</p>	<p>➤ Climate and Weather Comparison Provide students with a set of statements related to weather and climate (see “Weather or Climate?” BLM 5-E). Ask students to sort them into the two categories and to give reasons for their placement.</p>
<p>5-0-7f Use prior knowledge and experiences selectively to make sense of new information in a variety of contexts. GLO: A2, C4 (ELA Grade 5, 1.2.1)</p>	

SUGGESTIONS FOR ASSESSMENT

SUGGESTED LEARNING RESOURCES



Peer Assessment of “Cloud Models”

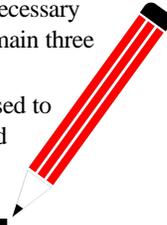
Have students fill out comment cards after viewing cloud models developed by three other students. The comment should describe a positive aspect of the model.

Teacher Notes

Background Information

The three main cloud types are identified in learning outcome 5-4-15. Numerous combinations of cloud types are possible. It is not necessary for students to know the names of all possible types, only the main three and their characteristics.

Caution: Cloud formations are only one of the observations used to predict weather. Avoid making rigid correlations between cloud type and weather conditions.



Addison Wesley Science & Technology 5: *Weather* (Lesson 4)

Pan Canadian Science Place 5: *Weatherwise* (Lesson 4)



Weather or Climate?

Have students write one statement using the term *weather*, and one using *climate*. (This can be used as an Exit Slip.)

Addison Wesley Science & Technology 5: *Weather* (Lesson 9)

Pan Canadian Science Place 5: *Weatherwise* (Lesson 7)

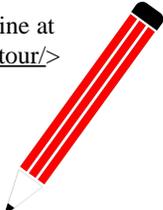
PRESCRIBED LEARNING OUTCOMES
<i>Students will...</i>
<p>5-4-17 Identify factors that influence weather and climate in Manitoba and across Canada, and describe their impacts.</p> <p><i>Examples: jet stream, proximity to water, elevation, chinook...</i></p> <p>GLO: D5, E2</p>
<p>5-0-2a Access information using a variety of sources. <i>Examples: libraries, magazines, community resource people, outdoor experiences, videos, CD-ROMs, Internet...</i> GLO: C6 (ELA Grade 5, 3.2.3; Math: SP-II.3.1)</p> <p>5-0-6c Identify and suggest explanations for patterns and discrepancies in data. GLO: A1, A2, C2, C5</p> <p>5-0-7a Draw, with guidance, a conclusion that explains investigation results. Include: explaining patterns in data; supporting or rejecting a prediction/hypothesis. GLO: A1, A2, C2 (ELA Grade 5, 3.3.4)</p>

SUGGESTIONS FOR INSTRUCTION

- **Weather Differences**
Have students identify different places they have visited in Manitoba and in Canada. Have them discuss what the weather was like in those places. Ask if they can think of any site-related conditions that may have affected the weather and climate (e.g., altitude, latitude, proximity to water).
- **Comparing Weather**
Have students analyze data from four Canadian cities to identify facts that influence weather and climate. (See “Influences on Climate,” BLM 5-F).
- **Guest Speaker**
Invite a meteorologist or weather forecast personality from a local television or radio station to speak to the class about factors that influence weather and climate in Canada. If this is not possible, students could access an “Ask the Expert” Internet site.

Teacher Notes

A Prairie Tour: A Grade 5 Integrated Unit for Teachers is online at <http://www.edu.gov.mb.ca/metks4/tech/currtech/imyn/prairietour/> an electronic resource that includes weather-related learning activities allowing students to apply graphing skills.



SUGGESTIONS FOR ASSESSMENT

SUGGESTED LEARNING RESOURCES



Extended Response

Provide students with the following:



Manitoba Weather and Climate

In your science notebook, identify factors that influence weather and climate in Manitoba and describe their impacts.

Look for:

- location (latitude/longitude)
- proximity to water
- jet stream
- elevation

Addison Wesley Science & Technology 5: *Weather* (Lesson 9)

Pan Canadian Science Place 5: *Weatherwise* (Lesson 5)

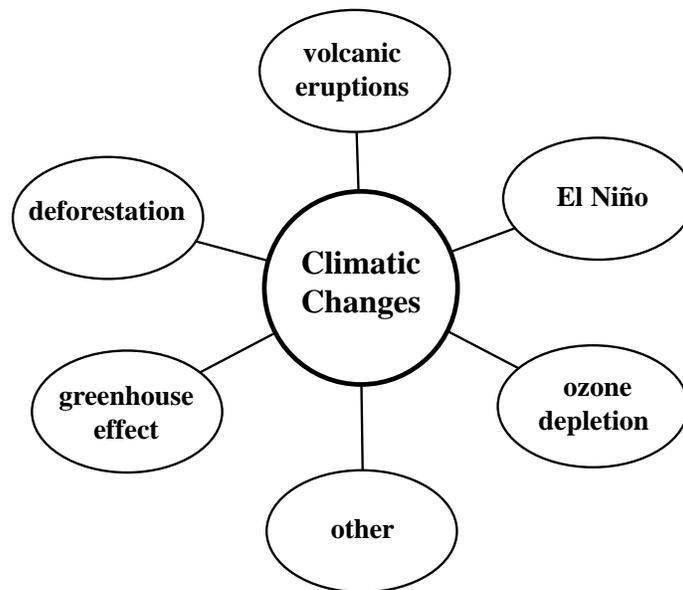
PRESCRIBED LEARNING OUTCOMES
<i>Students will...</i>
<p>5-4-18 Recognize that climates around the world are ever changing, and identify possible explanations. <i>Examples: volcanic eruptions, ozone depletion, greenhouse effect, El Niño, deforestation...</i> GLO: B5, D5, E2, E3</p>
<p>5-0-2a Access information using a variety of sources. <i>Examples: libraries, magazines, community resource people, outdoor experiences, videos, CD-ROMs, Internet...</i> GLO: C6 (ELA Grade 5, 3.2.3; Math: SP-II.3.1)</p> <p>5-0-7f Use prior knowledge and experiences selectively to make sense of new information in a variety of contexts. GLO: A2, C4 (ELA Grade 5, 1.2.1)</p> <p>5-0-7g Communicate methods, results, conclusions, and new knowledge in a variety of ways. <i>Examples: oral, written, multimedia presentations...</i> GLO: C6 (ELA Grade 5, 4.4.1; TFS: 3.2.2, 3.2.3)</p> <p>5-0-7h Identify, with guidance, potential applications of investigation results. GLO: C4</p>

SUGGESTIONS FOR INSTRUCTION

➤ **Accessing Prior Knowledge**

Have students work in small groups to prepare a concept map showing what they know about climatic changes.

Example:



➤ **Active Reading/Viewing**

Have students use the following active viewing strategy to analyze an article or video on some aspect of climate change. Using this strategy, students will

- give a one-sentence summary of the main point of the reading or viewing
- draw a picture or diagram representing an important aspect
- list key points
- identify three related questions
- explain how the reading or viewing relates to what has already been studied in class

SUGGESTIONS FOR ASSESSMENT

SUGGESTED LEARNING RESOURCES

**Cluster Reflection**

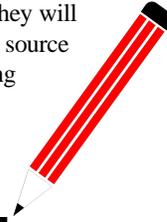
Provide students with the following sentence stems:

**Weather Reflection**

1. In the study of weather I learned . . .
2. I found it interesting that . . .
3. I was surprised . . .
4. I wonder . . .

Teacher Notes

Students should begin to become familiar with some of the concepts related to the much-debated subject of climate change, which they will analyze in greater depth in higher grades. The Internet is a rich source of information on this topic, including grade-appropriate reading material, and videos. The Government of Canada's website on climate change can be accessed at [<www.changementsclimatiques.gc.ca>](http://www.changementsclimatiques.gc.ca).



Pan Canadian Science Place 5:
Weatherwise (Lesson 10)

Notes