

Weather in Action



Teacher's Guide Middle School

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A Message from our Company ...

Dear Educator:

Thank you for your interest in the educational videos produced by the *Visual Learning Company*. We are a Vermont-based, family owned and operated business specializing in the production of quality educational science videos and materials.

We have a long family tradition of education. Our grandmothers graduated from normal school in the 1920's to become teachers. Brian's mother was an elementary teacher and guidance counselor, and his father was a high school teacher and superintendent. This family tradition inspired Brian to become a science teacher, and to earn a Ph.D. in education, and lead Stephanie to work on science educational programs at NASA.

In developing this video, accompanying teacher's guide, and student activities, our goal is to provide educators with the highest quality materials, thus enabling students to be successful. In this era of more demanding standards and assessment requirements, supplementary materials need to be curricular and standards based - this is what we do!

Our videos and accompanying materials focus on the key concepts and vocabulary required by national and state standards and goals. It is our mission to help students meet these goals and standards, while experiencing the joy and thrill of science.

Sincerely,

Brian and Stephanie Jerome



Standards Correlations

National Science Education Standards

(Content Standards: 5-8, National Academy of Sciences, c. 1996)

Science as Inquiry - Content Standard A:

As a result of activities in grades 5-8, all students should develop:

- Abilities necessary to do scientific inquiry
- Understandings about scientific inquiry

Earth and Space Science - Content Standard D:

As a result of their activities in grades 5-8, all students should develop an understanding that:

- Global patterns of atmospheric movement influence local weather. Oceans have a major effect on climate, because water in the oceans holds a large amount of heat.
- Clouds, formed by the condensation of water vapor, affect weather and climate.

Benchmarks for Science Literacy

(Project 2061 - AAAS, c. 1993)

The Physical Setting - The Earth (4B)

• Weather (in the short run) and climate (in the long run) involve the transfer of energy in and out of the atmosphere. Solar radiation heats the land masses, oceans, and air. Transfer of heat energy at the boundaries between the atmosphere, the land masses, and the oceans results in layers of different temperatures and densities in both ocean and atmosphere. The action of gravitational force on regions of different densities causes them to rise or fall and such circulation, influenced by the rotation of the earth, produces winds and ocean currents.

• The cycling of water in and out of the atmosphere plays an important role in determining climatic patterns. Water evaporates from the surface of the earth, rises and cools, condenses into rain or snow, and falls again to the surface. The water falling on land collects in rivers and lakes, soil, and porous layers of rock, and much of it flows back into the ocean.



Student Learning Objectives

Upon viewing the video and completing the enclosed student activities, students should be able to do the following:

- Identify the different characteristics of weather;
- Explain some of the techniques used in predicting weather;
- Identify the major cloud types, and describe the general type of weather they indicate;
- Describe the different ways clouds form;
- Recognize and describe the different types of precipitation including rain, snow, sleet, hail, and freezing rain;
- State some of the factors which contribute to changes in weather;
- Describe the different types of air masses and state the location in which they are formed;
- Differentiate between cold fronts, warm fronts, occluded fronts, and stationary fronts;
- Describe certain characteristics of storms and identify the condition associated with each type of storm; and
- Describe some of the tools and techniques meteorologists use to measure and predict the weather.



Assessment

Preliminary Test:

The Preliminary Test, provided in the Student Masters section, is an assessment tool designed to gain an understanding of student preexisting knowledge. It can also be used as a benchmark upon which to assess student progress based on the objectives stated on the previous pages.

Video Review:

The Video Review, provided in the Student Masters section, can be used as an assessment tool or as a student activity. There are two main parts. The first part contains questions titled “You Decide” that can be answered during the video. The second series of ten questions consists of a video quiz to be answered at the conclusion of the video.

Post-Test:

The Post-Test, provided in the Student Masters section, can be utilized as an assessment tool following student completion of the video and student activities. The results of the Post-Test can be compared against the results of the Preliminary Test to assess student progress.



Introducing the Video

Before showing the video, check the newspaper for the weekly forecast. Make an overhead transparency of a copy of the map for students to view. Ask students to identify their location on the map. Next ask them to interpret the weather condition of their locale as stated on the map. Ask students how the weather map was developed. As a class, discuss the symbols used on the map and describe what each one represents. Tell the students to pay close attention to the video for scientific explanations of how the type of weather is determined.

Video Viewing Suggestions

The Student Master “Video Review” is provided for distribution to students. You may choose to have your students complete this Master while viewing the program or to do so upon its conclusion.

The program is approximately 20-minutes in length and includes a ten-question video quiz. Answers are not provided to the Video Quiz on the video, but are included in this teacher’s guide. You may choose to grade student quizzes as an assessment tool or to review the answers in class.

The video is content-rich with numerous vocabulary words. For this reason you may want to periodically stop the video to review and discuss new terminology and concepts.



Student Assessments And Activities

Assessment Masters:

- Preliminary Test
- Video Review
- Post-Test

Student Activity Masters:

- Crazy Cold Fronts
- The Great Ice Storm of 1998
- Weather Maps
- Vocabulary of *Weather in Action*



Video Script: *Weather in Action*

1. The person driving this snowplow got up early in the morning to clear the roads so....
2. ... people could drive to work and buses could bring students to school.
3. These airline workers are deicing this plane,...
4. ...enabling the plane to safely take off and travel to its destination.
5. And this farmer and team of mules are plowing this field so it can be seeded with the arrival of the warm weather.
6. The work of all these people is greatly affected by the weather.
7. We're all affected by the action of weather in our day to day lives,...
8. ... be it for recreation...
9. ... or for work.
10. During the next few minutes we are going to explore some of the different characteristics of weather...
11. ... and talk about some of the techniques used in predicting the weather.
12. **Graphic Transition - Clouds**
13. The view from this airplane shows a layer of clouds.
14. What are clouds? What are the different kinds of clouds, and how are clouds formed?
15. While clouds may look like cotton...
16. ...or sheets of gray steel, they're actually made of tiny droplets of water or ice.
17. Clouds form in several different ways.
18. Clouds may form when warm air rises from the surface of the earth.
19. As the warm air rises, it cools until the water vapor it contains condenses, or turns to small droplets of water.
20. Clouds may also form in mountain areas where warm moist air cools as it passes over higher areas.
21. The dew point is the temperature at which water vapor condenses and forms a cloud.
22. When the rising air reaches its dew point it condenses and forms clouds.
23. When the air in a cloud is saturated with water the relative humidity is 100%.
24. These are just a couple of ways clouds may form.
25. **Graphic Transition - Cloud Formation**
26. Clouds form when moisture in the air condenses on small particles in the air.
27. These particles are called condensation nuclei.
28. There is a wide variety of sources of condensation nuclei including dust, smoke, and even small salt particles from ocean spray.
29. When water vapor condenses, water droplets stick to the condensation nuclei, forming tiny water droplets.

Script (cont.)



30. You Decide! What's formed when water droplets gather together?
31. When large nuclei of droplets come together they form a cloud. Let's take a look at some of the different types of clouds.
32. **Graphic Transition – Cloud Types**
33. You may have noticed that clouds come in many different shapes, sizes, and colors.
34. There are three main cloud types based on their appearance.
35. You are probably familiar with the white, puffy clouds called cumulus clouds.
36. Cumulus clouds usually indicate fair weather,...
37. ... but when they get large and the bottom of the clouds become dark they may produce thunderstorms.
38. Smooth, gray clouds which form a mat over the entire sky are called stratus clouds.
39. These clouds generally bring rain or snow in varying amounts
40. The third main group of clouds are called cirrus clouds, which are often called mares tails.
41. These clouds form at high altitude and are commonly made of ice crystals.
42. While there are many different types of clouds based on altitude and shape, most are different versions of the three main types we just discussed.
43. **Graphic Transition – Precipitation**
44. When we think of bad weather we usually think of heavy rain...
45. ... or snow. These are the two most common forms of precipitation. Precipitation is any form of moisture that falls from a cloud to the ground.
46. As you recall, water vapor condenses on condensation nuclei ...
47. ...which may come together to form clouds.
48. These tiny particles of moisture may grow larger as more water collects on them,...
49. ... forming mist drops, ...
50. ... then larger drizzle drops,...
51. ...and eventually rain drops.
52. When temperatures are below freezing, ice crystals may form which may...
53. ...develop into snowflakes.
54. If the moisture in a cloud gets heavy enough, it falls to the ground in the form of precipitation.
55. You Decide! What are some other forms of precipitation?
56. Sleet, consisting of partially frozen rain . . .
57. . . .and hail, which consists of small balls of ice, are some examples of other forms of precipitation.
58. Sleet can be hazardous because it makes roads slick.



Script (cont.)

59. And hailstones as large as grapefruits can damage crops and property.
60. **Graphic Transition – Air in Action**
61. In many parts of the world, the weather can change quite quickly.
62. What are some of the factors which contribute to changes in weather?
63. The constant movements of air and moisture in the atmosphere are responsible for changing weather.
64. These changes are often associated with the movement of large air masses.
65. Air masses tend to have the same general properties of the surface over which they form.
66. For example, when air sits over the dry desert, it becomes warm and dry.
67. This type of air mass is called a continental tropical air mass.
68. It is called continental because it forms over landmasses and it is called tropical because it's warm.
69. Off the coast of Florida tropical maritime air masses form which are warm and moist.
70. What would you call an air mass which forms over cool, dry land?
71. They're called continental polar air masses.
72. These are just a few of the different types of air masses.
73. When an air mass moves it brings with it the type of temperature and moisture over which it formed.
74. For example, a maritime tropical air mass tends to bring rainy, warm weather with it as it moves over land.
75. And this clear cold winter weather is the result of cold continental polar air which has moved south.
76. **Graphic Transition – Fronts**
77. You've probably heard about cold fronts and warm fronts. But what is a front?
78. A front is a boundary between two different types of air masses.
79. Just as oil and vinegar do not easily mix, air masses do not always mix, forming fronts or boundaries between them.
80. There are several different types of fronts including cold fronts, warm fronts, occluded fronts, and stationary fronts.
81. Perhaps you have been outside when a rush of cold fast wind arrives. The sky grows cloudy, and it soon begins to rain hard.
82. This is typical of a passing cold front.
83. In a cold front, a cold mass of air pushes under a warm mass of air, forcing the warm air upward.

Script (cont.)



84. This creates a steep slope of air. Large cumulonimbus clouds may form along the slope and produce violent storms.
85. Cold fronts tend to be fast moving.
86. On a weather map, cold fronts are indicated by a line with triangles pointing in the direction of the warmer air mass.
87. A warm front occurs when warm, less dense air overrides colder, denser air.
88. Warm fronts tend to be slower moving and tend to produce cloudy skies with precipitation followed by clearing and warm temperatures.
89. They are indicated on the weather map with half circles on one side facing in the direction of the colder air mass.
90. Occluded fronts occur when two cooler air masses merge, forcing warmer air to rise between them.
91. This tends to produce strong winds and heavy precipitation.
92. Stationary fronts occur when fronts stall or stop moving.
93. These types of fronts may remain in one place for several days.
94. **Graphic Transaction – Storms**
95. You Decide! What are some of the characteristics of storms?
96. If you said wind, precipitation, and maybe even thunder and lightning, you're right!
97. There are many different types of storms including snowstorms, and thunderstorms, as well as violent storms such as hurricane and tornadoes.
98. Large snowstorms and rainstorms tend to be associated with large moist air masses often referred to as low-pressure systems.
99. Some low-pressure systems may bring large accumulations of rain.
100. Or they may bring snow to a large area depending on how much moisture the system contains.
101. At this very moment hundreds of thunderstorms are occurring throughout the world.
102. A thunderstorm is a heavy rainstorm accompanied by thunder and lightning.
103. Thunderstorms can be very dangerous. Every year hundreds of people are hit by lightning.
104. Strong thunderstorms tend to form along cold fronts.
105. Or where warm, moist air allows the development of large cumulonimbus clouds, these are also sometimes called thunderclouds.
106. Such thunderclouds are capable of producing intense lightning and winds exceeding 150 kilometers per hour.



Script (cont.)

107. Conditions which lead to the development of thunderstorms may also create extremely powerful localized storms called tornadoes.
108. A tornado is a whirling, funnel-shaped cloud which contains very low air pressure at its bottom.
109. When tornadoes touch down they act like a giant vacuum cleaner sucking up objects as heavy as cars and houses.
110. They tend to form in low lying cumulonimbus clouds and along fronts. . .
111. . . and they may touch down for only a few minutes as they sweep across the landscape.
112. But tornadoes can cause massive destruction.
113. A hurricane is another type of violent storm
114. Like tornadoes, they consist of intense areas of low pressure, which spin in a counter clockwise direction.
115. Hurricanes may pack winds exceeding 120 kilometers per hour and they can be huge, reaching a size of more than 600 kilometers in diameter.
116. Hurricanes form over warm ocean waters where moist air rises rapidly and cools forming clouds.
117. A region of low pressure forms toward the center of a hurricane.
118. These satellite images of a hurricane show a storm as it heads toward land.
119. There its high winds and heavy rains cause property damage.
120. **Graphic Transition – Predicting the weather**
122. Predicting the weather is one of the most difficult tasks in modern science.
123. Meteorologists are scientists who study and often forecast the weather.
124. Meteorologists use a wide variety of tools to study the weather including...
125. ...weather instruments,...
126. ...weather balloons,...
127. ... satellite imagery, radar . . .
128. ...and computers.
129. Weather maps, created by meteorologists, provide a geographic representation of air masses, fronts, dew points, air pressure, and other information.
130. These aid meteorologists in forecasting weather.
131. A weather forecast is a scientific prediction of what the weather will be in the future, helping us to plan for outdoor activities.
132. Everyday you can get the weather forecast from the newspaper, TV, radio, or Internet.



Script (cont).

133. **Graphic Transition – Summing Up**
134. During the past few minutes we have taken a look at some of the characteristics of weather,. . .
135. . . . including the different types of clouds and the ways in which clouds form.
136. We explored how precipitation forms and . . .
137. . . . some of the different types of precipitation.
138. We took a look at some of the different types of air masses.
139. . . .and how fronts form between air masses.
140. We also explored some of the different types of storms including. . . .
141. . . .thunderstorms, ...
142. . . .tornadoes. . .
143. . . .and hurricanes.
144. Finally, we took a brief look at some of the tools meteorologists use to predict the weather.
145. So the next time you experience a storm, . . .
146. . . .or read a weather forecast, . . .
147. . . .think about how weather is continually in action.
148. You just might think about the weather a little differently.

Video Quiz:

Fill in the correct word when you hear this tone _____. Good luck and let's get started.

1. The dew point is the temperature at which water vapor _____.
2. When many droplets come together _____ form.
3. _____ clouds are white, puffy, fair weather clouds.
4. Cirrus clouds are made of crystals of _____.
5. _____ is moisture that falls from clouds.
6. A _____ tropical air mass is formed over warm oceans.
7. A boundary between two different air masses is a _____.
8. An incoming _____ front may produce windy, stormy weather.
9. Tornadoes are very intense areas of swirling _____ pressure.
10. _____ are scientists who study the weather.



Answers to Student Assessments

Preliminary Test

1. condensation
2. cumulus
3. ice
4. precipitation
5. nuclei
6. moisture
7. sleet
8. polar
9. front
10. meteorologists
11. false
12. true
13. true
14. false
15. false
16. true
17. true
18. false
19. true
20. false

Video Review

You Decide:

- A. A cloud is formed when large nuclei of droplets come together.
- B. Sleet and hail are other forms of precipitation.
- C. Wind, precipitation, thunder and lightning are all characteristics of a storm.

Video Quiz:

1. condenses
2. clouds
3. cumulus
4. ice
5. precipitation
6. maritime
7. front
8. cold
9. low
10. meteorologists

Post Test

1. true
2. true
3. false
4. true
5. true
6. false
7. false
8. true
9. false
10. false
11. sleet
12. meteorologists
13. nuclei
14. front
15. condensation
16. polar
17. cumulus
18. moisture
19. ice
20. precipitation

Answers to Student Activities



Crazy Cold Fronts

1. The diagram should illustrate warm water (less dense) floating above the cold, blue water (more dense).
2. A cold front is demonstrated in the aquarium.
3. The cold, blue water forced itself beneath the less dense, warm water.
4. Violent storms will occur along a cold front.

The Great Ice Storm of 1998

1. Freezing rain occurs when warm air overrides cold air masses.
2. Maps will vary but must include parts of New York, Vermont, New Hampshire, Maine and Quebec, Canada.
3. Electricity provides energy to heat homes, cook food, produce food, receive water and supply light.
4. Destruction of a forest results in the destruction of a habitat for animals. Without the forest, animals have no place to live and no food to eat.
5. Answers will vary.

Reading Weather Maps

1. Cold fronts and warm fronts are shown.
2. Cold fronts bring colder air, which is often followed by fair, cool weather. A warm front usually brings warmer air. Rainy weather may accompany a warm front, followed by humid weather.
3. Miami, Florida.
4. Mild, clear weather. A high pressure system is responsible.
5. The air temperature is 71° Fahrenheit. The passage of a warm front brought warmer weather.
6. The cold front is moving in an eastward direction. Chicago will experience it next.

Vocabulary

1. dew point, c
2. condensation nuclei, h
3. cumulus, j
4. precipitation, a
5. hail, i
6. tropical maritime, f
7. front, d
8. meteorologist, b
9. cirrus, g
10. stratus, e

Assessment and Student Activity Masters





Preliminary Test

Directions: Fill in the blank with the correct word. A list of possible answers is provided at the bottom of the page.

1. Clouds result from the _____ of water vapor.
2. _____ clouds indicate fair weather.
3. Cirrus clouds are made of _____ crystals.
4. Moisture falling from a cloud to the ground is known as _____.
5. Condensation _____ are small particles in the air on which water vapor condenses.
6. Precipitation occurs when the _____ in a cloud becomes too heavy.
7. _____ is partially frozen rain
8. A continental _____ air mass forms over cool, dry land.
9. A _____ is a boundary between two types of air masses.
10. Scientists who study the weather are called _____.

moisture
meteorologists
precipitation
polar
front
sleet

ice
nuclei
dry air
condensation
cumulus
rain



Preliminary Test

Directions: Decide whether the answer is True (T) or False (F).

- | | | |
|---|---|---|
| 11. Tornadoes tend to indicate good weather. | T | F |
| 12. Constant movement of air and moisture in the atmosphere are factors leading to a change in weather. | T | F |
| 13. Air masses have the same characteristics of the surface over which they form. | T | F |
| 14. A continental tropical air mass forms off the coast of Florida. | T | F |
| 15. Cold fronts tend to be slow moving. | T | F |
| 16. Low pressure systems may cause large snow and rain storms. | T | F |
| 17. A stationary front occurs when fronts stop moving, or stall. | T | F |
| 18. Hurricanes form over cold ocean waters due to air rising rapidly and then cooling. | T | F |
| 19. Tornadoes are storms consisting of swirling areas of very intense, low pressure. | T | F |
| 20. Condensation is any form of moisture that falls to the ground from a cloud. | T | F |



Video Review

Directions: During the course of the program, answer the “You Decide” questions as they are presented in the video. Answer the Video Quiz questions at the end of the video.

You Decide:

A. What is formed when water droplets gather together?

Answer _____

B. What are some other forms of precipitation?

Answer _____

C. What are some of the characteristics of storms?

Answer _____

Video Quiz:

1. The dew point is the temperature at which water vapor _____.
2. When many droplets come together _____ form.
3. _____ clouds are white, puffy, fair weather clouds.
4. Cirrus clouds are made of crystals of _____.
5. _____ is moisture that falls from clouds.
6. A _____ tropical air mass is formed over warm oceans.
7. A boundary between two different air masses is a _____.
8. An incoming _____ front may produce windy, stormy weather.
9. Tornadoes are very intense areas of swirling _____ pressure.
10. _____ are scientists who study the weather.



Post Test

Directions: Decide whether the answer is True (T) or False (F).

- 1. Air masses have the same characteristics of the surface over which they form. T F
- 2. Low pressure systems may cause large snow and rain storms. T F
- 3. Condensation is any form of moisture that falls to the ground from a cloud. T F
- 4. Constant movement of air and moisture in the atmosphere are factors leading to a change in weather. T F
- 5. Tornadoes are storms consisting of swirling areas of very intense, low pressure. T F
- 6. A continental tropical air mass forms off the coast of Florida. T F
- 7. Tornadoes tend to indicate good weather. T F
- 8. A stationary front occurs when fronts stop moving, or stall. T F
- 9. Cold fronts tend to be slow moving. T F
- 10. Hurricanes form over cold ocean waters due to air rising rapidly and then cooling. T F



Post Test

Directions: Fill in the blank with the correct word. Choose from the list of possible answers at the bottom of the page.

- 11. _____ is partially frozen rain.
- 12. Scientists who study the weather are called _____.
- 13. Condensation _____ are small particles in the air on which water vapor condenses.
- 14. A _____ is a boundary between two types of air masses.
- 15. Clouds result from the _____ of water vapor.
- 16. A continental _____ air mass forms over cool, dry land.
- 17. _____ clouds indicate fair weather.
- 18. Precipitation occurs when the _____ in a cloud becomes too heavy,
- 19. Cirrus clouds are made of _____ crystals.
- 20. Moisture falling from a cloud to the ground is known as _____.

- | | |
|----------------|--------------|
| moisture | ice |
| meteorologists | nuclei |
| precipitation | dry air |
| polar | condensation |
| front | cumulus |
| sleet | rain |



Crazy Cold Fronts

Objective: In this activity you will observe how a cold front develops.

Background:

The sun is shining and you are out swimming in a pool. All of a sudden dark clouds form in the sky and a cool breeze begins to blow. It begins to rain. What happened to the weather? A sudden change in the weather is usually caused by a front. Fronts always bring a change in wind direction and usually a change in air temperature. There are four different types of fronts. When a warm, moist air mass slides over a cold, dry air mass a **warm front** develops. Clouds form and usually produce rain. Skies will eventually clear and the air will be warmer. A **cold front** develops when a cold, dry air mass forces itself beneath a warm, moist air mass, resulting in violent storms along the front. After the skies clear the air will be cooler. **Stationary fronts** occur when two fronts meet and stop moving. This type of front may stay in place for several days and produce long periods of rain over the same area. An **occluded front** occurs when two air masses collide and force warm air to rise between them. They may cause rain and strong winds, but they produce weather that is less severe than that caused by cold fronts.

Materials:

Aquarium or large see-through container
Blue food coloring
Plastic ziploc bag
Ice cubes
Pin or sharp object

Directions:

1. Fill the aquarium with warm water.
2. Place several ice cubes and 4 to 5 drops of the blue food coloring into the ziploc bag and seal it. Let the ice cubes melt. Carefully puncture several holes in the top of the bag using the pin or sharp object.
3. Immerse the bag in the aquarium and hold it at one location for several minutes.
4. Observe what happens.

Conclusion:

1. Sketch a diagram of what occurred in the aquarium. Label the warm water and the cold water.
2. Which type of a front is demonstrated in the aquarium?
3. Describe what happened to the cold blue water. Explain how this is similar to the movement of cold air undercutting warm air.
4. What kind of weather would you expect to occur along this front?



The Great Ice Storm of 1998

In early January 1998, there was stagnation of a weather pattern over northeastern North America which resulted in the massive accumulation of ice on trees and electric pole lines. This freezing rain was caused by the overriding of warm air over cold air masses. A fine rain froze when falling from the warm air mass to the ground while passing through the cold, freezing air. This caused the rain to freeze and accumulate on any object with which it came in contact. The phenomenon lasted about one week.

This storm, unlike any other in living memory, affected 4.3 million acres in the Adirondack area of upper New York State. It also affected an extensive area within Vermont, New Hampshire, and Maine. In addition, it devastated the southern part of Quebec, Canada, including the city of Montreal.

The ice was 3-4 inches (7.5-10 cm) thick on trees and power lines in the whole area. The massive weight of the ice caused the destruction of countless, valuable trees. The damage to the trees caused the loss of future timber products, but also caused fear of fire in the future from the dead branches and logs. Also, the damage changed the woodland habitat, so that certain types of wildlife benefitted while others suffered due to changes in the environment. The effect of the storm on trees, forests, land, and wildlife could last for fifty years according to some early estimates.

The ice accumulation had an immediate effect on power transmission and loss of highway access due to fallen trees and wires. Many farms in this large area lost power to run their machinery and milking equipment. If the farms did not have access to auxiliary generators for electricity, they could not farm and milk the cows. This caused many farms to fail financially and lose their cows to production. Thus many farms went out of business. With the loss of farms, the land started to resort back to forest, affecting the local economy and also the distribution of wildlife.

In the Province of Quebec, in addition to the lost forest and farms, a major problem arose from loss of electricity to the city of Montreal. This large city, the capital of the Province, was without power for one month. The problem was so serious that at one time, the authorities considered ordering the evacuation of the city. The evacuation was considered because of the lack of services which are needed for life in the city environment. Can you imagine life in a city without heat, lights, water, traffic control, and communication for one month, in freezing January temperatures? Generally people look upon a loss of electricity for a few hours as a major inconvenience. Our whole life revolves around electricity and the convenience it provides.



Ice Storm (cont)

This storm caused the destruction of 3,100 steel and wood power towers and 116 high voltage transmission lines from the Hydro Quebec Power System on Hudson Bay, another indication of the scope of the storm.

Hopefully this will give some idea of the possible power, duration and destructive effect of an ice storm. This in turn is a result of the orientation of cold and warm air masses, and the stalled movement of this weather phenomenon.

Questions

1. Explain how freezing rain occurs. Draw a picture to explain the weather phenomenon.
2. Draw a map of the affected area of the storm.
3. List the ways we use and are dependent upon electricity.
4. Discuss how the destruction of a forest by ice can affect animals.
5. Describe how a storm like this might affect your life.



Reading Weather Maps

Objective: In this activity, you will learn how to interpret the symbols on a weather map.

Background: The map on the next page is an example of a weather map similar to ones used by meteorologists. This kind of a weather map provides details about current weather occurring at stations or at designated areas on the map. The stations are labeled according to the city they represent. On this map, high atmospheric pressure is indicated using the letter “H,” and low atmospheric pressure is indicated using the letter “L.” Fronts are also shown on this map. A front represents a major shift in the wind direction, usually accompanied by a change in temperature. There are other factors that meteorologists consider when predicting weather that are not shown on this map.

Below the maps are some sample cities with information of temperature and current conditions.

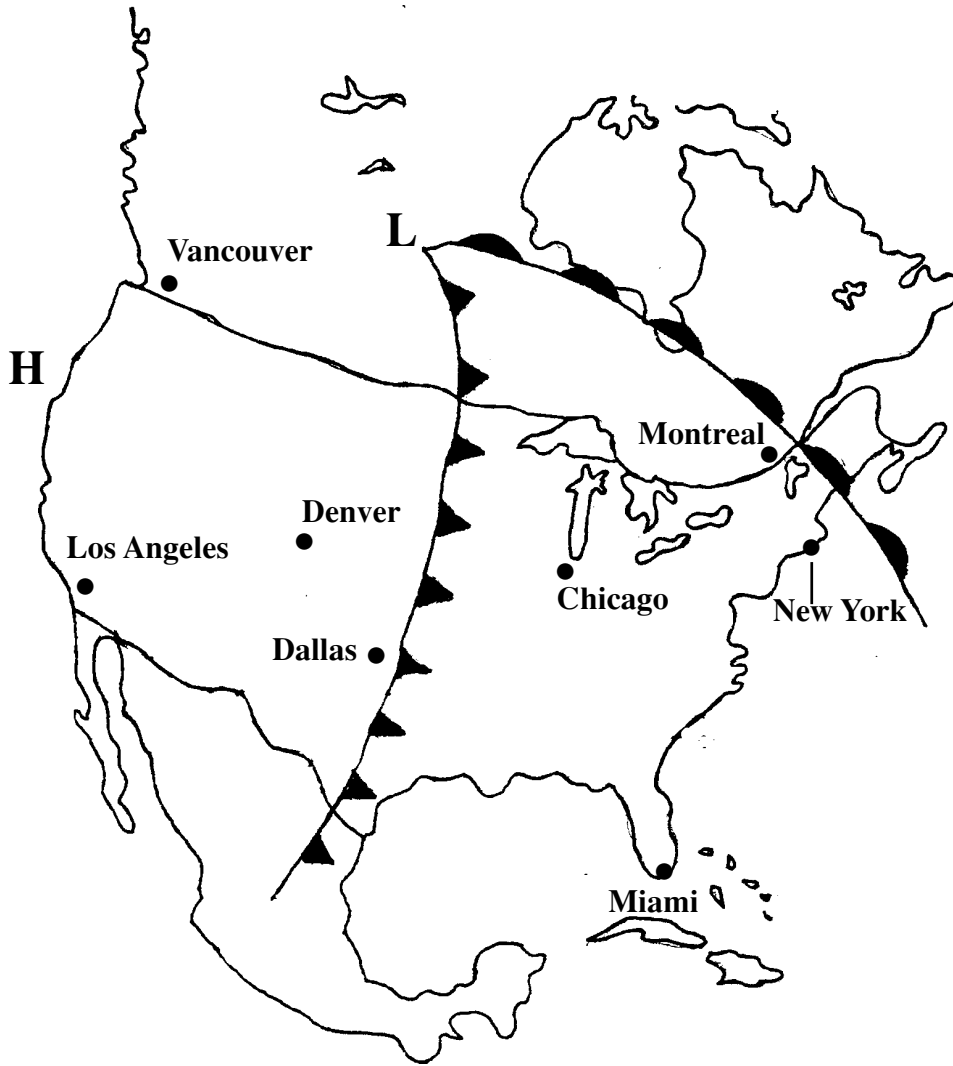
Directions: Use the map and data on the next page to answer the following questions.

Questions:

1. Which type of fronts are shown on this map?
2. Describe the type of weather most commonly associated with these types of fronts?
3. Which city has the highest temperature?
4. What is the weather in Vancouver, British Columbia? What air system is responsible for this weather?
5. What is the air temperature in New York? What caused the temperature to increase from yesterday’s temperature?
6. Describe the direction of movement of the cold front. What major city on the map will experience the cold front next?



Weather Maps (cont).



Current Weather Conditions		
Cities	Temperature	Current Conditions
Chicago	72° F.	thin clouds
Denver	49° F.	partly cloudy
Los Angeles	81° F.	sunny
Miami	84° F.	hazy
Montreal	67° F.	cloudy, with drizzle
New York	71° F.	cloudy, with drizzle
Vancouver	72° F	sunny
Dallas	58° F	thunderstorms



Vocabulary of Weather in Action

_____ 1. wed notip

_____ 2. odisnoacnetn icnule

_____ 3. msucluu

_____ 4. tpeiotprainic

_____ 5. ihal

_____ 6. ptclrtoa mtmireai

_____ 7. ftorn

_____ 8. gmtrlstoioeee

_____ 9. rsciur

_____ 10. trstasu

a. moisture falling from a cloud to the earth

b. a scientist who predicts and studies the weather

c. temperature at which water vapor condenses and forms a cloud

d. a boundary between air masses

e. clouds that form a flat layer in the sky

f. air mass that forms over warm water

g. clouds that form at high altitudes and are made of ice crystals

h. small particles in the air

i. small balls of ice falling as precipitation

j. white, puffy, fair-weather clouds