SCIENCE • GRADE 5

Science Content Standards
Earth Sciences: 4.C
Earth Sciences: 4.D

Above Level

Tracking Weather Patterns

FOCUScurriculum

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Tracking Weather Patterns
California's Content Standards Met

GRADE 5 SCIENCE

EARTH SCIENCES: 4—Energy from the Sun heats Earth unevenly, causing air movements that result in changing weather patterns. As a basis for understanding this concept:

c. Students know the causes and effects of different types of severe weather.

d. Students know how to use weather maps and data to predict local weather and know that weather forecasts depend on many variables.

GRADE 5 ENGLISH LANGUAGE ARTS

2.0 READING COMPREHENSION

Structural Features of Informational Materials 2.1—Understand how text features (e.g., format, graphics, sequence, diagrams, illustrations, charts, maps) make information accessible and usable.

Structural Features of Informational Materials 2.2—Analyze text that is organized in sequential or chronological order.

Comprehension and Analysis of Grade-Level-Appropriate Text 2.3—Discern main ideas and concepts presented in texts, identifying and assessing evidence that supports those ideas.

Comprehension and Analysis of Grade-Level-Appropriate Text 2.4—Draw inferences, conclusions, or generalizations about text and support them with textual evidence and prior knowledge.

SCIENCE • GRADE 5

Science Content Standards
Earth Sciences: 4.C
Earth Sciences: 4.D

Above Level

Student Book

Tracking Weather Patterns

Print pages 5–18 of this PDF for the student book.

How to Make the Student Book

- **The student book is contained on pages 5–18 of this PDF. It begins on the next page.**
- **To make one student book, or a two-sided master copy that can be photocopied, you will print on both sides of seven sheets of 8.5″ x 11″ paper.**
- **Do a test printout of one book first to familiarize yourself with the procedure.**
- **Follow these instructions carefully.**

First–Select the Paper

Since you will be printing on both sides of the sheets of paper, select a good quality white paper. We recommend using at least a 22lb sheet.

Second–Check Printer Settings

Be sure you have the correct page setup settings for your computer and printer. You will print these pages in landscape format.

Third–Print EVEN Pages

Open the PDF of the book you want to print. Select print from your file menu. In your printer's dialogue box enter pages 5–18 to print. Then select EVEN pages only. It is important to print only the EVEN pages first. Click "Print" to print the even pages. (**Important note**: The first page that prints will be blank. DO NOT discard this page. It will be needed to print the cover in the next step.)

Forth–Print ODD Pages

When the even pages have printed, flip the stack of pages over to print the odd pages. Place the stack back in your printer. Select print from the file menu again. In your printer's dialogue box, select ODD pages. Click "Print" to print the odd the pages.

Fifth–Fold the Book

You now have a complete book. Check to be sure the pages are in the correct order with the book's cover as the top page. Then fold the stack of paper in half.

Sixth–Staple the Book

Use an extended-length stapler to staple the pages together. Place three staples in the spine of the book.

Please note that printers vary in how they output pages. Do a test printing with one book and adjust the procedure as necessary.

If you want to make a one-sided master copy, print ALL pages 5–18 at once. Then select "one-sided to two-sided" on the copy machine.

AL

Tracking Weather Patterns

California's Content Standards Met

GRADE 5 SCIENCE

EARTH SCIENCES: 4—Energy from the Sun heats Earth unevenly, causing air movements that result in changing weather patterns. As a basis for understanding this concept:

c. Students know the causes and effects of different types of severe weather.

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GRADE 5 ENGLISH LANGUAGE ARTS

2.0 READING COMPREHENSION

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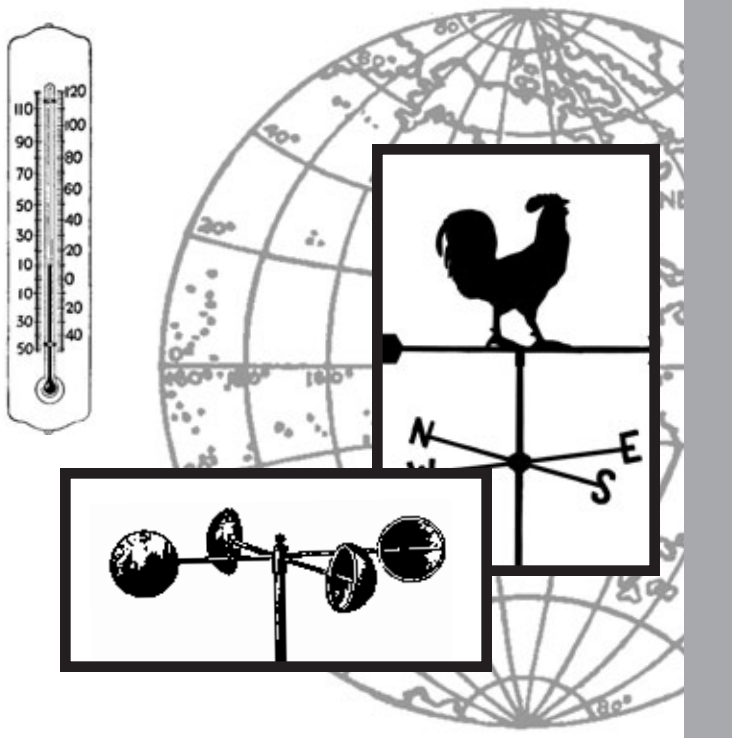
FOCUS ON CALIFORNIA STANDARDS

SCIENCE • GRADE 5

California Content Standards
Earth Sciences: 4.C
Earth Sciences: 4.D

Tracking Weather Patterns

by Caitlin Scott



SCIENCE • GRADE 5

California Content Standards
Earth Sciences: 4.A
Earth Sciences: 4.B

Tracking Weather Patterns

by
Caitlin Scott

FOCUScurriculum

Curriculum materials for **your** content standards

Table of Contents

INTRODUCTION

Who Tracks Weather?

What is the weather forecast for tomorrow? Will farmers have enough rain to grow crops this year? Who should **evacuate** if a hurricane is coming in from the Atlantic Ocean? What is the best place for a city to build a wind farm?

These are all questions that scientists can answer by tracking weather patterns. These scientists are called meteorologists.

There are about 7,400 meteorologists in the United States. This number will grow in the future, as the climate of the planet changes. Are you interested in a **career** studying the weather? If so, you should study science in school. You will also need to get a college degree in meteorology. Later, you might even get a graduate degree.

evacuate: to leave in a time of emergency
career: the work or job a person does

CHAPTER 1

Meteorologists

A meteorologist has an exciting job. Weather happens all the time, so many meteorologists work at night or on weekends. Sometimes, they work in an office recording data. They also work outdoors observing the weather. Sometimes, meteorologists fly in planes to watch the weather.

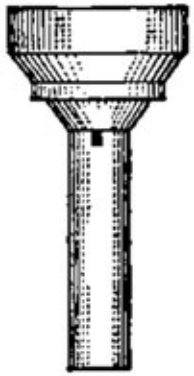
Some meteorologists work alone to study the weather. Others work in large teams. All this work is very important.

Meteorologists help people by predicting future weather. They also study changes in weather patterns that might affect the climate. Still, others invent new instruments to help study the weather.

What might you like about being a meteorologist?

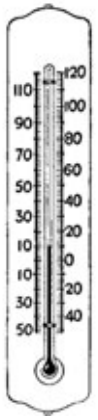
A Meteorologist's Tools

Scientists gather at weather stations to study the weather. They have many tools to help them. Here are some of these tools.



Rain Gauge

A rain gauge measures how many inches of rain has fallen. Average rainfall in the United States is about 76 inches per year.



Thermometer

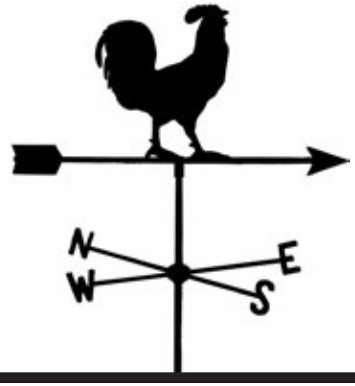
A thermometer measures how hot or cold the air is. It is colder in winter than in summer. It is also colder further from the equator and in the mountains.

Barometer

A barometer measures air pressure. Rising air pressure usually means fair weather. Falling air pressure often means bad weather or stormy skies.

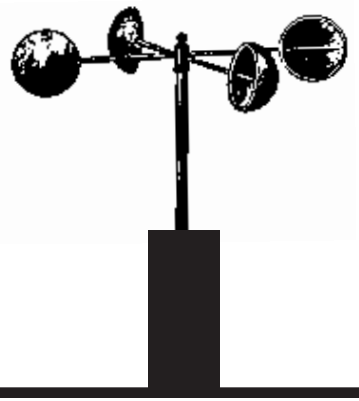
Weather vane

A weather vane shows which direction the wind is blowing. Weather typically moves in the direction of the wind.



Anemometer

An anemometer measures wind speed or how hard the wind is blowing. Storm winds can blow many miles per hour. In good weather, the wind is typically gentle.



Recording and Presenting Data

Meteorologists carefully record the information they gather about the weather and keep these records in notebooks or on spreadsheets in computers. Recording information helps them remember what they learned and make predictions based on the **data**.

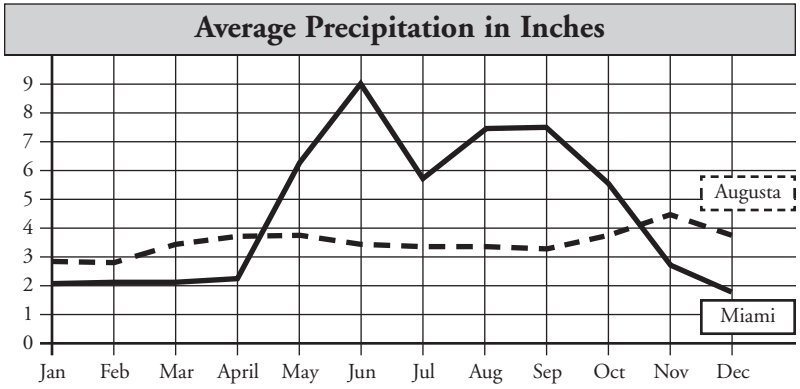
For example, here are two tables that show average **precipitation** and average **temperature** for two different cities, one in Florida and one in Maine.

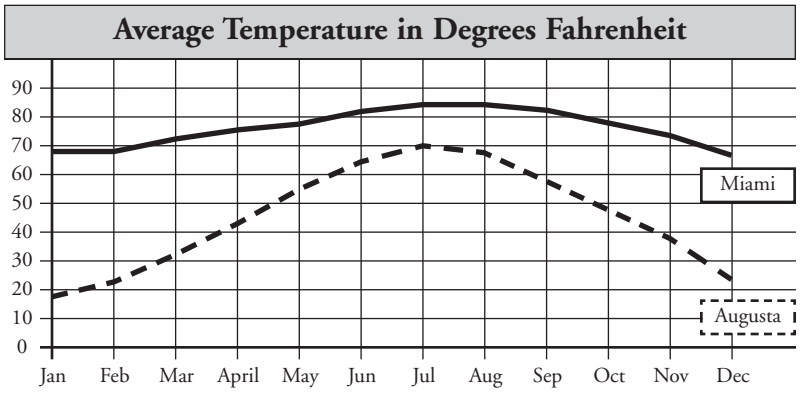
Weather in Miami, Florida												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average Temperature in Degrees Fahrenheit	67°	68°	72°	75°	78°	81°	84°	84°	82°	78°	74°	68°
Average Precipitation in Inches	2.0	2.1	2.4	2.9	6.3	9.3	5.7	7.6	7.6	5.6	2.7	1.8

Weather in Augusta, Maine												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average Temperature in Degrees Fahrenheit	18°	22°	32°	44°	55°	64°	70°	68°	58°	48°	38°	24°
Average Precipitation in Inches	2.9	2.8	3.3	3.7	3.8	3.3	3.3	3.3	3.1	3.9	4.5	3.8

data: information
precipitation: rain, ice, sleet, snow, and hail
temperature: a measure of the effect of heat energy

Scientists sometimes use line graphs to record data. Here is the same information about average precipitation and temperature in Augusta, Maine and in Miami, Florida. Compare the graphs to the tables. Which one do you think presents the data the best?





What conclusions can you draw about the weather in these two cities from these two graphs?

Weather Maps

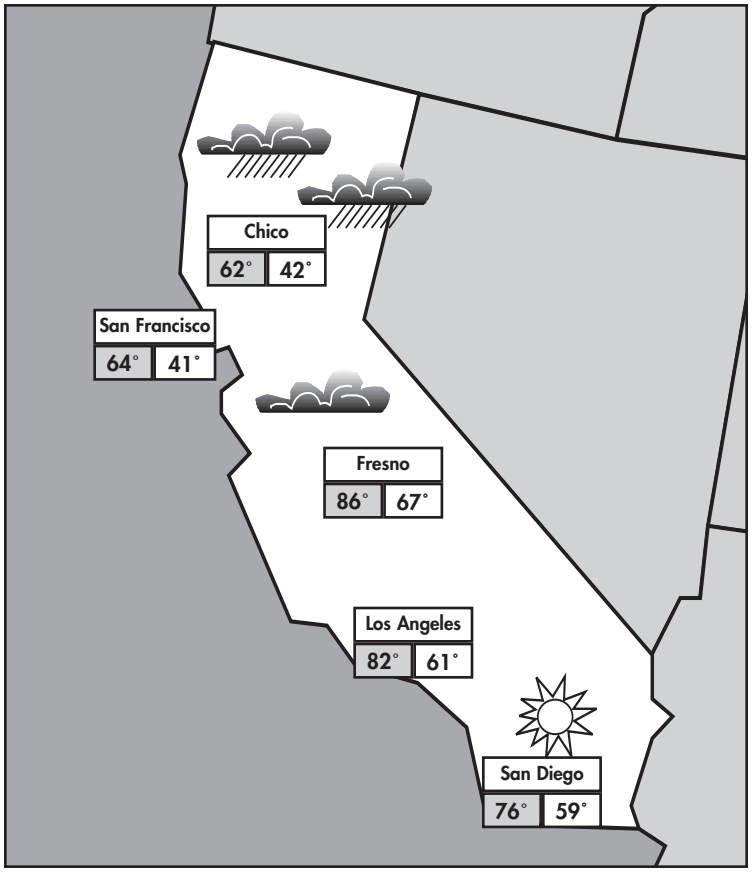
Meteorologists need to display information that tells other people about what they have learned about the weather. Sometimes they do this by using graphs and tables, but often they use weather maps.

Weather maps display a place such as the United States or a state within the United States. Then, meteorologists place symbols on the map that show weather conditions. For example, an illustration of the sun indicates it is currently sunny or it is **forecasted** to be sunny in the future. A cloud symbol indicates cloudy weather in the area. A cloud symbol with a raindrop means it is raining or likely to rain soon. A symbol of a snowflake means snow, and a lightning bolt indicates a thunderstorm.

Meteorologists also display temperatures on weather maps. Again, they may be the current temperature or a forecast for the high and low temperatures for the day.

forecast: to try to tell how something will turn out; to predict

Weather Map of California



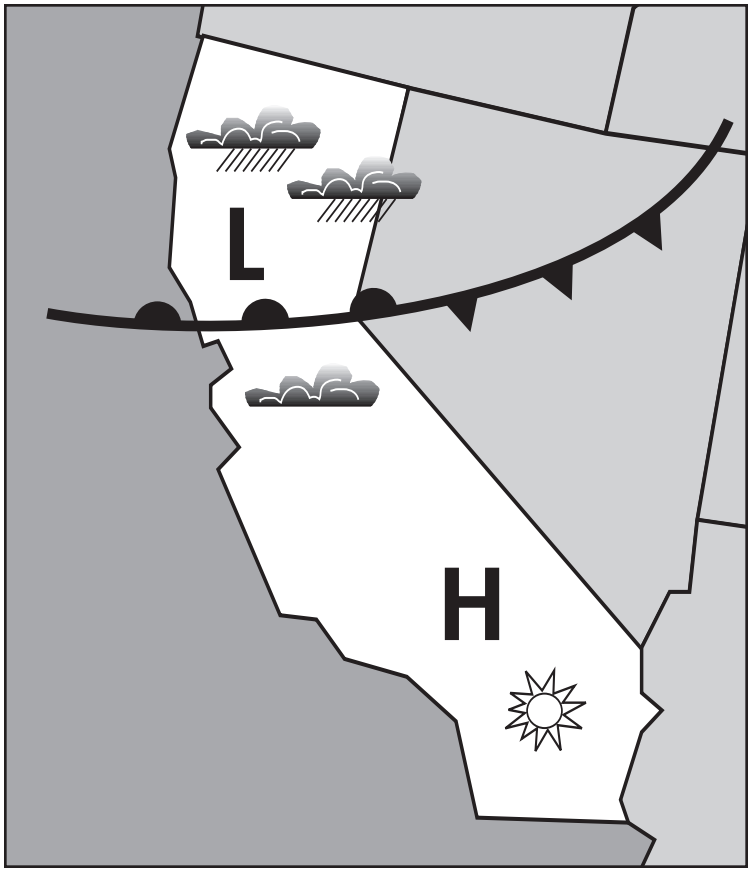
Describe the weather in California based on this map.

Meteorologists also study changes in air pressure. They discovered that air pressure can help us predict the weather. When the weather changes, air pressure typically changes at the same time. A drop in air pressure usually means stormy or rainy weather, while rising air pressure often means fair weather. To learn more about how air pressure affects our weather, read *The Air Around Us* in this series.

Meteorologists record air pressure and use symbols to display areas of high and low pressure on weather maps. An "H" means high pressure, usually indicating clear skies and fair weather. An "L" means low pressure, which typically indicates stormy skies and rough or rainy weather.

In addition, meteorologists create maps using images taken from satellites orbiting the Earth. These weather satellites have special cameras that take pictures of the Earth. Meteorologists use these pictures to create weather maps that show areas of sunshine, cloud cover, rain, as well as severe weather.

Weather Map of California



How does air pressure affect the weather?

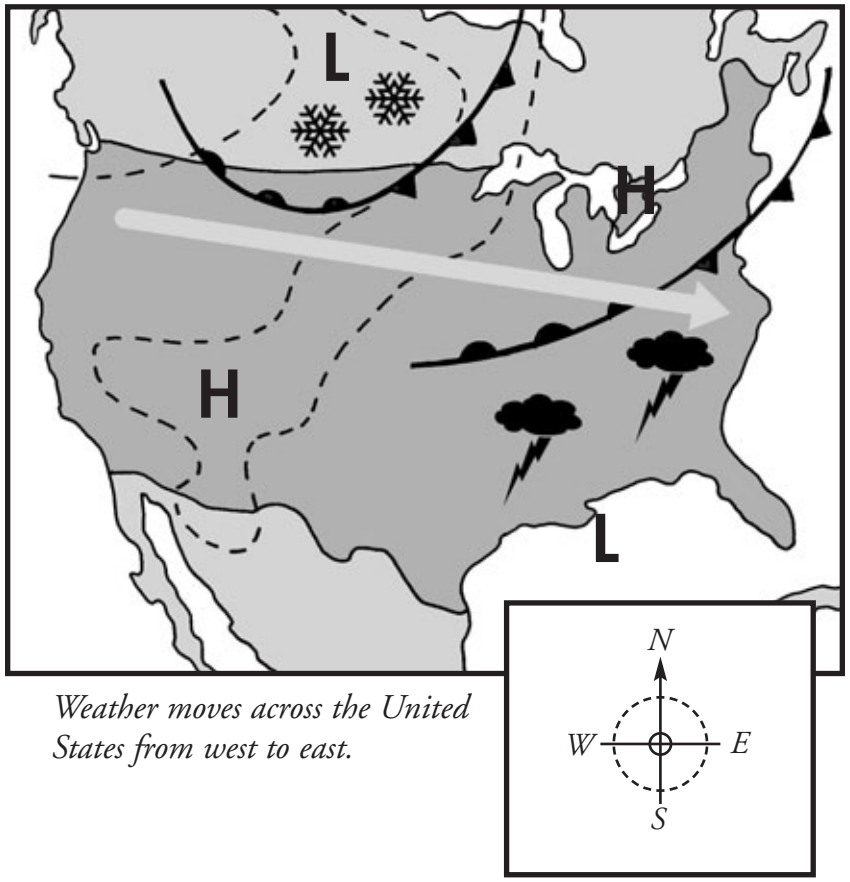
Weather Is Global

You have probably noticed that the wind does not stop at the end of your town, and rain doesn't quit at the border of your state. Furthermore, clouds don't disappear where the coasts of the United States meet the ocean waters.

Instead, weather moves over the surface of our entire planet. What happens in one place affects the weather in another. Why is this? Weather patterns move across the globe.

In the United States, most wind and weather moves from west to east. For example, if a rain cloud forms over the Pacific Ocean, wind can blow it inland causing rain on the west coast and then in states in the middle of the country, such as Iowa. In a few days, rain might fall on the east coast in the mid-Atlantic states such as Virginia.

Weather Map of the United States



Weather moves across the United States from west to east.

Describe the weather in the United States based on this map. What areas of the country will experience high pressure a few days from now?

CHAPTER 2

Studying Severe Weather

One of the most important things, a meteorologist does is study and track severe weather. One purpose of studying severe weather is to better predict it. Meteorologists can then help people know what to do to stay safe in a storm. By predicting storms and informing people about storm safety, meteorologists can save lives.

Tornados and hurricanes are all examples of severe weather. Floods result from large amounts of rain from storms. Scientists can tell the public if one of these storms is in the area. Then, they can tell people what they can do to escape the storm's damage. Or, if people can't get away from the storm in time, scientists can tell people what to do to stay safe and wait out the storm.

Floods

Floods are caused by heavy rains that can damage property and cause drowning. Fortunately, these safety tips may help save you, your family, and your property.

First, you should determine whether or not you live in an area that floods frequently. If you do, keep important items out of the basement or ground floor.

Second, be sure to have an escape plan. Know how to get to higher ground quickly and make sure everyone in your family knows the escape route.

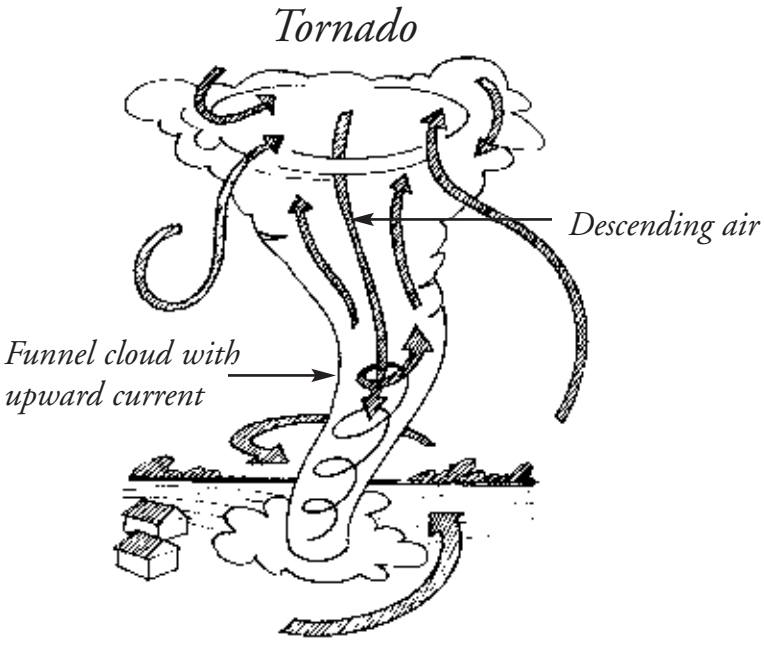
What if you're unable to escape before a flood strikes? Be prepared ahead of time by keeping canned food and plenty of bottled water in your house. You can eat this food and drink the water because it is protected from the dirty flood water. Other water and food in your house may get **contaminated** or damaged during the flood.

contaminated: to have been made dirty or polluted

Tornados

Tornados form over land when a mass of cold air collides with a mass of warm air and the two begin to spin. This spinning action can cause winds of more than 100 miles per hour, tearing the roofs off buildings and uprooting trees.

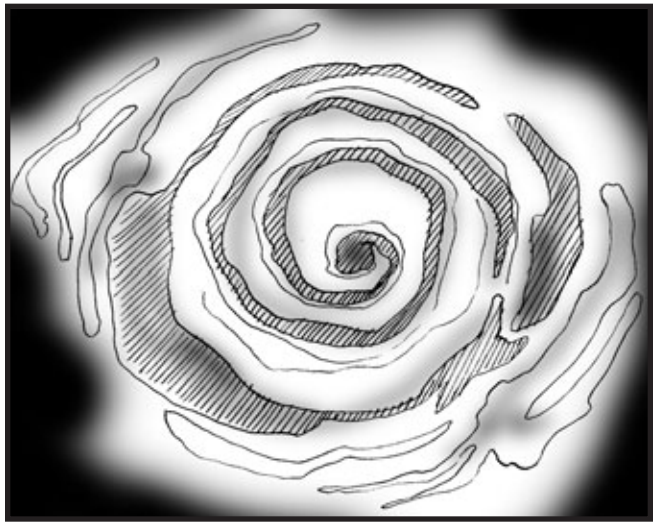
Towns that experience many tornados usually have a tornado warning siren. If you hear a tornado siren, move quickly to a basement, a storm cellar, or a room with no windows. This will help protect you from broken glass and other flying objects.



Hurricanes

Hurricanes are very severe storms that begin over the ocean. Like tornados, hurricanes form when cold and warm air masses collide and start spinning. Unlike tornados, people usually have fair warning when a hurricane is coming toward them.

When hurricanes are on the way, people typically have time to get away. Still, if you are told to evacuate, you need to leave right away. If you wait until the last minute, you might get caught in the storm winds and flood waters that come with hurricanes.



Hurricanes are large storms that form over the ocean and have winds of at least 74 miles per hour.

CHAPTER 3

Investigate Your Weather

In this book, you learned about weather patterns and tools for studying weather. You also learned how scientists show us information about the weather.

If you watch the weather and weather reports, you can stay safe in storms. You can also predict a sunny day for a fun outdoor game. Tracking and recording weather is an important part of our lives.

Create a chart in a notebook for each day of the week, such as the one on the next page, to record data about weather you observe. Record your observations for at least four weeks—longer if you wish. Then write a description of the changes in weather patterns you observed. Use tables and line graphs to present your information.

Weather Observations

DATE:

Temperature

Wind Direction

Wind Speed

Precipitation

Barometric Pressure

DATE:

Temperature

Wind Direction

Wind Speed

Precipitation

Barometric Pressure

Glossary

career—the work or job a person does

contaminated—to have been made dirty or polluted

data—information

evacuate—to leave in a time of emergency

forecast—to try to tell how something will turn out; to predict

precipitation—rain, ice, sleet, snow, and hail

temperature—a measure of the effect of heat energy

To Find Out More . . .

Want to learn more about tracking weather?

Try these books

Weather Atlas in the Round by Keith Lye. Running Press Book Publishers, 2001.

Storm Chasers by Gail Herman. Grosset & Dunlap, 1997.

Access these Web sites

U.S. Department of Labor
Occupational Outlook Handbook:
Atmospheric Scientists
http://www.bls.gov/oco/ocos051.htm

The American Meteorological Society
http://www.ametsoc.org

Write for more information

The American Meteorological Society
Education Programs
1120 G Street, NW Suite 800
Washington, DC 20005-3826

Index

ENGLISH-LANGUAGE ARTS • GRADE 5

Above Level

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English-language Arts Activities

Tracking Weather Patterns

Print pages 20–24 of this PDF for the reading activities.

Sequential Order

Understanding sequential order can help you understand and remember what you read.

Read this jumbled passage and try put the sentences back in the correct order to tell how tornados form.

This spinning action can cause winds of more than 100 miles per hour, tearing the roofs off buildings and uprooting trees. The two air masses begin to spin. Tornados form over land when a mass of cold air collides with a mass of warm air.

A graphic organizer can help you put the sentences in the sequential order.

1	Tornados form over land when a mass of cold air collides with a mass of warm air.
2	The two air masses begin to spin.
3	This spinning action can cause winds of more than 100 miles per hour, tearing the roofs off buildings and uprooting trees.

TRY THE SKILL

Read these jumbled sentences about how hurricanes form. Number each sentence to show the correct sequential order.

____ Eventually, the winds can reach over 74 miles per hour.

____ Like tornados, hurricanes form when cold and warm air masses collide.

____ Hurricanes are very severe storms that begin over the ocean.

____ The different temperature air masses start spinning.

Explain the safety steps you would take if you lived in an area that floods often.

_____

_____

_____

_____

_____

_____

Identifying Main Ideas

Sometimes the main idea in a paragraph is not stated directly. You have to think carefully about the main point of the paragraph in order to know what the main idea is. Most of the sentences should support the main idea.

Read this paragraph from *Tracking Weather Patterns*.

> Weather maps display a place such as the United States or a state within the United States. Then, meteorologists place symbols on the map that show weather conditions. For example, an illustration of the sun indicates it is currently sunny or it is forecasted to be sunny in the future. A cloud symbol indicates cloudy weather in the area. A cloud symbol with a raindrop means it is raining or likely to rain soon. A symbol of a snowflake means snow, and a lightning bolt indicates a thunderstorm.

What is the main idea? Is it that weather maps can show the United States?

No, most of the sentences are not about the United States. The main idea of the paragraph is that meteorologists use symbols to show weather conditions. Most of the sentences are about these symbols.

TRY THE SKILL

Read this paragraph from *Tracking Weather Patterns*. Then, write sentences telling what the main idea is and why you think this is the main idea.

> Tornados and hurricanes are all examples of severe weather. Floods result from large amounts of rain from storms. Scientists can tell the public if one of these storms is in the area. Then, they can tell people what they can do to escape the storm's damage. Or, if people can't get away from the storm in time, scientists can tell people what to do to stay safe and wait out the storm.

What is the main idea?

_____

_____

Why do you think this is the main idea?

_____

_____

_____

Use a Table of Contents

A table of contents tells you where to find information in a book. Chapter headings tell what a chapter is going to be about. Subheadings tell more about the information within a chapter.

Read the beginning of this table of contents. Notice the information you can learn from the table of contents.

What page and chapter would give you information about latitude?

The table of contents says this information is on page 7 in Chapter 1.

What might be another good title for Chapter 1?

Instead of "Global Patterns" this chapter could be called "Worldwide Weather Patterns," because this has the same meaning.

TRY THE SKILL

Reread the table of contents. Answer the questions.

1. What page and chapter would give information about wind?

_____

2. What page and chapter would give information about presenting data?

_____

3. What page and chapter would give information about writing down data?

_____

4. What would be another good title for Chapter 2?

Ⓐ Weather is Global
Ⓑ Tools for Studying Weather
Ⓒ Jobs Studying Weather

Inferring Author's Purpose

Authors have different reasons, or purposes for writing, and readers have different purposes for reading. Sometimes people read to understand something better. Sometimes they read to learn something new. Sometimes they read to solve problems.

Read this passage from *Tracking Weather Patterns* and try to determine the author's purpose.

Floods are caused by heavy rains that can damage property and cause drowning. Fortunately, these safety tips may help save you, your family, and your property.

First, you should determine whether or not you live in an area that floods frequently. If you do, keep important items out of the basement or ground floor.

Why might the author write this?

To help people solve a problem: to stay safe in a flood.

Who might read this and why might they read this?

Someone who lives in an area that floods often might read this to learn about flood safety.

TRY THE SKILL

Read the passage from *Tracking Weather Patterns* and answer the questions.

Towns that experience many tornados usually have a tornado warning siren. If you hear a tornado siren, move quickly to a basement, a storm cellar, or a room with no windows. This will help protect you from broken glass and other flying objects.

1. Why might the author have written this?

Ⓐ To help people understand sirens better.

Ⓑ To help people learn something new about storm cellars.

Ⓒ To help people behave safely during tornados.

2. Who might want to read this?

_____

Answer Key

Sequential Order

1. 4, 2, 3, 1

2. Keep important items out of the basement of ground floor. Be sure to have an escape plan. Be prepared by keeping canned food and plenty of bottled water.

Identifying Main Ideas

1. Scientists can warn people and help them stay safe in severe weather.

2. Most of the sentences are about how scientists can help people in severe weather.

Use a Table of Contents

1. Page 8, Chapter 1

2. Page 16, Chapter 2

3. Page 14, Chapter 2

4. C

Inferring Author's Purpose

1. C

2. Someone who is worried about tornados.