Violent Weather

A Reading A–Z Level Z Leveled Book
Word Count: 1,413

Connections

Writing

Research a type of violent weather that is not in the book. Pretend that you are able to cook up weather. Create a recipe card that lists the ingredients and steps necessary for the type of weather to occur. Include a picture or diagram.

Science

Imagine that you are your community's meteorologist. Create a brief video or presentation that details one type of violent weather that can occur in your area and gives tips about how to prepare.

Glossary

air pressure *(n.)* the force of air in the atmosphere (p. 13)

cold front *(n.)* the front edge of a moving mass of cold air (p. 5)

cumulonimbus clouds *(n.)* towering clouds with low, flat bases and spreading tops, often seen in thunderstorms (p. 6)

Doppler radar *(n.)* a tracking system that measures the speed of something and is often used to track storms and precipitation (p. 11)

supercell thunderstorm *(n.)* a storm made of rotating thunderclouds that reach high into the sky and often produce tornadoes, hail, and lightning (p. 7)

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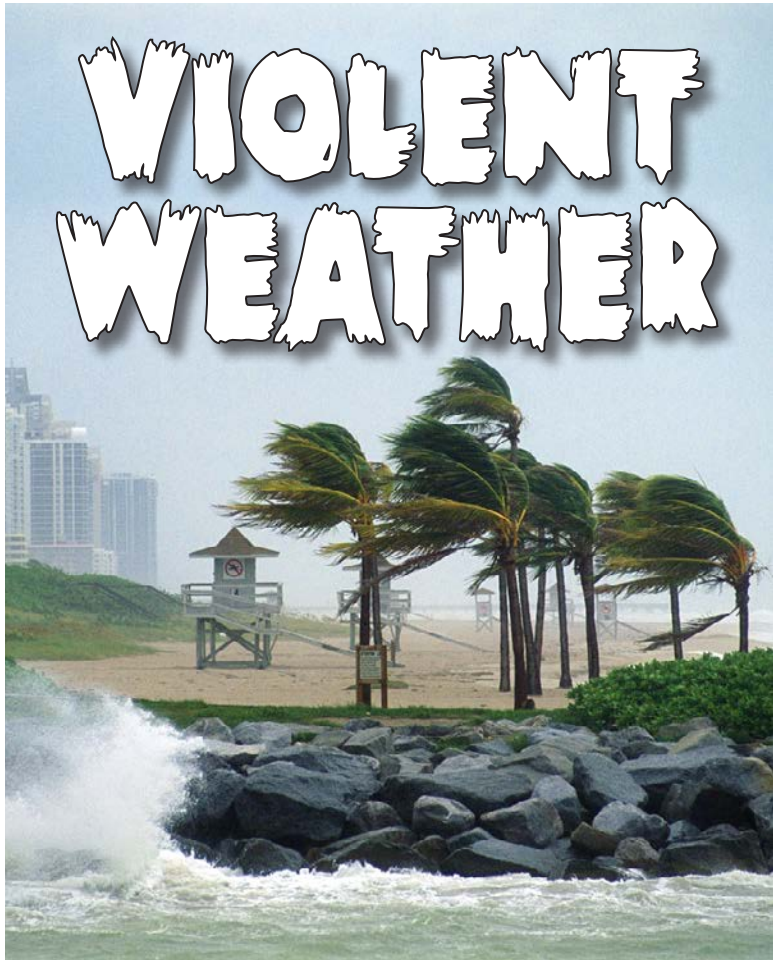

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Focus Question

What are some causes and effects of violent weather?

Words to Know

air pressure
cold front
cumulonimbus cloud
Doppler radar
supercell
thunderstorm

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Correlation

LEVEL Z	
Fountas & Pinnell	U–V
Reading Recovery	N/A
DRA	50





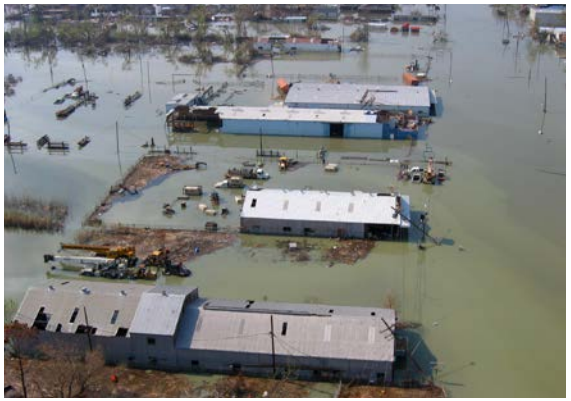
Conclusion

People can protect themselves from some elements of devastating weather, but they can't escape them entirely. Parts of the United States with no tornadoes or hurricanes may have broiling summers or harsh winters. On the West Coast, earthquakes and brush fires often make up for the moderate weather.

When choosing a place to live, it's probably most important for people—rather than worrying about the extremes or the worst calamities that may occur—to consider an area's general climate. That's the weather that will provide both the consistency and the drama they seek.

When a hurricane comes ashore, it drenches coastal areas with hammering rains and buffets them with heavy winds. The winds of a major hurricane can exceed 150 miles (240 km) per hour—strong enough to rip the roofs off many houses. Gusts from a major hurricane can match the wind speed of the most powerful tornado.

The biggest danger for low-lying communities is a wall of water, called the storm surge, which is forced toward land by the strength of the winds. The storm surge of a major hurricane can be up to 20 feet (6 m) high, and it can cause extensive flooding and loss of life far inland.



Two weeks after Hurricane Katrina, Venice, Louisiana, still had at least two feet of water everywhere.

The worst hurricane to hit the United States in recent years was Hurricane Katrina in August 2005. The hurricane caused severe destruction and killed thousands along the Gulf Coast in the states of Louisiana, Mississippi, Alabama, Georgia, and Florida.

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When Mother Nature Gets Hostile

Many climates offer consistency, which helps maintain the smoothness of people's everyday lives. What adds texture are weather events that come with the progress of the seasons, such as when it warms up enough for a gentle spring rain or cools enough for the first winter snowfall. When the weather stays the same for too long a period, many people feel bored and anxiously await the next big change. Weather provides drama for people's everyday lives.

Sometimes, however, weather becomes more than dramatic, it develops into something downright dangerous and destructive. Raging thunderstorms, tornadoes, and hurricanes are weather events that are awesome—and frightening—in their intensity. On planet Earth, these three phenomena of nature can wreak havoc when they occur.

A thunderstorm threatens a calm afternoon.

A satellite image of Hurricane Katrina just before it hit land in the southern United States

A hurricane starts with an area of low **air pressure**, with winds moving in a circular motion around it. The low-pressure area draws up warm, moist air from the sea below and grows into a tropical storm. The moisture condenses into clouds, releasing a great amount of energy. If the storm continues to grow, powered by that energy, its winds may reach a speed of 74 miles (119 km) per hour. At that point, the storm has become a hurricane.

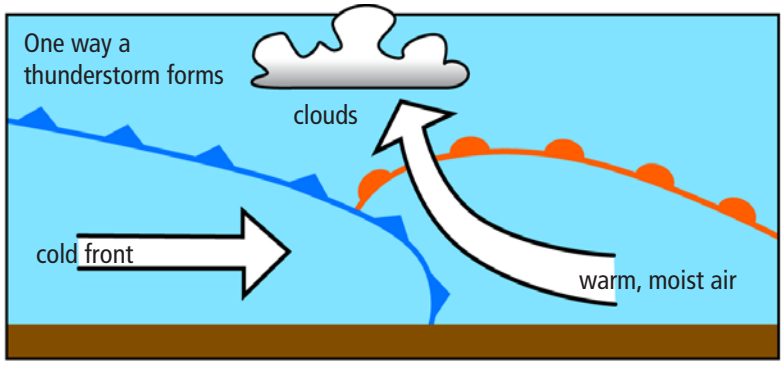
From space, a hurricane looks like a huge pinwheel. The outer parts of the pinwheel form a towering mass of rapidly circling storm clouds. At the center of the pinwheel is a calm area called the "eye" of the hurricane, where there is no wind or rain. A hurricane can be up to 600 miles (965 km) wide.

Hurricanes

For sheer violence in a limited area, nothing can match a major tornado. But people who live along seacoasts know that hurricanes can cause extensive destruction across a much wider swath of land.

A hurricane is an enormous rotating storm that develops above warm ocean waters in the summer or fall. Most hurricanes occur in the Atlantic Ocean, the Gulf of Mexico, and the Caribbean Sea, though some develop in the northeastern Pacific Ocean. The same kinds of storms occur in the Western Pacific and Indian oceans, where they are called typhoons or severe tropical cyclones.

The Indian Ocean island of Reunion braces for a severe tropical cyclone.



Thunderstorms

The most common violent-weather event is the thunderstorm. A major thunderstorm can dump several inches of rain on an area in a short amount of time and generate stiff winds. Dangers generated by thunderstorms include flash floods, hail, and lightning—with lightning being the most dangerous because it occurs with every thunderstorm.

Thunderstorms form when a large mass of warm, moist air rises high into the atmosphere and cools. One way warm air rises is by absorbing heat from the ground. This often happens on summer days as the ground gains plentiful heat from the Sun, and then loses it, warming the air above it. Warm, moist air can also be pushed aloft when it collides with a **cold front**. Cold air is denser than warm air, so the warm air rides up and over the boundary of a cold front.

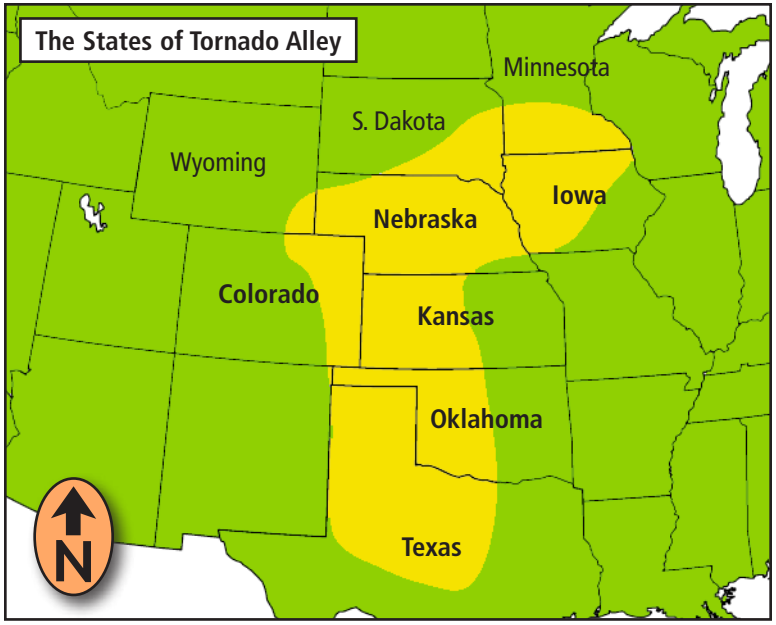
As the warmer air reaches higher altitudes, it expands, which causes it to cool. After it chills enough, water vapor in the air condenses—turns from a gas to a liquid—and forms puffy clouds called cumulus clouds. Some cumulus clouds expand into **cumulonimbus clouds**—huge clouds with a large, spreading area at the top—that produce thunderstorms.

When great amounts of water have condensed within a cumulonimbus cloud, the water grows too heavy to stay in the cloud and it falls as rain. A major storm produces intense rainfall in a brief amount of time, which can cause flash flooding that wipes out farms, homes, and can even cause deaths for those unprepared for the massive downpour. At the same time, strong downdrafts of air from the cloud may produce stiff winds at ground level.

A major tornado can have winds that rotate at speeds faster than 300 miles (480 km) per hour. A really powerful tornado can tear a wood-frame house off its foundations and lift it far into the air. Its path of destruction may extend for up to 50 miles (80 km).

One of the most powerful tornadoes ever recorded ripped through suburban Oklahoma City on May 3, 1999, as part of a four-day onslaught of twisters in Tornado Alley. **Doppler radar** clocked the tornado's winds at 318 miles (512 km) per hour. The tornado killed 36 people and destroyed more than 10,000 homes and other buildings.

Oklahoma City residents search through debris for belongings after the May 3, 1999, tornado.



Tornadoes can strike almost anywhere in the world, but about 75 percent of them occur in the United States. Approximately 750 tornadoes occur in the United States every year, killing an average of 100 people annually.

Most U.S. tornadoes occur in a large area of the central United States known as "Tornado Alley." This Great Plains region—perfectly designed for the development of tornadoes—has flat terrain that allows cold, dry air from Canada to meet moist, warm air from the Gulf of Mexico. When large masses of these two kinds of air converge, the result is often supercell thunderstorms—perfect tornado-generators.

There are two main kinds of thunderstorms: ordinary and severe. Ordinary thunderstorms are the typical storms that occur in the summer, usually lasting from 30 to 60 minutes and providing welcome relief from the heat. Severe thunderstorms, also called **supercell thunderstorms**, are huge rotating storms that can last several hours, producing extremely heavy rains and high winds that increase people's anxiety. Severe thunderstorms may also generate hail with large hailstones—sometimes as big as baseballs, or even larger. About 10 percent of thunderstorms are classified as severe.

Lightning strikes the tall towers and buildings in Panama City, Panama.

The biggest danger from all thunderstorms is lightning. Lightning is literally a giant spark in the sky, and it can cause wildfires and it can kill.

Lightning is caused by a buildup of electric charges in storm clouds. A lightning bolt is a flow of electric charges seeking opposite charges either in the clouds or on the ground. The bolts that shoot down from the clouds to the ground are dangerous to people.

A lightning bolt passes through a narrow channel of air, which is flash heated to a temperature of about 54,000° Fahrenheit (30,000°C), or about five times hotter than the surface of the Sun! The explosive heat causes the air in the channel to expand violently. The expansion produces a shockwave that we hear as thunder, which is how thunderstorms get their name.

Lightning sparked this fire, which destroyed 20 homes.

Tornadoes

Some supercell thunderstorms generate the most violent weather phenomena on Earth—tornadoes. A tornado is a large, spinning funnel-shaped cloud that extends downward from the base of a large storm cloud. Many tornadoes have a narrow snakelike appearance, while others appear as wide columns up to a mile (1.6 km) across.

A tornado moves along the ground with a forward speed averaging 30 miles (48 km) per hour, though some travel more than twice that fast. The funnel produces a strong updraft, sucking up almost everything in its path that isn't securely fastened to the ground, including vehicles and mobile homes. Most tornadoes assume a dark appearance once they touch the ground, the result of dirt and debris they have sucked up.