



Activity #34: Lightning

Did You Know?

Lightning can heat the air in its path to 54,000°F (30,000°C), which is five times hotter than the sun's surface. There are about 6,000 flashes of lightning every minute in the world.

Lightning is a huge electric spark that results when charges jump from one cloud to another or to the ground. On a hot humid summer day, when hot air climbs quickly, moisture in the air condenses to form billions of water drops and ice crystals. These pick up tiny electric charges as they move through the air. The violent air currents in thunderclouds move different-sized drops and dust particles at different speeds. Those of the same size and with similar amounts of electricity concentrate in the same part of the cloud. The thundercloud usually contains a positive electrical charge in its higher colder areas, and a negative electrical charge in the areas closest to the ground. The difference between charges at the top and charges at the bottom of the cloud creates a powerful voltage or electric pressure. This “push” sends a flash of lightning streaking through the cloud between those parts with opposite electric charges.

1. Lightning always takes the shortest and quickest path to the ground and strikes the tallest objects. Tall buildings and trees are most at risk. Study the safety information given in the chart below. If you are caught outdoors in a thunderstorm, follow those rules.
2. After reading the information below, scan today's newspaper for examples of things to avoid during a thunderstorm. Clip these out and create a poster display titled, “Things To Avoid During A Thunderstorm.” (Include also indoor objects to avoid: appliances, telephones, water taps, sinks, tubs, stoves, and anything that could conduct electricity.)

LIGHTNING SAFETY TIPS FOR OUTDOORS

1. When outdoors in a thunderstorm, the safest place to be is in an automobile (not a convertible). Lightning will go into the ground through the rubber tires.
2. If you do not have an automobile, stay low. Don't stand on a hilltop. Move to a low spot or crouch under a thick growth of small trees. If you are in a group, spread out. If you are out in a level field or prairie, drop to your knees and bend forward, putting your hands on your knees. Do not lie flat on the ground.
3. Get off or away from open water. Don't plan a day of sailing or swimming if a thunderstorm has been predicted.
4. Don't touch metal. Stay away from motorcycles, bicycles, golf carts, and tractors. Put down umbrellas, golf clubs, etc. Remove sports shoes with metal cleats. Stay away from wire fences, clotheslines, telephone poles, metal pipes, and rails.

Extension Activity: Make your own lightning by rubbing a comb with a piece of wool and holding it near a metal doorknob. This will produce a spark. By rubbing the comb, you charge it with electricity. The spark is made when the charge jumps to the uncharged (neutral) doorknob. The spark is the passage of an electrical charge between two objects, much like a spark of lightning.



Activity #35: Thunder

Did You Know?

Lightning and thunder happen at exactly the same time, but you see lightning first because light travels faster than sound. If you hear a thunderclap 5 seconds after you see a flash, the storm is about 1.2 miles (2 km) away.

When a flash of lightning passes through the atmosphere, it heats the nearby air, and causes it to expand rapidly. It is this movement that causes the sound. A short crash of thunder results from a short flash of lightning. Rolling thunder occurs when lightning covers a large area, or when clouds, mountains, or other obstructions cause echoes. Lightning and thunder happen at exactly the same time, but light and sound travel at different speeds, so lightning is seen first. Light travels at 186,000 miles per second (300,000 km) and takes only a fraction of a second to reach us. We see lightning the moment it flashes. It takes about 5 seconds for sound to travel a mile (3 seconds for a kilometer). When a thunderstorm is near, the thunderclap sound is loud and sharp. When it is far away, it is a low rumble. Ordinarily, you can't hear thunder more than 10 or 15 miles (16-24 km) away. If you see lightning and hear thunder at just about the same moment, the storm is right above you.

1. Look through today's newspaper for adjectives that describe "thunder." Write those words on the chart below. Then find the exact meaning for each word in your dictionary. Does the definition fit your description of thunder?
2. Next, look through the daily newspaper to find synonyms and antonyms for each adjective.

| ADJECTIVE | DICTIONARY DEFINITION | SYNONYM | ANTONYM |
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Extension Activity: What causes thunder? Try this simple experiment! Blow up a paper bag or a balloon. Tie it with a rubber band or a piece of string. Then place one hand on the top and one hand on the bottom of the bag and pop it. You will get a small clap of thunder. You create thunder by causing a small quantity of air to move fast. An object produces sound when it vibrates—moves back and forth or up and down. Humans only hear sound when an object vibrates at least sixteen times a second—and not more than 20,000 times a second.



Activity #36: Tornadoes

Did You Know?

On September 4, 1981 a tornado hit Ancona in Italy. It lifted a baby asleep in its stroller 50 feet (15 m) into the air and set it down safely 328 feet (100 m) away. The baby was still sleeping soundly!

More tornadoes occur in the central United States than anywhere else in the world. Tornadoes develop along squall lines of cumulonimbus clouds. A tornado starts when cold dry air coming from the west catches up with unusually warm, moist air from the south. The result is a whirling wind with thick, black clouds and thunderstorms. Water vapor is swept upward as gusts of warm air rise in a spiraling motion. When the air cools, it forms the tornado’s twisting, funnel-shaped cloud. The funnel-shaped wind cloud whirls at incredibly enormous speeds and picks up anything in its path ---- trees, animals, water, automobiles, houses ---- and whirls them upward. A rapidly rising column of air within the funnel lowers the pressure in the funnel’s center as the tornado advances. An entire house can be crushed in the midst of a tornado because the air pressure in the center of the tornado is lower than the normal pressure inside the house it passes. The tornado spins, smashing and destroying, until all the heated air that was near land has been squeezed up by the cooler, heavier, inflowing air. Then the air stops flowing and the tornado dies. The winds of a tornado are the most violent winds on earth; they may whirl around at speeds of 100 to 400 miles per hour (644 kph).

1. To simplify the understanding of a tornado, compare it to a household vacuum cleaner or to a lawn vacuum sweeper. Like a tornado, these appliances create force by the movement of air. Many household items operate with air or air pressure: tires, shock absorbers, air mattresses, snow blowers, leaf blowers, air compressors, and fans, just to name a few. Can you think of other items?
2. Look through today’s newspaper advertisements for two examples. List these below and explain how each item uses air or operates with air pressure.

| NEWSPAPER ADVERTISEMENT ITEM | HOW DOES IT USE AIR OR AIR PRESSURE? |
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Extension Activity: Look in your daily newspaper for articles about tornadoes in your region or a neighboring region. You may read about houses that are destroyed in the path of a tornado. This is because the air pressure of a tornado is very low. Perform the following simple experiment to understand what causes the low air pressure. Take two apples, tie a piece of string around each stem, then hang the apples a few inches apart. Center your face between the apples and blow air as hard as you can between them. Instead of being pushed apart, the apples will move toward each other. By blowing between the apples, you cause the air to move, which lessens the air pressure between them. Then the air on the sides of the apples pushes them towards the area of lower pressure.



Activity #37: Hurricanes

Did You Know?

About 90 per cent of the deaths that occur during hurricanes result from drowning in floods. The world's worst hurricane (for loss of life) took place in 1970 in Bangladesh. It unleashed floods killing more than one million people.

Hurricanes are areas of low air pressure that form over oceans in tropical climate regions. Hurricanes are large, whirling storms. They may have a diameter of 400 to 500 miles (640-800 kilometers). Winds swirl around the "eye" (center) of the storm at speeds of 75 miles per hour (121 kph) or more. The eye of a hurricane can be up to 20 miles (32 km) across. Here the weather is surprisingly calm with low winds and clear skies. Hurricanes hit land with tremendous force, bringing huge waves and heavy rain. Thunderstorms often form within hurricanes and produce tornadoes. Many hurricanes cause severe flooding. However, a hurricane weakens rapidly after it strikes land. Most hurricanes in North America hit areas near the Atlantic Ocean and the Gulf of Mexico. In the western Pacific Ocean, hurricanes are known as typhoons. For a hurricane to survive, the water temperature must be at least 75°-80°F and the surface winds must converge. Because hurricanes and typhoons need warm, moist air, they usually begin in late summer or early fall. Cold water off North America's west coast prevents hurricanes from surviving there. The warm water of the West Atlantic and the Gulf of Mexico creates more favorable conditions for hurricanes.

1. In 1992, Hurricane Andrew blew across southern Florida at speeds of 140-160 mph (225-258 kph). In terms of property loss, Andrew was one of the worst hurricanes to ever hit North America. The property devastation was massive. Entire communities were wiped out and had to be rebuilt. What would it take to completely rebuild a region such as south Florida?
2. Rebuilding after a natural disaster can be a very good thing because it stimulates the economy. Look through today's newspaper (especially in the classified ads) for businesses, services, and materials needed to rebuild a community. Using the model below, chart your information on poster board.

| HOW TO GO ABOUT REBUILDING A COMMUNITY | BUSINESSES TO CALL UPON | SERVICES NEEDED | MATERIALS NECESSARY |
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Extension Activity: Hurricanes were first given names in the 19th century by Clement Wragge, an Australian weather man. Nicknamed "Wet Wragge," he named very violent storms after people he disliked. Today an alphabetical list of names is drawn up each year for the coming year's hurricanes. Look through the sports section of your daily newspaper. If you were to create next year's list of hurricane names using the names of sports figures, which ones would you use and why? (What about Hurricane Shaq, for the hurricane with a "Magic" attack?)