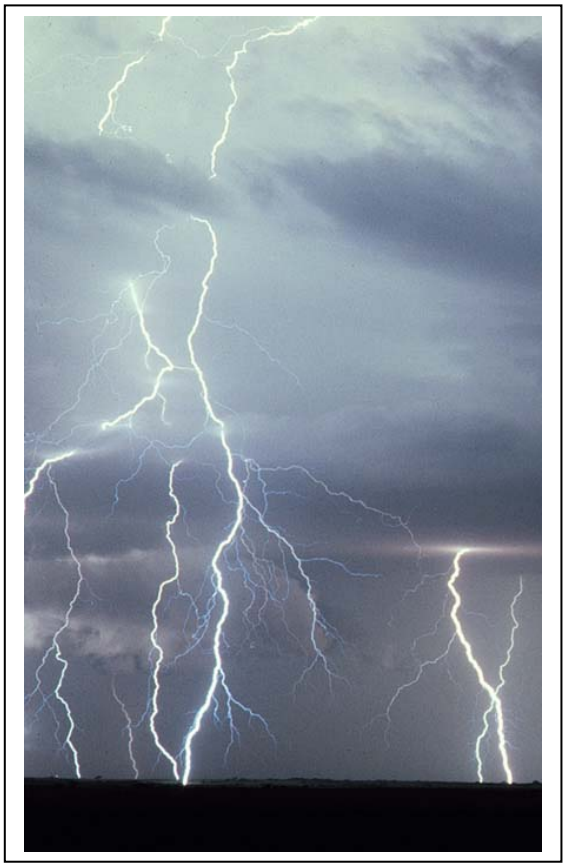
Lightning Facts

Types of Lightning:



- Intra-cloud lightning - One of the main kinds of lightning and it is the most common one. It occurs when lightning arcs between oppositely charged centers within the same cloud.
- Cloud-to-ground lightning - Also one of the main kinds of lightning. It is the most dangerous form of lightning and the kind we know most about.
- Inter-cloud lightning - Another one of the main kinds of lightning. It occurs when lightning leaps across a gap of clear air between two different clouds.
- Heat lightning - It occurs when it's hot.
- Summer lightning - It occurs in the summer.
- Sheet lightning - It seems to come in flat waves.
- Ribbon lightning - It looks like streamers flashing through the sky.
- Silent lightning - It appears without a sound because it is so far away.
- Colored lightning - It seems to flash red or blue.
- Ball lightning - It is a bright round spark that seems to float in the air.
- Elves - In the summer of 1995 this form of lightning was discovered by scientists. Elves are very bright, short flashes of lightning high above the clouds at the very edge of space. They last for less than a thousandth of a second. Their color is unknown but is thought to be green.
- Jets - Another recently discovered high-altitude lightning. Jets are fast-moving fountains or sprays of blue light that burst upward from the top of storm clouds to an altitude of about twenty miles above the clouds. Pilots have reported seeing columns of blue or green light above thunderheads for years, but have only recently been videotaped.
- Sprites - A recently discovered kind of lightning. One of the first true-color pictures of a red sprite was photographed at an altitude of sixty miles over a thunderstorm in the Midwest in July of 1994.

Lightning Facts:

- Lightning bolts travel at speeds of up to 60,000 miles per second.
- A single lightning bolt travels through twisted paths in the air that can be as wide as one of your fingers or from six to ten miles.
- A flash of lightning is brighter than 10,000,000 100-watt light bulbs.
- A flash of lightning can pulse as much power as there is in all the power plants in the United States in that split second.
- A flash of lightning could power a light bulb for a month.

- Trees sometimes can survive direct hits from lightning because the electricity passes over their wet surface and go into the ground.
- Florida is the lightning capital of the United States.
- 10% of all people struck by lightning were in Florida at the time.
- In March of 1991, a single six-hour storm stretching over Iowa, Illinois, Wisconsin, and Missouri caused more than 15,000 lightning strikes. During the storm the skies were blazed with almost constant lightning.
- Lightning can be made in a laboratory by an instrument called a Van de Graaff static electricity generator which could generate million of volts of artificial lightning from a metal sphere mounted at the top of an insulated column.
- About 71.4286% of all people struck by lightning still survive.
- Temperatures in the path of a lightning bolt can reach as high as 50,000 degrees Fahrenheit.

Early Beliefs about Lightning:

- The early Greeks thought that the king of the gods, Zeus, threw thunderbolts down from stormy skies.
- The Vikings imagined Thor, their god of weather, striking a powerful hammer against an anvil to produce thunder and lightning.
- Native American tribes believed the flashing feathers and flapping wings of the mighty Thunderbird caused lightning.

Safety Tips Concerning Lightning:

- Stay away from places that are more likely to be hit if you are caught out in the open of a thunderstorm.
- Places that are more likely to be hit by lightning: high ridges, open meadows, telephone poles, wire fences, rails, wet beaches, and single tall trees.
- A hardtop car is safe and bikes and open vehicles aren't.
- The best thing to do if your hair begins to stand on one end or you feel tingly is to crouch down with your hands off the ground and become "a basketball with legs."
- If you are in water, get out as soon as possible.

Common Questions about Lightning:

1. **What causes lightning?**

   Lightning originates around 15,000 to 25,000 feet above sea level when raindrops are carried upward until some of them convert to ice. For reasons that are not widely agreed upon, a cloud-to-ground lightning flash originates in this mixed water and ice region. The charge then moves downward in 50-yard sections called step leaders. It keeps moving toward the ground in these steps and produces a channel along which charge is deposited. Eventually, it encounters something on the ground that is a good connection. The circuit is complete at that time, and the charge is lowered from cloud to ground.

   The flow of charge (current) produces a luminosity that is very much brighter than the part that came down. This entire event usually takes less than half a second.

2. **Where does lightning usually strike?**

   Lightning comes from a parent cumulonimbus cloud. These thunderstorm clouds are formed wherever there is enough upward motion, instability in the vertical, and moisture to produce a deep cloud that reaches up to levels somewhat colder than freezing.

   These conditions are most often met in summer. In general, the US mainland has a decreasing amount of lightning toward the northwest. Over the entire year, the highest frequency of cloud-to-ground lightning is in Florida between Tampa and Orlando. This is due to the presence, on many days during the year, of a large moisture content in the atmosphere at low levels (below 5,000 feet), as well as high surface temperatures that produce strong sea breezes along the Florida coasts. The western mountains of the US also produce strong upward motions and contribute to frequent cloud-to-ground lightning. There are also high frequencies along the Gulf of Mexico coast westward to Texas, the Atlantic coast in the southeast US, and inland from the Gulf. Regions along the Pacific West Coast have the least cloud-to-ground lightning.

   Flashes that do not strike the surface are called cloud flashes. They may be inside a cloud, travel from one part of a cloud to another, or from cloud to air.

3. **Can lightning be detected?**

   Since the 1980s, cloud-to-ground lightning flashes have been detected and mapped in real time across the entire US by several networks.

   In 1994, the networks were combined into one national network consisting of antennas that detect the angle from ground strike points to an antenna (direction-finder antenna), that detect the time it took for them to arrive at an antenna (time-of-arrival method), or a combination of both detection methods. The network is operated by Global Atmospherics, Inc. You can also get lightning data for our neighbors to the north in Alberta, Canada.

   Flashes have also been detected from space during the past few years by an optical sensor. This experimental satellite covers the earth twice a day in tropical regions. The satellite also detects flashes that do not strike the ground, but cannot tell the difference between ground strikes and cloud flashes.

4. **How many flashes are there?**

   Over the continental 48 states, an average of 20,000,000 cloud-to-ground flashes have been detected every year since the lightning detection network covered the entire continental US in 1989. In addition, about half of all flashes have more than one ground strike point, so at least 30 million points on the ground are struck on the average each year in the US. Besides cloud-to-ground flashes, there are roughly 5 to 10 times as many cloud flashes as there are to ground.

5. **What types of damage can lightning cause?**

   Cloud-to-ground lightning can kill or injure people by direct or indirect means. The lightning current can branch off to a person from a tree, fence, pole, or other tall object. It is not known if all people are killed who are directly struck by the flash itself. In addition, flashes may conduct their current through the ground to a person after the flash strikes a nearby tree, antenna, or other tall object. The current also may travel through power or

telephone lines, or plumbing pipes to a person who is in contact with an electric appliance, telephone, or plumbing fixture.

Similarly, objects can be directly struck and this impact may result in an explosion, burn, or total destruction. Or, the damage may be indirect when the current passes through or near it. Sometimes, current may enter a building and transfer through wires or plumbing and damage everything in its path. Similarly, in urban areas, it may strike a pole or tree and the current then travels to several nearby houses and other structures and enter them through wiring or plumbing.

6. How to stay safe when lightning is around.

Based on these types of dangerous situations, don't be an isolated tall object, and don't be connected to anything that may be an isolated tall object. The best defense is to plan ahead and avoid exposure to lightning when a thunderstorm occurs. Know where safe shelter is located and leave enough time to reach safe shelter before the lightning threat is overhead.

One way to find the distance to lightning is to use the 'flash-to-bang' method. Count 5 seconds for every mile the lightning is away from you. Safe shelter must be reached completely in all situations before a flash is 2 to 3 miles away, which is 10 to 15 seconds flash-to-bang. Lightning safety is also considered at: National Lightning Safety Institute Kid's Lightning Information

But there is often blue sky in some direction while lightning is occurring nearby, and it may not be raining, so pay much more attention to the lightning than the rain. A particularly difficult situation is the first flash from a storm--watch for a storm that is growing quickly, such as when a storm is becoming very dark at its base or is growing very tall. An equally dangerous situation is when a storm appears to be finished, and only light rain and/or occasional thunder are heard, but the cloud overhead continues to be fairly dark. The most common situation for a lightning death or injury in Florida was found NOT to be in the heaviest rain area with lots of flashes, but after or before the time when rain and lightning was the most intense. So, the weak storm without too many flashes, at the edge of a larger storm, or early or late in the life of a storm is most dangerous.

The best shelter is a substantial building that has plumbing and wiring--in other words, one that is used or lived in by people for a major portion of the day. A very unsafe building for lightning has only a roof and some supports, but no wiring or pipes extending into the ground. A vehicle with a metal roof provides good shelter, and is much better than being in the open or in an ungrounded building, but is not as good as being in a building that is grounded by wires and pipes.

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