



We have all seen those ominous dark clouds that suddenly flash a bright bolt of lightning through the sky, with a loud clap of thunder trailing close by. Thunderstorms are a common occurrence on our planet, thousands happening any given minute, but much information is yet to be discovered about this mysterious light show. Scientists continue to have unanswered questions about lightning because the process is so complex. It involves an in depth knowledge of both physics and chemistry. (1)

Lightning is an electric current that originates inside of a cloud, caused by rapidly rising and falling air currents. Ice and water droplets move around inside the cloud, forming collisions and friction that cause the cloud to fill with both positive and negative charges, each at opposite ends of the cloud. To generate a bolt of lightning, the negative charges must gain enough power and pull towards the positive charges on the ground. The negative charge from the cloud will send out a feeler, best known as a *stepped*

*leader*, which is a series of negative charges. As the stepped leader approaches the ground, a *positive streamer* will extend up for it creating a *channel* and then a flash of light is created from the return stroke running from the ground to the clouds. (2)

Bolts of lightning do not always flash vertically. Most of the electrical energy created from a thunderstorm is dissipated within the clouds. Lightning may flash horizontally towards the positive particles of another nearby cloud, hopping back and forth between the positive and negative charges. (3)

As the air surrounding the lightning bolt is heated, it causes the air to expand faster than the speed of sound, squeezing the air and forming a shock wave that we know as thunder. Since lightning bolts can create many short bursts, multiple shock waves at various altitudes are made, which reach your ears at different times, making a rumbling sound. (4)

Light travels at 186,291 miles per second, which is much faster than sound at 1,088 feet per second. This explains why we always see a bolt of lightning before we hear a rumble of thunder. If you want an estimate as to how many miles away the lightning struck, simply count the seconds between the flash of light and the rumble of thunder and divide by 5. (5)

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