What causes thunder and lightning?

KS2 KS3 Ages 7-14 ⏰ 3 min read

You know that feeling when you shuffle across a carpet and then touch a door handle and get a tiny shock? That's static electricity. Now imagine the same thing but with a storm cloud the size of a city. That's lightning.

How does the charge build up?

Inside a thundercloud, there are millions of tiny ice crystals and water droplets bashing into each other as fierce winds throw them around. All that colliding strips electrons (negatively charged particles) off some of them and deposits them on others. Over time, the top of the cloud builds up a positive charge, and the bottom builds up an enormous negative charge. Meanwhile, the ground below — which tends to be positive — is getting increasingly attracted to the negative base of the cloud.

It's like rubbing a balloon on your hair. Your hair gives electrons to the balloon, leaving your hair positively charged and the balloon negatively charged — so they attract each other. A thundercloud does this same trick, just with trillions of particles and millions of volts instead of a party balloon.

What is a lightning bolt?

When the charge difference gets large enough, the electricity jumps — either within the cloud, to another cloud, or down to the ground. That jump is lightning. A single bolt can reach temperatures of around 30,000°C — about five times hotter than the surface of the Sun. The bolt typically takes less than a second. The whole thing is basically the world's most dramatic spark.

So where does the thunder come from?

That incredible heat — 30,000°C in a fraction of a second — causes the air around the lightning bolt to expand violently. Almost like a tiny explosion. That rapidly expanding air is the thunder. You hear it after you see the lightning because light travels almost instantly but sound takes about 3 seconds per kilometre. Count the seconds between the flash and the bang, divide by 3, and you've got the distance of the storm in kilometres.

Why do you never touch the tallest object?

Lightning takes the path of least resistance between the cloud and the ground — which tends to be the shortest, most conductive route. Tall, pointy objects (trees, flagpoles, you holding an umbrella on an open hill) provide a convenient stepping stone. This is why lightning rods exist: they give the lightning a deliberate, safe path to the ground and protect the building around them.