What is the Big Bang?

KS2 KS3 Ages 9-14 ⏰ 4 min read

About 13.8 billion years ago, everything that exists — all the matter, energy, space, and even time itself — was packed into a point so unimaginably hot and dense that the normal laws of physics break down when you try to describe it. Then it expanded. Very, very rapidly. That's the Big Bang.

It's important to say what the Big Bang *isn't*: it wasn't an explosion in space, like a bomb going off. Space itself didn't exist yet. The Big Bang was the rapid expansion of space, time, matter, and energy all at once from a single starting point.

Imagine drawing dots on the surface of a balloon and then blowing it up. The dots don't move across the balloon — the balloon itself gets bigger, so the dots get further apart. The universe is like that balloon. Galaxies aren't flying away from each other through space; the space between them is expanding, carrying them apart. And there's no "outside" the balloon. The surface is all there is.

How do we know it happened?

Several pieces of evidence point to the Big Bang. First, the universe is *expanding* — every galaxy is moving away from every other, which means if you run time backwards, they all converge at a single point. Second, the universe is filled with a faint background glow of radiation called the **Cosmic Microwave Background** — the cooled-down afterglow of the Big Bang, visible in every direction. Third, the proportions of hydrogen and helium in the universe match what physics predicts would form in the first few minutes of a Big Bang.

What happened in the first few minutes?

In the first second, the universe was a hot soup of fundamental particles. Within the first three minutes, protons and neutrons were combining to form the nuclei of the lightest elements — mainly hydrogen and helium. After about 380,000 years, the universe had cooled enough for electrons to join those nuclei to make the first proper atoms. The universe became transparent for the first time, and light could travel freely — that's the glow we still detect today.

What caused the Big Bang?

Nobody knows. This is one of the genuinely unsolved questions in physics. We can trace back to a tiny fraction of a second after it began, but what happened at the very start — or what (if anything) existed before — is beyond what current science can answer. It's not that the answer is complicated; it's that the question might not even make sense, because time itself may have begun at that moment.