How big is the universe?

KS2 KS3 Ages 7-14 ⏰ 4 min read

The honest answer to "how big is the universe?" is: we don't know. We can only see the part of the universe whose light has had time to reach us since the Big Bang — called the **observable universe**. Beyond that, space probably continues, possibly forever, but we have no way of seeing it.

The observable universe is about 93 billion light-years across. A light-year is the distance light travels in a year — roughly 9.5 trillion kilometres. So the observable universe is about 93 billion times 9.5 trillion kilometres across. The numbers have stopped meaning anything to human brains, so let's try some comparisons instead.

If you shrunk the Sun to the size of a grain of sand, Earth would be about 1 metre away. On that scale, the nearest star (Proxima Centauri) would be about 270 km away. The Milky Way galaxy would be 6.5 million km across. The nearest major galaxy, Andromeda, would be 150 billion km away. And the observable universe? About 40 light-years across, even after the shrinking. You've made it a trillion times smaller and it's still incomprehensibly large.

How many galaxies are there?

The latest estimates suggest there are roughly 2 *trillion* galaxies in the observable universe. Our own galaxy, the Milky Way, contains something like 100 to 400 billion stars. There are more stars in the observable universe than grains of sand on all of Earth's beaches. More stars than every word spoken by every human being who ever lived.

What's beyond the observable universe?

The observable universe isn't the edge of space — it's the limit of what we can see given the age of the universe and the speed of light. Beyond it, space almost certainly continues. Current cosmological models suggest the total universe could be vastly larger than what we can observe — some models suggest it's infinite. We simply don't know, and may never be able to find out.

Are we really just... here?

Given the numbers above, the idea that life exists only on Earth starts to feel slightly unlikely. Though we haven't found evidence of life elsewhere yet, the sheer scale of the universe — trillions of galaxies, hundreds of billions of stars each — makes it very hard to argue we're unique. This is one of the biggest open questions in all of science.

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