How does the brain work?

KS2 KS3 Ages 7-14 ⏰ 4 min read

Your brain contains roughly 86 billion neurons — nerve cells — each connected to thousands of others. The number of possible connections is greater than the number of atoms in the observable universe. It processes sensory information, controls every movement, stores decades of memories, generates emotions, and produces consciousness. And we still don't fully understand how most of it works.

Neurons and signals

Neurons communicate by sending electrical signals along their length and releasing chemical messengers (neurotransmitters) across tiny gaps (synapses) to the next neuron. When enough signals arrive at a neuron, it "fires" — sending its own signal onwards. The brain's activity is essentially billions of these tiny electrical events happening in parallel, constantly.

Think of a city at night, seen from above. Each light is a neuron. When you think a thought, recognise a face, or feel an emotion, certain "streets" of lights switch on in sequence — a specific pattern across billions of cells. Learning is what happens when those patterns are reinforced over time, like well-worn paths through a forest. The more you use a connection, the stronger it gets. That's why practising anything — piano, French, football — physically changes the structure of your brain.

Different regions, different jobs

The brain isn't a single unit — different regions handle different things. The **cerebral cortex** (the crinkled outer layer) handles thought, language, perception, and voluntary movement. The **hippocampus** is crucial for forming new memories. The **amygdala** processes emotion and fear responses. The **cerebellum** coordinates movement and balance. The **brainstem** handles automatic functions like breathing and heart rate — things you don't have to consciously think about.

What is consciousness?

This is the hardest question in all of neuroscience, possibly in all of science. We don't know why physical processes in the brain give rise to subjective experience — why

there's "something it feels like" to be you, rather than everything just happening in the dark. This is called the "hard problem of consciousness," and there's no agreed answer yet. Some of the world's best scientists and philosophers are still working on it.