How Pressure Works in Liquids and Gases

KS4 PHYSICS Ages 11-14 ⏰ 3 min read

What Is Pressure?

Pressure is a force pushing on something spread over an area. Imagine pushing down on a balloon — your hand applies force, but the force spreads across the balloon's surface. That's pressure in action. Scientists measure pressure in units called **pascals** (or **Pa**), named after a clever French mathematician.

Pressure happens everywhere: in the air around us, in the ocean, inside your car tyres, and even in your body. The key idea is that pressure comes from tiny particles (molecules) bouncing around and crashing into surfaces.

Think of it like a crowd of people jumping around in a room. The more people jumping, and the faster they jump, the more they bump into the walls — that's pressure!

How Pressure Works in Liquids

In **liquids** like water, the molecules are tightly packed together. They're close enough to touch, but they can still move around freely. When you dive deep underwater, the water above you presses down, creating **water pressure**.

Here's something cool: pressure in liquids pushes equally in all directions. It doesn't matter which way you point a hole in a container — the water will spray out with the same force. This is called **Pascal's Principle**, and it's why hydraulic machines (like the brakes in cars) work so well.

Think of it like a sponge full of water. If you squeeze it from the top, the water doesn't just squirt upwards — it squirts out from every side equally.

Deeper down means more pressure because there's more liquid above pushing down. This is why submarines need super-strong hulls at great depths!

How Pressure Works in Gases

In **gases** like air, molecules are far apart and zoom around randomly at high speed. Even though there are fewer particles, they create pressure by bumping constantly

into surfaces.

Atmospheric pressure is the weight of all the air above you pressing down. At sea level, this is about **101,325 Pa** — strong enough to crush you if your body didn't have pressure inside balancing it out!

Think of it like a swarm of bees buzzing around a jar. Each bee flying and hitting the walls creates pressure, just like gas molecules do.

When you increase the temperature of a gas, the molecules move faster and bump harder, so pressure rises. When you squeeze a gas into a smaller space, molecules crash into surfaces more often, so pressure also rises. This is why **pump** bicycle pumps get hot — you're compressing air and creating pressure!

Why Does This Matter?

Understanding pressure helps us design everything from scuba equipment to aeroplanes. Doctors use pressure to measure blood flow. Weather scientists track air pressure to predict storms. Engineers use hydraulics powered by liquid pressure to lift heavy weights easily.

Pressure is one of nature's most useful forces — invisible, but absolutely everywhere!