Physics – "The Diver in the Bottle"

Topic: Density, Pressure, and Archimedes' Principle **CAPS Grade:** Grade 8 (Density) & Grade 9 (Pressure) **Materials:**

- **The Vessel:** An empty, clear 2L plastic Coke/Fanta bottle filled to the very top with water.
- **The Diver:** A pen cap (with a littlePrestik/clay on the arm to add weight) OR a sealed ketchup/sauce packet from a fast-food takeaway.

The "Frugal" Solution

Demonstrating pressure usually requires syringes and hydraulics kits. This demonstrates the relationship between pressure and volume using trash.

The Procedure

1. **The Test:** Place your "diver" (pen cap or sauce packet) in a cup of water. It should *just barely* float. If it sinks, it's too heavy. If it floats too high, add a tiny bit of weight (wire/clay) to the pen cap.
2. **The Tank:** Drop the diver into the 2L bottle. It will float at the top.
3. **The Lid:** Screw the lid on **tightly**.
4. **The Action:** Pass the bottle to a student. Tell them to squeeze the sides of the bottle hard.
    - **What happens:** The diver will magically sink to the bottom.
    - **Release:** When they let go, the diver shoots back up to the top.

The Science (The "Why")

When you squeeze the bottle, you increase the **pressure**. Water cannot be compressed, but the tiny air bubble inside the pen cap (or sauce packet) *can*. The air bubble gets smaller, the diver becomes **denser** than the water, and it sinks.

The Lesson Takeaway

Pressure affects the volume of gases (Boyle's Law) and density determines buoyancy. Students "feel" the physics in their hands.