Floating and Sinking - Submarine

Grade Level	Grades 4+
Learning Objective	To investigate how air pressure affects floating
Science Unit	Energy and Forces: Floating
Skills Development	Making and Investigating
Materials Needed	A ketchup packet 2-litre plastic bottle with cap 
Steps	1. Fill the bottle to the top with water. 2. Push the ketchup packet into the bottle. 3. Fill the bottle to the top and place the cap on tightly. 4. Push the sides of the bottle. Write down what happens when you squeeze the bottle.
What's Happening?	The ketchup packet will sink when the bottle is squeezed and will float when released.
Scientific Principles	Inside the ketchup packet is a small pocket of air. When the bottle is squeezed, the pressure reduces the size of the bubble and the packet drops. When the bottle is released, the air pocket expands and the packet floats. This device is called a Cartesian Diver after René Descartes, a French mathematician and scientist. The ketchup packet works in the same way as a submarine. When a submarine wants to dive, it fills its tanks with seawater. When it returns to the surface it pumps air into the tanks, which causes it to rise. Fish have a similar adaptation. They have swim bladders; the fish floats when it inflates the bladder and sink when the bladder is deflated.