PhysicsLab-008	Buoyancy	Class 11I	Date 10/24	Name Ami Azuma

Hypothesis	An object completely immersed in a fluid experiences an upward buoyant force equal to the weight of fluid displaced by the object. (Archimedes' Principle)

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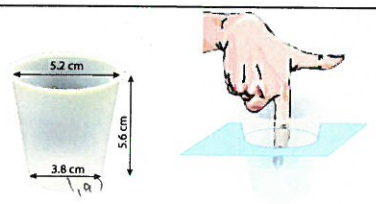
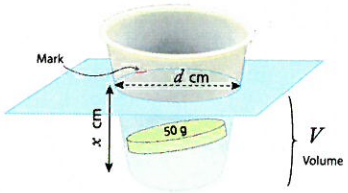
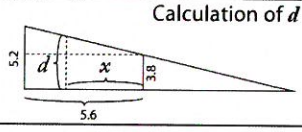
Experiment-A - A weight in a cup

1	Experience the buoyant force		
2	Measurement of the buoyant force A weight in a plastic cup on water		Measurement of x x = 3.6 cm
	Calculation of d 	$d = x \times \frac{5.2 - 3.8}{5.6} + 3.8$ $= 4.7$	d = 4.7 cm
	Calculation of V ***(V: The volume of water that the abject displaces)***	$V = \frac{1}{2} \times (Upper\ Area + Lower\ Area) \times x$ $= \frac{1}{2} \times \left(\frac{4.7^2}{2^2}\pi + 1.9^2\pi \right) \times 3.6$ $= 51.642 = 52$	V = 51.6 51.6×10^{-6} cm
	Buoyant force	$f = \rho_{water} V g$ $1000 \times 9.8 \times 51.6 \times 10^{-6}$ $= 0.50568$	f = 0.51
3	Gravity on the weight (and the cup)	$W = mg$ $= 0.05 \times 9.8 = 0.49$	W = 0.49

OK

Discussion

The buoyant force of a weight in a plastic cup on water is 0.51 N, and the gravity on the weight is 0.49 N. These two results are very close, so I can say that an object completely immeresed in a fluid experiences an upward buoyant face equal to the weight of fluid displaced by the object.

Very good

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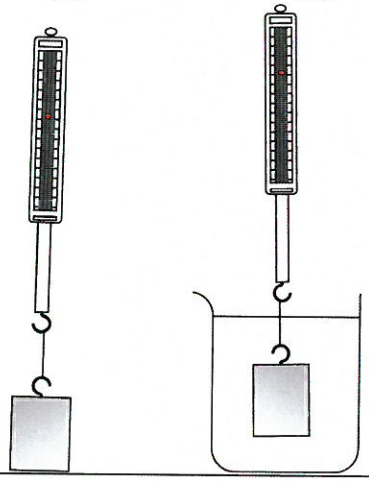
Experiment-B - Weight

1	Measurement (Zero adjustment of a spring scale)	W1 W2 	Measurement W1 = 0.6 N W2 = 0.4 N Buoyant force $f = W1 - W2 =$ 0.2N
2	Calculation	Mass of the weight (m)	$w = mg$ W1 $9.8m = 0.6$ $m = 0.0612$ kg
		Volume of the weight (V)	$1000 \times V \times 9.8 = 0.2N$ $9800V = 0.2$ $V = 2.04 \times 10^{-5}$ m3
		Density of the weight (ρ)	$\rho = \frac{m}{V}$ $= \frac{0.0612}{2.04 \times 10^{-5}}$ $= 3000$ OK

Discussion

Density of the weight is 3000 N in this experiment, and the density of Aluminium is 2700 N. Aluminium is the substance of which density is the closest to 3000N. Although there is a little error, the substance used in this lab could be "Aluminium".

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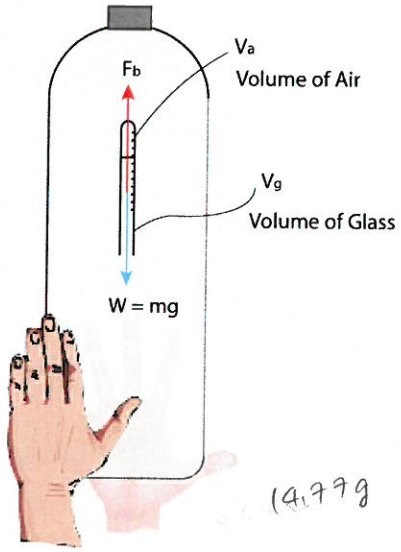
9.6ml → 0.0096 l

Experiment-C - Cartesian Diver

1	Set up and measurement	$F_b = (V_g + V_a)\rho_w g$  14.79g	Measurement The volume of air inside the test tube (Va) when it is in the intermediate position of the bottle.
2	Data	Mass of the test tube (m) = 0.01477 Density of glass (ρ glass) = 2500 kg/m³ Volume of the test tube(Vg)= 36.925	$\frac{0.01477}{V} = 2500$ $V_a = 5.908 \times 10^{-6}$
3	Calculation	Buoyant Force 9.6ml = 9.6×10^{-6} m³ Fb = (Vg +Va) $\rho_w g$ $= (9.6 \times 10^{-6} + 5.908 \times 10^{-6})$ eg	$(9.6 \times 10^{-6} + 5.908 \times 10^{-6}) \times 9800$ $= 0.1255\ldots$ $= 0.126$ N
		Gravity = mg $= 0.01477 \times 9.8$	$= 0.1447 = 0.145$ N OK

Discussion and opinions

The buoyant face of the glass is 0.126 N by calculating and gravity on the weight is 0.145 N. These two results are very similar to each other, so I can say that an object completely immeresed in a fluid experiences an upward buoyant face equal to the weight of fluid displaced by the object.

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