PhysicsLab-008	Buoyancy	Class 11-0	Date 10/24/18	Name Yukiko Takahashi

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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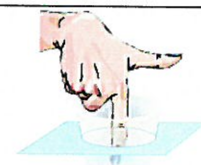
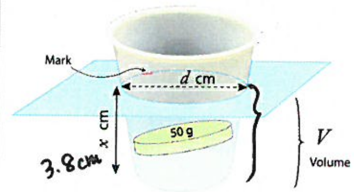
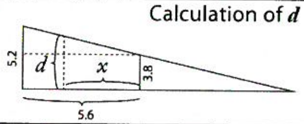
Experiment-A - A weight in a cup

1	Experience the buoyant force	 	
2	Measurement of the buoyant force A weight in a plastic cup on water		Measurement of x x = 3.8 cm
	Calculation of d 	$d = x \times \frac{5.2-3.8}{5.6} + 3.8$ $d = 3.8 \times \frac{5.2-3.8}{5.6} + 3.8 = 4.8$	d = 4.8cm
	Calculation of V *(V: The volume of water that the abject displaces)*	$V = \frac{1}{2} \times (Upper\ Area + Lower\ Area) \times x$ $V = \frac{1}{2} \times (5.76\pi + 3.61\pi)3.8$ $V = 4.685\pi \times 3.8 =$	V = 56 cm³ ↳ $56\ cm^3 \times \frac{m^3}{(100\ cm)^3} = 0.000056\ m^3$
	Buoyant force	$f = \rho_{water} V g$ $f = 1000\ kg/m^3 \times 0.000056 m^3 \times 9.8\ m/s^2$ =	f = 0.55N
3	Gravity on the weight (and the cup)	$W = mg$ $W = 9.8 \times (0.05 + 0.00267) = 0.52\ N$	W = 0.52N

OK

Discussion

In this experiment we used the cup and the weight to make it float on water to observe the weight's buoyancy. Through calculations we saw that the buoyancy is larger than the gravity. This result makes sense because the cup was floating, not completely inside the water.

Very Good!

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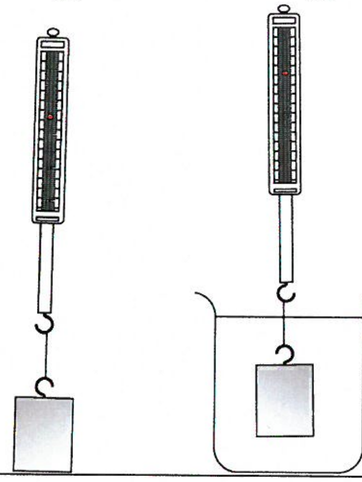
Experiment-B - Weight

1	Measurement (Zero adjustment of a spring scale)		Measurement W1 = 0.7 N W2 = 0.4 N Buoyant force $f = W1 - W2 = 0.3$ N
2	Calculation	Mass of the weight (m) $W = mg$	$0.7 = m \times 9.8$ $m = 0.071$ kg
		Volume of the weight (V) $f = \rho_w V g$	$0.3 = 1000 V 9.8$ $V = \frac{0.3}{9.8 \times 1000}$ m^3 $V = 0.000031 m^3 = 31 cm^3$
		Density of the weight (ρ)	$\rho = \frac{m}{V}$ $\rho = \frac{0.071 kg}{0.000031 m^3}$ $\rho = 2300 kg/m^3$

OK

Discussion

In this experiment we tested forces in 2 conditions ; out in the air and making it float in the water. We saw the buoyancy through the difference between the 2 forces. We learned how to calculate other things like mass, volume and density through forces and buoyancy.

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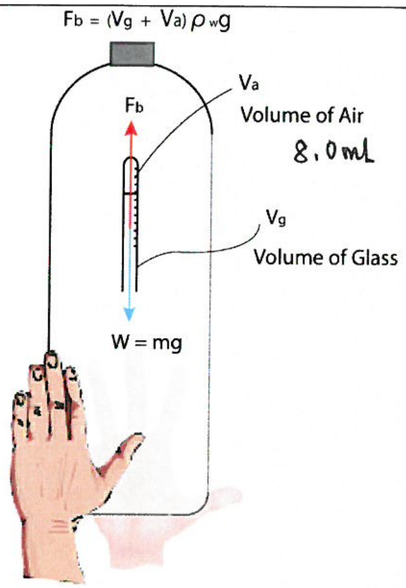
Experiment-C - Cartesian Diver

1	Set up and measurement		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) = 14.77g → 0.01477kg Density of glass (ρ glass) = 2500 kg/m³ Volume of the test tube(Vg)= 0.0000059 m³	
3	Calculation	Buoyant Force Fb = (Vg +Va) ρ_w g =(0.000008+0.0000059) 1000×9.8 = 0.13622 = 0.14 N	0.14 N
		Gravity = mg = 0.01477 kg × 9.8 = 0.1447 ≈ 0.14	0.14 N

OK

Discussion and opinions

In this experiment we tried to balance the buoyancy and gravity by making ~~it~~ the test tube float in the middle. We did succeed because we calculated the gravity & buoyancy and the answers were almost equal. We learned that buoyancy = gravity when something is floating IN water.
I thought that these 3 experiments were interesting to see the relationship between buoyancy and gravity. I loved doing this lab because it was very fun.

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