“IS THERE AN OCEAN IN THE HOUSE?”

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| Level | **Investigations** | | | |
| Topic | **Salinity** | | | |
| ‘*OITH bench-top’s* | Definitions, making, changing, measuring.  GTV 1.1  GTV 1.2 | Tool, (setup)  manufacturing, testing, modification.  GTV 1.2, 1.3 and 1.4 | Tool, calibration and system error.  GTV 1.5 and 1.6 | Doing with the tool. Enquiry. Problem. Proposition.  GTV 1.7 and 1.8 |
| Support material | Overview and  worksheets | Concept, analogy and creativity | Graphing , statistical  GTV 1.3 and 1.9 | Review  GTV 1.10 |

***Fun with Formulae # 1 !!***

Refer to **GTV 1.4**

Specific Gravity is a RATIO of density between 2 substances

***Specific Gravity = density A/ density B***

We can use this formulae to calculate what percentage of volume of an object A will be submerged if it is placed in a liquid or Gas B.

For example in the GTV 1.4 demonstration:

Wee Floaty has volume 54 cm3 (height x width x length, 3 x 3 x 6)

And weighs 41gms

Therefore Density of A (wee floaty is mass/volume =gm/litre=41/0.054

(Note we have to make sure the values are Kg/m3 or gm/Litre)

Density A = 759.3 gm/L

If we place it in pure water (0 ppt Salinity) – 1000 gm/L density B

Then Specific Gravity ratio, Density A/ Density B =759.3/1000 tells us that

75.93% of wee floaty will be submerged in pure water.

If we then place wee floaty in our 100ppt ‘seawater’ we can test the prediction, from calculation

Density A/density B= 759.3/1.099, that only 69.1% of the block will be submerged.

And we see this as in GTV 1.4 where the block floats higher in the denser, salty water.

***You can now test this out for yourself with an object of your choice in your own ‘sea solutions’ (blocks are easier for calculations).***

***Fun with Formulae # 2 !!***

From the previous activity we can see that how ‘floaty’ the setup is, changes with change in relative density. Interestingly Buoyancy isn’t changing if the object a being floated isn’t changed.

How is this you ask?

**BOUYANCY IS A FORCE** counteracting the force of Gravity pulling the object (e.g. Wee Floaty) down.

We can calculate this force using the formulae

***f (Buoyancy) = V (volume submerged in cubic meters) x Density of fluid or Gas (kg/m3) x f (Gravity)***

For wee floaty in pure water

fb = 0.000041m3 x 1000kg/m3 x 9.81Newtons

fb = 0.40221 Newtons

If you do the calculations for the other salinities you will discover that fb stays the same as density of the medium changes. Try the calculation for our 100ppt ‘sea’ with density of 1099kg/m3.

Buoyancy will change with a change in density of the object/substance being floated (or not).

Buoyancy will change with a change in gravitational force.

See spreadsheet guide on **GTV 1.9**

See **interview with Jess on GTV1.10** for more about Buoyancy