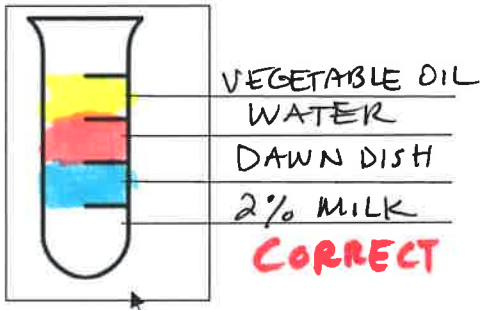
ANSWERS

Density of Liquids

AMAZING 9 LAYER DENSITY TOWER

1. Your lab group will use a plastic pipette to slowly place 2.5 mL of 4 different liquids into a test tube. The 4 liquids you will use are WATER, MILK (2%), Veg. Oil, and DAWN DISH DETERGENT
2. **Observe** the four liquids and record at least one **qualitative observation** of each liquid below:
   Water - transparent; red; moves easily Veg. oil - moves slower; yellow; transparency
   MILK - Opaque; white; moves easily Dawn - moves slowly; blue; translucent
3. **HYPOTHESIS**—Explain what you think will happen when you pour the 4 liquids into the test tube.
   I think the Dawn will be most dense because it moves slow and is thick; it looks heavy; I think the oil will be next dense
4. Draw, color and label a picture which illustrates your **hypothesis**.
5. Explain why you think this will happen. Milk has fat in it so I think it will float; Dawn seems heavy because it is so thick.
6. Your group needs to come up with a plan as to how you will experiment. Take turns With the tasks as you experiment. Record the name of the group manager Someone who is responsible
7. Your group will get four test tubes and 4 liquids. Do not mix or contaminate the original liquids. Use only 2.5 ml of each liquid in a test tube. Place the liquids in slowly, letting the liquid run down the side of the test tube. All test tubes must be clean for the next class to use. Remain in your seat and raise your hand if you have a question or need something.
8. Experiment with your group and record your **final results** below in a **colored** and **labeled** diagram.
   Explain your diagram and group results below:

   The milk was the most dense (1.035 g/mL)
   The Dawn dish detergent was 2nd most dense
   The water has a density of 1.0 g/mL) (1.03 g/mL)
   The oil was least dense (0.93 g/mL)
   Oil floats on H_2O



Final Result-(graded)

9. Which liquid is the least dense? Vegetable oil
10. Which liquid is the most dense? 2% milk
11. What makes one liquid denser than another liquid?
    milk has more mass per volume than the other liquids. Milk has more matter dissolved in it than the other 3 liquids.
12. What is the relationship between the density of a liquid and its position in the test tube? The less dense the liquid the higher it is in the test tube; the denser it is, the further down in the tube.
13. Explain how this experiment relates to the **layers of the earth**. The earth has layers because each layer is a different substance with different densities. The crust is least dense; the core is most dense.
14. Do some **research**. See if you can find the densities of the following earth layers and liquids:

a. Continental Crust	2.7 g/cm³	f. Vegetable Oil	0.93 g/mL
b. Oceanic Crust	2.9 (2.9) g/cm³	g. Water	1.0 g/mL
c. Mantle	3.3 g/cm³	h. Dawn Dish Detergent	1.03 g/mL
d. Outer Core	9.9 g/cm³	i. 1% Milk	1.035 g/mL
e. Inner Core	12.8 g/cm³		

Use these websites to assist you with research:

http://www.shonscience.com/uploads/2/2/1/3/22138584/2635932_orig.jpg

http://www.coolgeography.co.uk/GCSE/AQA/Restless%20Earth/Tectonics/Crustal_types.jpg

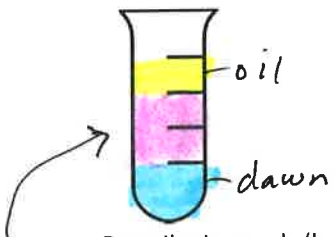
https://www.wccusd.net/cms/lib/CA01001466/Centricity/domain/1040/grade%208%20lessons/LiquidDensityColumnV2.pdf

http://cnmesm.wikispaces.com/G6_Seven+Layer+Density+Column

15. What surprised you during this experiment? Describe at least two things that surprised you.
    1.- I was surprised that the thickest liquid (Dawn) was not the densest liquid?
    2.- I was surprised that milk was so dense because it does have some fat(oil) in it. (2%)
16. Let's say you added 7 mL of vegetable oil instead of 2.5 mL, would that change where the vegetable oil would position itself in the test tube? No Explain your answer. The amount of liquid does not change the density of the liquid. The molecules are still arranged the same way whether you have a small amount of veg. oil or a large amount.
17. A lot of students hypothesized that the "thickest liquids" would be the most dense liquids. Was their hypothesis correct? No Explain: Thickness (or viscosity) does not determine density. Oil is thicker than water but less dense. Dawn is thicker than milk but less dense.
18. Describe **3 things you learned** from this lab.
    1.- The most dense layers sink
    2.- Thickness does not mean it is more dense.
    3.- Oil is the least dense.
19. Look at the density of the continental crust and oceanic crust. Sometimes at convergent boundaries the oceanic crust gets pushed under the continental crust. Why does the oceanic crust always sink under the continental crust? The Oceanic crust is more dense than the continental crust so it always sinks under continental crust. (called Subduction)
20. What can you conclude about the how the layers of the earth form? when the earth was forming, the densest materials sank creating the iron core and the least dense materials rose to the top forming the crust.

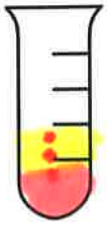
21. Why is the inner core so incredibly dense? it is made of a heavier element iron and nickel and under alot of pressure
22. Record your data/results from your 4 trials of experimentation below: (Color and label each test tube)

Trial 1



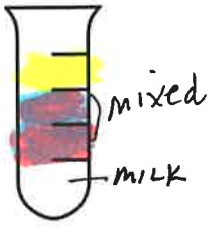
milk and H2O mixed

Trial 2

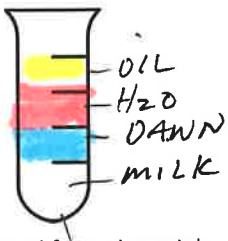


When we put oil in first, the red H2O sank through it.

Trial 3



Trial 4



We finally figured it out!

Describe in words (below) the results of each specific test or trial. Explain what you learned from that trial.