

# Density and Earth's Layers

The crust of the Earth is said to have a different composition than the inside of the Earth. Is this significant to the Earth's structure? These activities about density might help us investigate a little bit.

## Activity 1 - Different Compositions

### Procedures

1. Each group should have a medicine cup, white test tube rack, and test tube at your lab station, if not, please let the teacher know.
2. One group member will walk to the front of the lab and fill the medicine cup with 5 ml of blue liquid. **Gently** pour the liquid into the test tube so it slides down the side of the test tube. Then **use color** to draw your observation of the test tube in the box labeled 2. Using water at your station, carefully rinse out the medicine cup.
3. One group member will walk to the front of the lab and fill the medicine cup with 5 ml of yellow liquid. **Gently** pour the liquid into the test tube so it slides down the side of the test tube. Then **use color** to draw your observation of the test tube in the box labeled 3. Using water at your station, carefully rinse out the medicine cup.
4. One group member will walk to the front of the lab and fill the medicine with 5 ml of green liquid. **Gently** pour the liquid into the test tube so it slides down the side of the test tube. Then **use color** to draw your observation of the test tube in the box labeled 4. Using water at your station, carefully rinse out the medicine cup.
5. One group member will walk to the front of the lab and fill the medicine cup with 5 ml of purple liquid. Gently pour the liquid into the test tube. **Gently** pour the liquid into the test tube so it slides down the side of the test tube. Then **use color** to draw your observation of the test tube in the box labeled 5. Using water at your station, carefully rinse out the medicine cup.
6. One group member will walk to the front of the lab and fill the medicine cup with 5 ml of orange liquid. Gently pour the liquid into the test tube. . **Gently** pour the liquid into the test tube so it slides down the side of the test tube. Then **use color** to draw your observation of the test tube in the box labeled 6. Using water at your station, carefully rinse out the medicine cup.
7. Carefully pour the contents of the test tube down the drain at your station and let the warm water run for about 30 to 45 seconds cleaning out the sink, the test tube, and the medicine cup. Use a paper towel from the station to dry all of the supplies.

2

3

4

5

6

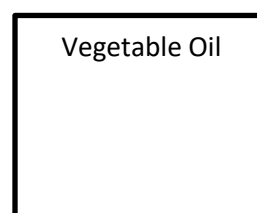
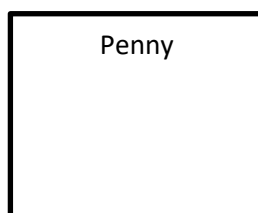
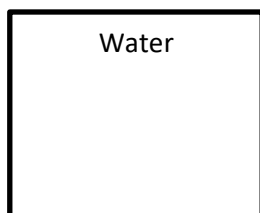
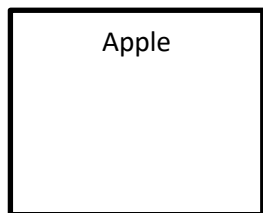
### Analysis Questions

8. What did you notice about the liquids as more were added to the test tube?
9. Did any of the liquids mix together? Explain what may have caused this phenomenon

## Activity 2 – What is Density?

Go to [dixiemiddlescience.weebly.com](http://dixiemiddlescience.weebly.com) – go to today's date and click on the black box that says “**DENSITY VIDEO**” and click on it. Watch the video and answer the following questions.

1. What is the formula for density?
2. Draw a picture showing the arrangement of the particles for each of the items from the video in the boxes below.



3. In your own words, explain why the penny sank in the water.

## Activity 3 – Density Phet Simulation

Go to [dixiemiddlescience.weebly.com](http://dixiemiddlescience.weebly.com) – go to today's date and click on the black box that says “**DENSITY PHET**”

A. When you see the wooden block, grab it with your mouse and put it in the water. Note that you can manipulate the block by pushing them underwater

Wooden block:

Mass= \_\_\_\_\_ Volume = \_\_\_\_\_ Density: \_\_\_\_\_

How much of the block is under the water?

Manipulate the blocks, use different materials, in the custom setting to find out the following

1. Is there a relationship between the volume of water displaced and the total volume of the block that has anything to do with density? If so, what is it?
  2. When objects float , they displace an amount of water equal to their: \_\_\_\_\_
  3. When objects sink, they displace an amount of water equal to their: \_\_\_\_\_
  4. What is the density of water? \_\_\_\_\_
  5. How do you think this activity would change if the objects were placed in a denser liquid like Mercury?
-

B. Now with the button clicked for “**Same mass**” fill in the following table:

color	Mass ( Kg)	Volume ( L)	D ( kg/L)	V of water displaced ( L)
Blue				
Yellow				
Green				
Red				

C. With the button clicked for “**Same volume**” fill in the table below:

color	Mass ( Kg)	Volume ( L)	D ( kg/L)	V of water displaced ( L)
Blue				
Yellow				
Green				
Red				

D. Now fill in the table for the “**same density**”:

color	Mass ( Kg)	Volume ( L)	D ( kg/L)	V of water displaced ( L)
Blue				
Yellow				
Green				
Red				

E. Now for the “**Mystery Blocks**”

Block	Mass ( kg)	Volume ( L)	Density ( Kg/L)	Material?
A				
B				
C				
D				
E				

1. Put the blocks in order from least to most dense:
2. Which blocks would float?
3. Which blocks would sink?

## Activity 4 – Density Practice Problems

Use the formula of density below to help you answer the following questions.

$$\text{Density} = \frac{\text{mass (g)}}{\text{Volume (ml)}}$$

1. A loaf of bread has a mass of 454 grams and a volume of 2270 ml. What is the density?
2. A block of wood has a density of 0.6 g/ml and a volume of 1.2 ml. What is the mass?
3. One liter of water has a mass of 1000g. What is the density?
4. Use the information about the densities of different substances to complete the data table below.

Mass (g)	Volume (ml)	Density	Substance
171	15		
148	40		
475	250		
680	1000		

Substance	Density (g/ml)
Gold	19.3
Mercury	13.5
Lead	11.4
Iron	7.87
Aluminum	3.7
Bone	1.7 – 2.0
Gasoline	0.66 – 0.69
Air (dry)	0.00119
Water	1.0

5. What is the density of water?
6. List the substances that will float in water.
7. Why do you think bone and gasoline have a range for the density?
8. In your own words, explain density.