Name: _____ Section: _____

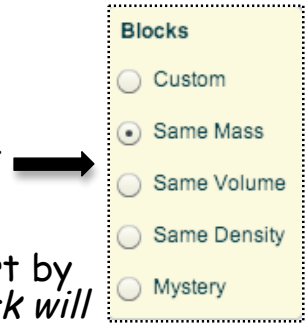
Exploring Density

Introduction: Density is a physical property of matter that is defined as the amount of mass of an object per unit volume. If the density of a substance is known, it is can be used to identity various objects. In order to calculate the density of a substance it is necessary to measure the mass and volume of the object.

Objective: Determine the densities and identities of various blocks by performing mass and volume measurements, and calculations.

Procedures:

1. Access the density simulation by going to: http://phet.colorado.edu/en/simulation/density
2. Select the "Run Now!" button. 

3. Take a few minutes to "tinker" with the simulation.
4. Using the radio button in the "Blocks" box in upper right hand corner, select "Same Mass." 

5. Complete the first two columns in the "Same Mass" chart by recording the object's mass and volume. ***NOTE**: No block will have a volume greater than 100 L*
    - ***Mass** - if not listed on the block, a scale will be provided*
    - ***Volume** – is measured by dragging, and holding, the block under water*
6. Complete the third column in the chart by calculating the density of the block - this is done by dividing the mass by the volume.
7. Manipulate the radio button to select the appropriate "Blocks" and repeat the procedures from steps 4-5 in order to complete the remaining charts. ***NOTE**: The "Mystery" chart requires you to complete a fourth column to identify the block.*
    - ***Identity** – select the "Show Table" button* 

Data:

Same Mass

Block	Mass *(kilogram)*	Volume *(liter)*	Density *(kilogram/liter)*
Blue			
Green			
Red			
Yellow			

Same Volume

Block	Mass *(kilogram)*	Volume *(liter)*	Density *(kilogram/liter)*
Blue			
Green			
Red			
Yellow			

Same Density

Block	Mass *(kilogram)*	Volume *(liter)*	Density *(kilogram/liter)*
Blue			
Green			
Red			
Yellow			

Mystery

Block	Mass *(kilogram)*	Volume *(liter)*	Density *(kilogram/liter)*	Identity
Blue (B)				
Green (C)				
Red (D)				
Purple (E)				
Yellow (A)				

Questions:

1) What is the name of the process you used to determine the volume of the blocks in the simulation? Explain your reasoning.

2) Although it was not feasible with the simulation, what would have been another alternative to figuring out the volume of the blocks?

Select the "Custom" radio button in the "Blocks" box and use the new tool to assist you in answering questions 3-6.

3) Consider the density formula. What happens to the density of an object as the mass increases? Decreases? Explain your reasoning.

4) Consider the density formula. What happens to the density of an object as the volume increases? Decreases? Explain your reasoning.

5) Assume that a 6.0 kilogram object is heated and its volume becomes greater due to expansion. Will the density of the object change? Explain your reasoning.

6) If the same object (from question 5) has an original density of $\approx$ 2.7 kilogram/liter and its volume doubled with heating, what is its new density? Explain your reasoning.