

## Unit 2 - Matter & Energy

### PhET Density Simulation Lab

Name \_\_\_\_\_  
Block \_\_\_\_\_

#### Density, Volume and Mass

Play around with the PhET simulation *Density*.  
Choose "Custom" and "My Block"

1. If you change the mass of the block, how does the block change?

Changing the mass makes the block heavier so it sinks.

2. If you change the volume of the block, how does the block change?

Increasing the volume makes the block larger (floats more),  
but decreasing the volume makes the block smaller (sinks more).

3. How does the density of the block change when you adjust the volume?

Increasing the volume, reduces density causing the block to float.  
Decreasing the volume, increases the density causing the block to sink.

4. How does the density of the block change when you adjust the mass?

Increasing the mass, increases density, causing the block to sink.  
Decreasing the mass, decreases density, causing the block to float.

5. *Prediction:* If you have several blocks of the same mass, will they all float or all sink the same in water?

The behavior will depend on the volume of the blocks. If mass is constant, then larger volumes will float, and smaller volumes will sink.

6. Try out the button "Same Mass" Explain what is different and what is the same about each of these blocks.

A. Compare features you can observe out of the water.

The blocks are all 5.00 kg, but they are different sizes. Red < Green < Blue < Yellow

B. Compare the behavior in water.

Red and green blocks sink. Blue block floats in the water. Yellow block floats half in and half out of water.

7. *Prediction:* If you have several blocks of the same volume, will they all float or all sink the same in water?

Depends on the mass. More mass will sink, less mass will float.

8. Try out the button “Same Volume” Explain what is different and what is the same about each of these blocks.

A. Compare features you can observe out of the water.

The blocks are all the same size, but they are different masses.

Red = 2.00 kg; Green = 4.00 kg; Blue = 6.00 kg; Yellow = 8.00 kg

B. Compare the behavior in water.

The yellow and blue blocks sank to the bottom. The green block floats with only a little bit out of the water. The red block floats with more than half out of the water.

9. *Prediction:* If you have several blocks of the same density, will they all float or all sink the same in water?

If the density is the same, then the blocks will sink or float the same.

10. Try out the button “Same Density” Explain what is different and what is the same about each of these blocks.

A. Compare features you can observe out of the water.

Blocks are different sizes and have different masses. Red is smallest and 1.00 kg. Green is a little larger with 2.00 kg. Blue is a little larger with 3.00kg. Yellow is largest with 4.00 kg.

B. Compare the behavior in water.

The blocks all float with the same portion of above the water.

11. Calculate the density for each mystery block, indicate whether it sinks or floats, and use the SHOW TABLE button to determine the block's identity.

Block Label	Mass	Volume	Density	Behavior	Identity
A	65.14 kg	3.38 L	19.3 kg/L	sink	gold
B	0.64 kg	1.00 L	0.64 kg/L	float	apple
C	4.08 kg	5.83 L	0.700 kg/L	float	gasoline
D	3.10 kg	3.38 L	0.917 kg/L	float	ice
E	3.53 kg	1.00 L	3.53 kg/L	sink	diamond