

## Student Directions *Density*: How Does Density Relate to Mass & Volume and an Objects Interaction with Water?

<http://phet.colorado.edu>

### Learning Goals:

Students will be able to use macroscopic evidence to:

1. Measure the volume of an object by observing the amount of fluid it displaces or can displace.
2. Provide evidence and reasoning for how objects of similar:
  - a. mass can have differing volume
  - b. volume can have differing mass.
3. Identify the unknown materials by calculating density using displacement of fluid techniques and reference tables provided in the simulation.

### Directions:

1. Explain how you use the simulation to measure the volume that an object can displace.  
Also:
  - a. What is similar or different from the volume that the blocks displace naturally?  
How might a scientist explain the behavior?
  - b. Explain why you think the blue block on the “Same Mass” setting can be placed anywhere in the water.
2. Design experiments to demonstrate the learning goal #2. Provide tables for evidence and use specific examples from your data to provide the reasoning.
3. Design an experiment to identify the 5 Mystery blocks using the Table in the simulation.
  - a. Write your procedure in paragraph form.
  - b. Identify each block using specific evidence to support your conclusions.
4. Design an experiment and data table to find the density of a real object.
  - a. Do several trials, calculating density for each trial.
  - b. Calculate the deviation for each trial from the average like you did in the Precision and Accuracy Lab. (*hint: find the absolute value of (observed density – average density)*).
  - c. Does your data show precision? Explain
  - d. Does your data show accuracy? Explain