**Tips for controls:**

* You can put the blocks in the water. If an object floats, you can hold it under water to measure its volume.
* Use the scale and the volume of water displaced to calculate the density of the mystery objects.
* Select same mass, volume, or density to compare and contrast the buoyancy of two blocks.
* Turn on the forces and drag the object below the surface to see how the buoyancy force changes.
* You can switch from water to oil using the buttons at the bottom of the Intro tab. In Buoyancy Playground tab, there is a continuous slider for fluid density.
* There are more controls in the “Buoyancy Playground” tab.
* If you are doing a lecture demonstration, set your screen resolution to 1024x768 so the simulation will fill the screen and be seen easily.

**Important modeling notes / simplifications:**

* For named objects in the drop-down menu, mass changes volume to keep density constant; for "My Block", mass changes density.
* There is a drag force when the block is moving through the water, but we do not show it. It is confusing to students and is not necessary for understanding buoyancy.
* We purposely left out the density of water on the slider, since we saw that it caused students to engage more with the sim.

**Insights into student use / thinking:**

* Students do not need to be told to put the block in the water; it is often their first move.
* Students notice that the buoyant force equals the block’s weight when the object is floating.
* Comparing two blocks at a time helps students notice the important ideas about buoyancy.
* Some students notice that when objects float, they displace their mass, but when objects sink, they displace their volume.
* Students learn that density is what determines whether an object sinks or floats.

**Suggestions for sim use:**

* For tips on using PhET sims with your students, see: [**Guidelines for Inquiry Contributions**](http://phet.colorado.edu/en/for-teachers/activity-guide)and [**Using PhET Sims**](http://phet.colorado.edu/en/for-teachers/classroom-use).
* The simulations have been used successfully with homework, lectures, in-class activities, or lab activities. Use them for introduction to concepts, learning new concepts, reinforcement of concepts, as visual aids for interactive demonstrations, or with in-class clicker questions. To read more, see: [**Teaching Physics using PhET Simulations**](http://phet.colorado.edu/publications/Teaching_physics_using_PhET_TPT.pdf).
* For activities and lesson plans written by the PhET team and other teachers, see: [**Teacher Ideas & Activities**](http://phet.colorado.edu/en/for-teachers/classroom-use).