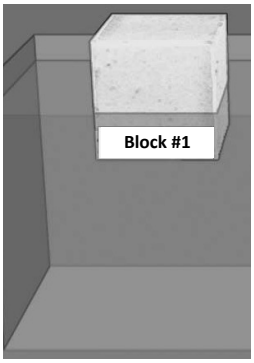
Name: _____
Class Period: _____

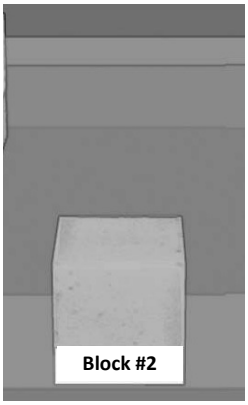
Floating and Sinking:
Pre Lab Questions:



You have a block, and you see that it floats in water.

What could it be made of?

What do you think will happen if you make a bigger block out of the same material? Will it float or sink?



You have another block that sinks.

What could it be made of?

What do you think will happen if you make a smaller block out of the same material? Will it float or sink?

Why do you think Block #1 floats and Block #2 sinks?

7/26/12 4:20 PM
Comment [1]: Pre-assessment
It's helpful to do a sink/float lab before this activity. Prompt students to use knowledge from the sink float lab to try to answer the pre lab questions.

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Exploring Density's Effects on Floating

Learning Objectives:

1. Be able to rank the relative density of objects after observing their floating behavior
2. Be able to determine density of an object through measurement

1. Take 5 minutes to explore the sim. Talk about what you find with your partner.

2. In "Custom" mode try exploring different materials with different volumes.

a. Which materials sink? _____

b. Which materials float? _____

c. In your own words, what do you think the label "Volume" means?
_____

d. In your own words, what do you think the label "Mass" means?
_____

3. Try going to "Same Mass" mode

a. All the blocks have the same mass, why do some sink and some float?
_____

b. Could all the blocks be the same material? Why or Why not? _____
_____

4. In "Custom" mode, try making different blocks of each material and filling in the table below. *Use a different mass and volume for every block.*

Material	Mass (kg)	Volume (L)	Mass divided by Volume	Density (kg/L)
Wood				
Wood				
Aluminum				
Aluminum				
Brick				
Brick				

7/27/12 12:04 PM
Comment [2]: Class Discussion Prompt:
-You explored that some things float in water while others sink. This concept is called buoyancy. Today you will learn that different materials have different densities and this determines their sinking and floating behavior. It's ok if you haven't seen the term density before that's ok, you will learn what density is today!

7/26/12 4:20 PM
Comment [3]: Prompt:
-We will also practice our math skills by using measurement, displacement, and division.

7/26/12 4:21 PM
Comment [4]: Play Time:
Encourage students to explore any and all aspects of the sim.

7/26/12 4:26 PM
Comment [5]: Possible Conceptual Difficulty:
Students may have difficulty articulating what volume is and finding the volume of the blocks.
To Address This:
Have a student share out where to find the volume of the block in liters, and discuss what volume means in the sim.

Possible Conceptual Difficulty:
Students may not know how to use the displacement method for determining volume. (Displacement Method: The level of the water after the block has been dropped in, minus the original starting level of the water).
To Address This:
Prompt students to share how they can hold the block under water and find the volume of the block through displacement.

7/26/12 4:26 PM
Comment [6]: Class Discussion:
How is mass different from volume?

7/26/12 4:26 PM
Comment [7]: Sim Tip:
Ensure that all students are on the "Same Mass" mode.

7/26/12 4:22 PM
Comment [8]: Class Discussion:
Have students think, pair, share their thoughts for questions a and b.

7/26/12 4:22 PM
Comment [9]: Differentiation:
Allow students to use calculators as needed.

7/27/12 12:06 PM
Comment [10]: Class Discussion:
-Why was it useful to see the density of a certain type of block after changing the mass or volume?
-What does this tell us about density?

Check for understanding:
It is important the students understand that even though an object might have a greater mass or volume, if it is still made out of the same material its density will not change.

5. In "Same Density" mode, figure out the volume of each block by holding them one at a time underwater

Block	Pool Volume (L) *No Block*	Pool Volume (L) *With Block*	Block Volume (L)
Green	100	102.5	2.5
Red			
Yellow			
Blue			

6. Now in "Same Density" mode, check that each block has the same density using the volumes you found

Block	Mass (kg)	Volume (L)	Density (kg/L)
Green			
Red			
Yellow			
Blue			

7. In "Mystery" mode, try calculating the density of the "Mystery" blocks!

Block	Mass (kg)	Volume (L)	Density (kg/L)	Sink or float?
A				
B				
C				
D				
E				

Why do some blocks sink and some blocks float?

_____

_____

8. In "Same Volume" mode, observe how the different blocks float

a. Which block has the *smallest* density? _____

b. Which block has the *biggest* density? _____

c. Could all the blocks be the same material? Why or Why not? _____

_____

9. Challenge!

In "Custom" mode, go to "My Block" and see if you can make a block that does not float or sink when you let it go in the middle of the water. What is the density of this block?

7/26/12 4:27 PM
Comment [11]: Check for understanding: Circulate to ensure that students are correctly determining the volume of the block.

7/26/12 4:27 PM
Comment [12]: Differentiation: Allow students to use calculators as needed.

7/26/12 4:28 PM
Comment [13]: Class Discussion: Have students think, pair, share the answer to this question.

Check for understanding: At this point in the activity it is important that students understand that things with a smaller volume and a larger mass will sink, and things with a larger volume and smaller mass float. If students are struggling with this concept work with them individually while other students are answering questions 8 and 9. Use guiding questions while the students are manipulating the mass and volume of the mystery blocks to help the students arrive at this understanding.

Prompt:
-Do you think that the this object will still sink if you increase the mass? Try it out! Did the volume stay the same? What does that make you think about how a greater mass affects sinking when the volume remains the same? Now let's keep the mass the same and change the volume. What do you think will happen this time? Etc.

7/26/12 4:29 PM
Comment [14]: Class Discussion: Have students share out thinking. Ask other students if they agree or disagree and have students use the sim on a projector or Smartboard to help other students understand how they arrived at their conclusions.

7/26/12 4:29 PM
Comment [15]: Class Discussion: Revisit the learning goals from the beginning of the activity.
-How well did we achieve these goals?
- Is anything still unclear?
-How do we feel about how much we learned using the sim today?

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Floating and Sinking:

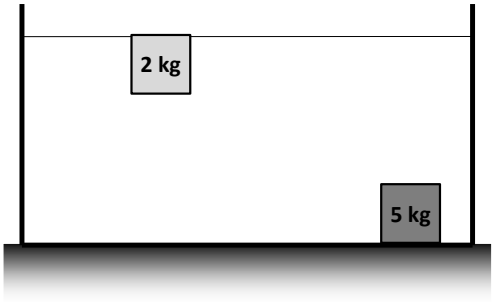
Post Lab Questions:

1. You have 5 blocks that are the same size, but different masses. The lightest one is 1kg, the heaviest one is 5kg. The picture shows how the 2kg and 5kg blocks float and sink in water.

   On the picture, **draw** where the other blocks would end up if you put them in the water.

   Explain why you think it would look that way?

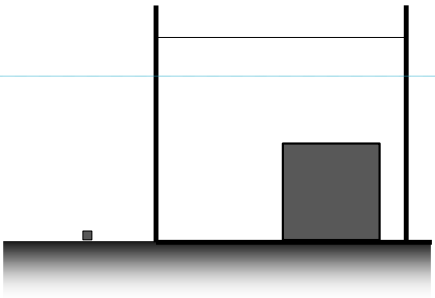
   _____
   _____
   _____
   _____



(Adapted from Univ. of Washington assessment question)

2. This picture shows a large block that sinks in the water, and a much smaller block of the **exact same material** sitting outside of the water.

   On the picture, **draw** what you think would happen if you put the smaller block into the water.



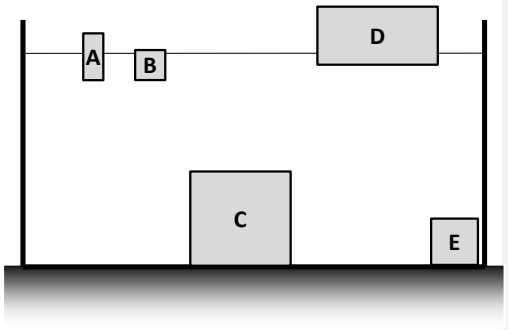
   Would it float or sink, or does it depend? _____

   The density of the smaller block is _____ the density of the larger block.
   (smaller than, same as, larger than)

7/26/12 4:29 PM
Comment [16]: Check for Understanding : After students have taken post assessment have them share out their thinking and draw on a white board how the blocks sink or float and explain why.

7/21/12 10:01 PM
Comment [17]: Check for understanding
-Why might some people want to say that the smaller block will float?
-How did the sim help us understand that the small block will behave like the larger block?

3. You have 5 blocks of different shapes, different sizes, and different materials. You put them in water and see that some float and some sink (see picture).
Can you tell which one has the **smallest density**? _____



If so, which one: _____

Explain how you can tell:
_____
_____

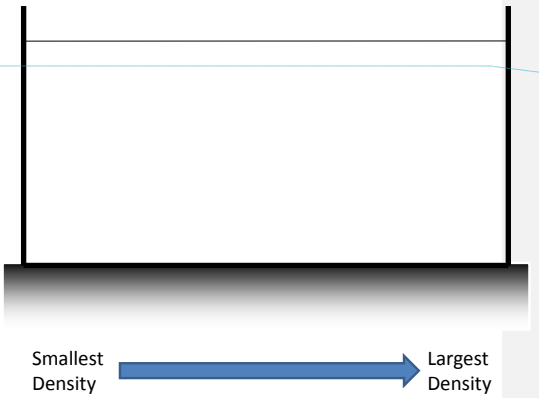
Can you tell which one has the **largest density**? _____

If so, which one: _____

Explain: _____

In the empty picture, **redraw** the blocks in the water in order from the **smallest density** one to the **largest density** one.

If you don't have enough information, **explain** what information you would need.



7/26/12 4:30 PM
Comment [18]: Check for understanding
Have a student share their thinking by drawing their answer on a white board. Have other students agree or disagree and explain how they arrived at their answer.