

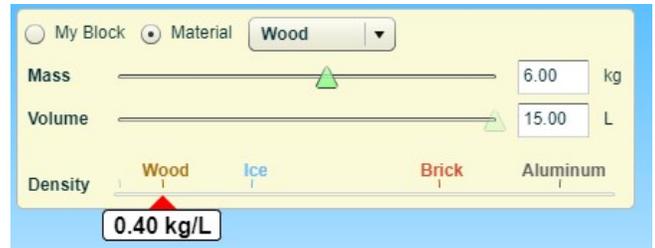
Name _____

Period _____

PhET Density Investigation

We will use these concepts to explore both density and the water displaced by an object using the PhET Density simulation.

<https://phet.colorado.edu/en/simulation/legacy/density>



Set the "Blocks" to Custom and the "Materials" to the one indicated in the data sheet below.

When you enter the mass, it will automatically calculate the volume based on the density. When you enter the volume, it will automatically calculate the mass based on the density. To change the mass or volume you can use the slide or enter a number. As you make changes you will see the block sink lower or float up higher in the water.



Trial 1 - Wood - The tank has a volume of 100 L when no blocks is in the tank.

Mass (kg)	Volume (L)	Density = $\frac{mass}{volume}$	Tank Level (L)	Change in Tank Level from previous trial	About what percent of the block is above the water?
4					
6					
2					
	8				
	2.5				

Can you describe a pattern for how the change in mass affects the change in volume?

Can you describe a pattern for how the change in mass affects the amount of water displaced (change in tank level)?

Can you describe a pattern for how the change in volume affects the amount of water displaced (change in tank level)?

Name _____

Period _____

Now change the material and one of the other properties and record your results.

Trial 2 - Different Materials - Water has a density of 1 Kg/

Material	Density (kg/L)	Mass (kg)	Volume (L)	Tank Level (L)	Did the block sink, float or stay suspended in mid-tank?
Styrofoam		1			
Wood		1			
Ice		1			
Brick		1			
Aluminum		1			
Styrofoam			10		
Wood			10		
Ice			10		
Brick			10		
Aluminum			10		
Ice			3.25		
Brick			3.0		
Styrofoam		3			

Name _____

Period _____

Which of the five blocks with the same 1 kg mass had the same tank level? How did their density compare the blocks with a different tank level?

Which of the five blocks with the same 10 L volume had the same tank level? How did their density compare the blocks with a different tank level?

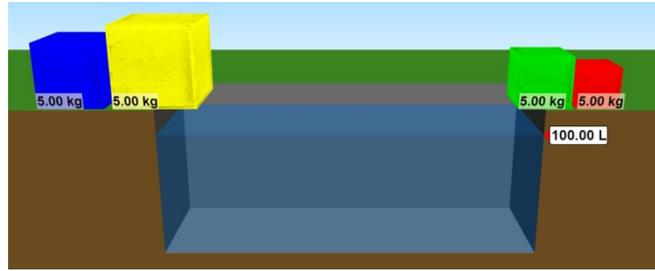
What is the pattern for the change in tank level for blocks with a density less than 1? Write a mathematical expression that will let you predict the change in tank level for any block whose density less than 1?

What is the pattern for the change in tank level for blocks with a density greater than 1? Write a mathematical expression that will let you predict the change in tank level for any block whose density greater than 1?

Name _____

Period _____

Now set the simulation to ""My Block" in the first box. Change the second "Blocks" to the name after the Trial for the next 4 activities.



You should see different colored blocks appear. *Place one block in the water at a time. Remove a block before you test the next one.*

Trial 3 - Same Mass

What is the tank level when there are no blocks in the tank? _____ L

Block Color	Mass (kg)	Tank Level (L)	Did it sink or float?	Is the density greater than, less than or equal to 1?
Blue				
Yellow				
Green				
Red				

How did you determine if the density was greater than, less than or equal to 1?

What happens if you stack the blue on top of the yellow?

Trial 4 - Same Volume

Block Color	Mass (kg)	Tank Level (L)	Did it sink or float?	Is the density greater than, less than or equal to 1?
Blue				
Yellow				
Green				
Red				

Name _____

Period _____

Trial 5 - Same Density

Block Color	Mass (kg)	Tank Level (L)	Did it sink or float?	Is the density greater than or less than 1?
Blue				
Yellow				
Green				
Red				

Trial 6 - Mystery

Block Color	Mass (kg)	Tank Level (L)	Did it sink or float?	Is the density greater than or less than 1?
A				
B				
C				
D				
F				

Can you rank the mystery objects from least density to greatest density?

Least Dense				Most Dense
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How did you decide on the order?