**Answer Key: Under the Sea: A Density Aquarium!**

**Background**
In this activity, you will create a density aquarium using various liquids and objects. You will then use evidence from your density aquarium to compare and contrast the densities of the various liquids and objects.

**Prelab Questions**
1. What is density?
   
   The amount of mass a substance has compared to its volume. 
   
   Density = mass/volume
   
   An object with high mass in a small volume has high density, ex: rock, and an object that have low mass in a large volume has low density, ex: balloon.

2. How can you tell that an object or liquid is less dense than another object or liquid?
3. How can you tell that an object or liquid is denser than another object or liquid?
   
   If the objects have the same volume, the object with more mass will have a higher density. If the objects have the same mass, the object with a smaller volume will have a higher density.  
   
   *Use the formula: Density = mass/volume

**Objective**
You will create a density aquarium and write evidence based claims that compare and contrast the densities of objects and liquids.

**Materials**
- 1 clear, medium-sized, plastic container
- Aquarium rocks of various sizes
- Plastic sea animal toys
- Water
- Vegetable Oil
- Blue food coloring

**Safety**
- Always wear safety goggles when handling chemicals in the lab.
- Wash your hands thoroughly before leaving the lab.
- Follow the teacher’s instructions for cleanup of materials and disposal of chemicals.

**Procedure**
1. Answer the pre-lab questions independently.
2. Review the materials needed to ensure you have all supplies.
3. Make your aquarium:
   a. Fill the bottom of your aquarium (the plastic container) with the aquarium rocks provided by your teacher.
b. Fill the aquarium 2/3 of the way with water.  

c. Add 4 drops of blue food coloring to the aquarium. Mix with your Popsicle stick/stirrer.  

d. Slowly pour the beaker of vegetable oil into the aquarium.  

e. Slowly drop in the plastic sea animals or any other objects provided by your teacher.  

4. Observe the various liquids and objects in your aquarium. Draw a detailed observation diagram (in color!) in the space below. Label all components.  

5. Answer the analysis questions in complete sentences.  

Observation Diagram  
*Remember, science diagrams are detailed, with colors and labels!*  

Answers/Diagrams will vary.  

Analysis  

1. What liquid is the least dense in your density aquarium? What evidence can you use to support your claim?  

   Oil is the least dense because it will sit on top of the water. If it was more dense than the water it would sink to the bottom of the aquarium.  

2. What object is the densest in your density aquarium? What evidence can you use to support your claim?  

   Rocks are the most dense object. They are resting on the bottom of the aquarium.  

3. Use the following sentence frame to compare/contrast the densities of two liquids or objects: example  

   ___a plastic fish______ is more/less (circle one) dense than __water______. My evidence to support this claim is that the fish is floating at the top of the water, indicating it has less density. If it were denser than the water it would sink to the bottom of the aquarium.  

4. Using the frame from question 3, write another density claim, using different objects/liquids. What evidence can you use to support this claim?  

   Food coloring and water have a very similar density value. I know this because the food coloring has mixed throughout the water, and it is not concentrated on the top of the aquarium or on the bottom.
Real World Application:
Unfortunately at times there are oil spills into the ocean from ships or from locations where oil is being drilled. This can cause a lot of serious damage to the ocean ecosystem. Based on what you learned about the density of oil and water, how can this information help to more easily clean up an ocean if there is an oil spill?

Answers will vary.