Educational Innovations, Inc.

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Surprising Science for Kids:

SINK OR FLOAT?

KIT-510

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Table of Contents

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Welcome to Surprising Science for Kids: Sink or Float?

Your ***Surprising Science for Kids: Sink or Float?*** kit includes just about everything you need to perform hands-on experiments and dynamic demonstrations related to density.

We believe the best way to learn about science is to have fun! The activities in this guide will ignite young students' curiosity and make them eager to explore on their own.

Included in this kit:

- 1 Ping Pong Ball
- 1 Rock
- Pumice Sample
- Ironwood Sample
- 2 Squares of Aluminum Foil
- 1 Diving Submarine
- 1 Lava Lamp Kit
- 1 Jellyfish Diver
- 1 Yen Coin
- 1 Paper Clip
- 1 Pipet
- 1 Liter Bottle

You will also need:

- Water
- Bowl or Cup
- Baking Powder

Extension Activity:

- Two Small, Clear Jars
- Dark Corn Syrup
- Vegetable Oil
- Three Tablespoons

About Density

Why do some things sink while others float?

From an early age, the common ground of experience with sinking or floating takes place in the bathtub or kitchen sink. Starting with a rubber ducky (designed to float), we experiment with items that sink and float when placed in water. These experiments and studies continue through to the university level.

The key words listed on the next page will help your students differentiate between the many commonly used (at times inaccurately) words scientists use when predicting if an object will sink or float. While conducting the experiments in this kit, students will be challenged to determine and explain why an item will sink or float in water.

Liquids—in our experiments, specifically, water—exert an upward force on anything that is put or pushed into it. You may have felt this force if you've ever tried to push a beach ball under water in the ocean, or attempting to submerge an inflated raft in a pool.

People are able to float in water with some practice, and can also swim deep below the surface. However, consider the Dead Sea, a salt lake in Western Asia: our bodies' natural **buoyancy** allows us to float with ease because of the salt concentration in the water.

It's important to remember the density of the object, and the liquid in which it is being tested when we consider whether an object will sink or float.

Activity 2:
Pumice vs. Iron Wood

Materials:

- Bowl
- Water
- Pumice (provided)
- Iron Wood (provided)

Directions:

Take notice of the two materials, observing similarities and differences. The pumice is a rock created by a volcano, while the wood has been collected from a very special tree. Using background knowledge and information given about each item, predict what will happen when you place each item into the water. Record your predictions below.

Pumice Prediction	Pumice Observations	Iron Wood Prediction	Iron Wood Observations

Place both objects into the bowl of water and observe what happens. Were your predictions correct?

Activity 2:
Pumice vs. Iron Wood

continued

Explanation of density using a suitcase example:

Imagine that you're packing for a vacation. Your only option is a hard shell suitcase, which ensures everything in your bag will be safe and undamaged on your trip.

If you're going on vacation on a tropical island during the summer, what type of clothing would you expect to pack? Shorts, t-shirts, bathing suits, flip flops… maybe a cover up for the beach.

Imagine packing these items in your suitcase. There would probably be plenty of extra space in the suitcase for other items because nothing is packed in very tightly. We would consider this suitcase to have a low level of density because of how loosely packed the items inside are.

Now, consider you're going on vacation to a ski resort in the winter. What type of clothing would you need to pack in the same suitcase? You would likely choose sweatshirts, thermal pants, boots, heavy socks, hats, gloves, long sleeve shirts… maybe a heavy jacket.

Now visualize packing all these items in that same suitcase. You might have to sit on top of the suitcase to squeeze it all in to close up! There would be no extra space in the suitcase for anything more, as it is packed quite tightly with all the items you need to take with you. We would consider this suitcase to have a high level of density because of how tightly packed the clothes are in the suitcase.

Information about Pumice and Iron Wood:

Pumice is a lightweight igneous (ig • nee • us) rock, formed when lava cools quickly above Earth's surface and traps gasses before the molten liquid solidifies. Because of this, the rock is not very dense and floats in the water. There are gas pockets inside the rock, making the "rock" less dense.

Iron Wood is a very rare wood that grows in the Caribbean and on the coast of South America. It is called *Lignum vitae* and is a type of Iron Wood, or wood that has a density greater than water.

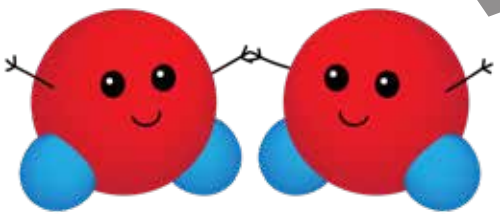
Activity 7:
Floating Yen Coin

Materials:

- Cup or Bowl
- Water
- Paper Clip (provided)
- Yen Coin (provided)
- Pipet (provided)

Background Information:

As you know from Activity 3, aluminum can float on the surface of water. This coin is a real Japanese Yen, which is made from aluminum. This is something unique, as the coins we have as part of U.S. currency all sink immediately due to their density in comparison to water.



Something special about water molecules is how they bond with one another. You may have watched raindrops bead down a window. Have you ever seen one raindrop join and link to another, making a larger drop? If you've ever filled a glass of water to the top and what seems to be over the top, you may have noticed that it has a curved, convex shape. The reason the water doesn't spill over is something called **surface tension**. The water molecules hold on to one another until they're stretched as far as they can go, even over the edge of the glass.

Directions:

Fill a cup or bowl with water. Unfold the paper clip so it looks like an uppercase "L." Place the Yen so it sits flat on one end while you hold the other end of the clip. Use the paper clip to gently lower the coin into the water. Observe the coin float on the surface of the water.

Despite the fact that the Yen is denser than water, it is light enough, that because of the surface tension of water, this coin will float. Challenge yourself to force the coin to sink. Consider adding weight to the Yen (by adding water droplets using the pipet to the coin) or adding a drop of liquid dishwashing soap to break the surface tension of the water.

Another great activity is to place the Yen on a flat surface. Predict the number of drops of water that will fit onto the coin. Using the pipet (dropper), add drops one at a time until the water spills over the side of the coin. You may be surprised at how many drops the coin will hold!

Extension Activity
Liquid Layers

Materials:

- Two (or more) small, clear jars
- Dark corn syrup
- Vegetable oil
- Water tinted with your choice of food coloring (blue, red or green work best)
- Three clean tablespoons
- OPTIONAL: Dishwashing soap, rubbing alcohol, other liquids

Background Information:

You've already learned that solid objects can sink or float when placed in a liquid, depending upon their density. But did you know that liquids do the same thing when they're placed into other liquids?

Just like solids, liquids have different densities. For example, tap water has a different density than seawater. Any compound that has a higher density than water will sink, while substances with a lower density than water will float.

You can even stack different layers of liquids! How? You can pick several different liquids with a range of densities, or you can add different substances to one liquid—such as dissolved sugar or salt—to alter its density. Adding food coloring to each layer makes a colorful density column.