Floating Yen Coins

YEN-110

Demonstrate surface tension, buoyancy, and even eddy currents with these amazing coins!

Classroom Demonstration Suggestions

Surface Tension 1:

The yen coins are made of aluminum, which can float on the surface of the water, even though aluminum has a density of 2.7 gm/cm^3, and the density of water is 1 g/cm^3.

Using a paper clip bent in an "L" shape or a plastic fork, gently lower the flat side of the coin onto the surface of a pan of water. When you remove the clip or fork, the coin will float on the water's surface.

Plastic cups, glass bowls or baking dishes with clear sides will make it easy to see the effects of surface tension. The coin will actually slightly depress the surface of the water and can easily be viewed through the side of the dish or bowl.

Adding more than one coin to the container will result in a cluster of coins forming. Since each coin depresses the surface of the water, they will tend to slowly float together and form a regular, crystalline structure. (Imagine bowling balls on a stretched bed sheet—they will slowly roll towards each other to form the most stable structure.)

Adding a few drops of soap, such as dish detergent, will break up the surface tension of the water and cause the coins to sink.

Watch our demo video:

Our YouTube channel includes a video showing some of the ways Floating Yen Coins can be used:

www.youtube.com/watch?v=kJlRnCed0bY

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Classroom Demonstration Suggestions

continued

Surface Tension 2:

Another great surface tension experiment you can conduct with your students is to have them initially predict the number of drops of water they can fit on the face of the yen. Then, using a pipet, have students drop water, one drop at a time, onto the face of the coin. They will be amazed at how many drops this small coin will hold.

This activity is perfect for discussing how variables can change the results of an experiment as a result of the experimenter's manipulation (independent variables).

Students can brainstorm reasons that some coins held more drops of water than another. Examples include the side of the coin that is used, how worn the coin is, and how high above the coin the water is dropped from the pipet. Controlling as many of these variables as possible will give the most accurate results.

Buoyancy vs. Surface Tension:

A charged rod will have different effects on floating objects, depending upon whether the object is floating due to surface tension or buoyancy (displaced water). A buoyant object will be attracted to a charged rod, while an object resting on the surface of the water will be repelled. Try charging a rod or piece of PVC pipe and bring it near to a floating aluminum coin—the coin will be repelled. To demonstrate a buoyant object being attracted to a charged rod, make a small boat out of aluminum foil and float it in the same pan as the coins. This boat will be attracted to a charged rod.

Eddy Currents:

For this demonstration, you will need a strong magnet, such as one of Educational Innovations' neodymium magnets. First, demonstrate that the yen coin is not magnetic, by trying to pick it up or stick it to the magnet. Next, set the coin on a flat surface, so that it balances upright on its edge. Very quickly move the magnet back and forth over the top of the coin without touching it. The rapid movement of the magnet will induce an eddy current, which creates a temporary magnetic field in the coin. The magnetic field in the coin is attracted to the moving magnet above, causing the coin to move.

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Please visit our website for more lesson ideas:
www.TeacherSource.com/Lessons

Check our blog for classroom-tested teaching plans on dozens of topics:
http://blog.TeacherSource.com

To extend your lesson, consider these Educational Innovations products:

Steel Sphere Density Kit (DEN-350)

Great for teaching the skills of observation and deduction! Although these two shiny, metal spheres have about the same mass, one has a diameter significantly smaller than the other, making their densities vastly different. Seeing the large one float in water seems unbelievable!

Giant Pumice (RM-300)

This is the largest volcanic pumice sample we have ever seen... and it still floats! This stuff makes a great density demonstration—one your students will remember for a long time. Because these are a naturally-occurring item, sample size and shape are dependent on availability and will vary. Use with our **Super Dense Wood Samples** for a fun and thought provoking lesson: the rock that floats with the wood that sinks!

Super Dense Wood (FE-12)

This very rare wood grows in South America. With a density higher than that of water, this unusual wood sinks in water and makes a great density lesson. May contain ironwood, Lignum Vitae, or other super dense woods.

Graduated Transfer Pipets #222 (PP-222A)

At 25 drops per milliliter (40 microliters per drop), these pipets are perfect for approximate measurements up to 1 ml at 0.25 ml graduations. We have found that this size pipet is just right for making super Cartesian Divers! Simply trim off the end and add one of our ballast nuts (Item CD-3). They can also be heat-sealed to form a liquid tight storage vessel. These pipets are so useful, it's always good to have a few around.