FAMILY FUN

Wednesday, May 13, 2020

WATER YOU DOING?

Why do tin foil boats float?

Source: https://www.sciencebuddies.org/stem-activities/aluminum-foil-boats-float

Your **foil** ball, crumpled into a tight clump, has more density because its pennies are crowded into a smaller space than those in the **foil boat**. The **foil boat** has less density because it is spread out and filled with air. Things **float** when they have less density than water, but sink when they have more.

Have you ever wondered how a ship made of steel can float? If you drop a steel bolt in a bucket of water, the bolt quickly sinks to the bottom. Then how can a steel ship float? And better yet, how can a steel ship carry a heavy load without sinking? It has to do with the density, or the mass per volume, of the ship (and its cargo) compared to the density of water. In this science activity, you will make little "boats" out of aluminum foil to explore how their size affects how much weight they carry and how this relates to the density of water.
Credits - Teisha Rowland, PhD, Science Buddies

How Much Weight Can Aluminum Foil Boats Float?

ITEMS NEEDED

- Aluminum foil
- Ruler
- Tape
- Scrap piece of paper and pen or pencil
- Rag or paper towels
- Pennies. You may need as many as 200 pennies, depending on the size and shape of the boats you make.
- Bucket, tub, sink, or dishpan
- Water

Procedure

1. Cut two squares of aluminum foil, making one square have dimensions that are twice that of the other square. For example, you could make one square be 12 inches by 12 inches (or 30 centimeters [cm] by 30 and make the second square be 6 inches by 6 inches (or 15 cm by 15 cm).

2. Fold the two aluminum foil squares into two different boat hulls. Try to make them the same shape. For example, you could make them both have two pointed ends (like canoes) or you could make them square or rectangular (i.e., rectangular prisms).
3. Make finishing touches to the boat hulls. Make sure they do not have any leaks. If needed, use a little tape to make them stronger. Flatten the bottoms of the hulls. On each, try to make sure the rim is the same height going all around the edge of the hull.
4. Fill the bucket, tub, sink, or dishpan with some water.

5. Take one of the boat hulls and carefully float it in the container of water.
6. Gently add one penny at a time. To prevent the hull from tipping, carefully balance the load.
7. Add pennies (left to right, front to back
8. Keep adding pennies until the hull finally sinks.
9. Carefully take out the sunken hull and place it and the pennies on a rag or paper towels. Dump any excess water back into the container.
10. Count how many pennies the hull could support before sinking (i.e., the penny that sank the hull does not count).

11. Repeat this process with the other hull. Be sure to only add dry pennies. Why do you think using dry pennies (instead of wet ones) is important?

What Happened?

When you first put one of the boat hulls on the water, it should have floated because its total density (or mass per unit of volume) was less than the density of water. As you added pennies to the hull, its density increased and the hull floated lower. Eventually, when enough pennies were added, the hull's density roughly equaled the density of water. This happens right before the penny is added that sinks the hull. The hull sinks because its density has finally become greater than the density of water.)

Explore Some More:

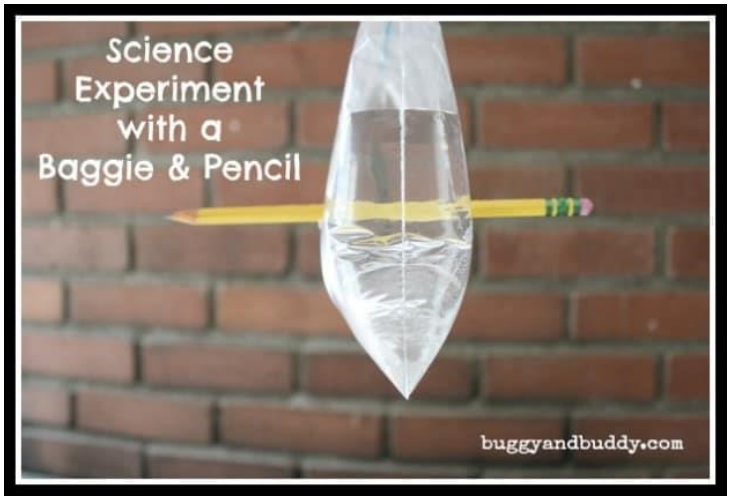
Go to the source listed for this activity and follow instructions to measure the volume of each hull and the weight of the pennies.

Science for Kids: Baggie and Pencil Magic

Source: https://buggyandbuddy.com/science-activities-for-kids-baggie-and-pencil-magic-science-invitation-saturday/

ITEMS NEEDED

- plastic baggie
- sharp pencil
- water



Procedure

1. Fill a baggie about 3/4 of the way full with water and seal it shut.
2. Make sure your pencil is sharpened. (The sharper the better!)
3. Hold up the baggie with one hand and use the other hand to firmly push the pointy end of the pencil through the side of the bag. Continue pushing it until the point is also coming out the other side of the bag.
4. Observe what happens!

Question to Spark More Curiosity & Critical Thinking

Is this what you expected to happen? Why or why not? What do you think will happen when the pencil is pulled out of the baggie?

What's Going On?

No water spills out the holes because ziploc bags are made of a polymer. Polymers have long chains of molecules that are flexible. When you poke a sharp pencil through the baggie, the pencil slides in between the chain of molecules that make up the polymer. The molecule chains make a seal around the pencil that won't let the water out.

Want to go even further?

Even more activities to inspire creativity and critical thinking for various ages:

- Can you put more than one pencil through your baggie at a time?
- Try this experiment with other materials.

Bending a Pencil Science: A Lesson in Light Refraction

Source: https://raisinglifelonglearners.com/bending-pencil-science/

Light is a fascinating subject. Many scientists spend their entire career studying light and how it works. Light refraction is a complicated scientific concept, but the **bending a pencil science** activity makes it a little easier for kids to understand this concept.

This simple science activity is something you can do when you're in a time crunch but still want to get that science lesson in. Learning about light refraction can take weeks, but this activity is the perfect place to start.

Learn about light refraction with just two simple materials! It's so easy, but illustrates a basic, important scientific principle.

ITEMS NEEDED

- Mason jar or other glass cup
- Pencil (bonus points for a fun one!)

Procedure

1. Fill the jar half-way with water. If you fill it too much, the bend is not as apparent. In fact, you can play around with different levels of water to see how that influences the light refraction.

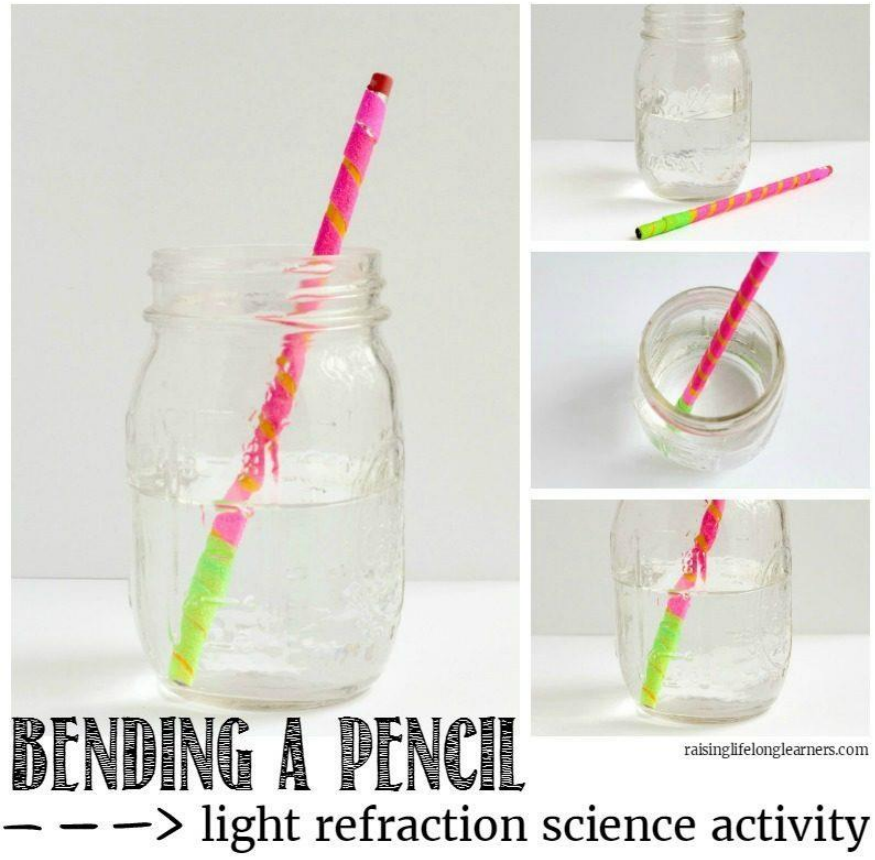
2. Put the pencil in the water. Look at it from the top. It's straight all the way down.

3. Look at it from the side. It's suddenly crooked!

Bending a Pencil Science Explained

Light refraction occurs when something gets in the way of the light waves. Light, like most other materials, travels mainly in waves (although it can also have particles, which is a whole other lesson!). Because the light can't travel as quickly in the water as it does in the air, the light bends around the pencil, causing it to look bent in the water. Basically, the light refraction gives the pencil a slight magnifying effect, which makes the angle appear bigger than it actually is, causing the pencil to look crooked.

You can illustrate this principle by having your kids run their hands through the air. It's easy. But when you try to run your flat hand through water, it's a little harder. Light also has to work a little harder to get through water.



What other light activities can you try with your kids after doing this one? Share your ideas with us on our post!