



# Whatever Floats Your Boat

## The Big Idea:

We bet your stuffed animals would love a boat ride on a hot day. But how do you make sure their boat will float? Use a quick homemade scale and some foil to float your friends!

## You Will Need:

- ★ 2-3 small friends: small stuffed animals, dolls, or other toys
- ★ 1 clothes hanger
- ★ String, cord, or thread: about 4 feet total
- ★ 2 identical plastic or paper cups
- ★ Aluminum foil
- ★ A bathtub filled with water, or better yet a kiddie pool!
- ★ Coins and/or rocks as weights
- ★ Optional: If you have 6 quarters and 15 dimes, you can do a cool bonus trick!

## The Math Behind the Scenes:

When something floats on the water, it sinks just enough so the water it "displaces," or pushes out of its way with the part underwater, weighs the same as its *whole* weight. Same with a boat: it will sink until the water it displaces weighs the same as the whole boat and the stuff inside. So to float your furry friends, you balance the toy with weights like coins or rocks until you equal the weight. Then you make a foil boat and test it with your weights first. That way you don't let your friends get wet!

## Weigh Your Friends

To float your stuffed animal, we'll need to test our boat with other stuff that can get wet. If you have a scale, you can weigh your furry friend, then weigh rocks or coins to create a matching pile to test. But if you don't have a scale, have no fear: you can make a balance!

1. Measure 2 1-foot pieces of string or cord, and tie each one to one end of the hanger.



2. Tie the other end of each cord to a container. You can prick a hole in each plastic cup, or prick 2 holes and run another piece of string through them to make a "handle" like these buckets. Do the same thing to both containers.
3. Hang the hanger and check that it is level when the containers are empty.
4. Place your toy in/on one container, and place rocks or coins in it until the hanger hangs level again. Now you have equal weights!

**Bonus:** Empty both cups and try this trick to discover a cool fact!

1. Place 15 dimes in one cup. Then add quarters to the other cup.
2. When they balance, check out the number of quarters. (You should get 6. For more precision you can try this with 30 dimes, which will match 12 quarters).
3. What value do those 6 quarters have, knowing that each is worth 25 cents? And what value do the 15 dimes have, with each worth 10 cents? That's right: each pile is worth \$1.50! Equal weights of dimes and quarters have equal monetary value.

## Now It's Time to Make Your Boat!

1. Tear off a sheet of foil that's bigger than your sailor.
2. Fold the edges up, then fold down in half to make strong sides.
3. Fill a tub or kiddie pool with water, and place your boat on the surface. Add weights to see if the boat floats. Fix as needed.
4. Once you can add all the weights without sinking the boat, your boat can hold your stuffed animal!



# Boat Brain Teasers

Try as many questions as you can! Answers upside-down below.

**PreK:** Line up your weights in order of size, from smallest to biggest. Are any of them the exact same size?

**Kindergarteners:** How many weights matched your sailor friend? Count them one by one!

**1<sup>st</sup>- graders:** If you had to add 1 more weight, how many would that have been? What if you had had to take 1 weight away?

**2<sup>nd</sup>-graders:** If you had needed twice as many weights to match your sailor friend, how many would you have used?

**3<sup>rd</sup>-graders:** A cup of water, which takes up 8 ounces of space (its “volume”), also weighs 8 ounces. If your boat displaced 1 1/2 cups of water, how much water weight is that? That’s the weight of your boat!

**4<sup>th</sup>-graders:** A pile of dimes and a pile of quarters of the same weight also have equal value! How many quarters match 20 dimes in weight?

**5<sup>th</sup>-graders:** If you have a pile of quarters, and a pile of dimes of the same value, and there are 18 more dimes than quarters, how many of each coin do you have?

**Answers:**  
**PreK:** Different for everyone...line them up by size!  
**K:** Again, different for everyone. Count up your weights: 1, 2, 3, etc.  
**1<sup>st</sup>:** Again, different for everyone. Add or subtract 1 from your total.  
**2<sup>nd</sup>:** Again, different for everyone. Double your number of weights.  
**3<sup>rd</sup>:** 12 ounces, since it's 8 ounces + 1/2 cup which is 4 ounces.  
**4<sup>th</sup>:** 8 quarters. 20 dimes = \$2.00, and there are 4 quarters in each dollar.  
**5<sup>th</sup>:** 30 dimes and 12 quarters. Since 4 quarters (\$1) equals 10 dimes, you always have 2/5 as many quarters as dimes. So the gap between the numbers is 3/5 of the number of dimes. Here, that gap is 18. If 18 is 3/5 of the dime count, then 6 is 1/5 of the dime count. That gives you 5 x 6 = 30 dimes. That's \$3.00, and with 4 quarters in each dollar, 3 x 4 = 12.