



## Test Your Boat Building Skills

Build a boat out of aluminum foil and see how many marbles your boat can hold. Then reshape your boat to see if you can get it to hold more marbles than your first try! Remember to be gentle with your foil and dry it off between trials.

### Materials Needed

Metric ruler

Scissors

2 pieces of aluminum foil (16 cm x 13.5 cm)

Big bowl of water

30 to 40 marbles

Towel

Data Collection Sheet for Aluminum Foil Boats

Pencil

### Procedure

1. Shape the aluminum foil into a shape that floats
2. Test your design in the bowl of water to make sure it floats. Does it lean to one side or not float well? If the answer of either of these questions is YES- reshape your foil into another shape that will float.
3. Draw a picture of your boat in the data collection sheet.
4. Once you have a shape that is floating, place marbles in it one at a time until it sinks.
5. Record the number of marbles your boat held before it sank. For example if your boat sank when the 12<sup>th</sup> marble was added, then your boat can hold 11 marbles.
6. Now try to beat your own record by reshaping your boat. Flatten the aluminum foil and dry it. Reshape your boat. What change are you going to make to the shape of your boat? Note your changes in the Data Collection Sheet.
7. Repeat steps 2 through 4.
  
8. Now try the entire procedure again with an new piece of foil. Take The second piece of aluminum foil. Repeat steps 1-7! It might take three or four different shaped boats to beat your first record or you might see the amount of marbles go up each time!



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## Data Collection Sheet for Aluminum Foil Boats

Table 1: Number of Marbles Held per Boat

Boat	Number of Marbles Held	Boat Building Notes
First Boat		Draw a picture of your first boat?
First Boat Re-shaped		What changes did you make to your boat?
Second Boat (Made from second piece of foil)		Draw a picture of your second boat?
Second Boat Re-shaped		What changes did your make to your second boat?

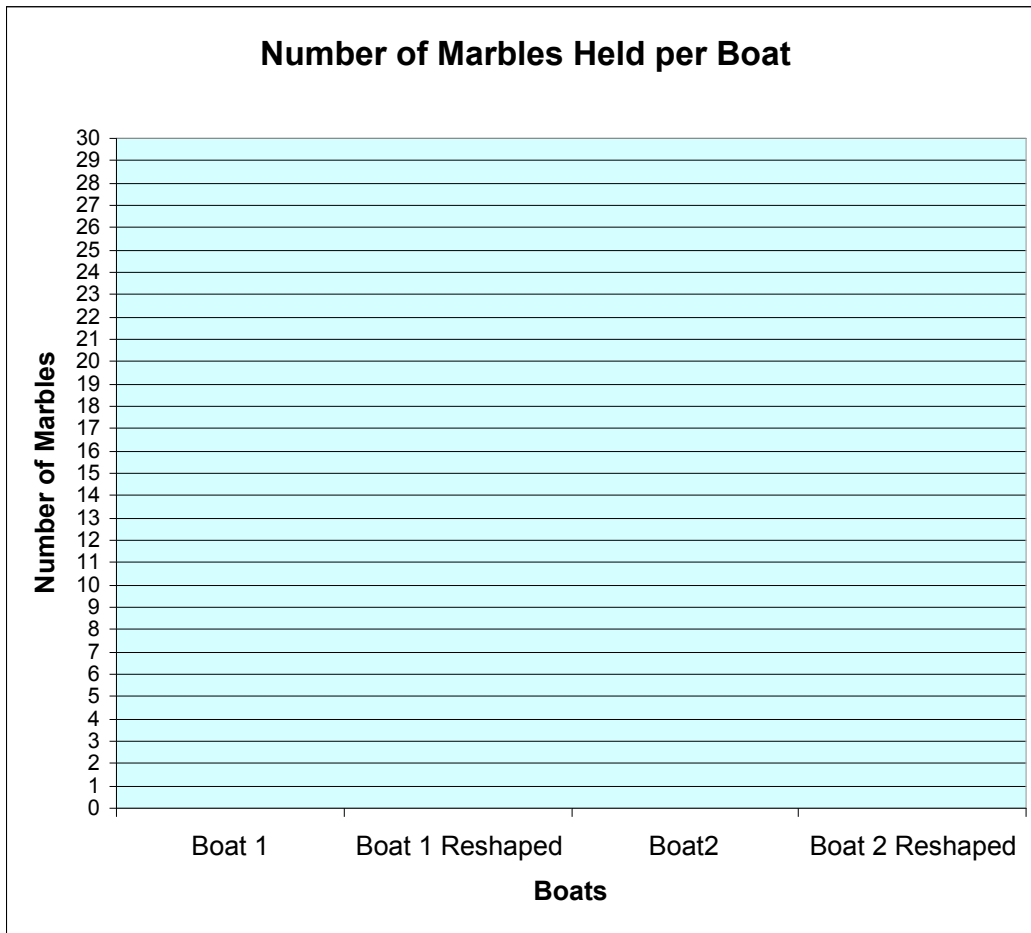


## Conclusion

1. Which of your boats held the most marbles?
2. Why do you think this boat held the most marbles?
3. Did your boat building skills improve as you continued to build boats? When we did this experiment on the show, only two of the four boat builders saw their re-shaped boats hold more marbles. We did not have time to do a second boat with a new piece of foil but I am sure they would have surpassed their own records with a few more tries.
4. If your pieces of foil were slightly different sizes, would this make a difference? Test this idea by using a piece of foil that is 16 cm x 14 cm and by making a boat that looks just like one of your other boats. Could this boat hold more marbles?
5. The foil was re-shaped to make another boat in Step #6. What if you forgot to dry your foil off with the towel? Would the extra water weight make a difference as to the number of marbles your boat could hold? Again test this idea by taking your last boat out of the water, flatten it but don't dry it. Try once again to make a similar looking boat.



**Challenge:** Can you make a graph of your data? Scientists use graphs to compare numbers. Use the following format to show how many marbles each boat held. Make a line above each boat to show the number of marbles that it held. Then color the area below each line to show the number of marbles held by each boat. If you boat held more than 30 marbles, you will have to extend the graph!



This is what some of the data looked liked from our show for two of the boat builders:

