Why Cargo Ships Can Float

Supplies
Modeling Clay
"Ship" Mold
Marbles ("cargo") in different shapes and sizes
Bucket of water or a beaker
Ruler

Question: Why do big heavy objects like ships float, but small heavy objects sink?

Experiment:

1) Fill the bucket full of water up until about the bottom of the handle.

2) Mold the clay into a ball.

3) What do you think will happen if you drop the marbles and the clay ball into the water?

4) Drop the marbles into the water. Now drop the clay ball into the water.
   a. What happens?

   b. Is there any water displacement? (Measure using the ruler.)

   c. Why do you think this happens?

5) Take the marbles and clay out of the water.

6) Shape the ball of clay into a "ship" using the mold.

7) What do you think will happen when you put the ship back into the water?

8) Put the clay that you shaped into a ship back in the water.

   a. What happens?

   b. Why do you think this happens?

   c. Is there any water displacement? (Measure using the ruler.)

9) Add a "cargo" of marbles onto the ship.
   a. What do you think will happen?

b. What happens?

c. Why do you think this happens?

i. Did the water displace when you added cargo?

ii. How much? (Measure with the ruler).

iii. Did the water displacement change when you added more cargo? How much?

10) How many marbles do you think that the ship can hold without sinking or tipping over?

11) Who can design a ship that can hold the most marbles without it sinking?

Conclusion: From this experiment, what can you conclude about why big heavy ships float but small heavy objects sink?