Buoyancy and You

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Boatbuilding

Mr. Kenyon

Aims and Objectives:

Purpose: To build a boat out of spaghetti uses 30 strands of spaghetti and glue to hold as much mass as possible using Archimedes Principle, teamwork, and picking groups.

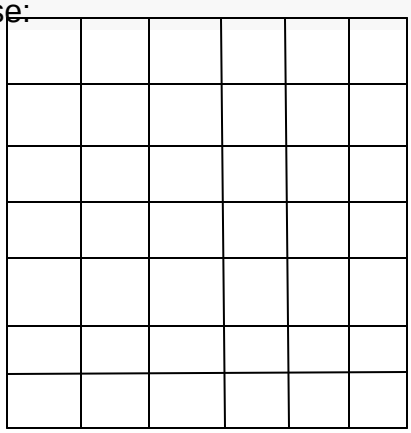
Hypothesis: If the object has a large base, then it will hold a large amount of weight because there is more surface area and therefore more water to displace in an object.

Previous Research and Initial Observations:

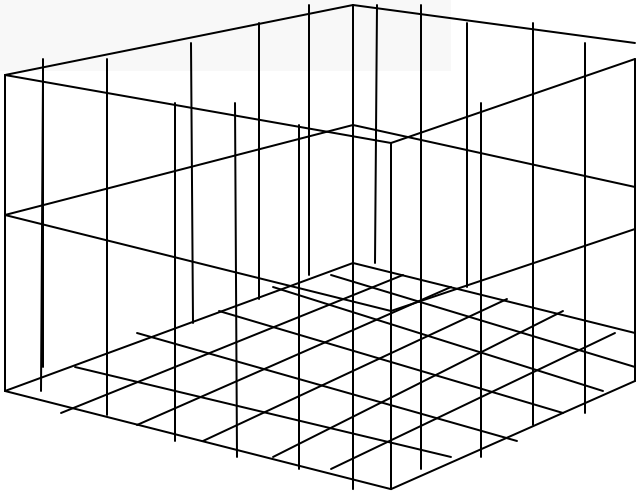
The science and art of boatbuilding has been at work for thousands of years, in fact it is so old that even the Vikings used them to travel as far east as Constantinople and the Vulgar River in Russia. Still today the science of this is used for transport, trade, and leisure around the world. The question remains how is it done? Asked by many individuals who are curious about how boats float. There are three main factors to consider when an individual is assigned the task of building a boat; these factors are Team work, and selection of individuals for the task presented. Believe it or not, science also comes into play when building even the smallest of boats out of the dumbest materials such as spaghetti! The biggest factor of boatbuilding to be considers especially when building a tanker or battleship is buoyancy. **Buoyancy** is the upward force from water exerted on a mass that keeps things afloat in water. Now why does an object float when distributed into an environment of water? An object floats in water because the force exerted from the buoyant force is equal to the weight of fluid displaced by the body or mass. This was first presented by a famous scientist known as Archimedes established “Archimedes Principle” which states “Any object, wholly or partially immersed in a fluid, is buoyed up by a force equal to the weight of the fluid displaced by the object.” This principle is still used today and has been used for centuries.

Apparatus:

Base:



Side View(3D):



Procedure:

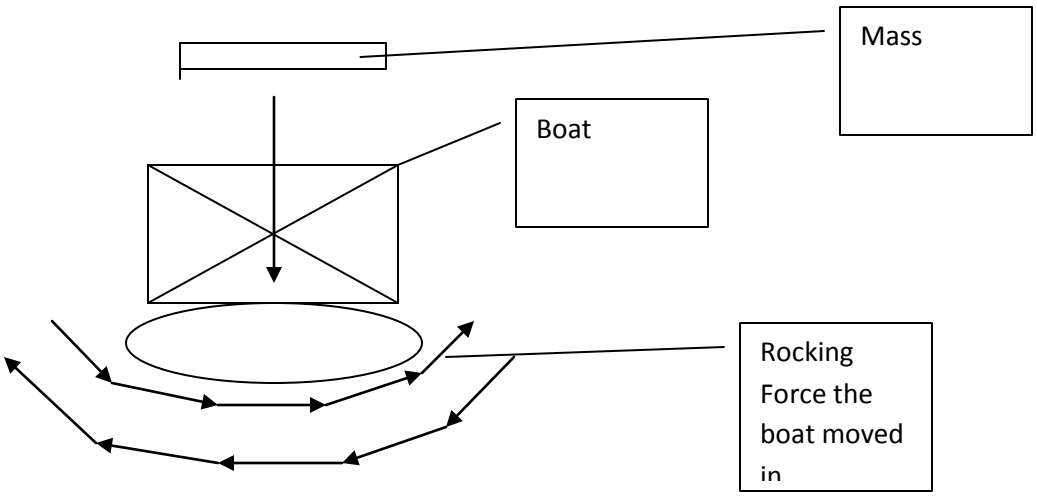
1. Design a boat to test Archimedes Principle
2. Have Design approved by teacher
3. Make a name for your vessel (optional)
4. Assign tasks to each of your group members to build something or solve a problem so that no one is left out
5. After your group has assembled your boat, check for cracks in spaghetti or structural flaws that you could improve on your boat
6. Wrap your boat in saran wrap
7. Place in water, and have teacher put weighted masses into boat
8. Take notes to see how your boat reacted to the masses being dropped in, as this will help and make it easier for future improvement in your vessel.
9. Throw out your boat once it is submerged, and record the masses it held

Readings/Results:

(Quantitative data on attached sheet)

Qualitative data:

1st Trial the boat tipped side to side because the base was too small



2nd Trial Boat leaked

Uncertainties:

(Chart on Attached Sheet)

Conclusion:

While the experiment for the first trial was in progress, I noticed that the object was very sturdy, but it was too small and there was not enough water displaced, therefore it sunk. However the second trial with our new and improved boat held more than twice as much as the first boat we created, unfortunately it leaked because of a small hole in the wrap that kept the water from getting inside the hull. The first boat failed because we did not consider the amount of water displaced, and worried more about how sturdy the boat was. The second however, was everything our boat was not, aside from the fact that it leaked.

Evaluation:

Overall, I think both boats were built well, but the first would have made a much better bridge than the first. One factor that greatly affected our first boat was that it was long and narrow, and did not displace enough water, because of this, the boat wobbled and tipped which eventually lead to its downfall. The second boat featured less structural integrity, but had much more displacement that the previous boat, the boat could have easily held 3000g but somehow the boat had a leak in its hull, and sunk. Our group had no limitation issues when it came to the actual model; we had plenty of glue and a large amount of spaghetti. If our group were to improve, we would make sure our base was not weaved and that our wall was stronger.