

JAMES E. RICHMOND SCIENCE CENTER

ENGINEERING DESIGN A SCIENCE @ HOME ACTIVITY BUOYANCY

CHARLES COUNTY PUBLIC SCHOOLS 5305 Piney Church Road Waldorf, MD 20602 301.934.7464 www.ccboe.com/ScienceCenter

OVERVIEW FOR PARENTS



The Engineering Design Process...

This lesson introduces the process which engineers use when creating, developing, improving, or implementing an idea. The goal is to help students understand this process when coming up with a solution to a problem. In this experiment:

- A problem has been presented with some questions to think about
- Some ideas have been presented in helping them come up with a solution
- Students should take notes as they work through the process
- Length of time for the project will be different for each individual

We would love to see their creativity so please tag us at James E. Richmond Science Center on Facebook and Twitter.

Thanks for visiting! See you soon!





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THE FORCE OF BUOYANCY

Buoyancy is a force that pushes up on objects. Surface area is the amount of area covered by the surface of something. The more surface area an object has for the force to push up on, the more likely the object will float and the more weight it will hold. In addition, the greater surface area also displaces more water.





Find a large container lid like a sour cream or butter lid and a small container lid like a bottle cap. Float both in a bowl of water. Stack pennies on the bottle cap lid and record the number it holds. **Hypothesize** (make an educated guess) about how many pennies the larger lid can hold based on what you have learned about buoyancy.



The Law of Buoyancy was discovered by a Greek mathematician and inventor named Archimedes.

As legend goes, Archimedes was taking a bath one day and noticed when he got in the tub the water overflowed. From this he realized water could be used to detect the volume (the amount of space an object fills, or occupies) of odd shaped objects and detect density (the degree of compactness of a substance) differences.



Archimedes' Principle states that a body totally or partially immersed in a fluid is subject to an upward force equal to the weight of the fluid it displaces.



PROBLEM:

I want to take what I have learned and build a boat.

QUESTIONS

How should I design it? What materials could I use? Where am I going to try and float it? Do I want it to hold weight? What resources can I use to help me?

AREA TO WRITE RESEARCH & IDEAS















Engineering Notebook James E. Richmond SCIENCE CENTER Design: _____ Materials Needed: _____ It is important to note the engineering process is a cycle and can be started *anywhere* in the process/cycle. How To Construct:

Build Your Prototype (prototype is another word for model)

HOW?

Use materials around the house to layout a model or draw a picture

You can use the space below to illustrate your model



Now that you have your prototype it is time to test your final result—TIME TO BUILD!

Engineers are always thinking and taking notes so let's put on our thinking cap:

- Was my surface area large enough or should I change the base?
- What other materials could I use to improve upon design?
- If I wanted my boat to hold more weight what do I need to do?
- If the body of water (tub, river, ocean) was different how would it affect my boat?

NOTES SECTION

Like a challenge? — teach your family about buoyancy and have them participate in a competition to see who can build the best boat.

We at the Science Center would love to see your finished project, notes you have taken in your engineering notebook, and/or get general feedback.

Tag us on Twitter or Facebook at James E. Richmond Science Center

