SWEducational

ACTIVITY PACKET

MATERIALS ENGINEERING EDITION

WHAT IS MATERIALS ENGINEERING?

Materials engineers design and discover new materials for engineering projects! This includes experimenting with materials that can stand up to extreme temperatures or are extremely strong and flexible. Some examples of projects a materials engineer would work on are designing solar panels, computer chips, or even materials that can go to space!

IMPORTANT TERMS

Buoyancy: how well something floats

- Example: A rubber duck in water is buoyant because it floats, but a rock in water is not buoyant because it sinks.
- In this activity you will be able to see how buoyant different materials are.
- Can you name any other buoyant objects? What about some things that aren't very buoyant?

Volume: measurement of how much something can hold

- Example: The volume of water in a swimming pool is much more than the volume of water in a drinking glass.
- You will be looking at how volume affects your boat in this activity.
- Can you guess the volume of water that the bowl in this activity holds? (hint: a water bottle holds 500mL of water)

Mass: how much matter something has

- Example: An airplane is much more massive than a pencil.
- By adding pennies to your boat, you are increasing the mass of your boat.
- Try ranking your materials for this activity from most massive to least massive.

Weight: gravity's pull on an object (the number you see on a scale)

- Example: When you put fruit on a scale in the grocery store, you can see how much it weighs.
- You will be adding pennies to your boat to make it weigh more.
- Can you list any units that are used for weight? Try guessing the weight of some of the materials that you are using for this activity.

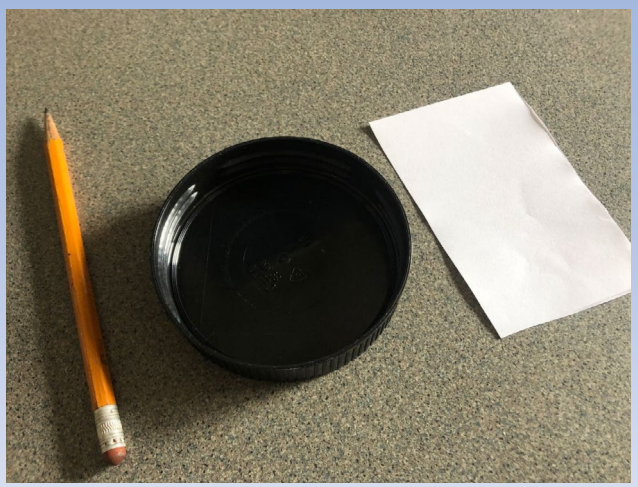
ACTIVITY INSTRUCTIONS

We will be building a boat today using recycled materials! Let's observe how different materials have differing buoyancy, volume, mass, and weight and affect how our boat floats and moves.

SUPPLIES

Before collecting supplies, double check with an adult that your materials are okay to use!

- Plastic jar lid (recycle lids!)
- Paper
- Pencil square
- Hot glue or tape
- Scissors (with help from an adult if needed!)



STEPS

1. Take a pencil and glue or tape it to the bottom of the lid.

2. Use scissors to cut the paper into a small square and carefully poke the paper square through the pencil to make a sail.

3. Now time to test your boat! Place your boat in a bowl, bath, or bucket of water.

4. First watch your boat to see if it sinks. If it floats, try blowing into the sail and see if your boat will move.

5. Now start placing coins in the lid. How many coins can you add until the boat sinks?

6. If you have more lids and pencils, make more boats! Some great materials to try are left-over egg cartons or snack boxes! How do different sized lids or different materials affect the boat?

OTHER LINKS AND VIDEOS

- What is Material Science and Engineering Video: https://www.youtube.com/watch?v=RAOHLGa4psk
- Video on what it is like to be a materials engineer: https://www.youtube.com/watch?v=DtosXFgP7C4
- Career in Materials Science and Engineering Video: https://www.youtube.com/watch?v=vZE_0WtSRGs
- Battle of the Beams - Fun demonstration to watch: https://www.youtube.com/watch?v=YcN3cy5VlAo&t=41s
- How It's Made Video on Solar Panels: https://www.youtube.com/watch?v=qZgWC-Cxd44

CAL POLY ENGINEER SPOTLIGHTS

KRISTIN

The world is full of materials. Materials exist in all forms in our life! Whether it be the ceramic in the mug from your juice this morning, or the tires that got you to school today, or even the grand steel bridges of a large city! Materials are important and the right materials for the right job can make our lives easier. Materials engineering zooms into the smallest atoms interacting with each other, building on each other and forming atomic structures. These structures determine the materials' properties and are what makes diamond strong or silicon conductive. Materials engineers help nearly all other engineering disciplines to elevate their design or characterize an unknown material. Materials make a difference in this world and hopefully, a materials engineer will make a difference in your world.

KRISTEN

I really enjoy Materials Engineering, because I get to learn about all the materials that make up every object that we encounter! It is interesting to learn about how changes at the atomic level of a material can make a huge difference in determining if a material is right for a certain application. There are lots of cool things you can do in materials engineering such as making small electronics all the way to the wings on airplanes. I have also really enjoyed using all of our lab equipment and doing materials characterization and testing.