

# SWEducational

## ACTIVITY PACKET

### MARINE ENGINEERING EDITION

#### WHAT IS MARINE ENGINEERING?

Marine Engineering works with designing, constructing, and maintaining machines that are used in the sea. This type of engineer works on tasks from designing boats to making sure that oil rigs stay in good condition. Thanks to Marine Engineers, we can explore and use resources from the sea.

Do you like prizes? How about showing off your project work? Submit a photo of your **completed Marine Engineering activity** through the link below! You'll see your project featured on the class page, and even be entered into a raffle for the chance to win a **GIFT CARD!**

**PHOTO RAFFLE**

Get your cameras ready and stay tuned... there will be a photo raffle in the next packet!

Gift Cards to...

- Starbucks
- XBOX
- PlayStation
- iTunes
- More!

Submit [Here!](https://forms.gle/AcEXCZkePKxmJqJCJA) Or type the link below:

<https://forms.gle/AcEXCZkePKxmJqJCJA>



## IMPORTANT TERMS

**Marine Vessels:** machines that transport people or objects over water

- Examples of marine vessels include cruise ships, fishing boats, and cargo ships.
- In this activity, you will be building and testing a marine vessel!
- How are marine vessels different from machines that transport people over land? (Hint: Think about the differences between a car and a boat.)

**Propulsion:** the act of moving something forward

- The propeller on a boat motor or the propeller on a helicopter are both propulsion systems that move the vehicles.
- In this activity, you will be creating the propulsion device for a marine vessel to help move it forward.
- What are the propulsion devices for other vehicles? (Such as a car, bike, rocket, sail boat)

**Buoyancy:** the force that pushes up on objects

- You would think that large cargo ships should sink because they are so heavy, but they actually float because of the buoyant force keeping them floating.
- Buoyancy is what allows objects to float and how your marine vessel will float on the surface of the water.
- Think about why some things float and why some things sink. Could buoyancy have anything to do with if an object floats or sinks.

**Potential Energy:** the stored energy an object has because of its position or state

- A ball on the top of a tall hill has more potential energy than a ball on the top of a short hill.
- In this activity, the rubber band will be able to store potential energy because the rubber band can stretch.
- If you twist the rubber band more or stretch the rubber band longer will the potential energy increase or decrease?



# ACTIVITY INSTRUCTIONS

## SUPPLIES

- A few rubber bands
- A small plastic bottle
- A short popsicle stick or a small piece of cardboard
- Scissors (if using a small piece of cardboard)
- Hot glue gun/Strong Glue/Tape. You may need help from an adult in using hot or strong glue
- Two long pencils/Strong Skewers

## STEPS

1. First, take your plastic bottle, apply a line of glue to the bottom half and stick one of your pencils so that about half of the pencil is stuck to the plastic bottle, and the other half stick out from below it. Now, apply another line of glue to the other side of the bottle and stick your pencil to it. This pencil should also stick out from the bottom of the bottle, and should be at about the same distance as the other pencil. Alternatively, you can securely tape your pencils to opposite sides of the bottom half of your bottle.

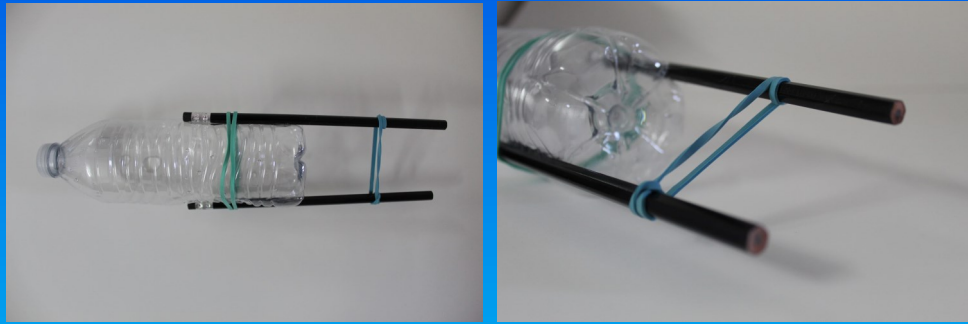


2. Next, take a rubber band and wrap it around the pencils and bottle, at the middle of the part where the pencils are attached to the bottle. You can use another rubber band to increase stability.





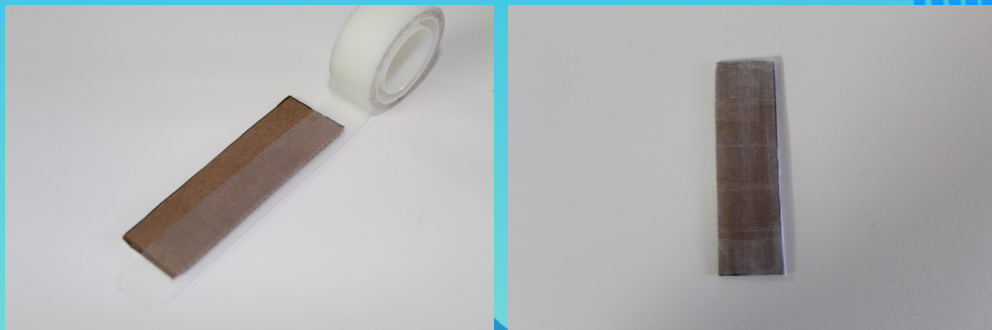
3. Place another rubber band around the pencils that are sticking out from the bottom of the bottle.



4. Now, we will add a propeller to the boat! If you will be using a small popsicle stick, go to Step 5. If you will be using a small piece of cardboard, do the following:
  - a. On your small piece of cardboard, draw a 3.5-inch by 1-inch rectangle.



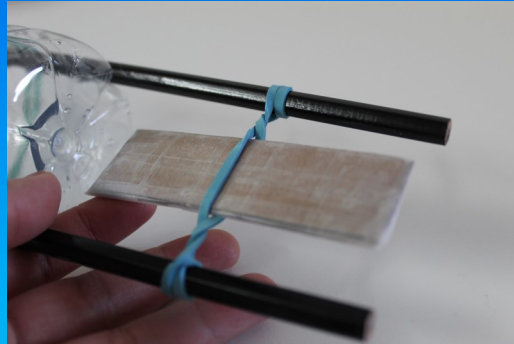
- b. Cut out the rectangle and wrap the piece with tape. Use as much tape as you need to make sure that the cardboard won't get wet when you test the boat later!



5. Place a popsicle stick or your piece of cardboard in between the rubber band.



6. Spin or flip the popsicle stick/cardboard piece in one direction until the rubber band twists so tight that you can't flip it easily anymore. Don't let go of the popsicle stick.



7. Take your boat to a bathtub filled with water, pond, puddle, or any body of water that you have access to and place it on the water. Only now let go of the popsicle stick. Your boat should run due to the potential energy stored in the wound rubber band, which makes the cardboard piece or popsicle stick spin! You can think of the movement of the cardboard or popsicle stick to be similar to the motion of your arms while swimming, and how it helps you move forward in the water. Click [here](#) to see an example of the test!

Marine engineers are responsible for designing different marine vessels, just like how you built the boat! See if you can create another design for a boat using other materials! What sort of things do you have to consider? Do your materials float or sink in the water? Is your propeller strong enough to move the boat? What changes do you have to make to make it better?

## RESOURCE LINKS / VIDEOS

- How Seawater Sabotages Ships: Crash Course Engineering -  
<https://www.youtube.com/watch?v=J9A55q7AR6E>
- Day in the Life of a Mega-ship Marine Engineer -  
<https://www.youtube.com/watch?v=rsglkYory8c>
- A Day In The Life Of MARINE ENGINEERS On A Mega Ship  
<https://www.youtube.com/watch?v=B7iphutZ8zA> (he lives on a boat too!!)
- Oceanic Engineering  
<https://www.youtube.com/watch?v=OhfpJeXX9Js>
- National Geographic: Ocean  
<https://www.nationalgeographic.com/environment/topic/oceans>

- American Museum of Natural History: Marine Biology

<https://www.amnh.org/explore/ology/marine-biology#all>

- Exploring the Ocean with Alvin Book

[https://www.nsf.gov/news/classroom/images/OCE\\_KidsOceanBooklet\\_2020\\_BK\\_Electronic\\_508.pdf](https://www.nsf.gov/news/classroom/images/OCE_KidsOceanBooklet_2020_BK_Electronic_508.pdf)

- The Encyclopedia Britannica: Ocean

<https://kids.britannica.com/students/article/ocean/276153>

## CAL POLY STUDENT SPOTLIGHT



**Reagan Lawson**

I love ocean engineering because there is so much of the sea that humans haven't explored, and diving deeper into this subject could change how we respond to global warming, how we protect wildlife, and even how we make electricity. Being from California, I feel a huge connection to the ocean and want it to be a part of my job everyday. One research project I am working on right now is building a device to monitor how the tide changes in places like Avila and Morro Bay. Another project I am starting soon involves discussing how wind turbines could be installed in the ocean near Morro Bay to power homes in San Luis Obispo.

