



# SOAP-POWERED BOATS



## HAVE YOU EVER WONDERED...

...how pond-skater insects manage to walk on water? And what could this possibly have to do with the way that soap can clean your plates and dishes?

Complete our soap-powered boats activity to learn all about the concept of surface tension!



### YOUR CHALLENGE!

Use a variety of different common household liquids to see which can power a small boat across water.

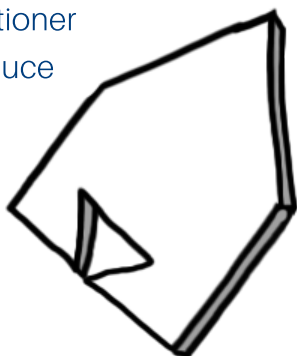
### YOU WILL NEED:

- Washing up liquid
- Ice cube tray
- Empty juice carton/foam takeaway container
- Baking tray
- Cotton buds
- Scissors



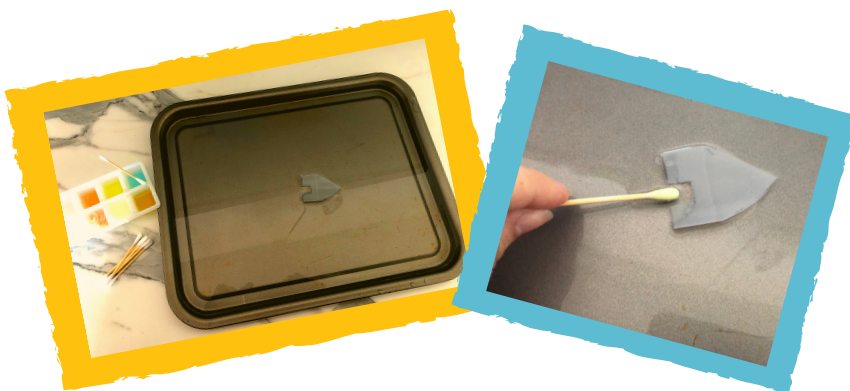
### SUGGESTED LIQUIDS:

- Vinegar
- Milk
- Cooking oil
- Liquid hand soap
- Shampoo
- Conditioner
- Soy sauce



### WHAT TO DO:

1. Start by putting a small amount of each liquid in each section of the ice cube tray.
2. Take the juice carton/takeaway container and cut out a piece bigger than the boat you want to make - 5cm is a good length.
3. Draw a basic boat shape (bottom left) on it and cut it out - the gap at the bottom is important!
4. Fill the baking tray with water and place your boat on the water's surface.
5. Dip a cotton bud in the washing up liquid and then touch it in the water in the gap at the back of your boat - what happens?
6. You'll need to change the water in the tray when the boat no longer moves, or when you want to try one of the other liquids.





# SOAP-POWERED BOATS



## EXPLORE FURTHER

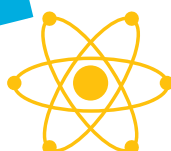
For more resources and videos search for the following:

- Pepper and Water Science
- Trick: how do you think it works?
- The Science of Soap
- What is surface tension?

What do the liquids that make the boat/pepper move all have in common?

Does the experiment work best with warm or cold water? Why do you think this is?

Why does the boat experiment stop working after a while?



## AND NOW FOR THE SCIENCE...

Water molecules like to stick together, creating a 'skin' on its surface which allows your boat to sit on top of the water - we call this surface tension. Soap contains something called a surfactant. Surfactants change the structure of the water molecules and lower surface tension, breaking that 'skin' on the water's surface.

When we add our soap to the water at the back of the boat, the molecules move to join up at the front of the boat, and carry the boat itself forwards too. As the soap spreads throughout the water, it decreases the surface tension all over the water so the boat eventually stops moving.

## IN THE REAL WORLD:

Soap and other detergents like washing up liquid or shampoo are all used for cleaning, because they help to break up grime and dirt, like dirty dishes or greasy hair.

One end of a molecule of surfactant is attracted to water, but the other end is attracted to dirt and grease - so the surfactant molecules help water to get hold of grease, break it up, and wash it away.



## COMPETITION TIME!

- Complete 4 challenges and submit an entry to our poster competition to be in with a chance of winning an EDT Experience Day at your school.
- For funded schools, you have the opportunity to receive the Industrial Cadets Challenger Award - click [here](#) for full details.
- Share a photo or video of your experiment with us on social media and use the hashtag #STEAMstars

