

Surface Tension Bath Toy

Have you ever seen bugs that can walk on water? Learn how surface tension allows bugs to walk on water and create your own toy raft that will not sink and can be propelled through the water.

TEKS:

M 2.9A: The student is expected to find the length of objects using concrete models for standard units of length.

SCI 5.5A: The student is expected to classify matter based on physical properties, including mass, magnetism, physical state (solid, liquid, and gas), relative density (sinking and floating), solubility in water, and the ability to conduct or insulate thermal energy or electric energy.

SCI 6.8: The student knows force and motion are related to potential and kinetic energy.

Materials:

- Flat piece of Styrofoam
- Kitchen sponge (make sure it doesn't have any soap on it)
- Large container, sink, or bathtub
- Liquid dish soap or liquid laundry detergent
- Scissors
- Toothpick
- Utility knife or box cutter
- Water

How To:

Make Your Raft

1. Cut the Styrofoam piece into a 3-inch by 2-inch rectangle.

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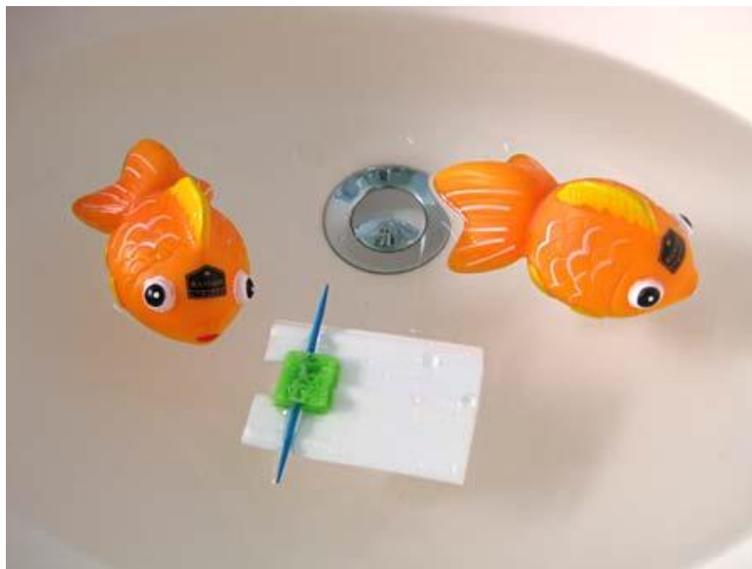
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2. To create the back of your raft, use the utility knife to carefully cut out a square that is 1-inch by 1-inch in size that is centered along one of the short ends of the raft (2-inch long side).



3. Next, cut a 1-inch by 1-inch square out of the kitchen sponge, which should fit into the square you cut out of the raft. If needed, adjust the size of the sponge piece.
4. Run a toothpick horizontally through the sponge piece. The toothpick will rest on the Styrofoam raft, while the sponge will rest in the raft's square hole. Run the toothpick closer to the top of the sponge so that when you place it in the Styrofoam hole, the bottom of the sponge piece is as low or lower than the bottom of the Styrofoam raft. Your raft is ready to launch!



<https://www.sciencebuddies.org/Files/5909/7/surface-tension-raft-toys.jpg>

Launch Your Raft:

1. Fill a large basin, sink, or bathtub with water. Make sure there is enough room for your raft to move around in it.
2. Once the water has settled, put the raft into the water and let it float. Make sure the sponge piece stays in the raft's square cutout.
3. When the raft is still, put one or two drops of liquid dish soap or laundry detergent on the sponge piece. Be careful that none of the detergent accidentally drops into the water. You should see the raft move quickly away from the side where the detergent was added, propelling the raft forward through the water.

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4. To observe the motion again, empty the basin, rinse the raft (especially the sponge) to remove all of the detergent, and re-fill the basin. Test the raft again by repeating steps 2-3.

STEM Explanation:

The raft is able to propel itself because of a property of water called surface tension. Surface tension is the force that causes the molecules on the surface of a liquid to be pushed together and form a layer. This is the force that supports insects that walk on water! When the detergent is added to the sponge, it decreases the surface tension of the water. This change causes the raft to move because the water molecules are separated from one another and no longer form a connected layer. Since the surface tension near the sponge is lower than at the other end of the raft, the higher surface tension at the front of the raft pulls it forward. As the detergent spreads through the water, the raft stops moving because there is no longer a difference in the water's surface tension behind and in front of the toy raft.

Career Connection:

Hydrologists study how water moves across and through the Earth's crust. They use their expertise to solve problems in the areas of water quality or availability. Hydrologists work in offices and in the field. In offices, hydrologists spend much of their time using computers to analyze data and model their findings. In the field, hydrologists may have to wade into lakes and streams to collect samples or to read and inspect monitoring equipment.

Resource:

<https://www.sciencebuddies.org/science-activities/how-surface-tension-works#instructions>

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