

TOUCH TOMORROW

A FESTIVAL OF SCIENCE, TECHNOLOGY, AND ROBOTS

Activity Name: Are Fluids Soft or Hard?

Presented by: Wu Lab

Explanation of Activity: Exploratory science is important to getting a better understanding of the world. Here, you will explore the strange properties of a non-Newtonian fluid, oobleck, which sometimes behaves like a solid and other times like a liquid.

Supplies needed:

- A medium mixing bowl, preferably with tall sides to help prevent mess
- 1 cup cool water
- 1.5 – 2 cups of cornstarch
- A few drops of food coloring (optional)
- Parchment paper, a plastic placemat, or some other non-porous surface to help with clean-up (optional)
- Small plastic bags (optional)

Step by step process:

If you are concerned about making a mess, this experiment can be done outside for easier clean up.

1. Add the water to your mixing bowl
2. Add the cornstarch slowly while mixing. At first you might mix with a spoon, but it might be easier to mix with your hands as you add more cornstarch.
3. Once you've added 1.5 cups of corn starch check that the consistency is right as you continue adding. You want the mixture to have the consistency of a very thick liquid when you tilt the bowl.
4. Add the food coloring to the mixture and combine using your hands

Once the food coloring is added you're ready to experiment! See the reflection questions for experiment ideas or try to come up with your own!

Trouble shooting:

- If your oobleck is too thin, try adding a little more cornstarch
- Similarly, if your oobleck is too thick, try adding a little more water
- Food coloring can stain clothing but should wash off hands fairly easily

Vocabulary:

Non-Newtonian fluid: Fluids that do not behave like Isaac Newton's visco-elastic fluid model where the viscosity is independent of the stress

Hypothesis: A prediction scientists make before they conduct an experiment and try to test with their experiments

Things to think about:

- How would you test if oobleck is a solid or a liquid?

A liquid should be pourable; try to pick up some oobleck with your hands and let it drip back into the container. Does it behave like a liquid here?

A solid would resist changes in shape. Try to roll some oobleck between your hands into a ball. Can you make it take on a solid shape? What happens if you stop rolling?

- If you make a small pool of oobleck in a shallow container and hit it hard with your hand does it feel like a solid or a liquid? What happens if you just place your hand gently on top of the oobleck?
- Try moving your fingers slowly through the pool of oobleck. What happens if you move your hand quickly through the oobleck instead?
- Transfer some of the oobleck into a small plastic bag. Seal the bag tight and then drop it onto the table. What happens to the shape of the oobleck when it hits the table?
- Do you think oobleck is more similar to a solid or a liquid? Why?
- Can you think of anything else that behaves sometimes like a solid and sometimes like a liquid?