Curiosity Guide #410
Matter

Accompanies Curious Crew, Season 4, Episode 10 (#410)

Viscosity Race

Investigation #6

Description

Can you predict a winner?

Materials

- 6 plastic, fillable spheres that open in halves, purchased from a craft store
- 6 golf balls
- Water
- Karo syrup
- Lamp oil
- Glycerin
- Rubbing alcohol
- Dish soap
- Small ramp made from a board, foam, and wood blocks
- Hot glue
- A friend

Procedure

1. Open a sphere. Half of a sphere is called a hemisphere. Place a golf ball in one hemisphere of the sphere.
2. Fill the hemisphere with a liquid so that the liquid pours over the ball and goes nearly to the lip of the hemisphere.
3. Add a bead of hot glue on the top edge of the hemisphere. Press the top half of the sphere in place; then leave to dry.

4. Repeat the process with the remaining spheres and liquids.
5. Set up your ramp.
6. Have your friend predict which spheres will roll the fastest and the slowest down the ramp.
7. Race different spheres, two at a time, starting at the top of the ramp.
8. Can you order the spheres from fastest to slowest?

My Results

Explanation

Honey and syrup are very thick liquids. The thickness causes those liquids to flow more slowly. Thick liquids are said to have high viscosity or internal friction. As the sphere begins to roll, the thick liquid is left on the uphill side of the ball. This extra mass changes the center of gravity, and the sphere slows down. As the thick liquid slowly flows downward, the sphere begins to gain speed. As soon as the liquid shifts to the uphill side of the ball, the sphere hesitates once again. Different liquids have different levels of viscosity, so that those that flow more readily will roll down the ramp much more quickly.

Think about this: Liquids can flow at room temperature and take the shape of the container that they are in. For example, the water in a fish tank will take the shape of that rectangular prism, but that same water poured into a fish bowl will take that new shape. This is because the particles in liquids have spaces in between so they can easily flow past one another. Have you ever walked in a lake or swimming pool? You can feel the water pushing on you, but you can still move through the water. As the particles move aside, they flow and fill in the spaces behind you. And the lake or pool are contained, too-- by the sides and bottom. How refreshing…cannonball!

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