



COSI Quicksand

Primary Audience:

Description:

Keywords: Water, Non-Newtonian Liquid

Concepts:

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Materials:

- For Demonstration:
 - Three-foot Trough or several bussing bins end to end
 - Plastic Bins
 - Cornstarch
 - Water
 - Bucket (or bin) for Rinsing Hands and Feet
 - Towels

Instructions:

NOTE: This activity can be messy and is best done outside.

(Make up cornstarch and water mixture in the troughs before the program starts. Mix two parts cornstarch to one part green-tinted water. There should be at least four inches of COSI Quicksand in the containers.)

Can you run across the COSI Quicksand without getting it on your feet or sinking into it while you are running?

Participants will remove their shoes and socks and line up. While waiting in line, encourage participants to experiment with the containers of quicksand.

When campers get to the walk through bins, encourage them to quickly walk or run through the material. When they get out, they can remove any lingering residue by doing the COSI Twist – wiggling or twisting their feet back and forth on the grass.

Possible Interactive Questions:

- What happens if you slap your hand on top of a liquid? Does this always happen?
- Is a liquid always a liquid? Do you think a liquid can act as a solid?

Water

- Can you roll a small amount of the Quicksand into a ball? Does it hold its shape?
- What happens when you hold the COSI Quicksand in your hand?
- What happens when you quickly draw your fingers through the Quicksand?
- What happens when you slap your hand or punch your fist into the Quicksand?
- What can you do to allow this substance to act like a liquid? What can you do to make this substance act like a solid?
- What happens if you put just a tiny amount between your fingers and then rub your fingers together?

What's Going On?

If you have a liquid in a pan, and you slap your hand on the top of this liquid, you would expect the liquid to splash, possibly getting you wet!

COSI Quicksand is a suspension (a liquid containing small solid particles that easily separate out of the mixture) of cornstarch and water. This substance has, under certain conditions, the properties of both a liquid and a solid. It is called a non-Newtonian liquid because sometimes it doesn't behave like a liquid should, according to Isaac Newton's laws. When struck, most liquids splatter and splash. However, when a non-Newtonian liquid is struck by a force, the physical structure of the material changes, increasing the thickness of the solution, making it behave more like a solid.

Scientists don't know exactly why non-Newtonian liquids behave the way they do. One theory suggests that water can't easily get between the cornstarch particles when there is a sudden pressure or movement. This makes it harder for the cornstarch particles to slip against each other as they would in a liquid, so the COSI Quicksand, and other non-Newtonian liquids, behave like a solid. That's just one of several theories. Maybe one of our campers will be the scientist who solves the puzzle of non-Newtonian liquids some day!

Further Exploration:

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Relevant Ohio Science Content Standards:

Physical Sciences 3-5 B:

4.4: Explain that matter has different states (e.g., solid, liquid and gas) and that each state has distinct physical properties.

Scientific Inquiry 3-5 B:

5.3: Use evidence and observations to explain and communicate the results of investigations.