Sparking Discovery in the Classroom

TRAVELING SCIENCE WORKSHOPS

DISCOVERY MUSEUM

Liquids & Solids

Teacher Resource Guide

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Liquids & Solids

Students engage in a fun chilly exploration, make observations and ask questions as they investigate the role temperature plays in causing materials to change from solid to liquid or liquid to solid.

Introduction

Most everything on earth is a solid, a liquid, or a gas. A solid holds its shape unless we do something to it. Solids can be hard like a rock, rigid like a crayon, or flexible like a rubber band. Solids can change shape, but only if something acts on it to make a change. Solids can even be squishy like a banana. Their shape can be changed by squishing it, but it stays in that form unless or until something acts on it.

A liquid is different from a solid. A liquid flows and pours and takes the shape of whatever container it is placed in. A gas does not have a shape, but fills whatever space it is in. Often we cannot see a gas – like the air around us. This program will focus on solids and liquids.

Changing a solid to a liquid

One of the interesting properties of some solids and liquids is that you can change some solids into a liquid and you can change some liquids into a solid.

Melting an ice cube

Pass out a ziplock bag with an ice cube to each student. Challenge the students to change the solid ice cube into liquid water without removing the ice cube from the bag. When everyone has successfully melted their ice cube, ask the children to share how they went about doing so.

More Melted Masterpieces

During the program we used a hairdryer to melt several crayons, splattering the hot wax over a sheet of paper. In this activity, students will use the heat from the sun to melt crayons and create another melted masterpiece.

This is a great way to use up some of those old, well used and broken crayons. Fill a gallon bag about a third of the way with a mix of different colored crayons that have been stripped of their paper sleeves. Discuss with the students the state of the crayons – are they a liquid or a solid? Using a hammer, break up the crayons into small bits. Discuss with the students that although the crayons have been broken into smaller bits they are still in a solid form. Talk with the students about ways they could turn those bits of crayon into a liquid. Let them know that you have a fun activity for them to try that involves creating a melted masterpiece using the crayons and a rock.

Have the students collect a rock about the size of their palm and sprinkle the bits of crayons over the top of it. On a warm sunny day, lay the rocks out in the sun. Ask the children to predict what they think will happen and then provide them with the opportunity to observe what happens over time. Discuss with the students how the heat from the sun is warming the bits of crayon and causing them to melt. Ask

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them to consider what they think will happen to the liquid crayon when the rocks are removed from the sun and begin to cool down.

Changing a liquid into a solid

A liquid can become a solid when it is frozen. Encourage children to generate a list of liquids that they think might change into a solid when placed in the freezer or outdoors on a particularly cold day. Starting with a solid, melting it, and then freezing it, can be an effective way for students to experience the changes of state. Water, chocolate, and wax are some easy materials to work with.

Protecting an Ice Cube Part 2

During the program, students designed and constructed a container for an ice cube that they thought would reduce the warming effects of the sun and/or the warmth of the room around the ice cube. That quick activity will have produced different results and a list of questions to prompt further investigation. Review those questions together and categorize them. Propose different groups of students or individuals pursue those new questions. For example, some children may have discovered that the ice cubes that were placed in the Styrofoam cups seemed to last longer than those in the paper cups. This might lead them to question if Styrofoam is a better insulator then paper or if it is possible to use other materials inside the paper cup that make it as effective as using a Styrofoam cup alone. Encourage further exploration of this and any other ideas that might have arose.

Does where you place your ice cube make a difference?

Some of the students might have observed that where they placed their ice cube, might have impacted how quickly the ice cube melted. You might encourage students to explore how different substances absorb the heat of the sun more or less than other substances. Lay out a tray of sand, a tray lined with black paper, a tray lined with foil, and a tray full of dark soil in the sun. Have students use a thermometer to measure the temperature of each of these trays at different time intervals. How do the temperature readings compare? Can the temperature of half of each tray be lowered, if half of the tray is shaded from the sun? If the students wanted to melt an ice cube melt quickly, which surface would they place the ice cube on? If they wanted to keep the ice cube as a solid as long as possible, what surface would they place the ice cube on?

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