From Science Is...
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WATER IN A JAR

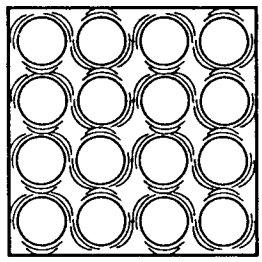
Solid, liquid, and gas -- the three basic states of matter. Make a people model of matter that shows how energy affects these three states.

MATERIALS: Masking tape.
Different colored shirts or signs for atoms.

DOING IT:

1. Mark off a large square on the ground with masking tape; leave one side open. The marked area represents an open jar. People will pretend that they're water in the jar. Individuals will be atoms as a solid (ice) changes to a liquid (water) and then a gas (steam). Note: This is a simplified model. Water is actually made up of groups of atoms (i.e. a water molecule is made up of two hydrogen atoms combined with one oxygen atom).

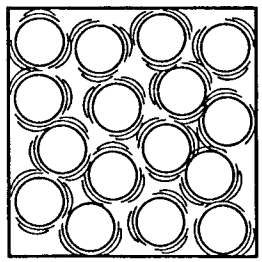
2. Everyone begins by standing close together at the bottom of the "jar" (end opposite the opening): "You're atoms in ice. You're frozen solid. But, look -- the sun is coming out! You're beginning to get a little warmer."



SOLID

3. Everyone sways a little from side to side to represent atoms vibrating: "You can feel the heat. You start to sway back and forth. You sway a little more. You're melting. You're becoming a liquid."

4. Everyone continues to sway, but also starts to move around slowly: "You're a liquid now. You rock back and forth as you walk around. You walk *slowly* around in the bottom part of the jar. Stay in the lines. You're water in a jar."

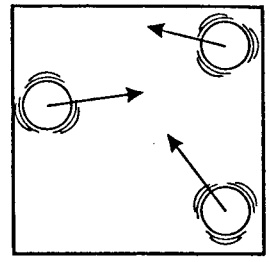


LIQUID

5. A few "atoms" near the "mouth" of the "jar" break away: "It's getting warmer. Someone is holding the jar over a stove. You rock back and forth more. A few of you evaporate from the top of the jar. You move around quickly outside the jar."

6. Everyone sways more (bends far to one side and then far to the other) and continues to *walk* until they leave the "jar": "Hey, it's really hot. You're boiling. You're rising up out of the jar into the air."

7. People now move quickly outside the "jar": "You're a gas now. You move quickly all over the place. You move in a straight line until you hit something. Then you bounce off and move in a straight line in a new direction."



GAS

8. Repeat the process, going from liquid in a jar to a solid.

Heat energy can cause one state of matter to change into another state. The particular state of a type of matter depends both on the matter itself and the temperature.

A "solid" is something that maintains its shape. The atoms (or molecules) of a solid vibrate in a fixed place. When heat is applied, the atoms begin to vibrate more. At a temperature called the "melting point", the atoms vibrate enough so that they break out of their fixed positions and the solid becomes a liquid. A "liquid" maintains its volume (the amount of space it takes up), but takes the shape of its container. The atoms of a liquid still vibrate, but they also move around slowly. When heat is applied, some atoms near the surface begin to vibrate enough to break away from the liquid (evaporate). At a temperature called the "boiling point", atoms throughout the liquid vibrate more and gas bubbles rise to the surface. The liquid then changes completely to a gas. A "gas" has no fixed volume, but takes up the volume of its container. The atoms of a gas move around quickly and are spaced far apart. When heat is applied to a gas, the atoms move faster.

Topics: States of Matter; Atoms; Energy.