

Water Magicians

Summary

Students observe water changing states from a solid to a liquid to a gas.

Materials

For the Teacher:

- Heating element
- Small pan
- 3 tall drinking glasses
- Ice cubes
- Transparent containers of various sizes

For the Student: (Individual)

- Paint brushes
- Paper cups with water

Background for Teachers

The three states of water (solid, liquid, and vapor) differ mainly in the distance between their molecules and in the energy the molecules have to move. Heat gives the energy necessary to change liquid water into vapor. Heat gives the vapor molecules the power to move rapidly and separate from other molecules by great distances. Water molecules in the liquid state move fast and are closer than in the gas state. There are spaces between the liquid water molecules. These spaces are what allow us to move through water when swimming.

Water is unique in how it changes from the liquid state to the solid. Most substances are denser as solids than as liquids. Like most solids, water becomes more dense as it cools, but only until it reaches about 40 degrees Fahrenheit. Then something unusual happens: The density decreases as water cools on its way to the freezing point. As water freezes, the molecules lock into position forming open spaces in between. Frozen water has more open spaces than liquid water molecules. Ice floats as a result of being less dense than water. An example of this can be seen as lakes and rivers freezing from the top down (rather than the bottom up).

Intended Learning Outcomes

1. Make observations and predictions. 3. Know science terminology.

Instructional Procedures

1. At least 30 minutes prior to lesson, put 3 glasses of ice cubes out where students can observe them. Ask students to predict what will happen to the ice. Record predictions on the board.
2. Begin the lesson by telling the class, "Today you are going to be magicians and make things change and disappear, but first, you need to learn the magic word, 'Abracadabra.'" Have them say the word, act surprised and say, "Look! Your magic is already working! There used to be ice cubes in those glasses, and now there's something different. What is it now? How did you do that? How else could it have happened?" (Warm air melted them.)
3. Explain that ice cubes are really water, but they are water in a solid form. Solids have their own shape, and their shape doesn't change if you put them in a different container. Demonstrate this by putting ice cubes in different containers. Ask students if the shape of the ice changed.
4. Explain that when the ice melted in the glasses, it changed from a solid to a liquid. Demonstrate how liquids take the shape of what they're in (pour water into the different shaped, transparent containers). Ask students, "Can you think of other examples of solids changing into liquid?" (melting

snowmen, popsicles, slurpies.)

5. Say, "As magicians you changed solid water into liquid water. Can you change water another way?" The teacher writes a word, using his/her finger, on the chalkboard with water and has students say, "Abracadabra." Watch together as it disappears on the board. Say, "I wonder if your magic works outside too." Distribute paint brushes and cups of water. Students paint their names on the sidewalk with water and say, "Abracadabra." Ask students, "What happened? Where did the water go?"

6. Explain that you will do an activity that will help them find out where their painted names went. Get the 3 glasses of melted ice water. Say, "This used to be solid ice and now it's liquid water. Can you predict what will happen to it if we heat it?" Pour the water into the pan and place it on the hot burner. Have the children say, "Abracadabra." Boil the water until vapor appears.

7. Ask students, "What is this cloudy mist over the pan? Is it a solid? Liquid? You magicians did it again! You changed the liquid water into something different. Scientists call this form of water, vapor. It's still water, but it looks different. Now it is a gas like the air we breathe. What did we have to do to the liquid water to change it to vapor? (Add heat.) Heat gives water the energy and power to change into vapor."

8. Ask students, "Do you think water would change into those three forms even if we weren't magicians?" In [Activity 2 \(3010-03-2\)](#) we will find out more about what makes water change into ice, liquid, and vapor.

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