Water Magic

This adult guide will provide you with step by step directions for engaging your child in science skills with water experiments at home.

Supplies

- Clear drinking glass
- Paper and pencil
- Water pitcher
- Plate
- Ice cube tray
- Hand mirror
- Saucepan
- Cork
- Spoon
- Paper towel or tissue
- Measuring cup – 2-cup or 4-cup size works best
- 2-3 containers that hold same volume, but are different shapes
- Clear file box or small aquarium
- Aluminum foil
- Selection of objects for "Sink or Float" experiment – marble, ping pong ball, plastic toy, sponge, etc
- Modeling clay
- Spray bottle with water
- Plastic plate
- Raincoat or plastic bag

Background

Young children are natural-born scientists. Like scientists, they are curious about the world around them and want to know what things are, why things happen, and how things work. By encouraging children's curiosity and their interest in asking questions, you are helping build the science skills they need to be successful in school.

Children are not too young to conduct science experiments. You just need age-appropriate materials and activities, and a great place to start is to learn about water. Below is a list of materials that you likely have at home that can become part of a child's "water science lab." We've also included descriptions of the activities demonstrated in the Virginia Aquarium's *Water Magic* video. And it goes without saying that your water lab should be somewhere you don't mind getting wet!

Instructions

Activity 1: What is water?

1. Pour water in a clear glass. Have your child make observations using the senses.
    a. What does water look like?
    b. What does it feel like?

c. Does it have a smell?
d. Does it make noise?
e. What does it taste like?

NOTE: *This is a great time to explain that we don't taste or touch things in the lab or out in nature unless we know it is safe to do.*

Extension

Do the same activity with other liquids you have at home (soda, cooking oil, molasses). Compare and contrast with water.

Activity 2: What is water made of?

Water is composed of two hydrogen atoms and one oxygen atom. Atoms are the very tiny parts that all things are made of. When different atoms combine, the result is a molecule

1. Have your child draw a big circle on piece of paper and write the letter O in the middle. That's the oxygen atom.

2. Next, draw two circles at the top of the oxygen atom as if they were ears, and write the letter H in the middle of each. Those are the hydrogen atoms.

3. Ask your child what cartoon character the drawing looks like. An easy way for your child to remember what water is made of is that hydrogen and oxygen combine to form a molecule that looks like a very famous mouse!

Activity 3: Why is water wet?

At room temperature, water is in its liquid phase. The atoms and molecules are loosely joined, which allows water to flow.

1. Using the pitcher, allow your child to pour water into the sink and then into a glass. Does water have a shape?

2. Take the pitcher outside and pour water on the driveway of sidewalk. What does the water do once it's on the ground?

Water has three phases – liquid, solid, and gas. The solid phase is ice, and the gas phase is water vapor. To change water into solid ice, we drop the temperature to 32°F. To change water into a gas called water vapor, we raise the temperature to 100°F.

3. Place a few ice cubes on a plate and ask your child to examine it. Does it have a shape and why? What does it feel like?

4. Ask your child what happens when the ice cube is squeezed in the hand over the plate. Why does your hand melt the cube?

5. Put a cube in a glass of water. Does it sink or float?

6. Fill the ice cube tray or other small container with water. Observe where the water level is in the tray or the container before putting it in the freezer. Later, when you remove the tray or container, look at level of the ice. Is it higher or lower than where the water level was before freezing? A unique feature of water is that its structure

expands when frozen into ice, making it less dense than water. That's why ice floats and why the water in the tray expanded to a larger size once frozen.

7. Put 2-3 cups of water in a small saucepan and place on the stove. Bring to a boil. As the water heats up, what do you see coming out of the pot? Hold the mirror above the steam to catch the water vapor and let your child examine it. What does it feel like? What happens to it? **NOTE**: *Make sure your young scientist observes the boiling water from a safe distance.*

8. Have your child hold the mirror close to the face and breathe on it. What do you see? Does it look like the steam you caught on the mirror? We have water in our bodies and release water vapor when we exhale.

Activity 4: What's in the glass?

If you ask a child what's in an empty glass, the answer likely will be "nothing," but we know that air fills spaces, even if we can't see it.

1. Fill the clear file box or small aquarium about 2/3 full of water. Take a clear and dry glass and ask your child what's in the glass. Now ball up a dry paper towel or tissue and place it in the bottom of a clear and dry glass. Make sure the paper does not fall out when the glass is turned upside down. Have your child hold the glass upside down over the water. Without tipping it to the side, push the upside-down glass in the water until it is completely submerged and then pull it out without tipping. With a dry hand, examine the paper. Is it wet or dry? What was inside the glass besides the paper?

2. Float a cork on the water in the container. Ask your child to sink the cork using air and the glass. The trick is to put the upside-down glass over the cork and push down. You'll see the water and cork with the air above as the glass is pushed under.

Activity 5: Can water bend a spoon?

When light passes from air into water, it bends or refracts. When we look at an object that is partly in air and partly in water, it appears to be bent or broken at the air-water boundary due to light refraction.

1. Fill a clear glass half full of water. Have your child place a spoon in the glass. What do you notice about the spoon? Pull the spoon out and then put it back? Do you notice the same bend in the spoon? Test another object such as a pencil.

Activity 6: Which container holds more water?

Children tend to think that taller containers hold more than shorter ones. This activity will help them learn that volume – how much water a container will hold - is not directly related to the container's height.

1. Find three containers of different heights that are the same volume. Food storage containers are good for this activity, as there are many that are 2-3 cup capacity.

2. To start the activity, fill a pitcher or large measuring cup with the volume of water that will fill each container.

3. Ask the child if all the containers will hold the same amount of water, and then let the child start the test by pouring the water into one container.

4. Continue by pouring the water from one container to the next.

Activity 7: Sink or float?

Whether something sinks or floats depends on its density. In a dense object that sinks, like a golf ball, the molecules making it up are tightly packed. In a less dense object that floats, like a ping pong ball, the molecules are loosely packed, allowing plenty of space for air. If you ask children why some things sink and others float, their answers usually are usually about size and weight: bigger things and heavier things sink. But we know that huge ships made of metal can float. The shape of ships makes them less dense and more buoyant, which is the ability to float.

1. With toddlers, "sink or float" is a great way to allow them to experiment, even in the bathtub. Which toys float and which ones sink?

2. To expand on this, take a 4"x4" square of aluminum foil and ask the child if it will sink or float.

3. Put the foil in the water side-down and watch what it does (float).

4. Then place the foil in the water on edge and watch what it does (sink). Sometimes the foil sinks and sometimes it floats. There must be most to sink or float than size and density.

5. Cut a second 4"x4" square of foil. Take one square and ball it up loosely. Take the second square and fold it as tightly as you can into a tiny square. Have your child drop the foil pieces into the water at the same time. What happens? Why did one float and one sink? Which one had more air inside? What happens when water starts to fill the foil ball?

Extension

Use foil or modeling clay to build boats. Test the boats to see if they float. Use pennies or marbles to test which boat can hold the most weight before sinking.

Activity 8: Absorb or repel?

Why do some materials absorb water, and some don't? The structure of paper, cotton, and other plant-based materials makes them attract water. Other materials with spaces large enough for water to pass through will absorb water. Plastic is an example of a material that repels water.

1. Put a drop of water on a plastic plate. Does the water sit on top of the plate or is it absorbed? Can you make the water move around the plate?

2. Hold a paper towel above a bowl of water and stick the edge about 1" into water. What happens? How far up the towel does the water move? Try it again and time how long the towel absorbs water before it stops.

3. Compare the absorbency of other types of paper to the paper towel – copier paper, newspaper, magazine page. What is different about each of these papers?

4. Examine your raincoat or your rain boots. Is it like the plastic plate or the paper towel?