Water Tricks

Dear Presenter,

This activity is 5 to 8 minute HANDS-ON presentation for approximately 500 people. You must do this activity at home BEFORE you attempt to lead the activity during the water festival.

Thank you for volunteering to present “Water Tricks.” Have fun, enjoy yourself and we hope you will consider volunteering again next year.

Big Sioux Water Festival

Water Tricks

Materials List - Page 1
(FOR APPROXIMATELY 500 PEOPLE)

For Water Race and Stretch:

CONSUMABLES:
- 1 gallon of water
- 1 bottle of food coloring (any color)
- 1 box of wooden toothpicks
- 1 roll of masking tape

NON-CONSUMABLES:
- 6 eyedroppers
- 3 laminated Water Race and Stretch activity sheets
- 1 laminated instruction card

For Weaving In and Out:

CONSUMABLES:
- 250 strips each of 3 different brand names of paper towels
- 1 gallon of water
- 3 bottles of food coloring (different colors)
- 1 roll of scotch tape with dispenser

NON-CONSUMABLES:
- 12 unsharpened pencils
- Three 12 oz. clear plastic cups
- Scissors
- Three 2 gallon ziplock bags to store paper towel strips
- 1 laminated instruction card

For The Parabola

CONSUMABLES:
- 1 gallon of water
- 1 bottle of food coloring (any color)

NON-CONSUMABLES:
- Parabola (see construction instructions)
- 1 laminated instruction card

For The Cartesian Diver

CONSUMABLES:
- 4 - 6 clear empty tennis ball containers with lids
- 1 gallon of water

NON-CONSUMABLES:
- 4 - 6 eyedroppers
- 1 laminated instruction card

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(FOR APPROXIMATELY 500 PEOPLE)

For Sink or Float

CONSUMABLES:

- 1 ½ gallons of water
- 1 bag of cotton balls

NON-CONSUMABLES:

- Small wooden block
- 1 package of crayons
- 2 unsharpened pencils
- 2 or 3 twist ties
- Small metal jar lid
- Plastic comb
- Golf balls
- One 11.4 Qt. Rubbermaid plastic dishpan
- 1 laminated instruction card

General Supplies for entire kit:

- 1.5 gallon Rubbermaid pitcher
- 2 gallon (or larger) plastic bucket for water storage
- A measuring cup (used to take water from the bucket to replace depleted water in the activities)
- Four 5 gallon garbage bags
- Several rolls of paper towels
- Various sizes of ziplock plastic bags for miscellaneous storage
- 1 large Rubbermaid container to store kit
- Presenter kit instruction notebook

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Parabola Construction Instructions

Materials needed:
To construct the stand
One 12" x 12" x 3/4" piece of plywood
One 12" x 3/4" plywood cut in the shape of an octagon
One large lazy susan turn mechanism
Two 3" H x 6"L x 3/4" W plywood blocks, painted with some type of waterproof sealant
Wood glue
4 ½" long piece of self-adhesive Velcro loops

To construct the parabola
Two 12" x 12" x 1/4" clear acrylic plastic sheets
Three 12" x 1" x 1/4" clear acrylic plastic pieces
Clear epoxy glue
4 ½" long piece of self-adhesive Velcro hooks

1. To construct stand: screw the lazy susan turn mechanism to the square piece of plywood and the octagonal piece of plywood with screws provided with the mechanism. Affix the octagonal piece to the top of the square piece, forming a lazy susan. Using wood glue, glue the two sealed plywood blocks to the top of the octagonal piece of plywood, gluing the 6" side. Lay the two sealed pieces approximately 1 ½" apart, forming a "sleeve" for the parabola to be placed in later. After the glue has dried, place the 4 ½" piece of Velcro in the center of the "sleeve"

2. To construct the parabola: Using a clear epoxy, glue together the pieces of acrylic plastic to form a tall, skinny box with one end open. After epoxy dries, place the 4 ½" piece of Velcro in the center of the bottom of the box. When you set the box into the sleeve of the stand, the Velcro will help keep the box in place.

Water Tricks

These are hands-on activities. To best explain and supervise, you will need to do them at home BEFORE the actual presentation.

Background information is provided as a basic overview with both general and specific information. Share this information with the visitors throughout the activity.

Background

For Sink or Float

If you could see molecules of water and how they act, you would notice that each water molecule electrically attracts its neighbors. Each has two hydrogen atoms and one oxygen atom. Within the water, as least a few molecules away from the surface, every molecule is engaged in a tug of war with its neighbors on every side. For every "up" pull there is a "down" pull, and for every "left" pull there is a "right" pull so that any given molecule feels no net force at all. At the surface things are different. There is no up pull for every down pull, since of course, there is no liquid above the surface; thus, the surface molecules tend to be pulled back into the liquid. It takes work to pull a molecule up to the surface. If the surface is stretched - as when you blow a bubble - it becomes larger in the area, and more molecules are dragged from within the liquid to become part of this increased area. This "stretchy skin" effect is called surface tension. Surface tension plays an important role in the way liquids behave. If you fill a glass with water, you will be able to add water above the rim of the glass because of surface tension.

For Water Race and Stretch

Water molecules are attracted to each other due to their molecular structure. This is known as cohesion. Water molecules stick together unless the cohesive bonds are weakened, causing them to "break" apart.

For Weaving In and Out

Capillary action occurs because water is sticky - water molecules stick to each otehr and to other substances, such as glass, cloth, organic tissues, and soil. Capillary action is important for moving water (and all of the things that are dissolved in it) around. Plants and trees couldn't thrive without capillary action. Plants put down roots into the soil which are capable of carrying water from the soil up into the plant. Water, which contains dissolved nutrients, gets inside the roots and starts climbing up the plant tissue.

For Cartesian Diver

Floating is a lot like a shoving match. A boat pushes down on the water and the water pushes up, holding the boat up. If the water pushes up harder than the boat pushes down, the boat floats - this property is known as buoyancy. If the boat pushes harder than the water, it will sink. Whichever pushes harder will win the war! This principal applies to how submarines operate. It floats on the surface because it pushes aside its own weight in the water (giving it buoyancy). When the submarine takes on water into its internal tanks, it wins the "pushing" war and sinks to the bottom.

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For The Parabola

A parabola is a mathematical curve. A spout of water takes the shape of a parabola for the very same reason that when we throw a ball in the air its path follows this same curve. When you hit or throw a baseball, it goes up and then gravity pulls it down in a smooth arc (a parabola). An object thrown in the air, even droplets of water propelled by a hose or fountain, follow a path forced on them by the vertical pull of gravity.

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ROOM REQUIREMENTS

Two 8' tables on which to place activities

PRE-PREPARATION

Pre-preparation can include any or all of the following

- Check supplies against supply list
- Cut paper towels into strips - you will need approximately 250 strips of each kinds of towel. Place strips in a well-marked 2 gallon ziplock bag (mark bags with the brand names of the paper towels)
- Make copies and laminate the "Water Race and Stretch" game

PREPARATION - Approximately 45 minutes to set up

- **For Parabola:** Fill parabola about 1/3 full of water. Carefully add a couple drops of food coloring. Place parabola on table with laminated instruction card.

- **For Cartesian Diver:** Fill tennis ball containers with water. Carefully place eyedroppers in each container. Cover with lids. Place each container on table with the laminated instruction card.

- **For Water Race and Stretch:** With masking tape, tape the Water Race and Stretch games to the table. Place 1 plastic cup with water and a drop of food coloring near the top of each game. Empty the box of toothpicks into a plastic cup and set in the midst of the games (for participants to use during the games). Put one eyedropper in each cup. Lay out the laminated instruction card so that it can be easily viewed.

- **For Sink or Float:** Fill Rubbermaid dishpan with approximately 2 inches of water. Place items next to dishpan. Place instruction card nearby. Station a roll or paper towels in a hand location so that you can dry off objects as needed. Lay out instruction card for participants to read.

- **For Weaving In and Out:** Fill 3 plastic cups with water (about ½ inch) and food coloring (a different color for each cup). Place a pencil near each cup and the scotch tape within easy reach. Lay out instruction card for participants to read.

General instructions:

✓ Tape one garbage bag to each end of each table (this will make clean up between each participant faster)
✓ Fill up water storage bucket
✓ Strategically place paper towel rolls under tables for quick clean up
✓ Place any extra (replacement) supplies under tables for easy access

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INTENDED PARTICIPANT OUTCOME

By completing these activities the participants will learn about water cohesion, buoyancy, surface tension and capillary action.

PROCEDURE

1. Carefully read the background material provided about each activity.

2. Great each of your visitors enthusiastically. As each participant arrives, explain each activity. Participants will move from one activity to another, in no specific order.

CLEAN UP AND SET UP FOR NEXT PARTICIPANT

1. Replenish water in cups as necessary, adding food coloring as you go.

2. Discard any used paper towels and cotton balls into garbage bags.

3. Wipe off the laminated Water Race and Stretch games after each participant finishes.

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FINAL CLEAN UP

Approximately 30 minutes

- Dispose of any used paper towel strips and cotton balls
- Empty water out of all containers and dry out with paper towels
- Empty and rinse out all eyedroppers. Dry off with paper towels
- Place all supplies into ziplock bags, Rubbermaid containers, etc.
- Wipe off Water Race and Stretch games and dry with paper towels
- Remove all garbage bags from the ends of the tables and dispose
- Place all kit supplies into the large Rubbermaid storage container (after they are all completely dry)
- Place presenter notebook in Rubbermaid container