



Water Connections

OBJECTIVE: These exercises will demonstrate the adhesive, cohesive and surface tension properties of water. They will show how water in the form of rain can adhere to pollution molecules. It will demonstrate how water flow without adhesion and cohesion our plant life would not be able to have water on the leaves and it would not be absorbed from the roots. The erosion and damage to management of water would be great. How proper protection and conservation of water can ensure a plentiful supply for all.

MATERIALS: (student worksheets for each activity are attached)

Activity 1 -

Clear plastic cups
Pennies - 100
Water

Activity 2

Eyedropper
Penny – one or two
Water

Activity 3

Boat pattern (see activity)
Stiff cardboard (or file folder)
Water

Soap
Large pan

Scissors
Water

Activity 4

Fork
Paper clips
Magnifying glass
Plastic Glass of Water

KEY VOCABULARY:

Adhesion is the attraction of the water molecule to other materials (like grass, soil, or leaves)

Cohesion is the attraction between water molecules.

Surface tension is like water's skin.

BACKGROUND: The nature of water molecules causes them to be attracted to other water molecules as well as to molecules of other substances. These qualities (adhesion) are required in order to move water through plants, and blood through the body. The cohesive force between water molecules causes the water surface to behave as though its covered by a thin membrane that is always trying to contract. This surface tension is like water's skin. Paper clips and water striders do not actually float – they are held up by bonds between water molecules. Wood and other objects actually float on water; they break the surface tension and stay afloat because the water molecules deeper in the water can support their weight.

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AQUARION

Water Company

The same forces that cause water molecules to be attracted to each other cause them to adhere to other substances. If these adhesive properties were not present, water would slide off all substances: leaves, animals.

PROCEDURE:

1. Set the classroom up in 4 different activity areas.
2. The students can work in groups or alone.
3. Explain to the students that they will be to demonstrate some amazing qualities of water.
4. Students rotate through each activity, keeping their results on the sheets provided at each station. Explain that they will do the class discussion part after all the students have rotated through each center.
5. Give the students the definition for Adhesion, cohesion and surface tension.
6. Let them make individual choices as to which definitions fit each experiment.
7. Have each student compare their answers.
8. Have the students write a reflection on the experiments and the results.



AQUARION

Water Company

Name _____ Date _____

**A
for**



**Penny
your**

Describe or draw the surface of the water before it spilled out of the cup.

thoughts!

Can you guess?

How many pennies do you think you'll be able to add to a glass filled with water before the water spills over?

Read the directions carefully before you begin this activity.

Directions: Fill the clear plastic cup with water until it is even with the rim. Add pennies, one at a time. Keep count of the number of pennies added. Continue until the water spills over the side.

Class discussion: The qualities of water: adhesion, cohesion and surface tension

Which one or more of these water qualities occurred with this activity?

What happened to support your choice? _____



Fill the cup to the top with water, then see how many pennies you can add.

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AQUARION

Water Company

Name _____

Date _____

Dripping Away



Number of drops placed on penny. _____

Is this number bigger or smaller than your guess?

Can you guess?

How many drops of water do you think you'll be able to put on a penny?

Why do you think this happened: _____

Read the directions carefully before you begin this event.

Directions:

Using an eyedropper, place as many drops of water on the penny as possible without spilling over the edge. Keep track of the number of drops. Continue until water spills over or the water drops collapses.

Class discussion: The qualities of water: adhesion, cohesion and surface tension

Which one or more of these water qualities occurred with this activity?

What happened to support your choice? _____

Describe and/or draw how the water appeared on the penny before the drop collapsed:



AQUARION

Water Company

Name _____

Date _____

Ready Set Go!



Can you guess?

Make a prediction as to what is about to happen.

Read the directions carefully before you begin this event.

Directions: Cut out two boats from a piece of cardboard (see pattern). Place a small drop of dish soap into the notch at the end of the pattern. Place the boat in a tray of water and describe what happens. Time how long it takes to get to the other side.

What caused the boat to move? (Hint: Place a drop of water on the table. What happens to it when you put soap in it?)

Use cardboard to design a better shape for the boat so that it will move faster and in a straight line. Experiment with different shapes of boats, placement and amount of soap used.

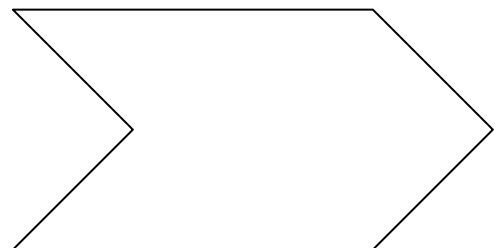
Choose the best design and place the boat at one end of the tray. Time how long it takes to get to the other side.

How long did it take to cross the pan?

Class discussion: The qualities of water: adhesion, cohesion and surface tension

Which one or more of these water qualities occurred with this activity?

What happened to support your choice?



Pattern

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AQUARION

Water Company

Name _____

Date _____

Activity 4. Staying on Top!



Can you guess?

How many paper clips do you think your team can suspend on the surface of the water? _____

Read the directions carefully before you begin this event

Directions: Try placing a paper clip on the surface of the water. (Hint: Lay the paper clip on the prongs of a fork and lower it into the water.) Use a magnifying glass to observe the surface of the water where it comes into contact with the paper clip.

Draw a picture and describe what this looks like.

Write the number of paper clips you suspended on the surface of the water.

Class discussion: The qualities of water: adhesion, cohesion and surface tension

Which one or more of these water qualities occurred with this activity?

What happened to support your choice? _____
