



H₂WhOa! Student Guide

Use this guide to assist you with gathering materials and following along with the activities in the *H₂WhOa!* video. The video has three activities you can do along with the instructor using simple materials. There is a materials list below that you can use to gather everything you need for the experiments. During the video, the instructor will let you know when you will use the materials you need. Pause the video when you need time to prep your materials or conduct your experiment. If you don't have the materials, don't worry, you can still watch the video and observe the experiments. There are vocabulary words in this guide to assist you if the instructor mentions a new word you may not yet know. At the end of the video, answer the reflection questions to test your knowledge.

Objectives:

> Students will explore how water can turn from a solid to a liquid to a gas, as well as how the properties of water make it a unique substance.

Grades: PreK – 2

MATERIALS		
Activity 1: Water Cycle Baggie	Activity 2: Surface Tension Experiments	Activity 3: Chromatography
<ul style="list-style-type: none"><input type="checkbox"/> Three ice cubes<input type="checkbox"/> Ziploc bag<input type="checkbox"/> Tape<input type="checkbox"/> Optional: sharpie markers<input type="checkbox"/> Optional: blue food coloring	<ul style="list-style-type: none"><input type="checkbox"/> Bowl or other shallow dish<input type="checkbox"/> Water<input type="checkbox"/> Paperclip<input type="checkbox"/> Pencil<input type="checkbox"/> Pepper<input type="checkbox"/> Toothpick<input type="checkbox"/> Liquid soap<input type="checkbox"/> Paper towel	<ul style="list-style-type: none"><input type="checkbox"/> Coffee filters<input type="checkbox"/> Markers<input type="checkbox"/> Container/cup of water



Activity 1: Water Cycle Baggie

WHAT TO DO

1. Optional step: add blue food coloring to the ice cube tray before you freeze it.
2. Optional step: Decorate the plastic bag however you wish! Note: If you color the bag in with a lot of darker colors it may be harder to see the condensation.
3. Place the ice cubes in the bag, then seal it shut.
4. Tape the bag in a window where it can get some sunlight. Direct sunlight is ideal.
5. Watch & observe! Come back to check on your bag every so often to track the changes occurring.

MATERIALS

- Three ice cubes
- Ziploc bag
- Tape
- Optional:
sharpie markers
- Optional: blue
food coloring



Activity 2: Surface Tension Experiments

WHAT TO DO

1. Pour some water in the bowl. I added blue coloring to my water so that you can more easily see what's happening, but you can skip this.
2. Grab a paperclip.
3. Put the paperclip in the water. What did it do?
4. Now try again using this technique: Set the paperclip on a small section of paper towel, and then gently place the paper towel in the water. As the paper towel starts to take on water, it will drop away from the paper clip. If you want the paper towel to sink fully, you can poke it down with a pencil.
5. Remove the paperclip and towel from the bowl.
6. Add a few shakes of pepper to the top of the water.
7. Get some dish soap. Take a toothpick and dip it into the soap so that you have the end coated. Now, tap the soapy end to the surface of the water.

MATERIALS

- Bowl or other
shallow dish
- Water
- Paperclip
- Pencil
- Pepper
- Toothpick
- Liquid soap
- Paper towel



MATERIALS

- Coffee filters
- Markers
- Container/cup of water

Activity 3: Chromatography

WHAT TO DO

1. Draw a line on the coffee filter with a marker, then fold into a triangle. Optional: Draw more! Draw as many lines, doodles or designs as you want. Just make sure all drawings are done so that they will end up above the waterline.
2. Set the tip into a cup of water, making sure the ink stays above the waterline.
3. Let the filter sit for a few minutes.
4. When you return you can open the filter up to see your amazing watercolor.

VOCABULARY

Evaporation — a process where liquids change to a gas or vapor.

Condensation — a process in which gas changes into a liquid when it touches a cooler surface.

Precipitation — the liquid and solid water particles that fall from clouds and reach the ground.

Surface — where the liquid water meets the air.

Cohesion — action or property of like molecules sticking together.

Surface Tension — a property of the surface of a liquid that allows it to resist an external force.

Hydrophobic — something or someone that fears water.

Capillary Action — the spontaneous flow of a liquid into a narrow tube or porous material, often acting in opposition to gravity.

Chromatography — the separation of a chemical mixture into different parts by using a liquid or a gas.

STUDENT REFLECTION SHEET

NAME _____

Record what you observed happening in your baggie in the attached chart using words, pictures, or both.

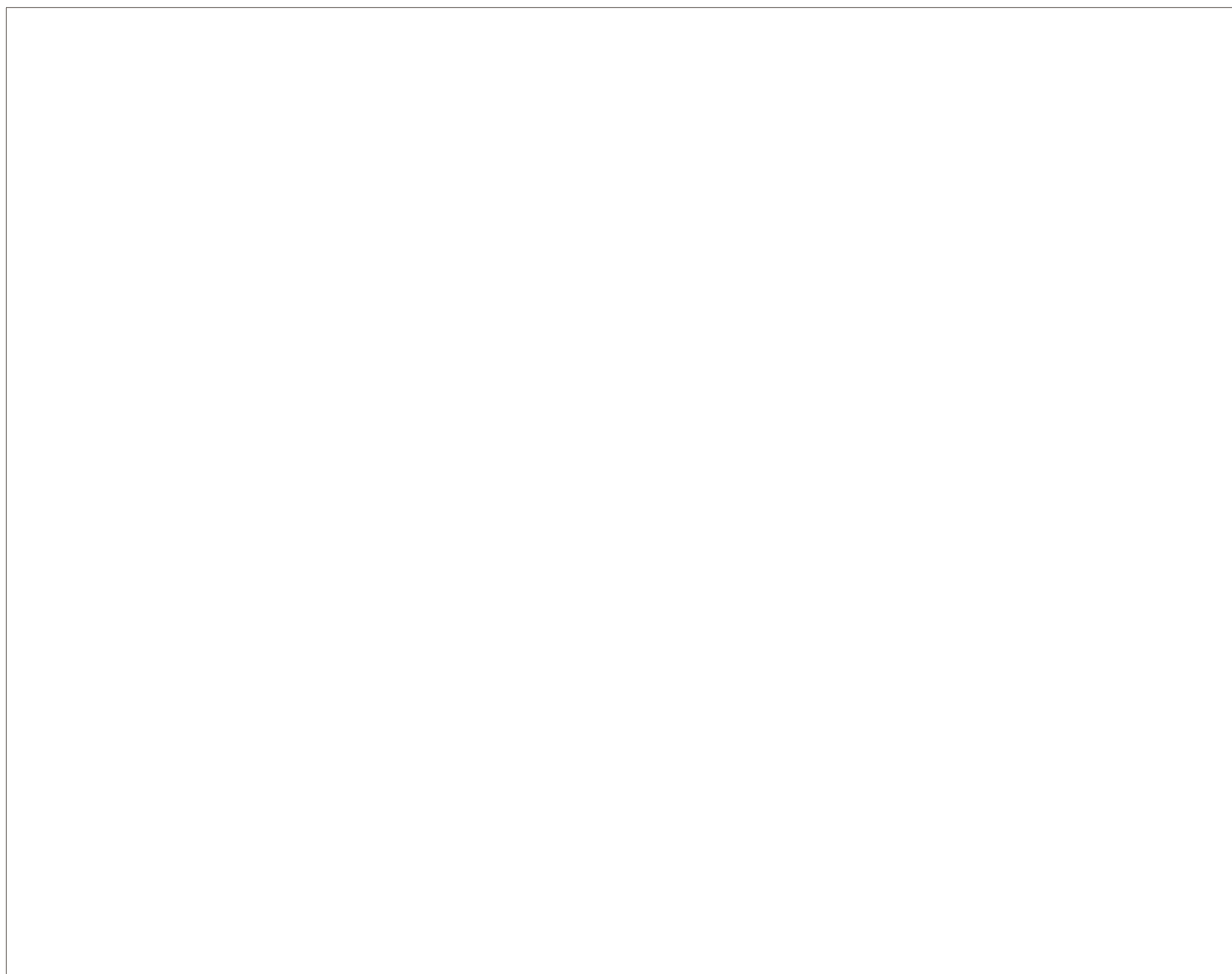
<p>Day 1 Draw what I see:</p> <p>Observation Notes:</p> <hr/> <hr/>	<p>Day 2 Draw what I see:</p> <p>Observation Notes:</p> <hr/> <hr/>
<p>Day 3 Draw what I see:</p> <p>Observation Notes:</p> <hr/> <hr/>	<p>Day 4 Draw what I see:</p> <p>Observation Notes:</p> <hr/> <hr/>

Describe/draw ways that you use water every day? Don't forget about water in solid and gas form too!



What do you think would happen if we didn't have water?

Draw a picture of what your coffee filter looked like below:



What color(s) marker did you use on your dry coffee filter?

What color(s) did you see on your coffee filter at the end of the experiment?

WHAT'S HAPPENING?

Activity 1:

Water is amazing. It is the only substance that can be found on Earth abundantly AND naturally as a solid, liquid and gas. It covers 70 percent of the Earth's surface and you can see its effects every day. One of the most common ways we interact with water is through weather and the water cycle. In our first experiment we are going to put that water cycle in a plastic bag so we can watch and observe.

When the sun hits the plastic bag it heats up the solid ice cube and melts them into a liquid. After a while evaporation occurs and that liquid will turn into water vapor. It rises to the top of the bag where condensation occurs, where that water vapor turns back into water droplets which, when enough collect in a "cloud," they get too big to stay up and come down which is called precipitation. Precipitation can be rain, snow, sleet, hail — anything that comes down from the sky. From there, the water cycle starts all over again.

Activity 2:

This experiment is all about looking a little more closely at what makes water such a special substance! Water molecules like to stick together. We call this cohesion. The water wants to stick together so it will hold up small objects — like the paperclip — rather than be pushed apart. Pepper flakes are also easily held up by the water's surface tension.

Soap works by breaking up those water molecules, allowing them to be pushed apart. Since the water molecules don't want to be broken up, they move away from where you tap the soap, and they carry the pepper flakes with them as they move.

Activity 3:

Water is so powerful it can even travel uphill, against gravity! It does this through something called capillary action, which is when water can flow through a narrow space, a solid material with small holes, or a hollow tube. Because of that cohesion we talked about earlier, the water molecules stick to each other which helps them climb up those narrow tubes.

In this experiment as the water climbs up the coffee filter, it starts to mix with the ink of the markers. Most marker colors are actually made by combining a few different colors together. When the water travels through the marker ink, it separates the marker back out into the different colors that make it up. This is what creates our cool "watercolor" designs!

Check out more activities at www.nysci.org