

# Properties of Water Lab

**Stations have been set up around the room. At each station, your group will perform the experiment indicated. The experiments can be done in any order. When you arrive at each station:**

1. Read and follow procedures.
2. Record answers in the table provided.
3. If required, **PREDICT** before observing.
4. Record your observations.
5. Write a possible explanation for your observations.

## Station #1: Freeze

Materials: one ½ pint plastic water bottle filled to the rim with water and frozen (NO lid), one ½ pint plastic water bottle filled to the rim with water and left at room temperature, container filled with water (large enough for the bottles to fit), Parafilm, and paper towels to cover the bottles.

### Procedure:

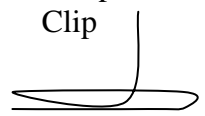
1. **PREDICT** what the frozen water bottle will look like. How will it compare to the bottle that was not frozen? **PREDICT** what will happen when you place bottles in a container of water.
2. Uncover the bottles and record your observations.
3. Cover both bottle openings tightly with Parafilm or plastic wrap.
4. Place both bottles in the pan of water and record your observations.
5. Remove and dry the bottles, remove the Parafilm or plastic wrap and cover the bottles for the next group.

| Station #1: Freeze              |             |             |
|---------------------------------|-------------|-------------|
| Prediction                      | Observation | Explanation |
| Frozen                          |             |             |
| Room temperature                |             |             |
| What do you still want to know? |             |             |

**Station #2 Part 1: Dish and clips**

Materials: paper clips, tweezers or bent paper clip, water in a bowl or large cup, paper towels.

Bent Paper  
Clip



**Procedure:**

1. **PREDICT** what will happen when you **gently** place a paperclip on the surface of water.
2. Make sure the paperclip is dry, use the tweezers or bent paper clip to **gently** put the paperclip **on** the surface of the water and observe. Can you put more than one paperclip on the surface of the water?
3. When finished, refill the cup if necessary; dry the paper clip, and place it on a paper towel for the next group.

| #2 Part: Dish and Clips         |             |             |
|---------------------------------|-------------|-------------|
| Prediction                      | Observation | Explanation |
|                                 |             |             |
| What do you still want to know? |             |             |

**Station #2 Part 2: Clean Dish and Clips**

Materials: paper clips, tweezers or bent paper clip, water mixed with several drops of detergent in a bowl or large cup, paper towels.



Bent Paper  
Clip

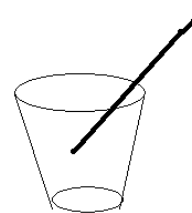
**Procedure:**

1. **PREDICT** what will happen when you place a paperclip on the surface of the water-detergent mixture.
2. Make sure the paper clip is dry, use the tweezers or bent paper clip to **gently** place the paperclip **on** the surface of the water and observe. Can you put more than one paperclip on the surface?
4. When finished, refill the cup if necessary; dry the paper clip and place it on a paper towel for the next group.

| #2 Part 2: Clean Dish and Clips |             |             |
|---------------------------------|-------------|-------------|
| Prediction                      | Observation | Explanation |
|                                 |             |             |
| What do you still want to know? |             |             |

**Station #3: Stir it Up**

Materials: glass stirring rod, plastic coffee stirrer (or plastic straw),  
2 clear plastic cups, paper towels,



**Procedure:**

1. Make sure the glass rod and coffee stirrer are dry.
2. Fill one cup with water.
3. Hold the glass stirring rod at a 45<sup>0</sup> angle over the center of the empty cup.
4. Slowly pour all water from the first cup on to the top end of the stirring rod into the empty cup.
5. Record your observations.
6. Repeat Steps 1-5 using a plastic coffee stirrer (or plastic straw).

| <b>#3 Stir it Up</b>            |             |
|---------------------------------|-------------|
| Observation: glass rod          | Explanation |
| Observation: coffee stirrer     | Explanation |
| What do you still want to know? |             |

**Station #4 Part 1: Stop on a Dime**

Materials: dropper, dime, cup of water, paper towels

**Procedure:**

1. **PREDICT** how many drops of water will fit on the dime before it spills over the edge.
2. Hold the dropper vertically. Count the drops as you carefully add water to the surface of the dime.  
**Stop** when water spills over the edge.
3. Record your observations.
4. Dry the dime and refill the cup for the next group, if necessary..

| <b>#4 Part 1-Stop on a Dime</b> |             |             |
|---------------------------------|-------------|-------------|
| Prediction                      | Observation | Explanation |
|                                 |             |             |
| What do you still want to know? |             |             |

**Station # 4 Part 2: A Clean Dime**

Materials: dropper, dime, cup of water with several drops of detergent mixed in, paper towels

**Procedure:**

1. **PREDICT** how many drops of water with detergent will fit on the dime before it spills over the edge.
2. Hold the dropper vertically. Count the drops as you carefully add water to the surface of the dime.  
**Stop** when water spills over the edge.
3. Record your observations.
4. Dry the dime and refill the cup for the next group, if necessary.

| <b>#4 Part 2- A Clean Dime</b>  |             |             |
|---------------------------------|-------------|-------------|
| Prediction                      | Observation | Explanation |
|                                 |             |             |
| What do you still want to know? |             |             |

**Station #5: Wax on, Wax off**

Materials: sheet of wax paper (or Styrofoam tray), dropper, water in cup, rubbing alcohol in cup, paper towels

**Procedure:**

1. Holding the dropper vertically, form a circle of water about the size of a nickel on the wax paper.
2. Place the tip of the dropper in the center of the circle and slowly drag the circle of water around.
3. Record your observations.
4. **PREDICT** what will happen when rubbing alcohol is used instead of water.
5. Dry the wax paper and repeat steps 1-3 with rubbing alcohol.
6. When finished, dry the wax paper for the next group.

| #5 Wax on, Wax off              |                             |                             |
|---------------------------------|-----------------------------|-----------------------------|
| Observation-water               | Explanation-water           |                             |
| Prediction-rubbing alcohol      | Observation-Rubbing alcohol | Explanation-rubbing alcohol |
| What do you still want to know? |                             |                             |

**Station #6: Ballooney**

Materials: paper towels, balloons, water in buret, buret stand, cup of water. If you don't have burets, use a **very** thin stream of water from a faucet. Leave the water from the faucet running to maintain a consistent stream.

**Procedure:**

1. Blow up a balloon. Tie a knot in it.
2. **PREDICT** what will happen when the balloon gets close to a stream of water.
3. Fill the buret and make a stream of water flow from it into the cup (or turn on a very small stream from a faucet)
4. Place the balloon near, but not touching, the stream of water.
5. Record your observations.
6. **PREDICT** what will happen when a balloon rubbed with a paper towel is held close to a stream of water.
7. Rub the balloon with a paper towel.
8. Bring the balloon near, but not touching, the stream of water.
9. Record your observations.
10. Clean up any spilled water and throw the balloon away to get ready for the next group.

| <b>#6 Ballooney</b>             |             |             |
|---------------------------------|-------------|-------------|
| Prediction #1                   | Observation | Explanation |
| Prediction #2 Rubbed balloon    | Observation | Explanation |
| What do you still want to know? |             |             |

**Station #7: Anti-Gravity**

Materials: paper towels, shallow dish, stapler, cup of colored water, metric ruler, marker

**Procedure:**

1. Fill the dish ½ full of colored water.
2. Fold a paper towel in half, then roll it into a tube which has a diameter smaller than the dish and staple it together.
3. Stand the rolled paper towel in the water and observe until the water stops moving.
4. Record your observations.
5. When the water movement has stopped, remove the paper towel tube and mark the point where the water stopped.
6. Measure and record (in centimeters) the distance the colored water traveled up the paper towel.
7. Empty and dry the dish to get ready for next group. Throw the paper towel away.

| #7 Anti-Gravity                     |             |
|-------------------------------------|-------------|
| Observation                         | Explanation |
| Distance water traveled in cm _____ |             |
| What do you still want to know?     |             |

**Station 8: Look Very Carefully!**

Materials: 2 plastic 10ml graduated cylinders (or small plastic test tubes), 2 glass 10 ml graduated cylinders, (or small glass test tubes) Label 1 plastic cylinder **rubbing alcohol** and one **water**. Label one glass cylinder **rubbing alcohol** and one **water**. Add equal amounts of water or rubbing alcohol to the appropriately labeled cylinder.

**Procedure:**

1. **Leave the cylinder on the table and carefully** look through the side of the graduated cylinder at the surface of the liquid.
2. **Sketch** and label what you see.

| #8 Look Very Carefully!           |                            |  |
|-----------------------------------|----------------------------|--|
| Sketch and label what you see     | Explain                    |  |
| Water in glass                    | Rubbing alcohol in glass   |  |
| Water in plastic                  | Rubbing alcohol in plastic |  |
| What else would you like to know? |                            |  |

**Station # 9: Pepper Anyone?**

Materials: shallow round container, pepper, toothpicks or cotton swabs, detergent in a small container, cup of water

**Procedure:**

1. Fill the shallow container  $\frac{1}{2}$  full of water.
2. Sprinkle pepper on the water and record your observations.
3. Carefully touch the surface of water in the middle of the container with the toothpick or swab and record your observations.
4. Dip the tip of a toothpick or cotton swab into the detergent.
5. Carefully touch the surface of water in the middle of the container with the detergent toothpick or swab.
6. Record your observations.
7. Discard the contents of the container, and rinse it well to prepare for the next group.

| <b>#9 Pepper Anyone?</b>          |   |             |
|-----------------------------------|---|-------------|
| Sketch the pepper and water       | Sketch again after touching with toothpick or describe what happened            | Explanation |
| Sketch the pepper and water       | Sketch again after touching with detergent toothpick or describe what happened. | Explanation |
| What else would you like to know? |   |             |



**Station #10: What's the difference?**

Materials: water from different sources (tap, bottled, distilled, spring, pond, etc.), plus any other liquids such as lemon juice, perfume, cola, eye drops, milk, etc that you have available. Choose the number of liquids you have time for. Large scale (pH 0-14) pH paper (or pH probes), small containers for each of the liquids

**Procedure:**

1. Place equal amounts of each liquid in the containers and label. Your teacher may have done this for you.
2. Record all water from different sources first, followed by the rest of the liquids.
3. **PREDICT** the pH of each liquid.
4. Dip a piece of pH paper into each type of water and the other liquids.
5. Record the pH.
6. Dispose of the pH paper and liquids according to your teacher's instructions.

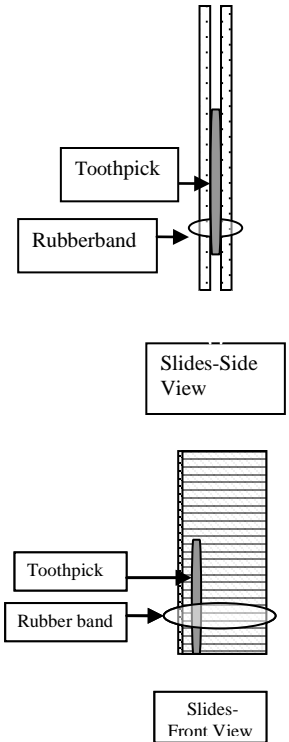
| <b>Station #10 - What's the difference?</b> |              |             |             |
|---|--------------|-------------|-------------|
| Substance                                   | Predicted pH | Observed pH | Explanation |
| 1.  |              |             |             |
| 2.  |              |             |             |
| 3.  |              |             |             |
| 4.  |              |             |             |
| 5.  |              |             |             |
| 6.  |              |             |             |
| 7.  |              |             |             |
| 8.  |              |             |             |
| 9.  |              |             |             |
| 10.   |              |             |             |
| 11.   |              |             |             |
| 12.   |              |             |             |
| 13.   |              |             |             |
| What else would you like to know?           |              |             |             |

**Station #11: Sliding through ACC (Adhesion, Cohesion and Capillary action)**

Materials: 4 glass slides, 1 toothpick, 2 rubber bands, and shallow dish with water

**Procedure:**

1. Place 2 slides together.
2. Put a rubber band around them to hold them together. This will be the control.
3. Place 2 more slides together, with a toothpick between them.
4. Put a rubber band around them to hold them together.
5. **PREDICT** what will happen when the short end of the slides are placed in the shallow dish of water.
6. Record your predictions
7. Place the short end of both slides into the dish of water.
8. Record your observations.
9. Dispose of the slides according to your teacher's instructions.



| Prediction            | Observation | Explanation |
|-----------------------|-------------|-------------|
| Slide to slide        |             |             |
| Slides with toothpick |             |             |

**Station #12: Water Magnet Model**

Materials: Water magnet models

Procedure:

1. Manipulate the models
  2. Answer the questions.
- 
1. Pull the pieces apart until there are 4 models, each containing one red and two white parts. What does each of these four models represent?
  
  
  
  
  
  
  
  
  
  
  2. What does the red part represent? The white part?
  
  
  
  
  
  
  
  
  
  
  3. Put the 4 water molecules close together again until they connect. Sketch and explain what happens.
  
  
  
  
  
  
  
  
  
  
  4. What happens when you put two white parts together? Two red parts?
  
  
  
  
  
  
  
  
  
  
  5. What type of force is attracting the models to each other? What type of force attracts actual water molecules to each other?
  
  
  
  
  
  
  
  
  
  
  6. What holds the oxygen to the hydrogen in an actual water molecule?