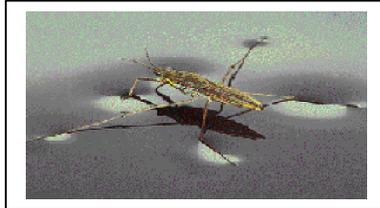


Name: \_\_\_\_\_ Date: \_\_\_\_\_

Partners: \_\_\_\_\_

# Willy the Water Strider



## Introduction

Willy the Water Strider has a problem. Water striders are insects that live on the surface of the water in slow moving streams, as well as in oceans. They are very sensitive to motion around them, and can move at a rate of about a meter per second. About three weeks ago, someone reported that the river was changing a few miles upstream. Something was causing the striders to fall in the water, instead of being able to walk like they usually do. In the past week, several of Willy's family members strode upstream to investigate, but, according to witnesses, they fell through the water. The new and dangerous river water seems to be getting closer to Willy's home, and he's concerned for his life. Willy never thought about what enables him to walk on water. He always took it for granted. But now as his life seems in danger, he wonders what helps him walk on water. Perhaps if he can figure that out, then he can learn how to save himself. What might be causing the Water Striders to fall in the water?

## Your Job

Your job is to investigate what keeps Willy on top of the water.

## Materials

Part 1 (Needle in a Petri Dish): Water, Alcohol, Needle, Petri Dish, Detergent

Part 2 (Penny Drop): Water, Dropper, Pennies

Part 3 (Over the Top): Water, Dropper, Pennies, Cup

Part 4 (Pepper Time): Water, Petri Dish, Pepper, Detergent

Part 5 (Wax Paper): Water, Wax Paper, Dropper

## Procedure

### *Part 1: Needle in a Petri Dish*

Fill a Petri dish with water. Put the needle on a fork and slowly lower the fork over the water, then into the water, then down so the needle floats. Were you able to make it float?

Then fill a Petri dish with alcohol. Try floating the needle in it by dipping it in with the fork. Were you able to make it float?

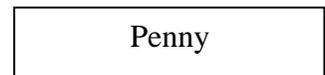
Put the needle in water again. Make it float. Then dip a second needle in detergent. Try to make it float. What happened?

***Part 2: Penny Drop***

Guess how many drops of water you can place on the surface of a penny without it spilling over: \_\_\_\_\_

With a penny, conduct two separate trials to see how many drops the penny can hold. Use heads or tails and use two different pennies.

Draw what the water on the penny looks like before the water spills over:



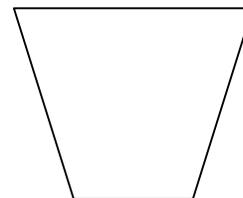
Trial 1 \_\_\_\_\_ Trial 2 \_\_\_\_\_ Calculate the average: \_\_\_\_\_

***Part 3: Over the Top***

Fill a small cup with water to the top without spilling over.

How many pennies do you think you could add before the water spills over? \_\_\_\_\_

Slowly add pennies to the lass of water one at a time. What does the side of the glass look like as you add more pennies? Draw the side view below:



How many pennies did you add before it spilled over? \_\_\_\_\_

***Part 4: Pepper Time***

Fill a Petri dish with water. Sprinkle pepper over the top of the water. What do you observe?

How many pepper pieces are immersed in the water?

Place one drop of detergent in the dish. What did you observe?

Are there more or less pepper pieces immersed in the water?

### ***Part 5: Wax Paper***

Take a piece of wax paper and place some drops of water on the wax paper. Try to push the water drops together. What do you observe?

Draw how the water looks on the wax paper.

### **Questions**

1. What enables Willy to walk on water?
2. What is surface tension?
3. What caused the water molecules to stick together and create surface tension?
4. Why did the needle float easier on the water than on the alcohol?
5. How did the addition of detergent affect the surface tension of water?
6. Why does detergent have this effect on water?
7. What shape did water take while on top of the glass or on top of the penny?
8. Why did water take on a dome shape, and not a flat one when on the wax paper?
9. Based on the evidence you collected in this activity, what do you think might be causing all the Water striders to fall into the water?
10. What are hydrogen bonds?
11. Draw four water molecules, and show how they are attracted to one another (show the charges).