Honors Biology Sticky Water Lab

Introduction: (Summarize in your own words in 3-5 sentences) The water molecule has an overall neutral charge, but its structure makes it a polar molecule. The polarity of the water molecule causes it to be attracted to other water molecules as well as molecules of other substances like tiny magnets. The cohesive force that occurs between water molecules is so strong that when comes in contact with another medium, such as air, the water creates a "sticky skin", which is known as surface tension. These bonds are so strong that they can support insects on pond water; you may have seen this before demonstrated by a water strider.

Objectives: (copy)
- To experiment with the adhesive and cohesive properties of water.
- To understand the effects of hydrogen bonds

Pre-lab: Explain the following properties of water (in your own words):
1. Polarity vs. Nonpolarity
2. Cohesion
3. Adhesion
4. Capillary Action (search on the web, don’t forget to cite your source!)

Materials: (copy)
Cups (red cup for soapy water; blue cup for plain water)
Forks
Pennies
Soap
Paper clips
Pipettes

Procedure - Part A - Pennies:
- Each pair of students will have a penny, three pipettes, a green cup for plain water, a red cup for soapy water, and paper towels.
- Copy the data table in your lab notebook, make a prediction as to how many drops of water can be dropped on the surface of a penny without breaking the surface tension.
- Write a step-by-step procedure for this portion of the lab.

<table>
<thead>
<tr>
<th>Predicted number of drops of water added before collapse</th>
<th>Water</th>
<th>Soapy Water</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual number of drops</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Procedure Part B - Paperclips:
• Each pair of students will have a fork, ten or more paper clips, a green cup, a red cup and paper towels.
• Make a data table in your lab notebook, make a prediction about how many paperclips you will be able to float on top of the water compared to soapy water.
• Write a step-by-step procedure for this portion of the lab.

Data: (copy)

<table>
<thead>
<tr>
<th></th>
<th>Regular water</th>
<th>Soapy water</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of clips predicted</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Using fork</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of clips actual</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Using fork</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Analysis Questions:
Use the properties of water from your pre-lab to explain the behavior of water in each of the procedures in this lab. There may be more than one property of water responsible for the observed behavior. Do NOT copy the questions, write your answers in complete sentences instead!

1. What properties of the water account for the differences found in the number of regular water drops compared to the number of soapy water drops placed on the dry penny? Explain your answer.
2. Why do you think the paperclips were supported on the water?
3. Explain the differences in the number of paper clips that floated on the surface of soapy water and clips that floated on plain water.

Conclusions: (in paragraph form addressing the questions below) Do NOT copy the questions, write your answers in complete sentences instead!

1. Discuss the results of your experiments. Were your hypotheses correct? Why or why not?
2. How does the addition of soap interfere with bonds between water molecules? (You may need to research the polarity of soap)
3. Explain the properties of water that were tested in this lab. How did we test for them and how did the data you collected support your hypothesis?