Name: ______________________

Paper or Plastic?

Background
Properties of matter have been observed in many lessons. This activity will show the importance of identifying and testing physical properties in the real-world. Today’s focus is on plastics. Large companies such as Dow Chemical are responsible for producing many different types of plastics for their customers, and so they are only as successful as the plastic products they produce. Testing the plastic materials that they produce is very important.

Pre-lab Questions
1. There are many types of plastic bags for sale in the grocery store. How do you select which type to purchase?

2. What makes one plastic bag better than another in your opinion?

3. What physical properties, if any, did you identify in questions 1 and 2?

Objective
You will research and investigate the physical properties of a variety of plastic bags in order to design and develop a prototype bag.

Safety
- Always wear safety goggles when handling chemicals in the lab.
- Wash your hands thoroughly before leaving the lab.
- Follow the teacher’s instructions for cleanup of materials and disposal of chemicals.

Procedure
1. There are 6 Testing Stations. Instructions for completing each test are provided at each station.
2. Follow the instructions at each station. You will complete the test for each plastic bag sample provided at the station. This means you will complete the same test multiple times while at the station.
3. When you have completed a station, rotate to another testing station. You must complete the tests at each station.
4. Record all of your test results in the data table provided below.
**Data**
Record all test results in the provided data table below.

**Analysis**
1. Based on the collected data which plastic bag would you consider to be the best? Explain why.

2. Plastics are made of molecules called *polymers*. Based on your testing, are all polymers the same? What similarities and differences did you observe?

3. Choose the bag that you believe is the worst of the bags you tested. What improvements would you suggest to improve it?

4. Were the tests that you completed during this lab reliable? Suggest a way that one of the tests you completed could be improved to make the results more reliable?

**Conclusion**
Pretend you are an employee for Dow Chemical Company. A customer wants you to design a special plastic bag for them that can hold 15lbs of sand, and it must be able to be lifted quickly without breaking as well as not puncture easily.

You have access to all of the materials needed to make any of the plastic bags that you tested today. Explain what materials you would use to design this bag (you can combine the materials from a variety of bags to make a unique bag!), be sure to explain why you are making these choices.
<table>
<thead>
<tr>
<th>Type of Plastic Bag</th>
<th>Station 1: Strength</th>
<th>Station 2: Tearing</th>
<th>Station 3: Stretch</th>
<th>Station 4: Air Capacity</th>
<th>Station 5: Water Capacity</th>
<th>Station 6: Puncture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Produce bag A</td>
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<tr>
<td>Produce bag B</td>
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<td>Produce bag C</td>
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<td>Trash bag A</td>
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<td>Trash bag B</td>
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<tr>
<td>Retail bag A</td>
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<td>Retail bag B</td>
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