Pre Lab (High School):

1. Please watch this brief animation on the Transforming Principle:
   
   [link]

2. What is the name of the scientist who published a study in 1928 on 2 different strains of Pneumococcus bacteria?

3. In the animation we are shown images of smooth (S) bacteria and rough (R) bacteria. These different types of bacteria are named after their different physical traits. Explain why you think they have different traits.

4. Why are the S bacteria able to survive in the mouse but the R bacteria are not?

5. Griffith combined heat killed S bacteria with living R bacteria. What molecule from the S cells has been released, taken up by the living R cells, and resulted in a transformation of the R cells?

6. How did Oswald Avery build upon Griffith’s work?
Pre-Lab (Middle School):

1. What do you know about bacteria?

   **Bacteria are unicellular organisms that lack a nucleus and membrane bound organelles.**

2. What do you know about *E. coli*?

   **E. coli are bacteria found in the environment, foods, and in the intestines of animals. While most strains of *E. coli* are harmless, some can make us sick.**

3. Briefly describe the difference between how humans store DNA to how bacteria store DNA. You might find it useful to draw a diagram!

   **Human cells store most of the DNA in a nucleus while bacteria cells have no nucleus.**

4. What does it mean when someone or something undergoes a "transformation"? Predict how we will be "transforming" bacterial cells.

   **A transformation is a change. We will be changing the bacteria by changing their DNA.**
Laboratory Worksheet (High School and Middle School):

1. As you watch or perform the experiment, keep track of what is in each tube. (Remember to add volumes.)

<table>
<thead>
<tr>
<th>+ Tube</th>
<th>- Tube</th>
</tr>
</thead>
<tbody>
<tr>
<td>250 µl CaCl2</td>
<td>250 µl CaCl2</td>
</tr>
<tr>
<td>mm294</td>
<td>mm294</td>
</tr>
<tr>
<td>10 µl pGFP (0.008 µg/µl)</td>
<td>No plasmid</td>
</tr>
<tr>
<td>250 µl LB</td>
<td>250 µl LB</td>
</tr>
<tr>
<td><strong>TOTAL VOLUME = 1010 µl</strong></td>
<td><strong>TOTAL VOLUME = 1000 µl</strong></td>
</tr>
</tbody>
</table>

2. What is the purpose of the – tube in the experiment?

   The – tube is the negative control.

3. Explain what a bacterial colony is.

   A group of identical cells (clones) derived from a single progenitor cell.
4. In the space below, draw your expected results.

![Diagram of expected results]

- LB -pGFP (No Growth)
- LB +pGFP
- Amp -pGFP (No Growth)
- Amp +pGFP (Colonies present)