Name: **Date:**

AP Biology Prelab for Lab 6: Molecular Genetics

Part 6A: Bacterial Transformation

1. Explain what happens during the process of bacterial transformation.

2. Explain the similarities and differences of the bacterial genome and plasmids.

3. What are the benefits of plasmids to prokaryotes? How can plasmids be transferred from one bacterium to another?

4. Draw a rough diagram of the recombinant pGLO plasmid. Include any genes and DNA sequences of note. Explain the origin and function of each.

5. How will the pGLO plasmid be introduced into the *E. coli* bacterium in this lab?

6. If we were to put the pGLO plasmid under a black light, would the DNA glow? Why or why not?

7. What is the purpose of adding arabinose sugar into the agar mixture?

8. How will we identify which bacterial colonies have taken up the pGLO plasmid?

9. You have four plates. Two plates are inoculated with bacteria that were not exposed to the plasmid (-pGLO) and two plates are inoculated with bacteria that have been exposed to the plasmid (+pGLO). Make predictions of whether bacteria will grow on the plate or not and if the bacteria will glow. Explain each prediction.
    a. –pGLO bacteria on a plate with ampicillin and no arabinose:

    b. –pGLO bacteria on a plate without ampicillin or arabinose:

    c. +pGLO bacteria on a plate with ampicillin and no arabinose:

    d. +pGLO bacteria on a plate with arabinose and ampicillin:

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AP Biology Prelab for Lab 6: Molecular Genetics

Part 6B: DNA Fingerprinting

1. What are restriction endonucleases (aka “restriction enzymes”) and how are they used in gel electrophoresis?

2. Give examples of three restriction enzymes and the sequences they recognize. Indicate where the enzymes cut their restriction sequences.

3. In what organism were restriction enzymes discovered? What is the hypothetical purpose of restriction enzymes in that organism?

4. What is the overall electrical charge on a DNA molecule? Why does DNA have this charge?

5. Explain how gel electrophoresis works and what is produced as a result. Make sure to explain the function of the agarose gel, the buffer solution and the electrical current.

6. How many bases of DNA are in a 1 kilobase fragment?

7. During gel electrophoresis, what is the relationship between the size of a DNA fragment and the distance it migrates down a gel?

8. What is a restriction fragment length polymorphism (aka “RFLP”)?

9. Give three examples of how RFLP analysis can be used in biotechnological applications.