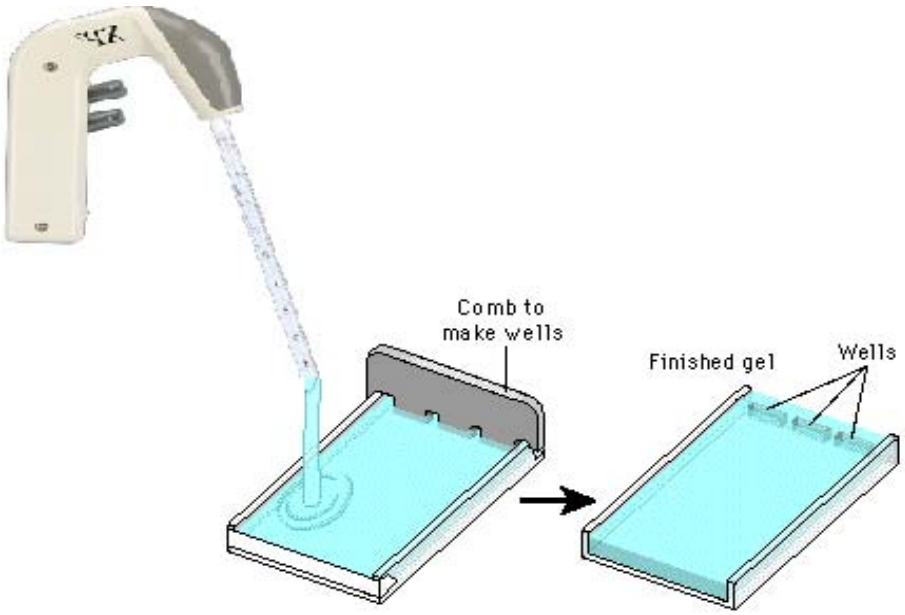
Name _____ **Per.** _____ **Date** _____

Chapter 12- Make Up Lab
DNA Fingerprinting

Read about the following experiment and results. When finished answer the questions.

Students will be learning about agarose gel electrophoresis as a tool for separating DNA fragments and how it is used for DNA fingerprinting.

<u>Part 1</u>- Preparing the Agarose Gel
The student will prepare the agarose gel by setting the smooth glass slide on a level table surface. Next the student attaches a pipet-aid to 10mL pipette. The student then obtains 7mL of melted agarose solution and promptly returns to their seat to carefully spread the melted agarose onto the glass slide. The student positions the comb onto the agarose and allows the agarose to cool for 3-4 minutes, solidifying the agarose into a gel. The student recognizes that the agarose is a gel when the gel appears cloudy in color.



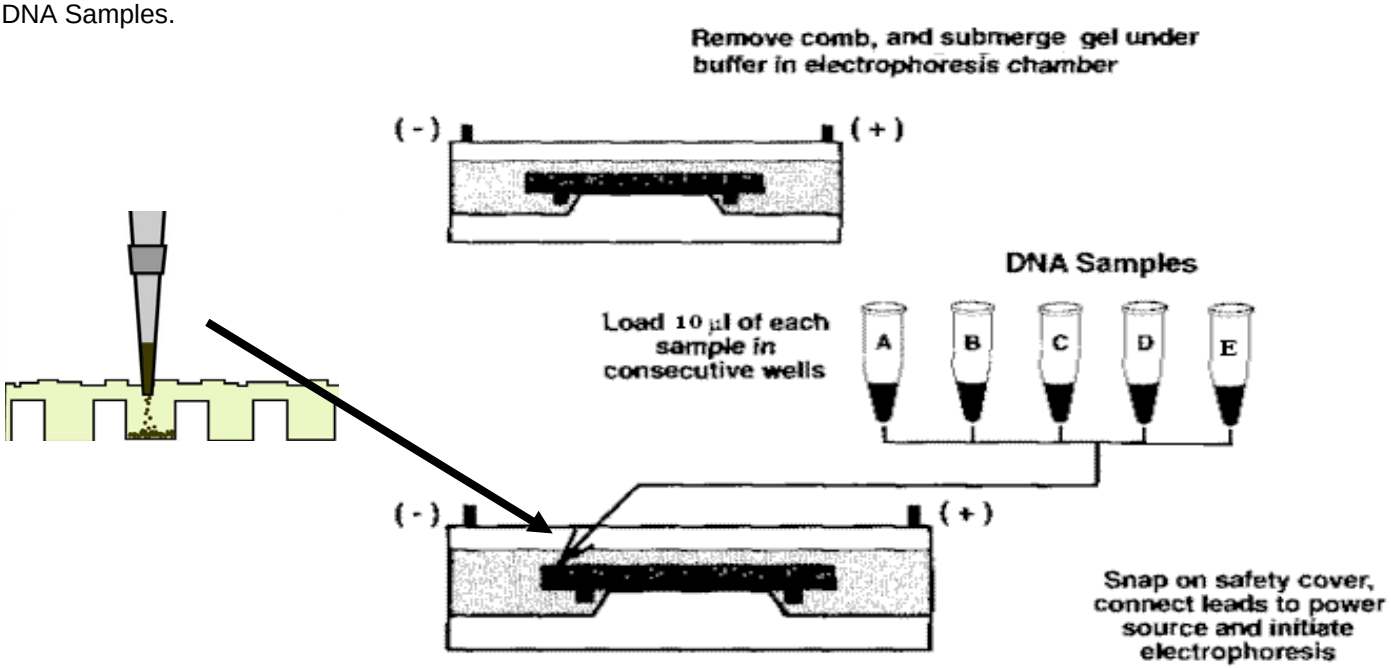
1 What is the **<u>purpose</u>** of this experiment?

2 List all of the **<u>materials</u>** that students will be using during this part of the experiment.

3 List all of the **<u>procedures</u>** that students will be doing during this part of the experiment.
Be sure to number your procedures.

Part 2- Loading the Gel

After 3-4 minutes, the student removes the comb and has successfully created 5 wells in the agarose gel. The student then places the glass slide and gel into the gel electrophoresis box. The student places the gel in the gel box making sure that the wells are on the negative side of the box. Next, the student adds just enough buffer to submerge the glass slide, gel, and wells. Once the gel is in the box, the student obtains 4 different DNA samples labeled A through E. The student attaches a new micropipette tip to the micropipette, which is set to aliquot 10µL. The student pushes down on the plunger of the micropipette, inserts the tip into DNA Sample A, and releases the plunger, sucking up 10µL of DNA Sample A. The student then inserts the tip of the micropipette into the first well of the gel, being cautious to not let the tip touch the gel. The student pushes down on the plunger expelling the 10µL of DNA Sample A into the well. The student repeats the micropipetting procedures for DNA Samples B through 5 and loads the remaining wells 2 through 5m making sure a new micropipette tip is used for each DNA Sample. Once all 5 wells are loaded the student is ready to run the gel loaded with 5 different DNA Samples.

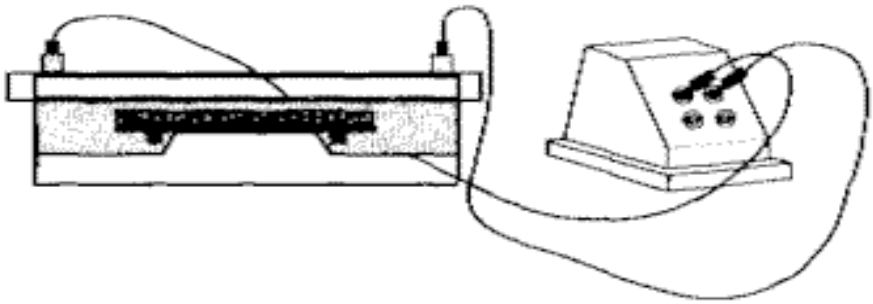


1 List all of the **materials** that students will be using during this part of the experiment.

2 List all of the **procedures** that students will be doing during this part of the experiment. Be sure to number your procedures.

Part 3- Running the Gel

The student has successfully loaded the 4 samples of DNA into the 4 wells. Next, the student closes the lid of the gel box being careful to not disturb the buffer. The student turns the power supply on and sets the voltage to 200 volts and lets the gel run for 15 minutes. While waiting, the student checks the gel box to see if the buffer has bubbles, which are created by the electrodes in the gel box. After 15 minutes the student turns off the power supply, removes the lid, and carefully picks up the glass slide and gel. Next, the student places the glass slide and gel into the staining tray.

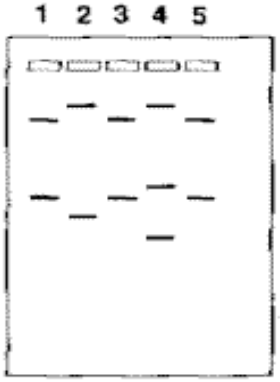


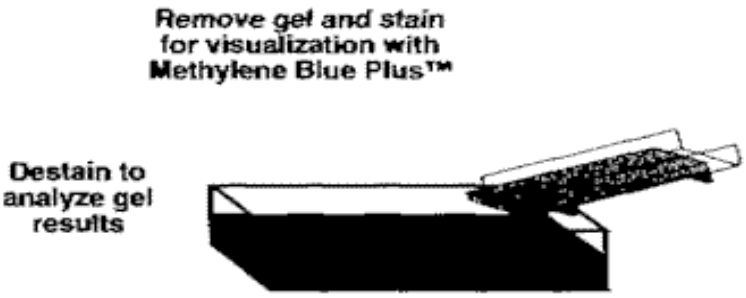
1 List all of the **materials** that students will be using during this part of the experiment.

2 List all of the **procedures** that students will be doing during this part of the experiment. Be sure to number your procedures.

Part 4- Staining the DNA in the Gel

While in the staining tray, the student adds methylene blue stain to the glass slide and gel. The student stains the gel for 5 minutes carefully rocking the tray back and forth. The student repeats the staining process one more time. After staining, the student rinses the gel with deionized water 2 times to remove any stain on the gel. Again, the student rocks the tray back and forth for 5 minutes. When staining is finished, the student places the gel on a light to see the different DNA bands created by gel electrophoresis.





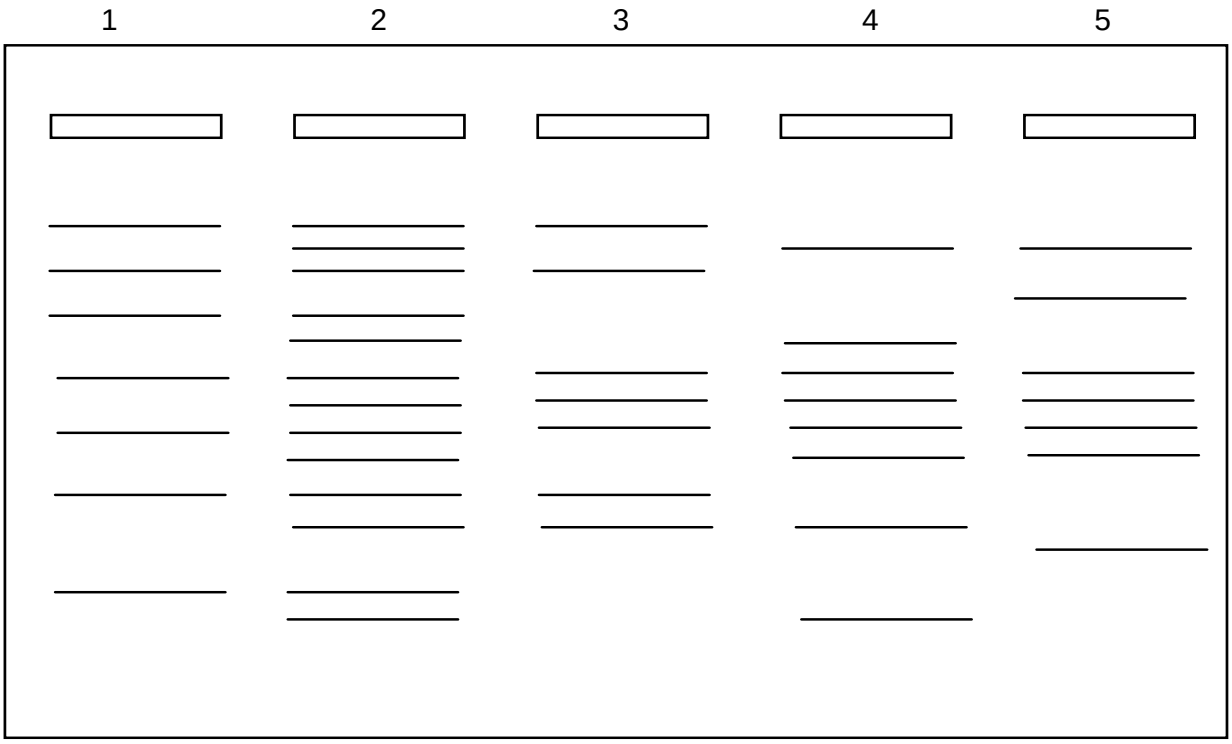
1 List all of the **materials** that students will be using during this part of the experiment.

2 List all of the **procedures** that students will be doing during this part of the experiment.
Be sure to number your procedures.

Results

Below are the DNA gel results. For each well, the following DNA samples were loaded.

Well #1- DNA sample from mother's blood
Well #2- DNA sample from baby's blood
Well #3- DNA sample from blood of possible father E
Well #4- DNA sample from blood of possible father F
Well #5- DNA sample from blood of possible father G



Analysis Questions

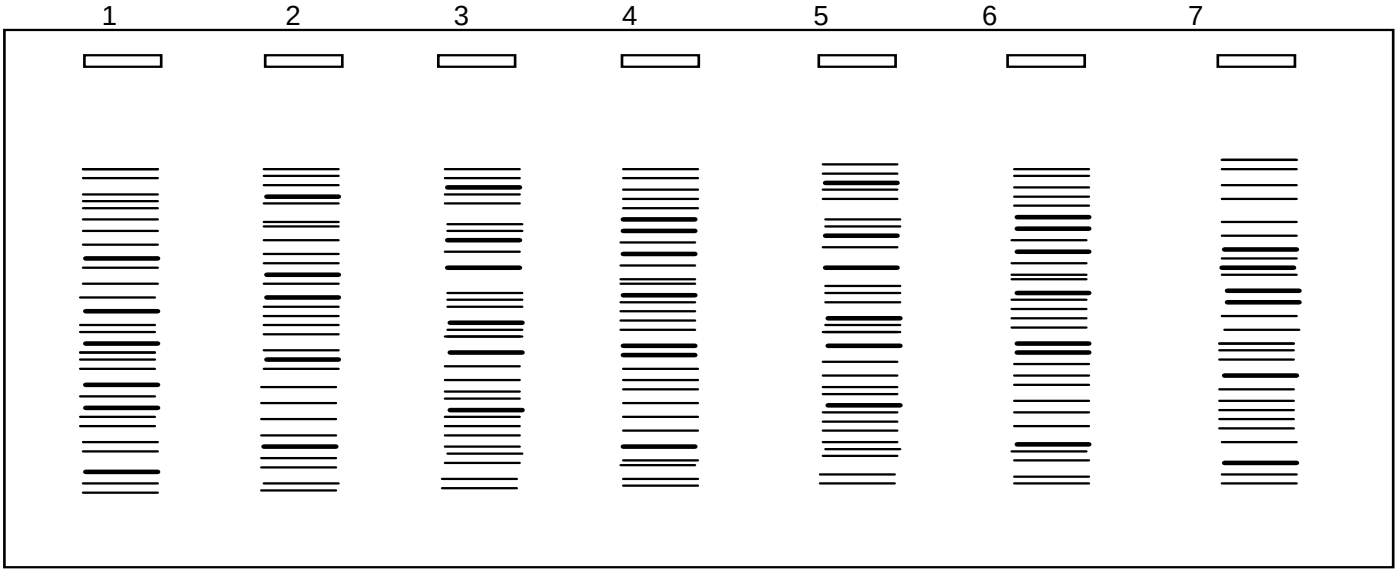
1 Based on your gel results, who is the father of the baby?

2 Explain how you were able to determine the father of the baby.

Assume that you are a molecular biologist involved in forensic medicine. Two women have been raped within a span of 2 weeks and you have been given the following evidence relating to the crime: Blood samples from both women, semen collected on each victim, and blood samples from three possible suspects.

Using the information and the DNA gel below, answer the following questions.

Well #1- Blood from Victim A
Well #2- Blood from Victim B
Well #3- Semen collected from Victim A
Well #4- Semen collected from Victim B
Well #5- Blood from Suspect X
Well #6- Blood from Suspect Y
Well #7- Blood from Suspect Z



3 Were both women assaulted by the same man?

4 Explain how you came to your conclusion in Question #3.

5 Which, if any, suspect or suspects, is/are involved in the crime?

6 Explain how you came to your conclusion in Question #5.

Using page 323 in your textbook, answer the following questions.

7 Define gel electrophoresis.

8 Explain how the bands on the gel are created during gel electrophoresis.

9 List two ways that gel electrophoresis can be used.