

DNA Tech. & Forensics Lab Make-Up

Biology 1102

Name: _____

Section: _____

This exercise replaces your quiz and homework grade (15 pts) for the DNA Tech/Forensics lab. Read through the DNA Tech. & Forensics section of your lab manual and complete the questions and problems found below. All responses should be typed in YOUR OWN WORDS and in COMPLETE SENTENCES. If you have any questions, feel free to contact your TA.

I. DNA Technology

1. (1 pt) Go to the following website and read about the first two techniques under the question “What are some of the DNA technologies used in forensic investigations?”

http://www.ornl.gov/sci/techresources/Human_Genome/elsi/forensics.shtml

If I had a few cells from an individual and I wanted to make multiple copies of their DNA, name a useful technique that could be used to accomplish this, and explain what you need to be careful to avoid when using this technique.

2. (1 pt) DNA, as you should have learned, exists as a long continuous strand, in each of your chromosomes. Your DNA therefore needs to be cleaved/digested (chopped up) before it can be analyzed. How is this digestion achieved?

3. GATAACCGGATCGTAGGCCA
CTATTGGCCTAGCATCCGGT

- a. (1/2 pt) Above is a double strand of DNA. How many base pairs long is it?
b. (1/2 pt) Restriction enzymes (REs) cut at specific restriction sites in DNA. This particular RE cuts between CC and GG, anytime it sees that sequence. Indicate those restriction sites by drawing a line(s) through the DNA strand.
c. (1/2 pt) How many fragments would result and what lengths would each be?

4. Go to the following websites to learn about the technique of gel electrophoresis.

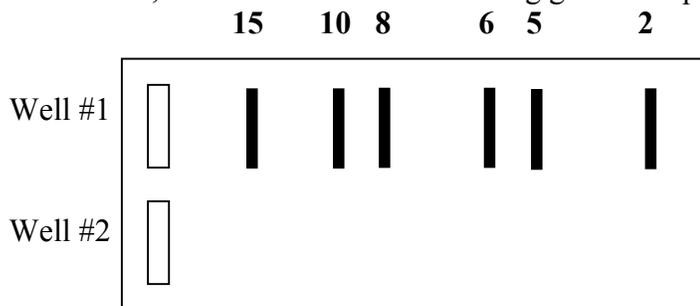
<http://web.utk.edu/~khughes/GEL/sld001.htm>

<http://www.life.uiuc.edu/molbio/geldigest/electro.html>

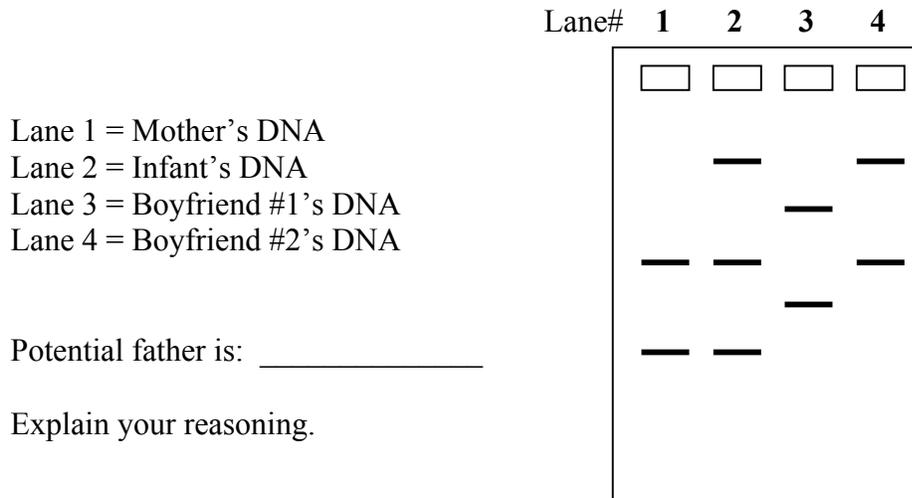
(Be sure to click on appropriate arrows/images to see what’s really going on.)

- a. (1/2 pt) What is agarose made from?
b. (1/2 pt) What is the typical volume of the sample loaded into the well with the micropipettor?

5. (1 pt) Examine the diagram below. Lane #1 shows the position of fragments in a DNA marker (i.e. a piece of DNA that produces fragments of known size). The size of each fragment in the marker (in bp) is given above each line. If the DNA fragments created in Question 3 were loaded into Lane #2, mark their location following gel electrophoresis.



- (1 pt) Consider performing a gel electrophoresis on your own DNA. What two factors determine how bands of DNA fragments migrate on the gel? Explain why these two factors/characteristics of the DNA molecule matter.
- (1.5 pts) Examine the image of the gel below. This represents information for a paternity test. Assume that the DNA was cut with one enzyme. Based on what you have learned about gel electrophoresis, who is the likely father of the child?



- Return to the website in question 1 to read the explanation to the questions: How does forensic identification work? and Is DNA an effective identifier?
 (1 pt) Summarize what you learned from these answers.
- (1 pt) Do a Google search for “Earl Washington – update” and briefly explain why his case is relevant to this laboratory topic.

II. Forensic Analysis

- (1 pt) If you were given a skull of a male and one of a female human, how could you distinguish between the two (explain with respect to **brow ridge**, **mandible**, and **occipital region**)?
- (1 pt) How does the female pelvis differ from the male pelvis? Why is this so?
- (1 pt) Can you determine the race of an individual from skeletal remains? If so, how?
- (1 pt) A Caucasian family reported a missing teenager to the police. Two years later, workmen on the grounds of a nearby park dug up some bones from a shallow grave. The family reported that their child, at the time the bones were found, would have been 17 years old. If the forensic files revealed a femur length (less epiphyses) of ~38.5 cm, based only on this information, is there a possibility that this child belonged to the family mentioned above. **Explain.**
- (1 pt) If the oblique femur length of the skeleton was found to be 42.5, use this information and the appropriate equation in your lab manual to calculate the height of the individual in feet and inches. 2.54 cm=1 inches.