



VIRTUAL DNA FINGERPRINTING

Lab Questions



Name: _____ Period _____

As you work through all sections of the lab, answer the following questions. Remember to read the information on the computer on your virtual desk and review the lab manual for instructions.

Introduction

- What five pieces of evidence were found at the crime scene?
 - _____
 - _____
 - _____
 - _____
 - _____
- What is a polymorphism? _____

- What two methods of DNA fingerprinting will be used in this case?
 - _____
 - _____

Episode 1 - Collecting Evidence:

- What is the length of DNA in a typical animal cell? _____
- List three types of environmental conditions that are detrimental to DNA evidence.
 - _____
 - _____
 - _____
- Who is suspect #4? _____
- How do the complementary bases that compose DNA pair up? ____/____ ____/____

Score at the end of Episode 1: _____

Episode 2- DNA Extraction

- What must be worn to ensure evidence is not contaminated? _____
- List three types of material evidence that would be useful for performing DNA extraction:
 - _____
 - _____
 - _____
- What did investigators find in suspect #2's home? _____



11. According to your lab manual, what is the step after adding protein digest solution?

12. Place the following DNA extraction steps in the correct order.

_____ Open the nucleus _____ Precipitate the DNA in alcohol _____ Lyse the cells

Score at the end of Episode 2: _____

Episode 3- Restriction Enzymes

13. How is the enzyme name *Eco*R1 derived? E: _____

co: _____ R: _____ l: _____

14. What was your score on the enzyme quiz? _____

15. What 3 items did you get out of the freezer?

a) _____ b) _____ c) _____

16. What must you do to the micropipet every time you measure a new liquid?

17. Which suspect had scratch marks on his/her arm? _____

Score at the end of Episode 3: _____

Episode 4- Gel Electrophoresis

18. What is agarose derived from? _____

19. Why is loading dye necessary? _____

20. What formula is useful for determining dilutions?

21. Where is the pre-poured agarose gel located? _____

22. DNA migrates toward which side of the gel box? positive negative circle one

23. What was your score on the dilution quiz? _____

Score at the end of Episode 4: _____



Episode 5- Southern Blot

24. How long do you have to wait for the DNA transfer to be complete? _____
25. List an application of DNA fingerprinting or genetic testing that does not involve solving a crime.

26. What is a genetic locus? _____
27. A probe analyzing one locus is sufficient to obtain an accurate DNA fingerprint. true
false
28. What was found on Clyde Beecham's uniform? _____
29. Why must the DNA probe be added behind protective glass? _____

Score at the end of Episode 5: _____

Episode 6- Polymerase Chain Reaction

30. Why do we use two different methods of DNA fingerprinting in this case? _____

31. What is a primer? _____
32. What microbe was instrumental in developing the PCR procedure? _____
33. How many PCR cycles does the lab manual tell you to program into the thermal cycler? _____
34. The process of heating the DNA to separate the strands is called: _____

Score at the end of Episode 6: _____

Episode 7- Analyze Results

35. What percentage of human DNA is identical among individuals? _____
36. Name a commonly used locus in DNA fingerprinting. _____
37. Whose DNA matched the hair evidence? _____
38. Whose DNA matched the blood evidence? _____
39. Whose DNA matched the skin evidence? _____
40. Who was the culprit in this crime? _____

Final Score: _____



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Lab Questions



Answers to Student Activity

1. Glass shard, blood, hair strands, skin cells, ripped blue cloth
2. Differences in DNA sequence among individuals.
3. PCR and RFLP
4. Heat, moisture, sunlight, bacterial decomposition
5. 1 meter
6. Clyde Beecham
7. A/T G/C
8. gloves
9. blood, bone, hair, saliva, semen, skin cells
10. ripped blue dress
11. incubate in a 45°C water bath
12. a) lyse the cells b) open the nucleus c) precipitate DNA in alcohol
13. *E: Escherichia* *co: coli* R: strain RY13 1: first such enzyme discovered
14. Answers will vary depending on student score.
15. Ice, restriction enzyme, restriction enzyme buffer
16. add a new, sterile, micropipet tip
17. Jane Elliott
18. seaweed
19. visualize the progress of DNA through the gel so you know when to turn the power off
20. $C_i V_i = C_f V_f$
21. refrigerator
22. positive
23. answers will vary depending on student score
24. 8 hours
25. diagnosing inherited genetic disorders, paternity testing
26. a location or site on the DNA strand
27. false
28. blood
29. the probe is radioactive
30. RFLP does not work well when the sample size is extremely small or degraded, as was the case with the hair and skin samples. As a result, PCR was required to amplify the amount of DNA being analyzed.
31. a small segment of DNA that matches a known series of bases on the target strand
32. *Thermus aquaticus*
33. 29 cycles
34. denaturing
35. 99.9%
36. D1S80, D4S139, LDLR, GYPA, DQA1, and D2S44. Many others not listed here.
37. Ending 1: Victim Ending 2: Scarlett Jeanus Ending 3: Victim
38. Ending 1: Ted Smithson Ending 2: Jane Elliott Ending 3: Clyde Beecham
39. Ending 1: Ted Smithson Ending 2: Victim Ending 3: Clyde Beecham
40. Ending 1: Ted Smithson Ending 2: Scarlett Jeanus & Jane Elliot Ending 3: Clyde Beecham