Group No: \_\_\_ Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period: \_\_\_\_

**Case 7-1 DNA Fingerprinting**

**Scenario:** Julie Chen is computer programmer at a high-tech military research facility, which is working on new spy satellite technology. She arrived at her office early this morning and discovered her door ajar, with the glass pane broken. When she looked behind her desk she found her room cleaner dead on the floor. She called and reported the incident to security immediately then a quick analysis of her computer revealed that someone had used her terminal to hack into and download classified information regarding the satellite’s design. While Ms. Chen has a perfect record and a high security clearance, the lab’s chief researcher suspects that she may have staged the break-in and murder the room cleaner to download the information herself so that she could sell it to a foreign agency.

You and the other forensic specialists from the National Security Agency (NSA) have been assigned to examine the crime scene. You recovered a strand of hair at the crime scene and now will need to analyze it in the lab.

S1 – Julie Chen, A computer programmer

S2 – Joe Chen, High ranking Military Officer, also Julie Chen’s husband

S3 – Kevin Wong, A college intern.

S4 – Anthony Spencer, A computer programmer from commercial satellite company that has long wanted the technology.

S5 – Mark Sven, A new hire in the facility

There are three major steps in analyzing DNA. First DNA collected from Crime Scene (CS). Second, DNA from suspects 1-5 (S1, S2, S3, S4, S5) needs to be digested using restriction enzymes to compare their sequences. Third, digested DNA is placed in gel electrophoresis machine to be separated. Finally DNA stain will be used to visualize the result.

**Step 1: A**ll DNA will be cut (digested) using a restriction enzyme, EcoRI. See Quick Procedure Guide.

After digesting DNA, please answer the questions below.

1. Can you see any evidence to indicate that your samples of DNA were fragmented or altered in any way by the addition of the restriction enzyme? \_\_\_\_ Explain. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

2. After incubating the DNA samples in the heating block, are there any visible clues that restriction enzymes may have in some way changed the DNA in any of the tubes? \_\_\_\_

**Step 2:** **Electrophoretic Analysis of Restriction Fragments**. Refer to Procedure Guide.

DNA is colorless so DNA fragments in the gel cannot be seen during electrophoresis. A blue loading dye, containing two blue dyes, is added to the DNA solution. The loading dye does not stain the DNA but make it easier to load the gels and monitor the progress of the DNA electrophoresis. The dye fronts migrate toward the positive end of the gel, just like the DNA fragments. The “faster” dye co-migrates with DNA fragments of approximately 500 bp, while the “slower” dye co-migrates with DNA fragments approximately 5 kb in size. Staining the DNA pinpoints its location on the gel. When the gel is immersed in Fast Blast DNA stain, the stain molecules attach to the DNA molecules trapped in the agarose gel. When the bands are visible, then you can compare the DNA restriction patterns of the different samples of DNA.

**Conclusion: Interpretation of Results**

1. What are we trying to determine? Restate the purpose.
2. Which of your DNA samples were fragmented?\_\_\_\_\_\_\_\_
3. What caused the DNA to become fragmented? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4. Based on the above analysis, do any of the samples of DNA seem to be from the same individual as the DNA from the crime scene? \_\_\_\_\_\_\_\_\_\_\_ Describe the scientific evidence that supports your conclusion.

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**Data:**

**Dry your gel then use acetate film to copy the result.**

**Error Analysis: If your gel result was such that you cannot determine the perpetrator, please explain the error and how it might have happened. Also explain what type of precautions you can take to prevent such error in the future.**

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