Name: _____ Date: _____ Block: _____

Who Ate the Cheese?

DNA Fingerprinting Lab

Objective In this simulation, you will examine crime scene evidence to determine who is responsible for eating the Queen's special imported Lindbergher Cheese (yes, the stinky cheese). You will model the process of electrophoresis and DNA fingerprinting.

ROYAL GUARD INCIDENT REPORT

Incident Data

Incident Type:	Theft	Complaint Status:	Pending DNA results
Processed by:	Chief Wiggam	Other Officers:	Officer Li Gase

Property

Property Code:	Rare cheese	Owner's Name:	Queen Elizabeth
Name:	Lindbergher	Value:	$12,000

Burglary Data

Method of Entry: Unknown, no evidence of force on doors or windows.

Narrative: The cheese was allegedly stolen from the Queen's sitting room the night before the grand ball. The cheese was listed as a gift from the Manchurian diplomat. Officer Li Gase dusted for fingerprints and found none on the table or doors. The maid claimed that they had been wiped clean earlier. The wheel of cheese was on a platform in the sitting room, and half of it had been eaten. Pictures were taken of the half eaten cheese and sent to the lab for further tests. Edna N. Zime, the lab technician, said that saliva samples could be taken from the teeth imprints of the cheese that was left behind.

Suspect Data

Suspect Number: 1 Name: Princess Dubbah Elix
Description of Suspicion: The princess was seen entering the sitting room earlier in the evening. She is well known for her love of cheese.

Suspect Number 2 Name: Electra Foresis
Description of Suspicion: Electra was recently involved in a relationship with the Manchurian diplomat that sources say ended badly. Her motive may have been to sabotage the diplomat's gift to the Queen.

Suspect Number 3 Name: Ada Nine
Description of Suspicion: Ada was the maid in charge of cleaning the sitting room. She had access to the cheese.

Suspect Number 4 Name: Gene Tics
Description of Suspicion: Gene is the leader of the local Cheese-Makers Guild, he may not have wished for Queen Elizabeth to have cheese from anywhere but his own guild.

Crime Lab Data

Crime Lab Investigator:	R. Renee	Lab Technician:	Edna N. Zime
List of Evidence Received:	Plastic bag with cheese crumbs	List of Procedures Used:	DNA extraction Polymerase Chain Reaction DNA restriction Analysis

Narrative: After receiving the package with the plastic bag marked Crime Scene, DNA was extracted from the saliva left on the half eaten cheese. Because the sample was so small, the DNA was amplified using the polymerase chain reaction. DNA was also isolated from the four suspects and compared to the crime scene DNA using DNA restriction analysis.

Results: See attached DNA Results

DNA Evidence Evaluation

1. Below you will find the DNA sequences obtained from each of the four suspects. This DNA will be cut with a restriction enzyme that recognizes the sequence CCGG. Every time this sequence appears in the DNA, the enzyme will cut between the C and G. Mark the sequences below in every location where they would be cut by this restriction enzyme.

Suspect 1 DNA Suspect 1 DNA Suspect 1 DNA Suspect 1 DNA Suspect 1 DNA Suspect 1 DNA Suspect 1 DNA Suspect 1 DNA Suspect 1 DNA
GTCCCAGCCGGACCGTACCGGTAGATCAGCCGGTAGATTGATAGCGTGATGTG
CAGGGTCGGCCTGGCATGGCCATCTAGTCGGCCATCTAACTATCGCACTACAC

Suspect 2 DNA Suspect 2 DNA Suspect 2 DNA Suspect 2 DNA Suspect 2 DNA Suspect 2 DNA Suspect 2 DNA Suspect 2 DNA Suspect 2 DNA
GTCTACGTAATCGTAGCCATCCGGACAGTGTGCACGATCGTACATGCTACGTG
CAGATGCATTAGCATCGGTAGGCCTGTCACACGTGCTAGCATGTACGATGCAC

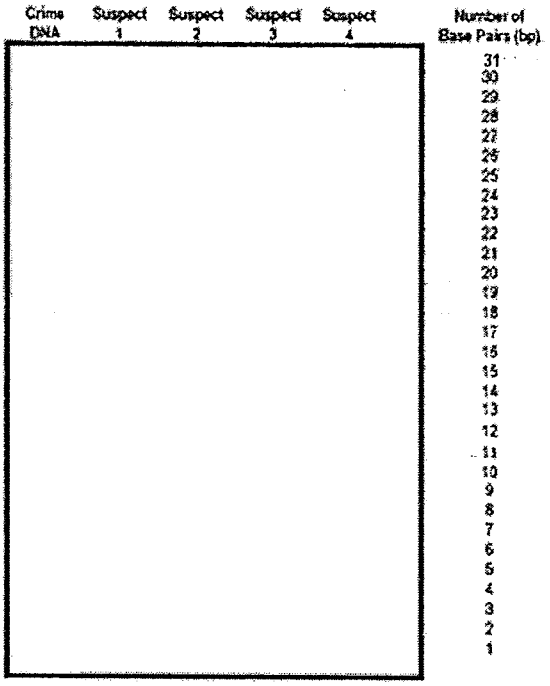
Suspect 3 DNA Suspect 3 DNA Suspect 3 DNA Suspect 3 DNA Suspect 3 DNA Suspect 3 DNA Suspect 3 DNA Suspect 3 DNA Suspect 3 DNA
GTCGACCGGTGACCGTGCGTACACAGTGCTCCGGATAGCTGATAGCTCCGGTG
CAGCTGGCCACTGGCACGCATGTGTCACGAGGCCTATCGACTATCGAGGCCAC

Suspect 4 DNA Suspect 4 DNA Suspect 4 DNA Suspect 4 DNA Suspect 4 DNA Suspect 4 DNA Suspect 4 DNA Suspect 4 DNA Suspect 4 DNA
GTCTCCATCCGGACTACCATACATCTGGTGTACCCGGTGATATCGTCCGGGTG
CAGAGGTAGGCCTGATGGTATGTAGACCACATGGGCCACTATAGCAGGCCCAC

2. Count the number of base pairs (bp) in each piece of DNA that is created after cutting with the restriction enzyme. Record the number of base pair in each fragment in the table below (Note: Different suspects may have different numbers of fragments depending on how many times the restriction enzyme cuts the DNA).

Suspect	1	2	3	4
Fragment 1 length				
Fragment 2 length				
Fragment 3 length				
Fragment 4 length				

3. In the space below is diagram of a sample gel obtained using gel electrophoresis. On this diagram, mark what the gel should look like for each of the four suspects. Be sure to use the base pair numbers indicated on the right hand side as a guideline for fragment placement. On your chart, label the positive (+) and the negative (-) ends of the gel.



4. When you think you have completed the gel correctly, show your teacher. If you are correct, your teacher will provide you with the sample of DNA from the crime scene. Add this sample to your gel.

5. Compare the crime scene DNA. Circle the suspect's DNA that matches the DNA from the crime scene. Which suspect is guilty of eating the cheese?

6. Summarize the DNA biology techniques that were used throughout the crime scene process. (You must follow the forensic process, in order, to explain how DNA technology was used to solve this crime. You cannot simply list the techniques. You must explain the basics of how the technique works and what it accomplished in helping to solve this crime. You should discuss the following techniques in your summary: DNA extraction, Polymerase Chain Reaction, Gel Electrophoresis, Restriction Enzymes, DNA fingerprinting.)

Name: _____ Date: _____ Block: _____

DNA Evidence Evaluation

1. Below you will find the DNA sequences obtained from a suspect. This DNA will be cut with a restriction enzyme that recognizes the sequence TCC. Every time this sequence appears in the DNA, the enzyme will cut between the T and C. Mark the sequences below in every location where they would be cut by this restriction enzyme.

gacgccagtcctatgagtgattagtccaaggtcctgcttg

2. Count the number of base pairs (bp) in each piece of DNA that is created after cutting with the restriction enzyme. Record the number of base pair in each fragment in the table below.

Suspect	1
Fragment 1 length	
Fragment 2 length	
Fragment 3 length	
Fragment 4 length	

3. In the space below is diagram of a sample gel obtained using gel electrophoresis. On this diagram, mark what the gel should look like. Be sure to use the base pair numbers indicated on the right hand side as a guideline for fragment placement. On your chart, label the positive (+) and the negative (-) ends of the gel.