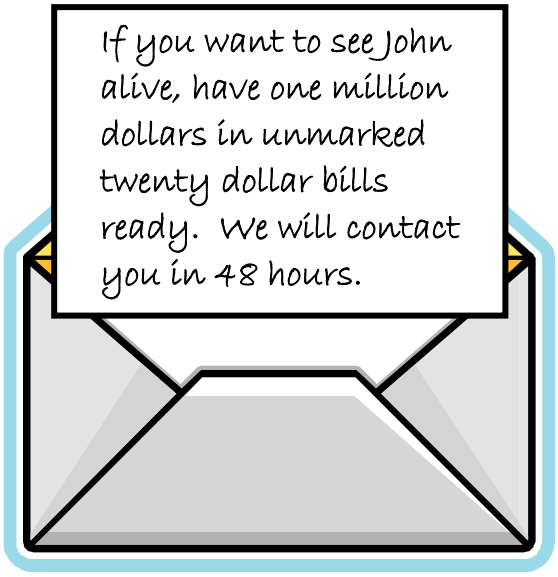
STO-127

Kidnapped

The Case

A wealthy celebrity has been kidnapped. The note found at the crime scene says that the kidnap victim will be released if a ransom of a million dollars is paid within 48 hours.



The police have three male suspects (A, B, and C) in temporary custody. These suspects were seen entering the victim's home on the day of the kidnapping.

The police would like you to do a preliminary forensic analysis of the evidence that was collected. They will use the information from this analysis to determine which of the suspects should be arrested for this crime.

Important: Before beginning this lab activity, you should tear off the Forensics Report on the last page of this lab packet. You will use this Forensics Report to record the data from your laboratory work.

Forensic Test 1: Blood Typing

Drops of blood were found at the crime scene. These might be from the kidnap victim or from one of the suspects. According to medical records, the victim's blood type is O.

For this forensic test you will use:

- Tubes of blood from Crime Scene and from Suspects A, B, and C
- Tubes of Anti-A and Anti-B Antibodies
- Blood Type Test Strip
- Droppers labeled: Crime Scene Blood, Blood Suspect A, Blood Suspect B, Blood Suspect C, Anti-A Antibodies, and Anti-B Antibodies

1. Use the Blood Typing instructions on the right to determine the blood type of the blood at the crime scene and blood from each of the suspects (A, B, and C).

2. Record the blood types of the samples on the Forensic Report.

3. Based only on the results of the blood type testing, what can you conclude? Record your conclusions on the Forensic Report.

Blood Typing

1. Place the plastic "Blood Type Test Strip" onto the sheet of black paper.

2. For each of the blood samples, place 1 drop of blood into the appropriate circles (Crime Scene, Suspect A, Suspect B, or Suspect C)

3. Add 1 drop of Anti-A Antibodies to each circle labeled A.

4. Add 1 drop of Anti-B Antibodies to each circle labeled B.

5. Observe which samples clump and do not clump.

6. Use the chart below to determine the blood type.

Blood type	Mixed with Anti-A Antibodies	Mixed with Anti-B Antibodies
A	Clumps	No clumps
B	No clumps	Clumps
AB	Clumps	Clumps
O	No clumps	No clumps

Forensic Test 2: Ink Analysis

The ransom note was written using black ink. **Chromatography** can be used to separate the pigments in inks.

For this forensic test you will use:

- Chromatography paper with ink samples
- Plastic cup for chromatography
- Tap water

The police have provided a piece of chromatography paper spotted with ink samples from:

- The ransom note (**RN**)
- A pen found in the home of the victim (**V**)
- Pens found in the homes of Suspects (**A**, **B**, and **C**).

1. Follow the directions on the right to use chromatography to compare the ink samples.

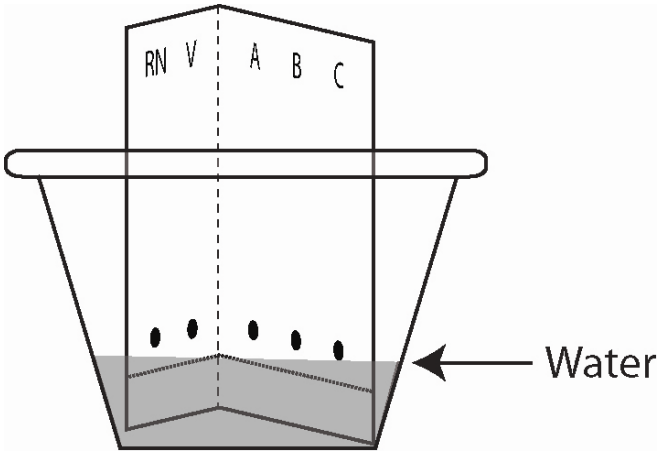
2. Record the results of the ink chromatography test on the Forensic Report.

3. Based <u>only</u> on the results of the ink chromatography test, what can you conclude? Record your conclusions on the Forensic Report.

Ink Chromatography

1. Add just enough water to cover the bottom of the cup approximately 0.5 cm deep.

2. Fold and stand the chromatography paper (with ink samples) in the cup as shown in the diagram below.



3. As the water moves up the chromatography paper, it will drag the ink samples through the chromatography paper. Because the pigments in the inks move at different rates, they will separate into colored bands of pigments.

4. While the ink samples are moving up the chromatography paper, **go on to Forensic Test 3**.

Forensic Test 3: White Powder Analysis

A suspicious white powdery substance was found at the crime scene.

- Suspect A works in a bakery. The white powder may be flour which contains starch.
- Suspect B works for a landscaping company. The white powder may be lime used to treat lawns.
- Suspect C is unemployed. He has visited Suspects A and B while they were working and may have come in contact with flour or lime.

For this forensic test you will use:

- Bag of White Powder
- White Powder Test Strip
- Small scoop
- Tube of Starch Indicator
- Tube of Acid
- Droppers labeled: Starch Indicator and Acid

1. Follow the directions to the right to test the white powder collected at the crime scene. Record the results of the powdery substance testing on the Forensic Report.

2. Based only on the results of the white powder testing, what can you conclude? Record your conclusions on the Forensic Report

3. Remember to check the chromatography paper before you start Forensic Test 4!

White Powder Testing

1. Place a small scoop of the white powder into each of the two circles on the "White Powder Test Strip."

2. Add two drops of Acid to the powder in one of the circles. If the powdery substance is lime, it will fizz when mixed with Acid.

3. Add two drops of Starch Indicator to the powder in the other circle. If the powdery substance is flour, it will turn blue-black when mixed with Starch Indicator.

Forensic Test 4: Fingerprint Analysis

The fingerprint lab has sent photos of a partial fingerprint that they lifted from the ransom note. They have also collected fingerprints from the suspects.

For this forensic test you will use the *Photos of Fingerprints from Crime Scene and Suspects*.

1. Observe the *Photos of Fingerprints from Crime Scene and Suspects*. Compare the partial fingerprint from the ransom note with the fingerprints of the three suspects.

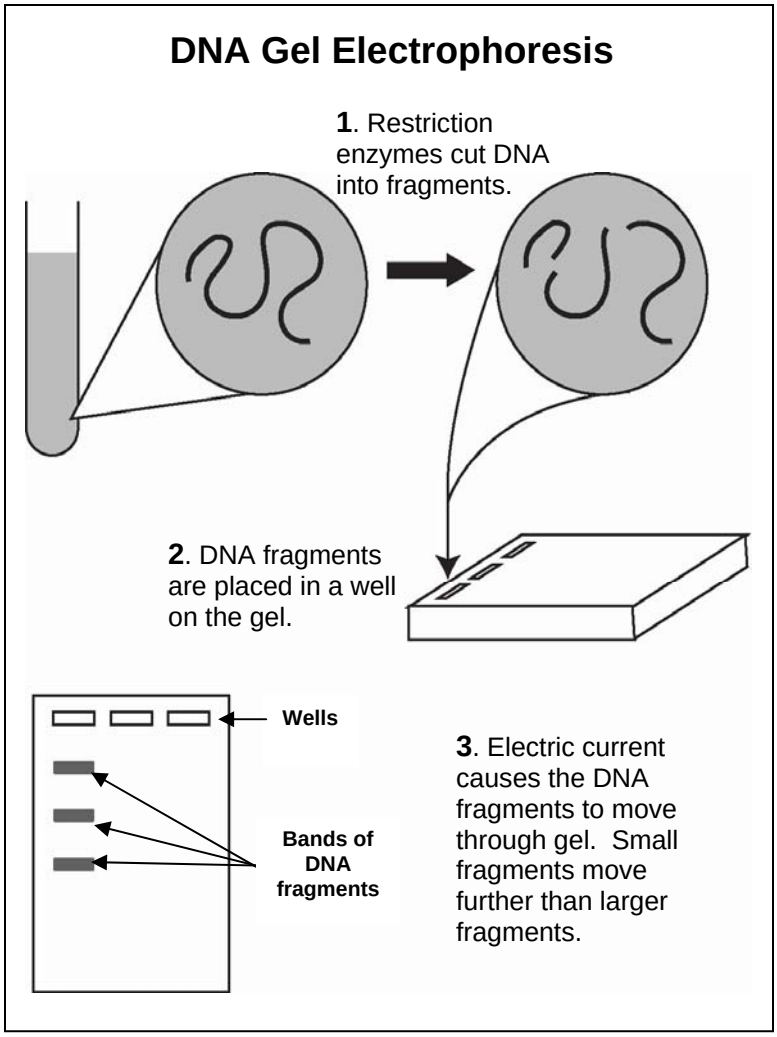
2. Record the results of the fingerprint comparisons on the Forensic Report.

3. Based only on the results of the fingerprint analysis, what can you conclude? Record your conclusions on the Forensic Report

Forensic Test 5: DNA Gel Electrophoresis

The DNA lab has been able to obtain a small amount of DNA from dried saliva on the flap of the envelope that contained the ransom note. The DNA lab has also obtained samples of the DNA from strands of the victim's hair found at the crime scene and from each of the suspects.

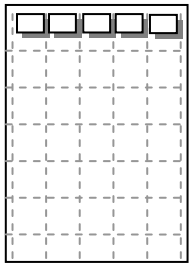
The DNA lab used a process called **gel electrophoresis** to analyze the DNA. The steps in DNA gel electrophoresis are shown in the diagram below.



For this forensic test you will need:

- Simulated DNA electrophoresis gel
- Plastic tray for gel staining
- Tube of DNA stain
- Stirrer
- Small measuring cup
- Water

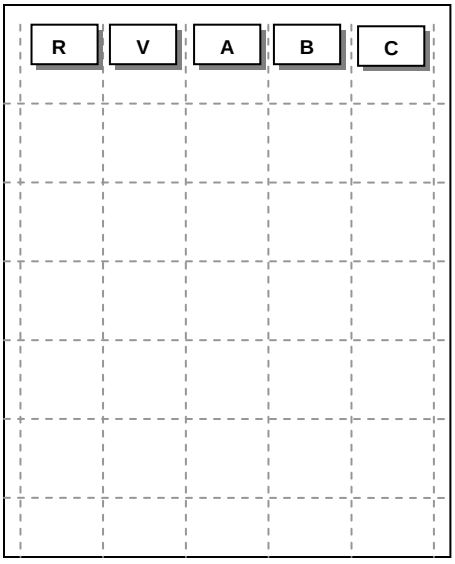
1. Your lab kit contains the electrophoresis gel that the DNA lab prepared.



   - Well **R** contains DNA from the ransom note.
   - Well **V** contains DNA from the victim.
   - Wells **A**, **B**, and **C** contain DNA from Suspects A, B, and C.

2. You can't see the DNA fragments in the gel because DNA is not colored. If you place the gel into DNA stain, the stain will turn the DNA pieces pink.
   - Pour the tube of DNA stain into the plastic tray.
   - Fill the small measuring cup with 10 ml of tap water and then pour the water into the plastic tray. Use the stir stick to stir the contents of the tray until the DNA stain dissolves completely.
   - Place the paper electrophoresis gel into the tray. Use the plastic stir stick to gently push the gel into the stain.

3. Compare the bands of DNA fragments for the DNA samples. On the diagram of the electrophoresis gel (below), draw the DNA bands. If DNA samples came from the same person, the patterns of bands should match.



4. Based <u>only</u> on the results of the DNA gel electrophoresis analysis, what can you conclude? Record your conclusions on the Forensic Report.

Summary Recommendations

1. What evidence suggests that Suspect A might have been involved in the crime?

2. What evidence suggests that Suspect B might have been involved in the crime?

3. What evidence suggests that Suspect C might have been involved in the crime?

4. Do you think that there is sufficient evidence for the police to arrest suspects A, B, or C for the kidnapping crime?

5. Based on analysis of all of the evidence, who do you think is most likely responsible for the kidnapping crime? Support your answer using evidence from your test results.

Forensic Report Lab Technician's Name _____

1. Blood Typing

Test Samples	Blood Type	Conclusions:
Victim's blood type	**O**	
Blood at crime scene		
Suspect A		
Suspect B		
Suspect C		

2. Ink Chromatography

Test Samples	Matches ink on ransom note? (Yes, No, or Inconclusive)	Conclusions:
Victim's pen		
Suspect A's pen		
Suspect B pen		
Suspect C's pen		

3. White Powder Test Results

Observations:	Conclusions:
White Powder is:	

4. Fingerprint Analysis Results

Test Samples	Matches fingerprint on ransom note? (Yes, No or Inconclusive)	Conclusions:
Suspect A		
Suspect B		
Suspect C		

5. DNA Gel Analysis Results

Test Samples	Matches DNA on ransom note envelope (**R**)? (Yes, No or Inconclusive)	Conclusions:
V - DNA from Victim		
A - DNA from Suspect A		
B - DNA from Suspect B		
C - DNA from Suspect C		