

North JH Invitational - February 22nd, 2020  
Crime Busters



*Exploring the World of Science*

Please record all answers in the provided answer sheet. You may write on this test, but only answers in the answer sheet will be scored.

There are a total of **90 possible points** on this test.

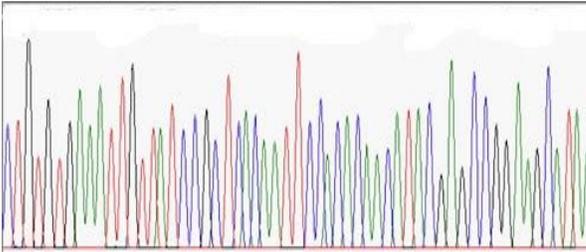
All ties will be broken in this order, according to the rules:

1. Crime Scene Analysis
2. Powders, Liquids, and Metals
3. Plastics, Fibers, and Hairs

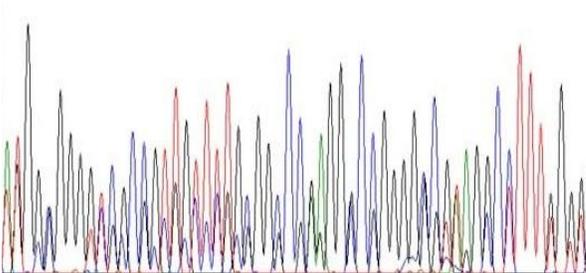
## North JH Invitational - Crime Busters test

*A local instrument and CD store named Marley's, owned by Buddy Marley, was broken into at 11:00pm last night. An electric guitar was the only item stolen. Police received a call a couple minutes after the break-in from a nearby resident, reporting that he heard a loud crash, walked towards the store, and saw the front window smashed in. Immediately after, he saw a person wearing all black exit through the window carrying an electric guitar. Police arrived at the scene several minutes later and found a brick on the ground, presumably used to break the window. The police also found a note on the ground from a pen, which read: "Thanks for the guitar, you don't deserve to own it." They collected evidence and rounded up five suspects. Now it is your job, the crime scene investigator, to determine from the evidence which suspect/s committed the crime. The suspects are listed below.*

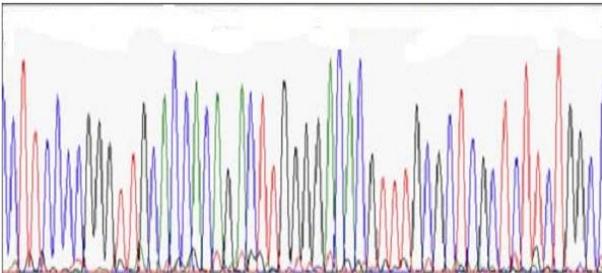
**Bruno Ronson** - Bruno Ronson is the manager of a nearby supplies store, which sells materials for electrical, plumbing, and painting needs. Ronson's work uniform includes a cotton dress suit and jeans. He owns a German shepherd named Lennon. Ronson routinely comes over to Marley's to discuss with Marley lot space, and claims that Marley's store takes up space that belongs to his painting store. His pen is labeled "BR". Bruno's DNA is shown below:



**Nicki West** - Nicki West is responsible for cleaning Marley's every day. Nicki occasionally gets cuts from her work, and she uses hydrogen peroxide to clean them. She wears a wool sweater to work each day. She owns two cats named Jessie and Agra. West has had many debates with Marley about her pay, but Marley is unwilling to raise her earnings. Her pen is labeled "NW". Nicki's DNA is shown below:

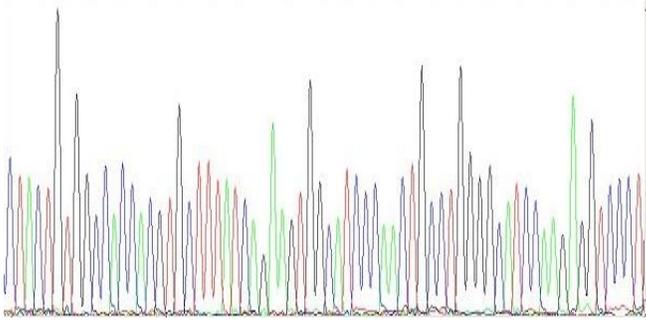


**Huey Springsteen** - Huey Springsteen is the cook at a chain restaurant for American food across the street from Marley's. Huey wears a nylon apron to work, and doesn't bother to take it off when his shifts are over. On his breaks, he often walks over to Marley's to look at the music collection and instruments. Springsteen likes to talk to Marley about his passion for music, and Marley mentioned that Huey has recently talked about buying an electric guitar when he gets enough money. He does not own any pets. His pen is labeled "HS". Huey's DNA is shown below:

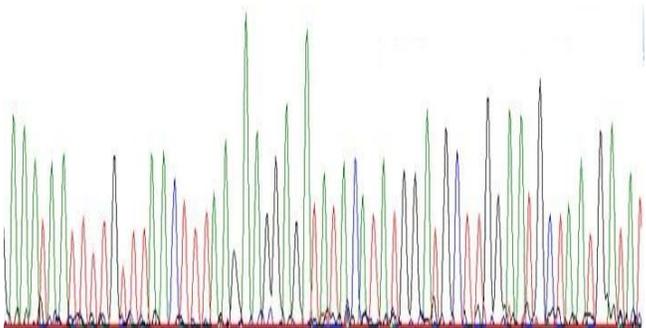


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**Taylor Goulding** - Taylor Goulding is a nurse at a hospital two blocks from Marley's. She works with patients that have gastrointestinal problems, and commonly administers vitamin C supplements, alka-seltzer tablets, and calcium carbonate tablets out of medicine bottles. Her uniform is a cotton medical lab coat. She used to visit Marley's, but hasn't been there for more than two months because her work has taken more time. She does not own any pets. Her pen is labeled "TG". Taylor's DNA is shown below:



**Jay McCartney** - Jay McCartney is a car manufacturer, and works with iron and aluminum along with steel. Jay's wears a polyester T-shirt and jeans to work. He is a routine visitor to Marley's, but claims that the prices are too high for many of the instruments. McCartney visits the lakes around town quite often, even in the winter. He makes homemade gelatin at home quite often. He keeps a water bottle with him at all times. He owns a Saint Bernard named Elton. His pen is labeled "JM". Jay's DNA is shown below:



In your answer sheet, tell what evidence was found at the crime scene, and whom each implicates. Below are the locations each piece of evidence was found at. **Powder #2 is a mixture of two powders.**

Powders, Liquids, and Metals

- 1) Powder 1 - On the floor near the electric guitars
- 2) Powder 2 (mixture) - On the floor near the electric guitars
- 3) Powder #3 - Under the window
- 4) Powder #4 - Next to Marley's desk
- 5) Powder #5 - On the floor near the electric guitars
- 6) Powder #6 - Outside the window
- 7) Powder #7 - On the floor
- 8) Liquid #1 - Under Marley's desk
- 9) Liquid #2 - On the floor
- 10) Metal #1 - On the floor
- 11) Metal #2 - Next to Marley's desk

Plastics, Fibers, and Hairs

- 23) Plastic #1 - Next to Marley's desk
- 24) Plastic #2 - On the floor
- 25) Plastic #3 - On the floor
- 26) Fiber #1 - On a shelf (see below for photos)
- 27) Fiber #2 - On the floor near the electric guitars (see below for photos)
- 28) Hair #1 - Next to Marley's desk (see below for photos)

*For questions 23-25, burn results are shown below.*

- 23) - Burns slowly, drips, has a blue and yellow flame, smells like wax
- 24) - Burns slowly, drips, has a blue and yellow flame, smells sweet
- 25) - Self-extinguishing, does not drip, has a yellow flame with green spurts, smells like HCl

*Images for questions 26-28*

26)

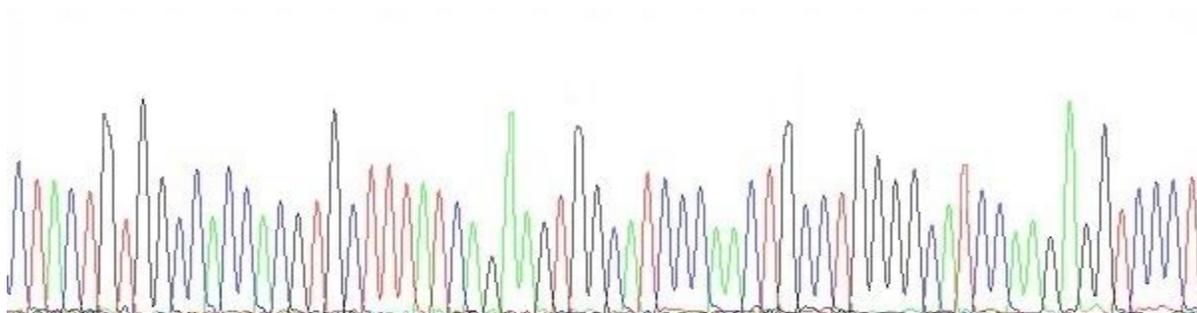
27)

28)



DNA, Soil, and Chromatography

35) DNA (see below) - On the window

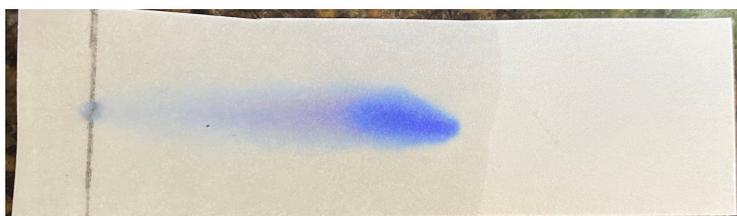


Whose DNA was found at the crime scene?

36) Soil #1 - On the floor

37) Who does the soil implicate?

38) The following chromatogram was acquired from the note.



Whose pen does it match?

Attach your chromatograms to the answer sheet in the marked location on page 3.

Short Answer

39) What is the chemical formula of baking soda?

40) Which liquid is the most alkaline? (Vinegar, ammonia, water, hydrogen peroxide, lemon juice, rubbing alcohol)

41) What does Rf stand for in chromatography?

42) What does PCR stand for?

43) What are the three steps in PCR?

44) What is the NCIC classification two-letter code for a fingerprint with a scarred or mutilated pattern?

Crime Scene Analysis

On page 4 of your answer sheet, write out your crime scene analysis. Include who you think did it, why you think they did it, and why you did not think the others did it.