2017 Science Olympiad

Forensics Exam

Test Packet

NAME(S): _____

SCHOOL: _____

TOTAL POINTS:

NOTE: YOU WILL NEED SAMPLES FOR THIS TEST SO ASK YOUR INSTRUCTOR TO SET

THEM UP BEFORE YOU BEGIN

Situation

Kitty Latoff receives a strange letter from a client named Michelle Xu asking her investigate a case on SciOly Island. However, she soon finds out that the woman requesting the investigation has been dead for 12 years. She was a world-renowned Science Olympiad competitor who suddenly destroyed all her medals and set Mr. Wood's classroom on fire. Spookily, as the classroom burnt down around her, she chanted everything she knew about the human body from studying for Anatomy/Physiology. Despite thinking the letter is a prank, Kitty decides to investigate anyway and finds the island is holding elections for team captain. Two years ago, a passerby heard the same chanting coming from Conestoga High School and discovered the body of captain Annie Xu slumped over a desk. Although she died from overstudying, the similarity to the death of Michelle caused the islanders to think the classroom is cursed.

People

Upon arrival, Kitty is welcomed by several people (Note: Everyone except Lauren Harris is salty about not getting a captain position).

- Lauren Harris: junior, the nerdiest member and co-captain of Conestoga's SciOly team
- Jordan Liu: sophomore, environmental science extraordinaire
- Alex Wang: senior, chemistry and physics prodigy
- Jerry Zhu: senior, professional bridge builder and participant of Dynamic Planet
- Michael Zhang: senior, Anatomy/Physiology partner of Michelle Xu, biology genius
- Jennifer Lee: sophomore, experienced Anatomy/Physiology and Disease Detective
- Jordan Gusdorf: junior, expert builder with air and wind constructions

Murder

That night, when the SciOly team is getting ready to leave for the national level SciOly competition, Lauren Harris' sodden body is found slumped over a desk in the cursed classroom as the same anatomy chant is playing in the background. Water marks show the body had been dragged to the desk from the lab area. On her wrist, a tiny red mark was found; she had been murdered by lethal injection!

Victim and Suspects:

Lauren Harris (victim): wears high quality clothing, owns a dog, helps out with Air Trajectory, takes potassium supplements, drinks a lot of soda

Jordan Liu (suspect 1): loves eating potato chips and drinking apple cider straight from the carton, works with pipes for Air Trajectory, wears squash apparel to school everyday, uses cold packs to treat his soreness after practice

Alex Wang (suspect 2): works as a car mechanic, takes treatment for athlete's foot, wears tennis apparel everyday, uses a lot of deodorants and antiperspirants, admits he has constipation and uses laxatives as treatment

Jerry Zhu (suspect 3): has diabetes, eats a lot of pickles, clumsy in the lab area during lab day so he uses an antiseptic for his cuts and burns, loves to bake but he can't eat his own pastries :(

Michael Zhang (suspect 4): likes to breed pea plants in his garden to study heredity, teaches Biology at local community college using blackboards, often uses calcium supplements to treat his calcium deficiency, owns a mutant dog as a result of a series of experiments

Jennifer Lee (suspect 5): uses a lot of acne medication, uses cough medicine for her cold, loves ceramics and painting, takes medication for her asthma, drinks a lot of coffee, owns a bat

Jordan Gusdorff (suspect 6): works with pipes for Air Trajectory, wears a lot of fuzzy winter sweaters to school, drinks from a water bottle everyday, on the swim team, owns a lot of cats

Please help Kitty solve this extremely puzzling case! You have <u>50 minutes.</u> Work efficiently and good luck! :)

BONUS: Draw a smiley face next to your name(s) for some extra help!

Part I:

Please identify each powder (found on the suspects) and give its molecular formula:

1. _____ ( )
2. _____ ( )
3. _____ ( )
4. _____ ( )
5. _____ ( )
6. _____ ( )
7. _____ ( )
8. _____ ( )
9. _____ ( )
10. _____ ( )
11. _____ ( )

The following powders were found at the crime scene. Please identify them and give their molecular formula :

1. _____ ( )
2. _____ ( )
3. _____ ( )
4. _____ ( )

Do the samples implicate anyone; if so, whom? (can be more than one person)

_____

Part II:

Please identify each plastic:

1. _____
2. _____
3. _____
4. _____

Give the structural formula and resin code of each identified plastic:

Sample Number	Structure	Resin Code
1		
2		
3		
4		

The following plastics were found at the crime scene. Please identify them:

1. _____
2. _____

Do the samples implicate anyone; if so, whom? (can be more than one person)

_____

Part III:

Please identify each hair & fiber:

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

Identify the following characteristics for each hair sample:

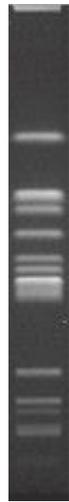| Sample Number	Medulla (absent or present)	Medulla Type	Color	Cuticle Type
5				
6				
7				
8				

The following hairs and fibers were found at the crime scene. Please identify them:

1. _____
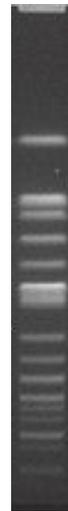2. _____
3. _____
4. _____

Do the samples implicate anyone; if so, whom? (can be more than one person)

_____

Part IV:

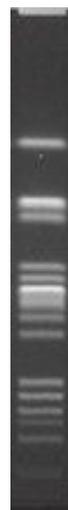The following are gel electrophoresis of the DNA found at the crime scene:
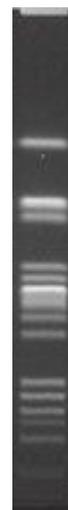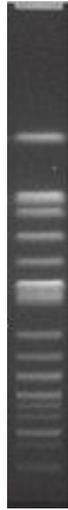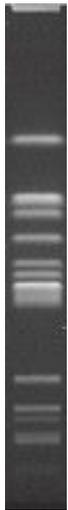

Gel #1

Gel #2

The following are gel electrophoresis of the DNA of the victim and the suspects:

Victim   Suspect #1   Suspect #2   Suspect #3   Suspect #4   Suspect #5   Suspect #6
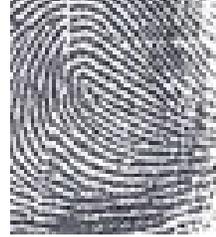
Do the samples implicate anyone; if so, whom? (can be more than one person)

_____

Part V:

The following partial fingerprints were lifted off a syringe discovered near the crime scene. Please identify each fingerprint pattern:

Sample #1   Sample #2

_____   _____

The following are the fingerprints collected from the suspects. Please identify each fingerprint pattern:

Suspect #1   Suspect #2   Suspect #3

_____   _____   _____

Suspect #4   Suspect #5   Suspect #6

_____   _____   _____

Part V (cont.)

Do the samples implicate anyone; if so, whom? (can be more than one person)

_____

Circle the correct answers pertaining to fingerprints:

01. The most common type of fingerprint pattern is the

    a. Arch

    b. Delta

    c. Whorl

    d. Loop

02. What would be the best way of visualizing a print found on a matchbook?

    a. Supergluing

    b. Ninhydrin

    c. Dusting and lifting

    d. It would not be possible to visualize a print on a matchbook.

03. How large an area of a latent print is needed to make a positive comparison to an inked print?

    a. Large enough to find at least 8-12 ridge characteristics

    b. Large enough to find at least 5 ridge characteristics

    c. A whole fingerprint

    d. Half a fingerprint

04. What would be the best way of visualizing a print found on a glass bottle?

    a. Iodine Fuming

    b. Dusting and lifting

    c. Superglue fuming

    d. Either b or c

05. A fingerprint left on a metal surface is mostly composed of

    a. Organic compounds

    b. Amino Acids

    c. Water

    d. Salt

6. Fingerprints are friction ridges of the _____ layer of the skin.

7. Sweat glands that produce the oils left by fingerprints are found in the _____ layer of the skin.

8. A chemical reagent used to develop latent prints on porous materials by reacting with amino acids is called _____,

9. The individuality of a fingerprint is determined by _____.

Part VI:
Based on your analysis of all of the evidence, can you determine who committed the crime? Explain what you think transpired.