



FORENSICS TEST



2015 SCIENCE OLYMPIAD TRYOUT TEST EXCHANGE

Written by Carmel High School

NAMES: _____

SCHOOL: _____ TEAM NUMBER: _____

SCORE: _____ /170

[INSTRUCTIONS]

Welcome detectives! A crime has been committed! You will have 50 minutes to identify and analyze the evidence found at the scene and figure out who did it! (Insert the Woz's rant about keeping goggles on at all times here)

[SCENARIO]

Bryan Zhou is a junior at Zarmel High School. He recently got a new cat, which he named Splash. Today was mandatory PSAT testing at Zarmel, and right after school, Bryan went to the library to study alone.

Bryan came home, and his little brother, Parker, told him that it was his turn to feed Splash. He put food in her bowl; however, she was nowhere in sight. The two brothers then started to look for Splash. They looked and looked around the neighborhood but did not find her. Upon this they called the police.

The uniformed officers arrived and found traces of several substances (Powders 1, 2, and 3) around the backyard. They also found some hair (Hairs 6 and 7) and plastics (Plastics 4 and 5) on the ground. There was also a hate note that had been handwritten in pen and nailed to the back door. The police were able to develop some fingerprints from the note and from the doorknob.

Bryan found Splash dead on the sidewalk a few days later. There was some blood on her claws and teeth, which evidently indicated that she had bitten someone before her death, but no evidence of bullet wounds. The officers collected what they could from the blood at the scene, and they also found several fibers (Fibers 8 and 9) entangled in Splash's claws, which were also sent to lab for further analysis. The blood did not react with any antigens.

When Bryan reported the death of Splash, the officers went to Zarmel High School, only a quarter of a mile away from his house, to ask for the names of anybody who had been absent. Sure enough, three students had not come to school although they were supposed to since it was PSAT day. The officers immediately found these suspects, interviewed them, fingerprinted them, took hair samples, took samples of the substances they found on their clothing, and confiscated their pens. Suspect interview sheets are provided for you.

Your task, detectives, is to analyze the evidence found and on the suspects, and use the evidence found to determine who seems guilty and needs to be called in for further questioning.

[SUSPECT INTERVIEWS]

KIM JUNG DUN

Kim is a fellow Chemistry Club officer with Bryan although she is quite annoyed with his arrogance. She had to attend tryouts for Gloomington's badminton team (fairly far away), so she was not able to attend school. She said she was on the road home during that day. She declared that she was very annoyed at how repeatedly Bryan would talk about Splash, but nonetheless, she loves cats, so she said that she would never ever hurt a cat and that she felt sorry for the death of Splash. She lives on the opposite side of Zarmel from Bryan.

PROFILE

17 years old, junior, 5'6", 125 lbs, Blood Type O+

Clothes: 50/50 Polyester-Cotton blend T-shirt and sweatpants

Pet: CATS OBVIOUSLY. FIVE OF THEM.

Hobbies: Badminton, ping pong

Job: Hospital volunteer

Evidence found: Powder A, Plastic D

WALTER WHITE

Walter is in Bryan's AP Biology class and worked with him on a project earlier in the school year. He got so sick that he was hospitalized a few days before PSAT testing day, so he could not come to school then. He said that Kim gave him medicine and food while he was there. He said he heard the police sirens from the hospital, which was near where Splash was found dead, and unfortunately (for him) returned to school the day the police officers were performing their investigation. Yet he said he doesn't recall Bryan ever talking about Splash with him.

PROFILE

16 years old, junior, 5'9", 149 lbs, Blood Type A+

Clothes: Silk collared shirt and cotton corduroy pants

Pet: Hamster

Hobbies: Biology, Rubix Cube

Job: Intern at IUPUI Biology Research Program

Evidence found: Powder B, Plastic E

OTTO MOBEEL

Otto, as his name suggests, loves working with cars. He fixed Bryan's car once when it completely broke down. He couldn't attend PSAT testing because he heavily procrastinated on a deadline to fix someone's car that was set for 4 p.m. that day. He said he has never heard of Splash. He said he was in his lab working on trying to find a solution for greenhouse gas problems during the time that Splash was missing. He also claimed that the scars observed by police officers came from power tools while working on his project.

Profile

16 years old, junior, 5'5", 117 lbs, Blood Type O-

Clothes: Plaid linen shirt and jeans

Pet: Dog

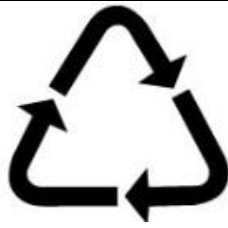
Hobbies: Fixing cars (of course), eating

Job: Car repairman

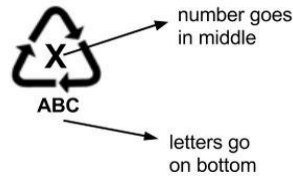
Evidence found: Powder C, Plastic F

[ANSWER SHEET]

	ID of Powder 1 from scene
	ID of Powder 2 from scene
	ID of Powder 3 from scene
	ID of Powder A from Kim
	ID of Powder B from Walter
	ID of Powder C from Otto
	Write the balanced equation of the reaction between sodium carbonate and hydrochloric acid. INCLUDE STATES OF MATTER.
	How would you distinguish glucose and sucrose?
	Write the balanced equation of the reaction between ammonium chloride and sodium hydroxide. INCLUDE STATES OF MATTER.
	Which powder is also known as baking soda?
	ID of Plastic 4 from the scene
	ID of Plastic 5 from the scene
	ID of Plastic D from Kim
	ID of Plastic E from Walter
	ID of Plastic F from Otto
	Draw the monomer unit of high density polyethylene in the space to the left.
	Density of Plastic D?
	Density of Plastic E?



Write the recycling symbol for polyvinyl chloride.
Like this:



	Plastic 5 polymerizes by...?
	What does PMMA stand for?
	Draw the monomer unit of polycarbonate in the space to the left.
	ID of Hair 6
	ID of Hair 7
	What are the three layers of the hair shaft?
	What does the outside of a cat hair look like?
	Proteins in hair are held together by what kind of chemical bonds?
	ID of Fiber 8
	ID of Fiber 9
	What are the three kinds of fibers?
	What is the general burn test behavior of animal fibers?
	How can you tell the difference between wool and silk?
	The blood found at the scene is what type? (include Rh factor)
	Fingerprint 1 found at the scene is what type?
	Fingerprint 2 found at the scene is what type?
	Identify the types of BOTH of Kim's fingerprints.

	Identify the types of BOTH of Walter's fingerprints.
	Identify the types of BOTH of Otto's fingerprints.
	Which method of lifting would have been best to develop the fingerprints from the note?
	What is the basis for this kind of lifting?
	What causes fingerprint ridge patterns?
	Which method of lifting would have been best to develop the fingerprints on the doorknob?
	What is the basis for this kind of lifting?
	About how many ridges does the average adult fingerprint have?
	About how many places on a fingerprint must match in order to declare a positive match?
	Draw a bifurcation in the space to the left.
	Draw a lake (enclosure) in the space to the left.
	What does AFIS stand for?
	Most likely suspect
	Present your crime analysis. Use the blank space below and the back if needed.