

Science Crime Busters

Div. B
Science Olympiad

2011 Louis Pasteur MS67 Practice Exam
written by Scott Ma



A) ___/50

B) ___/10

C) ___/5

D) ___/10

E) ___/25

Total: ___/100

Crime

Once upon a time, long, long ago- a fortnight, to be exact- the ancient city of Lamporecchio, Italy (yes, this is a real place!) had a problem. It was summertime and the tourists were flooding in by the dozen. The police, overwhelmed by all the chaos, joined their friends from the hospital at The Place (name undisclosed for security purposes), sipping coffee and ignoring the virtual chaos at their doorstep (which is why we don't have a volunteer police department). And so this went on for each summer for as long as we know.

However.

One day, when the police were relaxing at The Place, there came a cry of help from the nearby Panera Bread. The owner, Bob Fredson ran in screaming that someone had recently stolen his shipment of who knows what. The police went into the shop and collected evidence, but not wanting to help, went ahead and called on their backup (read: you) to do the job. The police then resumed their eternal vigil at the corner seat in The Place.

The back door of Panera Bread was broken through. The fingerprints on the doorknob have been taken for you. Inside the store, there were footprints on the tiles. Caricatures of those have been taken for you as well to examine. Strange powders were found on the trail to a crate. Near the crate was an assortment of items for you to examine as well. The items supposedly inside of the crate were gone. There was blood on the floor near the crate; it is suspected that the suspect had hurt him or herself before leaving. The footprints went to the cash register, where some hair was found on the floor. At the cash register all of the money had disappeared. There were items and fingerprints near the cash register; however, this was unsurprising as the cashier also doubled as a baker. However, all of the money inside the register was gone. Finally, the police discovered a piece of paper with what seemed to be a list of items.

The police have found four suspects: a hobo, an owner, a tourist, and a worker.

Remember to wear your goggles at all times and to clean up when you are done.
Good Luck Detectives!

Unknowns

Fingerprint 1 (found on doorknob)



Footprint 1 (found near entrance)



Fingerprint #2 (found on cash register)



Footprint 2 (shoeprint found near cash register)



DNA sample 1 (found near crate)



Hair Sample (found near cash register)

hair samples 1 + 2 + 3 should be placed here.

SUSPECTS

Bob Fredson: The owner of Panera Bread. He has probably sad from losing business from The Place and its awesome breadsticks. He likely wanted to get attention from the public and could have planned a fake problem. He has keys to enter from the back, as well as keys to the cash register. He orders supplies for his store every week. His dog patrols the store and “prevents” theft (he’s really just there for the food). He doesn’t work at his own store. He is addicted to sweets and always carries around lemon juice because its properties help him stay alert. (the preceding statement was not supported by the FDA.)

FINGERPRINT:



DNA:



Footprint:



Charles Larches (anagram!): The worker at Panera Bread. He has keys to the cash register at all times, and never anything more. He never wears shoes because he believes that they can help him find his inner self (he dislikes yoga). He may have stolen the cash because Bob had cut his wages and increased his hours of work due to loss of money. He is sometimes unsupervised by his boss. He has access to all of the items in the weekly shipment without question. He is let into the store by Bob five days a week. He is extremely messy. He hates the beach.

Fingerprint:



DNA:



Footprint:



Haro Reach: Haro comes from Japan every year to join the Lamporecchio Steel-Bending Competition for reasons we do not understand. He always carries around rubbing alcohol because paranoia has it that way. Also, his dog always stalks him everywhere he goes. He has always wanted to open a bakery but never had the funds or the materials to do so. He has a sweet tooth and plays the harmonica. His favorite video game is Call of Duty: Black Ops. He often visits the beach.

Fingerprint:



DNA:



Footprint:

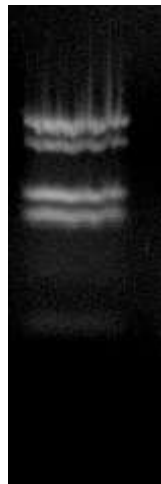


Mary N. Muno (m&m): Mary is the local hobo. She spends her days in the back of Panera Bread begging for food (she never gets any). She may have become extremely desperate and went ahead and stole both food and money from Panera Bread. Why couldn't she steal from The Place? Beats me. She also has a history for breaking and entering. She is allergic to flour.

Fingerprint:



DNA:



Footprint:



Answers

A. Qualitative Analysis (1 pt. each)

1	What is the identity of metal #1?	Aluminum
2	How did you identify it?	Fizz with HCl, nonmagnetic, no reaction with water, light density
3	Who does it implicate?	Haro Reach
4	What is the identity of metal #2?	Magnesium
5	How did you identify it?	Reacts with water
6	Who does it implicate?	Haro Reach
7	What is the identity of metal #3?	Iron
8	How did you identify it?	Magnetism
9	Who does it implicate?	Haro Reach
10	What is the identity of powder #4?	Cornstarch
11	How did you identify it?	Blackens with iodine
12	Name one use for this powder.	Answers May Vary
13	Who does this implicate?	Charles Larches
14	What is the identity of powder #5?	Baking Soda
15	How did you identify it?	Powder, soluble, HCl fizz
16	Who does this implicate?	Charles Larches
17	What is the identity of powder #6?	Sand
18	How did you identify it?	Does nothing
19	Who does this implicate?	Haro Reach
20	What is the identity of powder #7?	Flour

21	How did you identify it?	Clumps with water
22	Who does this implicate?	Charles Larches
23	What is the identity of powder #8?	Sugar
24	How did you identify it?	Soluble, grains
25	Who does this implicate?	Bob Fredson
26	What is the identity of powder #9?	Salt
27	How did you identify it?	Clears w/iodine, fizz w/HCl
28	Who does this implicate?	Charles Larches
29	What is the identity of liquid #10?	Vinegar
30	How did you identify it?	Very strong scent
31	Who does this implicate?	Charles Larches
32	What is the identity of liquid #11?	Lemon Juice
33	How did you identify it?	Citrus scent.
34	Who does this implicate?	Bob Fredson
35	What is the identity of liquid #12?	Water
36	How did you identify it?	Nothing special.
37	Who does this implicate?	Haro Reach and/or Charles Larches
38	What is the identity of liquid #13?	Rubbing Alcohol
39	How did you identify it?	Alcohol smell, smell
40	Who does this implicate?	Haro Reach
41	What is the identity of one of the powders in mixture #14?	Flour
42	Who does this implicate?	Charles Larches
43	What is the identity of the other powder?	Baking Soda

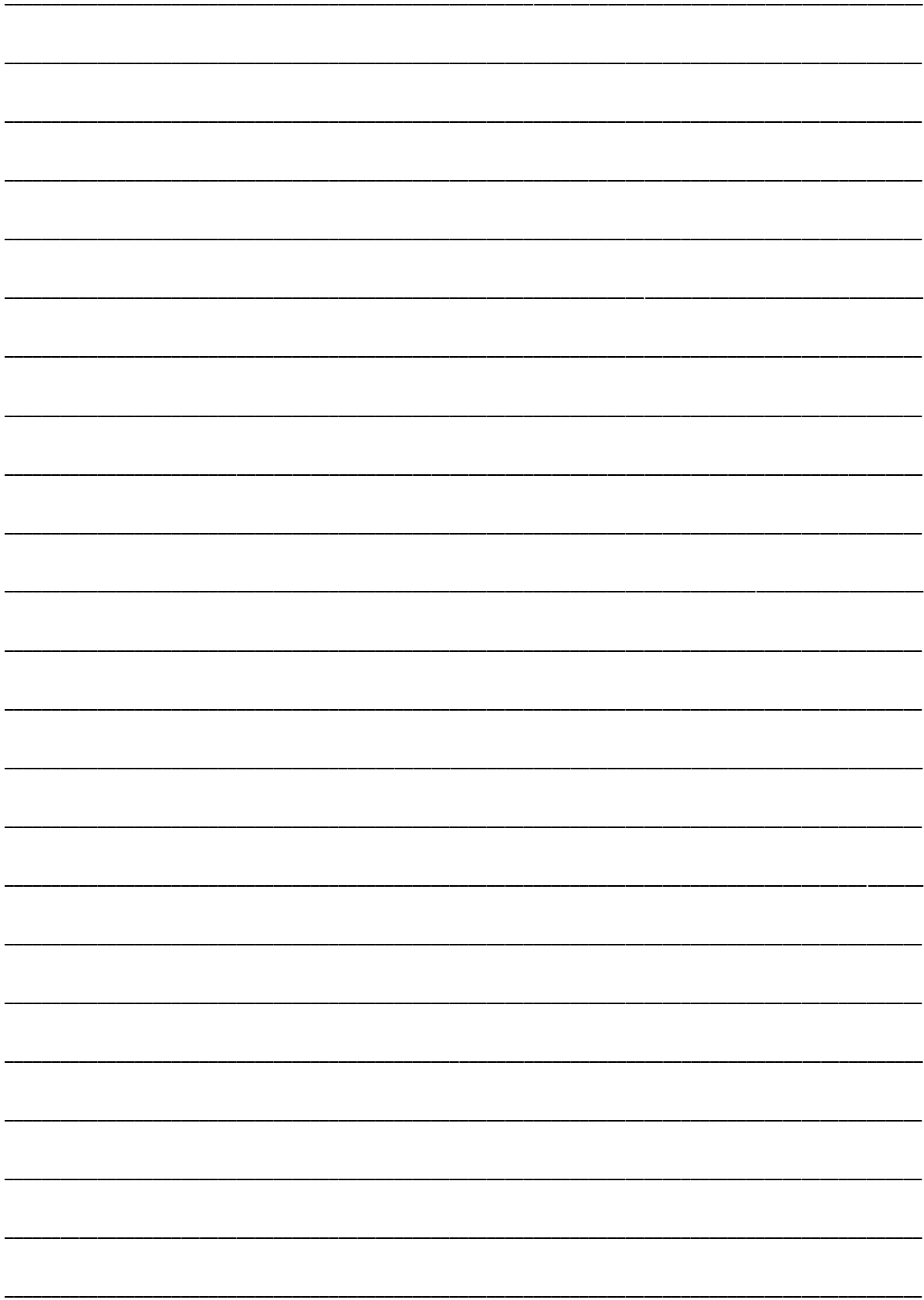
44	Name one use for this powder.	Baking. What else?
45	Who does it implicate?	Charles Larches
46	What is the identity of one of the powders in mixture #15?	Sand
47	Name one use for the powder.	Beaches, etc.
48	How did you identify it?	Does nothing.
49	Who does this implicate?	Haro Reach
50	What is the identity of the other powder?	Cornstarch

B. Polymer Testing/Natural Man-Made Substances (1 pt. each)

51	What kind of hair is #1?	Dog
52	What kind of hair is #2?	Human
53	What kind of hair is #3?	Dog
54	To whom does this hair implicate?	Haro Reach
55	What is fiber #1?	Vegetable
56	What is fiber #2?	Synthetic
57	What is polymer #3?	PETE
58	What is polymer #4?	LDPE
59	Name one use for polymer #4.	Cartons

C. Paper Chromatography (5 pts.)

60-64	Chromatography of suspects' pens versus the unknown. You must share the pens, located in the front.	Paperclip/staple your chromatography to your test. 1pt per pen.
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ANSWERS TO ESSAY

Both *Haro Reach* and *Bob Fredson* were involved inside the conspiracy. Evidence for them:

Haro's footprints were discovered inside of Panera Bread. Also, sand was discovered inside of the store, and Haro enjoys visiting the beach. There were metals on the floor that is relevant to Haro's participation in the metal contest. His dog is in there when he shouldn't even be, as his dog will follow only him around. Some rubbing alcohol have been found on-site, and Haro always carries that along. Haro and his dog's hair have been found inside of Panera Bread.

However, the detectives should have noticed Haro did not have keys to the cash register. Therefore, Bob must enter the situation.

Bob owns the keys to the cashier and the back door. As no one else could have been able to go through the back door, Bob must have been involved. His lemon juice was also found in the store.

It was not Charles Larches because...

- He couldn't enter through the back door.
- All of the materials supposedly against him were misleading because he worked at Panera Bread and was paid to use the materials there.
- It doesn't explain for the sand inside of the store.

It was not Mary N. Muno because...

- She is allergic to flour and flour was found inside of the store.

A LETTER TO THE EVENT SUPERVISOR

Place inside the following vials:

- #1- Aluminum
- #2- Magnesium
- #3- Iron
- #4- Cornstarch
- #5- Baking Soda
- #6- Sand
- #7- Flour
- #8- Sugar
- #9- Salt
- #10- Vinegar
- #11- Lemon Juice
- #12- Water
- #13- Rubbing Alcohol
- #14- Flour + Baking Soda
- #15- Sand + Cornstarch

Label the following hairs:

- #1- Dog
- #2- Human
- #3- Dog

Fibers:

- #1- Vegetable
- #2- Synthetic

Polymers:

- #3- PETE
- #4- LDPE

A NOTE TO THE EVENT SUPERVISOR

Any questions regarding to this test may be forwarded to *arugi* on the Science Olympiad Student Center (scioly.org). This test was created in correspondence to the 2011 Science Olympiad competition for B.

The answers for the test have been written on the test paper. For the use of the test, it is recommended that the answers be removed before the use of the test.

All questions are in accordance to the 2011 Science Crime Busters guidelines.

All items for the exam should be obtained in accordance to the 2011 Science Crime Busters rulebook.

Thank you and good luck, detectives, in the competition.

-arugi