

Answer Key: Science Crime Busters: The Case of "Fowl" Play

School and Team# _____

- A. **Qualitative Analysis:** Identify the unknown substances (total worth 50 points)
(found at the crime scene #5, #6, #10, #12 #13, and #14)

#1-10 (3 points each)

- #1 unknown ___ Flour _____
#2 unknown ___ Calcium Sulfate (Gypsum) _____
#3 unknown ___ Sodium Acetate _____
#4 unknown ___ Corn Starch _____
#5 unknown ___ Calcium Carbonate _____
#6 unknown ___ Sugar _____
#7 unknown ___ Vitamin C _____
#8 unknown ___ Baking Soda _____
#9 unknown ___ Sand _____
#10 unknown ___ Salt _____

#11-15 (4 points each)

- #11 unknown _____ flour/cornstarch _____
#12 unknown _____ salt/sugar _____
#13 unknown _____ magnesium _____
#14 unknown _____ aluminum _____
#15 unknown _____ hydrogen peroxide _____

- B. **Fiber/ Polymer Test:** Identify the following Substances (total worth 10 points)

#1-5 (worth 2 points each) (found at crime scene

1. Circle one answer : **Human** Cat Dog
2. Circle one answer: **Animal** Vegetable Synthetic
3. Circle one answer: Animal Vegetable **Synthetic**
4. Circle one answer: PETE **HDPE** PS LDPE PP PVC /and write out full name of polymer ___ high density polyethylene _____
5. Circle one answer: PETE HDPE PS **LDPE** PP PVC /and write out full name of polymer ___ Low density polyethylene _____

Total points out of _____/60 points

Answer Key Must have five labeled attached paper chromatography and circled number #4

C. Chromatography : (total worth 5 points, each correct paper attached chromatograms are worth 1 point each , identify the match to the ink pen sample found at the crime is also worth 1 point)

1st suspect's attached chromatogram:

2nd suspect's attached chromatogram:

3rd suspect's attached chromatogram:

4th suspect's attached chromatogram:

Crime scene note's attached chromatogram & circle the suspect number you believe to match above:

Total points out of -----/5 pts

Answer Key _____

D. **Crime Scene Evidence:** (worth total 10 points)

1. Name a different identifying pattern detail (loop, arch, or whorl) on the following fingerprints found at the crime scene and point to the area on the print you are identifying (worth 1 point each)

A) loop B) arch C) arch



2. Impressions of fingerprints may be left behind on a surface by the natural secretions of sweat from the ECCRINE glands that are present in friction ridge skin.
3. Which suspect(s) fingerprints were found at the crime scene and what identifying pattern (1/2 point) #4 Danny South-side captain (1/2 point) LOOP
4. The following composition of soil was found at the crime scene along the river edge: the soil had yellow to brick red color streaks in it. Thus the soil most likely contained what element? IRON.
5. The soil when tested had a permeability coefficient less than 10^{-7} . It would be considered IMPERMEABLE.
6. Given the above information it also contained some organic material and when rolled in hand formed a ball under pressure. It most likely is what type of soil CLAY
7. Suspect #4 soil sample taken from shoes contained: 50% clay, 40% sand, and 10% silt. They had what type of soil in their boots? CLAY
8. Suspect #1 soil sample taken from their shoes contained: 87% sand, 11% silt, and 2% clay. They had what type of soil in their footwear? SAND

Total points _____/10 total

- E. **Analysis of the Crime Scene:** (Total worth 25 points) describe who is/are the main suspect(s) and who is/are not the suspect(s). Draw conclusions based on the evidence and scenario.

3pt: Correct Person #4 Danny South Side Captain

2 pts. Correct Motive (any two):

- Did not like it at camp.
- Did not like the captain of North side
- Wanted them to do his chores
- He had no friends
- Wanted to win so people would like him.

1 pt. for each piece of evidence associated with him ties him to crime (max of 11 pts.)

- Had a key so had access to recyclables
- Drank cola from cans with 6 pack ring matched polymer at crime scene
- Team collected recyclables #1-3. He got rid of recyclables #4-6 so his team would win contest and hoped his team would like him for being a winning captain.
- Had matching hair to scene: Dark Brown & human
- Had matching pen to note at crime scene/chromatography matched
- Note mentioned need to buy tums and more cans of cola and note to write dad to send cooler clothing and get shaving....
- Soil clay on boot matched soil at crime scene
- Treated for wounds possibly from a fall/ someone fell at crime scene
- Rubbed head from head injury/ tuft of hair found on over hanging branch at crime scene
- Rather Clumsy
- Unhappy personality
- Wool socks match fiber on tree stump
- Finger print match on note
- Calcium carbonate at crime scene on note. Note could have been in pocket with tums and he eats tums all the time.
- Sugar and Salt match unknowns found at crime scene
- Foot print tread matches that of his boots
- Had ripped up jeans perhaps where he fell on stump

- Tried to make own fire more impressive than north teams by adding Magnesium and Aluminum Shavings from father's draft shop, maybe to impress fellow team mates and make friends
- Was really hot and irritable from wearing long pants and flannel shirt and wool socks in extreme heat.

3 pts. for each suspect who did not commit crime and must list 3 reasons why it is not them. One point for each reason up to 3 maximum.

#1 Suspect probably not associated with crime scene. (any 3).

- Hair did not match: Light Brown not Dark Brown
- No matching fingerprint
- Ink pen does not match
- No fiber matches
- No unknown matches
- Wears only nylon, cotton. Wool was at crime scene.
- Smooth bottom flip-flops
- Sand soil
- Plaster- of- Paris
- Recyclable conscious
- No motive: is happy now that it's sunny
- Is a life guard and gets to spend all day at beach

#2 Suspect probably not associated with crime scene. Not enough evidence. (any 3).

- Wears only cotton and linen plant fiber materials/allergy to wool But wool was at crime scene no match
- Flat bottom shoes no real tread like found at crime scene.
- Drinks from a reusable mug, recyclable conscious,
- Hair did not match: Blonde not Dark Brown
- Ink pen does not match
- Some matching unknowns to crime scene, but had link to kitchen like Sugar and Salt

#3 Suspect probably not associated with crime scene. Not enough evidence. (any 3).

- Hair did not match: Red not Dark Brown
- Ink pen does not match
- Wears only running shoes, not shoes with deep tread like at crime scene.

- Unknowns: vitamin c and does not match but calcium carbonate did match.
- Polystyrene is recyclable # 6 did not match crime. If dumped recyclables at crime scene would have hurt own team.
- Purell is mainly alcohol and had access to first aid kit. Could have been person to switch alcohol for hydrogen peroxide, ties him to prank but not crime scene. Seems to be rather agile and coordinated: less likely to fall.