

**Captains Tryouts 2018-19 Forensics Exam**  
Lower Merion High School



Team Name: \_\_\_\_\_

Names: \_\_\_\_\_

\_\_\_\_\_

You may take the test apart as needed.  
Follow the directions for each section and take note of point values.

**Powders**

Identify the powders. (2 points each, 14 total)

Powder A - \_\_\_\_\_

Powder B - \_\_\_\_\_

Powder C - \_\_\_\_\_

Powder D - \_\_\_\_\_

Powder E - \_\_\_\_\_

Powder F - \_\_\_\_\_

Powder G - \_\_\_\_\_

Supplemental questions. (11 points)

1. Write the equation for the reaction of glucose with Benedict's reagent. (2 points)

2. Will a precipitate form from this reaction? Which one? (3 points)



3. What is the color of a KCl burn test? What ion gives this color? (2 points)

4. Which powder could be found in large amounts in the ocean? (1 point)

5. Which is more reactive? Sodium or lithium? (1 point)

6. What are 2 common uses for ammonium chloride? (1 point each, 2 points total)

**Plastics**

Identify the plastics. (2 points each, 6 points total)

Plastic A - \_\_\_\_\_

Plastic B - \_\_\_\_\_

Plastic C - \_\_\_\_\_

Supplemental questions. (6 points)

1. Which plastic is recommended to store acetone? (1 point)
2. Which plastic has a density of 1.04 g/ml? (1 point)
3. Which plastic burns with a green flame? (1 point)
4. How does PC polymerize? (1 point)
5. What monomer makes up PS? Write the chemical formula as well. (2 points)

### Fibers

Identify the fibers. (2 points each, 8 points total)

Fiber A - \_\_\_\_\_

Fiber B - \_\_\_\_\_

Fiber C - \_\_\_\_\_

Fiber D - \_\_\_\_\_

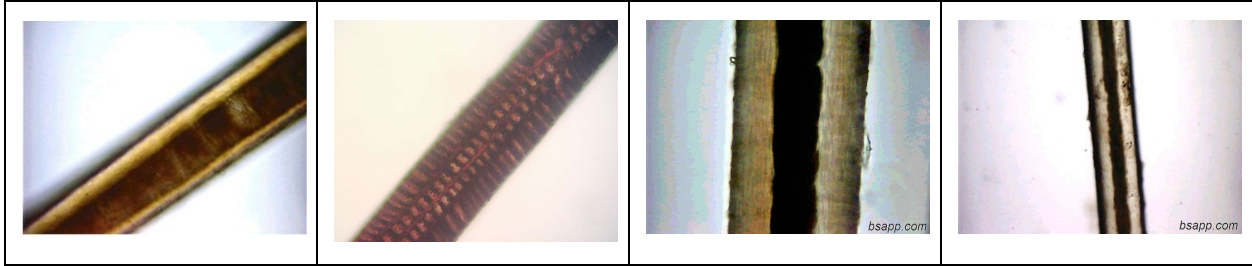
Supplemental questions. (7 points)

1. Which fiber smells like paper when burned? (1 point)
2. Name an example of an animal, vegetable, and synthetic fiber. (1 point each, 3 points total)
3. Which fiber burns with a sweet odor? (1 point)
4. Which fiber class dissolves in bleach? (1 point)
5. Which fiber was nylon a synthetic replacement for? (1 point)

### Hairs

Identify the hairs. (2 points each, 8 points total)

A	B	C	D
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Hair A - \_\_\_\_\_

Hair B - \_\_\_\_\_

Hair C - \_\_\_\_\_

Hair D - \_\_\_\_\_

Supplemental questions. (10 points)

1. Explain the identifying features of each of the hairs above. (2 points each, 8 total)

A -

B -

C -

D -

2. How would you tell a mongoloid hair from a negroid hair? (2 points)

### Chromatography

Perform a chromatography with the provided pen and calculate the  $R_f$  factor here, showing your work. Staple this to the front of the test before you hand it in. (15 points for the completed chromatography, 1 points for correct  $R_f$ , 2 points for correct work, 18 points total)

For your analysis, you found that Pepe's pen has an  $R_f$  of 0.36 and Tom's pen has an  $R_f$  of 0.56. The ink in the drawing of a tree found at the crime scene has an  $R_f$  of 0.53

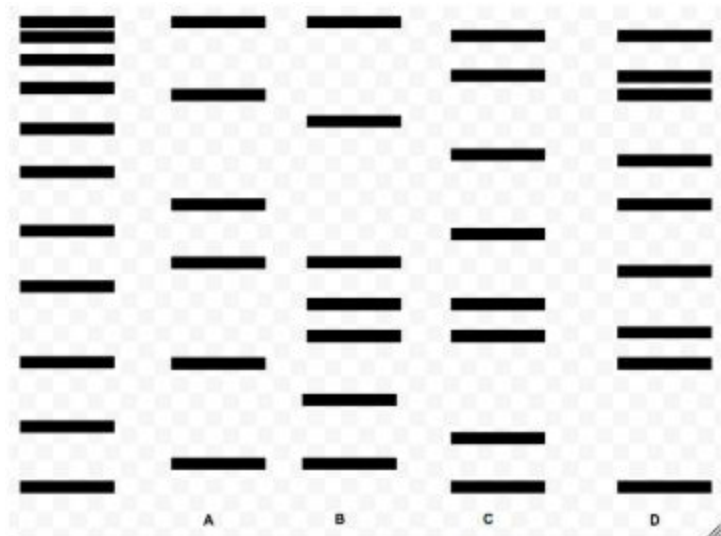
Supplemental questions. (3 points)

1. What can you tell about the polarity of an ink if it travels further with a solvent of water than another ink? (2 points)

2. What does HPLC stand for? (1 point)

### DNA

Pepe interrupts your investigation to demand your help in finding his parents. If Pepe's DNA is sample A in the picture, who are the two samples most likely to be his parents? (1 point each, 2 points total)



Supplemental questions. (3 points)

1. What does  $k_p$  stand for? (1 point)

2. What is the charge of DNA? (1 point)

3. How do base pairs bond together? (1 point)

**Fingerprints**

1. Identify the minutia in the photo. (1 points each, 7 points total)



2. Identify the the type of fingerprint in each photo. (2 points each, 10 points total)

Jake Paul (A)	Pepe the Frog (B)	Raini Rodriguez (C)	Tom Cruise (D)	Crime Scene (E)

**Blood**

Identify the blood types of each sample. From left to right in the pictures, the wells are Anti-A, Anti-B, Anti-D, and Control. (1 point each, 4 points total)

A	B	C	Crime Scene (D)

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**Analysis**

Bob's ghost appears to you in a dream. "Who did it?" he asks gently, "I just want to be able to forgive them." Write a thorough explanation of the evidence implicating each suspect and whether or not you will bring them into your dream for further questioning with Bob. (70 points)