The Get Down

"This ain't Disneyland, this is the Bronx. Either you be strong, or you be gone. All I find, all I keep. Either you beat the world, or you get beat."

<table>
<thead>
<tr>
<th>School: KEY</th>
<th>1/2</th>
<th>1/6</th>
<th>1/22</th>
<th>1/20</th>
<th>1/80</th>
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</thead>
<tbody>
<tr>
<td>Team: KEY</td>
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<tr>
<td>Powder</td>
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<tr>
<td>Plastics, Fiber &amp; Hair</td>
<td>1/16</td>
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<tr>
<td>Chromatography</td>
<td>1/22</td>
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<td>Physical evidence</td>
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<tr>
<td>Analysis</td>
<td>1/80</td>
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The Get Down
The Fantastic Four plus one were about to celebrate their win against the Herc Brothers in the Get Down. On the night of the party, Shaolin Fantastic, also known as Shao, was found dead by Ezekiel in a burnt building with a gunshot to his head. The floor was covered with blood. The police came shortly after and found traces of plastics and fibers. Your forensics team collected the fingerprints at the crime scene and found a note near Shao’s dead body. The mayor, aka, Papa Fuerte, deemed the crime as top priority and ordered your forensics team to investigate further.

Evidence Found at Crime Scene
- Powder A
- Polymer G
- Fiber J
- Pen
- Fingerprint NN
- DNA AA
- Blood Sample II
The Suspects

Ezekiel “Books” Figuero

Description – Smart, resourceful teen, brimming with untapped talent for writing and held an unrequited love for Mylene. He was determined to make a mark in the world as Shao’s wordsmith. Was found shaken up beside Shao’s dead body with his jeans torn. He was with the Kipling brothers a few hours before he found Shao.

Statement – “Boom then crash, the shattering of glass. I dive to the floor busting my ass. Level the playing field and ya’ll will see who’ll really win, and yeah I got anger.”

Evidence
Powder F
Fiber K
Pen KK
Fingerprint OO
DNA BB
Blood Type HH

Ra-Ra Kipling

Description – A loyal, respected, protective friend of Ezekiel’s and brother to Boo Boo and Dizzee with his head screwed on tight. Was found with Boo Boo making goods for the party. He asked immediately where his friend Ezekiel was and if he was with Mylene with a panicked face.

Statement – “It’s the friendships we break more than the friendships we make that delineate the intelligent leader.”

Evidence
Powder C
Fingerprint PP
Pen JJ
DNA CC
Blood Type EE
Mylene Cruz

Description – A tenacious girl with an incredible voice. She loves Ezekiel, but fears he won’t leave the Bronx because of Shao, who often saw her as a distraction to Ezekiel. Was found with Papa Fuerte drinking coffee. Her face looked surprised after hearing the news.

Statement – “Shao used to say, ‘Players always get played at the end’. I guess he wasn’t wrong.”

Evidence
Powder B, E
Fingerprints QQ
Pen LL
DNA EE
Blood Type FF

Marcus “Dizzee” Kipling

Description – Most artistically minded out of all the Kipling Brothers, Dizzee is a graffiti artist who tags as Rumi 411. He was found covered in paint and was with his brothers prepping for the party a couple of hours ago, before he was found.

Statement – “Where there is ruin, there is hope for treasure. Shao would be happy knowing what proceeds him is legend.”

Evidence
Powder D
Fiber L
Fingerprint RR
Pen MM
DNA DD
Blood Type GG
I. Qualitative Analysis (12pts)
Complete the following table by identifying each unknown's full name and chemical formula with the corresponding suspect.

<table>
<thead>
<tr>
<th>Powder</th>
<th>Full Name</th>
<th>Chemical Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Magnesium Sulfate</td>
<td>MgSO₄</td>
</tr>
<tr>
<td></td>
<td>(crime scene)</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Boric Acid</td>
<td>H₃BO₄</td>
</tr>
<tr>
<td>C</td>
<td>Sucrose</td>
<td>C₁₂H₂₂O₁₁</td>
</tr>
<tr>
<td>D</td>
<td>Sodium Chloride</td>
<td>NaCl</td>
</tr>
<tr>
<td>E</td>
<td>Magnesium Sulfate</td>
<td>MgSO₄</td>
</tr>
<tr>
<td>F</td>
<td>Sodium Bicarbonate/Baking Soda</td>
<td>NaHCO₃</td>
</tr>
</tbody>
</table>

II. Polymers and Fibers (16pts)

Polymers (2pts each)
(Note: Provide the abbreviated version of the polymer name, not the full name.) Identify the polymers. Physical samples will be provided.

G. _______ PVC_ (crime scene)  
H. _______ HDPE_  
I. _______ PVC_  

1. PP polymerizes by _______ addition (1pt)  
2. What is the term describing a repeating unit in a polymer chain? _______ Mer _______ (1pt)

Fibers (2pts each)
Identify the fibers. Physical samples will be provided.

J. _______ Cotton_ (crime scene)  
K. _______ Cotton_  
L. _______ Polyester_  

1. Nylon was intended to be the synthetic replacement for which other fiber? (2pts)  
   Silk
III. Chromatography and Mass Spectrum

Chromatography (12pts)
Line A represents the stopping point of the solvent. Find the Rf factors of each pen. (2pts each)

\[
\begin{align*}
&\text{JL: } 0.1375 \\
&\text{KL: } 0.1420 \\
&\text{LL: } 0.1125 \\
&\text{MM: } 0.1375
\end{align*}
\]

The Rf factor of the ink from the pen discovered at the crime scene is 0.15. Whose pen was found at the crime scene? (4pts)

Ezekiel
Mass Spectrum Analysis (10pts)
The mass spectrum below was taken of a liquid found at the crime scene.

1.) What is the most likely molar mass of this chemical compound? _______194_______ (3pts)
2.) What is the m/z value of the base peak? _______194_______ (2pts)
3.) The pattern shown by the peaks identify specific parts of the compound. What chemical compound is the results of the mass spectrum pointing to? _______Caffeine_______ (5pts)
IV. Fingerprints, DNA Chromatography, and Blood Analysis

Fingerprints (5pts)
In the space provided, identify the fingerprint pattern.

NN. Central Pocket Whorl
OO. Ulnar Loop
PP. Ulnar Loop
QQ. Central Pocket Whorl
RR. Plain Whorl

1. How many ridges does the average human adult have on one finger? (2pts)
   150

2. What causes fingerprint ridge patterns? (2pts)
   Amount and location of volmer pads in thick skin

3. What is the chemical basis for Iodine Fuming (Ninhydrin)? (2pts)
   Iodine reacts with oils/fats or Ninhydrin reacts with amino acids
DNA Chromatography (1pt)

DNA evidence was collected from the crime scene. DNA evidence was also collected from Ezekiel, Ra-Ra, Mylene, and Dizzee. Analyze the evidence below and determine if any of the suspects are the guilty party. Place the sample letter of the guilty party, if any, below in the blank space provided.

DNA Sample: __EE__
Blood Analysis (8pts)
Identify the following blood types (including the Rh factor) based on the blood results. (1pt each)

<table>
<thead>
<tr>
<th>ANTI-A</th>
<th>ANTI-B</th>
<th>ANTI-D</th>
</tr>
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<tbody>
<tr>
<td>EE.</td>
<td></td>
<td></td>
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<tr>
<td>FF.</td>
<td></td>
<td></td>
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<tr>
<td>GG.</td>
<td></td>
<td></td>
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<tr>
<td>HH.</td>
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\[
\begin{align*}
\text{AB}^- & \quad A^+ \\
\text{O}^- & \quad B^+
\end{align*}
\]

A blood sample was taken from the scene. The results are shown below. Identify the blood type and the corresponding subject in the space provided. (2pts each)

Blood Type ____A^+_____
Corresponding subject: Blood sample ____FF____
Analysis

After weeks of thorough investigation and examination, the question still comes down to this: Who is responsible for wreaking havoc in the Bronx and killing Shaolin Fantastic? Be sure to support your answer with evidence and reasoning. (30pts)

Hold Mylene Cruz for questioning

Evidence:
Powder E matches with substance found at the crime scene
Magnesium Sulfate is used in gun powder which indicates she might have the murder weapon
Boric acid is used in pyrotechnics which might explain the burnt building
Pen does not match
Fingerprints match with evidence found at crime scene
DNA matches with DNA found at the crime scene
Blood matches with blood found at the crime scene
Liquid found at the crime scene was caffeine, which Mylene Cruz was found drinking coffee with Papa Fuerte

Motive: Jealousy towards Shao for keeping Ezekiel

Release Ezekiel Figuero

Evidence:
Powder does not match with evidence found at the crime scene
Baking Soda often used for cooking which means he was in fact with the Kipling Brothers
Fiber matches evidence found at the crime scene
Torn jeans match with Ezekiel's statement when he found Shao
Pen matches
Ezekiel is a writer, may have been there before he died
Fingerprints do not match evidence found at the crime scene
DNA does not match
Blood does not match

Release Ra-Ra Kipling

Powder does not match
Sucrose is often used for cooking which matches with his description/statement
Pen does not match
Fingerprints do not match
DNA does not match
Blood does not match

Release Marcus "Dizzee" Kipling

Powder does not match
Sodium Chloride is used for cooking, matches description
Fiber does not match
Pen does not match
Fingerprints do not match
DNA does not match
Blood does not match

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