B - Crime Busters - Dec. Practice - December 19 SO Practice - 12-19-2020

Powders

1. (1.00 pts) Powder 1 is an off white powder, that is soluble in water, and turns blue in iodine, what is it?

- A) Salt
- B) Sugar
- C) Gelatin
- D) Vitamin C

2. (1.00 pts) Powder 2 is an off white powder that is not soluble in water and turns black in iodine, what is it?

- A) Cornstarch
- B) Flour
- C) Baking Soda
- D) Calcium Carbonate

3. (1.00 pts) Powder 3 is a crystal with irregular shapes that dissolves in water and has no reaction with the other solvents, what is it?

- A) Salt
- B) Sugar
- C) Gelatin
- D) Vitamin C

4. (1.00 pts) Powder 4 is a white powder that fizzes in all of the solvents, what is it?

- A) Baking Soda
- B) Calcium Carbonate
- C) Alka-Seltzer
- D) Sodium Acetate

5. (1.00 pts) Powder 5 is a yellowish crystal that becomes jelly like in water, what is it?

- A) Salt
- B) Sugar
- C) Gelatin
- D) Sodium Acetate

6. (1.00 pts) Powder 6 is a very fine white powder that is soluble in water, has a pH of approximately 8 and has no reaction to the other solvents, what is it?

- A) Salt
- B) Sugar
- C) Sodium Acetate
- D) Vitamin C

Liquids

7. (1.00 pts) Liquid 1 is a clear liquid with no odor, a pH of 7, and a delayed fizz in HCl, what is it?

- (●) A) Hydrogen Peroxide
- ( ) B) Water
- ( ) C) Vinegar
- ( ) D) Lemon Juice

8. (1.00 pts) Liquid 2 is a clear liquid with no odor and a pH of 7, what is it?

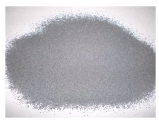
- ( ) A) Hydrogen Peroxide
- (●) B) Water
- ( ) C) Vinegar
- ( ) D) Rubbing Alcohol

Metals

9. (1.00 pts) Identify Metal 1.

- (●) A) Aluminum
- ( ) B) Tin
- ( ) C) Magnesium
- ( ) D) Zinc

10. (1.00 pts) Identify Metal 2.



- ( ) A) Aluminum
- ( ) B) Tin
- (●) C) Magnesium
- ( ) D) Zinc

Fingerprints

11. (1.00 pts) Who's print matches best to Print #1 found at the crime scene?

- ( ) A) Kevin Nguyen
- ( ) B) Jin Park
- (●) C) Bernice Low
- ( ) D) Matthew Linsagan
- ( ) E) Aaron Deivaprakash

12. (1.00 pts) Who's print matches best to Print #2 found at the crime scene?

- ○ A) Kevin Nguyen
- ○ B) Jin Park
- ○ C) Bernice Low
- ○ D) Matthew Linsagan
- ◉ E) Aaron Deivaprakash

13. (1.00 pts) What type of fingerprint is Kevin's second fingerprint?

- ◉ A) Accidental Whorl
- ○ B) Plain Whorl
- ○ C) Double Loop Whorl
- ○ D) None of the above

14. (1.00 pts) What type of fingerprint is Aaron's first fingerprint?

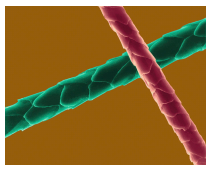
- ○ A) Accidental Whorl
- ◉ B) Central Pocket Whorl
- ○ C) Plain Whorl
- ○ D) None of the above

15. (1.00 pts) What type of fingerprint is Print #1 from the crime scene?

- ○ A) Plain Whorl
- ◉ B) Double Loop Whorl
- ○ C) Accidental Whorl
- ○ D) None of the above

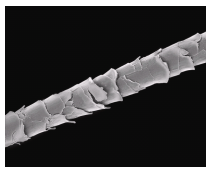
Hairs

16. (1.00 pts) Identify Hair 1.



- ◉ A) Cat
- ○ B) Dog
- ○ C) Human

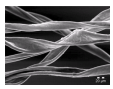
17. (1.00 pts) Identify Hair 2.



- ○ A) Cat
- ◉ B) Dog
- ○ C) Human

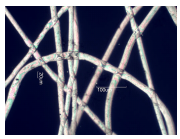
Fibers

18. (1.00 pts) Identify Fiber 1.



- ○ A) Animal
- ◉ B) Vegetable
- ○ C) Synthetic

19. (1.00 pts) Identify Fiber 2.



- ○ A) Animal
- ○ B) Vegetable
- ◉ C) Synthetic

Plastics

20. (1.00 pts) Plastic 1 melts and may burn, but extinguishes on removal from the flame, what plastic is it?

- ○ A) PETE
- ◉ B) PVC
- ○ C) PP
- ○ D) PS

21. (1.00 pts) Plastic 2 melts and bubbles first and produces an acetaldehyde like smell, what plastic is it?

- ◉ A) PETE
- ○ B) PP
- ○ C) PS
- ○ D) PMMA

Trivia

22. (1.00 pts) Which part of the hair contains DNA?

- ◉ A) Root
- ○ B) Shaft
- ○ C) Tip
- ○ D) None of the above

23. (1.00 pts) What type of polymerization is used to make PETE?

- ◉ A) Condensation
- ○ B) Addition

C) None of the above

24. (1.00 pts) Which of the following is not a way to detect fingerprints on a porous surface?

A) Fuming
B) Iodine fuming
C) Ninhydrin fuming
D) Magnetic powder

25. (1.00 pts) What biological difference leads to different types of fingerprints?

A) The amount of time a child spends in the womb
B) The amount of volumer pads in the skin
C) All of the above
D) None of the above

26. (1.00 pts) Someone molds a lump of clay. What type of fingerprints are left in the clay?

A) Latent
B) Visible
C) Patent
D) Plastic

Use the image below for questions 29-33.

27. (1.00 pts) Identify the crossover.

A) A
B) B
C) C
D) D
E) E

28. (1.00 pts) Identify the core.

A) A
B) B
C) C
D) D
E) E

29. (1.00 pts) Identify the ridge ending.

- ○ A) A
- ○ B) B
- ○ C) C
- ◉ D) D
- ○ E) E

30. (1.00 pts) Identify the island.

- ○ A) C
- ○ B) D
- ◉ C) E
- ○ D) F
- ○ E) G

31. (1.00 pts) Identify the pore.

- ○ A) C
- ○ B) D
- ○ C) E
- ○ D) F
- ◉ E) G

32. (1.00 pts) How does iodine fuming work?

- ◉ A) The iodine reacts with amino acids in the prints
- ○ B) The iodine reacts with the ridges in the prints
- ○ C) The iodine reacts with the starch in the prints
- ○ D) None of the above

33. (1.00 pts) What is the average number of volumer pads on an adult's finger?

- ○ A) 120
- ○ B) 130
- ○ C) 140
- ◉ D) 150

34. (1.00 pts) Which of these was the earliest fingerprint development methods?

- ◉ A) Iodine fuming
- ○ B) Ninhydrin
- ○ C) Cyanoacrylate fuming
- ○ D) SPR

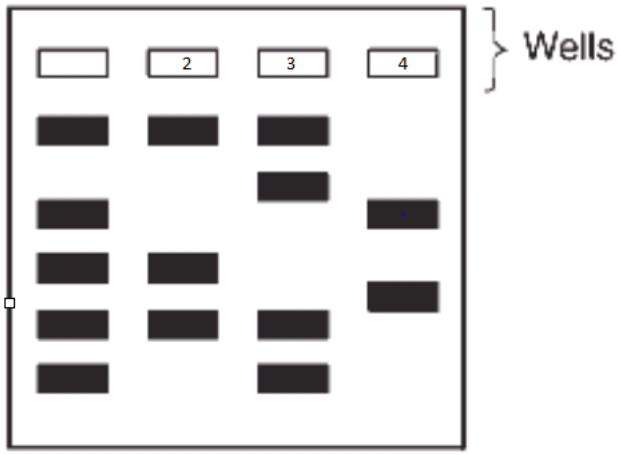
35. (1.00 pts) What does IAFIS stand for?

- ○ A) International Automated Fingerprint Identification System
- ◉ B) Integrated Automated Fingerprint Identification System
- ○ C) Imaginary Automated Fingerprint Identification System
- ○ D) None of the above

36. (1.00 pts) What are the differences in DNA and genetic code called?

- A) Nucleic acids
- B) Nucleotides
- C) Polymorphisms
- D) ATP

Use the image below to answer questions 39-40.



37. (1.00 pts) Which well has the shortest band of DNA?

- A) Well 2
- B) Well 3
- C) Well 4
- D) Both A and B

38. (1.00 pts) Which well has the longest band of DNA?

- A) Well 2
- B) Well 3
- C) Well 4
- D) Both A and B

39. (1.00 pts) DNA is attracted to the _____ of the gel electrophoresis because of its ____ charge.

- A) Anode, negative
- B) Anode, positive
- C) Cathode, negative
- D) Cathode, positive

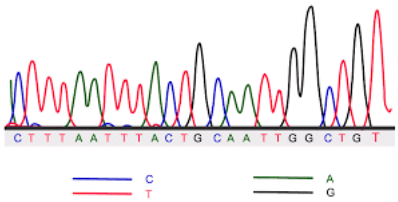
40. (1.00 pts) Gel electrophoresis is used to:

- A) Separate DNA gragments
- B) Identify DNA fragments
- C) Purify DNA fragments
- D) Both A and B
- E) Both A and C

41. (1.00 pts) Why do scientists load DNA of known sizes into the agarose gel?

- (●) A) It makes it easier to determine sizes of unknowns using comparison techniques
- ( ) B) To fill in all the slots of the gel so you can run it
- ( ) C) To practice loading the DNA before you get to the important DNA
- ( ) D) So you know how long the gel needs to run

42. (1.00 pts) What would be the complementary base pair for the fifth base pair in the electropherogram?



- ( ) A) A
- (●) B) T
- ( ) C) C
- ( ) D) G

43. (1.00 pts) What is the most common forensics analysis?

- (●) A) STR
- ( ) B) SNP
- ( ) C) PCR
- ( ) D) Gel electrophoresis

44. (1.00 pts) What does liquid chromatography test for?

- ( ) A) Polarity
- (●) B) Pollution
- ( ) C) Salt concentration
- ( ) D) None of the above

45. (1.00 pts) Which of the following is not a type of chromatography?

- ( ) A) TLC
- ( ) B) Liquid Chromatography
- ( ) C) Gas Chromatography
- (●) D) None of the above

46. (1.00 pts) What does it mean if the chromatogram doesn't react?

- ( ) A) The chromatography was done wrong
- ( ) B) The pen isn't working
- ( ) C) The pen is old
- (●) D) The pen is a permanent marker

47. (1.00 pts) What is the stationary phase in TLC?

- ( ) A) Water

- ○ B) Silica Gel
- ○ C) Alumina
- ◉ D) Both B and C
- ○ E) None of the above

48. (30.00 pts) Write Up: in complete sentences tell us who you think committed the crime and why.

Expected Answer: 10 points for correct suspect and why (Aaron): explain motive (1) 6 points for evidence (-3 if no explanation for why the evidence points to this person) 3 points fo identification 5 points for each suspect explaining why it wasn't them (points only awarded to correct wrong suspects): 5 if they identify evidence and explain why it connects to suspect (-2.5 if no connection)

If you have remaining time, double check your answers and ensure you've answered every question to the best of your ability.

<u>Scenario:</u> As everyone was coming back from winter break, University of California San Diego's famous King Triton statue was found to be absolutely ruined! Toilet paper, flour, eggs, amongst other destructive material were found scattered everywhere! We need you to figure out who committed this act of vandalism so that Chancellor Coleslaw can suspend the suspect!

Suspects:

Kevin Nguyen - One of the most popular members of ALPHA ALPHA ALPHA, UCSD's hottest fraternity. He frequently goes to the gym in his nylon track pants and takes various nutrient/diet supplements to maintain his "pack." Complains that everyone is anti-social and "nerdy" because of how packed the Geisel Library is; often calls UCSD, UC "Socially Dead".

Jin Park - An international STEM major from Korea who is just starting to get accustomed to the American culture. His IB credits from his highschool haven't transferred over, so he was forced to take all humanities GEs required by the school, which he absolutely hates. Loves to shop and flex his cotton GUCCI trench coat and shower shoes. Recently brought home a cat from UTC, which has not been too friendly towards him. He uses disinfectant to clean his wounds. Uses a heating pad because he gets extremely cold at night.

Bernice Low- UCSD's top surfer and local San Diegan. She lives off campus in her apartment and as of recently hasn't been able to park on campus due to the construction of the Elon Musk College, which is a major inconvenience (over an hour walk!!). Her surfing career has kept her very busy so she carries pastries in shrink wrap as a travel snack. Wears a rayon jumpsuit.

Matthew Linsangan- A hardcore computer science major that loves designing and building models out of PET, metal, and amongst other odd material to stick them together. He rooms and shares a chihuahua named Chewy with Aaron. Can't fall asleep and stays up every night due to loud construction noises. Wears a thick wool jacket everywhere he goes.

Aaron Deivaprakash- an avid member of the Student Council for UCSD that loves debating and above all things, academic integrity. Recently, he volunteered at the Winter Triton Fest, an extravagant fireworks show. He is currently rallying and petitioning to stop the construction of UCSD's Elon Musk College. Constantly cleans his dorm so that nothing can stop his "genius" but mainly because he owns quite a messy dog. However, after all these preventative measures he frequently gets sick, so he takes many precautionary measures (medicine) to prevent this. Often pranks Matthew by placing his items in Jell-O. Wears silk cultural wear to emphasize UCSD's mission of developing "world citizens"

Suspect Name	Print #1	Print #2
Crime Scene		
Kevin Nguyen		
Jin Park		
Bernice Low		
Matthew Linsangan		
Aaron Deivaprakash