

**B - Crime Busters Practice Test - Nov 7 Country-wide SO Practice - 11-07-2020**

You are here to solve a crime and answer questions about evidence found at the scene of this crime and collected off suspects. You will use your knowledge of solids, powders, and many other physical forms of evidence, as well as your reading comprehension skills and creative thinking to complete this test. Read each question carefully. The crime scene is attached and the evidence found is described in the first 16 questions as well as number 48.

Evidence Found at the Crime Scene

**1. (1.00 pts)** Powder 1 is gray and powdery and reacts with no solvents. Identify powder 1.

- A) Gypsum
- B) Sand
- C) Vitamin C
- D) Gelatin

**2. (1.00 pts)** Powder 2 is a white powder that is soluble in water and reacts to iodine and turns it blue. Identify powder 2.

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

**3. (1.00 pts)** Powder 3 is a very fine white powder, is soluble in water, has no reaction in the other solvents, and has a pH of 8. Identify powder 3.

- A) Sodium acetate
- B) Baking soda
- C) Cornstarch
- D) Flour

**4. (1.00 pts)** Powder 4 is an irregularly shaped crystal that is soluble in water and has no reaction with the other solvents. What is powder 4?

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

**5. (1.00 pts)** Powder 5 is a cube shaped crystal that is soluble in water and has no reaction with the other solvents. What is powder 5?

- A) Salt
- B) Sugar

- C) Vitamin C
- D) Gelatin

**6. (1.00 pts)** Powder 6 is an off white colored powder that is not soluble in water, and turns black in iodine. What is powder 6?

- A) Flour
- B) Cornstarch
- C) Calcium carbonate
- D) Gypsum

**7. (1.00 pts)** Plastic 1 produces a yellow flame when burned, burns quickly and drips as it burns. What is plastic 1?

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

**8. (1.00 pts)**

Plastic 2 produces a yellow flame, burns slowly, does not self extinguish, produces little to no smoke, does not char and smells like acetaldehyde. What is plastic 2?

- A) PETE
- B) HDPE
- C) PVC
- D) PP

**9. (1.00 pts)** Liquid 1 is a clear liquid with a pungent odor and a pH of approximately 8. What is liquid 1?

- A) Water
- B) Hydrogen peroxide
- C) Rubbing alcohol
- D) Vinegar

**10. (1.00 pts)** Liquid 2 is a clear liquid with a very strong scent and a pH of approximately 14. What is liquid 2?

- A) Vinegar
- B) Rubbing alcohol
- C) Ammonia
- D) Lemon juice

**11. (1.00 pts)** Metal 1 is a dark color, fizzes in HCl and produces a white-silver flame when burned. What is metal 1?

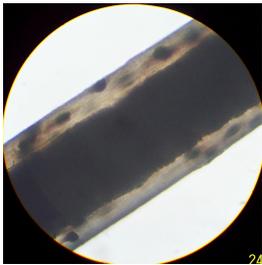
- A) Aluminum
- B) Magnesium

- C) Tin
- D) Iron

12. (1.00 pts) Metal 2 is a grayish metal that is very malleable and produces a white-silver flame when burned. What is metal 2?

- A) Aluminum
- B) Iron
- C) Tin
- D) Zinc

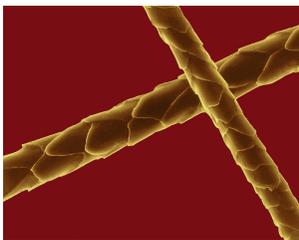
13. (1.00 pts)



Identify hair 1 pictured above.

- A) Cat
- B) Dog
- C) Human

14. (1.00 pts)



Identify hair 2 pictured above.

- A) Cat
- B) Dog
- C) Human

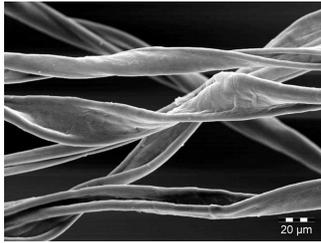
15. (1.00 pts)



Identify fiber 1 pictured above.

- A) Natural
- B) Synthetic

16. (1.00 pts)



Identify fiber 2 pictured above.

- A) Natural
- B) Synthetic

Trivia

17. (1.00 pts) What is a single unit of a polymer called?

- A) Mono
- B) Monopiece
- C) Monomer
- D) None of the above

18. (1.00 pts) Which of the following is a method of polymerization?

- A) Addition
- B) Condensation
- C) All of the above
- D) None of the above

19. (1.00 pts) What are the recycling numbers on plastics used for?

- A) To note the order that the plastics were made
- B) To determine how the plastic can be recycled
- C) Both A and B
- D) None of the above

20. (1.00 pts) Which of the following is not a common use for PMMA?

- A) LED TV screens
- B) Laptops
- C) Plexiglass
- D) Glasses lenses

21. (1.00 pts) What does the pH scale measure?

- A) Concentration of hydronium ions
- B) Concentration of hydroxide ions
- C) None of the above

22. (1.00 pts) Which of the following does hydrogen peroxide not react to?

- A) Light
- B) Oxygen
- C) Water
- D) None of the above

23. (1.00 pts) What is produced in the reaction between hydrogen peroxide and iodine?

- A) Hydrogen gas
- B) Oxygen gas
- C) Carbon monoxide
- D) Carbon dioxide

24. (1.00 pts) What is the chemical formula for hydrogen peroxide?

- A)  $H_2O$
- B)  $H_2O_2$
- C) None of the above

25. (1.00 pts) What is the symbol for iron?

- A) Fe
- B) I
- C) Ir

D) Sn

**26. (1.00 pts)** Which is the heaviest metal?

- A) Tin
- B) Copper
- C) Zinc
- D) Iron
- E) Aluminum

**27. (1.00 pts)** What is the most abundant metal in the Earth's crust?

- A) Aluminum
- B) Magnesium
- C) Copper
- D) Zinc

**28. (1.00 pts)** What is the symbol for tin?

- A) T
- B) Ti
- C) Sn
- D) Sb

**29. (1.00 pts)** Where is the dermal papilla located?

- A) At the top of the hair follicle
- B) In the middle of the hair follicle
- C) At the base of the hair follicle
- D) None of the above

**30. (1.00 pts)** Which hair is finer, cat or dog?

- A) Cat
- B) Dog

**31. (1.00 pts)** What is the order of the hair growth stages?

- A) Anagen, telegen, catagen
- B) Anagen, catagen, telegen
- C) Catagen, anagen, telegen
- D) Catagen, telegen, anagen

32. (1.00 pts) What regulates hair growth?

- A) Androgens
- B) Dopamine
- C) Oxytocin
- D) Serotonin

33. (1.00 pts) What can be determined from a strand of hair?

- A) Race
- B) Age
- C) Sex
- D) All of the above

34. (1.00 pts) What is the hardest textile to tear?

- A) Polyester
- B) Nylon
- C) Cotton
- D) None of the above

35. (1.00 pts) What is the main difference between synthetic and natural fibers when burning?

- A) Synthetic fibers burn, natural fibers melt
- B) Synthetic fibers melt, natural fibers burn
- C) Synthetic fibers shrivel, natural fibers expand
- D) None of the above

36. (1.00 pts) What is the difference between a compound and a mixture?

- A) A compound can be easily separated
- B) A mixture can be easily separated
- C) They are the same
- D) None of the above

37. (1.00 pts) What does it mean when a substance is hygroscopic?

- A) The substance does not like water
- B) The substance absorbs water from the environment/air
- C) The substance is attracted to water
- D) None of the above

38. (1.00 pts) What does it mean when a substance is hydrophobic?

- A) The substance does not like water
- B) The substance absorbs water from the environment/air
- C) The substance is attracted to water
- D) None of the above

39. (1.00 pts) What is iodine reacting to in flour and cornstarch?

- A) Carbohydrates
- B) Sugars
- C) Starch
- D) Fat

40. (1.00 pts) How many deltas does a whorl have?

- A) 0
- B) 1
- C) 2
- D) 3+

41. (1.00 pts) What could cause a change in a fingerprint pattern?

- A) Scars
- B) Burns
- C) Both A and B
- D) None of the above

42. (1.00 pts) Which of the following is a method for developing fingerprints?

- A) Dusting
- B) SPR
- C) Cyanoacrylate
- D) All of the above

43. (1.00 pts) How does ninhydrin work?

- A) It reacts to fats in the print
- B) It sticks to the print
- C) It reacts to amino acids in the prints
- D) It reacts with moisture in the air

44. (1.00 pts) How does dusting for fingerprints work?

- A) The dust reacts to fats in the print
- B) The dust sticks to the print
- C) The dust reacts to amino acids in the print
- D) The dust reacts with moisture in the air

45. (1.00 pts) What is a latent fingerprint?

- A) A visible fingerprint
- B) A fingerprint made in a soft substance such as clay
- C) An invisible fingerprint
- D) None of the above

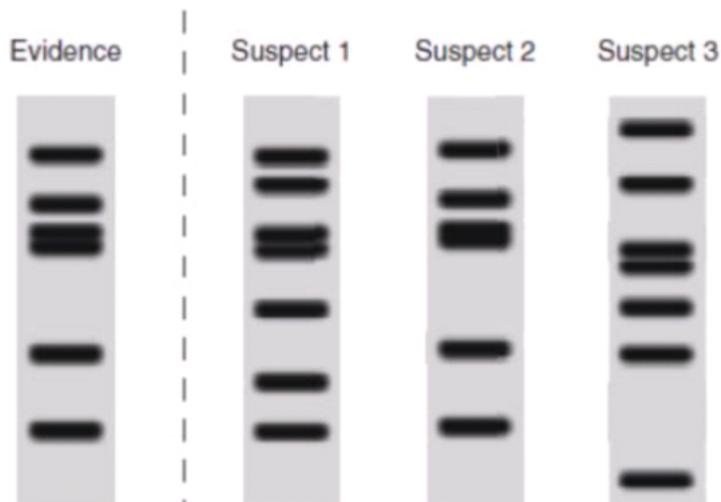
46. (1.00 pts) What length of DNA strand would travel the least in a gel electrophoresis?

- A) 50 bp
- B) 100 bp
- C) 150 bp
- D) 200 bp

47. (1.00 pts) What would have the MOST impact on the size of the DNA fragments in a gel electrophoresis?

- A) using the wrong buffer
- B) Not using a restriction enzyme
- C) Swapping the positive and negative charges on the electrophoresis chamber
- D) Running the gel electrophoresis at lower voltage

48. (1.00 pts) A gel electrophoresis test has been performed on DNA found at a crime scene. Comparing this to three other suspects, what MUST be true?



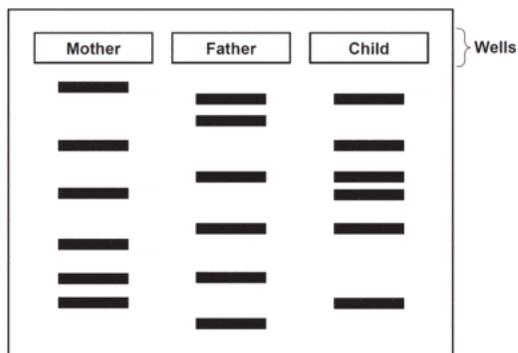
- A) The culprit is Suspect 1

- B) The culprit is Suspect 2
- C) The culprit is Suspect 3
- D) The culprit is none of the suspects

49. (1.00 pts) After 7 rounds of PCR how many strands of DNA will be produced?

- A) 14
- B) 49
- C) 128
- D) 256
- E) 512

50. (1.00 pts) Based on the gel electrophoresis, which person has the shortest DNA fragment?



- A) the father
- B) the mother
- C) the child
- D) the father and child

51. (12.00 pts) Please provide your write up below.

Expected Answer:

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

