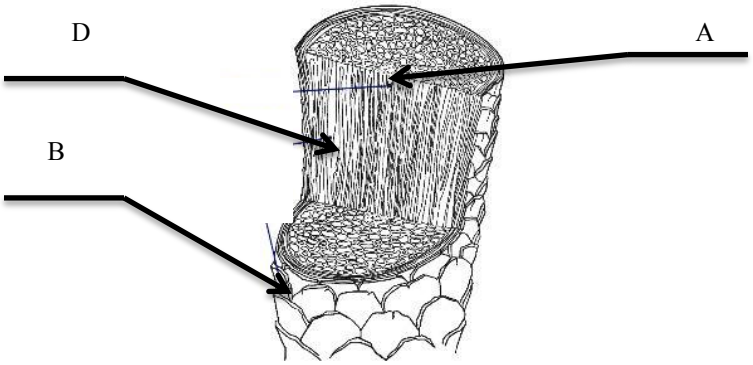
2013 Forensics Test

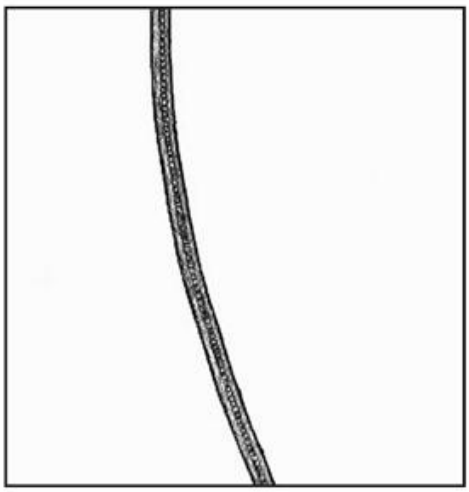
Clio Invitational

1) Label the correct parts of a hair shaft below using three of the following terms:
   a. Medulla
   b. Cuticle
   c. Follicle
   d. Cortex
   e. Dermal papilla

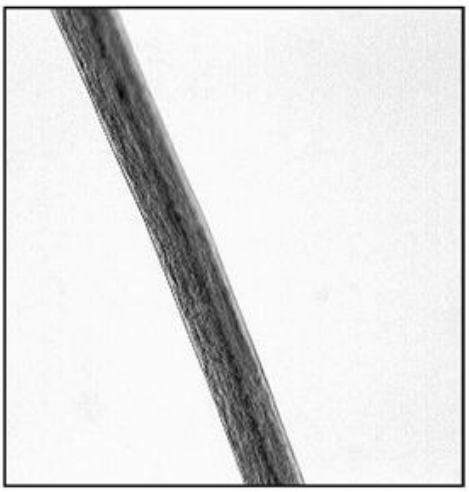


THE HAIR SHAFT

2) The roots of a hair sample are very distinguishable between humans and animals. Label each of the following pictures of hair roots as either human or animal. Each choice will be used once.



ANIMAL



HUMAN

3) You have three fibers and perform burn tests on all three. The results are seen below.

Fiber A	Fiber B	Fiber C
Not Self-Extinguishing	Self-Extinguishing	Not self-extinguishing
Burns and chars	Burns briefly and melts	Burns and chars
Odor of burning paper	Odor of celery	Odor of burning grass
Creates a soft, gray ash	Creates a hard gray bead	Creates a soft, gray ash

Label each fiber using options from the following list (only three fibers will be used, none will be doubled up).

A – Cotton **B – Nylon** **C - Wool**

4) Luminol is a chemical used by crime scene investigators to identify blood stains. What is the chemical formula for luminol? (circle the correct answer)

$C_8H_7O_3N_3$

5) In order to obtain a strong glow so that the blood stains are easily seen, luminol requires a catalyst to accelerate the chemical reaction that occurs between luminol and hydrogen peroxide. What is the catalyst in this case? (circle the correct answer)

Iron in hemoglobin

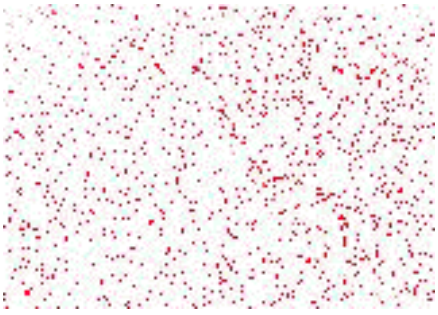
6) What is the most common blood type? ____O^+_____

7) What is the least common blood type? _____AB_____ (+1 EC if they put AB-, tiebreaker #2)

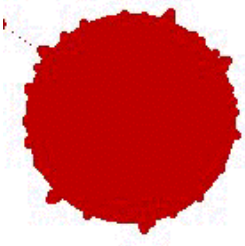
8) Complete the following chart by entering 'yes' or 'no' in each box.

ABO Blood Type	Antigen A	Antigen B	Antibody Anti-A	Antibody Anti-B
A	Y	N	N	Y
B	N	Y	Y	N
O	N	N	Y	Y
AB	Y	Y	N	N

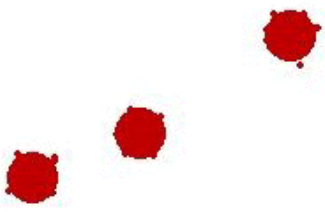
9) Given the pictures below, identify which blood spatters would be formed at low, medium and high velocity. Each choice will be used once. (**high, low, medium**)



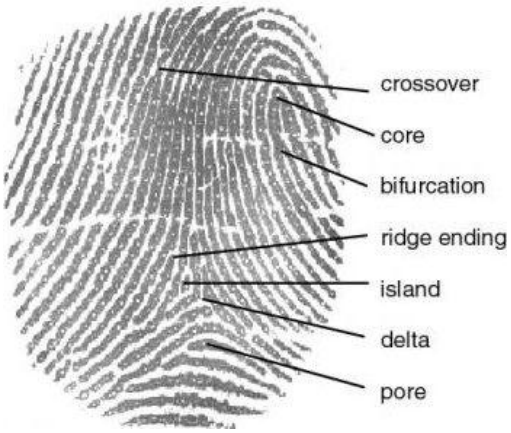
HIGH



LOW



MEDIUM



10) What type of fingerprint is seen above? _____loop_____

Match the points on the fingerprint with the name of the characteristic below:

11) ___F____ Delta

12) ____G___ Pore

13) ____D___ Ridge ending

14) ___C____ Bifurcation

15) ___A____ Crossover

16) ____B___ Core

17) ___E____ Island

Answer each of the following as 'true' or 'false'.

18) ____F_____ There is no established link between the fingerprint patterns of a child and that of their parents.

19) _____T_____ There is no known method of determining the age of a latent print.

20) ____T_____ A ridge that is thinner and shallower than those surrounding it may be termed 'incipient'.

21) ____F_____ The fingerprinting acronym ACE-V stands for "analyze, collect, evaluate, and verify."

22) Which of the following is <u>not</u> a method for collecting latent prints?

Fluorescent powders

Cyanoacrylate

Leuco Crystal Violet

Ninhydrin

Answer each of the following as ‘true’ or ‘false’.

23) ____F_____ The difference between HDPE and LDPE is in the amount of crosslinking between the polymer chains.

24) ____T_____ PETE is a condensation polymer.

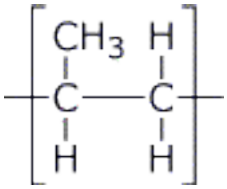
25) From the following list of polymers, circle those that are thermoplastics:

PETE ***PS*** ***PC***

PVC

LDPE ***HDPE***

26) Draw the repeating unit of polypropylene. (tie breaker #1)



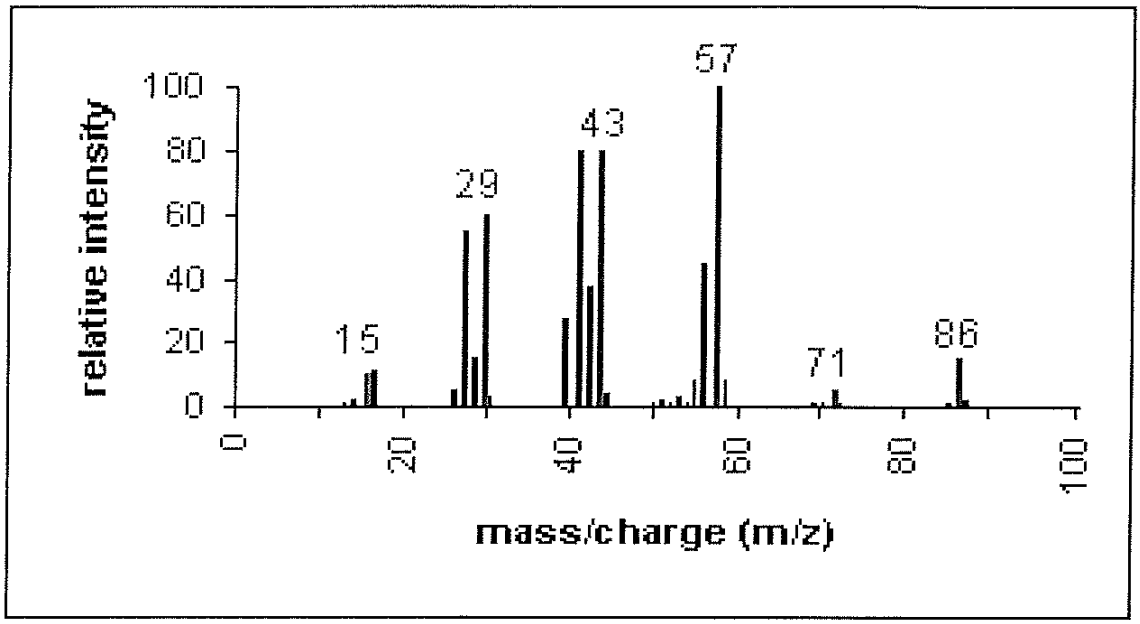
27) If a body is found and only blowfly eggs (no larva or pupa) are present, what is the maximum amount of time that has passed since the victim was killed? (circle the best answer and assume that adult blowflies found the body immediately.)

24 hrs

28) Put the following in order of appearance should a corpse sit undiscovered long enough.

a. Beetles
b. Blow Fly
c. Moth Larvae

_____B_____ , _____A_____, ____C_____



29) What is the most likely molar mass of this chemical compound? _____86_____

30) What is the m/z value of the base peak? _____57_____

31) The pattern shown by the peaks identify specific parts of the compound. What is the probably molecular formula for this compound? _____hexane_____

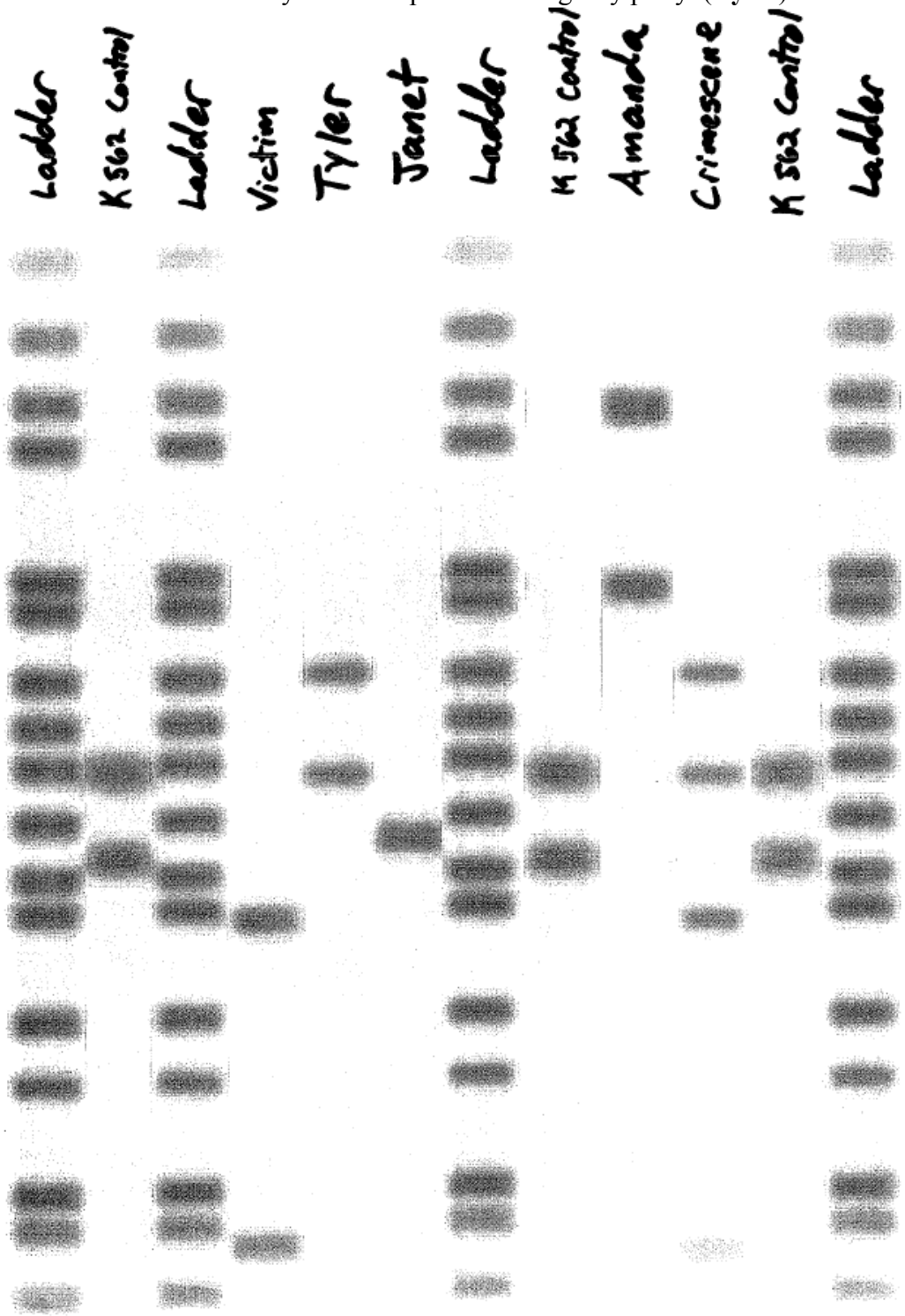
32) If the mobile phase in a chromatography experiment moved 15 cm and R_f value of one of the compounds in the mixture was 0.85, how far would the compound move on the paper? (2 pts, subtract ½ pt for no unit)
15 x 0.85 = 12.75 cm

33) In paper chromatography, what is the stationary phase (be specific). ___water (in the paper fibers)_____ (1 pt for water, 1 pt for paper fibers, tiebreaker #3)

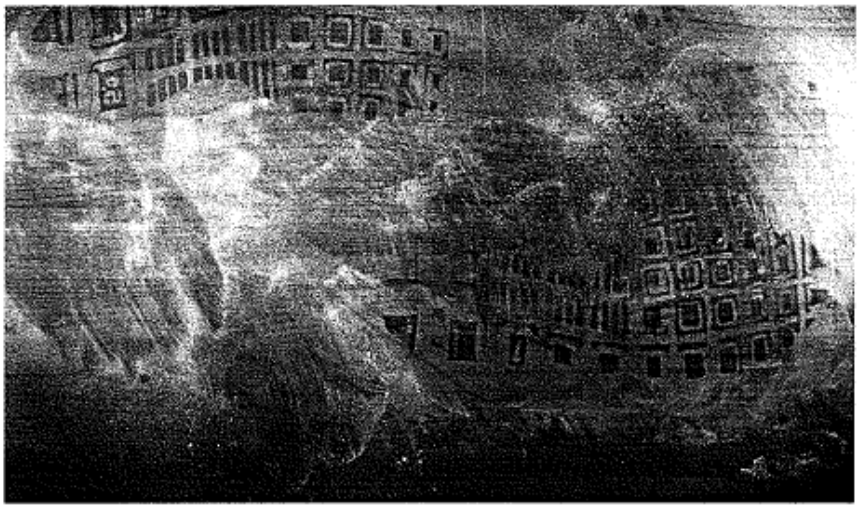
34) Which particle would show the greatest deflection in a mass spectrometer? (circle the correct answer)

CH_3^{2+}

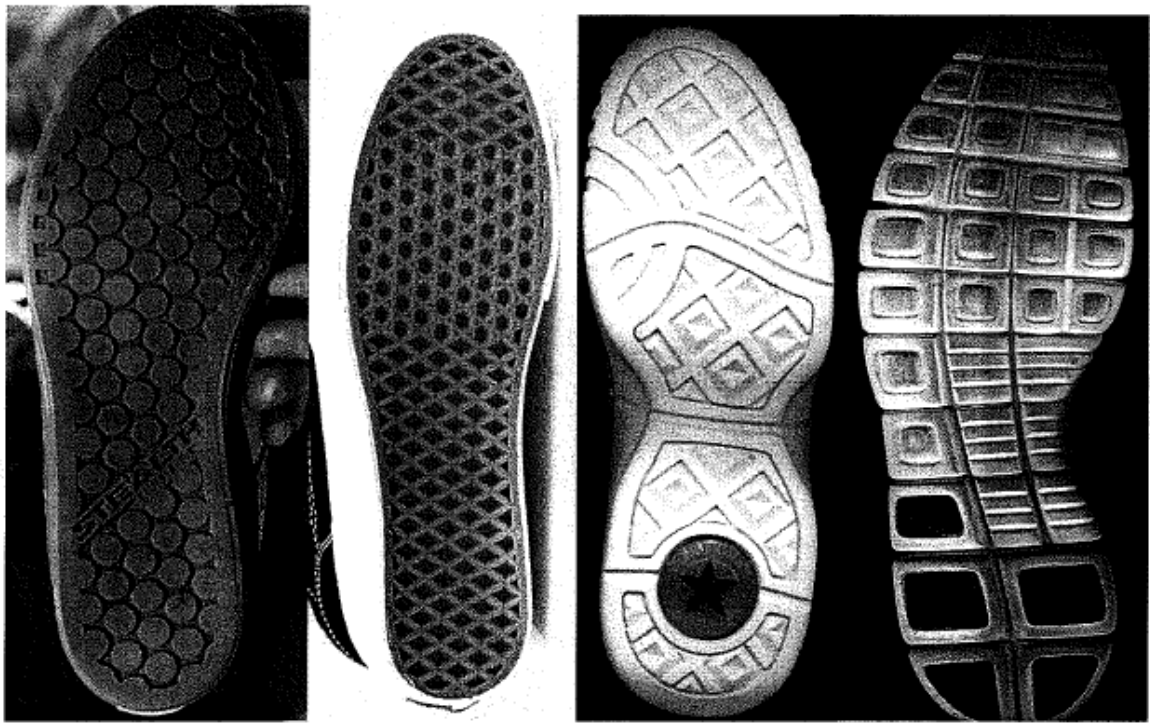
35) DNA evidence was collected from a crime scene as well as from the victim. DNA evidence was also collected from Tyler, Janet and Amanda. Analyze the evidence below and determine if any of the suspects are the guilty party. (**Tyler**)



36) A set of shoe prints was found at the scene of a crime and photographed. The soles of the shoes of four suspects were also photographed for comparison. IF one of the shoes matches, circle the name of the appropriate suspect above the photograph. If none of the shoes match, write "No Match" on the page. (**Murphy**)



Steve Amanda Janet Murphy



37) Which of the following is used to detect glucose in a solution? (circle the correct answer)

Benedicts solution

Match the color of the burning chemical with the chemical that most likely produced it:

38) ___B____ Sodium	a) faint green flame
39) ____D___ Lithium	b) yellow flame
40) ___C____ Potassium	c) light purple flame
41) ___E____ Boric Acid	d) red flame
42) ___F____ Calcium	e) bright green flame
43) ____A___ Ammonium Chloride	f) yellow-red flame