A. Forensic Science—also called Forensics or __________________________________
   
a. Definition: The study and ____________________________ of __________________ to matters of the ____________________________.
   
b. Application comes from many areas, including:
   
   Integumentary—Fingerprints, Hair
   Skeletal—Bones
   Cardiovascular—Blood
   Digestive—Teeth, Saliva
   Reproductive—Semen

   Measurements
   Ratios
   Algebraic Formulas
   Graphing
   Distance
   Practical Word Problems

   DNA
   Genetics
   Entomology—Insects
   Botany—Plant Identification
   Zoology—Animal Hair/Blood

   Soil Studies
   Casts and Molds

   Computers
   Chromatography
   Spectroscopy
   Microscopes
   Electrophoresis
   Photography

   Law
   Forensic History
   Psychology—Criminal Mind
   Time Periods
   Geography/Maps

   Density
   Mixtures
   Organic Analysis
   Inorganic Analysis
   Toxicology—Drugs/Poisons
   Fibers
   Fire/Explosives

   Paper and Ink Analysis
   Handwriting
   Typewriting
   Forgery

   Blood Splatters/Patterns
   Trajectory
   Speed
   Light
   Sound—Voice Patterns
   Bone Fractures

   Communication—written, oral
   Technical Reading Skills
   Research Skills
   Biographies
   Fiction/Nonfiction

   Careers
   Critical Thinking
   Deductive Reasoning
   Problem Solving Skills
   Study Skills

   GENERAL
   B. Forensic Scientist
   
a. Job Description
   
   i. ___________________________ and ___________________________ crime scenes
   ii. Collect and preserve ___________________________
   iii. Analyze and compare evidence in a ___________________________
   iv. Reconstruction of data (form the “best theory” of events in the case)
   v. Provide ___________________________
   
b. Skills Needed
   
   i. Good observation skills—use the ___________________________
   ii. Analytical skills—ability to identify the problem, organize info, draw ___________________________
   iii. ___________________________ reasoning—using logical steps to draw a conclusion based on facts or evidence
C. Branches of Forensic Science

a. Forensic __________________________ - medical doctors, medical examiners, and pathologists study the medical history, perform an __________________, and collects medical and trace evidence from the body for further analysis. Help determine __________________ and circumstances of __________________ (may be for murder investigations, but also help with insurance claims, malpractice claims, etc.)

b. Forensic __________________________ - dentists who specialize in identification perform bite mark analysis and dental identification when there is no other way for body __________________________

c. Forensic __________________________ - medical examiners and the Coroner’s office determine toxic substances in the body; includes ______________ and __________________

d. Forensic __________________________ - identification of persons or personal characteristics (sex, age, race, stature) based on body _______________________

e. Forensic __________________________ - identification of blood and other body fluids (semen, vaginal fluid, saliva)

f. Forensic __________________________ - uses insects to determine time of death and location of a corpse

g. Forensic Psychiatry and __________________________ - evaluate offenders and profile criminal cases

h. Forensic Engineering- investigate transportation __________________________, materials failure cases, determine cause of building/structure __________________________, etc.

i. Forensic Computer Science- investigate criminal use of __________________________ and electronic records

D. Services of the Crime Laboratory

a. Different crime laboratories have a variety of services due to local laws, the capabilities of the agency, and budget limitations. A “full-service” crime laboratory would include the following:

   i. Physical Science Unit – Incorporates the principles of chemistry, physics, and geology to identify and compare __________________________ __________________________

      1. May be further divided into Drug Identification, Soil & Mineral Analysis, and Trace Evidence sections.

      2. Trace and Transfer Evidence- identification of __________________________ of materials found at a scene or on a victim (blood, food, hair, paper, fibers, cosmetics, soil, gunshot residue, etc.).

   ii. Biology Unit – Applies the knowledge of biological sciences in order to investigate __________ samples, ______________, ______________, botanical samples, __________, and fiber samples. Also includes DNA profiling.

   iii. Firearms Unit – Investigates discharged __________________________, cartridge cases, shotgun shells, and ammunition. Also includes comparison of __________ marks, __________ treads, and __________ prints.

      1. ______________ - A specific type of physical pattern identification; matching projectiles and casings to individual firearms or __________________________.

   iv. Document Examination Unit – Provides __________________________ __________________________ and other reproduction processes; __________ and paper analysis; __________________________ and authenticity. Also analyzes indentations, obliterations, erasures, and burned or charred documents.

   v. Photography Unit – Responsible for __________________________ and examining physical evidence. May use special techniques ( ______________ imaging, infrared, _________, ____________ ). Also responsible for photographic display in __________________________ presentations.
vi. **Toxicology Unit** – Examines body fluids (________________, ________________) and organs for the presence of drugs and poisons. Also responsible for training __________________ operators and for maintenance of the instruments.

vii. **Fingerprint Unit** – Processes and examines crime scene and evidence for____________________ fingerprints.

1. Latent fingerprints are marks left at a crime scene not immediately __________________ to the naked eye.

viii. **Polygraph Unit** – Conducts polygraph (____ ____________________) tests; administered by people trained in investigation and interrogation.

ix. **Voiceprint Analysis Unit** – Attempts to tie a recorded voice to a particular suspect. Use an instrument called a ___________________ ___________________ to make a visual graphic display called a __________________________.

x. **Evidence-Collection Unit** – Dispatches specially trained personnel to the crime scene to collect and ____________________________ physical evidence. Must follow specific procedures to maintain _______________________________.

1. Chain of Custody refers to the document or paper trail showing the ________________, custody, control, ________________, analysis, and disposition of physical and electronic evidence.

2. Chain-of-custody bears on the __________________ of the evidence, not its admissibility. Just because you don’t have a chain-of-custody process doesn’t mean that the evidence is __________________________. Admissibility is determined by the manner in which the evidence was ___________________________. It must be __________________________ obtained!

E. **Four Major Crime Labs** have been created to assist in cases that extend beyond state and local jurisdictions. They offer their expertise to any local agency that requests it.

a. __________ (Federal Bureau of Investigation)- established in 1908 during the presidency of T.Roosevelt

i. As an ____________________________-driven and a ___________________________ -focused national security organization with both intelligence and law enforcement responsibilities, the mission of the FBI is to protect and defend the United States against terrorist and foreign intelligence threats, to uphold and enforce the criminal laws of the United States, and to provide leadership and criminal justice services to federal, state, municipal, and international agencies.

ii. FBI has ____________________________ crime lab in the world!

iii. FBI Headquarters is in ____________________________, but there are 56 field offices located in major cities throughout the U.S., 381 smaller offices across the nation, and more than 78 international offices called “legal attachés” in U.S. embassies worldwide.

b. __________ (Drug Enforcement Administration)- analyzes drugs seized in ____________________________ cases

i. The Drug Enforcement Administration was created by President Richard Nixon through an Executive Order in July 1973 in order to establish a single unified command to combat "an all-out global war on the drug menace."

c. __________ (Bureau of Alcohol, Tobacco, and Firearms)- The ATF itself was established in 1972, but it traces its roots to the days of ____________________________.

i. ATF is a unique law enforcement agency that protects our communities from violent criminals, criminal organizations, the illegal use and trafficking of firearms, the illegal use and storage of
acts of arson and bombings, acts of terrorism, violations of __________ laws, and the illegal diversion of alcohol and tobacco products.

d. USPIS (US _______________ Inspection Service)- handles criminal investigations relating to postal service.
   i. USPIS is one of our country’s ______________________ federal law enforcement agencies, founded by Benjamin Franklin in 1737.
   ii. The mission of the U.S. Postal Inspection Service is to support and protect the U.S. Postal Service and its employees, infrastructure, and customers; enforce the laws that defend the nation’s mail system from illegal or dangerous use; and ensure public ______________ in the mail.
   iii. Postal Inspectors are federal law enforcement officers who carry firearms, make arrests, execute federal search ______________ and serve subpoenas.

F. Forensics in Florida
   a. The _______________ Department of Law Enforcement, known as ________, is the state’s official crime lab.
   b. Their headquarters are in _______________________, but they have offices in Ft. Meyers, Jacksonville, Orlando, Pensacola, and _______________________.
   c. Pinellas, Miami-Dade, Palm Beach, Indian River, and Broward Counties have their own labs.

G. History of Forensic Science and Important Individuals
   a. 13th Century China: The ____________ case ever recorded using forensic science. When someone was __________________, all of the ______________ in the village were collected. ____________ were attracted to the traces of blood and landed on only one of the knives, causing the suspect to ______________.
   b. Mathieu Orfila (1814): Considered the “Father of Forensic ________________”; chemist who published first scientific paper on the detection of ______________ and their effects on animals.
   c. William Herschel (1856): Used ________________ on documents to identify workers in India.
   d. Alphonse Bertillon (1879): “Father of ________________ ________________”. Developed Anthropometry which uses __________ ________________ to distinguish individuals.
   e. Henry Fauld (1880): Uses fingerprints to eliminate an ________________ ________________ burglary suspect.
   f. Sir Arthur Conan Doyle (1887): Published his first ________________ ________________ story; Considered the first “CSI”, featured in four novels and 56 short stories, popularized scientific crime-detection methods.
   g. Francis Galton (1892): Published ________________ ________________. Conducted the first definitive study of fingerprints and their _________________. Gave proof of their ________________.
   h. Hans Gross (1893): Published ________________ ________________. Wrote the first paper describing the application of ________________ ________________ to the field of criminal investigation.
   i. Karl Landsteiner (1901): Discovered the ____________ ________________ groups, later received Nobel Prize.
   j. Edmond Locard (1910): Incorporated Gross’ principles within a workable ________________ ________________; became the founder and director of the Institute of Criminalistics at the University of Lyons, France.
   k. Albert S. Osborn (1910): Published ________________ Documents. Developed the fundamental principles of ________________ ________________.
   l. Leone Lattes (1915): Developed a method for determining blood type from ________________ blood.
m. **August Vollmer** (1923): Established the ____________ Crime Lab in United States, located in Los Angeles.

n. **Calvin Goddard** (1925): Developed a __________________________ microscope; first used to compare _________________ to see if fired from the same weapon.

H. Involvement of Forensics in Criminal Cases
   a. Different types of criminal cases receive different levels of forensic treatment.
      i. Forensics are used more in crimes against ________________ rather than ________________ (ex. Murder and rape)
   b. There are also differences in the importance of physical evidence analysis with different types of cases
      i. Ex. Important in ________________ possession; drugs must be identified
   c. Certain types of physical evidence are associated with particular crimes
      i. Ex. Burglary- ________________ evidence
   d. There are a number of different kinds of law in the U.S. Criminal Justice System:
      i. **Statutory Law**: “Law on the ____________”; these are legislative acts declaring, commanding, or prohibiting something. They have been ________________ by a governmental body or agency (such as Congress) and are based on the ________________.
      ii. **Common Law or Case Law**: Laws made up of judicial opinions and ________________ set in appellate courts.
      iii. **Civil Law**: Often referred to as ________________ law; deals with relationships between individuals involving matters such as ________________, contracts, marriage/______________, ________________, negligence, and other civil concerns. Violations of civil law are usually punishable by ________________ or transfer of property.
      iv. **Criminal Law**: Often referred to as ________________ law; deals with regulation and enforcement of rights. Offenses against an individual are usually offensive to ________________; the ________________ becomes the plaintiff in court. (ex. Miranda vs. Arizona)
         1. ________________ - minor crime such as theft, minor assault and battery, or possession of small amount of illegal drugs.
         2. ________________ - major crime such as murder, rape, armed robbery, serious assaults, dealing of illegal drugs, fraud, auto theft, or forgery.
         3. In criminal cases, the prosecution must prove guilt “beyond a ________________ ________________” to convict the suspect.
         4. Violations of criminal law are punishable by fines, community ________________, ________________, incarceration, life in prison, or capital punishment (death).
   v. **Equity Law**: Remedial or preventative; includes injunctions and ________________ orders.
   vi. **Administrative Law**: Laws established by agencies such as the ________, ________________ Security Administration, or branches of the ________________.
   e. Forensic scientists may examine evidence concerning the breaking of any and all types of laws listed above. However, all collectors and handlers of evidence must be aware of the rights guaranteed in the ________________ of ________________ by the US Constitution, so that individual rights are not violated.

Some of these rights include:
- Protection from ________________ search and seizure
- The right not to be arrested without ________________
- The right to be presumed innocent until ________________ guilty
- The right against self-______________
• The right to a fair and _______________ jury trial that will be free from cruel and unusual _______________ and _______________ bail and fines

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**The Bill of Rights**

*(consists of the first ten amendments to the Constitution)*

- **First Amendment:** Freedom of Religion, Speech, and Press, the Right to Assemble Peaceably and to Petition the Government “for a redress of grievances.”
- **Second Amendment:** Right to Keep and Bear Arms- “A well-regulated militia, being necessary to the security of a free state, the right of the people to keep and bear arms, shall not be infringed.”
- **Third Amendment:** Quartering of Troops- “No soldier shall, in time of peace be quartered in any house, without the consent of the owner, nor in time of war, but in a manner to be prescribed by law.”
- **Fourth Amendment:** Search and Seizure- “The right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures, shall not be violated, and no warrants shall issue, but upon probable cause, supported by oath or affirmation, and particularly describing the place to be searched, and the persons or things to be seized.”
- **Fifth Amendment:** Grand Jury, Double Jeopardy, Self-Incrimination, Due Process
- **Sixth Amendment:** Criminal Prosecutions – Right to a speedy public trial by an impartial jury, to confront witnesses and to counsel for defense.
- **Seventh Amendment:** Common Law Suits –Right to a Trial by Jury
- **Eighth Amendment:** No Excessive Bail or Fines or Cruel and Unusual Punishment- “Excessive bail shall not be required, nor excessive fines imposed, nor cruel and unusual punishments inflicted.”
- **Ninth Amendment:** Non-Enumerated Rights or “Rule of Construction of the Constitution”- “The enumeration in the Constitution, of certain rights, shall not be construed to deny or disparage others retained by the people.”
- **Tenth Amendment:** States’ Rights- Rights not explicitly delegated to the Federal Government in the Constitution are reserved to the States or to the People.
I. Steps in Pursuing Justice
   a. These can be different depending on jurisdictions (federal, state, local), state procedures, type of crime, prior history, etc. However the general generic procedure may go as follows:
      i. Crime is __________________________
      ii. Crime is __________________________ (a suspect may be identified)
      iii. Police __________________________ and information is collected
      iv. Crime Scene is documented and searched for __________________________
      v. All information assembled into a report for a __________________________
      vi. Investigation ensues
      vii. If there is enough evidence to establish __________________________ ________________, an arrest __________________________ is issued
           1. In cases of __________________________ danger, officers do not wait for a warrant.
      viii. After arrest, suspect is __________________________
            fingerprinted, photographed, and informed of __________________________ Rights
            • Before a law enforcement officer may question a suspect, they must inform the detainee of their rights and make sure they __________________________ them.
      ix. Suspect is brought before magistrate/judge, or commissioner within _____ hours for arraignment
           1. During arraignment, the defendant is brought before court to hear charges and enter a __________________________. May enter a plea of:
              a. Guilty - admitting to the Judge that one has committed acts which violate a law
              b. Not guilty - one believes he or she has not violated the law
              c. Not guilty by reason of __________________________ - meaning that at the time of the crime, the defendant was ‘unable to appreciate the nature and quality or the __________________________ of the acts’
              d. __________________________ __________________________ - if he or she has already been tried for the same crime in the same court
              e. No __________________________ - neither admits or denies the crime, but accepts punishment as though he/she were __________________________
      x. Preliminary or evidentiary hearing, grand jury, or plea __________________________
         1. Preliminary or evidentiary hearing: a hearing before a judge to determine whether a person charged with a crime should be held for __________________________.
         2. Grand jury: A grand jury is a group of people that are selected and sworn in by a court, just like jurors that are chosen to serve on a trial jury. A prosecutor will work with a grand jury to decide whether to bring __________________________, or an indictment, against a potential defendant.
            a. If the suspect is indicted, a trial __________________________ is set.
b. Indict means to ___________________ ________________ a person of a crime

3. Plea bargaining: an agreement in which a defendant _______________ ________________ to a _______________ charge and the prosecutor in return drops more serious charges to avoid the _______________ and _______________ of trial.

1. Crime Reported
2. Crime Investigated
3. Suspect Arrested
4. Preliminary Arrangement / before a Magisterial District Judge
5. Preliminary Hearing / before a Magisterial District Judge
6. Formal Arrangement / at Manatee County Courthouse
7. Plea or Trial
8. Verdict Rendered / Guilty, or Not Guilty, or Case Dismissed
9. Pre-sentence Investigation / Assessment Board evaluation
10. Sentencing
Eyewitness Testimony

• Fact: In this country, it is estimated that _______ of wrongly convicted defendants, later cleared by ______ evidence, were convicted based largely on eyewitness testimony!

• ________________ memory: common in victims of violent crimes
  o This is a vivid recollection of __________________________

Suspect Lineups

• Studies show that the __________ it takes an eyewitness to decide if the perpetrator is in a lineup, the _______ confident they actually are about their decision
  o Eyewitnesses typically take several minutes to point out the perpetrator because they often feel pressured to choose the correct one
  o However, if they are truly confident, they should be able to decide in __________________________

• An eyewitness is more likely to __________ identify a person in a set of lineup photographs if there is anything that __________________ one picture from another
  o For example:
    ▪ If one picture is larger than the others
    ▪ If facial features in all the photographs are not identical

• Malpass and Devine study (1981) – Power of suggestion
  o Half of their participants in the staged act of vandalism were told that the perpetrator was in the lineup while the other half were told that the perpetrator may or may not be present
  o Results: the participants who were led to believe that the perpetrator was present felt ______________ to pick someone, and more often than not, they chose an __________________________

What makes memories inaccurate?

• Poor __________________
• __________ in viewing
• __________ exposure
• Something covering the perpetrator’s ________ (i.e., a mask)
• Heightened __________ and ___________ levels
• Presence of a __________
• The __________________________ (the tendency for people to recognize faces of their own race more accurately than faces of other races)
• Memory Test Results: list the objects you remember in the box.

• ________________ questions
  o Example: “Was the man wearing a black jacket?”
  o Why could this question present problems?
    ▪ It doesn’t leave room for ____________________________
    ▪ It encourages eyewitness to ____________________________ (in this example, it coerces eyewitnesses into believing the man was wearing a particular color jacket, just like I convinced you that you saw pictures that weren’t really there)

• Crime Scene Results: answer the crime scene questions in the box.

• Ronald Cotton Case – excerpts from https://www.innocenceproject.org/cases/ronald-cotton/

  “Thompson-Cannino [the rape victim] first chose Ronald Cotton as her attacker in a photo lineup. Soon after, she chose him again in a live lineup – she was 100 percent sure she had the right man. The evidence at trial included a flashlight found in Cotton’s home that resembled one used by the assailant and rubber from Cotton’s shoe that was consistent with rubber found at one of the crime scenes, but overwhelmingly the evidence rested on Thompson-Cannino’s identification.

  In January 1985, Cotton was convicted by a jury of one count of rape and one count of burglary. In a second trial, in November 1987, Cotton was convicted of both rapes and two counts of burglary. He was sentenced to life in prison plus fifty-four years.

  When the DNA test results were reported in May 1995, the district attorney and the defense motioned to dismiss all charges. On June 30, 1995, Cotton was officially cleared of all charges and released from prison. In July 1995, the governor of North Carolina officially pardoned Cotton. Cotton had served 10.5 years in prison.”

• Facial Composites
  o Sketches or computer-generated images created from __________________________ memory used to identify a __________________________