UNIT 3: Types of Physical Evidence
Textbook Chapter 2 (Forensic Science for High School)

Unit Vocabulary:

- Evidence:
  _____

- Testimonial Evidence:
  _____

- Physical Evidence:
  _____

- Indirect Evidence:
  _____

- Circumstantial Evidence:
  _____

- Questioned or Unknown Sample (Q):
  _____

- Known Sample(K):
  _____

- Control Sample:
  _____

- Individual Evidence:
  _____

- Class Evidence:
  _____

Locard's Exchange Principle
- "EVERY CONTACT LEAVES A TRACE"
- The value of trace (or contact) forensic evidence was first recognized by _____ _____ in 1910. He was the director of the very first crime laboratory in existence, located in Lyon, France.
- The Locard's Exchange Principle states that "_____ _____." For example, burglars will leave traces of their presence behind and will also take traces with them. They may leave hairs from their body or fibers from their clothing behind and they may take carpet fibers away with them.

Individual vs. Class Evidence

_____

Material that can be related to a single source; individualization always involves a comparison

_____

Material that can be associated only with a group of items that share properties or characteristics

Evidence Examples: _____
- Physical and chemical analysis of paint evidence (chips or residue) can indicate it's _____, such as automobile paint, house paint, nail polish, etc. The evidence can be _____ to _____ different types of paint classified in a database, which can be used to identify a particular make or model of car or brand of tool.
- Paint evidence can also indicate _____ characteristics if an investigator is able to find similarities between _____, such as the color, number of layers, chemical composition, or a physical match between the edges of two paint chips – one from a tool and one from a crime scene.
- **DID YOU KNOW:** Most paint evidence submitted to a lab will come from hit-and-run cases involving automobiles.

Evidence Examples: _____
- Glass particles can be found at various crime scenes, such as _____ _____.
- Glass at a crime scene is analyzed to determine its color, surface characteristics, tint, thickness, density, chemical composition, and refractive index (RI).
- The results of the tests provide clues about the crime and help investigators connect the evidence to a suspect or
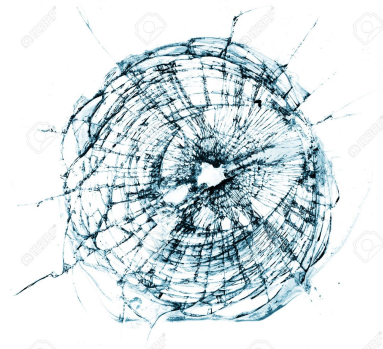
other object used in a crime, such as matching glass from a crime scene to a headlight to a suspect's car.
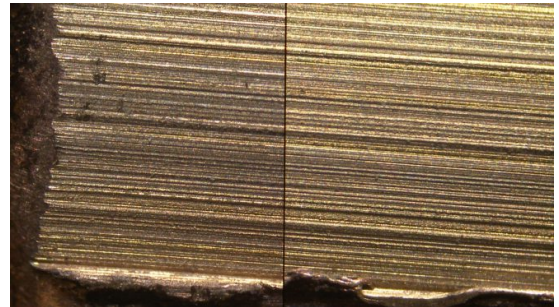
Evidence Examples: _____

- Explosive substances can be examined to determine its _____ to identify the type of explosive used and its origin.
- _____ of explosives found on a suspect's clothing, skin, hair, or other objects may be matched to explosives from the crime scene.
- Materials used to make an explosive device will be compared to evidence found in the suspect's possession to confirm a match.
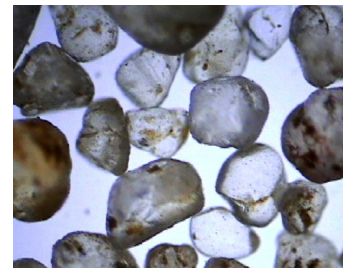
Evidence Examples: _____

- Characteristics of ammunition, firearms, and residue are examined to find matches between suspects and the evidence found at a crime scene.
- Chemical tests can reveal _____ on the hands, face, or clothing of a victim or suspect to indicate how close a person was to a fired gun.
- **DID YOU KNOW**: Caliber (handguns & rifles) or gauge (shotguns) refers to the size of the internal diameter of a gun's barrel.
- Rifling (grooves) in a gun barrel causes distinctive grooves, indentations and scratches upon fired bullets, which can be matched to the weapon that fired them.
- Police are able to search _____ database to compare markings from bullets, cartridge cases, and shotgun shells to ballistic evidence.

Evidence Examples: _____

- Dust, dirt, or sand evidence can reveal where a person has _____ and may be picked up at a crime scene or left behind.
- Investigators examine the samples for chemical composition, pollen, plant material, and other organic matter to find links to a specific crime scene.

Evidence Examples: _____

- There are 3 types of fingerprint patterns: _____. Investigators also identify unique ridge characteristics in a fingerprint that can be used to identify a suspect or victim.
- _____ is a database used by investigators at local, state, and national levels to search for matches to fingerprints found at a crime scene.

Arch   Loop   Whorl

Evidence Examples: _____

- Impression evidence can be photographed, _____ with tape, or _____ with plaster to compare to a suspect's shoes or tires.
- Investigators will examine the evidence to identify the brand of _____ or _____ based on its tread pattern and other physical features to provide leads in the case.
- Shoes and tires will also show _____after being used for a period of time as well as other features (scratches, nicks, and cuts) that can be used to match evidence to specific items. For example, shoeprints can be matched to a suspect based on how the treads on the shoes that are worn down due to that person's _____.

Pirate   Ninja   Zombie   T-Rex

Evidence Examples: _____

- Each of the _____ teeth in humans is unique due to age and wear.
- Impressions and photographs of bite marks left on a victim, assailant, or other object at a crime scene can often be matched to _____.
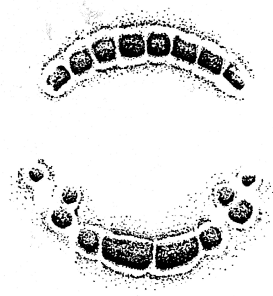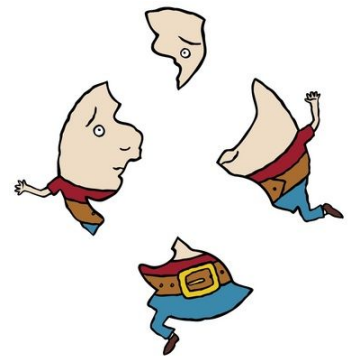
Evidence Examples: _____

- Tiny _____ form on the edges of a tool as it is used, which can be used to identify matches between evidence and suspects.
- Tools may also pick up traces of blood or other substances that can be tested or have fingerprints that can be lifted.

Evidence Examples: _____

- When an object broken, torn, or cut, two unique edges are formed, which are referred to as _____.
- These edges can be _____ by the naked eye or with microscopes to see if they fit together, which indicates that they may have been part of the same object at one time.
- Investigators may compare the edges on pieces of tape, glass fragments, paint chips, pieces of a car from an accident, paper bag, etc. to find possible matches.

Evidence Examples: _____

- Wounds can often be matched to weapons or tool marks on the weapon. Investigators may also be able to determine the weapon's size, shape, and length.
- Analysis of a wound may provide clues to a victim's injuries, _____ of the suspect (left-handed, right-handed, height, etc.), and _____ of the victim and suspect at the time of the incident.
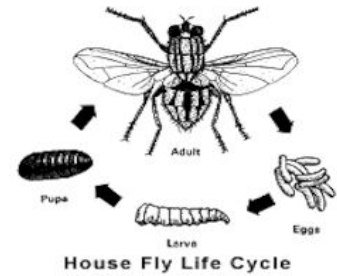
Evidence Examples: _____

- Examiners will analyze a
  _____ or other
  document to find clues to link it to a crime scene or
  a specific suspect. They will analyze the type of
  paper used, printing method or handwriting style,
  and type of ink.
- Other unique features, such as watermarks on
  stationary or _____ made as
  someone wrote on a page in a notebook, may
  provide useful clues.

Evidence Examples: _____

- Flies, beetles, and other insects can provide useful clues
  about a _____.
- Forensic entomologists use factors such as
  _____, the location and
  condition of the body, and their knowledge of the life cycles
  of insects to help them estimate the postmortem interval or
  _____ (the time between death and the discovery of the
  body).

Evidence Examples: _____

- Investigators can extract _____ from almost any tissue,
  including hair, fingernails, bones, teeth and body fluids. The
  DNA is used to create a _____ that can be compared to
  profiles from suspects or victims.
- _____ (Combined DNA Index System) is a
  database maintained by the FBI that is used to find matches to
  unknown DNA samples from a crime scene.

Evidence Examples: _____

- Forensic anthropologists analyze
  _____ to determine four
  characteristics for a victim: age, sex, race, and stature (height/build).
  - _____ - Determined by examining the pelvis, humerus, and femur
  - _____ – Determined by analyzing the development of the
    teeth, bone growth, and the length of
    specific bones, such as the femur.
  - _____ – Determined by analyzing
    the skull for characteristics that are
    common among people of different
    races.
- DNA samples can be collected from bone, teeth,
  and hair to provide clues to a person's
  identity. Scientists may also be able to gain
  clues as to a person's past, recent
  _____, or the cause of death based
  on bone fractures and other signs of trauma.

What do forensic anthropologists do?

- **Generally, forensic anthropologists DO NOT do any of the following:**
    - _____ trace evidence (hair, fibers)
    - Run DNA tests
    - Analyze ballistics or _____ evidence
    - Analyze _____ spatter
    - Conduct autopsies
- **What a forensic anthropologist does DO to aid in a case:**
    - Goes to a crime scene to assist in the collection of _____
    - Cleans up the _____ so that they may be looked at
    - Analyzes skeletal remains to establish the _____ of the individual
    - Looks at _____ evident on the bones to establish the pathway of a bullet or the number of stab wounds
    - Works with a forensic _____ (dentist) to match dental records
    - Testifies in court about the identity of the individual and/or the injuries that might be evident in the skeleton
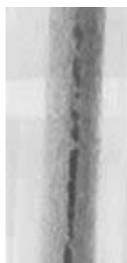
Evidence Examples: _____

- Blood, semen, saliva, sweat, and urine can be analyzed to give investigators information about the crime as well as its victim or the suspect.
- _____ can be used at a crime scene to find body fluid evidence. Areas with potential evidence are swabbed, bagged and collected in vials, which are _____ and have a low risk of cross contamination.
- Examples:
    - Vomit and urine can be used to test for alcohol, drugs, and poisons.
    - Cigarette butts may contain dried saliva.
    - Semen containing sperm is valuable for DNA analysis.
    - Blood can provide DNA evidence and blood spatter can provide clues about the crime.

Evidence Examples: _____

- Hairs and fibers may be _____ from the suspect or the suspect's clothes to the victims' and vice versa. For example, a suspect may pick up carpet fibers on his shoes or leave hairs behind at a crime scene.
- Hairs can be examined to identify their _____, such as human or animal. Hairs with roots intact can be tested for DNA.
- Fibers are used to make clothing, carpeting, furniture, beds, and blankets. They may be natural fibers from plants or animals or synthetic fibers that are man-made.
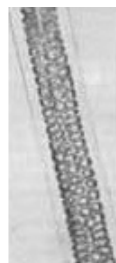
Human   Dog   Deer   Rabbit   Cat   Mouse