

Advanced Forensic Science Examination

Forensic Science · Answer Key · 19 Questions

1. Which of the following is NOT a primary constituent of a typical latent fingerprint's residue?

- A) Amino acids
- B) Lipids
- C) Salts

D) DNA fragments

2. The 'Locard's Exchange Principle' states that a criminal will always leave something behind at a crime scene and take something away. What is the fundamental scientific concept underpinning this principle?

A) Conservation of mass

- B) Entropy
- C) Friction
- D) Chemical equilibrium

3. In forensic entomology, the identification of the earliest developing insect species on a decomposing body is crucial for estimating the post-mortem interval (PMI). Which family of flies is typically the first to colonize carrion?

A) Drosophilidae (fruit flies)

B) Calliphoridae (blow flies)

- C) Muscidae (house flies)
- D) Sarcophagidae (flesh flies)

4. What is the primary mechanism by which luminol detects blood, even if it has been cleaned or is not visible to the naked eye?

- A) Absorption of UV light
- B) Fluorescence under UV light

C) Chemiluminescence

D) Phosphorescence

5. Which type of firearm rifling imparts a progressive twist to a projectile, meaning the rate of twist increases along the length of the barrel?

- A) Conventional rifling
- B) Polygonal rifling
- C) Hook rifling

D) Progressive rifling

6. The analysis of trace DNA found in minute quantities, often from touch DNA, is a significant advancement in forensic science. What is the most common method used for amplifying these small amounts of DNA?

- A) Southern blotting
- B) Polymerase Chain Reaction (PCR)**
- C) DNA sequencing
- D) Gel electrophoresis

7. In forensic toxicology, the 'ethanol window' refers to the time frame during which ethanol can be reliably detected in a biological sample. Which biological sample provides the longest ethanol detection window?

- A) Blood
- B) Urine
- C) Saliva
- D) Hair**

8. The examination of soil samples for forensic purposes is known as forensic geomorphology. What specific physical property of soil is most commonly analyzed to link a suspect to a crime scene?

- A) pH level
- B) Organic content
- C) Mineral composition and particle size distribution**
- D) Water retention capacity

9. What is the primary chemical reaction that occurs during the development of a traditional silver-halide photographic latent image, which is relevant to some forensic imaging techniques?

- A) Oxidation
- B) Reduction**
- C) Polymerization
- D) Hydrolysis

10. In the analysis of glass fragments, the refractive index is a critical characteristic. What physical phenomenon is the refractive index a measure of?

- A) The density of the material
- B) The speed of light in a vacuum compared to its speed in the material**
- C) The tensile strength of the glass
- D) The melting point of the glass

11. Which forensic analytical technique is based on the principle of separating ions based on their mass-to-charge ratio?

- A) Infrared Spectroscopy (IR)
- B) Gas Chromatography-Mass Spectrometry (GC-MS)**
- C) Atomic Absorption Spectroscopy (AAS)
- D) X-ray Diffraction (XRD)

12. The study of human skeletal remains for forensic purposes is called forensic anthropology. Which specific type of bone fracture is characterized by inward displacement of the bone fragments, often seen in blunt force trauma to the skull?

- A) Comminuted fracture
- B) Greenstick fracture
- C) Depressed fracture**
- D) Transverse fracture

13. In forensic ballistics, the unique markings left on a bullet by the rifling of a firearm barrel are known as 'striations.' What is the primary method used to compare these striations?

- A) Microscopic comparison using a comparison microscope**
- B) Spectroscopic analysis
- C) Radiographic imaging
- D) Hardness testing

14. The decomposition of a body can produce gases that cause the body to swell. This phenomenon is known as:

- A) Putrefaction
- B) Autolysis
- C) Lividity
- D) Bloating**

15. Which forensic discipline focuses on the identification and comparison of impression evidence such as tire tracks, shoe prints, and tool marks?

- A) Forensic Serology
- B) Forensic Ballistics
- C) Forensic Odontology
- D) Forensic Impression Evidence Analysis**

16. The examination of voice patterns for identification purposes is known as forensic phonetics or speaker recognition. What is the fundamental principle that allows for speaker recognition?

- A) The unique length of vocal cords
- B) The unique resonant characteristics of the vocal tract and voice box**
- C) The speed at which air is expelled
- D) The specific frequency of vocal cord vibration

17. In forensic document examination, the analysis of the ink used in questioned documents can provide valuable information. What is the most common chromatographic technique used for ink analysis?

- A) Thin-layer chromatography (TLC)**
- B) Paper chromatography
- C) Gas chromatography (GC)
- D) Ion chromatography

18. What is the primary chemical process responsible for the discoloration and degradation of a body exposed to sunlight for an extended period, leading to a mummified appearance?

- A) Adipocere formation
- B) Desiccation**
- C) Putrefaction
- D) Saponification

19. Which type of explosive residue analysis utilizes techniques like ion mobility spectrometry (IMS) or gas chromatography-mass spectrometry (GC-MS) to detect and identify explosive compounds?

- A) Microscopic analysis
- B) Trace analysis**
- C) Bulk analysis
- D) Spectroscopic analysis