1. Forensic science is the application of science to:
   b. Civil laws.
   c. Criminal laws.
   d. Both civil and criminal laws.

2. The fictional character of Sherlock Holmes was created by:
   a. Dalton.
   b. Doyle.
   c. Darwin.
   d. Denton.

3. Who is known as the “father of forensic toxicology”?
   a. Orfila
   b. Locard
   c. Osborn

4. Who developed the system known as anthropometry?
   a. Goddard
   b. Gross
   c. Bertillon
   d. Galton

5. Who undertook the first definitive study of fingerprints as a method of personal identification?
   a. Gross
   b. Lattes
   c. Locard
   d. Galton

6. Who devised a technique for determining the blood group of a dried bloodstain, which he applied to criminal investigations?
   a. Lattes
   b. Gross
   c. Locard
   d. Bertillon

7. Who established the comparison microscope as the indispensable tool of the modern firearms examiner?
   a. Goddard
   b. Lattes
   c. Gross
   d. Galton

8. Who wrote the first treatise describing the application of science to the field of criminal investigation?
   a. Locard
   b. Osborn
   c. Gross
   d. Galton

9. Who established the first workable crime laboratory?
   a. Osborn
   b. Locard
   c. Bertillon
   d. Galton

10. What is the oldest forensic laboratory in the United States?
    a. New York City Police Department
    b. Federal Bureau of Investigation
    c. Secret Service
    d. Los Angeles Police Department

11. Which entity maintains the largest crime laboratory in the world?
    a. Scotland Yard
    b. Royal Canadian Mounted Police
    c. Federal Bureau of Investigation
    d. Los Angeles Police Department
12. Which of the following would not be included in the work of the biology unit of a crime lab?
   a. Blood typing
   b. Comparison of hairs
   c. DNA profiling
   d. Fingerprint analysis

13. Which unit is responsible for examining body fluids and organs for the presence of drugs and poisons?
   a. Toxicology unit
   b. Physical science unit
   c. Biology unit
   d. Trace evidence unit

14. Which one of the following people did not make a contribution to forensic toxicology?
   a. Valentin Ross
   b. Alphonse Bertillon
   c. Carl Wilhelm Scheele
   d. Mathieu Orfila

15. The concept of “general acceptance” of scientific evidence relates to what?
   a. Frye standard
   b. Exclusionary rule
   c. First Amendment
   d. Miranda warnings

16. Which of the following makes a false statement? An expert witness must be able to demonstrate:
   a. Education in his/her area of expertise.
   b. A formal degree in forensic science.
   c. Significant experience in a relevant field.
   d. Working knowledge of the subject matter.

17. Who is the final evaluator of forensic evidence?
   a. Police
   b. Jury
   c. Accused
   d. Media

18. Bite marks would be least likely to be found in cases involving:
   a. Sexual abuse
   b. Murder
   c. Arson
   d. Assault

19. Forensic odontology refers to the study of which of the following?
   a. Teeth
   b. Drugs
   c. Bones
   d. Rocks

20. The effectiveness of an expert’s testimony is almost always dependent on:
   a. The ability of the expert to talk in clear, concise language.
   b. The educational background of the expert.
   c. The scientific validity of the tests used.
   d. All of the above

21. The dramatization of forensic science on television has led to a phenomenon known as what?
   a. NCIS effect
   b. NYPD effect
   c. CSI effect
   d. LAPD effect

22. The lay witness provides testimony that relies on what?
   a. Scientific education
   b. Personal opinions
   c. Personal knowledge
   d. Scientific experience

23. What area of forensic science examines the relationship between human behavior and legal proceedings?
   a. Forensic psychology
   b. Forensic sociology
   c. Forensic pathology
   d. Forensic psychiatry
24. What area of forensic science is concerned with failure analysis, accident reconstruction, and causes and origins of fires or explosions?
   a. Forensic engineering
   b. Forensic psychiatry
   c. Forensic anthropology
   d. Forensic odontology

25. Approximately how many crime labs are currently operating in the United States (including federal, state, county, and municipal labs)?
   a. 250
   b. 400
   c. 150
   d. 200

26. Which of the following can be said to explain the rapid growth of crime labs during the last forty years?
   a. Supreme Court decisions in the 1960s
   b. A staggering increase in crime rates in the United States
   c. The advent of DNA profiling
   d. All of the above

27. The conditions at a crime scene can be compromised by all of the following actions except:
   a. Taking photographs at the crime scene.
   b. Eating food at the crime scene.
   c. Turning on a faucet on the crime scene.
   d. Smoking at the crime scene.

28. Which of the following may give clues about the timing of an incident?
   a. Presence or absence of a television
   b. Position of the day’s newspaper inside or outside the house
   c. Position of the victim’s vehicle
   d. Whether a door is locked or unlocked

29. The size and location of the crime scene as well as the events that occurred there will determine:
   a. The kind of evidence that will be missing.
   b. The time at which the crime scene is searched.
   c. The kind of search pattern that will be used to locate evidence.
   d. The number of personnel who will process the evidence at the crime laboratory.

30. The purpose of the crime-scene search is to locate what?
   a. DNA evidence
   b. Physical evidence
   c. Fingerprint evidence
   d. Bloodstain evidence

31. Officers should attempt to locate tool marks at the point of entry during the investigation of what type of crime?
   a. Homicide
   b. Burglary
   c. Hit and run
   d. Assault

32. The first responding officer at the crime scene must make attempts to detain and question whom?
   a. Witnesses
   b. Unauthorized personnel
   c. Suspects
   d. Both a and c.

33. The most common methods of crime-scene recording do not include which one of the following?
   a. Note taking
   b. Photographs
   c. Sketches
   d. Infrared analysis
34. A rough sketch does *not* need to include which one of the following?
   a. Compass heading designating north
   b. Date, location, and time
   c. Sketch of the suspect
   d. Location of all recovered physical evidence

35. In a crime-scene sketch, the location of an item of evidence is specified in terms of its precise distance from points of reference that:
   a. Are fixed or immovable.
   b. Are within ten feet of the item.
   c. Are located outside the boundaries of the crime scene.
   d. Can be transported to the crime laboratory.

36. Small amounts of trace evidence can be conveniently packaged in a carefully folded paper package called what?
   a. Druggist fold
   b. Vacuum sweeping
   c. Mailing envelope
   d. Manila envelope

37. Which of the following items is likely to contain DNA evidence?
   a. Bedsheet
   b. Blue rug fiber
   c. Glass fragment
   d. Self-adhesive mailing stamp

38. Which one of the following is a correct evidence-collection procedure?
   a. Items recovered from scene of a murder should be sent along with the body to the medical examiner.
   b. All items collected from the same grid area should be packaged together.
   c. Every item should be secured individually in a plastic bag to prevent contamination.
   d. Bloodstained garments should be packaged separately in paper bags.

39. How must an evidence collector take care to avoid potentially contaminating objects of evidential value by transferral of DNA?
   a. Reusing shoe covers
   b. Wearing a face mask
   c. Packaging items containing potential DNA evidence in airtight bags
   d. Packaging all items containing potential DNA evidence in the same package

40. A properly maintained chain of custody is *not* the responsibility of which one of the following?
   a. Crime-scene processor
   b. Evidence clerk
   c. Forensic technician
   d. Trial judge

41. The collection of standard/reference samples at the crime scene is important because they:
   a. Are obtained only from suspects in cases of violent assault.
   b. Permit comparisons to be made with the evidence.
   c. Serve as a source of extra test material if required in the crime lab.
   d. Prove the continuity of possession.
42. When evidence is submitted to the crime laboratory, the analyst receiving the evidence should do what?
   a. Carry out the tests specified on the submission form and any further tests found necessary
   b. Carry out only the tests specified on the submission form
   c. Carry out only the test he or she deems necessary
   d. Carry out any and all tests at his or her disposal

43. The relative evidential value of laboratory test results is almost always dependent on what?
   a. The number of people employed in the crime-scene search and at the crime lab
   b. The manner in which the evidence is collected and preserved
   c. The volume of the physical evidence collected
   d. Whether the crime is considered high profile

44. Success in the recognition and collection of physical evidence is determined primarily by what factor?
   a. Notoriety of the case
   b. Time available to the evidence collectors
   c. Skill of personnel processing the crime scene
   d. Type of evidence involved

45. What determines the appropriate manner of collecting and preserving physical evidence at a crime scene?
   a. The nature of the evidence
   b. The circumstances of the crime
   c. The importance of the case
   d. The number of evidence collectors present at the crime scene

46. Which of the following items may not be placed in an airtight container?
   a. Charred debris recovered from a fire
   b. Bloodstained clothing
   c. Glass
   d. Hairs and fibers

47. Which of the following is not a concern of the evidence collector?
   a. Maintaining the chain of custody
   b. Utilizing the proper packaging material for evidence
   c. Labeling evidence
   d. Determining the natural variations that exist in physical evidence

48. Physical evidence at a hit-and-run scene could include which of the following?
   a. Fiber and tissue
   b. Glass fragments
   c. Fabric impressions
   d. All of the above

49. A dry bloodstain can be collected from an object that cannot be transported to the crime lab by doing what?
   a. Scraping the stain off the surface
   b. Cutting out the area of the object bearing the stain
   c. Transferring the stain to a moistened swab
   d. All of the above

50. Which of the following are required only in the case of special circumstances at a crime scene?
   a. Particle masks
   b. Biohazard packages
   c. Shoe covers
   d. None of the above
51. Physical evidence may be obtained from which of the following?
   a. The crime scene
   b. The victim
   c. The suspect
   d. All of the above

52. What is the list of all people who have come into possession of an item of evidence called?
   a. Evidence log
   b. Photography log
   c. Chain of custody
   d. Examination notes

53. What should the investigator who packaged the evidence write on the evidence tape seal?
   a. His/her full name
   b. His/her initials
   c. Case number
   d. Location

54. The successful outcome of a criminal investigation is almost always directly related to what?
   a. The manner in which the evidence is collected and preserved
   b. The number of people employed in the crime lab
   c. The volume of the physical evidence collected
   d. Whether the crime is considered high profile

55. The removal of any evidence from a person or from the scene of a crime must be done in conformity with the privileges of which amendment to the Constitution?
   a. Sixth
   b. Fourth
   c. Fifth
   d. First

56. The police are not required to obtain a search warrant in which of the following situations?
   a. They are unable to locate a judge to issue a warrant.
   b. They are certain their suspect is guilty.
   c. They are in the process of a legal arrest.
   d. They are investigating the murder of a fellow officer.

57. The presence of blood and semen at crime scenes exposes investigators to which of the following infectious agents?
   a. Hepatitis B
   b. HIV
   c. Both a and b
   d. Neither a nor b

58. When a forensic analyst determines the chemical composition of a preparation that may contain illicit drugs such as heroin, cocaine, or barbiturates, this is an example of what?
   a. Individualization
   b. Identification
   c. Classification
   d. Comparison

59. When a paint chip found on a hit-and-run victim’s garment is examined side-by-side with paint removed from a vehicle suspected of being involved in the incident, this is an example of what?
   a. Comparison
   b. Identification
   c. Classification
   d. Individualization

60. When items of evidence have individual characteristics, this can lead to a determination of common origin (i.e., the conclusion that they are from a single source). Which type of evidence cannot yield such results?
   a. Random striations on tools
   b. Fingerprints
   c. Wear patterns on tires
61. The likelihood of finding class physical evidence is _____ the likelihood of finding physical evidence with individual characteristics.
   a. Same as
   b. Less than
   c. Greater than

62. Physical evidence can be used to exonerate or exclude a person from suspicion if:
   a. It is collected in accordance with the Fourth Amendment.
   b. The standard reference sample (i.e., control) from the person does not share characteristics with evidence at the crime scene.
   c. It does not have a well-documented chain of custody.
   d. Evidence taken from suspect is obtained voluntarily.

63. Forensic databases are not maintained for which one of the following?
   a. Fingerprints
   b. Dental impressions
   c. DNA
   d. Automotive paint

64. The Combined DNA Index System (CODIS) became fully operational in what year?
   a. 1998
   b. 1991
   c. 1978
   d. 1999

65. A component of the National Integrated Ballistics Information Network is called
   a. PDQ
   b. CODIS
   c. IBIS
   d. Both a and b

66. Evidence with class characteristics can do which of the following?
   a. Exonerate an innocent suspect
   b. Link a person to a crime with a high degree of certainty
   c. Always be fitted together in the manner of a jigsaw puzzle
   d. Have no evidential value

67. If the laboratory can piece together broken glass from a window or headlight, then the evidence has_____ characteristics.
   a. Identification
   b. Comparative
   c. Individual
   d. Class

68. During a comparison analysis, a suspect specimen and a control specimen are subjected to the same tests and examinations for the ultimate purpose of determining what?
   a. Whether or not they have a common origin
   b. If they are identical in chemical composition
   c. If the same person handled them
   d. If they are alike in molecular structure

69. The determination that an explosive mixture contains dynamite is an example of the process of what?
   a. Identification
   b. Comparison
   c. Class characterization
   d. Individualization

70. Which of the following is the computerized database used to store DNA information?
   a. AFIS
   b. CODIS
   c. HIBIM
   d. PDQ
71. Palynology is the study of what?
   a. Fish
   b. Insects
   c. Birds
   d. Spores

72. Who ultimately determines the significance of physical evidence during a trial?
   a. The judge
   b. Expert witness
   c. The Supreme Court
   d. The jury

73. Paint chips, random glass fragments, and synthetic fibers all exhibit what type of characteristics?
   a. Individual
   b. Class
   c. Identification
   d. Comparison

74. The fact that the overall frequency of an event can be determined by multiplying together the frequencies of the independently occurring factors related to that event is called what?
   a. Multiplication Rule
   b. Frequency Rule
   c. Product Rule
   d. Factor Rule

75. What is a computerized archive of information relating to a specific type of physical evidence called?
   a. Evidence database
   b. Information database
   c. Comparison database
   d. Forensic database

76. What type of trace evidence was used in the trial of Wayne Williams?
   a. Hair
   b. Soil
   c. Fibers
   d. Paint

77. Physical evidence is considered to have _____ eyewitness (testimonial) evidence.
   a. The same value as
   b. Greater value than
   c. Less value than

78. What can be used in making an identification of a deceased individual?
   a. Fingerprinting
   b. Dental examination
   c. Facial reconstruction
   d. All of the above

79. The death of an individual due to chronic alcoholism is ruled what?
   a. Natural
   b. Accidental
   c. Suicide
   d. Undetermined

80. What is the cause of the largest percentage of accidental deaths?
   a. Drug overdoses
   b. Drowning
   c. Fire
   d. Transportation accidents

81. What are the characteristic markings on the skin caused from the discharge of a firearm called?
   a. Staining
   b. Stippling
   c. Tattooing
   d. b and c

82. What is the best place to take a blood sample from in order to avoid contamination?
   a. Inferior vena cava
   b. Superior vena cava
   c. Heart
   d. Femoral vein
83. Which of the following would be most likely to cause a sharp force injury?
   a. Hammer
   b. Baseball bat
   c. Piece of glass

84. A body that displays a cherry-red discoloration might lead a pathologist to suspect what type of poisoning?
   a. Cyanic acid
   b. Arsenic
   c. Pesticide
   d. Carbon monoxide

85. Where are defense wounds most typically seen?
   a. Hands
   b. Face
   c. Shins
   d. Back

86. Death at a fire scene is most often attributed to inhalation of what?
   a. Carbon dioxide
   b. Carbon monoxide
   c. Nitrogen
   d. Hydrogen

87. Pulmonary edema is frequently found in victims that chronically abused what substance?
   a. Marijuana
   b. Amphetamines
   c. Heroin
   d. Alcohol

88. Beginning an hour after death, the body will lose heat at approximately what rate?
   a. 0–0.5°F per hour
   b. 0.5–1°F per hour
   c. 1–1.5°F per hour
   d. 1.5–2°F per hour

89. Lividy can be expected to be fixed after how long?
   a. 2 hours
   b. 4 hours
   c. 16 hours
   d. 24 hours

90. A pathologist would expect rigor mortis to disappear after how long?
   a. 12 hours
   b. 24 hours
   c. 36 hours
   d. 48 hours

91. Time of death can be approximated by analyzing the vitreous humor for the levels of what?
   a. Potassium
   b. Calcium
   c. Sodium
   d. Magnesium

92. How long does adipocere typically take to develop?
   a. 2 weeks
   b. 4 weeks
   c. 8 weeks
   d. 12 weeks

93. What must a medical examiner possess?
   a. Elected position
   b. Medical degree
   c. Board certification
   d. b and c

94. Which of the following should be performed first at a death scene?
   a. Secure the scene
   b. Take photographs
   c. Sketch the scene
   d. Collect evidence

95. What does hemoglobin transport in the blood?
   a. Hydrogen
   b. Carbon dioxide
   c. Carbon monoxide
   d. Oxygen
96. Which factor can help to determine whether a victim was alive during a fire?
   a. Levels of carbon monoxide in the body
   b. Extent of burns on the body
   c. Presence of soot in the airways
   d. a and c

97. Victims of hanging will typically display which physical characteristic?
   a. Fracture of the hyoid bone
   b. Fracture of the thyroid cartilage
   c. Abundance of large petechiae on the eyelids
   d. Blue appearance of the face

98. What is commonly fractured in strangulation cases?
   a. Hyoid bone
   b. Thyroid cartilage
   c. Thymus cartilage
   d. Nothing

99. What drug is not commonly tested for during a death investigation?
   a. Alcohol
   b. Cocaine
   c. LSD
   d. Morphine/Heroin

100. What part of the victim’s body often is covered in bags in order to prevent loss of trace evidence?
    a. Hands
    b. Feet
    c. Head
    d. No part

101. Death intentionally caused by another person is typically ruled to be what?
    a. Accident
    b. Suicide
    c. Homicide
    d. Natural

102. Homicide, suicide, accident, natural, and undetermined are all categories of what?
    a. Manner of death
    b. Cause of death
    c. Mechanism of death
    d. Method of death

103. Putrefaction and autolysis are two types of _____ processes.
    a. Rigor mortis
    b. Decomposition
    c. Livor mortis
    d. Algor mortis

104. Evidence of tampering with the position of a body after death can be obtained by evaluating what?
    a. Rigor mortis
    b. Algor mortis
    c. Livor mortis
    d. Both b and c

105. What does the term rigor mortis refer to?
    a. Temperature of death
    b. Stiffness of death
    c. Color of death
    d. Time of death

106. A corpse was discovered in an apartment last November. It was that of a 50-year-old male who died of a heart attack. At the time of discovery, the body temperature was determined to be 89°F. What is the most probable postmortem interval?
    a. 1 hour
    b. 2 hours
    c. 7 hours
    d. 4 hours

107. The rate of cooling of a dead body is not influenced by which of the following?
    a. Weather conditions
    b. Location
    c. Size of body
    d. Gender of victim
108. According to forensic entomologists, which "witness" is the first to arrive at the crime scene?
   a. Carrion beetle
   b. Mite
   c. Spider
   d. Blowfly

109. Which of the following indicators can be used to estimate the time of death?
   a. Rigor mortis
   b. Eye fluid potassium levels
   c. Livor mortis
   d. All of the above

110. What part of a decedent’s body resists rapid decomposition and is used by forensic anthropologists to provide information about the decedent?
   a. Teeth
   b. Bones
   c. Soft tissue
   d. Cartilage

111. To determine the sex of skeletal remains, a forensic anthropologist would examine all of the following areas of the skeleton except which?
   a. Cranium
   b. Pelvis
   c. Sacrum
   d. Femur

112. The stage of fusion of various bones within a skeleton can be examined to learn what about the decedent?
   a. Sex
   b. Race
   c. Occupation
   d. Age

113. The amount of spatter from a blood droplet falling on a hard, nonporous surface is ______ that of a drop of blood of equal size falling from the same distance onto a softer, porous surface.
   a. The same as
   b. Less than
   c. Greater than

114. The pointed end of a bloodstain always faces:
   a. Opposite its direction of travel.
   b. Toward the direction from which the force came.
   c. In its direction of travel.
   d. Toward the position of the blood source.

115. What characteristic will a blood droplet deposited at an angle of impact of about 90 degrees (i.e., directly vertical to the surface) exhibit?
   a. Acute elongation
   b. A tail showing the directionality
   c. Elliptical in shape
   d. Approximately circular in shape

116. What is the most common type of bloodstain pattern found at a crime scene?
   a. Cast-off spatter
   b. Void spatter
   c. Impact spatter
   d. Arterial spray

117. The velocity classification of an impact spatter pattern:
   a. Cannot illuminate the specific events that produced pattern.
   b. Can determine the kind of action that produced the pattern.
   c. Is never used for descriptive purposes.
   d. Can only be determined by a trained bloodstain pattern analyst.

118. The intersection of straight lines through the long axis of several individual bloodstains in an impact spatter pattern illustrates the pattern’s what?
   a. Area of origin
   b. Void pattern
   c. Area of convergence
   d. Velocity classification
119. At the crime scene, the string method is used to find out what about the impact spatter pattern?
   a. Area of origin
   b. Void pattern
   c. Area of convergence
   d. Velocity classification

120. What is the deposition of backward spatter produced by a gunshot wound determined by?
   a. The location of the injury
   b. The size of the wound created
   c. The distance between the victim and the muzzle
   d. All of the above

121. What conclusion can be made if a murder victim’s blood is found inside the muzzle of a firearm?
   a. No conclusion can be made
   b. The firearm is the murder weapon
   c. The firearm was present during injury to the victim
   d. The owner of the firearm is the perpetrator

123. Which weapon would create cast-off patterns consisting of small droplets in a linear pattern?
   a. Baseball bat
   b. Knife
   c. Wooden plank
   d. All of the above

124. The pressure of the pumping of oxygenated blood out of an injury causes bright red colored blood to spurt out and form what pattern?
   a. Void
   b. Expirated
   c. Arterial spray
   d. Both b and c

125. What is an expirated blood pattern at a crime scene characterized by?
   a. Bubbles of oxygen within the pattern
   b. Skeletonized edges
   c. Lighter color than other patterns
   d. Both a and b

126. The removal of an object or surface that was located between the origin of blood and the target surface during the bloodstain deposition leaves what behind?
   a. Expirated blood
   b. A void
   c. Blowback spatter
   d. An unidentifiable pattern

127. When an object with blood on it touches one that does not have blood on it, this produces what?
   a. Flow
   b. Indistinguishable pattern
   c. Contact pattern
   d. Trail pattern

128. Widely spaced bloody shoe prints with satellite spatter between the shoe prints were likely deposited by an individual who was doing what?
   a. Standing in place
   b. Walking slowly
   c. Running
   d. Carrying a bloody weapon

129. Which of the following may show movements of objects or bodies while the pattern was still forming or after the blood has dried.
   a. Flow pattern
   b. Cast-off pattern
   c. Bloodstain tail
   d. Trail pattern
130. The approximate drying time of a pool of blood can be used to estimate timing of events at a crime scene and varies according to what?  
   a. Clotting ability of the blood  
   b. Blood type of the blood  
   c. Environmental conditions at the scene  
   d. Method of deposition

131. What can the skeletonized perimeter of a bloodstain be used to interpret?  
   a. The kind of force that produced the bloodstain  
   b. The time that elapsed between deposition of the stain and alteration of the stain  
   c. The source of the bloodstain  
   d. Both b and c

132. A trail pattern leading away from the victim at a stabbing scene was most likely created by what?  
   a. A victim’s arterial wound  
   b. Blood dripping from the murder weapon  
   c. Postmortem movement of the victim  
   d. Blood expelled from a respiratory injury

133. In the grid method of bloodstain documentation, a grid of squares of known dimensions is laid over the entire pattern in order to do what?  
   a. Show the relative sizes of bloodstains in photographs  
   b. Prevent contamination of the bloodstains  
   c. Collect bloodstains for delivery to the laboratory  
   d. All of the above

134. Proper location and documentation of bloodstain patterns at the crime scene is the responsibility of whom?  
   a. Bloodstain analysis specialist  
   b. Lead investigator  
   c. Criminalists and specialists  
   d. All crime-scene personnel

135. Which of the following is of paramount importance in the interpretation of bloodstain patterns?  
   a. The direction of impact  
   b. The surface texture  
   c. The angle of impact  
   d. The amount of blood

136. When an object partially blocks the deposition of blood spatter onto a surface or object, what type of pattern is created on the target surface or object?  
   a. Transfer  
   b. Flow  
   c. Void  
   d. Cast-off

137. Rough surfaces usually result in stains with what type of spatter?  
   a. Forward  
   b. Back  
   c. Blow-back  
   d. Satellite

137. What type of impact spatter would create a pattern consisting of large, separate drops with diameters of 5 millimeters?  
   a. Low-velocity spatter  
   b. Medium-velocity spatter  
   c. High-velocity spatter  
   d. Both a and b

138. Drops propelled from a blunt surface will be larger than drops from a sharp instrument. What shape will the pattern be?  
   a. Narrow  
   b. Wide  
   c. Linear  
   d. Thin
139. The presence of a cast-off pattern shows that how many blows were delivered?
   a. More than 1
   b. More than 2
   c. More than 5
   d. The cast-off pattern cannot indicated how many blows were delivered.

140. Setting up a rectangular border of rulers around the patterns and then placing a small ruler next to each stain describes what method of documentation?
   a. String
   b. Stake
   c. Grid
   d. Perimeter ruler

141. Generally, bloodstain diameter _____ as height increases.
   a. Decreases
   b. Remains unchanged
   c. Increases
   d. Increases lengthwise, decreases widthwise

142. The position of the victim or suspect when the stain-producing event took place is illustrated by what aspect of a bloodstain pattern in three-dimensional space?
   a. Void
   b. Area of convergence
   c. Directionality
   d. Area of origin

143. What type of transfer pattern is produced when the object makes contact with the surface and then is removed without any other movement.
   a. Void
   b. Contact
   c. Simple
   d. Flow

144. In general, as both the force and velocity of impact increase, what happens to the diameter of the resulting blood droplets?
   a. Increases
   b. Stays the same
   c. Decreases
   d. The diameter is unaffected by force and velocity.

145. Droplets of _____ are very small. They may not travel far and could be overlooked.
   a. High-velocity spatter
   b. Transfer patterns
   c. Medium-velocity spatter
   d. Low-velocity spatter

146. What information can an investigator gain from locating of the area of origin of a bloodstain pattern?
   a. Position of weapons at a crime scene
   b. Position of person from which pattern originated
   c. Type of force used
   d. Identity of the suspect

147. What should one surmise if a blood flow found on an object or body does not appear consistent with the direction of gravity?
   a. The object or body was within 5 feet of the blood source.
   b. The object or body was moved after the blood had dried.
   c. The object or body was not moved.
   d. The object or body was at a lower temperature than the blood.

148. Which blood components are directly pertinent to the forensic aspects of blood identification?
   a. Platelets
   b. Blood serum
   c. Red blood cells
   d. Both b and c
149. In routine blood banking, which antigen(s) must be determined in testing for compatibility?
   a. A
   b. B
   c. D
   d. All of the above

150. Type AB blood contains which of the following?
   a. Anti-A antibodies and B antigens
   b. Anti-A antigens and anti-B antibodies
   c. Both A and B antigens
   d. Both anti-A and anti-B antibodies

151. The sensitivity of the Takayama and Teichmann crystal tests for the identification of bloodstains is _____ the sensitivity of the Kastle-Meyer color test for bloodstain identification.
   a. The same as
   b. Greater than
   c. Less than

152. To determine whether a bloodstain is of human or animal origin, what will the serologist perform?
   a. A precipitin test
   b. The luminol test
   c. An analysis with Hemastix strips
   d. RIA

153. Which of the following types of cells are not contained in plasma?
   a. Phagocytes
   b. Leukocytes
   c. Erythrocytes
   d. Platelets

154. The amount of acid phosphatase in seminal fluid is _____ the amount of acid phosphatase in blood.
   a. Greater than
   b. The same as
   c. Less than

155. What is PSA (p30)?
   a. A polymorphic enzyme found in red blood cells
   b. A protein unique to seminal plasma
   c. A blood enzyme used to discriminate bloodstains
   d. A protein specific to females

156. Evidence to substantiate that a rape occurred could include what?
   a. Blood and semen
   b. Hairs
   c. Fibers
   d. All of the above

157. The technology of DNA typing had its beginnings in 1985 with the work of whom?
   a. Henry Lee
   b. Francis Crick
   c. James Watson
   d. Alec Jeffreys

158. DNA is which of the following?
   a. A protein
   b. A starch
   c. A polymer
   d. An enzyme

159. Who deduced the molecular structure of DNA?
   a. Gregor Mendel
   b. Francis Crick
   c. James Watson
   d. Both b and c

160. Which is not a component of a nucleotide?
   a. Phosphorous-containing group
   b. Double helix
   c. Sugar
   d. Nitrogenous base
161. Which nitrogenous base is not found in DNA?
   a. Thymine
   b. Cytosine
   c. Uracil
   d. Adenine

162. Which component of DNA forms the backbone of the molecule?
   a. Phosphate group
   b. Nitrogenous base
   c. Sugar
   d. Both a and c

163. A gene pair made up of two similar alleles—for example, AA and BB—is said to be what?
   a. Heterozygous
   b. Monoclonal
   c. Complementary
   d. Homozygous

164. Luminol can be used at crime scenes to do what?
   a. Detect traces of blood without compromising potential DNA typing
   b. Make hair evidence fluoresce
   c. Light up the crime scene with a high degree of illumination
   d. Locate latent prints that otherwise would be overlooked

165. Where are buccal cells obtained from?
   a. Semen
   b. The mouth and inside of the cheek
   c. Urine
   d. Blood

166. In DNA replication, what do polymerases do?
   a. Enable the strands to unwind from the helix
   b. Help assemble the new DNA strands in proper base sequence
   c. Separate the strands of the double helix
   d. All of the above

167. What does the PCR technique do?
   a. Provides a statistical analysis of the nitrogenous-base pairings
   b. Can produce many exact copies of segments of DNA
   c. Produces information regarding the sequence of nitrogenous bases
   d. Virtually eliminates operator error from DNA analysis

168. The PCR technique requires the use of a thermal cycler to do what?
   a. Synthesize protein
   b. Copy DNA
   c. Make probes radioactive
   d. Hydrolyze polymerase

169. In the PCR process, the first step is to heat the DNA strands. This is to permit what?
   a. DNA to coil very tightly in the helical shape
   b. The process to take place without DNA degradation
   c. Hybridization to take place
   d. Double-stranded molecules to separate completely

170. The amplification of DNA using the thermal cycler takes approximately how long?
   a. 30 cycles
   b. 4 cycles
   c. 2 hours
   d. 2 minutes

171. Which is an advantage of working with short DNA fragments?
   a. They are more stable and less likely to break apart.
   b. Their quantity can be greatly amplified by PCR technology.
   c. They are less subject to degradation due to adverse environmental conditions.
   d. All of the above
172. Why has STR analysis replaced other DNA typing techniques?
   a. It is less subject to sample degradation
   b. STR requires a smaller sample size
   c. It can be implemented using the PCR
   d. All of the above

173. The separation of STRs using capillary electrophoresis:
   a. Evolved from the flat-gel electrophoresis approach.
   b. Decreases analysis time.
   c. Is currently the preferred method.
   d. All of the above

174. Which statement is not true?
   Few forensic labs do analysis of mtDNA because:
   a. Little mtDNA is present in a cell.
   b. The analysis procedure is very rigorous.
   c. It costs much more than nuclear DNA profiling.
   d. Such study takes a long time.

175. The means to detect the amelogenin gene are included in commercial STR kits used in crime labs because the gene allows determination of what?
   a. Ethnicity
   b. Blood type
   c. Gender
   d. Eye color

176. The discriminating power of mtDNA is ______ the discriminating power of STR analysis.
   a. Greater than
   b. The same as
   c. Less than

177. CODIS is a national system of what?
   a. Computers that track the movement of sex offenders released from prison
   b. Shared databases of DNA-typing information from convicted felons and crime-scene evidence
   c. Vastly enhanced 911 emergency systems
   d. Crime laboratory directors

178. Y-STR markers are useful when multiple males are involved in a sexual assault. If three men are involved in such an attack, the investigators would expect Y-STR analysis to show a maximum of how many peaks?
   a. 8
   b. 3
   c. 6
   d. 4

179. As currently performed, DNA-profiling technology cannot provide information that would help with which of the following?
   a. Matching a suspect to biological evidence found at a crime scene
   b. Deciding immigration cases based on family relationships
   c. Settling matters of questioned paternity/maternity
   d. Determining whether an individual carries a genetic defect

180. A DNA sample is normally said to have a low copy number when it contains fewer than ______ DNA-bearing cells.
   a. 18
   b. 36
   c. 180
   d. 800
181. The presence or absence of how many antigens determines an individual’s blood type in the A-B-O system?
   a. 0
   b. 1
   c. 2
   d. 3

182. An individual who is “type O” has what type of antibodies?
   a. O antibodies
   b. A antibodies
   c. B antibodies
   d. Neither A nor B antibodies

183. Where are antibodies found?
   a. In the red blood cells
   b. In the white blood cells
   c. In the solid portion of blood
   d. In the blood serum

184. If blood is found to have both A and B antigens, what type is it?
   a. A
   b. B
   c. AB
   d. O

185. Which of the following statements is false?
   a. Semen is unequivocally identified by the presence of spermatozoa.
   b. The likelihood of finding seminal acid phosphatase in vaginal swabs decreases with time.
   c. Spermatozoa can generally be found in the vagina of a living - female three days after sexual intercourse.
   d. Semen will contain the enzyme p30.

186. A stain can tentatively be identified as blood by what test?
   a. Benzidine test
   b. Luminol test
   c. Phenolphthalein test
   d. All of the above

187. Which of the following statements is false?
   a. Dried bloodstains may be tentatively identified as blood by a peroxidase test.
   b. All bloods contain the enzyme peroxidase.
   c. A-B-O antigens are present in all human blood.
   d. The Kastle-Meyer test is used to determine whether blood is of human origin.

188. How many different bases are associated with the makeup of DNA?
   a. 3
   b. 4
   c. 5
   d. 6

189. The concept of simultaneously extracting, amplifying, and detecting a combination of STRs is known as:
   a. PCR
   b. THO1
   c. Multiplexing
   d. Electrophoresis

190. Which statement about Y-STRs is incorrect?
   a. Female STRs will not yield a Y-STR profile.
   b. Y-STRs can be amplified by PCR.
   c. Y-STR types are typically shorter in length as compared to X-STRs.
   d. A typical Y-STR pattern has one band.
191. Which of the following statements about mitochondrial DNA is incorrect?  
   a. Mitochondrial DNA is located outside the cell’s nucleus.  
   b. Mitochondrial DNA is constructed in a loop configuration.  
   c. Many copies of mitochondrial DNA’s hypervariable regions are made by PCR.  
   d. The number of repeat segments found in the hypervariable regions are used to type mitochondrial DNA.

192. What structures transport oxygen from the lungs to the body tissues and carry carbon dioxide back to the lungs?  
   a. Red blood cells  
   b. White blood cells  
   c. Alveoli  
   d. Lymphocytes

193. The D antigen is also known as what?  
   a. Monoclonal antigen  
   b. X antigen  
   c. AB antigen  
   d. Rh antigen

194. The clumping together of red blood cells by the action of an antibody is known as what?  
   a. Radioimmunology  
   b. Clotting  
   c. Agglutination  
   d. Serology

195. A precipitin test can be used to identify which of the following?  
   a. Human blood  
   b. Dog blood  
   c. Cat blood  
   d. All of the above

196. Acid-phosphatase is a major constituent of what?  
   a. Blood  
   b. Semen  
   c. Saliva  
   d. Perspiration

197. The presence of which of the following indicates that a stain is seminal in nature?  
   a. PGM  
   b. Peroxidase  
   c. p30  
   d. DNA

198. STRs normally consist of repeating sequences of how many bases?  
   a. 13–17  
   b. 18–22  
   c. 3–7 bases  
   d. 8–12

199. The amount of DNA material required for STR analysis is _______ the amount of DNA required for previous tandem repeat analysis.  
   a. The same as  
   b. Greater than  
   c. Less than

200. How should blood-containing clothes from a victim be packaged?  
   a. In an airtight metal container  
   b. In an airtight clear plastic container  
   c. In a metal paint can  
   d. In breathable paper after the blood has dried