MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question. Please mark your answer in the space provided.

1) ______ The technology of DNA typing had its beginnings in 1985 with the work of:

2) ______ The building blocks of the DNA molecule are known as:
   A) hydrocarbons.  B) nucleotides.  C) amino acids.  D) polysaccharides.

3) ______ Which is NOT a component of a nucleotide?
   A) double helix
   B) sugar
   C) phosphorous containing group
   D) nitrogenous base

4) ______ Which component of DNA forms the backbone of the molecule?
   A) nitrogenous base  B) sugar  C) phosphate group  D) both A and B

5) ______ Which of the following depicts correct base-pairing in DNA?
   A) C-T  B) A-U  C) G-A  D) T-A

6) ______ The specific proteins produced by a cell are directly related to the:
   A) length of the chromosomes.
   B) sequence of sugars and phosphates in the cell.
   C) sequence of nucleotides in the DNA of the cell.
   D) number of mitochondria in the cell.

7) ______ What is the number of nitrogenous bases needed to code for a specific amino acid? A) 2  B) 3  C) 5  D) 6

8) ______ In DNA replication, polymerases:
9) _______ PCR is a technique that:
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) all of the above

10) _______ Restriction enzymes:
A) reduce the DNA replication rate.
B) cut DNA at specific sites.
C) limit the amount of protein produced in a cell.
D) reduce the time required for PCR.

11) _______ Which statement about tandem repeats is NOT true?
A) Their origin is a mystery.
B) It is thought that they may act as spacers between the coded regions of DNA.
C) More than 30% of the human genome is composed of these repeating units.
D) They are of no forensic interest.

12) _______ Which statement regarding RFLPs is NOT true?
A) Restriction enzymes are used to cut RFLPs from the DNA helix.
B) All humans have the same type of repeats.
C) Typically a core repeat sequence would consist of 15-30 bases.
D) There is little variation in the number of repeats from person to person.

13) _______ In DNA typing, using a three-probe system, a typical DNA pattern will show a maximum of how many bands?
A) 3  B) 6  C) 9  D) 12

14) _______ Which of the following is in the correct sequence?
A) addition of radioactive probe → gel electrophoresis → hybridization → Southern blotting → addition of restriction enzymes → visualization of DNA fragments
B) extraction of DNA from cells → hybridization → Southern blotting → gel electrophoresis → visualization of DNA fragments
C) Southern blotting → gel electrophoresis → addition of restriction enzymes → addition of radioactive probe → visualization of DNA fragments
D) extraction of DNA from cells → gel electrophoresis → Southern blotting → hybridization → row visualization of DNA fragments on X-ray film

15) _______ During gel electrophoresis the DNA is:
A) separated by fragment size. B) cut into fragments. C) extracted from the cell nuclei. D) undergoing hybridization.

16) _______The rate at which large DNA fragments move through the electrophoretic gel is ________ the rate at which small DNA fragments move through the same apparatus.
A) greater than B) the same as C) less than

17) _______In the PCR process, the first step is to heat the DNA strands. This is to permit the:
A) hybridization to take place. B) process to take place without DNA degradation. C) DNA to coil very tightly in the helical shape. D) double-stranded molecules to separate completely.

18) _______Each cycle of the DNA Thermal Cycler takes approximately:
A) two hours. B) 30 seconds. C) two minutes. D) four hours.

19) _______Which is an advantage of working with short DNA fragments?
A) They are more stable and less likely to break apart. B) They are less subject to degradation due to adverse environmental conditions. C) Their quantity can be greatly amplified by PCR technology. D) all of the above

20) _______STR analysis has replaced RFLP DNA typing because it:
A) reduces time to obtain results from a sample. B) is less subject to sample degradation. C) requires a smaller sample size. D) all of the above

21) _______The separation of STRs using capillary electrophoresis:
A) automates sampling and data collection. B) decreases analysis time. C) evolved from the flat-gel electrophoresis approach. D) all of the above

22) _______Which statement is NOT true? Few forensic labs do analysis of mtDNA because:
A) such study takes a long time. B) the analysis procedure is very rigorous. C) it costs much more than nuclear DNA profiling. D) little mtDNA is present in a cell.
23) _______ Means to detect the amelogenin gene are included in commercial STR kits used in crime labs because the gene allows determination of:
A) age.  B) gender.  C) blood type.  D) ethnicity.

24) _______ The discriminating power of mtDNA is ________ the discriminating power of STR analysis.
A) the same as  B) greater than  C) less than

25) _______ CODIS is a national system of:
A) shared databases of DNA typing information from convicted felons and crime scene evidence.
B) standards for forensic science evaluators.
C) computers to track the movement of sex offenders released from prison.
D) vastly enhanced 911 emergency systems.

26) ______ 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:
A) three peaks.  B) six peaks.  C) four peaks.  D) eight peaks.

27) ______ STRs normally consist of repeating sequences of:
A) 8-12 bases.  B) 18-2 bases.  C) 13-17 bases.  D) 3-7 bases.

28) ______ As currently performed, DNA-profiling technology cannot provide information helpful in:
A) determining whether an individual carries a genetic defect.
B) matching a suspect to biological evidence found at a crime scene.
C) deciding immigration cases based on family relationships.
D) settling matters of questioned paternity/maternity.

29) ______ STR analysis has replaced RFLP DNA typing because it:
A) reduces time to obtain results from a sample.
B) is less subject to sample degradation.
C) requires a smaller sample size.
D) all of the above

30) ______ A simple method of obtaining a DNA sample is to swab the inside of the cheek. What is the name given to these types of cells?