1. Which is Not a major function of the genetic material?
   a) store information                        c) catalyze chemical reactions
   b) replicate itself                            d) undergo mutations

2. DNA was discarded as a possible candidate for the genetic material because
   a) with only four types of nucleotides, it was a very simple, repetitive molecule that could not account for 20 different amino acids.
   b) is had been shown that proteins were more important in transferring genetic information than nucleic acids.
   c) proteins and carbohydrates were of more interest.
   d) it was thought that RNA was more likely to be the genetic material.

3. The process of transformation in bacteria involves
   a) transfer of genes for making a mucous capsule.
   b) infection with a virus called bacteriophage.
   c) production of a cancer cell.
   d) the matting of two different kinds of live bacteria.

4. DNA was first proven to be the transforming factor on bacterial cells by
   a) Meischer    b) Watson and Crick    c) Griffin    d) McClintock     e) Avery

5. Hershey and Chase experimented with radioactively labeled phosphorus and sulfur to determine that DNA and not protein is the genetic material. Which of the following was essential to this confirming experiment?
   a) Sulfur is present in amino acids in the protein coat of bacteria.
   b) Phosphorus is present in high amounts in DNA.
   c) Sulfur is not present in DNA.
   d) Phosphorus is not present in amino acids in the protein coat of bacteria.
   e) All of the above were critical to demonstrating DNA is involved in genetic material.

6. One of Chargaff's rules state

7. The amount of adenine is always equal to the amount of ____ in DNA.
   a) cytosine     b) uracil      c) guanine       d) thymine      e) ATP

8. The x-ray diffraction photography of Rosalind Franklin and Maurice was critical evidence of DNA
   a) indicating that DNA has a double helix structure.
   b) showing equal number of purines and pyrimidines.
   c) showing the bases of DNA were held together by hydrogen bonds.
   d) revealing the structure of the deoxyribose sugar.
   e) of the location of each adenine, guanine, cytosine, and thymine.

9. In the Watson and Crick model of DNA, the "steps" of the ladder are composed of
   a) sugars
   b) a purine and a pyrimidine
   c) two purines
   d) two pyrimidines
   e) a sugar and a phosphate molecule

10. Which of the following statements concerning a gene is correct?
    a) A gene can code for a specific protein.
    b) A gene can exist in alternate forms called introns.
    c) A gene undergoes crossing-over during DNA replication.
    d) A gene that is very similar in sequence in a human and in a bacterium is probably a recent mutation
    e) A gene that is expressed in every offspring of every generation is recessive.

11. Which statement is Not true about DNA replication?
    a) It proceeds in a 5' to 3' direction only.
    b) One strand of new DNA is replicated faster than the other strand at the replication fork.
    c) DNA can only replicate at one point on a chromosome at one time.
    d) It occurs more rapidly in bacteria than in eukaryotes.
    e) Replication can only begin at a special origin of replication.

12. Which statement is Not true about DNA replication in prokaryotes?
    a) Replication begins at a single origin of replication.
    b) Replication is bidirectional from the origin(s).
    c) Replication occurs at about 1 million base pairs per minute.
    d) Since bacterial cells replicate so rapidly, a second round of replication may begin before the first has completed.
    e) There are numerous different bacterial chromosomes, with replication occurring in each at the same time.
13. Which statement is Not true about DNA replication in eukaryotes?
   a) Replication of the entire genome takes about ten minutes.
   b) A replication fork occurs at each growing point of the replicating chromosome(s).
   c) Eukaryotes have numerous different chromosomes, with replication occurring in each at the same time.
   d) Replication occurs at the rate of about 500 - 5000 base pairs per minute.
   e) Multiple sites of replication are present on each chromosome.

Questions 14-15 refer to the chart below.

<table>
<thead>
<tr>
<th>mRNA Codons</th>
<th>Amino Acids</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGA</td>
<td>arginine</td>
</tr>
<tr>
<td>GGA</td>
<td>glycine</td>
</tr>
<tr>
<td>AGC</td>
<td>serine</td>
</tr>
<tr>
<td>GCA</td>
<td>alanine</td>
</tr>
<tr>
<td>CAG</td>
<td>glutamine</td>
</tr>
</tbody>
</table>

14. ...glutamine-glutamine-glutamine...
   ...serine-serine-serine...

Which of the following messenger RNA sequences could code for both of the two amino acid sequences above, simply by a shift in the reading frame?
   a) ...AGCAGCAGCAGC...
   b) ...AGUAGUAGUAGU...
   c) ...GCUGCUGCUGCU...
   d) ...GCAAGCGCAAGC...

15. glycine-serine-glycine

Which of the following DNA strands will code for the amino acid sequence shown above?
   a) ACTCCTTCT
   b) TCTCGTTCG
   c) CGGTGACT
   d) CCTCGTTCG
   e) CCTTCGCCT

16. The two strands of a DNA molecule are held together by
   a) ionic bonds   b) covalent bonds   c) peptide bonds   d) hydrogen bonds

17. During DNA replication, the enzyme DNA polymerase
   a) separates the two nucleotide chains of a DNA molecule.
   b) constructs new nucleotide chains that are complementary to the chains in the original DNA molecule.
   c) breaks down the original DNA molecule into individual nucleotides.
   d) joins two DNA molecules into a single molecule.

18. Damage to DNA is usually repaired by
   a) purines   b) nucleotides   c) enzymes   d) replication forks

19. During replication, the two strands of DNA separate at a point called a(n)
   a) helicase   b) purines   c) replication fork   d) phosphate group

20. Each nucleotide in a DNA molecule is constructed of
   a) a sulfur group, a five carbon sugar molecule, and a nitrogen base.
   b) a phosphate group, a six carbon sugar, and a nitrogen base.
   c) a phosphate group, a five carbon sugar, and an oxygen base.
   d) a phosphate group, a five carbon sugar, and a nitrogen base.

21. Process in which a protein is assembled at a ribosome
   a) Transcription b) Translation c) Transformation d) Replication e) Reverse transcription

22. Process in which naked DNA is taken up by a bacterial or yeast cell
   a) Transcription b) Translation c) Transformation d) Replication e) Reverse transcription

23. Process in which RNA is produced by using a DNA template
   a) Transcription b) Translation c) Transformation d) Replication e) Reverse transcription

24. Process that is semiconservative and involves DNA and several enzymes
   a) Transcription b) Translation c) Transformation d) Replication e) Reverse transcription

25. The direction of replication of DNA is
   a) 5' to 3'   b) 3' to 5'   c) 5' to 5'   d) 3' to 3'   e) variable
26. Chemical group that, together with a sugar and a nitrogen base, makes up a nucleotide
27. A hydrogen bond
28. A 3' carbon of deoxyribose
29. A 5' carbon of deoxyribose
30. Most likely to be broken during replication

31. Arrange the steps of DNA replication on the lagging strand in order with the earliest steps first.
   1. DNA ligase links segments
   2. Okazaki fragments form
   3. Enzymes unwind the DNA double helix
   4. DNA polymerase attaches to the nucleotides
   5. Enzymes add short RNA primers
   a) 1, 2, 3, 4, 5  b) 2, 4, 3, 1, 5  c) 3, 5, 4, 2, 1  d) 4, 5, 1, 2, 3  e) 5, 4, 3, 1, 2

32. Rosalind Franklin helped reveal the structure of DNA by using
   a) X-ray crystallography  b) cytosine analysis  c) centrifuge analysis  d) bacteriaphages

33. The term replication refers to DNA's ability to
   a) respond to X-ray photography  b) make copies of itself  c) attack bacteriaphages  d) twist into a helix

34. If a change is made when DNA copies itself, a ________ results.
   a) clone  b) death  c) mutation  d) base pair

35. A section of DNA with bases A-T-T-C-G-C will line up with bases

36. In DNA replication,
   a) each new single helix is composed of 50 percent protein and 50 percent DNA protein.
   b) each new triple helix is composed of one old DNA strand and two new DNA strands.
   c) each new double helix is composed of one old protein strand and one new protein strand.
   d) each new double helix is composed of one old DNA strand and one new DNA strand.

37. Enzyme used in the synthesis of mRNA
   a) DNA ligase  b) DNA polymerase  c) RNA polymerase  d) Restriction enzyme  e) Reverse transcriptase

38. Enzyme found in retroviruses that produce DNA from an RNA template
   a) DNA ligase  b) DNA polymerase  c) RNA polymerase  d) Restriction enzyme  e) Reverse transcriptase

39. Enzyme used during replication to attach Okazaki fragments to each other
   a) DNA ligase  b) DNA polymerase  c) RNA polymerase  d) Restriction enzyme  e) Reverse transcriptase

40. Enzyme used to position nucleotides during DNA Replication
   a) DNA ligase  b) DNA polymerase  c) RNA polymerase  d) Restriction enzyme  e) Reverse transcriptase

41. Which of the following terms refers to both the movement of a ribosome along a piece of mRNA and the movement of a piece of one chromosome to another chromosome?
   a) Transduction  b) Transgenesis  c) Transformation  d) Translocation  e) Transplantation
42. Which of the following is a pyrimidine base?
a) adenine  b) guanine  c) thymine  d) colchicines  e) None of the above.

43. Which of the following is Not one of the four bases that makes up DNA?
a) adenine  b) uracil  c) guanine  d) cytosine  e) thymine

44. The diameter of the DNA ladder is always
a) 3.0 nm  b) 2.0 nm  c) 1.5 nm  d) 2.5 nm  e) 3.4 nm

45. Which of the following statements about DNA replication is Not correct?
a) Unwinding of the DNA molecule occurs as hydrogen bonds break.
b) Replication occurs as each base is paired with another exactly like it.
c) The process is known as semiconservative replication because one old strand is conserved in the new molecule.
d) The enzyme that catalyzes DNA replication is DNA polymerase.
e) Complementary base pairs are held together with hydrogen bonds.

46. Because one original strand of the double stranded helix is found in each daughter cell, the replication process is called
a) proofreading  b) semiconservative  c) redundant  d) freeing DNA  e) mutation positive

47. Each complete turn of the DNA helix is how long?
a) 3.0 nm  b) 2.0 nm  c) 3.4 nm  d) 2.1 nm  e) 5.0 nm

48. Which of the following is a purine base?
a) cytosine  b) thymine  c) adenine  d) malonine  e) All of the above.

49. Griffin did an experiment in which live R bacteria was changed by dead S bacteria. Such a change is an example of
a) translocation  b) transduction  c) fertilization  d) transformation

50. The concept of an "inborn error of metabolism" was the first recognition of the relationship between gene activity and metabolic disease, made by
a) Beadle and Tatum with parasitic molds.
b) Pauling and Itano with sickle cell anemia.
c) Sir Archibald Garrod from general family inheritance patterns.
d) Watson and Crick, as a natural outcome of their model of DNA.
e) Gregor Mendel, who extrapolated his pea plant data to human disease.

51. The first codon to be deciphered was _______, which codes for ______.
a) AAA, praline  b) GGG, alanine  c) UUU, phenylalanine  d) TTT, arginine  e) CCC, glycine

52. Which of the following classes of RNA molecules carries the genetic information as it is needed for the construction of a protein?
a) ribosomal RNA  b) transfer RNA  c) messenger RNA  d) primary mRNA transcript

53. Which of the following classes of RNA molecules carries the amino acids that are added to the growing polypeptide chain?
a) ribosomal RNA  b) transfer RNA  c) messenger RNA  d) primary mRNA transcript

54. Which of the following classes of RNA molecules is linked with proteins in forming the large and small subunits of a cytoplasmic structure?
a) ribosomal RNA  b) transfer RNA  c) messenger RNA  d) primary mRNA transcript

55. Prior to protein synthesis, the DNA
a) attracts tRNAs with appropriate amino acids.
b) must first undergo replication.
c) contains anticodons that must become codons.
d) serves as a template for the production of mRNA.
e) adheres to ribosomes for protein synthesis.

56. Which of the following classes of RNA molecules is never found in the cytosol?
a) ribosomal RNA  b) transfer RNA  c) messenger RNA  d) primary mRNA transcript

57. Transcription of a part of a DNA molecule with a nucleotide sequence of A-A-A-C-A-A-C-T-T results in a mRNA molecule with the complementary sequence of
b) U-U-U-G-U-U-G-A-A
c) T-T-T-G-A-A-G-C-C
d) C-C-C-A-C-C-T-C-C
e) None of the above.
58. Which is the process that synthesizes mRNA, tRNA, or rRNA?
   a) translation    b) transcription     c) transposition     d) transformation

59. Which of the following nucleotide bases is found only in RNA, not in DNA?
   a) guanine    b) adenine      c) thymine      d) uracil      e) cytosine

60. Which of the following nucleotide bases is found only in DNA, not in RNA?
   a) guanine    b) adenine      c) thymine      d) uracil      e) cytosine

61. An intervening sequence in a eukaryotic gene that is not an active part of the gene is called a(n)
   a) exon    b) intron      c) replicon

62. Which is the process by which a protein is constructed?
   a) translation    b) transcription     c) transposition     d) transformation

63. Which is most directly responsible for the sequence of amino acids in a protein?
   a) the sequence of the anticodons
   b) the number of codons in mRNA
   c) the enzyme that attaches the amino acid to tRNA
   d) the proteins associated with rRNA
   e) the sequence of codons in mRNA

64. The correct sequence of events in the production of a polypeptide is
   a) initiation, termination, elongation
   b) elongation, termination, initiation
   c) termination, elongation, initiation
   d) elongation, initiation, termination
   e) initiation, elongation, termination

65. Which of the following is Not a form of ribonucleic acid, or RNA?
   a) messenger RNA    b) ribosomal RNA     c) transfer RNA     d) translation RNA

66. During transcription, the genetic information is rewritten as a molecule of
   a) messenger RNA    b) ribosomal RNA     c) transfer RNA     d) translation RNA

67. In a cell, the equipment for translation is located in the
   a) cytosol    b) nucleus     c) plasma membrane      d) centrioles

68. The number of nucleotides required to specify one amino acid is called a
   a) genome    b) codon      c) radon      d) intron      e) exon

69. Codons that signal the end of a polypeptide chain are called
   a) silent codons    b) secret codons     c) stop codons     d) stop introns

70. How many amino acids are there?
   a) 8    b) 9   c) 10      d) 20      e) 64

71. During transcription, the information in the DNA is rewritten, or transcribed, in the form of
   a) RNA    b) proteins  c) codons     d) polypeptides

72. The RNA copy of the information from DNA is composed of
   a) tRNA    b) mRNA      c) pRNA      d) rRNA

73. The conversion of the message carried by the RNA into polypeptides is called
   a) transmutation b) transmittal c) translation d) transcription

74. The starting signal for mRNA synthesis is a special sequence of DNA called a
   a) promoter    b) director      c) polymerase     d) primer

75. In eukaryotes transcription factors lead the RNA polymerase to the
   a) adjacent polypeptide b) promoter   c) codon     d) primer

76. Both eukaryotes and prokaryotic RNA polymerase stop transcription at a special sequence called
   a) transcriptors b) terminal codons c) terminators d) translation ends

77. Interruptions in pre-mRNA, or intervening sequences, are called
   a) positrons b) interrupters c) introns d) mistakes
78. In RNA, thymine is replaced by
a) adenine  b) guanine  c) cytosine  d) uracil

79. Which gene in an operon is incorrectly matched with its function?
a) promoter - where RNA polymerase first binds to DNA  
b) regulator - binds to the repressor protein  
c) structural - make mRNA by transcription  
d) operator - if unbound, allows RNA polymerase to bind to DNA

80. Which statement is Not correct about the lac operon?
a) It regulates the production of a series of five enzymes.  
b) It is normally turned off if glucose is present.  
c) Lactose binds to the repressor protein and inactivates it.  
d) It is an inducible system.  
e) The structural genes make products that allow lactose metabolism.

81. Which of the following best describes why the polymerase chain reaction is a standard technique used in molecular biology research?
a) It uses inexpensive materials and produces perfect results.  
b) It can purify specific sections of a DNA molecule.  
c) It can produce large amounts of specific DNA sequences.  
d) It can duplicate the entire human genome.  
e) It can produce large amounts of mRNA.

82. The first level of primary control in eukaryotic gene activity is ________ control.
a) feedback  b) translational  c) transcriptional  d) posttranscriptional  e) posttranslational

83. Which level of primary control in eukaryotic gene activity involves the life span of the mRNA molecule and the ability of the mRNA to bind to ribosomes?
a) feedback  b) translational  c) transcriptional  d) posttranscriptional  e) posttranslational

Questions 84-87 refer to the following:
A student uses restriction enzymes to cut a DNA molecule into fragments. The digested DNA is loaded into the wells of an agarose gel and the gel is subjected to an electric current. Upon completion of the run, the gel is stained.

84. The rate of migration of the DNA fragments through the agarose gel is determined by the
a) ratio of adenine to cytosine in the fragment  
b) presence of hydrogen bonds between base pairs  
c) length of time the electrophoresis unit is allowed to operate  
d) number of nucleotides in the fragment  
e) volume of the starting sample

85. Which of the following is true of the dye used to stain the fragments?
a) It increases the contrast between the agar and the DNA fragments.  
b) It must be accounted for when calculating the molecular weight of the fragments.  
c) Its charged areas interfere with the migration of the DNA.  
d) It is bonded only to the sticky ends of the fragments and can directly determine the sequence of the DNA fragments.  
e) It gives a three-dimensional view of the structure of the DNA fragments.

86. The type and density of the gel are important because
a) they influence the rate of migration of the fragments  
b) they may cause some DNA molecules to replicate  
c) some DNA nucleotides may be lost due to chemical reactions with the gel  
d) some DNA molecules may sink to the bottom and not migrate  
e) some DNA molecules may cross-link

87. The procedures described can be used to do all of the following EXCEPT
a) isolate and purify certain DNA fragments  
b) synthesize novel DNA molecules  
c) study the activity of restriction enzymes  
d) calculate the size of DNA fragments  
e) identify the source of DNA material

88. An enhancer site is
a) part of an operon  
b) located at a distance from genes it affects  
c) found only in prokaryotes  
d) an attachment site for RNA polymerase

89. "Jumping genes" that have the ability to move within and between chromosomes are called
a) introns  
b) exons  
c) transposons  
d) retroviruses  
e) oncogenes

90. A deletion of one base pair that alters the sequence of codons, as the loss of "A" in C-C-G-T-A-G-C to form C-C-G-T-G-C is called a(n)
a) transposon  
b) point mutation  
c) carcinogen  
d) oncogene  
e) frameshift mutation
91. All of these are considered carcinogens Except
a) cigarette smoke
b) ultraviolet light
c) cabbage and related vegetables
d) certain viruses
e) radon

92. An oncogene is
a) a viral gene with no relation to the host cell's genes.
b) a mutated form of a proto-oncogene.
c) a bacterial gene that causes cancer in the host.
d) always seen in human cancer cells.
e) a gene that turns off cellular reproduction.

93. In the lac operon of E. coli, lactose functions as
a) a promoter  b) an operator  c) a repressor protein  d) an inducer

94. A tobacco plant can be made to express a gene from fireflies, resulting in the emission of light. Which of the following is the basis for this phenomenon?
a) Chloroplasts can be made to produce light if firefly proteins are injected into plant cells.
b) Fireflies and tobacco plants share a recent common ancestor.
c) Fireflies and tobacco plants are infected by the same kinds of bacteria.
d) Transcription and translation are fundamentally similar in both fireflies and tobacco plants.
e) Most enzymes in fireflies have the same amino acid sequence as the enzymes in tobacco plants.

95. In eukaryotic cells, transcription occurs
a) on parts of the DNA that are uncoiled  c) only on introns
b) only on exons  d) on all parts of the DNA

96. Enhancers
a) code for proteins called inducers  c) must be located close to the genes they activate
b) are found only in prokaryotic genomes  d) facilitate transcription by binding to transcription factors

97. A gene whose normal function is to prevent uncontrolled cell division is
a) an oncogene  b) a cancer gene  c) a homeotic gene  d) a tumor suppressor gene

98. The spread of cancer cells beyond their original site is called
a) gene expression  b) morphogenesis  c) metastasis  d) cell differentiation

99. Pre mRNA is a form of RNA that contains
a) euchromatin  b) prokaryotic transcription factors  c) introns and exons  d) only exons

100. An operon consists of
a) a group of operators  c) a group of structural genes
b) an operator, a promoter, and structural gene  d) lactose, polymerase, and operators

101. A mutation that causes premature completion of protein synthesis due to a substitution error is known as a(n)
a) Frameshift mutations  b) Missense mutations  c) Nonsense (Point) mutations  d) Thymine dimmer  e) Duplication error

102. The correct order of molecules involved in protein synthesis is
a) messenger RNA, transfer RNA, DNA, polypeptide  b) DNA, messenger RNA, polypeptide, transfer RNA
c) polypeptide, DNA, messenger RNA, transfer RNA  d) DNA, messenger RNA, transfer RNA, polypeptide
e) transfer RNA, polypeptide, messenger RNA, DNA

103. A tumor suppressor gene can prevent replication of damaged DNA by
a) degrading the damage DNA  b) blocking the cell cycle at the G1 checkpoint
c) activating a newly transcribed DNA molecule  d) initiating lysis of the cell containing the damage DNA
e) methylating the defective nucleotides

104. A repressor protein can shut down transcription by binding to this item.
a) operon  b) operator  c) promoter  d) structural gene(s)  e) regulatory gene
105. When the repressor is inactivated, RNA polymerase can bind to this item and allow transcription to occur.
   a) operon  b) operator  c) promoter  d) structural gene(s)  e) regulatory gene

106. What type of gene codes for a repressor?
   a) regulator     b) promoter       c) operon       d) enhancer

107. An inducer molecule functions by
   a) causing DNA replication                                                c) binding the rRNA subunits of a ribosome
   b) removing a repressor molecule from an operator            d) digesting lactose molecules in bacteria cells

Questions 108-111 refer to the following:
A scientist is using an ampicillin-sensitive strain of bacteria that cannot use lactose because it has a nonfunctional gene in the lac operon. She has two plasmids. One contains a functional copy of the affected gene of the lac operon, and the other contains the gene for ampicillin resistance. Using restriction enzymes and DNA ligase, she forms a recombinant plasmid containing both genes. She then adds a high concentration of the plasmid to a tube of the bacteria in a medium for bacterial growth that contains glucose as the only energy source. This tube (+) and a control tube (—) with similar bacteria but no plasmid are both incubated under the appropriate conditions for growth and plasmid uptake. The scientist then spreads a sample of each bacterial culture (+ and —) on each of the three types of plates indicated below.

<table>
<thead>
<tr>
<th></th>
<th>Glucose Medium</th>
<th>Glucose Medium with Ampicillin</th>
<th>Glucose Medium with Ampicillin and Lactose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bacterial strain</td>
<td>#1</td>
<td>#2</td>
<td>#3</td>
</tr>
<tr>
<td>with added plasmid (+)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bacterial strain</td>
<td>#4</td>
<td>#5</td>
<td>#6</td>
</tr>
<tr>
<td>with no plasmid (—)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

108. If no new mutations occur, it would be most reasonable to expect bacterial growth on which of the following plates?
   a) 1 and 2 only
   b) 3 and 4 only
   c) 5 and 6 only
   d) 4, 5, and 6 only
   e) 1, 2, 3, and 4 only

109. The scientist used restriction enzymes for what purpose in the experiment’?
   a) To make the plasmid small enough to transform cells
   b) To make cuts in the plasmid DNA
   c) To make the plasmid enter the cells
   d) To enable the fragments of DNA to form covalent bonds
   e) To enable the plasmid to recognize the bacterial cells

110. If the scientist had forgotten to use DNA ligase during the preparation of the recombinant plasmid, bacterial growth would most likely have occurred on which of the following?
   a) 1 and 2 only
   b) 1 and 4 only
   c) 4 and 5 only
   d) 1, 2, and 3 only
   e) 4, 5, and 6 only

<table>
<thead>
<tr>
<th></th>
<th>Lactose Medium</th>
<th>Lactose Medium with Ampicillin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bacterial strain</td>
<td>#7</td>
<td>#8</td>
</tr>
<tr>
<td>with added plasmid (+)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bacterial strain</td>
<td>#9</td>
<td>#10</td>
</tr>
<tr>
<td>with no plasmid (—)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

111. If the scientist used the cultures to perform another experiment as shown above, using medium that contained lactose as the only energy source, growth would most likely occur on which of the following plates?
   a) 10 only
   b) 7 and 8 only
   c) 7 and 9 only
   d) 8 and 10 only
   e) 9 and 10 only
112. What is the function of a vector in genetic engineering?
   a) cut DNA into many fragments
   b) carry DNA into a new cell
   c) link together newly joined fragments of DNA
   d) make millions of copies of a specific segment of DNA
   e) separate fragments of DNA by their length and electrical charges

113. What is the function of DNA ligase in recombinant technology?
   a) make millions of copies of a specific segment of DNA
   b) carry DNA into a new cell
   c) separate fragments of DNA by their length and electrical charges
   d) cut DNA into many fragments
   e) link together newly joined fragments of DNA

114. To carry out a polymerase chain reaction (PCR), you must have the catalytic DNA polymerase and
   a) a blueprint or gene map of the sequence you wish to copy.
   b) a number of "primers" from either side of the target DNA in order to get the polymerase replication process going.
   c) two of the four nucleotides since the other half will naturally fall in place.
   d) a DNA synthesizer machine.
   e) a DNA probe.

115. Which best describes a transgenic organism?
   a) one that acts as the donor for DNA to be moved into another organism
   b) one produced by cloning a mutant cell
   c) one that contains a foreign gene and is free living in the environment
   d) one produced by the polymerase chain reaction
   e) any genetically modified organism resulting from laboratory research

116. Which of the following techniques is Not used in preparing DNA fingerprints?
   a) gene therapy  b) RFLP analysis  c) gel electrophoresis  d) polymerase chain reaction