Bio Final Sample Exam

1. Which term includes all others in the list?
• monosaccharide
• disaccharide
• starch
• **carbohydrate**
• polysaccharide

2. The molecular formula for glucose is C6H12O6. What would be the molecular

formula for a polymer made by linking ten glucose molecules together by
dehydration reactions?
• C60H120O60
• C6H12O6
• **C60H102O51**
• C60H100O50
• C60H111O51

3. The enzyme amylase can break glycosidic linkages between glucose

monomers only if the monomers are the a form. Which of the following could
amylase break down?
• **glycogen, starch, and amylopectin**
• glycogen and cellulose
• cellulose and chitin
• starch and chitin
• starch, amylopectin, and cellulose

4. Choose the pair of terms that correctly completes this sentence: Nucleotides
are to _____ as _____ are to proteins.
• **nucleic acids; amino acids**
• amino acids; polypeptides
• glycosidic linkages; polypeptide linkages
• genes; enzymes
• polymers; polypeptides

5. Which of the following statements concerning unsaturated fats is true?

• They are more common in animals than in plants.
•
They have double bonds in the carbon chains of their fatty
acids.
• They generally solidify at room temperature.

• They contain more hydrogen than saturated fats having the same
number of
carbon atoms.
• They have fewer fatty acid molecules per fat molecule.

6. The structural level of a protein least affected by a disruption
in hydrogen
bonding is the
• **primary level.**
• secondary level.
• tertiary level.
• quaternary level.
• All structural levels are equally affected.

7. Which of the following pairs of base sequences could form a short
stretch of a
normal double helix of DNA?

• 5'-purine-pyrimidine-purine-pyrimidine-3' with
3'-purine-pyrimidine-purinepyrimidine-
5'
• 5'-A-G-C-T-3' with 5'-T-C-G-A-3'
• 5'-G-C-G-C-3' with 5'-T-A-T-A-3'
• **5'-A-T-G-C-3' with 5'-G-C-A-T-3'**
• all of the above

8. Enzymes that break down DNA catalyze the hydrolysis of the
covalent bonds

that join nucleotides together. What would happen to DNA molecules
treated
with these enzymes?
• The two strands of the double helix would separate.
•
The phosphodiester bonds between deoxyribose sugars would
be broken.
• The purines would be separated from the deoxyribose sugars.

• The pyrimidines would be separated from the deoxyribose sugars.
• All bases would be separated from the deoxyribose sugars.

9. Which of the following is not a protein?
• hemoglobin
• **cholesterol**
• an antibody
• an enzyme
• insulin

10. Which of the following statements about the 5' end of a polynucleotide strand
is correct?
• The 5' end has a hydroxyl group.
• **The 5' end has a phosphate group.**
• The 5' end is identical to the 3' end.
• The 5' end is antiparallel to the 3' end.
• The 5' end is the fifth position on one of the nitrogenous bases

11. The symptoms of a certain inherited disorder in humans include breathing

problems and, in males, sterility. Which of the following is a reasonable
hypothesis for the molecular basis of this disorder?
• a defective enzyme in the mitochondria
• defective actin molecules in cellular microfilaments
• **defective dynein molecules in cilia and flagella**
• abnormal hydrolytic enzymes in the lysosomes
• defective ribosome assembly in the nucleolus

12. Choose the statement that correctly characterizes bound ribosomes.
• Bound ribosomes are enclosed in their own membrane.
• Bound and free ribosomes are structurally different.
•
Bound ribosomes generally synthesize membrane proteins and secretory proteins.

• The most common location for bound ribosomes is the cytoplasmic surface of the
plasma membrane.
• All of the above.

13. Which of the following is not considered part of the endomembrane system?
• nuclear envelope
• **chloroplast**
• Golgi apparatus
• plasma membrane
• ER

14. Cells of the pancreas will incorporate radioactively labeled amino acids into

proteins. This "tagging" of newly synthesized proteins enables a researcher to

track the location of these proteins in a cell. In this case, we are tracking an

enzyme that is eventually secreted by pancreatic cells. Which of the following
is the most likely pathway for movement of this protein in the cell?
• ER?Golgi?nucleus
• Golgi?ER?lysosome
• nucleus?ER?Golgi
• **ER?Golgi?vesicles that fuse with plasma membrane**
• ER?lysosomes?vesicles that fuse with plasma membrane

15. Which of the following structures is common to plant and animal cells?
• chloroplast
• wall made of cellulose
• tonoplast
• **mitochondrion**
• centriole

16. Which of the following is present in a prokaryotic cell?
• mitochondrion
• **ribosome**
• nuclear envelope
• chloroplast
• ER

17. Which type of cell would probably provide the best opportunity to study
lysosomes?
• muscle cell
• nerve cell
• **phagocytic white blood cell**
• leaf cell of a plant
• bacterial cell

18. Which of the following statements is a correct distinction between prokaryotic

and eukaryotic cells attributable to the absence of a prokaryotic cytoskeleton?
• Organelles are found only in eukaryotic cells.
• **Cytoplasmic streaming is not observed in prokaryotes.**
• Only eukaryotic cells are capable of movement.
• Prokaryotic cells have cell walls.

• Only the eukaryotic cell concentrates its genetic material in a region separate from
the rest of the cell.

19. Which of the following structure-function pairs is mismatched?
• nucleolus; ribosome production
• lysosome; intracellular digestion
• ribosome; protein synthesis
• Golgi; protein trafficking
• **microtubule; muscle contraction**

20. Cyanide binds with at least one of the molecules involved in the production of

ATP. Following exposure of a cell to cyanide, most of the cyanide could be
expected to be found within the
• **mitochondria.**
• ribosomes.
• peroxisomes.
• lysosomes.
• endoplasmic reticulum.

21. In what way do the various membranes of a eukaryotic cell differ?
• Phospholipids are found only in certain membranes.

• **Certain proteins are unique to each membrane.**
• Only certain membranes of the cell are selectively permeable.
• Only certain membranes are constructed from amphipathic molecules.

• Some membranes have hydrophobic surfaces exposed to the cytoplasm, while others
have hydrophilic surfaces facing the cytoplasm.

22. According to the fluid mosaic model of membrane structure, proteins of the
membrane are mostly

• spread in a continuous layer over the inner and outer surfaces of the membrane.
• confined to the hydrophobic core of the membrane.
• **embedded in a lipid bilayer.**

• randomly oriented in the membrane, with no fixed inside-outside polarity.

• free to depart from the fluid membrane and dissolve in the surrounding solution.

23. Which of the following factors would tend to increase membrane fluidity?
• **a greater proportion of unsaturated phospholipids**
• a greater proportion of saturated phospholipids
• a lower temperature
• a relatively high protein content in the membrane

• a greater proportion of relatively large glycoproteins compared to lipids having
smaller molecular masses

24. Which of the following processes includes all others?
• osmosis
• diffusion of a solute across a membrane
• facilitated diffusion
• **passive transport**
• transport of an ion down its electrochemical gradient

25. Based on the model of sucrose uptake in Figure 7.19, which of the following

experimental treatments would increase the rate of sucrose transport into the
cell?
• decreasing extracellular sucrose concentration
• **decreasing extracellular pH**
• decreasing cytoplasmic pH
• adding an inhibitor that blocks the regeneration of ATP

• adding a substance that makes the membrane more permeable to hydrogen ions

26. For the situation in question 6, which solute(s) will exhibit a net diffusion out
of the cell?
• sucrose
• **glucose**
• fructose
• sucrose, glucose, and fructose
• sucrose and glucose

27. For the situation in question 6, is the solution outside the cell isotonic,
hypotonic, or hypertonic?
• isotonic
• **hypotonic**
• hypertonic

28. For the situation in question 6, in which direction will there be a net osmotic
movement of water?
• **into the cell**
• out of the cell
• There will be no net osmotic movement of water.

29. For the situation in question 6, after the cell is placed in the beaker, which of
the following changes will occur?

• The net water movement will be out of the cell, the artificial cell will become

more flaccid, and the two solutions will eventually have the same solute
concentrations.

• The net water movement will be out of the cell, the artificial cell will become

more flaccid, and the two solutions will have different solute concentrations.
•
The net water movement will be into the cell, the
artificial cell will become more

turgid, and the two solutions will eventually have the same
solute concentrations.

• The net water movement will be into the cell, the artificial cell will become more

turgid, and the two solutions will have different solute concentrations.

• There will be no net movement of water and the concentrations of sucrose,

glucose, and fructose will eventually become the same inside and outside the cell

30. Choose the pair of terms that correctly completes this sentence: Catabolism is
to anabolism as _____ is to _____.
• exergonic; spontaneous
• **exergonic; endergonic**
• free energy; entropy
• work; energy
• entropy; enthalpy

31. Most cells cannot harness heat to perform work because
• heat is not a form of energy.
• cells do not have much heat; they are relatively cool.
• **temperature is usually uniform throughout a cell.**
• heat can never be used to do work.
• heat denatures enzymes.

32. According to the first law of thermodynamics,

• matter can be neither created nor destroyed.
• **energy is conserved in all processes.**
• all processes increase the order of the universe.
• systems rich in energy are intrinsically stable.
• the universe constantly loses energy because of friction.

33. Which of the following metabolic processes can occur without a net influx of
energy from some other process?
• ADP + Pi ? ATP + H2O
• **C6H12O6 + 6 O2 ? 6 CO2 + 6 H2O**
• 6 CO2 + 6 H2O ? C6H12O6 + 6 O2
• amino acids ? protein
• glucose + fructose ? sucrose

34. If an enzyme has been inhibited noncompetitively,
• the ?G for the reaction it catalyzes will always be negative.
• the active site will be occupied by the inhibitor molecule.
• raising substrate concentration will increase inhibition.
• more energy will be necessary to initiate the reaction.
•
the inhibitor molecule may be chemically unrelated to the substrate.

35. If an enzyme solution is saturated with substrate, the most effective way to
obtain an even faster yield of products is to
• **add more of the enzyme.**
• heat the solution to 90°C.
• add more substrate.
• add an allosteric inhibitor.
• add a noncompetitive inhibitor.

36. If an enzyme is added to a solution where its substrate and products are in
equilibrium, what would occur?
• Additional product would be formed.
• Additional substrate would be formed.
• The reaction would change from endergonic to exergonic.
• The free energy of the system would change.
• **Nothing; the reaction would stay at equilibrium.**

37. Some bacteria are metabolically active in hot springs because

• they are able to maintain a cooler internal temperature.
• high temperatures make catalysis unnecessary.
• **their enzymes have high optimal temperatures.**
• their enzymes are completely insensitive to temperature.
• they use molecules other than proteins as their main catalysts.

38. Which of the following characteristics is not associated with allosteric
regulation of an enzyme's activity?
• **A mimic of the substrate competes for the active site.**

• A naturally occurring molecule stabilizes a catalytically active conformation.
• Regulatory molecules bind to a site remote from the active site.
• Inhibitors and activators may compete with one another.
• The enzyme usually has a quaternary structure.

39. What is the reducing agent in the following reaction?
• oxygen
• **NADH**
• NAD+
• lactate
• pyruvate

40. The immediate energy source that drives ATP synthesis by ATP synthase
during oxidative phosphorylation is
• the oxidation of glucose and other organic compounds.
• the flow of electrons down the electron transport chain.
• the affinity of oxygen for electrons.
•
the H+ concentration gradient across the inner
mitochondrial membrane.
• the transfer of phosphate to ADP.

41. Which metabolic pathway is common to both fermentation and cellular
respiration?
• the citric acid cycle
• the electron transport chain
• **glycolysis**
• synthesis of acetyl CoA from pyruvate
• reduction of pyruvate to lactate

42. In mitochondria, exergonic redox reactions
• are the source of energy driving prokaryotic ATP synthesis.
• are directly coupled to substrate-level phosphorylation.
• **provide the energy to establish the proton gradient.**
• reduce carbon atoms to carbon dioxide.

• are coupled via phosphorylated intermediates to endergonic processes.

43. The final electron acceptor of the electron transport chain that functions in
oxidative phosphorylation is
• **oxygen.**
• water.
• NAD+.
• pyruvate.
• ADP.

44. When electrons flow along the electron transport chains of mitochondria,
which of the following changes occurs?
• **The pH of the matrix increases.**
• ATP synthase pumps protons by active transport.
• The electrons gain free energy.
• The cytochromes phosphorylate ADP to form ATP.
• NAD+ is oxidized.

45. In the presence of a metabolic poison that specifically and completely inhibits
all function of mitochondrial ATP synthase, which would you expect?

• a decrease in the pH difference across the inner mitochondrial membrane
•
an increase in the pH difference across the inner mitochondrial membrane
• increased synthesis of ATP
• increased oxygen consumption
• an accumulation of NAD+

46. Cells do not catabolize carbon dioxide because
• its double bonds are too stable to be broken.

• CO_2 has fewer bonding electrons than other organic compounds.
• CO_2 is already completely reduced.
• **CO_2 is already completely oxidized.**
• the molecule has too few atoms.

47. Which of the following is a true distinction between fermentation and cellular
respiration?
• Only respiration oxidizes glucose.
•
NADH is oxidized by the electron transport chain in
respiration only.

• Fermentation, but not respiration, is an example of a catabolic pathway.
• Substrate-level phosphorylation is unique to fermentation.
• NAD+ functions as an oxidizing agent only in respiration.

48. Most CO_2 from catabolism is released during
• glycolysis.
• **the citric acid cycle.**
• lactate fermentation.
• electron transport.
• oxidative phosphorylation.

49. The light reactions of photosynthesis supply the Calvin cycle with
• light energy.
• CO_2 and ATP.
• H_2O and NADPH.
• **ATP and NADPH.**
• sugar and O_2.

50. Which of the following sequences correctly represents the flow of electrons
during photosynthesis?
• NADPH ? O_2 ? CO_2
• H_2O ? NADPH ? Calvin cycle
• NADPH ? chlorophyll ? Calvin cycle
• **H_2O ? photosystem I ? photosystem II**
• NADPH ? electron transport chain ? O_2

51. Which of the following conclusions does not follow from studying the
absorption spectrum for chlorophyll a and the action spectrum for photosynthesis (see Figure 10.9a and b)?
• Not all wavelengths are equally effective for photosynthesis.

• There must be accessory pigments that broaden the spectrum of light that
contributes to photosynthesis.

• The red and blue areas of the spectrum are most effective in driving
photosynthesis.
•
Chlorophyll owes its color to the absorption of green
light.
• Chlorophyll a has two absorption peaks.

52. Cooperation of the two photosystems is required for
• ATP synthesis.
• **reduction of NADP+.**
• cyclic photophosphorylation.
• oxidation of the reaction center of photosystem I.
• generation of a proton-motive force.

53. In mechanism, photophosphorylation is most similar to
• substrate-level phosphorylation in glycolysis.
• **oxidative phosphorylation in cellular respiration.**
• the Calvin cycle.
• carbon fixation.
• reduction of NADP+.

54. In what respect are the photosynthetic adaptations of C4 plants and CAM
plants similar?
• In both cases, only photosystem I is used.
• Both types of plants make sugar without the Calvin cycle.
•
In both cases, an enzyme other than rubisco carries out the
first step in carbon
fixation.
• Both types of plants make most of their sugar in the dark.
• Neither C4 plants nor CAM plants have thylakoids.

55. Which of the following processes is most directly driven by light energy?

• creation of a pH gradient by pumping protons across the thylakoid membrane
• carbon fixation in the stroma
• reduction of NADP+ molecules
• **removal of electrons from chlorophyll molecules**
• ATP synthesis

56. Which of the following statements is a correct distinction between cyclic and
noncyclic electron flow?
• Only noncyclic electron flow produces ATP.

• In addition to ATP, cyclic electron flow also produces O2 and NADPH.
• Only cyclic electron flow utilizes light at 700 nm.
• Chemiosmosis is unique to noncyclic electron flow.
•
Only cyclic electron flow can operate in the absence of photosystem II.

57. Which of the following statements is a correct distinction between autotrophs
and heterotrophs?
• Only heterotrophs require chemical compounds from the environment.
• Cellular respiration is unique to heterotrophs.
• Only heterotrophs have mitochondria.
•
Autotrophs, but not heterotrophs, can nourish themselves beginning with CO2 and
other nutrients that are inorganic.
• Only heterotrophs require oxygen.

58. Which of the following does not occur during the Calvin cycle?
• carbon fixation
• oxidation of NADPH
• **release of oxygen**
• regeneration of the CO2 acceptor
• consumption of ATP

59. Which of these equations best summarizes photosynthesis?
• C6H12O6 + 6 O2 —> 6 CO2 + 12 H2O

• $C_6H_{12}O_6 + 6\ O_2 \longrightarrow 6\ CO_2 + 6\ H_2O + Energy$
• $6\ CO_2 + 6\ O_2 \longrightarrow C_6H_{12}O_6 + 6\ H_2O$
• **$6\ CO_2 + 6\ H_2O \longrightarrow C_6H_{12}O_6 + 6\ O_2$**
• $H_2O \longrightarrow 2\ H^+ + 1/2\ O_2 + 2e$

60. The light reactions of photosynthesis use _____ and produce _____.
• NADPH ... NADP+
• **water ... NADPH**
• carbon dioxide ... oxygen
• carbon dioxide ... sugar
• NADPH ... oxygen

61. _____ has a longer wavelength than _____.
• **Red ... green**
• Violet ... blue
• Yellow ... red
• Green ... yellow
• Blue ... green

62. Carbon fixation involves the addition of carbon dioxide to _____.
• rubisco
• **RuBP**
• G3P
• 3-PGA
• NADPH

63. After 3-PGA is phosphorylated, it is reduced by _____.
• NADP+
• ADP
• CO_2
• **NADPH**
• ATP

64. How many carbon dioxide molecules must be added to RuBP to make a single
molecule of glucose?
• 2
• 4
• **6**
• 8
• 10

65. In the Calvin cycle, how many ATP molecules are required to regenerate
RuBP from five G3P molecules?
• 1
• 2
• **3**
• 4
• 5

66. In his work with pneumonia-causing bacteria and mice, Griffith found that

• the protein coat from pathogenic cells was able to transform nonpathogenic cells.
• heat-killed pathogenic cells caused pneumonia.
•
some substance from pathogenic cells was transferred to nonpathogenic cells,
making them pathogenic.
• the polysaccharide coat of bacteria caused pneumonia.
• bacteriophages injected DNA into bacteria.

67. E. coli cells grown on 15N medium are transferred to 14N medium and allowed to

grow for two more generations (two rounds of DNA replication). DNA extracted

from these cells is centrifuged. What density distribution of DNA would you
expect in this experiment?
• one high-density and one low-density band
• one intermediate-density band
• one high-density and one intermediate-density band
• **one low-density and one intermediate-density band**
• one low-density band

68. A biochemist isolates and purifies molecules needed for DNA replication. When

she adds some DNA, replication occurs, but each DNA molecule consists of a

normal strand paired with numerous segments of DNA a few hundred nucleotides
long. What has she probably left out of the mixture?
• DNA polymerase
• **DNA ligase**
• nucleotides
• Okazaki fragments
• primase

69. What is the basis for the difference in how the leading and lagging strands of
DNA molecules are synthesized?
• The origins of replication occur only at the 5' end.
• Helicases and single-strand binding proteins work at the 5' end.
•
DNA polymerase can join new nucleotides only to the 3' end of a growing strand.
• DNA ligase works only in the 3' --> 5' direction.
• Polymerase can work on only one strand at a time.

70. In analyzing the number of different bases in a DNA sample, which result would
be consistent with the base-pairing rules?
• A = G
• **A + G = C + T**
• A + T = G + T
• A = C
• G = T

71. Synthesis of a new DNA strand usually begins with
• **an RNA primer.**
• a DNA primer.
• an Okazaki fragment.
• DNA ligase.
• a thymine dimer.

72. A eukaryotic cell lacking active telomerase would
• be unable to take up DNA from the surrounding solution.
• be unable to identify and correct mismatched nucleotides.
•
experience a gradual reduction of chromosome length with each replication cycle.
• have a greater potential to become cancerous.
• be unable to connect Okazaki fragments.

73. The elongation of the leading strand during DNA synthesis
• progresses away from the replication fork.
• occurs in the 3' --> 5' direction.
• produces Okazaki fragments.
• **depends on the action of DNA polymerase.**
• does not require a template strand.

74. The spontaneous loss of amino groups from adenine results in hypoxanthine, an

unnatural base, opposite thymine in DNA. What combination of molecules could
repair such damage?
• **nuclease, DNA polymerase, DNA ligase**
• telomerase, primase, DNA polymerase
• telomerase, helicase, single-strand binding protein
• DNA ligase, replication fork proteins, adenylyl cyclase
• nuclease, telomerase, primase

75. The most reasonable inference from the observation that defects in DNA repair
enzymes contribute to some cancers is that
• cancer is generally inherited.
• **uncorrected changes in DNA can lead to cancer.**
• cancer cannot occur when repair enzymes work properly.
• mutations generally lead to cancer.

• cancer is caused by environmental factors that damage DNA repair enzymes

76. Who demonstrated that DNA is the genetic material of the T2 phage?
• Franklin
• **Hershey and Chase**
• Meselson and Stahl
• Watson and Crick
• Darwin and Wallace

77. The radioactive isotope 32P labels the T2 phage's _____.
• **DNA**
• tail
• base plate

• protein coat
• head

78. Hershey and Chase used _____ to radioactively label the T2 phage's proteins.
• **35S**
• 14C
• 222Ra
• 32P
• 92U

79. After allowing phages grown with bacteria in a medium that contained 32P and

35S, Hershey and Chase used a centrifuge to separate the phage ghosts from the

infected cell. They then examined the infected cells and found that they contained
_____, which demonstrated that _____ is the phage's genetic material.
• labeled protein ... DNA
• labeled protein .... protein
• labeled DNA ... labeled protein
• labeled DNA .... protein
• **labeled DNA ... DNA**

80. Which of these is a difference between a DNA and an RNA molecule?
• DNA contains uracil, whereas RNA contains thymine.
• DNA is a polymer composed of nucleotides, whereas RNA is a polymer composed of nucleic acids.
• **DNA is double-stranded, whereas RNA is single-stranded.**

• DNA contains five-carbon sugars, whereas RNA contains six-carbon sugars.

• DNA contains nitrogenous bases, whereas RNA contains phosphate groups.

81. Which of these nitrogenous bases is found in DNA but not in RNA?
• adenine
• cytosine
• guanine
• **thymine**
• uracil

82. In a nucleotide, the nitrogenous base is attached to the sugar's _____ carbon and

the phosphate group is attached to the sugar's _____ carbon. (Activity: DNA and
RNA Structure)
• 1' ... 2'
• **1' ... 5'**
• 2' ... 3'
• 1' ... 3'
• 2' ... 1'

83. Nucleic acids are assembled in the _____ direction. (Activity: DNA and RNA
Structure)
• 1' to 5'
• 2' to 3'
• **5' to 3'**
• 4' to 5'
• 5' to 1'

84. In a DNA double helix an adenine of one strand always pairs with a(n) _____ of

the complementary strand, and a guanine of one strand always pairs with a(n)
_____ of the complementary strand.
• guanine ... adenine
• cytosine ... uracil
• cytosine ... thymine
• **thymine ... cytosine**
• uracil ... cytosine

85. Short segments of newly synthesized DNA are joined into a continuous strand by
_____.
• helicase
• DNA polymerase
• **ligase**
• primase
• single-strand binding protein

86. After DNA replication is completed, _____.

• each new DNA double helix consists of one old DNA strand and one new DNA
strand
• **each new DNA double helix consists of two new strands**

• one DNA double helix consists of two old strands and one DNA double helix
consists of two new strands

• each of the four DNA strands consists of some old strand parts and some new
strand parts
• there are four double helices

87. The first step in the replication of DNA is catalyzed by _____.
• **helicase**
• DNA polymerase
• ligase
• primase
• single-strand binding protein

88. The action of helicase creates _____.
• primers and DNA fragments
• primers and replication bubbles
• DNA fragments and replication forks
• **replication forks and replication bubbles**
• DNA fragments and replication bubbles

89. Why is the new DNA strand complementary to the 3' to 5' strands assembled in
short segments?
• the replication forks block the formation of longer strands
• DNA polymerase can assemble DNA only in the 3' to 5' direction
•
DNA polymerase can assemble DNA only in the 5' to 3'
direction
• it is more efficient than assembling complete new strands
• only short DNA sequences can extend off the RNA primers

90. The synthesis of a new strand begins with the synthesis of a(n)
_____.

• single-strand binding protein
• Okazaki fragment
• poly(A) tail
• short pieces of DNA
• **RNA primer complementary to a preexisting DNA strand**

91. An old DNA strand is used as a _____ for the assembly of a new DNA strand.
• complement
• primer
• **template**
• source of nucleotides
• model

92. Base-pair substitutions involving the third base of a codon are unlikely to result in
an error in the polypeptide. This is because
• substitutions are corrected before transcription begins.
• substitutions are restricted to introns.
•
the base-pairing rules are less strict for the third base
of codons and anticodons.
• a signal-recognition particle corrects coding errors.

• transcribed errors attract snRNPs, which then stimulate splicing and correction.

93. In eukaryotic cells, transcription cannot begin until

• the two DNA strands have completely separated and exposed the promoter.
• **several transcription factors have bound to the promoter.**
• the 5' caps are removed from the mRNA.
• the DNA introns are removed from the template.
• DNA nucleases have isolated the transcription unit.

94. Which of the following is not true of a codon?
• It consists of three nucleotides.
• It may code for the same amino acid as another codon.
• It never codes for more than one amino acid.
• **It extends from one end of a tRNA molecule.**
• It is the basic unit of the genetic code.

95. The metabolic pathway of arginine synthesis is as follows:

• Beadle and Tatum discovered several classes of Neurospora mutants that were

able to grow on minimal medium with arginine added (see Figure 17.2). They
were able to conclude that
• one gene codes for the entire metabolic pathway.
• the genetic code of DNA is a triplet code.

• class I mutants have their mutations later in the nucleotide chain than do class II
mutants.
•
class I mutants have a nonfunctional enzyme at step A, and
class II mutants have
one at step B.
• class III mutants have nonfunctional enzymes for all three steps.

96. The anticodon of a particular tRNA molecule is
• **complementary to the corresponding mRNA codon.**
• complementary to the corresponding triplet in rRNA.
• the part of tRNA that bonds to a specific amino acid.
• changeable, depending on the amino acid that attaches to the tRNA.
• catalytic, making the tRNA a ribozyme.

97. Which of the following is not true of RNA processing?
• **Exons are cut out before mRNA leaves the nucleus.**
• Nucleotides may be added at both ends of the RNA.
• Ribozymes may function in RNA splicing.
• RNA splicing can be catalyzed by spliceosomes.

• A primary transcript is often much longer than the final RNA molecule that leaves
the nucleus.

98. Which of the following is true of translation in both prokaryotes and eukaryotes?
• Translation is coupled to transcription.
• The product of transcription is immediately ready for translation.
• **The codon UUU codes for phenylalanine.**
• Ribosomes are affected by streptomycin.

• The signal-recognition particle (SRP) binds to the first 20 amino acids of certain

polypeptides.

99. Using Figure 17.5, identify a 5' ? 3' sequence of nucleotides in the DNA template
strand for an mRNA coding for the polypeptide sequence Phe-Pro-Lys.
• UUU-GGG-AAA
• GAA-CCC-CTT
• AAA-ACC-TTT
• **CTT-CGG-GAA**
• AAA-CCC-UUU

100. Which of the following mutations would be most likely to have a harmful effect
on an organism?
• a base-pair substitution
• a deletion of three nucleotides near the middle of a gene
• a single nucleotide deletion in the middle of an intron
•
a single nucleotide deletion near the end of the coding sequence

• a single nucleotide insertion downstream of, and close to, the start of the coding
sequence

101. Which component is not directly involved in translation?
• mRNA
• **DNA**
• tRNA
• ribosomes
• GTP

Like