BSC1010, Exam 5 Take Home Portion (Ch. 1-20) **Name** _____

Place your answers on a Scantron. No erasures allowed. Errors in machine scoring resulting from stray pencil marks or erasures will not be revised or hand graded. Turn the Scantron in at the start of class and then take the In Class Portion.

1) A covalent chemical bond is one in which 1) _____
   A) protons and neutrons are shared by two atoms so as to satisfy the requirements of both atoms.
   B) outer-shell electrons of two atoms are shared so as to satisfactorily fill the outer electron shells of both atoms.
   C) outer-shell electrons of one atom are transferred to the inner electron shells of another atom.
   D) the inner-shell electrons of one atom are transferred to the outer shell of another atom.
   E) electrons are removed from one atom and transferred to another atom so that the two atoms become oppositely charged.

The following question is based on Figure 3.1: solute molecule surrounded by a hydration shell of water.

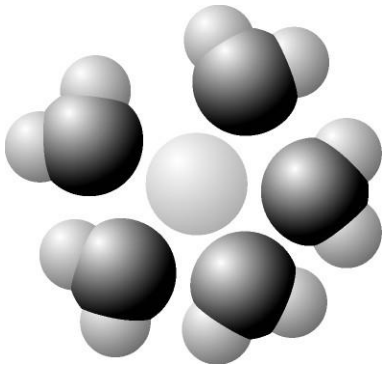


Figure 3.1

2) Based on your knowledge of the polarity of water molecules, the solute molecule is most likely 2) _____
   A) positively charged.
   B) nonpolar.
   C) hydrophobic.
   D) negatively charged.
   E) without charge.

3) Hydrophobic substances such as vegetable oil are 3) _____
   A) charged molecules that hydrogen-bond with water molecules.
   B) nonpolar substances that have an attraction for water molecules.
   C) polar substances that have an affinity for water.
   D) nonpolar substances that repel water molecules.
   E) polar substances that repel water molecules.

4) Which of the following solutions has the greatest concentration of hydrogen ions $[H^+]$? 4) _____
   A) black coffee at pH 5
   B) gastric juice at pH 2
   C) household bleach at pH 12
   D) vinegar at pH 3
   E) tomato juice at pH 4

5) Why are hydrocarbons insoluble in water? 5) _____
   A) They are hydrophilic.
   B) The majority of their bonds are polar covalent carbon-to-hydrogen linkages.
   C) They are lighter than water.

D) The majority of their bonds are nonpolar covalent carbon-to-hydrogen linkages.
E) They exhibit considerable molecular complexity and diversity.

6) How many molecules of water are needed to completely hydrolyze a polymer that is 11 monomers long? 6) _____
A) 9 B) 12 C) 8 D) 11 E) 10

7) On food packages, to what does the term "insoluble fiber" refer? 7) _____
A) amylopectin
B) polypeptides
C) chitin
D) cellulose
E) starch

The following questions are based on the 15 molecules illustrated in Figure 5.8. Each molecule may be used once, more than once, or not at all.

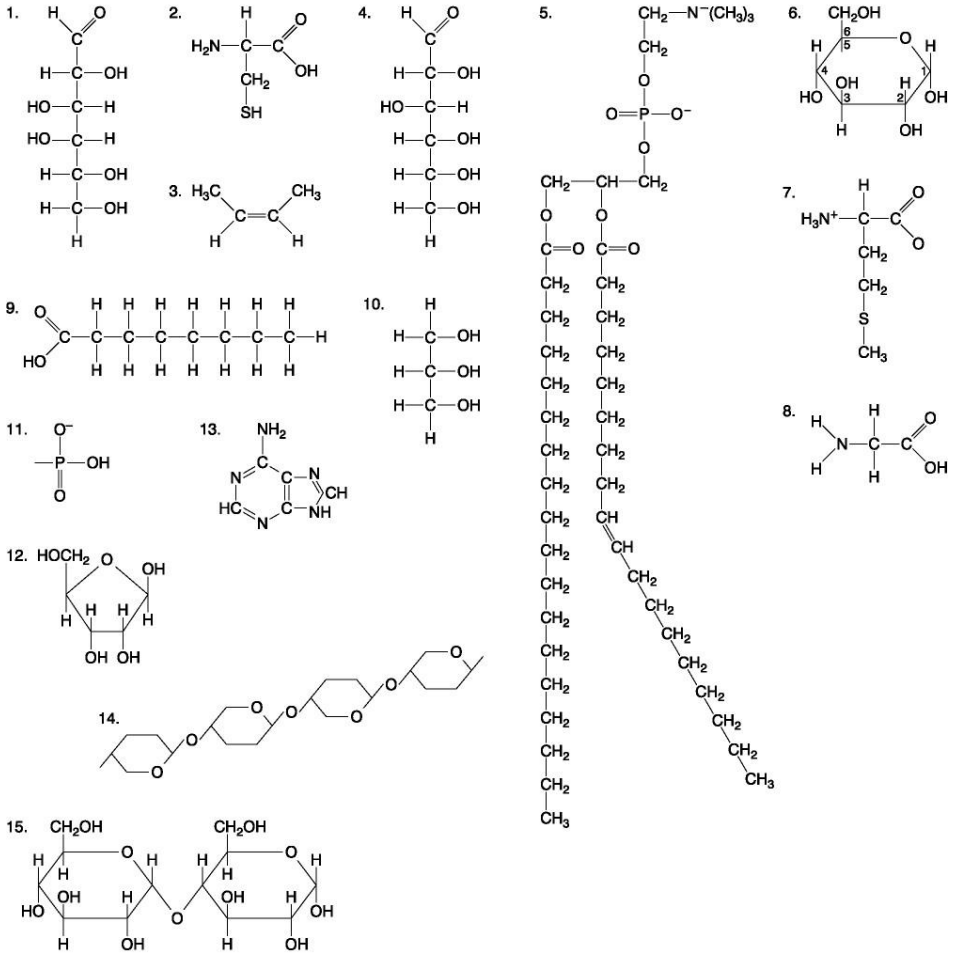


Figure 5.8

8) Which molecule has hydrophilic and hydrophobic properties and would be found in plasma membranes? 8) _____
A) 6 B) 14 C) 5 D) 1 E) 12

9) Which of the following combinations could be linked together to form a nucleotide? 9) _____
A) 3, 7, and 8
B) 11, 12, and 13
C) 12, 14, and 15
D) 1, 2, and 11
E) 5, 9, and 10

10) Which of the following molecules act as building blocks (monomers) of polypeptides? 10) _____
A) 1, 4, and 6
B) 2, 7, and 8
C) 11, 12, and 13
D) 12, 13, and 15
E) 7, 8, and 13

11) Which of the following molecules contains a glycosidic linkage type of covalent bond? 11) _____
A) 12 B) 15 C) 6 D) 13 E) 4

12) All of the following are part of a prokaryotic cell *except* 12) _____
A) a cell wall.
B) DNA.
C) a plasma membrane.
D) ribosomes.
E) an endoplasmic reticulum.

13) Large numbers of ribosomes are present in cells that specialize in producing which of the following molecules? 13) _____
A) starches
B) lipids
C) glucose
D) steroids
E) proteins

14) Under which of the following conditions would you expect to find a cell with a predominance of free ribosomes? 14) _____
A) a cell that is secreting proteins
B) a cell that is constructing its cell wall or extracellular matrix
C) a cell that is producing cytoplasmic enzymes
D) a cell that is enlarging its vacuole
E) a cell that is digesting food particles

15) In animal cells, hydrolytic enzymes are packaged to prevent general destruction of cellular components. Which of the following organelles functions in this compartmentalization? 15) _____
A) chloroplast
B) peroxisome
C) lysosome
D) glyoxysome
E) central vacuole

16) Organelles other than the nucleus that contain DNA include 16) _____
A) ribosomes.
B) mitochondria.
C) chloroplasts.
D) B and C only
E) A, B, and C

17) Which of the following relationships between cell structures and their respective functions is correct? 17) _____
A) ribosomes: secretion
B) lysosomes: formation of ATP
C) cell wall: support, protection
D) chloroplasts: chief sites of cellular respiration
E) chromosomes: cytoskeleton of the nucleus

For the following questions, match the labeled component of the cell membrane (Figure 7.1) with its description.

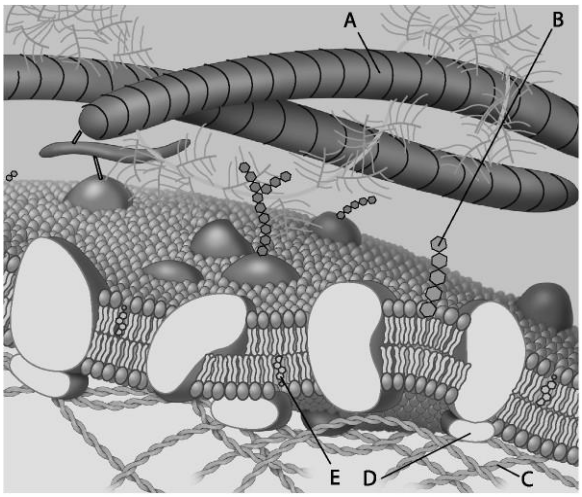


Figure 7.1

18) cholesterol 18) _____

19) glycolipid 19) _____

20) An animal cell lacking oligosaccharides on the external surface of its plasma membrane would likely be impaired in which function? 20) _____
   A) establishing the diffusion barrier to charged molecules
   B) attaching to the cytoskeleton
   C) maintaining fluidity of the phospholipid bilayer
   D) cell-cell recognition
   E) transporting ions against an electrochemical gradient

21) Which of these often serve as receptors or cell recognition molecules on cell surfaces and play a central role in blood types, immune response, vaccinations and tissue rejection? 21) _____
   A) peripheral proteins
   B) transmembrane proteins
   C) integral proteins
   D) integrins
   E) glycoproteins

Read the following information and refer to Figure 7.4 to answer the following questions.

Five dialysis bags, constructed from a semi-permeable membrane that is impermeable to sucrose, were filled with various concentrations of sucrose and then placed in separate beakers containing an initial concentration of 0.6 *M* sucrose solution. At 10-minute intervals, the bags were massed (weighed) and the percent change in mass of each bag was graphed.

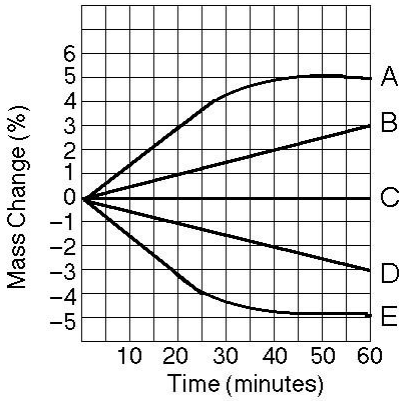


Figure 7.4

22) Which line represents the bag with the highest initial concentration of sucrose? 22) _____

23) What is the voltage across a membrane called? 23) _____
A) electrochemical gradient
B) chemical gradient
C) membrane potential
D) osmotic potential
E) water potential

24) In receptor-mediated endocytosis, receptor molecules initially project to the outside of the cell. Where do they end up after endocytosis? 24) _____
A) on the ER
B) on the outside of vesicles
C) on the outer surface of the nucleus
D) on the inside surface of the vesicle
E) on the inside surface of the cell membrane

25) Which of the following statements is a logical consequence of the second law of thermodynamics? 25) _____
A) Every energy transfer requires activation energy from the environment.
B) If there is an increase in the energy of a system, there must be a corresponding decrease in the energy of the rest of the universe.
C) If the entropy of a system increases, there must be a corresponding decrease in the entropy of the universe.
D) Energy can be transferred or transformed, but it cannot be created or destroyed.
E) Every chemical reaction must increase the total entropy of the universe.

26) Sucrose is a disaccharide, composed of the monosaccharides glucose and fructose. The hydrolysis of sucrose by the enzyme sucrase results in 26) _____

A) production of water from the sugar as bonds are broken between the glucose monomers.
B) bringing glucose and fructose together to form sucrose.
C) the release of water from sucrose as the bond between glucose and fructose is broken.
D) breaking the bond between glucose and fructose and forming new bonds from the atoms of water.
E) utilization of water as a covalent bond is formed between glucose and fructose to form sucrase.

The following questions are based on the reaction A + B → C + D shown in Figure 8.2.

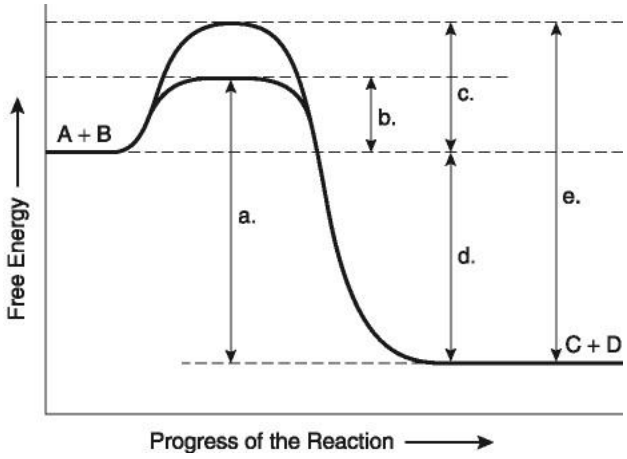


Figure 8.2

27) Which of the following represents the activation energy required for the enzyme-catalyzed reaction? 27) _____

A) a B) b C) c D) d E) e

28) The mechanism in which the end product of a metabolic pathway inhibits an earlier step in the pathway is known as 28) _____

A) noncooperative inhibition.
B) feedback inhibition.
C) metabolic inhibition.
D) allosteric inhibition.
E) reversible inhibition.

29) Which of the following statements describes the results of this reaction? 29) _____
$C_6H_{12}O_6 + 6\ O_2 \rightarrow 6\ CO_2 + 6\ H_2O$ + Energy

A) O_2 is reduced and CO_2 is oxidized.
B) $C_6H_{12}O_6$ is oxidized and O_2 is reduced.
C) $C_6H_{12}O_6$ is reduced and CO_2 is oxidized.
D) O_2 is oxidized and H_2O is reduced.
E) CO_2 is reduced and O_2 is oxidized.

30) Where does glycolysis takes place? 30) _____

A) cytosol
B) mitochondrial matrix
C) mitochondrial inner membrane
D) mitochondrial outer membrane
E) mitochondrial intermembrane space

31) The oxygen consumed during cellular respiration is involved directly in which process or event? 31) _____
A) the citric acid cycle
B) glycolysis
C) the oxidation of pyruvate to acetyl CoA
D) the phosphorylation of ADP to form ATP
E) accepting electrons at the end of the electron transport chain

32) Which process in eukaryotic cells will proceed normally whether oxygen (O_2) is present or absent? 32) _____
A) chemiosmosis
B) oxidative phosphorylation
C) glycolysis
D) the citric acid cycle
E) electron transport

33) A molecule that is phosphorylated 33) _____
A) has an increased chemical reactivity; it is primed to do cellular work.
B) has been reduced as a result of a redox reaction involving the loss of an inorganic phosphate.
C) has a decreased chemical reactivity; it is less likely to provide energy for cellular work.
D) has been oxidized as a result of a redox reaction involving the gain of an inorganic phosphate.
E) has less energy than before its phosphorylation and therefore less energy for cellular work.

Refer to Figure 9.2, showing the citric acid cycle, as a guide to answer the following questions.

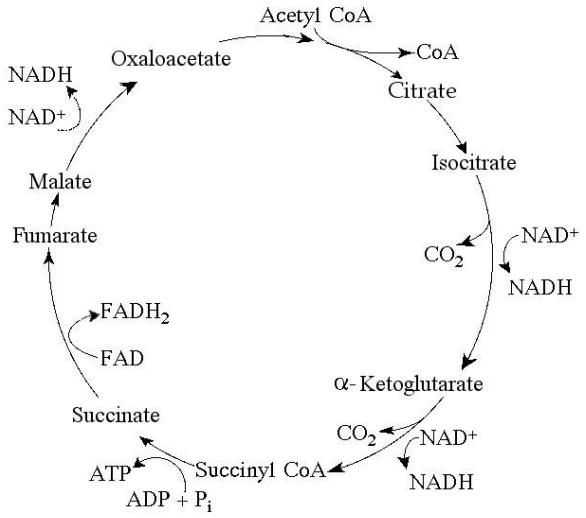


Figure 9.2

34) How many molecules of carbon dioxide (CO_2) would be produced by five turns of the citric acid cycle? 34) _____
A) 60 B) 5 C) 2 D) 12 E) 10

35) During aerobic respiration, electrons travel downhill in which sequence? 35) _____
A) food → NADH → electron transport chain → oxygen
B) food → glycolysis → citric acid cycle → NADH → ATP
C) glucose → pyruvate → ATP → oxygen
D) glucose → ATP → electron transport chain → NADH
E) food → citric acid cycle → ATP → NAD^+

36) Where are the proteins of the electron transport chain located? 36) _____

A) cytosol
B) mitochondrial outer membrane
C) mitochondrial matrix
D) mitochondrial inner membrane
E) mitochondrial intermembrane space

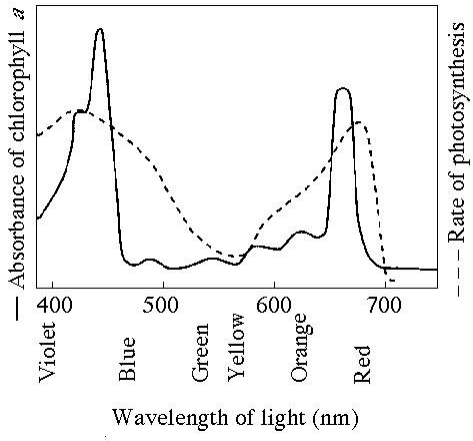


Figure 10.1

37) What wavelength of light in the figure is *most* effective in driving photosynthesis? 37) _____

A) 575 mm
B) 420 mm
C) 730 mm
D) 625 mm
E) 475 mm

38) In mitochondria, chemiosmosis translocates protons from the matrix into the intermembrane space, whereas in chloroplasts, chemiosmosis translocates protons from 38) _____

A) the stroma to the photosystem II.
B) ATP synthase to $NADP^+$ reductase.
C) the stroma to the thylakoid space.
D) the intermembrane space to the matrix.
E) the matrix to the stroma.

39) Where are the molecules of the electron transport chain found in plant cells? 39) _____

A) thylakoid membranes of chloroplasts
B) cytoplasm
C) stroma of chloroplasts
D) inner membrane of mitochondria
E) matrix of mitochondria

For the following question 40, compare the light reactions with the Calvin cycle of photosynthesis in plants.

40) Produces molecular oxygen (O_2) 40) _____

A) both the light reactions and the Calvin cycle
B) occurs in the chloroplast but is not part of photosynthesis
C) neither the light reactions nor the Calvin cycle
D) the Calvin cycle alone
E) light reactions alone

41) Cytokinesis usually, but not always, follows mitosis. If a cell completed mitosis but not cytokinesis, the result would be a cell with 41) _____
A) two nuclei.
B) high concentrations of actin and myosin.
C) a single large nucleus.
D) two nuclei but with half the amount of DNA.
E) two abnormally small nuclei.

42) Chromosomes first become visible during which phase of mitosis? 42) _____
A) telophase
B) metaphase
C) prophase
D) prometaphase
E) anaphase

43) Which of the following is a protein synthesized at specific times during the cell cycle that associates with a kinase to form a catalytically active complex? 43) _____
A) protein kinase
B) cyclin
C) MPF
D) Cdk
E) PDGF

44) DNA is replicated at this time of the cell cycle: 44) _____
A) G_2 B) G_0 C) S D) M E) G_1

45) What is a karyotype? 45) _____
A) A system of classifying cell nuclei
B) The combination of chromosomes found in a gamete
C) The collection of all the mutations present within the genome of an individual
D) The set of unique physical characteristics that define an individual
E) A display of every pair of homologous chromosomes within a cell, organized according to size and shape

46) Which of the following is *true* of a species that has a chromosome number of 2n = 16? 46) _____
A) The species has 16 sets of chromosomes per cell.
B) A gamete from this species has 4 chromosomes.
C) During the S phase of the cell cycle there will be 32 separate chromosomes.
D) The species is diploid with 32 chromosomes per cell.
E) Each cell has 8 homologous pairs.

For the following question 47, match the key event of meiosis with the stages listed below.

I.	Prophase	IV.	Prophase II
II.	Metaphase I	VI.	Metaphase II
III.	Anaphase I	VII.	Anaphase II
IV.	Telophase I	VIII.	Telophase II

47) Tetrads of chromosomes are aligned at the equator of the spindle; alignment determines independent assortment. 47) _____
A) I B) II C) IV D) VII E) VIII

You have isolated DNA from three different cell types of an organism, determined the relative DNA content for each type, and plotted the results on the graph shown in Figure 13.3. Refer to the graph to answer the following questions.

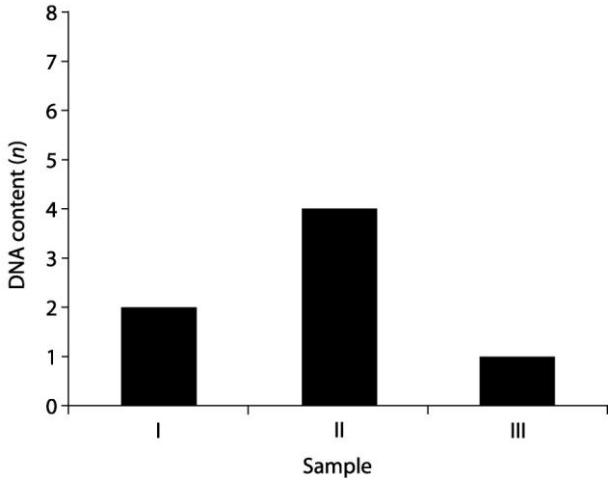


Figure 13.3

48) Which sample might represent a sperm cell? 48) _____
A) I
B) II
C) III
D) Either I or II
E) Either II or III

49) Huntington's disease is a dominant condition with late age of onset in humans. If one parent has the disease, what is the probability that his or her child will have the disease? 49) _____
A) 0 B) 1 C) 3/4 D) 1/4 E) 1/2

50) A woman has six sons. The chance that her next child will be a daughter is 50) _____
A) 1/6. B) 0. C) 5/6. D) 1. E) 1/2.

The following questions refer to the pedigree chart in Figure 14.2 for a family, some of whose members exhibit the dominant trait, wooly hair. Affected individuals are indicated by an open square or circle.

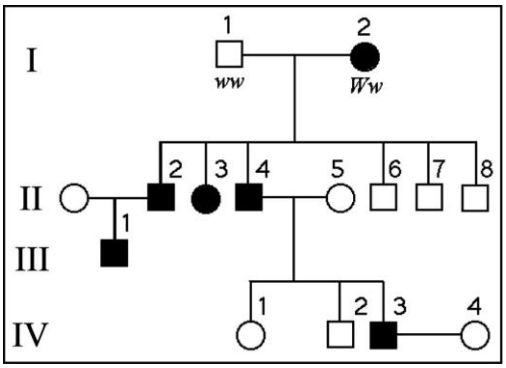


Figure 14.2

51) What is the genotype of individual II-5? 51) _____
A) *Ww*
B) *ww* or *Ww*
C) *ww*
D) *WW* or *ww*
E) *WW*

52) A pedigree analysis for a given disorder's occurrence in a family shows that, although both parents of an affected child are normal, each of the parents has had affected relatives with the same condition. The disorder is then which of the following? 52) _____
A) Dominant
B) Incompletely dominant
C) Recessive
D) A new mutation
E) Maternally inherited

53) Red-green color blindness is a sex-linked recessive trait in humans. Two people with normal color vision have a color-blind son. What are the genotypes of the parents? 53) _____
A) X^cX^c and X^CY
B) X^CX^c and X^CY
C) X^CX^C and X^cY
D) X^cX^c and X^cY
E) X^CX^C and X^CY

54) What does transformation involve in bacteria? 54) _____
A) the creation of a strand of DNA from an RNA molecule
B) the creation of a strand of RNA from a DNA molecule
C) assimilation of external DNA into a cell
D) the type of semiconservative replication shown by DNA
E) the infection of cells by a phage DNA molecule

55) What kind of chemical bond is found between paired bases of the DNA double helix? 55) _____
A) covalent
B) sulfhydryl
C) ionic
D) phosphate
E) hydrogen

Use Figure 16.1 to answer the following questions.

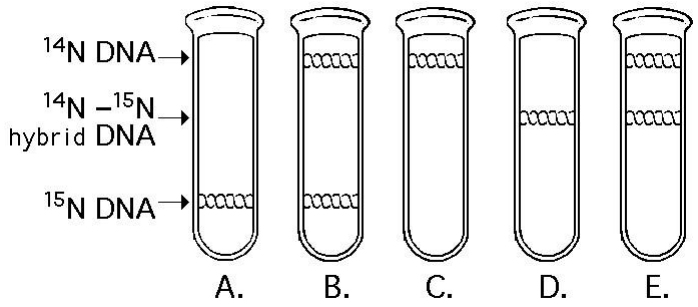


Figure 16.1

56) In the late 1950s, Meselson and Stahl grew bacteria in a medium containing "heavy" nitrogen (^{15}N) and then transferred them to a medium containing ^{14}N. Which of the results in Figure 16.1 would be expected after one round of DNA replication in the presence of ^{14}N? 56) _____

57) What determines the nucleotide sequence of the newly synthesized strand during DNA replication? 57) _____
A) the arrangement of histones in the sugar phosphate backbone
B) the relative amounts of the four nucleoside triphosphates in the cell
C) the particular DNA polymerase catalyzing the reaction
D) the nucleotide sequence of the template strand
E) the primase used in the reaction

58) The enzyme telomerase solves the problem of replication at the ends of linear chromosomes by which method? 58) _____
A) causing specific double strand DNA breaks that result in blunt ends on both strands
B) adding a single 5' cap structure that resists degradation by nucleases
C) causing linear ends of the newly replicated DNA to circularize
D) adding numerous GC pairs which resist hydrolysis and maintain chromosome integrity
E) adding numerous short DNA sequences such as TTAGGG, which form a hairpin turn

59) What is the function of DNA polymerase III? 59) _____
A) to seal together the broken ends of DNA strands
B) to unwind the DNA helix during replication allowing the normal base pairing rules to apply
C) to covalently bond nucleotides to the end of the newly forming DNA strand
D) to rejoin the two DNA strands (one new and one old) after replication
E) to degrade damaged DNA molecules

60) To repair a thymine dimmer by nucleotide excision repair, in which order do the necessary enzymes act? 60) _____
A) DNA ligase, nuclease, helicase
B) exonuclease, DNA polymerase III, RNA primase
C) endonuclease, DNA polymerase I, DNA ligase
D) helicase, DNA polymerase I, DNA ligase
E) DNA polymerase I, DNA polymerase III, DNA ligase

61) What is the role of DNA ligase in the elongation of the lagging strand during DNA replication? 61) _____

A) catalyze the lengthening of telomeres
B) join Okazaki fragments together
C) stabilize the unwound parental DNA
D) synthesize RNA nucleotides to make a primer
E) unwind the parental double helix

The following questions refer to Figure 17.1, a simple metabolic pathway:

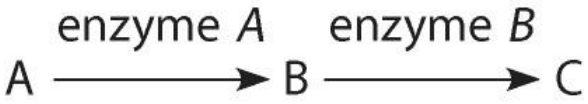


Figure 17.1

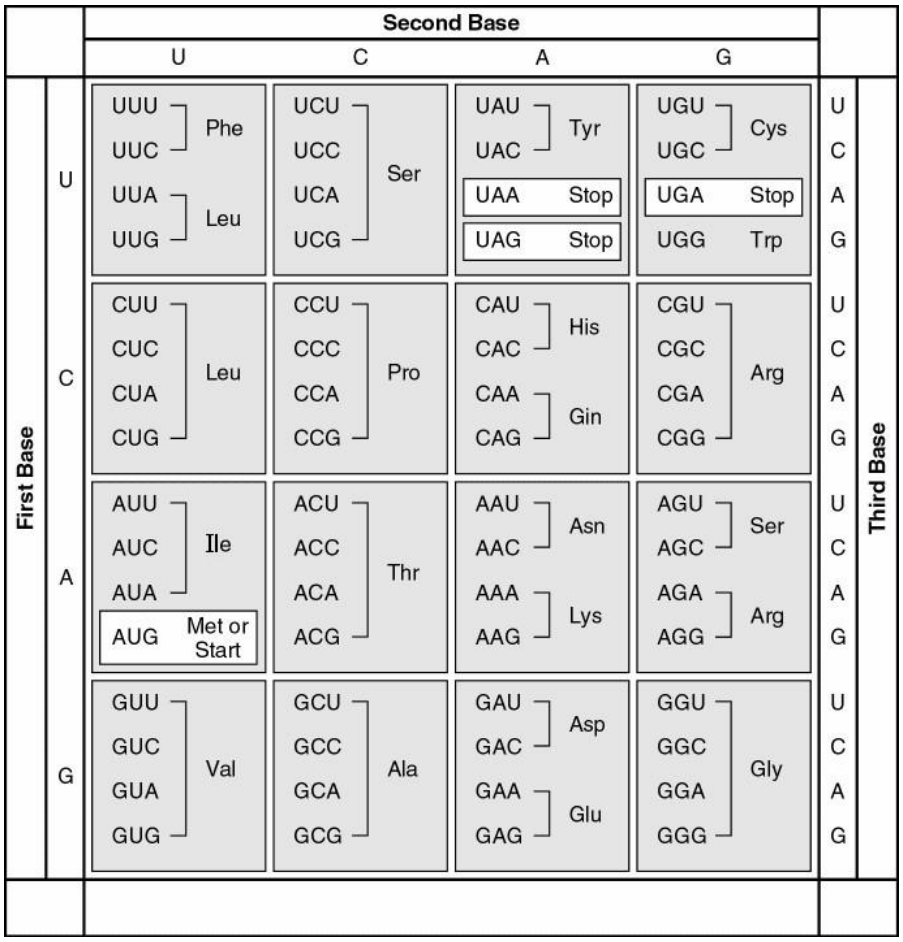
62) A mutation results in a defective enzyme *A.* Which of the following would be a consequence of that mutation? 62) _____

A) an accumulation of A and B and no production of C
B) an accumulation of B and no production of A and C
C) an accumulation of B and C and no production of A
D) an accumulation of A and no production of B and C
E) an accumulation of C and no production of A and B

63) A particular triplet of bases in the template strand of DNA is 5' AGT 3'. The corresponding codon for the mRNA transcribed is 63) _____

A) 5' TCA 3'.
B) 3'ACU 5'.
C) 3' UGA 5'.
D) 3' UCA 5'.
E) either UCA or TCA, depending on wobble in the first base.

The following questions refer to Figure 17.2, a table of codons.



First Base	Second Base: U	Second Base: C	Second Base: A	Second Base: G	Third Base
U	UUU Phe	UCU Ser	UAU Tyr	UGU Cys	U
	UUC Phe	UCC Ser	UAC Tyr	UGC Cys	C
	UUA Leu	UCA Ser	UAA Stop	UGA Stop	A
	UUG Leu	UCG Ser	UAG Stop	UGG Trp	G
C	CUU Leu	CCU Pro	CAU His	CGU Arg	U
	CUC Leu	CCC Pro	CAC His	CGC Arg	C
	CUA Leu	CCA Pro	CAA Gln	CGA Arg	A
	CUG Leu	CCG Pro	CAG Gln	CGG Arg	G
A	AUU Ile	ACU Thr	AAU Asn	AGU Ser	U
	AUC Ile	ACC Thr	AAC Asn	AGC Ser	C
	AUA Ile	ACA Thr	AAA Lys	AGA Arg	A
	AUG Met or Start	ACG Thr	AAG Lys	AGG Arg	G
G	GUU Val	GCU Ala	GAU Asp	GGU Gly	U
	GUC Val	GCC Ala	GAC Asp	GGC Gly	C
	GUA Val	GCA Ala	GAA Glu	GGA Gly	A
	GUG Val	GCG Ala	GAG Glu	GGG Gly	G

Figure 17.2

64) What is the sequence of a peptide based on the following mRNA sequence? 64) _____

5' . . . UUUUCUUAUUGUCUU 3'

A) cyc-phe-tyr-cys-leu
B) phe-leu-ile-met-val
C) phe-ser-tyr-cys-leu
D) leu-pro-asp-lys-gly
E) leu-cys-tyr-ser-phe

65) What are the coding segments of a stretch of eukaryotic DNA called? 65) _____

A) transposons
B) introns
C) codons
D) replicons
E) exons

66) A particular triplet of bases in the coding sequence of DNA is AAA. The anticodon on the tRNA that binds the mRNA codon is 66) _____

A) UUU.
B) AAA.
C) UUA.
D) TTT.
E) either UAA or TAA, depending on first base wobble.

67) Which of the following is a function of a signal peptide? 67) _____
A) to direct an mRNA molecule into the cisternal space of the ER
B) to translocate polypeptides across the ER membrane
C) to bind RNA polymerase to DNA and initiate transcription
D) to signal the initiation of transcription
E) to terminate translation of the messenger RNA

68) When translating secretory or membrane proteins, ribosomes are directed to the ER membrane by 68) _____
A) a signal sequence of RNA that precedes the start codon of the message.
B) a specific characteristic of the ribosome itself, which distinguishes free ribosomes from bound ribosomes.
C) a signal-recognition particle that brings ribosomes to a receptor protein in the ER membrane.
D) moving through a specialized channel of the nucleus.
E) a chemical signal given off by the ER.

69) When does translation begin in prokaryotic cells? 69) _____
A) once the pre-mRNA has been converted to mRNA
B) after the 5' caps are converted to mRNA
C) as soon as transcription has begun
D) as soon as the DNA introns are removed from the template
E) after a transcription initiation complex has been formed

70) Which point mutation would be most likely to have a catastrophic effect on the functioning of a protein? 70) _____
A) a base deletion near the end of the coding sequence, but not in the terminator codon
B) a base deletion near the start of a gene
C) a base insertion near the end of the coding sequence, but not in the terminator codon
D) deletion of three bases near the start of the coding sequence, but not in the initiator codon
E) a base substitution

71) A frameshift mutation could result from 71) _____
A) either an insertion or a deletion of a base.
B) a base deletion only.
C) deletion of three consecutive bases.
D) a base insertion only.
E) a base substitution only.

72) The role of a metabolite (a metabolite is a molecule, like tryptophane, that is the end product of an enzymatic pathway, that activates a repressible operon, is to 72) _____
A) bind to the operator region and block the attachment of RNA polymerase to the promoter.
B) increase the production of inactive repressor proteins.
C) bind to the repressor protein and inactivate it.
D) bind to the promoter region and decrease the affinity of RNA polymerase for the promoter.
E) bind to the repressor protein and activate it. as part of "feedback" control of gene expression.

73) For a repressible operon to be transcribed, which of the following must occur? 73) _____
A) A corepressor must be present.
B) RNA polymerase must bind to the promoter, and the repressor must be inactive.
C) RNA polymerase and the active repressor must be present.
D) RNA polymerase must not occupy the promoter, and the repressor must be inactive.
E) RNA polymerase cannot be present, and the repressor must be inactive.

74) Muscle cells and nerve cells in one species of animal owe their differences in structure to 74) _____
A) having unique ribosomes.
B) having different genes.
C) using different genetic codes.
D) having different genes expressed.
E) having different chromosomes.

75) A cell that remains entirely flexible in its developmental possibilities is said to be 75) _____
A) differentiated.
B) determined.
C) totipotent.
D) epigenetic.
E) genomically equivalent.

76) Which of the following statements is true about stem cells? 76) _____
A) Stem cells can differentiate into specialized cells.
B) Stem cells are found only in bone marrow.
C) Stem cells are found only in the adult human brain.
D) Stem cell DNA lacks introns.
E) Stem cells can continually reproduce and are not subject to mitotic control.

77) Which of the following can contribute to the development of cancer? 77) _____
A) chromosome translocations
B) mutations caused by X-rays
C) transposition
D) random spontaneous mutations
E) all of the above

Use the following scenario for the following question 78.

A few decades ago, Knudsen and colleagues proposed a theory that, for a normal cell to become a cancer cell, a minimum of two genetic changes had to occur in that cell. Knudsen was studying retinoblastoma, a childhood cancer of the eye.

78) In colorectal cancer, several genes must be mutated in order to make a cell a cancer cell, supporting Knudsen's hypothesis. Which of the following kinds of genes would you expect to be mutated? 78) _____
A) the genes of the bacteria that are abundant in the colon
B) genes involved in control of the cell cycle
C) the same genes that Knudsen identified as associated with retinoblastoma
D) genes that are especially susceptible to mutation
E) genes coding for enzymes that act in the colon

79) The host range of a virus is determined by 79) _____
A) whether its nucleic acid is DNA or RNA.
B) the enzymes carried by the virus.
C) the glycoproteins on its surface and on that of the host.
D) the enzymes produced by the virus before it infects the cell.
E) the proteins in the host's cytoplasm.

80) Viral envelopes can best be analyzed with which of the following techniques? 80) _____
A) immunofluorescent tagging of capsid proteins
B) transmission electron microscopy
C) antibodies against specific proteins not found in the host membranes
D) staining and visualization with the light microscope
E) use of plaque assays for quantitative measurement of viral titer

81) The host range of a virus is determined by 81) _____
A) whether its nucleic acid is DNA or RNA.
B) the proteins in the host's cytoplasm.
C) the proteins on its surface and that of the host.
D) the enzymes carried by the virus.
E) the enzymes produced by the virus before it infects the cell.

82) Why are viruses referred to as obligate parasites? 82) _____
A) They can incorporate nucleic acids from other viruses.
B) They cannot reproduce outside of a host cell.
C) They must use enzymes encoded by the virus itself.
D) Viral DNA always inserts itself into host DNA.
E) They invariably kill any cell they infect.

83) Most molecular biologists think that viruses originated from fragments of cellular nucleic acid. Which of the following observations supports this theory? 83) _____
A) Viruses are enclosed in protein capsids rather than plasma membranes.
B) Viruses can reproduce only inside host cells.
C) Viruses contain either DNA or RNA.
D) Viruses can infect both prokaryotic and eukaryotic cells.
E) Viral genomes are usually more similar to the genome of the host cell than to the genomes of viruses that infect other cell types.

84) What is the name given to viruses that are single-stranded RNA that acts as a template for DNA synthesis? 84) _____
A) lytic phages
B) proviruses
C) retroviruses
D) bacteriophages
E) viroids

85) What is the function of reverse transcriptase in retroviruses? 85) _____
A) It uses viral RNA as a template for making complementary RNA strands.
B) It uses viral RNA as a template for DNA synthesis.
C) It hydrolyzes the host cell's DNA.
D) It converts host cell RNA into viral DNA.
E) It translates viral RNA into proteins.

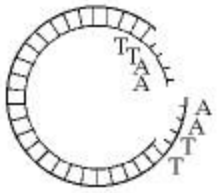


Figure 20.1

86) Which enzyme was used to produce the molecule in Figure 20.1? 86) _____
A) RNA polymerase
B) transcriptase
C) ligase
D) a restriction enzyme
E) DNA polymerase

87) What is the enzymatic function of restriction enzymes? 87) _____
A) to cleave (cut) nucleic acids at specific sites called "recognition sequences"
B) to join nucleotides during replication
C) to add new nucleotides to the growing strand of DNA
D) to repair breaks in sugar-phosphate backbones
E) to join nucleotides during transcription

88) What is the most logical sequence of steps for splicing foreign DNA into a plasmid and inserting the plasmid into a bacterium? 88) _____
I. Transform bacteria with recombinant DNA molecule.
II. Cut the plasmid DNA using restriction enzymes.
III. Extract plasmid DNA from bacterial cells.
IV. Hydrogen-bond the plasmid DNA to nonplasmid DNA fragments.
V. Use ligase to seal plasmid DNA to nonplasmid DNA.
A) I, II, IV, III, V
B) II, III, V, IV, I
C) III, IV, V, I, II
D) IV, V, I, II, III
E) III, II, IV, V, I

89) A principal problem with inserting an unmodified mammalian gene into a bacterial plasmid, and then getting that gene expressed in bacteria, is that 89) _____
A) bacteria cannot remove eukaryotic introns.
B) bacterial DNA is not found in a membrane-bounded nucleus and is therefore incompatible with mammalian DNA.
C) prokaryotes use a different genetic code from that of eukaryotes.
D) bacteria translate polycistronic messages only.
E) bacterial RNA polymerase cannot make RNA complementary to mammalian DNA.

90) Which of the following seals the sticky ends of restriction fragments to make recombinant DNA? 90) _____
A) gel electrophoresis
B) gene cloning
C) restriction enzymes
D) DNA ligase
E) reverse transcriptase

Use Figure 20.3 to answer the following questions. The DNA profiles below represent four different individuals.

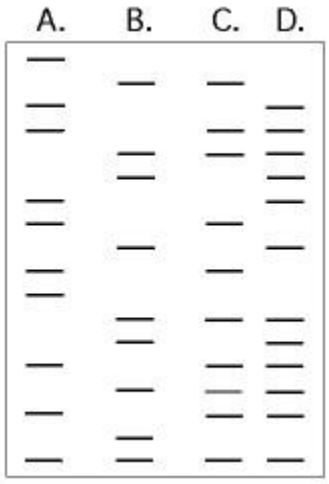


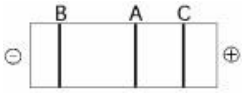
Figure 20.3

91) Which of the following statements is most likely true? 91) _____
A) D is the child of A and B.
B) A is the child of C and D.
C) D is the child of B and C.
D) B is the child of A and C.
E) D is the child of A and C.

Figure 20.2

92) The segment of DNA shown in Figure 20.2 has restriction sites I and II, which create restriction fragments A, B, and C. Which of the gels produced by electrophoresis shown below best represents the separation and identity of these fragments? 92) _____

A)

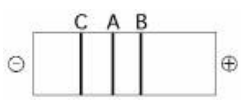


B)

C)

D)

E)



93) Which of the following procedures would produce RFLPs? 93) _____
A) incubating RNA with DNA nucleotides and reverse transcriptase
B) incubating a mixture of single-stranded DNA from two closely related species
C) incubating DNA with restriction enzymes
D) incubating DNA fragments with "sticky ends" with ligase
E) incubating DNA nucleotides with DNA polymerase

94) Which of the following is most similar to the formation of identical twins? 94) _____
A) cell cloning
B) use of adult stem cells
C) reproductive cloning
D) embryo transfer
E) therapeutic cloning

95) Which of the following is a false statement regarding deoxyribonucleic acid (DNA)? 95) _____
A) Each deoxyribonucleic acid molecule is composed of two long chains of nucleotides arranged in a double helix.
B) DNA is a code specifying the sequence of amino acids in a protein.
C) DNA is an enzyme that puts together amino acids to make a protein.
D) Genes are composed of deoxyribonucleic acid.
E) DNA is composed of chemical monomers called nucleotides.

96) Which of the following statements concerning prokaryotic and eukaryotic cells is *not* correct? 96) _____
A) Prokaryotic cells lack a membrane-bound nucleus.
B) Prokaryotic cells contain small membrane-enclosed organelles.
C) Eukaryotic cells contain a membrane-bound nucleus.
D) DNA or deoxyribonucleic acid is present in the nucleus of eukaryotic cells.
E) DNA, or deoxyribonucleic acid, is present in both prokaryotic cells and eukaryotic cells.

97) In order to understand the chemical basis of inheritance, one must understand the molecular structure of DNA. This is an example of the application of _____ to the study of biology. 97) _____
A) reductionism
B) feedback regulation
C) emergent properties
D) evolution
E) the cell theory

98) A type of protein critical to all cells is organic catalysts called 98) _____
A) feedback inhibitors.
B) metabolites.
C) nutrients.
D) enzymes.
E) feedback activators.

99) When blood glucose level rises, the pancreas secretes insulin, and as a result blood glucose level declines. When blood glucose level is low, the pancreas secretes glucagon, and as a result blood glucose level rises. Such regulation of blood glucose level is the result of 99) _____
A) catalytic feedback.
B) positive feedback.
C) protein-protein interactions.
D) negative feedback.
E) bioinformatic regulation.

100) Prokaryotic and eukaryotic cells generally have which of the following features in common? 100) _____

A) a membrane-bounded nucleus
B) ribosomes
C) flagella or cilia that contain microtubules
D) a cell wall made of cellulose
E) linear chromosomes made of DNA and protein

END