Final Exam PRACTICE TEST

Multiple Choice
Identify the choice that best completes the statement or answers the question.

____ 1. Organisms, such as plants, that make their own food are called
a. autotrophs.
b. heterotrophs.
c. thylakoids.
d. pigments.

____ 2. Organisms that cannot make their own food and must obtain energy from the foods they eat are called
a. autotrophs.
b. heterotrophs.
c. thylakoids.
d. plants.

____ 3. Which of the following is an autotroph?
a. mushroom
b. impala
c. leopard
d. tree

____ 4. Which of the following is NOT an example of a heterotroph?
a. mushroom
b. leopard
c. grass
d. human

____ 5. What are the three parts of an ATP molecule?
a. adenine, thylakoids, stroma
b. stroma, grana, chlorophyll
c. adenine, ribose, phosphate groups
d. NADH, NADPH, and $FADH_2$

____ 6. Which of the following is NOT a part of an ATP molecule?
a. adenine
b. ribose
c. chlorophyll
d. phosphate

____ 7. Energy is released from ATP when
a. a phosphate group is added.
b. adenine bonds to ribose.
c. ATP is exposed to sunlight.
d. a phosphate group is removed.

____ 8. Which of the following is NOT a true statement about ATP?
a. ATP consists of ribose, adenine, and phosphate.
b. ADP forms when ATP releases energy.
c. ATP provides energy for the mechanical functions of cells.
d. Used ATP is discarded by the cell as waste.

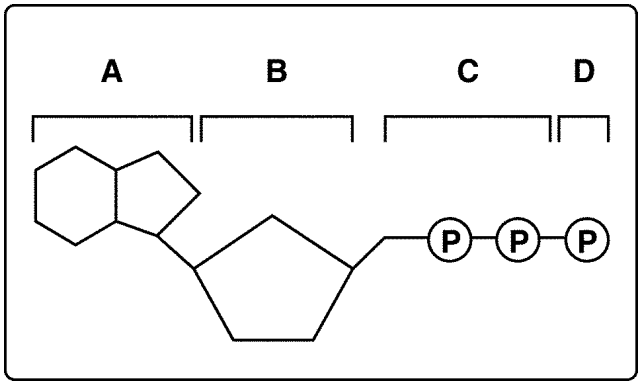

Figure 8–1

____ 9. Look at Figure 8–1. All of the following are parts of an ADP molecule EXCEPT
a. structure A.
b. structure B.
c. structure C.
d. structure D.

____ 10. Which structures shown in Figure 8–1 make up an ATP molecule?
a. A and B
b. A, B, and C
c. A, B, C, and D
d. C and D

____ 11. In Figure 8–1, between which parts of the molecule must the bonds be broken to form an ADP molecule?
a. A and B
b. B and C
c. C and D
d. all of the above

____ 12. Jan van Helmont concluded that plants gain most of their mass from
a. water.
b. the soil.
c. carbon dioxide in the air.
d. oxygen in the air.

____ 13. Which scientists showed that plants need light to grow?
a. van Helmont and Calvin
b. Priestley and Ingenhousz
c. van Helmont and Priestley
d. Priestley and Calvin

____ 14. Ingenhousz showed that plants produce oxygen bubbles when exposed to
a. ATP.
b. carbon dioxide.
c. light.
d. a burning candle.

____ 15. Suppose Priestley repeated his experiment using many kinds of plants besides mint, and that when different plants were placed under the jar the candle remained lighted for different periods of time. What would be a logical conclusion from these experiments?
a. Different plants require different amounts of water.
b. Different plants release different amounts of carbon dioxide.
c. Different plants require different amounts of light.
d. Different plants release different amounts of oxygen.

____ 16. A student is collecting the gas given off from a plant in bright sunlight at a temperature of 27°C. The gas being collected is probably
a. oxygen.
b. carbon dioxide.
c. ATP.
d. vaporized water.

____ 17. Photosynthesis uses sunlight to convert water and carbon dioxide into
a. oxygen.
b. high-energy sugars and starches.
c. ATP and oxygen.
d. oxygen and high-energy sugars and starches.

____ 18. Which of the following is(are) used in the overall reactions for photosynthesis?
a. carbon dioxide
b. water
c. light
d. all of the above

____ 19. In the overall equation for photosynthesis, six molecules of carbon dioxide result in six molecules of
a. glucose.
b. water.
c. oxygen.
d. ATP.

____ 20. Plants gather the sun’s energy with light-absorbing molecules called
a. pigments.
c. chloroplasts.

b. thylakoids.
d. glucose.

____ 21. Plants take in the sun's energy by absorbing
a. high-energy sugars.
b. chlorophyll *a*.
c. chlorophyll *b*.
d. sunlight.

____ 22. Most plants appear green because chlorophyll
a. does not absorb green light.
b. reflects violet light.
c. absorbs green light.
d. none of the above

____ 23. Which region of the visible spectrum is not absorbed well by chlorophyll?
a. blue
b. violet
c. green
d. red

____ 24. A granum is a
a. stack of chloroplasts.
b. stack of thylakoids.
c. membrane enclosing a thylakoid.
d. photosynthetic pigment molecule.

____ 25. The stroma is the region outside the
a. thylakoids.
b. chloroplasts.
c. plant cells.
d. all of the above

____ 26. Which of the following is false?
a. A chloroplast contains stroma.
b. A stroma contains a thylakoid.
c. A granum contains several thylakoids.
d. A thylakoid contains chlorophyll.

____ 27. Which step is the beginning of photosynthesis?
a. Pigments in photosystem I absorb light.
b. Pigments in photosystem II absorb light.
c. High-energy electrons move through the electron transport chain.
d. ATP synthase allows H^+ ions to pass through the thylakoid membrane.

____ 28. Which of the following is NOT a step in the light-dependent reactions?
a. High-energy electrons move through the electron transport chain.
b. Pigments in photosystem II absorb light.
c. ATP synthase allows H^+ ions to pass through the thylakoid membrane.
d. ATP and NADPH are used to produce high-energy sugars.

____ 29. Which of the following is inside the thylakoid membrane?
a. electron transport chain
b. photosystem I
c. ATP synthase
d. all of the above

____ 30. Why does the inside of the thylakoid membrane become positively charged during the light-dependent reactions?
a. H^+ ions are released as water splits.
b. ATP synthase allows H^+ ions to pass through the membrane.
c. ATP synthase produces ATP from ADP.
d. Carbon dioxide builds up in the stroma.

____ 31. Which pathway represents the flow of electrons during photosynthesis?
a. $H_2O \rightarrow$ Photosystem I $\rightarrow$ Photosystem II
b. $O_2 \rightarrow$ ADP $\rightarrow$ Calvin cycle
c. Photosystem I $\rightarrow$ Calvin cycle $\rightarrow$ NADPH

d. $H_2O \rightarrow NADPH \rightarrow$ Calvin cycle

____ 32. The Calvin cycle takes place in the
a. stroma.
b. photosystems.
c. thylakoid membranes.
d. chlorophyll molecules.

____ 33. What is a product of the Calvin cycle?
a. oxygen gas
b. ATP
c. high-energy sugars
d. carbon dioxide gas

____ 34. How does the Calvin cycle differ from the light-dependent reactions?
a. It takes place in the stroma.
b. It takes place in chloroplasts.
c. It requires light.
d. It takes place in the thylakoid.

____ 35. If carbon dioxide is completely removed from a plant's environment, what would you expect to happen to the plant's production of high-energy sugars?
a. More sugars will be produced.
b. No sugars will be produced.
c. The same number of sugars will be produced but without carbon dioxide.
d. Carbon dioxide does not affect the production of high-energy sugars in plants.

____ 36. Which of the following affects the rate of photosynthesis?
a. water
b. temperature
c. light intensity
d. all of the above

____ 37. If you continue to increase the intensity of light that a plant receives, what happens?
a. The rate of photosynthesis increases with light intensity.
b. The rate of photosynthesis decreases with light intensity.
c. The rate of photosynthesis increases and then levels off.
d. The rate of photosynthesis does not change.

____ 38. What would you expect to happen to plants at temperatures greater than 45°C?
a. They will have a very high rate of photosynthesis.
b. They will have a less than optimal rate of photosynthesis.
c. They will have a high rate of photosynthesis if light intensity is also great.
d. They will have an optimal rate of photosynthesis if water is available.

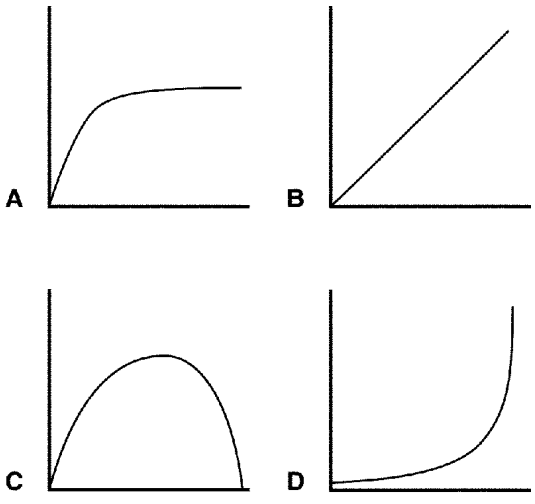

Figure 8–2

____ 39. Which of the graphs in Figure 8–2 represents the effect of temperature on the rate of photosynthesis?
a. A
b. B
c. C
d. D

____ 40. Which of the graphs in Figure 8–2 represents the effect of light intensity on the rate of photosynthesis?
a. A
b. B
c. C
d. D

____ 41. As a cell becomes larger, its
a. volume increases faster than its surface area.
b. surface area increases faster than its volume.
c. volume increases, but its surface area stays the same.
d. surface area stays the same, but its volume increases.

____ 42. The rate at which wastes are produced by a cell depends on the cell's
a. ratio of surface area to volume.
b. environment.
c. volume.
d. surface area.

____ 43. All of the following are problems that growth causes for cells EXCEPT
a. DNA overload.
b. excess oxygen.
c. obtaining enough food.
d. expelling wastes.

____ 44. Compared to small cells, large cells have more trouble
a. dividing.
b. producing daughter cells.
c. moving needed materials in and waste products out.
d. making copies of their DNA.

____ 45. The process by which a cell divides into two daughter cells is called
a. cell division.
b. metaphase.
c. interphase.
d. mitosis.

____ 46. Which of the following is NOT a way that cell division solves the problems of cell growth?
a. Cell division provides each daughter cell with its own copy of DNA.
b. Cell division increases the mass of the original cell.
c. Cell division increases the surface area of the original cell.
d. Cell division reduces the original cell's volume.

____ 47. If a normal cell divides, you can assume that
a. its surface area has become larger than its volume.
b. its volume has become larger than its surface area.
c. it has grown to its full size.
d. it has grown too large to meet its needs.

____ 48. If a cell's DNA were not copied before cell division, the cell could
a. have a DNA overload.
b. become cancerous.
c. fail to exchange materials.
d. divide.

____ 49. Which of the following happens when a cell divides?
a. The cell's volume increases.
b. It becomes more difficult for the cell to get enough oxygen and nutrients.

c. The cell has DNA overload.
d. Each daughter cell receives its own copy of the parent cell's DNA.

____ 50. When during the cell cycle are chromosomes visible?
a. only during interphase
b. only when they are being replicated
c. only during cell division
d. only during the G_1 phase

____ 51. Which of the following is a phase in the cell cycle?
a. G_1 phase
b. G_2 phase
c. M phase
d. all of the above

____ 52. Which pair is correct?
a. G_1 phase, DNA replication
b. G_2 phase, preparation for mitosis
c. S phase, cell division
d. M phase, cell growth

____ 53. When during the cell cycle is a cell's DNA replicated?
a. G_1 phase
b. G_2 phase
c. S phase
d. M phase

____ 54. Which event occurs during interphase?
a. The cell grows.
b. Centrioles appear.
c. Spindle fibers begin to form.
d. Centromeres divide.

____ 55. Which of the following is a correct statement about the events of the cell cycle?
a. Little happens during the G_1 and G_2 phases.
b. DNA replicates during cytokinesis.
c. The M phase is usually the longest phase.
d. Interphase consists of the G_1, S, and G_2 phases.

____ 56. Which of the following is NOT a correct statement about the events of the cell cycle?
a. Interphase is usually the longest phase.
b. DNA replicates during the S phase.
c. Cell division ends with cytokinesis.
d. The cell grows during the G_2 phase.

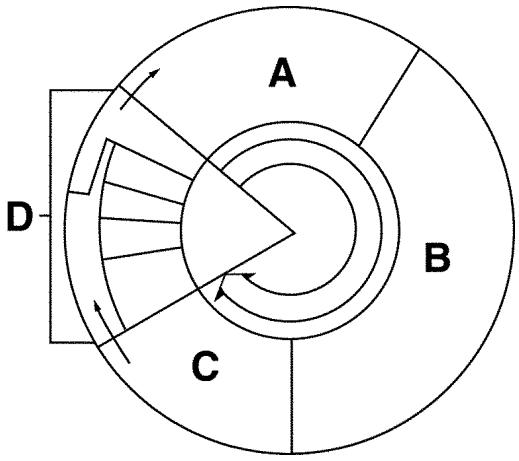

Figure 10–1

____ 57. Cell division is represented in Figure 10–1 by the letter

a. A.
b. B.
c. C.
d. D.

____ 58. The cell cycle is the
a. series of events that cells go through as they grow and divide.
b. period of time between the birth and the death of a cell.
c. time from prophase until cytokinesis.
d. time it takes for one cell to undergo mitosis.

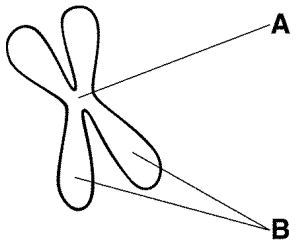

Figure 10–2

____ 59. The structure labeled A in Figure 10–2 is called the
a. centromere.
b. centriole.
c. sister chromatid.
d. spindle.

____ 60. The structures labeled B in Figure 10–2 are called
a. centromeres.
b. centrioles.
c. sister chromatids.
d. spindles.

____ 61. During which phase(s) of mitosis are structures like the one shown in Figure 10–2 visible?
a. anaphase and prophase
b. prophase and metaphase
c. metaphase only
d. anaphase and interphase

____ 62. Which of the following is a phase of mitosis?
a. cytokinesis
b. interphase
c. prophase
d. S phase

____ 63. The first phase of mitosis is called
a. prophase.
b. anaphase.
c. metaphase.
d. interphase.

____ 64. During which phase of mitosis do the chromosomes line up along the middle of the dividing cell?
a. prophase
b. telophase
c. metaphase
d. anaphase

____ 65. Which of the following represents the phases of mitosis in their proper sequence?
a. prophase, metaphase, anaphase, telophase
b. interphase, prophase, metaphase, anaphase, telophase
c. interphase, prophase, metaphase, telophase
d. prophase, metaphase, anaphase, telophase, cytokinesis

____ 66. What is the role of the spindle during mitosis?
a. It helps separate the chromosomes.
b. It breaks down the nuclear membrane.
c. It duplicates the DNA.

d. It divides the cell in half.

____ 67. The two main stages of cell division are called
a. mitosis and interphase.
b. synthesis and cytokinesis.
c. the M phase and the S phase.
d. cytokinesis and mitosis.

____ 68. One difference between cell division in plant cells and in animal cells is that plant cells have
a. centrioles.
b. centromeres.
c. a cell plate.
d. chromatin.

____ 69. During normal mitotic cell division, a parent cell having four chromosomes will produce two daughter cells, each containing
a. two chromosomes.
b. four chromosomes.
c. eight chromosomes.
d. sixteen chromosomes.

____ 70. Which of the following is a factor that can stop normal cells from growing?
a. contact with other cells
b. growth factors
c. a cut in the skin
d. cyclin that has been taken from a cell in mitosis

____ 71. Cells grown in a petri dish tend to divide until they form a thin layer covering the bottom of the dish. If cells are removed from the middle of the dish, the cells bordering the open space will begin dividing until they have filled the empty space. What does this experiment show?
a. When cells come into contact with other cells, they stop growing.
b. The controls on cell growth and division can be turned on and off.
c. Cell division can be regulated by factors outside the cell.
d. all of the above

____ 72. Which of the following explains why normal cells grown in a petri dish tend to stop growing once they have covered the bottom of the dish?
a. The cells lack cyclin.
b. The petri dish inhibits cell growth.
c. Contact with other cells stops cell growth.
d. Most cells grown in petri dishes have a defective p53.

____ 73. When cytoplasm from a cell that is undergoing mitosis is injected into a cell that is in interphase, the second cell
a. stays in interphase.
b. enters mitosis.
c. stops making cyclin.
d. loses its p53.

____ 74. In eukaryotic cells, the timing of the cell cycle is regulated by
a. the centrioles.
b. cyclins.
c. the spindle.
d. all of the above

____ 75. Cyclins are a family of closely related proteins that
a. regulate the cell cycle.
b. produce p53.
c. cause cancer.
d. work to heal wounds.

____ 76. Which of the following regulate(s) the cell cycle?
a. growth factors
b. cyclins
c. p53
d. all of the above

____ 77. Which of the following is an internal regulator of the cell cycle?

a. cyclins
b. growth factors
c. the mitotic spindle
d. cancer cells

____ 78. Cancer is a disorder in which some cells have lost the ability to control their
a. size.
b. spindle fibers.
c. growth rate.
d. surface area.

____ 79. A cell with a defective p53 gene is likely to
a. divide regularly.
b. stop dividing.
c. accumulate chromosomal damage.
d. combat tumors.

____ 80. Cancer affects
a. humans only.
b. most unicellular organisms.
c. multicellular organisms.
d. unicellular organisms.

____ 81. What is a tumor?
a. an accumulation of cyclins
b. a mass of cancer cells
c. the rapidly dividing cells found at the site of a wound
d. a defective p53 gene

____ 82. Gregor Mendel used pea plants to study
a. flowering.
b. gamete formation.
c. the inheritance of traits.
d. cross-pollination.

____ 83. Offspring that result from crosses between parents with different traits
a. are true-breeding.
b. make up the F_2 generation.
c. make up the parental generation.
d. are called hybrids.

____ 84. Gregor Mendel removed the male parts from the flowers of some plants in order to
a. prevent hybrids from forming.
b. prevent cross-pollination.
c. stimulate self-pollination.
d. make controlled crosses between plants.

____ 85. The chemical factors that determine traits are called
a. alleles.
b. traits.
c. genes.
d. characters.

____ 86. Gregor Mendel concluded that traits are
a. not inherited by offspring.
b. inherited through the passing of factors from parents to offspring.
c. determined by dominant factors only.
d. determined by recessive factors only.

____ 87. When Gregor Mendel crossed a tall plant with a short plant, the F_1 plants inherited
a. an allele for tallness from each parent.
b. an allele for tallness from the tall parent and an allele for shortness from the short parent.
c. an allele for shortness from each parent.
d. an allele from only the tall parent.

____ 88. The principle of dominance states that
a. all alleles are dominant.
b. all alleles are recessive.

c. some alleles are dominant and others are recessive.
d. alleles are neither dominant nor recessive.

____ 89. When Gregor Mendel crossed true-breeding tall plants with true-breeding short plants, all the offspring were tall because
a. the allele for tall plants is recessive.
b. the allele for short plants is dominant.
c. the allele for tall plants is dominant.
d. they were true-breeding like their parents.

____ 90. If a pea plant has a recessive allele for green peas, it will produce
a. green peas if it also has a dominant allele for yellow peas.
b. both green peas and yellow peas if it also has a dominant allele for yellow peas.
c. green peas if it does not also have a dominant allele for yellow peas.
d. yellow peas if it does not also have a dominant allele for green peas.

____ 91. A tall plant is crossed with a short plant. If the tall F_1 pea plants are allowed to self-pollinate,
a. the offspring will be of medium height.
b. all of the offspring will be tall.
c. all of the offspring will be short.
d. some of the offspring will be tall, and some will be short.

____ 92. In the P generation, a tall plant was crossed with a short plant. Short plants reappeared in the F_2 generation because
a. some of the F_2 plants produced gametes that carried the allele for shortness.
b. the allele for shortness is dominant.
c. the allele for shortness and the allele for tallness segregated when the F_1 plants produced gametes.
d. they inherited an allele for shortness from one parent and an allele for tallness from the other parent.

____ 93. In the P generation, a tall plant was crossed with a short plant. If alleles did not segregate during gamete formation,
a. all of the F_1 plants would be short.
b. some of the F_1 plants would be tall and some would be short.
c. all of the F_2 would be short.
d. all of the F_2 plants would be tall.

____ 94. When you flip a coin, what is the probability that it will come up tails?
a. 1/2
b. 1/4
c. 1/8
d. 1

____ 95. In the P generation, a tall plant is crossed with a short plant. The probability that an F_2 plant will be tall is
a. 25%.
b. 50%.
c. 75%
d. 100%.

____ 96. Organisms that have two identical alleles for a particular trait are said to be
a. hybrid.
b. homozygous.
c. heterozygous.
d. dominant.

Tt

		T	***t***
TT	***T***	***TT***	***Tt***
	T	***TT***	***Tt***

T	=	***Tall***
t	=	***Short***

Figure 11–1

____ 97. In the Punnett square shown in Figure 11–1, which of the following is true about the offspring resulting from the cross?

a. About half are expected to be short.
b. All are expected to be short.
c. About half are expected to be tall.
d. All are expected to be tall.

____ 98. A Punnett square shows all of the following EXCEPT

a. all possible results of a genetic cross.
b. the genotypes of the offspring.
c. the alleles in the gametes of each parent.
d. the actual results of a genetic cross.

____ 99. If you made a Punnett square showing Gregor Mendel's cross between true-breeding tall plants and true-breeding short plants, the square would show that the offspring had

a. the genotype of one of the parents.
b. a phenotype that was different from that of both parents.
c. a genotype that was different from that of both parents.
d. the genotype of both parents.

____ 100. What principle states that during gamete formation genes for different traits separate without influencing each other's inheritance?

a. principle of dominance
b. principle of independent assortment
c. principle of probabilities
d. principle of segregation

RrYy

	RY	***Ry***	***rY***	***ry***
RY	***RRYY***	***RRYy***	***RrYY***	***RrYy***

Seed Shape
***R* = Round**
***r* = Wrinkled**

RrYy

Ry	***RRYy***	***RRyy***	***RrYy***	***Rryy***
rY	***RrYY***	***RrYy***	***rrYY***	***rrYy***
ry	***RrYy***	***Rryy***	***rrYy***	***rryy***

Seed Color
***Y* = Yellow**
***y* = Green**

Figure 11–2

____ 101. The Punnett square in Figure 11–2 shows that the gene for pea shape and the gene for pea color
a. assort independently.
b. are linked.
c. have the same alleles.
d. are always homozygous.

____ 102. How many different allele combinations would be found in the gametes produced by a pea plant whose genotype was *RrYY*?
a. 2
b. 4
c. 8
d. 16

____ 103. If a pea plant that is heterozygous for round, yellow peas (*RrYy*) is crossed with a pea plant that is homozygous for round peas but heterozygous for yellow peas (*RRYy*), how many different phenotypes are their offspring expected to show?
a. 2
b. 4
c. 8
d. 16

____ 104. Situations in which one allele for a gene is not completely dominant over another allele for that gene are called
a. multiple alleles.
b. incomplete dominance.
c. polygenic inheritance.
d. multiple genes.

____ 105. A cross of a black chicken (*BB*) with a white chicken (*WW*) produces all speckled offspring (*BBWW*). This type of inheritance is known as
a. incomplete dominance.
b. polygenic inheritance.
c. codominance.
d. multiple alleles.

____ 106. Variation in human skin color is an example of
a. incomplete dominance.
b. codominance.
c. polygenic traits.
d. multiple alleles.

____ 107. Why did Thomas Hunt Morgan use fruit flies in his studies?
a. Fruit flies produce a large number of offspring.
b. Fruit flies take a long time to produce offspring.
c. Fruit flies share certain characteristics with pea plants.
d. Fruit flies have a long lifespan.

____ 108. The number of chromosomes in a gamete is represented by the symbol
a. Z.
b. X.
c. N.
d. Y.

____ 109. Gametes have
a. homologous chromosomes.

b. twice the number of chromosomes found in body cells.
c. two sets of chromosomes.
d. one allele for each gene.

____ 110. Gametes are produced by the process of
a. mitosis.
b. meiosis.
c. crossing-over.
d. replication.

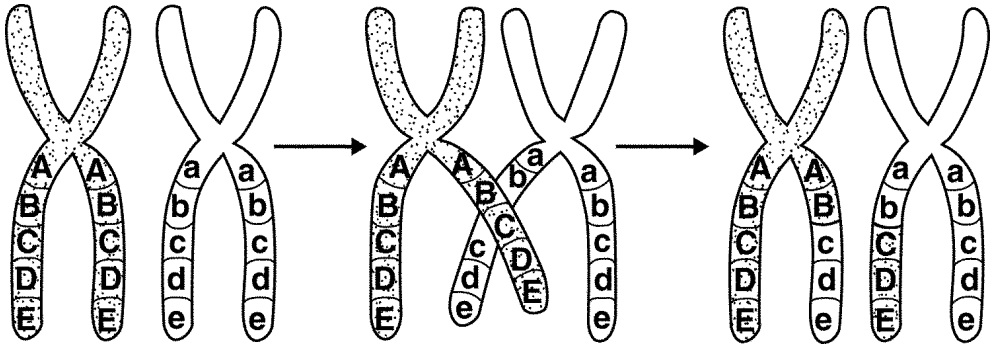

Figure 11–3

____ 111. What is shown in Figure 11–3?
a. independent assortment
b. anaphase I of meiosis
c. crossing-over
d. replication

____ 112. Chromosomes form tetrads during
a. prophase I of meiosis.
b. metaphase I of meiosis.
c. interphase.
d. anaphase II of meiosis.

____ 113. What happens between meiosis I and meiosis II that reduces the number of chromosomes?
a. Crossing-over occurs.
b. Metaphase occurs.
c. Replication occurs twice.
d. Replication does not occur.

____ 114. Unlike mitosis, meiosis results in the formation of
a. two genetically identical cells.
b. four genetically different cells.
c. four genetically identical cells.
d. two genetically different cells.

____ 115. Crossing-over rarely occurs in mitosis, unlike meiosis. Which of the following is the likely reason?
a. Chromatids are not involved in mitosis.
b. Tetrads rarely form during mitosis.
c. A cell undergoing mitosis does not have homologous chromosomes.
d. There is no prophase during mitosis.

____ 116. Which of the following assort independently?
a. chromosomes
b. genes on the same chromosome
c. multiple alleles
d. codominant alleles

____ 117. Linked genes
a. are never separated.
b. assort independently.
c. are on the same chromosome.
d. are always recessive.

____ 118. If the gene for seed color and the gene for seed shape in pea plants were linked,
a. all of Mendel's F_1 plants would have produced wrinkled, green peas.

b. Mendel's F_2 plants would have exhibited a different phenotype ratio for seed color and seed shape.
c. Mendel's F_1 plants would have exhibited a different phenotype ratio for seed color and seed shape.
d. all of Mendel's P plants would have produced wrinkled, green peas.

____ 119. Gene maps are based on
a. the frequencies of crossing-over between genes.
b. independent assortment.
c. genetic diversity.
d. the number of genes in a cell.

____ 120. If two genes are on the same chromosome and rarely assort independently,
a. crossing-over never occurs between the genes.
b. crossing-over always occurs between the genes.
c. the genes are probably located far apart from each other.
d. the genes are probably located close to each other.

____ 121. The farther apart two genes are located on a chromosome, the
a. less likely they are to be inherited together.
b. more likely they are to be linked.
c. less likely they are to assort independently.
d. less likely they are to be separated by a crossover during meiosis.

____ 122. Avery's experiments showed that bacteria are transformed by
a. RNA.
b. DNA.
c. proteins.
d. carbohydrates.

____ 123. What did Griffith observe when he injected a mixture of heat-killed, disease-causing bacteria and live harmless bacteria into mice?
a. The disease-causing bacteria changed into harmless bacteria.
b. The mice developed pneumonia.
c. The harmless bacteria died.
d. The mice were unaffected.

____ 124. What would Hershey and Chase have concluded if both radioactive ^{32}P and ^{35}S were found in the bacteria in their experiment?
a. The virus's protein coat was not injected into the bacteria.
b. The virus's DNA was not injected into the bacteria.
c. Genes are made of protein.
d. Both the virus's protein coat and its DNA were injected into the bacteria.

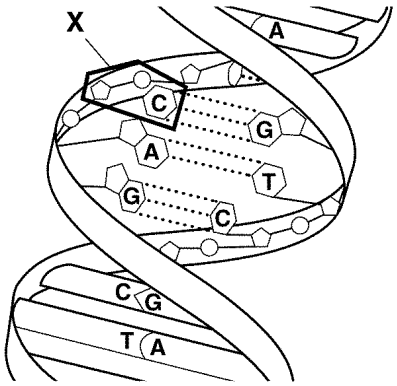

Figure 12–1

____ 125. Figure 12–1 shows the structure of a(an)
a. DNA molecule.
b. amino acid.
c. RNA molecule.
d. protein.

____ 126. Which of the following is a nucleotide found in DNA?
a. ribose + phosphate group + thymine
b. ribose + phosphate group + uracil
c. deoxyribose + phosphate group + uracil
d. deoxyribose + phosphate group + cytosine

____ 127. Because of base pairing in DNA, the percentage of
a. adenine molecules in DNA is about equal to the percentage of guanine molecules.
b. pyrimidines in DNA is about equal to the percentage of purines.
c. purines in DNA is much greater than the percentage of pyrimidines.
d. cytosine molecules in DNA is much greater than the percentage of guanine molecules.

____ 128. During mitosis, the
a. DNA molecules unwind.
b. histones and DNA molecules separate.
c. DNA molecules become more tightly coiled.
d. nucleosomes become more tightly packed.

____ 129. Which of the following include all the others?
a. DNA molecules
b. histones
c. chromosomes
d. nucleosomes

____ 130. DNA is copied during a process called
a. replication.
b. translation.
c. transcription.
d. transformation.

____ 131. DNA replication results in two DNA molecules,
a. each with two new strands.
b. one with two new strands and the other with two original strands.
c. each with one new strand and one original strand.
d. each with two original strands.

____ 132. During DNA replication, a DNA strand that has the bases CTAGGT produces a strand with the bases

a. TCGAAC.
b. GATCCA.
c. AGCTTG.
d. GAUCCA.

____ 133. RNA contains the sugar
a. ribose.
b. deoxyribose.
c. glucose.
d. lactose.

____ 134. Unlike DNA, RNA contains
a. adenine.
b. uracil.
c. phosphate groups.
d. thymine.

____ 135. Which of the following are found in both DNA and RNA?
a. ribose, phosphate groups, and adenine
b. deoxyribose, phosphate groups, and guanine
c. phosphate groups, guanine, and cytosine
d. phosphate groups, guanine, and thymine

____ 136. How many main types of RNA are there?
a. 1
b. 3
c. hundreds
d. thousands

____ 137. Which type(s) of RNA is(are) involved in protein synthesis?
a. transfer RNA only
b. messenger RNA only
c. ribosomal RNA and transfer RNA only
d. messenger RNA, ribosomal RNA, and transfer RNA

____ 138. Which of the following are copied from DNA?
a. mRNA only
b. mRNA, tRNA, and rRNA
c. mRNA and tRNA only
d. proteins

____ 139. What is produced during transcription?
a. RNA molecules
b. DNA molecules
c. RNA polymerase
d. proteins

____ 140. During transcription, an RNA molecule is formed
a. that is complementary to both strands of DNA.
b. that is identical to part of a single strand of DNA.
c. that is double-stranded.
d. inside the nucleus.

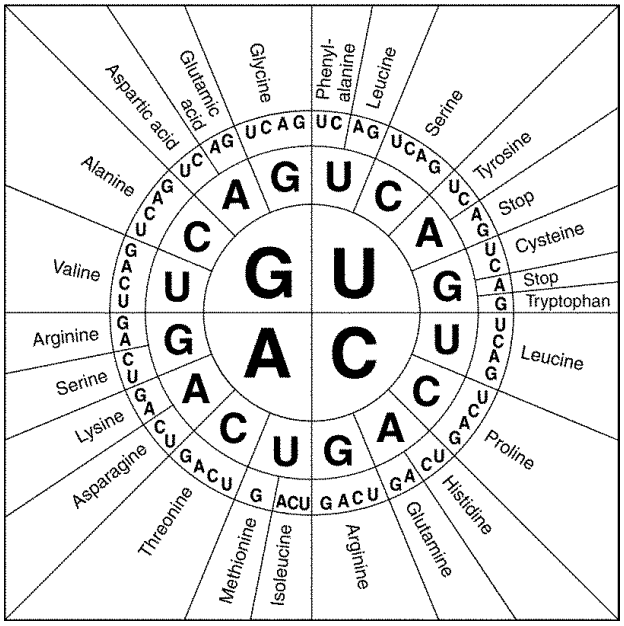

Figure 12–2

____ 141. What does Figure 12–2 show?
a. anticodons
b. the order in which amino acids are linked
c. the code for splicing mRNA
d. the genetic code

____ 142. How many codons are needed to specify three amino acids?
a. 3
b. 6
c. 9
d. 12

____ 143. Why is it possible for an amino acid to be specified by more than one kind of codon?
a. Some codons have the same sequence of nucleotides.
b. There are 64 different kinds of codons but only 20 amino acids.
c. Some codons do not specify an amino acid.
d. The codon AUG codes for the amino acid methionine and serves as the "start" codon for protein synthesis.

____ 144. Which of the following terms is LEAST closely related to the others?
a. intron
b. tRNA
c. polypeptide
d. anticodon

____ 145. During translation, the type of amino acid that is added to the growing polypeptide depends on the
a. codon on the mRNA only.
b. anticodon on the mRNA only.
c. anticodon on the tRNA to which the amino acid is attached only.
d. codon on the mRNA and the anticodon on the tRNA to which the amino acid is attached.

____ 146. Genes contain instructions for assembling
a. purines.
b. nucleosomes.
c. proteins.
d. pyrimidines.

____ 147. Which type of RNA functions as a blueprint of the genetic code?
a. rRNA
b. tRNA
c. mRNA
d. RNA polymerase

____ 148. Which of the following statements is false?
a. Some genes code for enzymes.
b. The instructions for making some proteins are not specified by genes.
c. An organism's inherited traits depend on proteins.
d. An organism's genes determine its inherited traits.

____ 149. A mutation that involves one or a few nucleotides is called a(an)
a. chromosomal mutation.
b. inversion.
c. point mutation.
d. translocation.

____ 150. Which of the following is NOT a gene mutation?
a. inversion
b. insertion
c. deletion
d. substitution

____ 151. Which of the following is NEVER a frameshift mutation?
a. substitution
b. insertion
c. deletion
d. point mutation

____ 152. A promoter is a
a. binding site for DNA polymerase.
b. binding site for RNA polymerase.
c. start signal for transcription.
d. stop signal for transcription.

____ 153. Which of the following statements is true?
a. A promoter determines whether a gene is expressed.
b. An expressed gene is turned off.
c. Proteins that bind to regulatory sites on DNA determine whether a gene is expressed.
d. RNA polymerase regulates gene expression.

____ 154. If a specific kind of protein is not continually used by a cell, the gene for that protein is
a. always transcribed.
b. never expressed.
c. turned on and off at different times.
d. not regulated.

____ 155. In *E. coli*, the *lac* operon controls the
a. breakdown of lactose.
b. production of lactose.
c. breakdown of glucose.
d. production of glucose.

____ 156. A *lac* repressor turns off the *lac* genes by
a. binding to the promoter.
b. DNA polymerase.
c. binding to the operator.
d. binding to the *lac* genes.

____ 157. When *E. coli* is grown on glucose,
a. lactose molecules bind to the *lac* repressor.
b. the *lac* repressor binds to the operator of the *lac* operon.
c. RNA polymerase binds to the promoter of the *lac* operon.
d. the *lac* genes are transcribed.

____ 158. Which of the following is NOT generally part of a eukaryotic gene?
a. operon
b. TATA box
c. promoter sequences
d. enhancer sequences

____ 159. Gene regulation in eukaryotes
a. usually involves operons.
b. is simpler than in prokaryotes.
c. allows for cell specialization.
d. includes the action of an operator region.

____ 160. Specialized cells regulate the expression of genes because they
a. do not want the genes to become worn out.
b. cannot control translation.
c. do not carry the complete genetic code in their nuclei.
d. do not need the proteins that are specified by certain genes.

____ 161. Hox genes determine an animal's
a. basic body plan.
b. size.
c. skin color.
d. eye color.

____ 162. Which of the following statements is false?
a. Mutations do not occur in hox genes.
b. Hox genes that are found in different animals are very different from each other.
c. Hox genes control the normal development of an animal.
d. Hox genes occur in clusters.

____ 163. During his voyage on the *Beagle*, Charles Darwin made many observations
a. in England.
b. in North America.
c. on the Galápagos Islands.
d. in Asia.

____ 164. On the Galápagos Islands, Charles Darwin observed
a. completely unrelated species on each of the islands.
b. species exactly like those found in South America.
c. somewhat similar species, with traits that suited their particular environments.
d. species completely unrelated to those found in South America.

____ 165. The species of finches that Charles Darwin found on the Galápagos Islands displayed different structural adaptations. One of the adaptations that Darwin noted was the
a. similarities of the birds' embryos.
b. birds' different-shaped beaks.
c. length of the birds' necks.
d. number of eggs in each bird's nest.

____ 166. Based on the adaptations Charles Darwin observed in finches and tortoises in the Galápagos, he wondered
a. if species living on different islands had once been members of the same species.
b. if finches and tortoises had originated from the same ancestral species.
c. if all birds on the different islands were finches.
d. why all tortoises on the different islands were identical.

____ 167. Darwin began to formulate his concept of evolution by natural selection after
a. experimentation with animals.
b. observations of many species and their geographical location.
c. reading the writings of Wallace.
d. agreeing with Lamarck about the driving force behind evolution.

____ 168. James Hutton's and Charles Lyell's work suggests that
a. Earth is many millions of years old.
b. Earth is several thousand years old.
c. all fossils were formed in the last 1000 years.

d. all rocks on Earth contain fossils.

____ 169. In the 1800s, Charles Lyell emphasized that
a. the human population will outgrow the available food supply.
b. all populations evolve through natural selection.
c. Earth is a few thousand years old.
d. past geological events must be explained in terms of processes observable today.

____ 170. One scientist who attempted to explain how rock layers form and change over time was
a. Thomas Malthus.
b. James Hutton.
c. Charles Darwin.
d. Jean-Baptiste Lamarck.

____ 171. James Hutton's and Charles Lyell's work was important to Darwin because these scientists
a. explained volcanoes and earthquakes.
b. explained all geologic events on Earth.
c. suggested that Earth was old enough for evolution to have occurred.
d. refuted the work of Lamarck, which was based on misunderstandings.

____ 172. What did Charles Darwin learn from reading the work of James Hutton and Charles Lyell?
a. Earth is relatively young.
b. Earth is very old.
c. All geological change is caused by living organisms.
d. The processes that formed old rocks on Earth do not operate today.

____ 173. Jean-Baptiste Lamarck proposed that organisms
a. have an innate tendency toward complexity and perfection.
b. have an innate tendency to become simpler as time passes.
c. inherit all of the adaptations they display.
d. belong to species that never change.

____ 174. Which is a major concept included in Lamarck's theory of evolution?
a. Change is the result of survival of the fittest.
b. Body structure can change according to the actions of the organism.
c. Population size decreases the rate of evolution.
d. Artificial selection is the basis for evolution.

____ 175. Lamarck's theory of evolution includes the concept that new organs in a species appear as a result of
a. continual increases in population size.
b. the actions of organisms as they use or fail to use body structures.
c. an unchanging local environment.
d. the natural variations already present within the population of organisms.

____ 176. In each generation, the wings of experimental fruit flies were clipped short for fifty generations. The fifty-first generation emerged with normal-length wings. This observation would tend to disprove the idea that evolution is based on
a. inheritance of natural variations.
b. inheritance of acquired characteristics.
c. natural selection.
d. survival of the fittest.

____ 177. The economist Thomas Malthus suggested that
a. in the human population, people die faster than babies are born.
b. there would soon be insufficient food for the growing human population.

c. in the 1700s, England needed more housing.
d. the majority of a species' offspring die.

____ 178. The idea that only famine, disease, and war could prevent the endless growth of human populations was presented by
a. Charles Darwin.
b. Jean-Baptiste Lamarck.
c. Thomas Malthus.
d. Charles Lyell.

____ 179. Darwin realized that the economist Malthus's theory of population control
a. applied only to humans.
b. could be generalized to any population of organisms.
c. could be generalized only when populations lived in crowded conditions.
d. explained why the number of deaths exceeded that of births.

____ 180. In 1859, Charles Darwin published his revolutionary scientific ideas in a work titled
a. *Principles of Geology.*
b. *Essay on the Principle of Population.*
c. *Evolution in Malaysia.*
d. *On the Origin of Species.*

____ 181. Darwin was prompted to publish his theory of evolution by
a. an essay by Wallace on evolution.
b. the publication of Lamarck's theory of evolution.
c. the vice governor of the Galápagos Islands.
d. the work of Hutton and Lyell.

____ 182. When Charles Darwin returned from the voyage of the *Beagle*, he
a. immediately published his ideas about evolution.
b. realized his ideas about evolution were wrong.
c. wrote about his ideas but waited many years to publish them.
d. copied the evolutionary theory of Wallace.

____ 183. Why might Darwin have hesitated to publish his concept of evolution by natural selection?
a. He realized it was not supported by his data.
b. He felt it was too similar to Lamarck's to be considered original.
c. He was disturbed by his findings, which challenged fundamental scientific beliefs.
d. He realized that his idea was contradicted by the work of Hutton and Lyell.

____ 184. Charles Darwin's observation that finches of different species on the Galápagos Islands have many similar physical characteristics supports the hypothesis that these finches
a. have the ability to interbreed.
b. acquired traits through use and disuse.
c. all eat the same type of food.
d. descended from a common ancestor.

____ 185. According to Darwin's theory of natural selection, individuals who survive are the ones best adapted for their environment. Their survival is due to the
a. possession of adaptations developed through use.
b. possession of inherited adaptations that maximize fitness.
c. lack of competition within the species.
d. choices made by plant and animal breeders.

____ 186. When farmers select animals or plants to use for breeding, they look for

a. species that are perfect and unchanging.
b. homologous structures.
c. traits that are produced artificially.
d. natural variations that are present in a species.

____ 187. When a farmer breeds only his or her best livestock, the process involved is
a. natural selection.
b. artificial selection.
c. artificial variation.
d. survival of the fittest.

____ 188. When lions prey on a herd of antelopes, some antelopes are killed and some escape. Which part of Darwin's concept of natural selection might be used to describe this situation?
a. acquired characteristics
b. reproductive isolation
c. survival of the fittest
d. descent with modification

____ 189. Which statement about the members of a population that live long enough to reproduce is consistent with the theory of natural selection?
a. They transmit characteristics acquired by use and disuse to their offspring.
b. They tend to produce fewer offspring than others in the population.
c. They are the ones that are best adapted to survive in their environment.
d. They will perpetuate unfavorable changes in the species.

____ 190. Charles Darwin called the ability of an organism to survive and reproduce in its specific environment
a. diversity.
b. fitness.
c. adaptation.
d. evolution.

____ 191. According to Darwin's theory of natural selection, the individuals that tend to survive are those that have
a. characteristics their parents acquired by use and disuse.
b. characteristics that plant and animal breeders value.
c. the greatest number of offspring.
d. variations best suited to the environment.

____ 192. Which of the following phrases best describes the results of natural selection?
a. the natural variation found in all populations
b. unrelated but similar species living in different locations
c. changes in the inherited characteristics of a population
d. the struggle for existence undergone by all living things

____ 193. An adaptation is an inherited characteristic that can be
a. physical or behavioral.
b. physical or geographical.
c. acquired during the organism's lifetime.
d. the result of artificial selection.

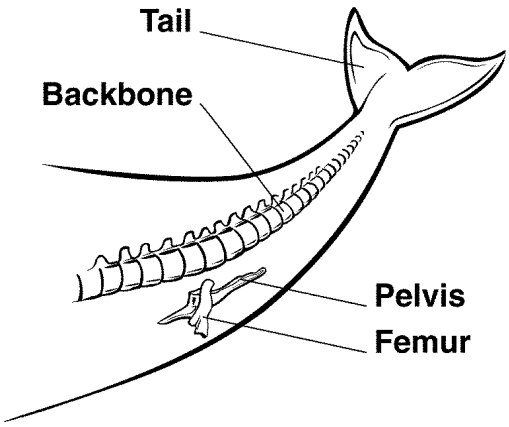

Figure 15–1

____ 194. In humans, the pelvis and femur, or thigh bone, are involved in walking. In whales, the pelvis and femur shown in Figure 15–1 are
a. examples of fossils.
b. vestigial structures.
c. acquired traits.
d. examples of natural variation.

____ 195. Modern sea star larvae resemble some primitive vertebrate larvae. This similarity may suggest that primitive vertebrates
a. share a common ancestor with sea stars.
b. evolved from sea stars.
c. evolved before sea stars.
d. belong to the same species as sea stars.

____ 196. Darwin's concept of evolution was NOT influenced by
a. the work of Charles Lyell.
b. knowledge about the structure of DNA.
c. his collection of specimens.
d. his trip on the H.M.S. *Beagle*.

____ 197. People of Charles Darwin's time understood that fossils
a. were preserved remains of ancient organisms.
b. were available for every organism that ever lived.
c. were unrelated to living species.
d. were evidence for the evolution of life on Earth.

____ 198. The number and location of bones of many fossil vertebrates are similar to those in living vertebrates. Most biologists would probably explain this fact on the basis of
a. the needs of the organisms.
b. a common ancestor.
c. the struggle for existence.
d. the inheritance of acquired traits.

____ 199. Charles Darwin viewed the fossil record as
a. evidence that Earth was thousands of years old.
b. a detailed record of evolution.
c. interesting but unrelated to the evolution of modern species.
d. evidence that traits are acquired through use or disuse.

____ 200. The hypothesis that species change over time by natural selection was proposed by
a. James Hutton.
c. Thomas Malthus.

b. Jean-Baptiste Lamarck.
d. Charles Darwin.

____ 201. Charles Darwin's theory of evolution explains all of the following EXCEPT
a. how species become extinct.
b. how inherited traits are passed from parent to offspring.
c. how species change over time.
d. how evolution takes place in the natural world.

____ 202. Darwin's theory of evolution suggests that
a. species change over time.
b. extinct species are not related to living species.
c. different species can interbreed.
d. animals that look alike are the most closely related.

____ 203. Darwin's theory of evolution is based on the idea(s) of
a. heritable variation and natural selection.
b. use and disuse.
c. a tendency toward perfect, unchanging species.
d. the transmission of acquired characteristics.

____ 204. The same kinds of cells that grow in similar patterns in different but related organisms produce
a. homologous structures such as wings and arms.
b. the same kind of embryos.
c. natural variations in a population.
d. descent with modification.

____ 205. Which phrase best defines evolution by natural selection?
a. an adaptation of a species to its environment
b. a sudden replacement of one population by another
c. changes in a species as it becomes more perfect
d. a process of change in species over time

____ 206. Which of the following statements describe what all members of a population share?
a. They are temporally isolated from each other.
b. They are geographically isolated from each other.
c. They are members of the same species.
d. They have identical genes.

____ 207. All the genes of all members of a particular population make up the population's
a. relative frequency.
b. phenotype.
c. genotype.
d. gene pool.

____ 208. Which statement below about gene pools is typically true?
a. They contain two or more alleles for each inheritable trait.
b. They contain only dominant alleles.
c. They belong to two or more interbreeding species.
d. The relative frequencies of the alleles never change.

____ 209. If an allele makes up one fourth of a population's alleles for a given trait, its relative frequency is
a. 100 percent.
b. 75 percent.
c. 25 percent.
d. 4 percent.

____ 210. Interbreeding among members of a population results in

a. different types of alleles in the gene pool.
b. changes in the relative frequencies of alleles in the gene pool.
c. no changes in the relative frequencies of alleles in the gene pool.
d. an absence of genetic variation in the population.

____ 211. In a population, the sum of the relative frequencies of all alleles for a particular trait is
a. equal to 100 percent.
b. equal to the number of alleles for the trait.
c. constantly changing.
d. dependent on the number of alleles.

____ 212. A change in a sequence of DNA is called a
a. recombination.
b. polygenic trait.
c. single-gene trait.
d. mutation.

____ 213. The two main sources of genetic variation are
a. genotypes and phenotypes.
b. gene shuffling and mutations.
c. single-gene traits and polygenic traits.
d. directional selection and disruptive selection.

____ 214. In many kinds of organisms, inheritable differences are due mostly to
a. mutations during gamete formation.
b. polygenic traits.
c. gene shuffling during gamete formation.
d. the effects of radiation.

____ 215. Gene shuffling includes the independent movement of chromosomes during meoisis as well as
a. mutations from radiation.
b. changes in the frequencies of alleles.
c. crossing-over.
d. mutations from chemicals.

____ 216. In a particular population, sexual reproduction can produce
a. mutations.
b. many different phenotypes.
c. new allele frequencies.
d. meiosis.

____ 217. The gene shuffling that occurs as part of sexual reproduction
a. changes the gene pool's allele frequencies.
b. does not change the gene pool's allele frequencies.
c. keeps the phenotypes consistent.
d. is caused by radiation or chemicals.

____ 218. A single-gene trait that has two alleles and that shows a simple dominant-recessive pattern will result in
a. one phenotype.
b. two phenotypes.
c. four phenotypes.
d. millions of phenotypes.

____ 219. An example of a single-gene trait is
a. widow's peak in humans.
b. weight of human infants at birth.
c. height in humans.
d. beak size in the Galápagos finches.

____ 220. The number of phenotypes produced for a given trait depends upon
a. the number of genes that control the trait.
b. which form of the trait is dominant.
c. the relative frequencies of the various alleles.

d. the relationship of allele frequencies to Mendelian ratios.

____ 221. The phenotypes for a typical polygenic trait can often be expressed as
a. a bar graph.
b. a bell-shaped curve.
c. Mendelian ratios.
d. allele frequencies.

____ 222. Compared to a polygenic trait, a single-gene trait tends to have
a. fewer phenotypes.
b. more phenotypes.
c. the same number of phenotypes.
d. phenotypes that form a bell-shaped curve.

____ 223. A polygenic trait can have
a. many possible genotypes, but few possible phenotypes.
b. many possible genotypes, producing many possible phenotypes.
c. fewer phenotypes than most single-gene traits.
d. fewer genotypes than most single-gene traits.

____ 224. Natural selection acts directly on
a. alleles.
b. genes.
c. phenotypes.
d. mutations.

____ 225. Which of the following is NOT a way in which natural selection affects the distribution of phenotypes?
a. directional selection
b. stabilizing selection
c. disruptive selection
d. chance events

____ 226. When individuals at only one end of a bell curve of phenotype frequencies have high fitness, the result is
a. directional selection.
b. stabilizing selection.
c. disruptive selection.
d. genetic drift.

____ 227. When individuals with an average form of a trait have the highest fitness, the result is
a. not predictable.
b. disruptive selection.
c. directional selection.
d. stabilizing selection.

____ 228. In a population of finches in which one group of birds has a short, parrotlike beak and another group has a long, narrow beak, what process has probably occurred?
a. directional selection
b. disruptive selection
c. stabilizing selection
d. genetic drift

____ 229. If a mutation introduces a new skin color in a lizard population, which factor might determine whether the frequency of the new allele will increase?
a. how many other alleles are present
b. whether the mutation makes some lizards more fit for their environment than other lizards
c. how many phenotypes the population has
d. whether the mutation was caused by nature or by human intervention

____ 230. In genetic drift, allele frequencies change because of
a. mutations.
b. chance.
c. natural selection.
d. genetic equilibrium.

____ 231. Which of the following events do biologists consider a random change?
a. directional selection
b. speciation
c. disruptive selection
d. genetic drift

____ 232. Genetic drift tends to occur in populations that
a. are very large.
b. are small.
c. are formed from new species.
d. have unchanging allele frequencies.

____ 233. The type of genetic drift that follows the colonization of a new habitat by a small group of individuals is called
a. the Hardy-Weinberg principle.
b. the founder effect.
c. directional selection.
d. stabilizing selection.

____ 234. One similarity between natural selection and genetic drift is that both events
a. are based completely on chance.
b. begin with one or more mutations.
c. involve a change in a population's allele frequencies.
d. take place only in very small groups.

____ 235. The situation in which allele frequencies of a population remain constant is called
a. evolution.
b. genetic drift.
c. genetic equilibrium.
d. natural selection.

____ 236. One of the conditions required to maintain genetic equilibrium is
a. natural selection.
b. mutations.
c. nonrandom mating.
d. no movement into or out of the population.

____ 237. The genetic equilibrium of a population can be disturbed by each of the following EXCEPT
a. nonrandom mating.
b. movement into and out of the population.
c. a large population size.
d. mutations.

____ 238. The allele frequencies of a population are more likely to remain unchanged if
a. the population size is reduced.
b. frequent movement into and out of the population occurs.
c. all mating is random.
d. the mutation rate increases.

____ 239. According to the Hardy-Weinberg principle, genetic equilibrium would be more likely in a population of mice if
a. the population size rapidly decreases.
b. mutation rates within the population rise.
c. no natural selection takes place.
d. there is frequent movement into and out of the population.

____ 240. Which factor would most likely disrupt genetic equilibrium in a large population?
a. the production of large numbers of offspring
b. mating that is not random
c. the absence of movement into and out of the population
d. the absence of mutations

____ 241. The separation of populations by barriers such as rivers, mountains, or bodies of water is called
a. temporal isolation.
b. geographic isolation.
c. behavioral isolation.
d. genetic equilibrium.

____ 242. A factor that is necessary for the formation of a new species is
a. reproduction at different times.
b. geographic barriers.
c. different mating behaviors.
d. reproductive isolation.

____ 243. What situation might develop in a population having some plants whose flowers open at midday and other plants whose flowers open late in the day?
a. behavioral isolation
b. geographic isolation
c. temporal isolation
d. genetic drift

____ 244. The geographic isolation of two populations of a species tends to increase differences between their gene pools because it
a. prevents interbreeding between the populations.
b. prevents interbreeding within each population.
c. causes temporal isolation of the two populations.
d. increases differences in courtship behavior.

____ 245. Although they often live in the same habitat, the American toad breeds earlier in the spring than the Fowler's toad does. What can be inferred from this information?
a. The two species do not interbreed because of geographic isolation.
b. The two species do not interbreed because of temporal isolation.
c. The two species interbreed throughout the spring season.
d. The American toad will cause the extinction of the Fowler's toad.

____ 246. Which is the first step that occurred in the speciation of the Galápagos finches?
a. establishing genetic equilibrium
b. behavioral isolation
c. ecological competition
d. arrival of the founding population

____ 247. The Galápagos finch species are an excellent example of
a. speciation.
b. genetic equilibrium.
c. stabilizing selection.
d. selection on single-gene traits.

____ 248. What did Peter and Rosemary Grant learn about mate choice from the Galápagos finches?
a. Phenotype plays no role in mate choice.
b. Finches prefer mates with beaks similar in size to their own.
c. Finches prefer mates with smaller beaks than their own.
d. Finches prefer mates with larger beaks than their own.

____ 249. In Rosemary and Peter Grant's study of the Galápagos finches, what process was encouraged by ecological competition during the dry season?
a. stabilizing selection
b. disruptive selection
c. directional selection
d. genetic drift

____ 250. Which statement about evolution in the Galápagos finches is true?
a. Natural selection on beak size and shape is driven by available food.
b. Stabilizing selection has favored an intermediate beak type for all of the finches.
c. Mate choice likely plays no role in the finches' evolution.
d. None of the finch species is reproductively isolated.

Final Exam PRACTICE TEST
Answer Section

MULTIPLE CHOICE

1. ANS: A PTS: 1 DIF: B REF: p. 201
   OBJ: 8.1.1
2. ANS: B PTS: 1 DIF: B REF: p. 201
   OBJ: 8.1.1
3. ANS: D PTS: 1 DIF: E REF: p. 201
   OBJ: 8.1.1
4. ANS: C PTS: 1 DIF: A REF: p. 201
   OBJ: 8.1.1
5. ANS: C PTS: 1 DIF: E REF: p. 202
   OBJ: 8.1.2
6. ANS: C PTS: 1 DIF: B REF: p. 202
   OBJ: 8.1.2
7. ANS: D PTS: 1 DIF: A REF: p. 202
   OBJ: 8.1.2
8. ANS: D PTS: 1 DIF: E REF: p. 202
   OBJ: 8.1.2
9. ANS: D PTS: 1 DIF: A REF: p. 202 | p. 203
   OBJ: 8.1.2
10. ANS: C PTS: 1 DIF: A REF: p. 202
    OBJ: 8.1.2
11. ANS: C PTS: 1 DIF: B REF: p. 202 | p. 203
    OBJ: 8.1.2
12. ANS: A PTS: 1 DIF: B REF: p. 204 | p. 205
    OBJ: 8.2.1
13. ANS: B PTS: 1 DIF: A REF: p. 204 | p. 205 | p. 206
    OBJ: 8.2.1
14. ANS: C PTS: 1 DIF: B REF: p. 206
    OBJ: 8.2.1
15. ANS: D PTS: 1 DIF: E REF: p. 205
    OBJ: 8.2.1
16. ANS: A PTS: 1 DIF: E REF: p. 204
    OBJ: 8.2.1
17. ANS: D PTS: 1 DIF: B REF: p. 204 | p. 206
    OBJ: 8.2.2
18. ANS: D PTS: 1 DIF: A REF: p. 206
    OBJ: 8.2.2
19. ANS: C PTS: 1 DIF: E REF: p. 206
    OBJ: 8.2.2
20. ANS: A PTS: 1 DIF: B REF: p. 207
    OBJ: 8.2.3
21. ANS: D PTS: 1 DIF: B REF: p. 207
    OBJ: 8.2.3
22. ANS: A PTS: 1 DIF: A REF: p. 207

OBJ: 8.2.3

23. ANS: C PTS: 1 DIF: E REF: p. 207
OBJ: 8.2.3

24. ANS: B PTS: 1 DIF: A REF: p. 208
OBJ: 8.3.1

25. ANS: A PTS: 1 DIF: B REF: p. 208
OBJ: 8.3.1

26. ANS: B PTS: 1 DIF: E REF: p. 208
OBJ: 8.3.1

27. ANS: B PTS: 1 DIF: A REF: p. 210 | p. 211
OBJ: 8.3.2

28. ANS: D PTS: 1 DIF: E REF: p. 210 | p. 211
OBJ: 8.3.2

29. ANS: D PTS: 1 DIF: A REF: p. 210 | p. 211
OBJ: 8.3.2

30. ANS: A PTS: 1 DIF: E REF: p. 210 | p. 211
OBJ: 8.3.2

31. ANS: D PTS: 1 DIF: E REF: p. 209 | p. 210
OBJ: 8.3.2

32. ANS: A PTS: 1 DIF: A REF: p. 208 | p. 212
OBJ: 8.3.3

33. ANS: C PTS: 1 DIF: B REF: p. 212
OBJ: 8.3.3

34. ANS: A PTS: 1 DIF: E REF: p. 212
OBJ: 8.3.3

35. ANS: B PTS: 1 DIF: A REF: p. 212 | p. 213
OBJ: 8.3.3

36. ANS: D PTS: 1 DIF: B REF: p. 213 | p. 214
OBJ: 8.3.4

37. ANS: C PTS: 1 DIF: A REF: p. 214
OBJ: 8.3.4

38. ANS: B PTS: 1 DIF: E REF: p. 214
OBJ: 8.3.4

39. ANS: C PTS: 1 DIF: E REF: p. 214
OBJ: 8.3.4

40. ANS: A PTS: 1 DIF: E REF: p. 213 | p. 214
OBJ: 8.3.4

41. ANS: A PTS: 1 DIF: A REF: p. 242
OBJ: 10.1.1

42. ANS: C PTS: 1 DIF: E REF: p. 241
OBJ: 10.1.1

43. ANS: B PTS: 1 DIF: A REF: p. 241
OBJ: 10.1.1

44. ANS: C PTS: 1 DIF: B REF: p. 243
OBJ: 10.1.1

45. ANS: A PTS: 1 DIF: B REF: p. 243
OBJ: 10.1.2

46. ANS: B PTS: 1 DIF: A REF: p. 243
OBJ: 10.1.2

47. ANS: C PTS: 1 DIF: E REF: p. 243
OBJ: 10.1.2
48. ANS: A PTS: 1 DIF: E REF: p. 241 | p. 243
OBJ: 10.1.2
49. ANS: D PTS: 1 DIF: B REF: p. 243
OBJ: 10.1.2
50. ANS: C PTS: 1 DIF: A REF: p. 244
OBJ: 10.2.1
51. ANS: D PTS: 1 DIF: B REF: p. 245
OBJ: 10.2.1
52. ANS: B PTS: 1 DIF: A REF: p. 245
OBJ: 10.2.1
53. ANS: C PTS: 1 DIF: A REF: p. 245
OBJ: 10.2.1
54. ANS: A PTS: 1 DIF: A REF: p. 245
OBJ: 10.2.1
55. ANS: D PTS: 1 DIF: E REF: p. 245
OBJ: 10.2.1
56. ANS: D PTS: 1 DIF: E REF: p. 245
OBJ: 10.2.1
57. ANS: D PTS: 1 DIF: B REF: p. 245
OBJ: 10.2.1
58. ANS: A PTS: 1 DIF: B REF: p. 245
OBJ: 10.2.1
59. ANS: A PTS: 1 DIF: B REF: p. 244
OBJ: 10.2.2
60. ANS: C PTS: 1 DIF: B REF: p. 244
OBJ: 10.2.2
61. ANS: B PTS: 1 DIF: E REF: p. 246 | p. 247 | p. 248
OBJ: 10.2.2
62. ANS: C PTS: 1 DIF: B REF: p. 246
OBJ: 10.2.2
63. ANS: A PTS: 1 DIF: B REF: p. 246
OBJ: 10.2.2
64. ANS: C PTS: 1 DIF: A REF: p. 248
OBJ: 10.2.2
65. ANS: A PTS: 1 DIF: A REF: p. 246
OBJ: 10.2.2
66. ANS: A PTS: 1 DIF: A REF: p. 247
OBJ: 10.2.2
67. ANS: D PTS: 1 DIF: A REF: p. 244
OBJ: 10.2.2
68. ANS: C PTS: 1 DIF: E REF: p. 248
OBJ: 10.2.2
69. ANS: B PTS: 1 DIF: E REF: p. 248
OBJ: 10.2.2
70. ANS: A PTS: 1 DIF: A REF: p. 250
OBJ: 10.3.1

71. ANS: D PTS: 1 DIF: E REF: p. 250
OBJ: 10.3.1
72. ANS: C PTS: 1 DIF: A REF: p. 250
OBJ: 10.3.1
73. ANS: B PTS: 1 DIF: E REF: p. 251
OBJ: 10.3.2
74. ANS: B PTS: 1 DIF: B REF: p. 251
OBJ: 10.3.2
75. ANS: A PTS: 1 DIF: A REF: p. 251
OBJ: 10.3.2
76. ANS: D PTS: 1 DIF: E REF: p. 251 | p. 252
OBJ: 10.3.2
77. ANS: A PTS: 1 DIF: E REF: p. 251
OBJ: 10.3.2
78. ANS: C PTS: 1 DIF: A REF: p. 252
OBJ: 10.3.3
79. ANS: C PTS: 1 DIF: E REF: p. 252
OBJ: 10.3.3
80. ANS: C PTS: 1 DIF: E REF: p. 252
OBJ: 10.3.3
81. ANS: B PTS: 1 DIF: B REF: p. 252
OBJ: 10.3.3
82. ANS: C PTS: 1 DIF: B REF: p. 263
OBJ: 11.1.1
83. ANS: D PTS: 1 DIF: A REF: p. 264
OBJ: 11.1.1
84. ANS: D PTS: 1 DIF: E REF: p. 264
OBJ: 11.1.1
85. ANS: C PTS: 1 DIF: B REF: p. 265
OBJ: 11.1.2
86. ANS: B PTS: 1 DIF: A REF: p. 265
OBJ: 11.1.2
87. ANS: B PTS: 1 DIF: E REF: p. 265
OBJ: 11.1.2
88. ANS: C PTS: 1 DIF: B REF: p. 265
OBJ: 11.1.3
89. ANS: C PTS: 1 DIF: A REF: p. 265
OBJ: 11.1.3
90. ANS: C PTS: 1 DIF: E REF: p. 265
OBJ: 11.1.3
91. ANS: D PTS: 1 DIF: B REF: p. 265
OBJ: 11.1.4
92. ANS: C PTS: 1 DIF: A REF: p. 265 | p. 266
OBJ: 11.1.4
93. ANS: D PTS: 1 DIF: E REF: p. 266
OBJ: 11.1.4
94. ANS: A PTS: 1 DIF: B REF: p. 267
OBJ: 11.2.1
95. ANS: C PTS: 1 DIF: E REF: p. 269

OBJ: 11.2.1
96. ANS: B PTS: 1 DIF: B REF: p. 268
OBJ: 11.2.2
97. ANS: D PTS: 1 DIF: E REF: p. 268
OBJ: 11.2.2
98. ANS: D PTS: 1 DIF: A REF: p. 268 | p. 269
OBJ: 11.2.2
99. ANS: C PTS: 1 DIF: E REF: p. 268
OBJ: 11.2.2
100. ANS: B PTS: 1 DIF: B REF: p. 271
OBJ: 11.3.1
101. ANS: A PTS: 1 DIF: B REF: p. 271
OBJ: 11.3.1
102. ANS: A PTS: 1 DIF: A REF: p. 271
OBJ: 11.3.1
103. ANS: A PTS: 1 DIF: E REF: p. 271
OBJ: 11.3.1
104. ANS: B PTS: 1 DIF: B REF: p. 272
OBJ: 11.3.2
105. ANS: C PTS: 1 DIF: A REF: p. 272
OBJ: 11.3.2
106. ANS: C PTS: 1 DIF: E REF: p. 273
OBJ: 11.3.2
107. ANS: A PTS: 1 DIF: A REF: p. 274
OBJ: 11.3.3
108. ANS: C PTS: 1 DIF: B REF: p. 275
OBJ: 11.4.1
109. ANS: D PTS: 1 DIF: E REF: p. 275
OBJ: 11.4.1
110. ANS: B PTS: 1 DIF: B REF: p. 276
OBJ: 11.4.2
111. ANS: C PTS: 1 DIF: A REF: p. 276 | p. 277
OBJ: 11.4.2
112. ANS: A PTS: 1 DIF: A REF: p. 276
OBJ: 11.4.2
113. ANS: D PTS: 1 DIF: E REF: p. 277
OBJ: 11.4.2
114. ANS: B PTS: 1 DIF: A REF: p. 278
OBJ: 11.4.3
115. ANS: B PTS: 1 DIF: E REF: p. 276
OBJ: 11.4.3
116. ANS: A PTS: 1 DIF: B REF: p. 279
OBJ: 11.5.1
117. ANS: C PTS: 1 DIF: A REF: p. 279
OBJ: 11.5.1
118. ANS: B PTS: 1 DIF: E REF: p. 279
OBJ: 11.5.1
119. ANS: A PTS: 1 DIF: B REF: p. 280
OBJ: 11.5.2

120. ANS: D PTS: 1 DIF: A REF: p. 280
OBJ: 11.5.2
121. ANS: A PTS: 1 DIF: E REF: p. 280
OBJ: 11.5.2
122. ANS: B PTS: 1 DIF: B REF: p. 289
OBJ: 12.1.1
123. ANS: B PTS: 1 DIF: A REF: p. 288
OBJ: 12.1.1
124. ANS: D PTS: 1 DIF: E REF: p. 290
OBJ: 12.1.1
125. ANS: A PTS: 1 DIF: B REF: p. 294
OBJ: 12.1.2
126. ANS: D PTS: 1 DIF: A REF: p. 291
OBJ: 12.1.2
127. ANS: B PTS: 1 DIF: E REF: p. 294
OBJ: 12.1.2
128. ANS: D PTS: 1 DIF: A REF: p. 296
OBJ: 12.2.1
129. ANS: C PTS: 1 DIF: E REF: p. 296 | p. 297
OBJ: 12.2.1
130. ANS: A PTS: 1 DIF: B REF: p. 297
OBJ: 12.2.2
131. ANS: C PTS: 1 DIF: A REF: p. 299
OBJ: 12.2.2
132. ANS: B PTS: 1 DIF: E REF: p. 299
OBJ: 12.2.2
133. ANS: A PTS: 1 DIF: B REF: p. 300
OBJ: 12.3.1
134. ANS: B PTS: 1 DIF: A REF: p. 300
OBJ: 12.3.1
135. ANS: C PTS: 1 DIF: E REF: p. 300
OBJ: 12.3.1
136. ANS: B PTS: 1 DIF: B REF: p. 300
OBJ: 12.3.2
137. ANS: D PTS: 1 DIF: A REF: p. 300 | p. 301
OBJ: 12.3.2
138. ANS: B PTS: 1 DIF: E REF: p. 301
OBJ: 12.3.2
139. ANS: A PTS: 1 DIF: B REF: p. 301
OBJ: 12.3.3
140. ANS: D PTS: 1 DIF: A REF: p. 301
OBJ: 12.3.3
141. ANS: D PTS: 1 DIF: B REF: p. 303
OBJ: 12.3.4
142. ANS: A PTS: 1 DIF: A REF: p. 302
OBJ: 12.3.4
143. ANS: B PTS: 1 DIF: E REF: p. 303
OBJ: 12.3.4

144. ANS: A PTS: 1 DIF: A REF: p. 302
OBJ: 12.3.5
145. ANS: D PTS: 1 DIF: E REF: p. 304 | p. 305
OBJ: 12.3.5
146. ANS: C PTS: 1 DIF: B REF: p. 306
OBJ: 12.3.6
147. ANS: C PTS: 1 DIF: A REF: p. 306
OBJ: 12.3.6
148. ANS: B PTS: 1 DIF: E REF: p. 306
OBJ: 12.3.6
149. ANS: C PTS: 1 DIF: B REF: p. 307
OBJ: 12.4.1
150. ANS: A PTS: 1 DIF: A REF: p. 307
OBJ: 12.4.1
151. ANS: A PTS: 1 DIF: E REF: p. 307
OBJ: 12.4.1
152. ANS: B PTS: 1 DIF: B REF: p. 309
OBJ: 12.5.1
153. ANS: C PTS: 1 DIF: A REF: p. 309
OBJ: 12.5.1
154. ANS: C PTS: 1 DIF: E REF: p. 310
OBJ: 12.5.1
155. ANS: A PTS: 1 DIF: B REF: p. 310
OBJ: 12.5.2
156. ANS: C PTS: 1 DIF: A REF: p. 310
OBJ: 12.5.2
157. ANS: B PTS: 1 DIF: E REF: p. 310
OBJ: 12.5.2
158. ANS: A PTS: 1 DIF: B REF: p. 311
OBJ: 12.5.3
159. ANS: C PTS: 1 DIF: A REF: p. 311
OBJ: 12.5.3
160. ANS: D PTS: 1 DIF: E REF: p. 311
OBJ: 12.5.3
161. ANS: A PTS: 1 DIF: B REF: p. 312
OBJ: 12.5.4
162. ANS: B PTS: 1 DIF: A REF: p. 312
OBJ: 12.5.4
163. ANS: C PTS: 1 DIF: B REF: p. 371
OBJ: 15.1.1
164. ANS: C PTS: 1 DIF: A REF: p. 371
OBJ: 15.1.1
165. ANS: B PTS: 1 DIF: A REF: p. 372
OBJ: 15.1.1
166. ANS: A PTS: 1 DIF: E REF: p. 372
OBJ: 15.1.1
167. ANS: B PTS: 1 DIF: A REF: p. 372
OBJ: 15.1.1
168. ANS: A PTS: 1 DIF: B REF: p. 374

OBJ: 15.2.1

169. ANS: D PTS: 1 DIF: B REF: p. 375
OBJ: 15.2.1

170. ANS: B PTS: 1 DIF: A REF: p. 374
OBJ: 15.2.1

171. ANS: C PTS: 1 DIF: E REF: p. 375
OBJ: 15.2.1

172. ANS: B PTS: 1 DIF: B REF: p. 375
OBJ: 15.2.1

173. ANS: A PTS: 1 DIF: A REF: p. 376
OBJ: 15.2.2

174. ANS: B PTS: 1 DIF: E REF: p. 376
OBJ: 15.2.2

175. ANS: B PTS: 1 DIF: B REF: p. 376
OBJ: 15.2.2

176. ANS: B PTS: 1 DIF: E REF: p. 376
OBJ: 15.2.2

177. ANS: B PTS: 1 DIF: A REF: p. 377
OBJ: 15.2.3

178. ANS: C PTS: 1 DIF: B REF: p. 377
OBJ: 15.2.3

179. ANS: B PTS: 1 DIF: E REF: p. 377
OBJ: 15.2.3

180. ANS: D PTS: 1 DIF: B REF: p. 379
OBJ: 15.3.1

181. ANS: A PTS: 1 DIF: B REF: p. 378
OBJ: 15.3.1

182. ANS: C PTS: 1 DIF: A REF: p. 378
OBJ: 15.3.1

183. ANS: C PTS: 1 DIF: E REF: p. 378
OBJ: 15.3.1

184. ANS: D PTS: 1 DIF: E REF: p. 382
OBJ: 15.3.1

185. ANS: B PTS: 1 DIF: E REF: p. 381
OBJ: 15.3.2

186. ANS: D PTS: 1 DIF: A REF: p. 379
OBJ: 15.3.2

187. ANS: B PTS: 1 DIF: B REF: p. 379
OBJ: 15.3.2

188. ANS: C PTS: 1 DIF: A REF: p. 381
OBJ: 15.3.3

189. ANS: C PTS: 1 DIF: E REF: p. 381
OBJ: 15.3.3

190. ANS: B PTS: 1 DIF: B REF: p. 380
OBJ: 15.3.3

191. ANS: D PTS: 1 DIF: A REF: p. 380
OBJ: 15.3.3

192. ANS: C PTS: 1 DIF: E REF: p. 381
OBJ: 15.3.3

193. ANS: A PTS: 1 DIF: B REF: p. 380
OBJ: 15.3.3
194. ANS: B PTS: 1 DIF: B REF: p. 384
OBJ: 15.3.4
195. ANS: A PTS: 1 DIF: E REF: p. 382
OBJ: 15.3.4
196. ANS: B PTS: 1 DIF: A
REF: p. 373 | p. 374 | p. 375 | p. 376 | p. 377 OBJ: 15.3.4
197. ANS: A PTS: 1 DIF: E REF: p. 382
OBJ: 15.3.4
198. ANS: B PTS: 1 DIF: A REF: p. 382
OBJ: 15.3.4
199. ANS: B PTS: 1 DIF: A REF: p. 382
OBJ: 15.3.4
200. ANS: D PTS: 1 DIF: B REF: p. 379
OBJ: 15.3.5
201. ANS: B PTS: 1 DIF: E REF: p. 379 | p. 380 | p. 381
OBJ: 15.3.5
202. ANS: A PTS: 1 DIF: B REF: p. 381
OBJ: 15.3.5
203. ANS: A PTS: 1 DIF: A REF: p. 379 | p. 381
OBJ: 15.3.5
204. ANS: A PTS: 1 DIF: E REF: p. 384
OBJ: 15.3.4
205. ANS: D PTS: 1 DIF: E REF: p. 381
OBJ: 15.3.5
206. ANS: C PTS: 1 DIF: A REF: p. 394
OBJ: 16.1.1
207. ANS: D PTS: 1 DIF: B REF: p. 394
OBJ: 16.1.1
208. ANS: A PTS: 1 DIF: A REF: p. 394
OBJ: 16.1.1
209. ANS: C PTS: 1 DIF: B REF: p. 394
OBJ: 16.1.1
210. ANS: C PTS: 1 DIF: E REF: p. 395
OBJ: 16.1.2
211. ANS: A PTS: 1 DIF: E REF: p. 394
OBJ: 16.1.1
212. ANS: D PTS: 1 DIF: B REF: p. 394
OBJ: 16.1.2
213. ANS: B PTS: 1 DIF: B REF: p. 394
OBJ: 16.1.2
214. ANS: C PTS: 1 DIF: A REF: p. 395
OBJ: 16.1.2
215. ANS: C PTS: 1 DIF: A REF: p. 395
OBJ: 16.1.2
216. ANS: B PTS: 1 DIF: E REF: p. 395
OBJ: 16.1.2

217. ANS: B PTS: 1 DIF: E REF: p. 395
OBJ: 16.1.2
218. ANS: B PTS: 1 DIF: A REF: p. 395
OBJ: 16.1.3
219. ANS: A PTS: 1 DIF: B REF: p. 395
OBJ: 16.1.3
220. ANS: A PTS: 1 DIF: B REF: p. 395
OBJ: 16.1.3
221. ANS: B PTS: 1 DIF: A REF: p. 396
OBJ: 16.1.3
222. ANS: A PTS: 1 DIF: E REF: p. 395 | p. 396
OBJ: 16.1.3
223. ANS: B PTS: 1 DIF: E REF: p. 396
OBJ: 16.1.3
224. ANS: C PTS: 1 DIF: B REF: p. 397
OBJ: 16.2.1
225. ANS: D PTS: 1 DIF: B REF: p. 398
OBJ: 16.2.1
226. ANS: A PTS: 1 DIF: A REF: p. 398
OBJ: 16.2.1
227. ANS: D PTS: 1 DIF: A REF: p. 399
OBJ: 16.2.1
228. ANS: B PTS: 1 DIF: E REF: p. 399
OBJ: 16.2.1
229. ANS: B PTS: 1 DIF: E REF: p. 397 | p. 398
OBJ: 16.2.1
230. ANS: B PTS: 1 DIF: B REF: p. 400
OBJ: 16.2.2
231. ANS: D PTS: 1 DIF: B REF: p. 400
OBJ: 16.2.2
232. ANS: B PTS: 1 DIF: A REF: p. 400
OBJ: 16.2.2
233. ANS: B PTS: 1 DIF: A REF: p. 400
OBJ: 16.2.2
234. ANS: C PTS: 1 DIF: E REF: p. 400
OBJ: 16.2.2
235. ANS: C PTS: 1 DIF: B REF: p. 401
OBJ: 16.2.3
236. ANS: D PTS: 1 DIF: B REF: p. 401
OBJ: 16.2.3
237. ANS: C PTS: 1 DIF: A REF: p. 401
OBJ: 16.2.3
238. ANS: C PTS: 1 DIF: A REF: p. 402
OBJ: 16.2.3
239. ANS: C PTS: 1 DIF: E REF: p. 401
OBJ: 16.2.3
240. ANS: B PTS: 1 DIF: E REF: p. 401
OBJ: 16.2.3
241. ANS: B PTS: 1 DIF: B REF: p. 405

OBJ: 16.3.1

242. ANS: D PTS: 1 DIF: B REF: p. 404
OBJ: 16.3.1

243. ANS: C PTS: 1 DIF: A REF: p. 405
OBJ: 16.3.1

244. ANS: A PTS: 1 DIF: E REF: p. 405
OBJ: 16.3.1

245. ANS: B PTS: 1 DIF: E REF: p. 405
OBJ: 16.3.1

246. ANS: D PTS: 1 DIF: B REF: p. 408
OBJ: 16.3.2

247. ANS: A PTS: 1 DIF: A REF: p. 408
OBJ: 16.3.2

248. ANS: B PTS: 1 DIF: E REF: p. 407
OBJ: 16.3.2

249. ANS: C PTS: 1 DIF: A REF: p. 407
OBJ: 16.3.2

250. ANS: A PTS: 1 DIF: E REF: p. 407
OBJ: 16.3.2