Cell Unit Practice Test

Completion
Complete each statement.

1. According to the cell theory, all cells come from existing ____________________.

2. Electrons pass through thin slices of cells or tissues and produce flat, two-dimensional images in ____________________ electron microscopy.

3. Depending on whether they have a ____________________, unicellular organisms are classified as either eukaryotes or prokaryotes.

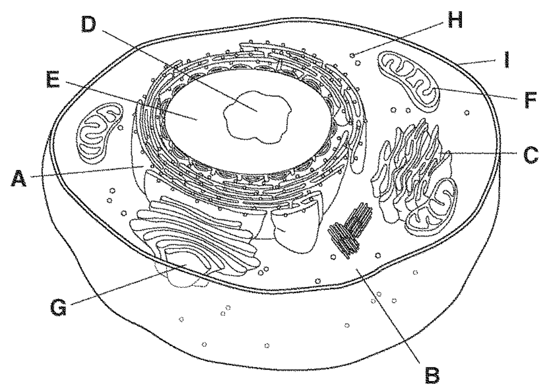


Figure 7–7

4. The small, dense region indicated in Figure 7–7 by the letter D is called the ____________________.

5. Most of the time, the cell's genetic information is found as threadlike _________________________ in the cell's nucleus.

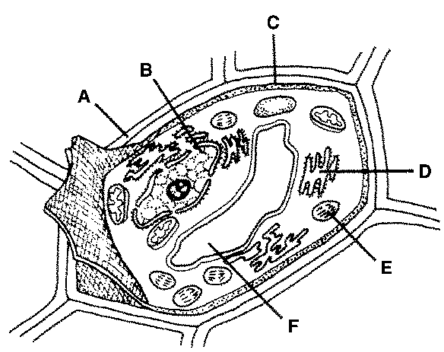


Figure 7–6

6. The storage structure indicated in Figure 7–6 by the letter F is a(an) ____________________ .

7. Unlike smooth endoplasmic reticulum, rough endoplasmic reticulum has ____________________ attached to it.

8. In plants, ____________________ capture energy from sunlight and convert it into chemical energy, whereas ____________________ convert chemical energy into compounds that are convenient for the cell to use.

9. The cell takes in food and water and eliminates wastes through its selectively permeable _________________________.

10. Molecules tend to move from an area where they are more concentrated to an area where they are less concentrated. This process is called ____________________.

11. Large molecules, such as glucose, that cannot cross the lipid bilayer can still move across the membrane through a type of passive transport called _________________________.

12. Some materials can move across the cell membrane against a concentration gradient by ____________________.

13. A cell's relatively constant internal physical and chemical conditions are called _________________________.

14. The cells in a multicellular organism have specific jobs. This is called cell _________________________.

15. The levels of organization in a multicellular organism listed from simplest to most complicated are ____________________, tissues, ____________________, and organ systems.

16. Cells keep only a small amount of ____________________ on hand and regenerate it as needed using energy stored in carbohydrates and other molecules.

17. Organisms, such as hawks and leopards, that obtain energy from the foods they consume are called ____________________.

18. Photosynthesis requires light, water, carbon dioxide, and light absorbing ____________________.

19. If you separate the pigments found in a typical plant cell's chloroplasts, you will find ____________________, orange, and red pigments.

20. ____________________ are saclike photosynthetic membranes inside chloroplasts.

21. Thylakoids are arranged in stacks known as ____________________.

22. Thylakoids are a ____________________ color because they contain chlorophyll.

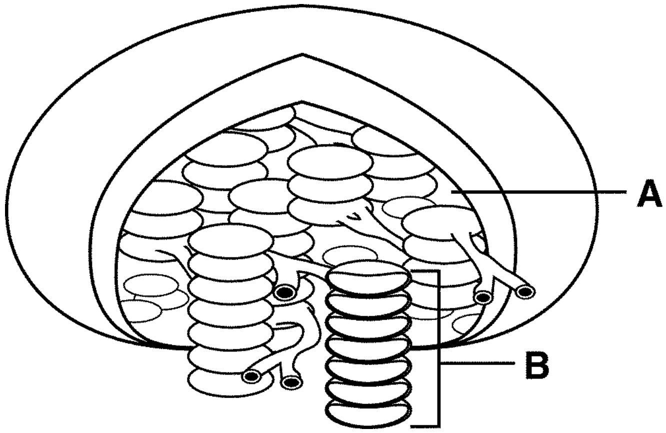


Figure 8–7

23. The area in Figure 8–7 labeled A is called the ____________________.

24. Photosystems I and II are found in the structure labeled ____________________ in Figure 8–7.

25. The electron carrier _________________________ is converted to NADPH during the light-dependent reactions.

26. Photosynthesis uses the energy of sunlight to convert water and carbon dioxide into oxygen and _________________________.

27. A membrane protein called _____________________ allows H^+ ions to pass through the thylakoid membrane and into the stroma.

28. The electrons that chlorophyll loses to the electron transport chain are replenished by ____________________ molecules.

29. During the Calvin cycle, molecules of ____________________ supply the carbon component of carbohydrates.

30. In many plants, the rate of photosynthesis ____________________ when the weather becomes very cold.

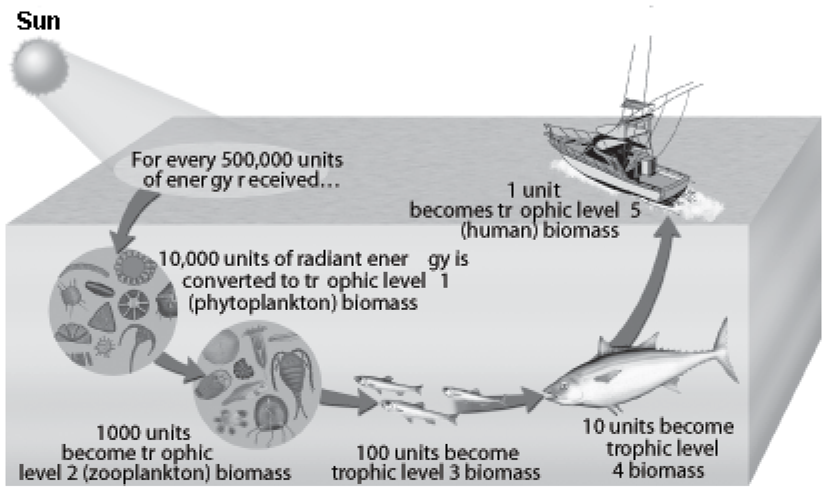


Figure 9–5

31. Figure 9–5 shows that the original source of energy for all organisms in an ocean food chain is ____________________.

32. The three main stages of cellular respiration are ____________________, the Krebs cycle, and ________________________.

33. Cellular respiration in nearly all organisms depends on autotrophs performing the process of _________________________.

34. Photosynthesis occurs only in plants, algae, and some bacteria. In contrast, ______________________________ occurs in all eukaryotic cells.

35. Glycolysis rearranges a 6-carbon glucose molecule into two 3-carbon molecules of _________________________.

36. Two pyruvic acid molecules going through the Krebs cycle will result in ____________________ ATP molecule(s), as well as the energy carriers $FADH_2$ and NADH.

37. When ____________________ pass through ATP synthase, ATP molecules are produced from ADP molecules.

38. The _____________________________ is a series of carrier proteins that use high-energy electrons to create a buildup of H^+ ions on one side of the inner mitochondrial membrane.

39. Glycolysis alone nets only ____________________ molecules of ATP from each glucose molecule.

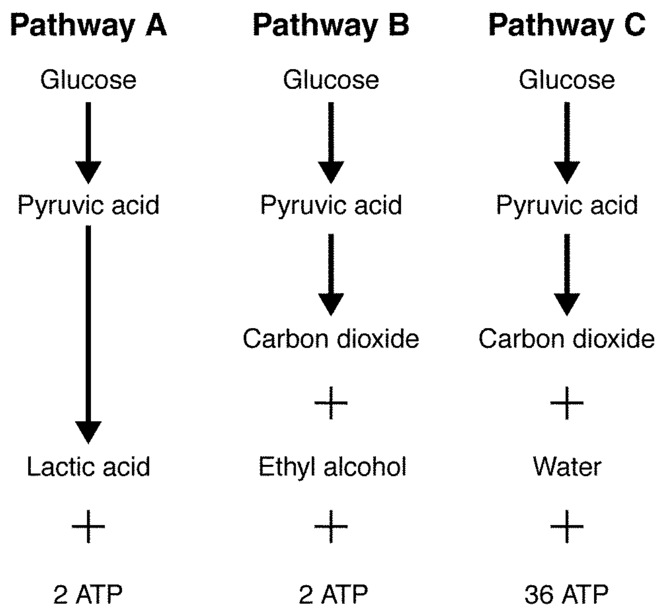


Figure 9–4

40. The pathway labeled B in Figure 9–4 is called ____________________ fermentation.

41. Based on Figure 9–4, ____________________ ATP molecules per glucose molecule are generated through fermentation.

42. In Figure 9–4, only the pathway labeled ____________________ requires oxygen.

43. The body gets rid of lactic acid in a chemical pathway that requires ____________________.

44. A high level of lactic acid in the body is a sign that ______________________________ fermentation has occurred.

45. A person who regularly does aerobic exercise probably takes in ____________________ oxygen than a sedentary person.

46. The larger a cell becomes, the ____________________ efficiently it is able to function.

47. During ____________________ reproduction, cells can produce genetically different offspring, whereas during ____________________ reproduction, cells produce genetically identical offspring.

48. The number of sister chromatids in a human body cell that is entering cell division is ____________________.

49. Cell division occurs in two main stages, the first of which is called _________________________.

50. Together, the G_1 phase, S phase, and G_2 phase are called ____________________.

51. A cell that has 5 chromosomes in the G_1 phase will have ____________________ chromatids in the G_2 phase.

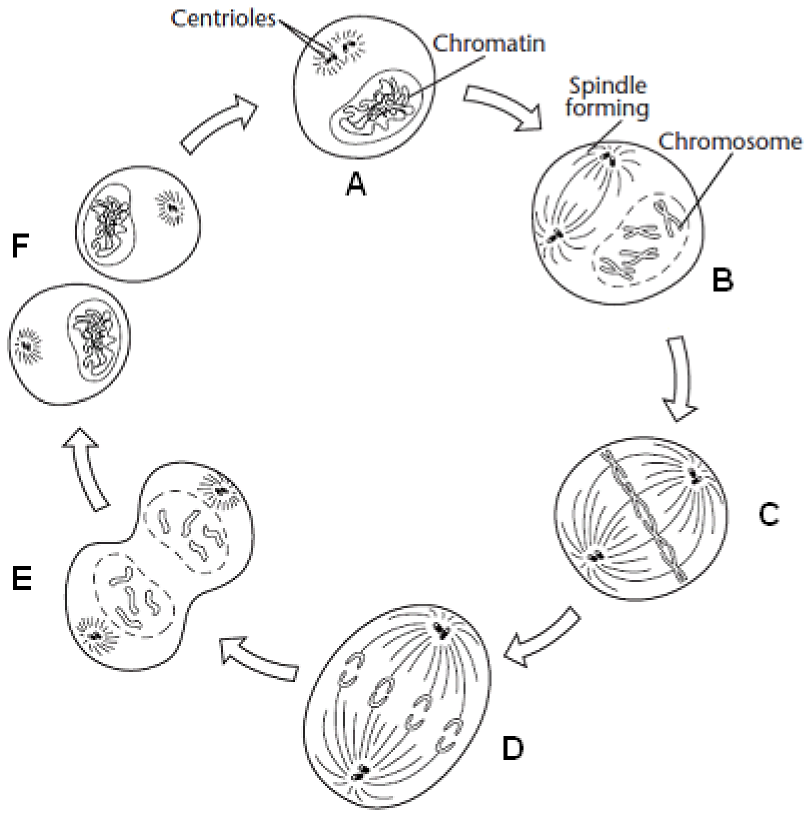


Figure 10–7

52. The phase of mitosis shown in step C in the Figure 10–7 above is called ____________________.

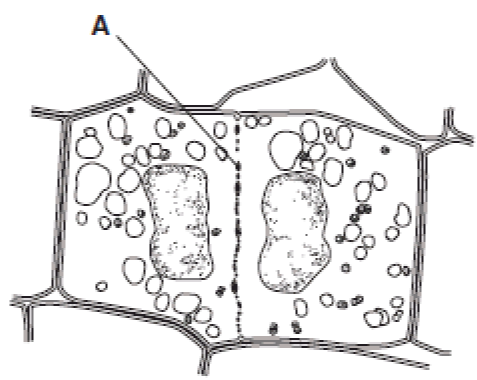


Figure 10–8

53. Look at Figure 10–8. Once structure A has completely formed, another phase of the cell cycle will start. This phase will be called ____________________.

54. The structure labeled A in Figure 10–8 is called the _________________________.

55. The process shown in Figure 10–8 occurs only in ____________________ cells that are going through cytokinesis.

56. During normal development, the cells between toes and fingers die by ____________________, a process of programmed cell death.

57. In all forms of ____________________, the diseased cells fail to respond to the signals that regulate growth and the cell cycle.

58. Adult skin cells can no longer become other types of cells because they have already undergone _________________________.

59. Embryonic stem cells gathered from the inner cell mass of the blastocyst are called ____________________ because they can develop into most, but not all human cell types.

60. Harvesting ____________________ stem cells from a willing donor is not as controversial as harvesting techniques that involve the destruction of an embryo.

Short Answer

61. What does the cell theory say?

62. What kinds of microscopes could you use to look at the structure of DNA? Could you study the structure of DNA in a living specimen? Why or why not?

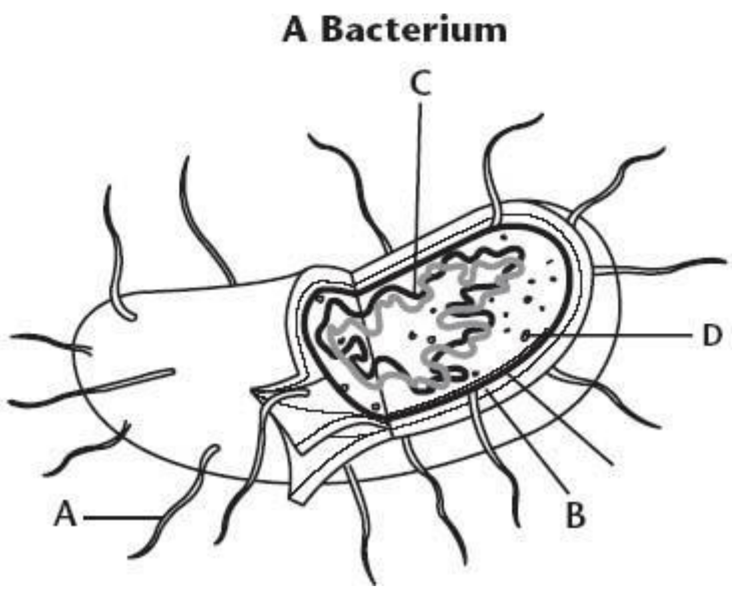


Figure 7–8

63. Is the cell in Figure 7–8 above a prokaryote or a eukaryote? What features help you determine your answer?

64. How do prokaryotes and eukaryotes differ?

65. What are two functions of the nucleus?

66. List two functions of the cytoskeleton.

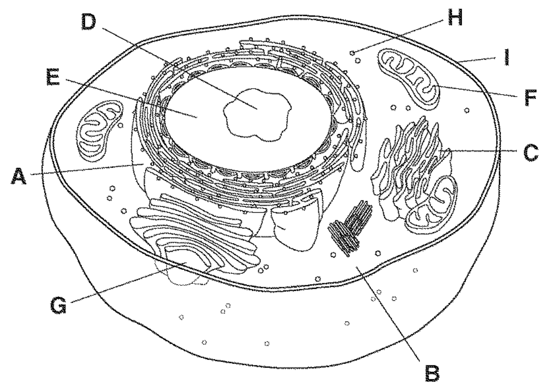


Figure 7–7

67. Identify each of the cell structures indicated in Figure 7–7. Use these terms: nucleus, mitochondrion, ribosome, cell membrane, smooth endoplasmic reticulum, rough endoplasmic reticulum, nucleolus, Golgi apparatus, cytoplasm.

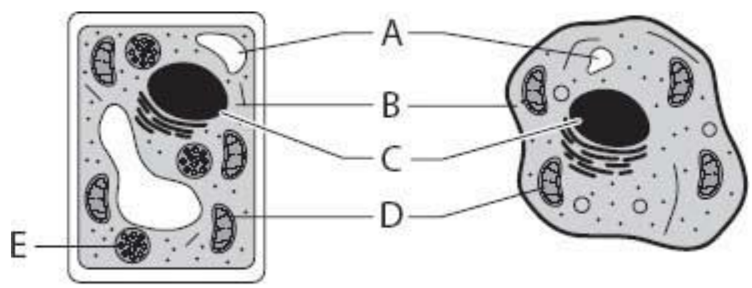


Figure 7–9

68. Which structures in the cells shown in Figure 7–9 above are responsible for meeting the cells' energy needs? Based on the presence or absence of these structures, identify which cell is a plant cell.

69. What advantages do cell walls provide plant cells that contact fresh water?

70. What would happen if a cell's membrane became impermeable?

71. Define diffusion.

72. Explain, in terms of osmosis, why a raisin placed in a cup of pure water overnight will puff up with water.

73. What would happen to an animal cell with an internal salt concentration of 0.8% if it were placed in a salt solution with a concentration of 0.2%? Why?

74. How are endocytosis and exocytosis similar? How are they different?

75. List the four levels of organization in a multicellular organism in order from simplest to most complex.

76. What happens when a phosphate group is removed from an ATP molecule?

77. What is ATP, and when is energy released from it?

78. What is the difference between an autotroph and a heterotroph? Give an example of each type of organism.

79. Explain how the ultimate source of energy for heterotrophs is the sun even though they cannot make their own food.

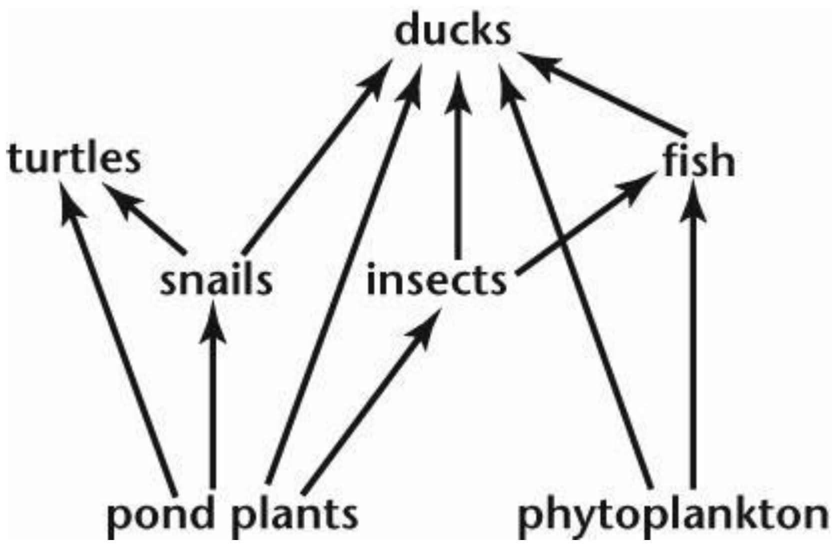


Figure 8–9

80. Examine the food web in Figure 8–9 and identify whether each organism is an autotroph or a heterotroph.

81. A student exposed two plants to only red light and two plants to only green light. Which plants should grow better? Why?

82. Explain the role of electron carriers in photosynthesis and give one example.

83. Write the overall equation for photosynthesis in both symbols and words.

84. Why are six carbon dioxide molecules required to make one glucose molecule?

85. In what ways are photosystems I and II similar?

86. Why is it important that a membrane seperate the cellular regions on either side of an ATP synthase molecule in order for the protein to perform its function?

87. What is the role of hydrogen ions in the conversion of ADP to ATP?

88. What does the Calvin cycle do?

89. Describe the relationship between the light-dependent and the light-independent reactions.

90. What are three factors that affect the rate of photosynthesis?

91. What is the relationship between a calorie and a Calorie? If a person eats 2000 calories, how many Calories has he eaten?

92. What is cellular respiration?

93. List the three main stages of cellular respiration in order. Where does each stage take place in the cell?

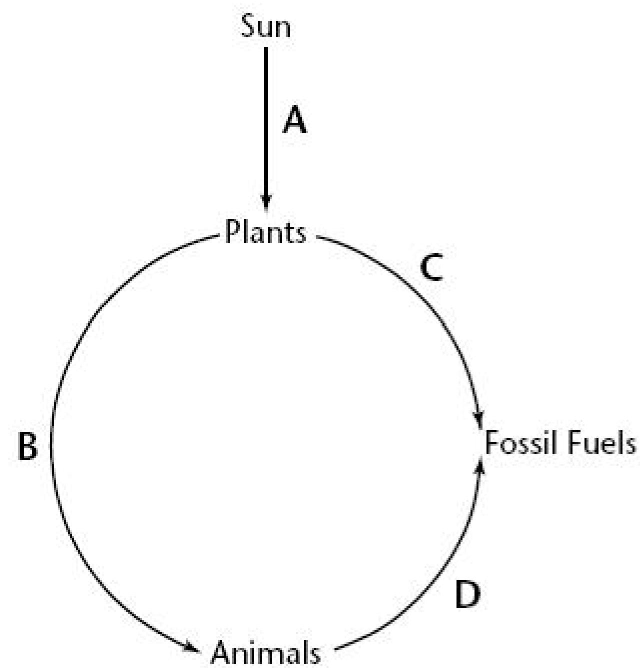


Figure 9–6

94. Figure 9–6 shows how energy flows among the sun, plants, animals, and fossil fuels. Which arrow represents cellular respiration? Explain your reasoning.

95. What roles does oxygen play in photosynthesis and in cellular respiration?

96. What happens to a molecule of glucose that undergoes glycolysis?

97. Describe glycolysis in terms of energy input, energy output, and net gain of ATP.

98. Why is the Krebs cycle also known as the citric acid cycle?

99. The electron transport chain uses the energy stored in high-energy electrons to pump H^+ ions across the inner mitochondrial membrane. Why?

100. What role does oxygen play in the electron transport chain?

101. Give two examples of fermentation in real life.

102. What are the two types of fermentation? How do their products differ?

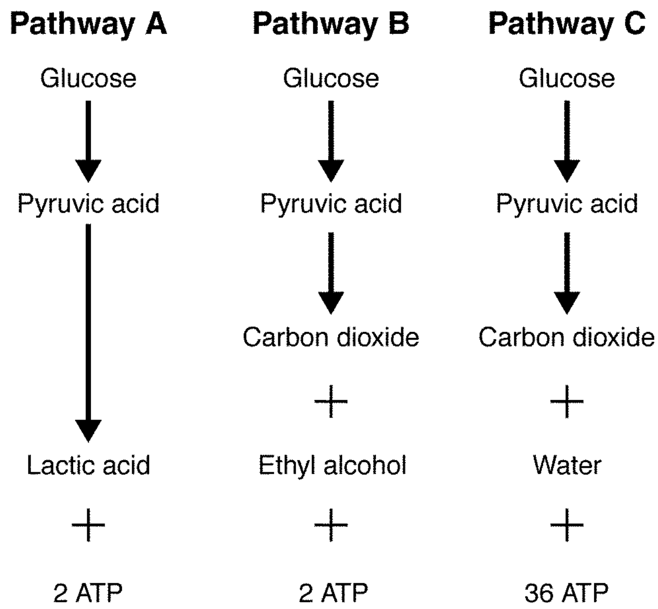


Figure 9–4

103. Given the inefficiency of two of the pathways shown in Figure 9–4, what advantage could there be to using these pathways to produce energy?

104. Based on Figure 9–4, which pathway is most efficient at producing energy for a cell? Explain your answer.

105. What three sources of ATP does your body use during a long aerobic exercise session?

106. List two problems that growth causes for cells.

107. What effect does cell size have on a cell's ability to efficiently carry out its activities?

108. Which type of reproduction, sexual or asexual, is best suited for organisms that live in a place where environmental conditions are stable? Explain.

109. How does packaging genetic information into chromosomes help the process of cell division?

110. Explain the difference between chromatids and chromatin.

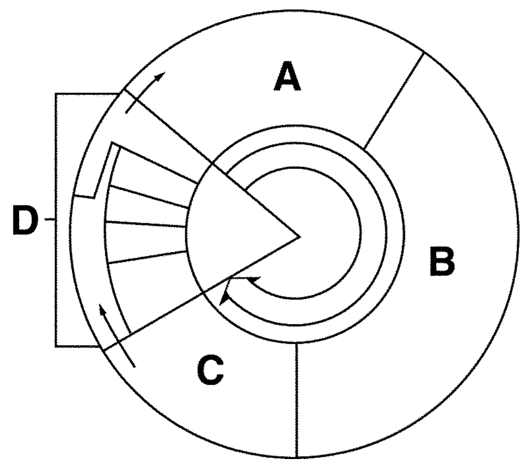


Figure 10–3

111. The main events of the cell cycle are labeled A, B, C, and D in Figure 10–3. Name these events. Then, briefly state what happens during each event.

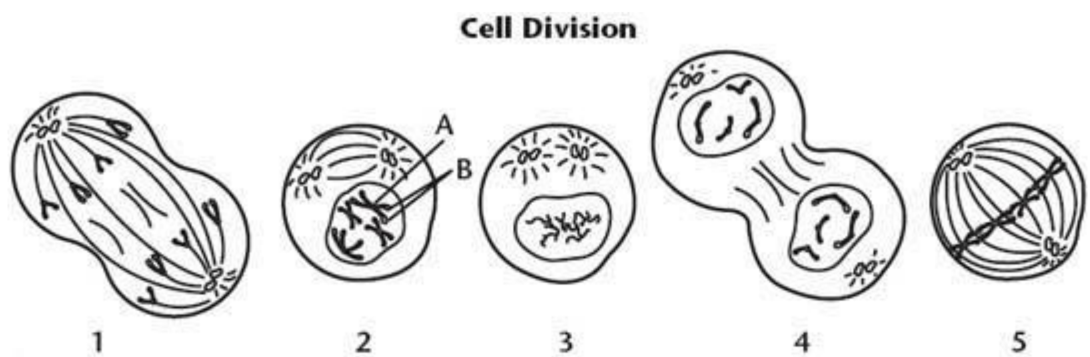


Figure 10-9

112. Identify each phase of mitosis shown in Figure 10-9 above and the order in which they occur.

113. How are metaphase and anaphase different?

114. Explain the difference between cytokinesis in plant cells and animal cells.

115. The level of cyclins in a cell increases during the M phase of the cell cycle. What might happen to a cell if no cyclins were present during the M phase?

116. How do cancer cells differ from normal cells?

117. Normal cells grown in a petri dish tend to divide until they form a thin layer covering the bottom of the dish. How would you expect cancer cells to behave in this situation?

118. What is differentiation?

119. How are embryonic stem cells different from adult stem cells?

120. Why is harvesting adult stem cells less controversial than harvesting embryonic stem cells?

Other

A student put together the experimental setup shown below. The selectively permeable membrane is permeable to water, but not the solute shown.

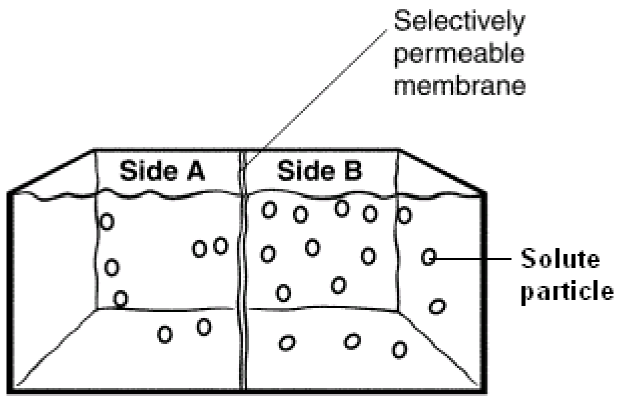


Figure 7–10

121. **Interpret Visuals** Describe the experimental setup shown in Figure 7–10.

122. **Compare and Contrast** How does the solution on Side A of the apparatus shown in Figure 7–10 differ from the solution on Side B?

123. **Predict** Look at Figure 7–10. Describe the movement of water in the experimental setup. What will happen to the concentration of water over time?

124. **Predict** What will the apparatus shown in Figure 7–10 look like when equilibrium is reached?

125. **Predict** Once equilibrium is reached in the apparatus shown in Figure 7–10, will the water molecules continue to move? Explain your answer.

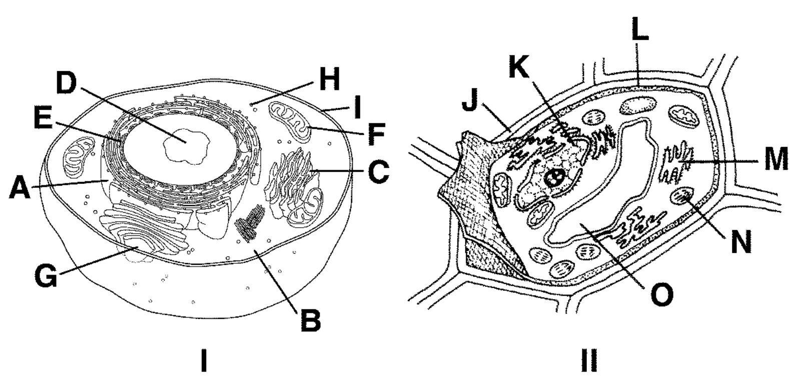


Figure 7–11

126. **Interpret Visuals** Which drawing in Figure 7–11, I or II, contains structures that carry out photosynthesis? What is this structure labeled in the diagram?

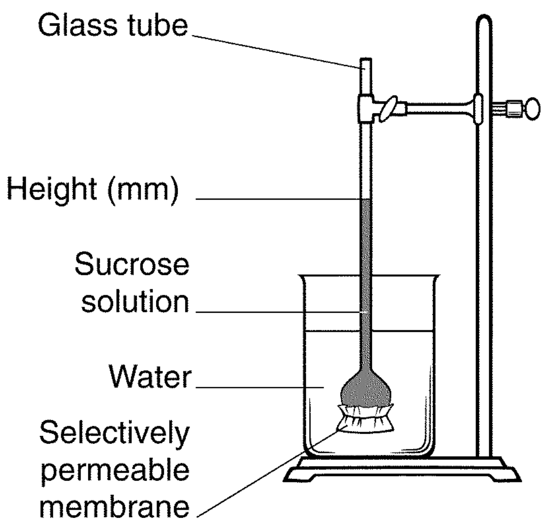
127. **Compare and Contrast** Look at Figure 7–11. Which structure in drawing I corresponds to structure L in drawing II? What is the name of this structure?

128. **Compare and Contrast** Which three structures are found in drawing II of Figure 7–11 but not in drawing I? What are the names of these structures?

129. **Interpret Visuals** Which organelle is labeled K in Figure 7–11? What is the function of this organelle?

130. **Interpret Visuals** Do the drawings in Figure 7–11 represent prokaryotes or eukaryotes? How do you know?

The experimental setup below shows an osmometer. An osmometer is a device used to measure the amount of osmotic pressure exerted by a liquid passing through a semipermeable membrane. The graph shows one lab group's results compared with the results of the rest of the class combined. Line A represents the results of the single lab group. Line B represents the data of the rest of the class.



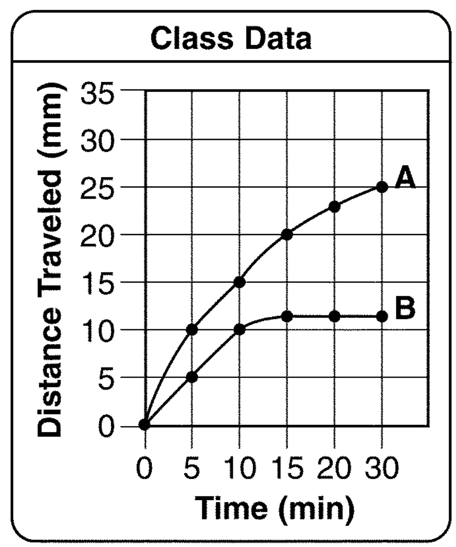


Figure 7–12

131. **Compare and Contrast** Look at the graph in Figure 7–12. Compare the lab results of the single lab group with those collected by the rest of the class.

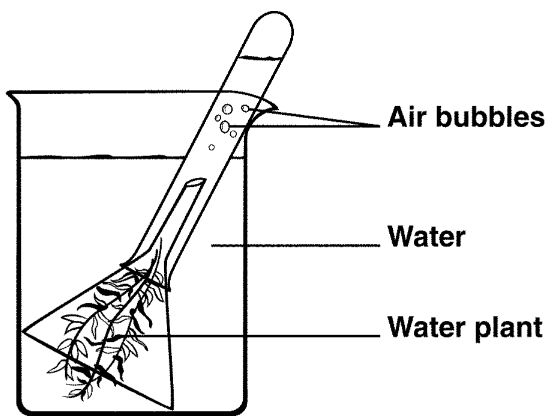
132. **Analyze Data** Which results in the graph in Figure 7–12 are more likely to be accurate, those represented by line A or by line B? Why?

133. **Evaluate and Revise** What could account for the difference in lines A and B in the graph in Figure 7–12?

134. **Predict** Look at the graph in Figure 7–12. How would the results differ if a sucrose solution with twice the concentration of the one used to collect the results represented by line A were used?

135. **Calculate** How might you use the graph in Figure 7–12 to calculate the rate of osmosis observed? What units would you use to report the rate?

A student prepared two beakers with identical sprigs of a water plant as shown below. She placed one beaker in the shade and the other beaker beside a fluorescent lamp. She then systematically changed the distance from the beaker to the lamp. She counted the bubbles given off by the plants in each beaker. Shown here is the graph of the data for the beaker she placed beside the lamp.



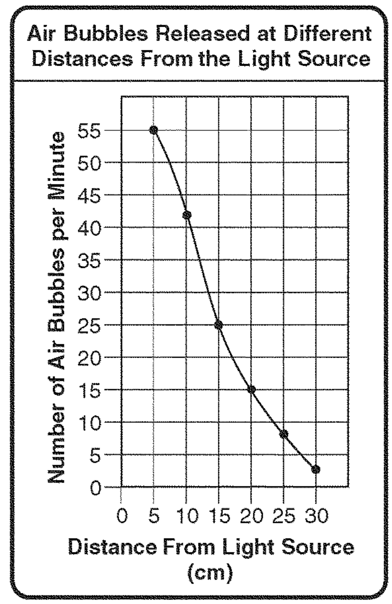


Figure 8–10

136. **Control Variables** In the experiment described in Figure 8–10, which beaker is the student's control?

137. **Apply Concepts** Look at Figure 8–10. If the student later tested the bubbles collected in the test tube, what would she find they are made of? How do you know?

138. **Interpret Graphs** Look at the graph in Figure 8–10. At what distance from the light source was the greatest number of bubbles produced?

139. **Analyze Data** Look at the graph in Figure 8–10. What do the student's data show?

140. **Predict** In the experiment described in Figure 8–10, if the lamp were placed closer than 5 centimeters from the water plant, would the plant give off many more bubbles? Why or why not?

A student put together two different experimental setups as shown below.

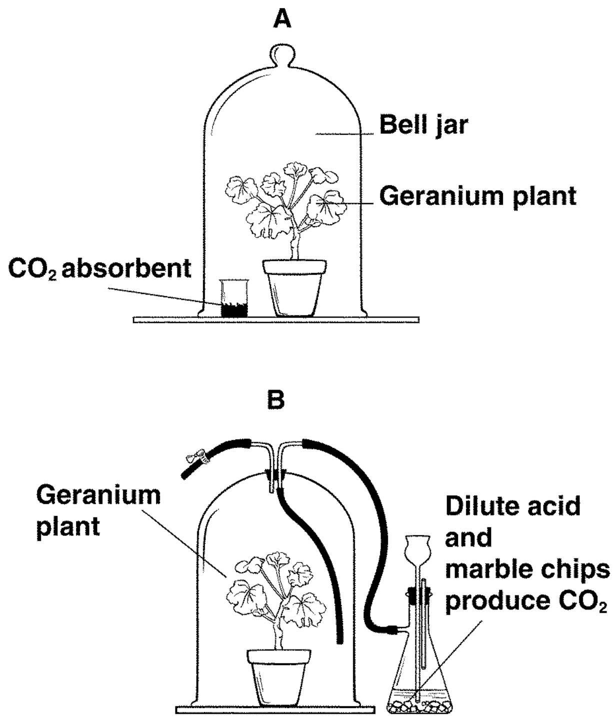


Figure 8–11

141. **Design an Experiment** Look at Figure 8–11. What factor is the student varying? What might the student be trying to test?

142. **Control Variables** Suggest an appropriate control for the experiment shown in Figure 8–11.

143. **Predict** In Figure 8–11, assume that the student placed Plant A in indirect sunlight for two days. How would the rate of photosynthesis of this plant compare with that of a plant grown under normal conditions?

144. **Predict** In Figure 8–11, assume that the student placed Plant B in indirect sunlight for two days. How would the rate of photosynthesis of this plant compare with that of a plant grown under normal conditions?

145. **Predict** Review the setups in Figure 8–11. Make a prediction about the effect of carbon dioxide on starch production in plants.

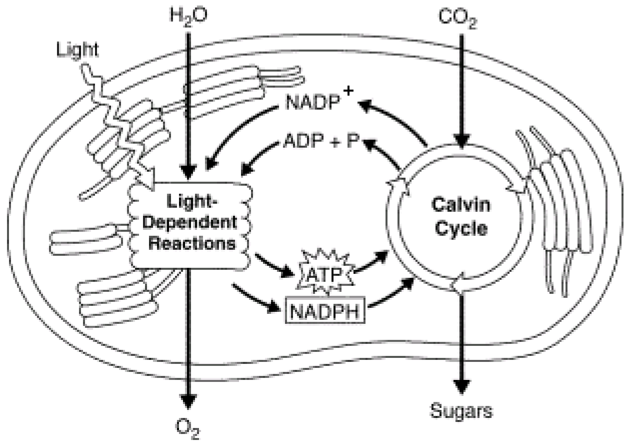


Figure 8–12

146. **Interpret Visuals** What process is shown in Figure 8–12?

147. **Interpret Visuals** What organelle is shown in Figure 8–12?

148. **Interpret Visuals** Look at Figure 8–12. What are the products of the light-dependent reactions?

149. **Interpret Visuals** What are the products of the Calvin cycle shown in Figure 8–12?

150. **Interpret Visuals** In Figure 8–12, what provides the carbon needed to make sugars?

A scientist set up a respiration chamber as shown below. She placed a mouse in flask B. Into flasks A, C, and D, she poured distilled water mixed with the acid-base indicator phenolphthalein. In the presence of CO_2, phenolphthalein turns from pink to clear. She allowed the mouse to stay in the chamber for about an hour.

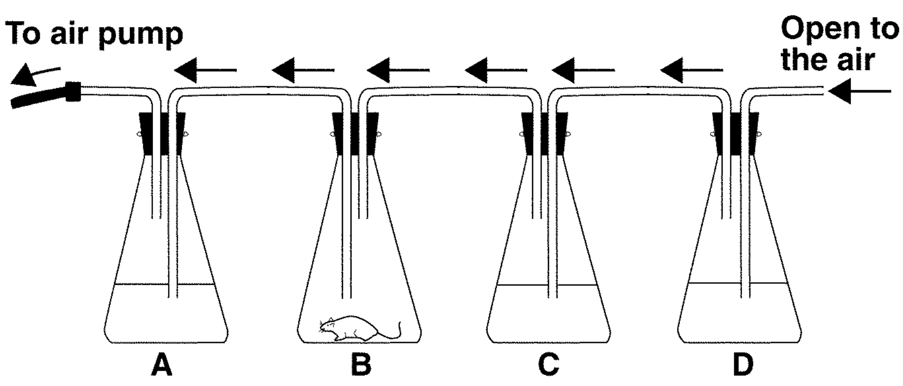


Figure 9–7

151. **Infer** Write the equation for cellular respiration. Based on this equation and the setup shown in Figure 9–7, what substance(s) would you expect the mouse in flask B to give off?

152. **Interpret Visuals** What will the mouse require to carry out cellular respiration? Look at the flasks in Figure 9–7. Describe the flow of materials through the flasks. Will the mouse receive fresh air so that it can survive?

153. **Interpret Visuals** Based on Figure 9–7, how will the scientist be able to detect whether the mouse is carrying out cellular respiration?

154. **Apply Concepts** Assume that the scientist set up an identical respiration chamber, except that in this setup she placed a cricket in flask B instead of a mouse. At the end of one hour, she measured the amount of CO_2 given off by the cricket and the mouse. A small amount of CO_2 had been given off by the mouse, but little to no CO_2 had been given off by the cricket. Was the cricket carrying out cellular respiration? Explain these results.

155. **Predict** Assume that the scientist set up an identical respiration chamber, except that in this setup she placed a mouse that had been exercising on a hamster wheel. Then, the scientist measured the amount of CO_2 given off by both mice at the end of 15 minutes. Predict which setup produced the most CO_2. Explain your answer.

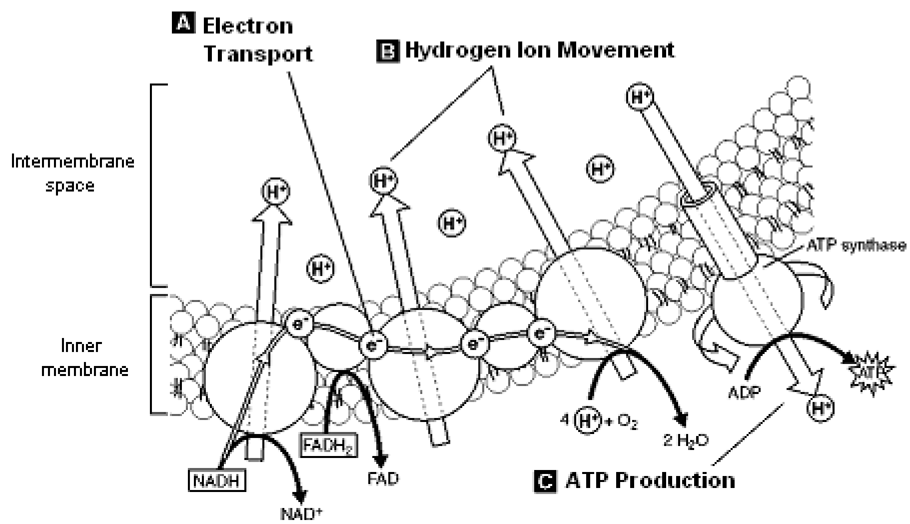


Figure 9–8

156. **Interpret Visuals** What process does Figure 9–8 show?

157. **Interpret Visuals** Look at Figure 9–8. Where do the electrons moving along the inner membrane come from?

158. **Interpret Visuals** Where do the electrons moving along the inner membrane in Figure 9–8 end up?

159. **Infer** Look at the arrows and H^+ ions in Figure 9–8. Which direction do most of the H^+ ions move in? What is the result of this movement?

160. **Interpret Visuals** ATP synthase is an enzyme. Find ATP synthase in Figure 9–8. What reaction does ATP synthase catalyze when an H^+ ion passes through its channel?

A student poured a solution of bromthymol blue indicator into three test tubes. Then, he placed an aquatic plant in two of the test tubes, as shown below. He placed a stopper on each test tube and placed them all in the dark for 24 hours. Bromthymol blue turns from blue to yellow in the presence of CO_2.

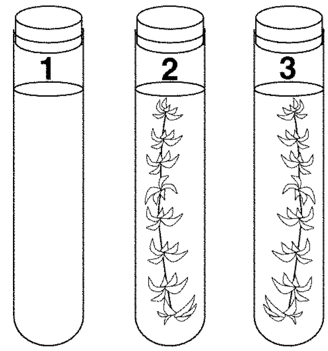


Figure 9–9

161. **Apply Concepts** Look at Figure 9–9. Which process or processes would you expect the organisms in the test tubes to carry out—cellular respiration, photosynthesis, or both? When would you expect each process to occur?

162. **Infer** What is the purpose of the bromthymol blue in Figure 9–9? How can the student use this indicator to draw conclusions about the processes that the aquatic plants are carrying out? Explain your answer.

163. **Predict** Predict what will happen to the test tubes in Figure 9–9 after 24 hours in the dark.

164. **Predict** Assume that after 24 hours in the dark, the bromthymol blue in test tubes 2 and 3 in Figure 9–9 had turned yellow. The student then placed test tube 3 in a sunny window. He left test tube 2 in the dark. Predict what color the solution in each test tube will be after the next 24 hours.

165. **Apply Concepts** Explain your prediction in question 14 in terms of cellular respiration and/or photosynthesis.

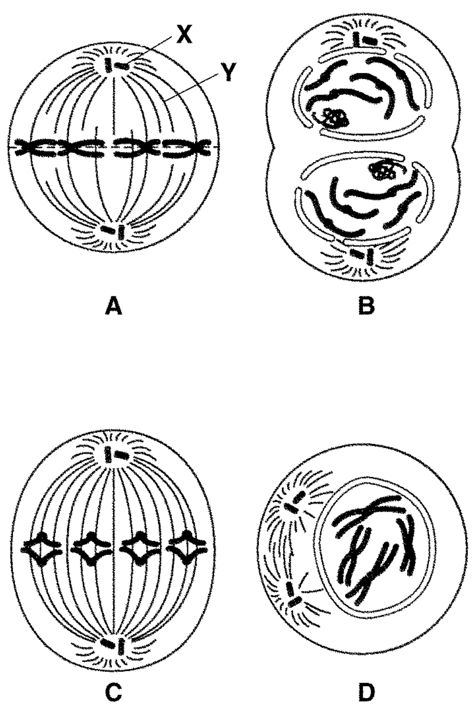


Figure 10–10

166. **Interpret Visuals** What does Figure 10–10 represent? How do you know if this is an animal cell or a plant cell?

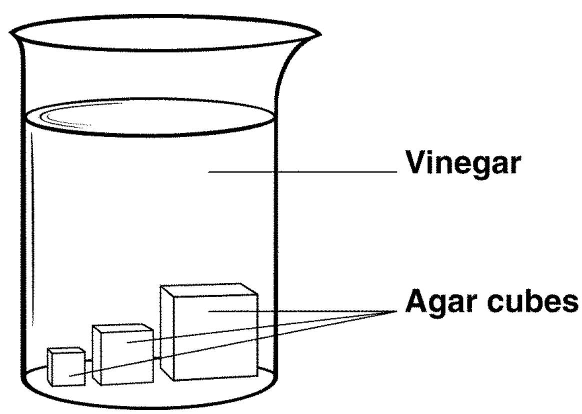
167. **Infer** What is the chromosome number of the cell shown in Figure 10–10?

168. **Infer** Identify the structures labeled X and Y in Figure 10–10.

169. **Apply Concepts** List the correct order for the diagrams in Figure 10–10.

170. **Predict** After the steps shown in Figure 10–10 are arranged in the correct order, what would a diagram of the next step show?

A student placed three cubes of agar that contained the indicator phenolphthalein in a beaker of vinegar. The sides of the cubes were the following lengths: 3 cm, 2 cm, and 1 cm. In the presence of an acid, such as vinegar, phenolphthalein turns from pink to clear. After 10 minutes, the student cut each cube open and measured the distance that the vinegar had diffused into each cube. She then started to complete the data table.



Comparison of Agar Cubes

Cube Size (length in cm)	Surface Area (cm^2)	Volume (cm^3)	Ratio of Surface Area to Volume	Depth of Diffusion (mm)	Time (minutes)	Rate of Diffusion (mm/minute)
3	54	27			10	
2					10	
1	6	1			10	

Figure 10–11

171. **Design an Experiment** What is the student probably trying to test? What do the cubes in Figure 10–11 probably represent?

172. **Calculate** Look at the data table in Figure 10–11. What are the surface area, volume, and ratio of surface area to volume for the cube that is 2 cm in length?

173. **Compare and Contrast** Compare the cubes in Figure 10–11 with respect to their sizes and their ratios of surface area to volume.

174. **Infer** Look at the experimental setup in Figure 10–11. How will the student know how far the vinegar has diffused into each cube?

175. **Predict** Examine Figure 10–11. In which cube will the vinegar take the longest time to diffuse into the center? In which tube will the vinegar take the shortest time to diffuse into the center?

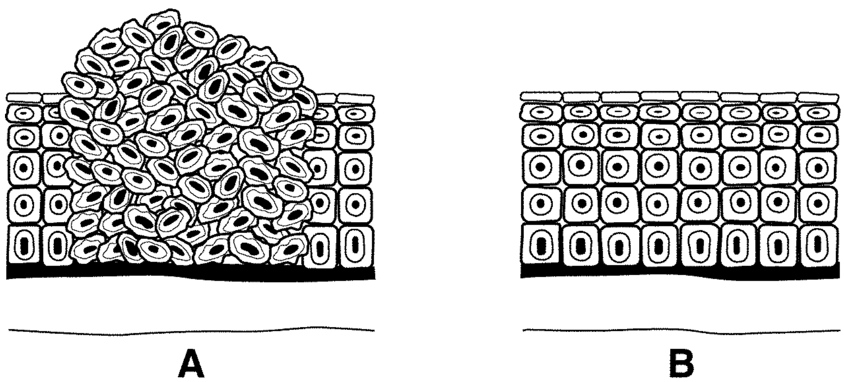


Figure 10–12

176. **Interpret Visuals** Look at Figure 10–12. Which diagram shows cancer cells? How do you know?

177. **Compare and Contrast** Explain how cancer cells are different from normal cells. Then, relate these characteristics to the diagram in Figure 10–12 that shows cancer cells.

178. **Predict** Look at the cancer cells shown in Figure 10–12. What can happen if these cells are left untreated?

179. **Apply Concepts** Explain the role that p53 might have had in the growth and division of the cells shown in each diagram in Figure 10–12.

180. **Problem Solving** How might the cancer cells shown in Figure 10–12 be prevented from doing more harm to the organism they are a part of?

Essay

181. Summarize three statements from the cell theory. Explain the significance of the cell theory to biology.

182. Describe the cell membrane, cell wall, nucleus, and cytoplasm. Which of these structures are you likely to find in a prokaryotic cell? Eukaryotic cell? Plant cell? Animal cell?

183. Distinguish between microtubules and microfilaments. Describe two functions of each kind of structure.

184. Compare and contrast the structure and function of the cell wall with that of the cell membrane.

185. Why is the cell membrane sometimes compared to mosaic art?

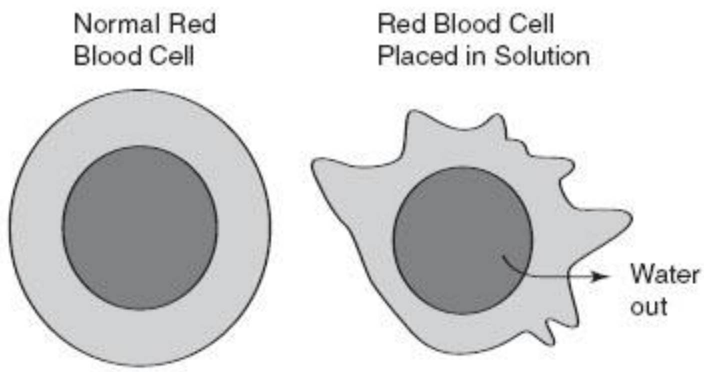


Figure 7-13

186. The diagrams in Figure 7-13 above show a normal blood cell before and after it is placed in a solution. Describe what could cause the cell to react the way that it did.

187. Imagine a container separated into two compartments by a membrane that is permeable to sugar. Describe what happens when sugar solutions with two different concentrations are placed on opposite sides of the membrane.

188. How do facilitated diffusion and active transport differ? Is osmosis an example of facilitated diffusion or active transport?

189. Compare a cell from a unicellular organism with a cell from a multicellular organism in terms of cell specialization.

190. Discuss the levels of organization in multicellular organisms and explain why these levels are not used to describe unicellular organisms.

191. Compare the storage capacity of ATP and glucose. How does the cell use each of these molecules to store energy?

192. Discuss the relationship between autotrophs and heterotrophs. Do heterotrophs depend on autotrophs for their survival? Explain your answer.

193. Describe how pigments obtain energy from light. Use chlorophyll as an example of the process you describe.

194. Describe the kinds of light that chlorophyll and carotene pigments absorb. What is the advantage for a plant to have more than one kind of pigment?

195. Trace the events that occur in the thylakoid membrane during the light-dependent reactions.

196. What happens to the electrons in a chlorophyll molecule when light shines on it? Does the chlorophyll molecule ever run out of electrons? Explain your answer.

197. Some people informally call the light-dependent reactions the “light reactions” and the light-independent reactions the “dark reactions.” Why is this naming system misleading?

198. Describe the activities that take place in the stroma in (a) bright sunlight and in (b) darkness.

199. Identify three factors that affect the rate of photosynthesis and explain the effect of each.

200. Describe how photosynthesis in CAM plants differs from photosynthesis in more typical plants. Why is it unlikely that you would find a CAM plant in an aquatic environment?

201. What would happen if all the energy in glucose were released in just one step instead of gradually as it is in cellular respiration? How is the gradual process of cellular respiration advantageous to the cell?

202. Compare photosynthesis with cellular respiration.

203. List the main events of glycolysis. How many ATP molecules are produced and consumed by glycolysis? What effect does the presence of oxygen have on the events that follow glycolysis?

204. Describe the main steps and the results of the Krebs cycle.

205. Identify the electron carriers of cellular respiration. Discuss the relationship between the electron carriers and the electron transport chain.

206. Explain how high-energy electrons are used by the electron transport chain to produce ATP.

207. Compare lactic acid fermentation with alcoholic fermentation. Where does each process occur? What are the products of each process?

208. People who suffer from a heart attack often have an increased ratio of lactic acid to pyruvic acid in their hearts. What does this observation say about the availability of oxygen in the heart muscle cells of someone who has had a heart attack? How could you use this information to screen people who might be at risk for a heart attack?

209. Which pathways does the body use to release energy during exercise? Discuss these pathways in terms of a footrace.

210. Why does lactic acid fermentation “kick in” during a sprint race?

211. Relate ratio of surface area to volume to cell growth and cell division.

212. What kinds of problems does growth cause for cells? How does cell division help a cell solve these problems?

213. List and describe the main events of the cell cycle. Illustrate your description with a diagram of the cell cycle.

214. Describe what happens during the four stages of mitosis.

215. Assume that prophase begins with eight chromatids in the nucleus of a cell. When telophase ends, how many chromosomes will be present in each new nucleus? Explain your answer.

216. Discuss the relationship between mitosis and cytokinesis. What would be the result if one happened without the other?

217. Describe how the skin cells near a cut behave. What role does contact with other cells have in the behavior of cells near a cut?

218. Describe how the cell cycle is regulated.

219. Describe how cancer cells are different from other cells. Based on these differences, explain why cancer has been such a difficult condition to cure.

220. Why are some people opposed to stem cell research, and why do others believe it is unethical to not pursue such research? What do you think scientists should do concerning these issues?

Cell Unit Practice Test
Answer Section

COMPLETION

1. ANS: cells

   PTS: 1 DIF: L2 REF: p. 191 OBJ: 7.1.1 State the cell theory.
   STA: UT.BIO.2.3.b TOP: Foundation Edition
   BLM: comprehension
2. ANS: transmission

   PTS: 1 DIF: L2 REF: p. 192
   OBJ: 7.1.2 Describe how the different types of microscopes work.
   TOP: Foundation Edition BLM: comprehension
3. ANS: nucleus

   PTS: 1 DIF: L3 REF: p. 194
   OBJ: 7.1.3 Distinguish between prokaryotes and eukaryotes. STA: UT.BIO.2.3.d
   BLM: synthesis
4. ANS: nucleolus

   PTS: 1 DIF: L1 REF: p. 196
   OBJ: 7.2.1 Describe the structure and function of the cell nucleus.
   STA: UT.BIO.2.3.d TOP: Foundation Edition
   BLM: knowledge
5. ANS: chromosomes

   PTS: 1 DIF: L2 REF: p. 197
   OBJ: 7.2.1 Describe the structure and function of the cell nucleus.
   STA: UT.BIO.2.3.d BLM: comprehension
6. ANS: vacuole or central vacuole

   PTS: 1 DIF: L3 REF: p. 198
   OBJ: 7.2.2 Describe the role of vacuoles, lysosomes, and the cytoskeleton.
   STA: UT.BIO.2.3.d BLM: synthesis
7. ANS: ribosomes

   PTS: 1 DIF: L2 REF: p. 200
   OBJ: 7.2.3 Identify the role of ribosomes, endoplasmic reticulum, and Golgi apparatus in making proteins.
   STA: UT.BIO.2.3.d TOP: Foundation Edition
   BLM: analysis
8. ANS: chloroplasts, mitochondria

   PTS: 1 DIF: L3 REF: p. 202
   OBJ: 7.2.4 Describe the function of the chloroplasts and mitochondria in the cell.
   STA: UT.BIO.2.3.d BLM: synthesis
9. ANS: cell membrane

PTS: 1 DIF: L2 REF: p. 204
OBJ: 7.2.5 Describe the function of the cell membrane. STA: UT.BIO.2.3.d
TOP: Foundation Edition BLM: comprehension

10. ANS: diffusion

PTS: 1 DIF: L1 REF: p. 208 OBJ: 7.3.1 Describe passive transport.
STA: UT.BIO.2.3.c BLM: knowledge

11. ANS: facilitated diffusion

PTS: 1 DIF: L3 REF: p. 209 OBJ: 7.3.1 Describe passive transport.
STA: UT.BIO.2.3.c BLM: synthesis

12. ANS: active transport

PTS: 1 DIF: L2 REF: p. 212 OBJ: 7.3.2 Describe active transport.
STA: UT.BIO.2.3.c TOP: Foundation Edition
BLM: comprehension

13. ANS: homeostasis

PTS: 1 DIF: L1 REF: p. 214
OBJ: 7.4.1 Explain how unicellular organisms maintain homeostasis.
STA: UT.BIO.2.3.c TOP: Foundation Edition
BLM: knowledge

14. ANS: specialization

PTS: 1 DIF: L1 REF: p. 215
OBJ: 7.4.2 Explain how multicellular organism maintain homeostasis.
STA: UT.BIO.2.3.c TOP: Foundation Edition
BLM: knowledge

15. ANS: cells, organs

PTS: 1 DIF: L1 REF: p. 216
OBJ: 7.4.2 Explain how multicellular organism maintain homeostasis.
STA: UT.BIO.2.3.c TOP: Foundation Edition
BLM: knowledge

16. ANS: ATP

PTS: 1 DIF: L2 REF: p. 227
OBJ: 8.1.1 Describe the role of ATP in cellular activities. STA: UT.BIO.2.1.a
TOP: Foundation Edition BLM: comprehension

17. ANS:
heterotrophs
consumers

PTS: 1 DIF: L1 REF: p. 228
OBJ: 8.1.2 Explain where plants get the energy they need to produce food.
STA: UT.BIO.2.2.a TOP: Foundation Edition
BLM: knowledge

18. ANS:
pigments

chlorophyll

PTS: 1 DIF: L2 REF: p. 230
OBJ: 8.2.1 Explain the role of light and pigments in photosynthesis.
STA: UT.BIO.2.2.b | UT.BIO.2.3.d TOP: Foundation Edition
BLM: application

19. ANS: green

PTS: 1 DIF: L2 REF: p. 231
OBJ: 8.2.1 Explain the role of light and pigments in photosynthesis.
STA: UT.BIO.2.2.b | UT.BIO.2.3.d BLM: application

20. ANS: Thylakoids

PTS: 1 DIF: L2 REF: p. 231
OBJ: 8.2.1 Explain the role of light and pigments in photosynthesis.
STA: UT.BIO.2.2.b | UT.BIO.2.3.d TOP: Foundation Edition
BLM: comprehension

21. ANS: grana

PTS: 1 DIF: L1 REF: p. 231
OBJ: 8.2.1 Explain the role of light and pigments in photosynthesis.
STA: UT.BIO.2.2.b | UT.BIO.2.3.d TOP: Foundation Edition
BLM: knowledge

22. ANS: green

PTS: 1 DIF: L2 REF: p. 230 | p. 231
OBJ: 8.2.1 Explain the role of light and pigments in photosynthesis.
STA: UT.BIO.2.2.b | UT.BIO.2.3.d BLM: application

23. ANS: stroma

PTS: 1 DIF: L1 REF: p. 231
OBJ: 8.2.1 Explain the role of light and pigments in photosynthesis.
STA: UT.BIO.2.2.b | UT.BIO.2.3.d TOP: Foundation Edition
BLM: knowledge

24. ANS: B

PTS: 1 DIF: L2 REF: p. 235 | p. 237
OBJ: 8.3.1 Describe what happens during the light-dependent reactions.
STA: UT.BIO.2.2.b | UT.BIO.2.3.d TOP: Foundation Edition
BLM: application

25. ANS: $NADP^+$

PTS: 1 DIF: L2 REF: p. 232
OBJ: 8.2.2 Explain the role of electron carrier molecules in photosynthesis.
STA: UT.BIO.2.2.b TOP: Foundation Edition
BLM: comprehension

26. ANS:
high-energy sugars
glucose

PTS: 1 DIF: L1 REF: p. 232
OBJ: 8.2.3 State the overall equation for photosynthesis.
STA: UT.BIO.2.1.b | UT.BIO.2.2.b | UT.BIO.2.2.c TOP: Foundation Edition
BLM: knowledge

27. ANS: ATP synthase

PTS: 1 DIF: L2 REF: p. 236 | p. 237
OBJ: 8.3.1 Describe what happens during the light-dependent reactions.
STA: UT.BIO.2.2.b | UT.BIO.2.3.d TOP: Foundation Edition
BLM: application

28. ANS: water

PTS: 1 DIF: L3 REF: p. 236 | p. 237
OBJ: 8.3.1 Describe what happens during the light-dependent reactions.
STA: UT.BIO.2.2.b | UT.BIO.2.3.d BLM: synthesis

29. ANS: carbon dioxide

PTS: 1 DIF: L2 REF: p. 239
OBJ: 8.3.2 Describe what happens during the light-independent reactions.
STA: UT.BIO.2.2.b | UT.BIO.2.3.d TOP: Foundation Edition
BLM: comprehension

30. ANS: decreases

PTS: 1 DIF: L2 REF: p. 240
OBJ: 8.3.3 Identify factors that affect the rate at which photosynthesis occurs.
STA: UT.BIO.2.2.b BLM: application

31. ANS: the sun

PTS: 1 DIF: L2 REF: p. 250
OBJ: 9.1.1 Explain where organisms get the energy they need for life processes.
STA: UT.BIO.2.2.b TOP: Foundation Edition
BLM: application

32. ANS: glycolysis, electron transport

PTS: 1 DIF: L1 REF: p. 252 OBJ: 9.1.2 Define cellular respiration.
STA: UT.BIO.2.2.b | UT.BIO.2.2.c TOP: Foundation Edition
BLM: knowledge

33. ANS: photosynthesis

PTS: 1 DIF: L3 REF: p. 253
OBJ: 9.1.3 Compare photosynthesis and cellular respiration. STA: UT.BIO.2.2.b
BLM: synthesis

34. ANS: cellular respiration

PTS: 1 DIF: L1 REF: p. 253
OBJ: 9.1.3 Compare photosynthesis and cellular respiration. STA: UT.BIO.2.2.b
TOP: Foundation Edition BLM: knowledge

35. ANS: pyruvic acid

PTS: 1 DIF: L1 REF: p. 254

OBJ: 9.2.1 Describe what happens during glycolysis. STA: UT.BIO.2.2.b
TOP: Foundation Edition BLM: knowledge

36. ANS: 2

PTS: 1 DIF: L3 REF: p. 256 | p. 257
OBJ: 9.2.2 Describe what happens during the Krebs cycle. STA: UT.BIO.2.2.b
BLM: synthesis

37. ANS: H^+ ions

PTS: 1 DIF: L3 REF: p. 258
OBJ: 9.2.3 Explain how high-energy electrons are used by the electron transport chain.
STA: UT.BIO.2.2.b BLM: synthesis

38. ANS: electron transport chain

PTS: 1 DIF: L2 REF: p. 258
OBJ: 9.2.3 Explain how high-energy electrons are used by the electron transport chain.
STA: UT.BIO.2.2.b TOP: Foundation Edition
BLM: comprehension

39. ANS: 2

PTS: 1 DIF: L2 REF: p. 254
OBJ: 9.2.4 Identify how much ATP cellular respiration generates.
STA: UT.BIO.2.2.b | UT.BIO.2.2.c TOP: Foundation Edition
BLM: comprehension

40. ANS: alcoholic

PTS: 1 DIF: L2 REF: p. 263
OBJ: 9.3.1 Explain how organisms get energy in the absence of oxygen.
STA: UT.BIO.2.2.b TOP: Foundation Edition
BLM: analysis

41. ANS: 2

PTS: 1 DIF: L1 REF: p. 254 | p. 263
OBJ: 9.3.1 Explain how organisms get energy in the absence of oxygen.
STA: UT.BIO.2.2.b TOP: Foundation Edition
BLM: knowledge

42. ANS: C

PTS: 1 DIF: L2 REF: p. 252 | p. 263
OBJ: 9.1.2 Define cellular respiration. STA: UT.BIO.2.2.b | UT.BIO.2.2.c
TOP: Foundation Edition BLM: analysis

43. ANS: oxygen

PTS: 1 DIF: L1 REF: p. 265
OBJ: 9.3.2 Identify the pathways the body uses to release energy during exercise.
STA: UT.BIO.2.2.b BLM: knowledge

44. ANS: lactic acid

PTS: 1 DIF: L2 REF: p. 265
OBJ: 9.3.2 Identify the pathways the body uses to release energy during exercise.

STA: UT.BIO.2.2.b TOP: Foundation Edition
BLM: application

45. ANS: more

PTS: 1 DIF: L3 REF: p. 252
OBJ: 9.3.2 Identify the pathways the body uses to release energy during exercise.
STA: UT.BIO.2.2.b BLM: synthesis

46. ANS: less

PTS: 1 DIF: L1 REF: p. 274
OBJ: 10.1.1 Explain the problems that growth causes for cells. STA: UT.BIO.2.3.a
BLM: knowledge

47. ANS: sexual, asexual

PTS: 1 DIF: L2 REF: p. 277
OBJ: 10.1.2 Compare asexual and sexual reproduction. STA: UT.BIO.4.1.b
TOP: Foundation Edition BLM: comprehension

48. ANS: 92

PTS: 1 DIF: L3 REF: p. 280 | p. 282
OBJ: 10.2.1 Describe the role of chromosomes in cell division.
STA: UT.BIO.2.3.a TOP: Foundation Edition
BLM: synthesis

49. ANS: mitosis

PTS: 1 DIF: L1 REF: p. 282
OBJ: 10.2.2 Name the main events of the cell cycle. STA: UT.BIO.2.3.a
TOP: Foundation Edition BLM: knowledge

50. ANS: interphase

PTS: 1 DIF: L2 REF: p. 281
OBJ: 10.2.2 Name the main events of the cell cycle. STA: UT.BIO.2.3.a
TOP: Foundation Edition BLM: comprehension

51. ANS: 10

PTS: 1 DIF: L3 REF: p. 281 | p. 282
OBJ: 10.2.2 Name the main events of the cell cycle. STA: UT.BIO.2.3.a
TOP: Foundation Edition BLM: synthesis

52. ANS: metaphase

PTS: 1 DIF: L2 REF: p. 282
OBJ: 10.2.3 Describe what happens during the four phases of mitosis.
STA: UT.BIO.2.3.a TOP: Foundation Edition
BLM: comprehension

53. ANS: G_1 phase, Interphase

PTS: 1 DIF: L3 REF: p. 284
OBJ: 10.2.2 Name the main events of the cell cycle. STA: UT.BIO.2.3.a
TOP: Foundation Edition BLM: synthesis

54. ANS: cell plate

PTS: 1 DIF: L2 REF: p. 284
OBJ: 10.2.4 Describe the process of cytokinesis. STA: UT.BIO.2.3.a
TOP: Foundation Edition BLM: application

55. ANS: plant

PTS: 1 DIF: L2 REF: p. 284
OBJ: 10.2.4 Describe the process of cytokinesis. STA: UT.BIO.2.3.a
TOP: Foundation Edition BLM: analysis

56. ANS: apoptosis

PTS: 1 DIF: L1 REF: p. 288
OBJ: 10.3.1 Describe how the cell cycle is regulated. STA: UT.BIO.2.3.a
TOP: Foundation Edition BLM: knowledge

57. ANS: cancer

PTS: 1 DIF: L1 REF: p. 289
OBJ: 10.3.2 Explain how cancer cells are different from other cells.
STA: UT.BIO.2.3.a TOP: Foundation Edition
BLM: comprehension

58. ANS: differentiation

PTS: 1 DIF: L2 REF: p. 293
OBJ: 10.4.1 Describe the process of differentiation. STA: UT.BIO.2.3.d
TOP: Foundation Edition BLM: comprehension

59. ANS: pluripotent

PTS: 1 DIF: L2 REF: p. 294 | p. 295
OBJ: 10.4.2 Define stem cells and explain their importance. STA: UT.BIO.2.3.d
TOP: Foundation Edition BLM: comprehension

60. ANS: adult

PTS: 1 DIF: L3 REF: p. 297
OBJ: 10.4.3 Identify the possible benefits and issues relating to stem cell research.
STA: UT.BIO.4.2.d BLM: evaluation

SHORT ANSWER

61. ANS:
The cell theory says that all living things are composed of cells. It also says that cells are the basic units of structure and function in living things and that new cells come from existing cells.

PTS: 1 DIF: L1 REF: p. 191 OBJ: 7.1.1 State the cell theory.
STA: UT.BIO.2.3.b TOP: Foundation Edition
BLM: knowledge

62. ANS:
DNA is too small to see with a light microscope, so an electron microscope is needed to examine its structure. Electron microscopes cannot be used to look at living specimens, so the structure of DNA cannot be studied in a living specimen.

PTS: 1 DIF: L3 REF: p. 191 | p. 193
OBJ: 7.1.2 Describe how the different types of microscopes work.
BLM: application

63. ANS:
This cell is a prokaryote. It has a cell wall, indicated by the letter B, and its DNA, indicated by the letter C, is not enclosed in a nucleus.

PTS: 1 DIF: L3 REF: p. 194
OBJ: 7.1.3 Distinguish between prokaryotes and eukaryotes. STA: UT.BIO.2.3.d
BLM: evaluation

64. ANS:
Prokaryotes are generally simpler and smaller than eukaryotes, whereas eukaryotes enclose their DNA in a nucleus and have other specialized organelles.

PTS: 1 DIF: L2 REF: p. 194
OBJ: 7.1.3 Distinguish between prokaryotes and eukaryotes. STA: UT.BIO.2.3.d
TOP: Foundation Edition BLM: analysis

65. ANS:
The nucleus is the control center of the cell and contains nearly all the cell's DNA.

PTS: 1 DIF: L1 REF: p. 197
OBJ: 7.2.1 Describe the structure and function of the cell nucleus.
STA: UT.BIO.2.3.d TOP: Foundation Edition
BLM: knowledge

66. ANS:
The cytoskeleton helps the cell maintain its shape and internal organization. It is also involved in many forms of cell movement.

PTS: 1 DIF: L1 REF: p. 199
OBJ: 7.2.2 Describe the role of vacuoles, lysosomes, and the cytoskeleton.
STA: UT.BIO.2.3.d TOP: Foundation Edition
BLM: knowledge

67. ANS:
(A) rough endoplasmic reticulum; (B) cytoplasm; (C) smooth endoplasmic reticulum; (D) nucleolus; (E) nucleus; (F) mitochondrion; (G) Golgi apparatus; (H) ribosome; (I) cell membrane

PTS: 1 DIF: L2 REF: p. 196 | p. 202
OBJ: 7.2.3 Identify the role of ribosomes, endoplasmic reticulum, and Golgi apparatus in making proteins.
STA: UT.BIO.2.3.d TOP: Foundation Edition
BLM: application

68. ANS:
The structure identified with the letter E is a chloroplast, which captures energy from sunlight and converts it into chemical energy. The structures identified with the letter D are mitochondria, which convert chemical energy into compounds more convenient for the cell to use. The cell with the chloroplasts is a plant cell.

PTS: 1 DIF: L2 REF: p. 202
OBJ: 7.2.4 Describe the function of the chloroplasts and mitochondria in the cell.
STA: UT.BIO.2.3.d TOP: Foundation Edition
BLM: evaluation

69. ANS:
Cell walls protect the plant cells from expanding even under tremendous osmotic pressure.

PTS: 1 DIF: L3 REF: p. 211
OBJ: 7.2.5 Describe the function of the cell membrane. STA: UT.BIO.2.3.d
BLM: synthesis

70. ANS:
The cell would die because needed nutrients, such as food and water, could not get inside the cell and wastes would accumulate inside the cell.

PTS: 1 DIF: L3 REF: p. 204 | p. 205
OBJ: 7.2.5 Describe the function of the cell membrane. STA: UT.BIO.2.3.d
BLM: evaluation

71. ANS:
Diffusion is the movement of molecules from an area of higher concentration to an area of lower concentration.

PTS: 1 DIF: L1 REF: p. 208 OBJ: 7.3.1 Describe passive transport.
STA: UT.BIO.2.3.c TOP: Foundation Edition
BLM: knowledge

72. ANS:
Because the concentration of water in the cup is greater than the concentration of water in the raisin, water will flow from the cup into the raisin.

PTS: 1 DIF: L3 REF: p. 208 | p. 210
OBJ: 7.3.1 Describe passive transport. STA: UT.BIO.2.3.c
BLM: application

73. ANS:
The cell would swell and burst, because the 0.2% salt solution is hypotonic with respect to the cell, causing a net movement of water into the cell.

PTS: 1 DIF: L3 REF: p. 210 | p. 211
OBJ: 7.3.1 Describe passive transport. STA: UT.BIO.2.3.c
BLM: synthesis

74. ANS:
Both are forms of active transport of large molecules carried out by movements of the cell membrane. Endocytosis involves taking material into the cell, whereas exocytosis involves moving material out of the cell.

PTS: 1 DIF: L2 REF: p. 213 OBJ: 7.3.2 Describe active transport.
STA: UT.BIO.2.3.c TOP: Foundation Edition
BLM: analysis

75. ANS:
cell, tissue, organ, organ system

PTS: 1 DIF: L1 REF: p. 216
OBJ: 7.4.2 Explain how multicellular organism maintain homeostasis.
STA: UT.BIO.2.3.c TOP: Foundation Edition
BLM: knowledge

76. ANS:

When a phosphate group is removed from ATP, energy that was strored in the bond between phosphate groups is released and ADP is formed.

PTS: 1 DIF: L2 REF: p. 226 | p. 227
OBJ: 8.1.1 Describe the role of ATP in cellular activities. STA: UT.BIO.2.1.a
TOP: Foundation Edition BLM: comprehension

77. ANS:
ATP is the chief energy-storing molecule used by organisms. Energy is released when the bonds between phosphate groups are broken, converting ATP into ADP.

PTS: 1 DIF: L2 REF: p. 227
OBJ: 8.1.1 Describe the role of ATP in cellular activities. STA: UT.BIO.2.1.a
TOP: Foundation Edition BLM: comprehension

78. ANS:
Autotrophs are organisms that can make their own food; one example is grass. Heterotrophs are organisms that get energy by consuming other organisms or organic matter; an example is a rabbit.

PTS: 1 DIF: L1 REF: p. 228
OBJ: 8.1.2 Explain where plants get the energy they need to produce food.
STA: UT.BIO.2.2.a TOP: Foundation Edition
BLM: knowledge

79. ANS:
Heterotrophs get energy by eating autotrophs and/or other heterotrophs. They obtain the sun's energy that is stored in the autotrophs they eat or by feeding on animals that eat autotrophs.

PTS: 1 DIF: L2 REF: p. 228
OBJ: 8.1.2 Explain where plants get the energy they need to produce food.
STA: UT.BIO.2.2.a TOP: Foundation Edition
BLM: application

80. ANS:
Pond plants and phytoplankton are autotrophs. Ducks, turtles, snails, insects, and fish are heterotrophs.

PTS: 1 DIF: L3 REF: p. 228
OBJ: 8.1.2 Explain where plants get the energy they need to produce food.
STA: UT.BIO.2.2.a BLM: synthesis

81. ANS:
The plants exposed to red light should grow better because chlorophyll absorbs red light well but does not absorb green light well.

PTS: 1 DIF: L3 REF: p. 230 | p. 231
OBJ: 8.2.1 Explain the role of light and pigments in photosynthesis.
STA: UT.BIO.2.2.b | UT.BIO.2.3.d BLM: synthesis

82. ANS:
Electron carriers accept pairs of high-energy electrons and transfer them, along with their energy, to other molecules. $NADP^+$ is one example of an electron carrier.

PTS: 1 DIF: L2 REF: p. 232
OBJ: 8.2.2 Explain the role of electron carrier molecules in photosynthesis.
STA: UT.BIO.2.2.b TOP: Foundation Edition
BLM: comprehension

83. ANS:

$$6CO_2 + 6H_2O \xrightarrow{\text{light}} C_6H_{12}O_6 + 6O_2\text{; carbon dioxide + water} \xrightarrow{\text{light}} \text{sugar + oxygen}$$

PTS: 1 DIF: L2 REF: p. 232
OBJ: 8.2.3 State the overall equation for photosynthesis.
STA: UT.BIO.2.1.b | UT.BIO.2.2.b | UT.BIO.2.2.c TOP: Foundation Edition
BLM: application

84. ANS:
Each carbon dioxide molecule contains one carbon atom, and a glucose molecule contains six carbon atoms.

PTS: 1 DIF: L3 REF: p. 232
OBJ: 8.2.3 State the overall equation for photosynthesis.
STA: UT.BIO.2.1.b | UT.BIO.2.2.b | UT.BIO.2.2.c BLM: synthesis

85. ANS:
Sample answer: Both are found in the electron transport chain withitn the thylakoid membranes. They both absorb light and use the light's energy to excite electrons.

PTS: 1 DIF: L3 REF: p. 235 | p. 236
OBJ: 8.3.1 Describe what happens during the light-dependent reactions.
STA: UT.BIO.2.2.b | UT.BIO.2.3.d BLM: synthesis

86. ANS:
The two cellular regions must have a difference in concentration of hydrogen ions in order for ions to flow through the protein and cause it to turn ADP into ATP. Without the membrane separating these regions, there could not be a concentration gradient.

PTS: 1 DIF: L3 REF: p. 236 | p. 237
OBJ: 8.3.1 Describe what happens during the light-dependent reactions.
STA: UT.BIO.2.2.b | UT.BIO.2.3.d BLM: analysis

87. ANS:
Hydrogen ions pass through ATP synthase, causing it to spin. As ATP synthase rotates, ADP is converted to ATP.

PTS: 1 DIF: L2 REF: p. 236 | p. 237
OBJ: 8.3.1 Describe what happens during the light-dependent reactions.
STA: UT.BIO.2.2.b | UT.BIO.2.3.d TOP: Foundation Edition
BLM: analysis

88. ANS:
The Calvin cycle uses ATP and NADPH from the light-dependent reactions to convert carbon dioxide molecules into high-energy sugars.

PTS: 1 DIF: L1 REF: p. 238 | p. 239
OBJ: 8.3.2 Describe what happens during the light-independent reactions.
STA: UT.BIO.2.2.b | UT.BIO.2.3.d TOP: Foundation Edition
BLM: comprehension

89. ANS:
The light-dependent reactions use energy from the sun to produce ATP and NADPH, and the light-independent reactions (Calvin cycle) use ATP and NADPH from the light-dependent reactions to produce high-energy sugars.

PTS: 1 DIF: L2 REF: p. 235 | p. 239
OBJ: 8.3.2 Describe what happens during the light-independent reactions.
STA: UT.BIO.2.2.b | UT.BIO.2.3.d TOP: Foundation Edition
BLM: synthesis

90. ANS:
water, light intensity, temperature

PTS: 1 DIF: L1 REF: p. 240
OBJ: 8.3.3 Identify factors that affect the rate at which photosynthesis occurs.
STA: UT.BIO.2.2.b TOP: Foundation Edition
BLM: knowledge

91. ANS:
There are 1000 calories in 1 Calorie. Eating 2000 calories is the same as eating 2 Calories.

PTS: 1 DIF: L3 REF: p. 250
OBJ: 9.1.1 Explain where organisms get the energy they need for life processes.
STA: UT.BIO.2.2.b BLM: synthesis

92. ANS:
Cellular respiration is the process that releases energy by breaking down food molecules in the presence of oxygen.

PTS: 1 DIF: L1 REF: p. 251 OBJ: 9.1.2 Define cellular respiration.
STA: UT.BIO.2.2.b | UT.BIO.2.2.c TOP: Foundation Edition
BLM: knowledge

93. ANS:
The three stages are as follows: glycolysis (which occurs in the cytoplasm), the Krebs cycle (which occurs in the matrix of the mitochondria), and electron transport (which occurs in the inner mitochondrial membrane).

PTS: 1 DIF: L2 REF: p. 252 OBJ: 9.1.2 Define cellular respiration.
STA: UT.BIO.2.2.b | UT.BIO.2.2.c TOP: Foundation Edition
BLM: synthesis

94. ANS:
Arrow B represents cellular respiration, because it shows the flow of energy from plants to animals. Plants produce food (sugars), which animals use to fuel cellular respiration.

PTS: 1 DIF: L3 REF: p. 253
OBJ: 9.1.3 Compare photosynthesis and cellular respiration. STA: UT.BIO.2.2.b
BLM: analysis

95. ANS:
Photosynthesis releases oxygen into the atmosphere as a product, whereas cellular respiration uses oxygen as a reactant to release energy from food.

PTS: 1 DIF: L1 REF: p. 253
OBJ: 9.1.3 Compare photosynthesis and cellular respiration. STA: UT.BIO.2.2.b
TOP: Foundation Edition BLM: knowledge

96. ANS:
During glycolysis, the bonds of glucose are broken and rearranged to produce 2 molecules of pyruvic acid.

PTS: 1 DIF: L1 REF: p. 254
OBJ: 9.2.1 Describe what happens during glycolysis. STA: UT.BIO.2.2.b

TOP: Foundation Edition BLM: knowledge

97. ANS:

Glycolysis requires an initial input of 2 ATP molecules and produces an output of 4 ATP molecules, for a net gain of 2 ATP molecules.

PTS: 1 DIF: L3 REF: p. 255
OBJ: 9.2.1 Describe what happens during glycolysis. STA: UT.BIO.2.2.b
BLM: analysis

98. ANS:

Citric acid is the first compound formed in the process.

PTS: 1 DIF: L1 REF: p. 256
OBJ: 9.2.2 Describe what happens during the Krebs cycle. STA: UT.BIO.2.2.b
TOP: Foundation Edition BLM: knowledge

99. ANS:

The movement of H^+ ions back across the inner mitochondrial membrane through ATP synthase converts ADP into ATP.

PTS: 1 DIF: L1 REF: p. 258
OBJ: 9.2.3 Explain how high-energy electrons are used by the electron transport chain.
STA: UT.BIO.2.2.b TOP: Foundation Edition
BLM: knowledge

100. ANS:

Oxygen is the final electron acceptor in the electron transport chain, which means that it is needed to get rid of low-energy electrons and H^+ ions.

PTS: 1 DIF: L2 REF: p. 258
OBJ: 9.2.3 Explain how high-energy electrons are used by the electron transport chain.
STA: UT.BIO.2.2.b TOP: Foundation Edition
BLM: comprehension

101. ANS:

Sample answer: Lactic acid fermentation occurs in the muscles, and alcoholic fermentation occurs in rising bread dough.

PTS: 1 DIF: L2 REF: p. 263
OBJ: 9.3.1 Explain how organisms get energy in the absence of oxygen.
STA: UT.BIO.2.2.b TOP: Foundation Edition
BLM: application

102. ANS:

Alcoholic fermentation produces carbon dioxide, alcohol, and NAD^+, whereas lactic acid fermentation produces lactic acid and NAD^+.

PTS: 1 DIF: L2 REF: p. 263
OBJ: 9.3.1 Explain how organisms get energy in the absence of oxygen.
STA: UT.BIO.2.2.b TOP: Foundation Edition
BLM: analysis

103. ANS:

Pathway A and pathway B can both take place when there is no oxygen. When cells run out of oxygen, they can still produce some energy, even though they do so inefficiently.

PTS: 1 DIF: L3 REF: p. 262 | p. 263
OBJ: 9.3.1 Explain how organisms get energy in the absence of oxygen.
STA: UT.BIO.2.2.b BLM: synthesis

104. ANS:
Sample answer: Cellular respiration, shown in pathway C, is most efficient, because it produces the most ATP using the same amount of glucose as the other two pathways.

PTS: 1 DIF: L3 REF: p. 252
OBJ: 9.2.4 Identify how much ATP cellular respiration generates.
STA: UT.BIO.2.2.b | UT.BIO.2.2.c BLM: analysis

105. ANS:
The body uses ATP that is already present in the muscle cells, ATP released from lactic acid fermentation, and ATP released from cellular respiration.

PTS: 1 DIF: L2 REF: p. 264 | p. 265
OBJ: 9.3.2 Identify the pathways the body uses to release energy during exercise.
STA: UT.BIO.2.2.b TOP: Foundation Edition
BLM: comprehension

106. ANS:
As a cell grows larger, more demands are placed on its DNA, and the cell has more trouble moving enough nutrients and wastes across the cell membrane.

PTS: 1 DIF: L2 REF: p. 274 | p. 276
OBJ: 10.1.1 Explain the problems that growth causes for cells. STA: UT.BIO.2.3.a
TOP: Foundation Edition BLM: comprehension

107. ANS:
A large cell carries out its activities less efficiently than a small one does.

PTS: 1 DIF: L2 REF: p. 274
OBJ: 10.1.1 Explain the problems that growth causes for cells. STA: UT.BIO.2.3.a
BLM: application

108. ANS:
Because the offspring of asexual reproduction are genetically identical to parents, they have the characteristics that help them survive in the conditions in which the parent cells survived. They might not have characteristics to survive should the conditions change.

PTS: 1 DIF: L3 REF: p. 278
OBJ: 10.1.2 Compare asexual and sexual reproduction. STA: UT.BIO.4.1.b
TOP: Foundation Edition BLM: evaluation

109. ANS:
Packaging genetic material into chromosomes helps the cell separate the DNA precisely during cell division. If the genetic material was spread out into smaller pieces, some of the material might get lost more easily when the cell divided into two cells.

PTS: 1 DIF: L2 REF: p. 280
OBJ: 10.2.1 Describe the role of chromosomes in cell division.
STA: UT.BIO.2.3.a TOP: Foundation Edition
BLM: analysis

110. ANS:

Chromatids are two identical DNA strands joined by a centromere, and chromatin is the material (DNA and proteins) that makes up chromosomes.

PTS: 1 DIF: L3 REF: p. 280 | p. 282
OBJ: 10.2.1 Describe the role of chromosomes in cell division.
STA: UT.BIO.2.3.a TOP: Foundation Edition
BLM: synthesis

111. ANS:
A: G_1 phase, cell growth; B: S phase, DNA replication; C: G_2 phase, preparation for mitosis; D: M phase, cell division (mitosis and cytokinesis).

PTS: 1 DIF: L2 REF: p. 281 | p. 282
OBJ: 10.2.2 Name the main events of the cell cycle. STA: UT.BIO.2.3.a
TOP: Foundation Edition BLM: analysis

112. ANS:
1 is anaphase. 2 is prophase. 3 is interphase (or G_2 phase). 4 is telophase. 5 is metaphase.
They occur in the following order: 3, 2, 5, 1, and 4 (or: 2, 5, 1, 4, 3).

PTS: 1 DIF: L3 REF: p. 280 | p. 282
OBJ: 10.2.3 Describe what happens during the four phases of mitosis.
STA: UT.BIO.2.3.a TOP: Foundation Edition
BLM: analysis

113. ANS:
In metaphase the sister chromatids are still attached to one another and are found in the middle of the cell, whereas in anaphase the sister chromatids have separated and are beginning to move to opposite sides of the cell.

PTS: 1 DIF: L2 REF: p. 280 | p. 282
OBJ: 10.2.3 Describe what happens during the four phases of mitosis.
STA: UT.BIO.2.3.a TOP: Foundation Edition
BLM: analysis

114. ANS:
In plant cells, a cell plate forms in the cytoplasm midway between each new nucleus. The cell plate gradually develops into a separating membrane, and a cell wall begins to appear in the cell plate. In animal cells, there is no cell plate. The cell membrane is drawn inward until the cytoplasm is pinched into two nearly equal parts.

PTS: 1 DIF: L3 REF: p. 284
OBJ: 10.2.4 Describe the process of cytokinesis. STA: UT.BIO.2.3.a
TOP: Foundation Edition BLM: synthesis

115. ANS:
A cell that lacked cyclins would probably not undergo mitotic division, and then it would continue to grow, have DNA overload, and exchange materials inefficiently until it dies.

PTS: 1 DIF: L3 REF: p. 286
OBJ: 10.3.1 Describe how the cell cycle is regulated. STA: UT.BIO.2.3.a
BLM: evaluation

116. ANS:
Cancer cells do not respond to the signals that control the growth of normal cells. As a result, cancer cells form tumors and can spread throughout the body.

PTS: 1 DIF: L2 REF: p. 289
OBJ: 10.3.2 Explain how cancer cells are different from other cells.
STA: UT.BIO.2.3.a TOP: Foundation Edition
BLM: comprehension

117. ANS:
Cancer cells are not constrained by crowding and would probably continue to grow after forming a thin layer covering the bottom of the petri dish.

PTS: 1 DIF: L3 REF: p. 289
OBJ: 10.3.2 Explain how cancer cells are different from other cells.
STA: UT.BIO.2.3.a BLM: synthesis

118. ANS:
Differentiation is the process by which cells become specialized.

PTS: 1 DIF: L1 REF: p. 293
OBJ: 10.4.1 Describe the process of differentiation. STA: UT.BIO.2.3.d
TOP: Foundation Edition BLM: knowledge

119. ANS:
Embryonic stem cells come from embryos and are pluripotent, whereas adult stem cells come from adults and are only multipotent.

PTS: 1 DIF: L2 REF: p. 295
OBJ: 10.4.2 Define stem cells and explain their importance. STA: UT.BIO.2.3.d
TOP: Foundation Edition BLM: analysis

120. ANS:
Harvesting adult stem cells do not generally harm the donor, whereas harvesting embryonic stem cells usually destroys the embryo.

PTS: 1 DIF: L2 REF: p. 297
OBJ: 10.4.3 Identify the possible benefits and issues relating to stem cell research.
STA: UT.BIO.4.2.d BLM: evaluation

OTHER

121. ANS:
The experimental setup shows a solution with differing concentrations of solute separated by a selectively permeable membrane. The membrane is permeable to water but not the solute.

PTS: 1 DIF: L2 REF: p. 208 | p. 210
OBJ: 7.3.1 Describe passive transport. STA: UT.BIO.2.3.c
BLM: analysis

122. ANS:
The solution on Side A has fewer solute particles than the solution on Side B. Both solutions have the same amount of water, so the solution on Side A is hypotonic compared to the solution on Side B.

PTS: 1 DIF: L2 REF: p. 210 OBJ: 7.3.1 Describe passive transport.
STA: UT.BIO.2.3.c BLM: analysis

123. ANS:
The membrane is permeable to water so water can cross the membrane in both directions. Over time, there will be a net movement of water toward Side B, which has a higher concentration of solute particles.

PTS: 1 DIF: L2 REF: p. 208 | p. 210
OBJ: 7.3.1 Describe passive transport. STA: UT.BIO.2.3.c
BLM: application

124. ANS:
At equilibrium, Side A will have less water than Side B and the concentration of solute molecules will be equal on either side of the selectively permeable membrane.

PTS: 1 DIF: L2 REF: p. 208 | p. 210
OBJ: 7.3.1 Describe passive transport. STA: UT.BIO.2.3.c
BLM: analysis

125. ANS:
Yes, the water molecules will continue to move across the membrane; however, there will not be a net movement from one side to the other.

PTS: 1 DIF: L2 REF: p. 208 | p. 210
OBJ: 7.3.1 Describe passive transport. STA: UT.BIO.2.3.c
BLM: application

126. ANS:
Drawing II—a plant cell—contains the structure described (a chloroplast). The structure is labeled N.

PTS: 1 DIF: L1 REF: p. 202
OBJ: 7.2.4 Describe the function of the chloroplasts and mitochondria in the cell.
STA: UT.BIO.2.3.d TOP: Foundation Edition
BLM: knowledge

127. ANS:
Structure I. They both represent the cell membrane.

PTS: 1 DIF: L3 REF: p. 200
OBJ: 7.2.5 Describe the function of the cell membrane. STA: UT.BIO.2.3.d
BLM: analysis

128. ANS:
Structures J, N, and O. Structure J is the cell wall, structure N is a chloroplast, and structure O is a vacuole.

PTS: 1 DIF: L3 REF: p. 203
OBJ: 7.2.2 Describe the role of vacuoles, lysosomes, and the cytoskeleton.
STA: UT.BIO.2.3.d BLM: analysis

129. ANS:
The organelle labeled K is the nucleus. The nucleus stores DNA and directs the activities of the cell.

PTS: 1 DIF: L1 REF: p. 197
OBJ: 7.2.1 Describe the structure and function of the cell nucleus.
STA: UT.BIO.2.3.d TOP: Foundation Edition
BLM: knowledge

130. ANS:
Both drawings represent eukaryotes, as shown by the presence of a nucleus.

PTS: 1 DIF: L2 REF: p. 193
OBJ: 7.1.3 Distinguish between prokaryotes and eukaryotes. STA: UT.BIO.2.3.d
TOP: Foundation Edition BLM: application

131. ANS:
Line A shows that the single group's results are quite different from the results of the rest of the class. Over a half-hour period, the lab group found that the solution traveled 25 mm, whereas the rest of the class found a distance of only 12 mm over the same period of time. The distance traveled in the lab group's data also kept increasing, whereas the class' data leveled out at about 10 minutes.

PTS: 1 DIF: L2 REF: p. 210 | p. 211
OBJ: 7.3.1 Describe passive transport. STA: UT.BIO.2.3.c
TOP: Foundation Edition BLM: analysis

132. ANS:
The rest of the class's results (line B) are more likely to be accurate because they represent a larger sample size.

PTS: 1 DIF: L3 REF: p. 210 | p. 211
OBJ: 7.3.1 Describe passive transport. STA: UT.BIO.2.3.c
BLM: evaluation

133. ANS:
The lab group (line A) might have used a more concentrated solution of sucrose or a membrane with a different permeability.

PTS: 1 DIF: L3 REF: p. 210 | p. 211
OBJ: 7.3.1 Describe passive transport. STA: UT.BIO.2.3.c
BLM: evaluation

134. ANS:
The more concentrated the solution, the longer distance the solution will travel over the same period of time. Thus, a more concentrated solution would produce a longer distance.

PTS: 1 DIF: L3 REF: p. 210 | p. 211
OBJ: 7.3.1 Describe passive transport. STA: UT.BIO.2.3.c
BLM: synthesis

135. ANS:
The rate of osmosis could be calculated by dividing the distance traveled by time. The units would be mm/min.

PTS: 1 DIF: L3 REF: p. 210 | p. 211
OBJ: 7.3.1 Describe passive transport. STA: UT.BIO.2.3.c
BLM: analysis

136. ANS:
The beaker she placed in the shade is the control.

PTS: 1 DIF: L2 REF: p. 240
OBJ: 8.3.3 Identify factors that affect the rate at which photosynthesis occurs.
STA: UT.BIO.2.2.b TOP: Foundation Edition
BLM: application

137. ANS:
The bubbles are probably oxygen gas, which is a product of photosynthesis.

PTS: 1 DIF: L2 REF: p. 232
OBJ: 8.2.3 State the overall equation for photosynthesis.
STA: UT.BIO.2.1.b | UT.BIO.2.2.b | UT.BIO.2.2.c TOP: Foundation Edition

BLM: application

138. ANS:
5 cm

PTS: 1 DIF: L2 REF: p. 240
OBJ: 8.3.3 Identify factors that affect the rate at which photosynthesis occurs.
STA: UT.BIO.2.2.b TOP: Foundation Edition
BLM: application

139. ANS:
The student's data show that as the water plant gets closer to the light, the water plant gives off more bubbles.

PTS: 1 DIF: L2 REF: p. 240
OBJ: 8.3.3 Identify factors that affect the rate at which photosynthesis occurs.
STA: UT.BIO.2.2.b TOP: Foundation Edition
BLM: analysis

140. ANS:
Sample answer: Probably not; the graph shows that the effect is leveling off. Also, we know that light intensity increases the rate of photosynthesis up to a certain point and then levels off.

PTS: 1 DIF: L3 REF: p. 240
OBJ: 8.3.3 Identify factors that affect the rate at which photosynthesis occurs.
STA: UT.BIO.2.2.b BLM: evaluation

141. ANS:
The student is varying the concentration of carbon dioxide in the environment of two similar plants. The student is probably trying to test the effect of carbon dioxide concentration on plants.

PTS: 1 DIF: L2 REF: p. 232
OBJ: 8.2.3 State the overall equation for photosynthesis.
STA: UT.BIO.2.1.b | UT.BIO.2.2.b | UT.BIO.2.2.c TOP: Foundation Edition
BLM: analysis

142. ANS:
The student might set up a similar geranium plant under a bell jar with a tube that allows air to enter and leave the plant's environment freely.

PTS: 1 DIF: L3 REF: p. 232
OBJ: 8.2.3 State the overall equation for photosynthesis.
STA: UT.BIO.2.1.b | UT.BIO.2.2.b | UT.BIO.2.2.c BLM: evaluation

143. ANS:
Plant A is being grown with a carbon dioxide absorbant. A plant grown in an environment with depleted carbon dioxide would not be able to carry out the Calvin cycle—its rate of photosynthesis would likely be slower than that of a plant grown under normal contitions. Photosynthesis may even stop all together.

PTS: 1 DIF: L3 REF: p. 239
OBJ: 8.3.2 Describe what happens during the light-independent reactions.
STA: UT.BIO.2.2.b | UT.BIO.2.3.d BLM: evaluation

144. ANS:
This plant has been in a carbon-dioxide-rich environment. It will probably have a higher rate of photosynthesis than a plant under normal conditions because carbon dioxide is plentiful.

PTS: 1 DIF: L3 REF: p. 239

OBJ: 8.3.2 Describe what happens during the light-independent reactions.
STA: UT.BIO.2.2.b | UT.BIO.2.3.d BLM: evaluation

145. ANS:
Plants require carbon dioxide to produce starches. A higher concentration of carbon dioxide surrounding a plant can increase the production of starches. If the area surrounding a plant is depleted of carbon dioxide, a plant may not be able to produce any starches.

PTS: 1 DIF: L3 REF: p. 239
OBJ: 8.3.2 Describe what happens during the light-independent reactions.
STA: UT.BIO.2.2.b | UT.BIO.2.3.d BLM: evaluation

146. ANS:
photosynthesis

PTS: 1 DIF: L1 REF: p. 233
OBJ: 8.2.3 State the overall equation for photosynthesis.
STA: UT.BIO.2.1.b | UT.BIO.2.2.b | UT.BIO.2.2.c TOP: Foundation Edition
BLM: knowledge

147. ANS:
a chloroplast

PTS: 1 DIF: L1 REF: p. 231
OBJ: 8.2.1 Explain the role of light and pigments in photosynthesis.
STA: UT.BIO.2.2.b | UT.BIO.2.3.d TOP: Foundation Edition
BLM: knowledge

148. ANS:
Oxygen gas, ATP, and NADPH are the products of the light-dependent reactions.

PTS: 1 DIF: L1 REF: p. 233
OBJ: 8.3.1 Describe what happens during the light-dependent reactions.
STA: UT.BIO.2.2.b | UT.BIO.2.3.d TOP: Foundation Edition
BLM: knowledge

149. ANS:
sugars, $NADP^+$, ADP, and P

PTS: 1 DIF: L1 REF: p. 233
OBJ: 8.3.2 Describe what happens during the light-independent reactions.
STA: UT.BIO.2.2.b | UT.BIO.2.3.d TOP: Foundation Edition
BLM: knowledge

150. ANS:
carbon dioxide

PTS: 1 DIF: L1 REF: p. 233
OBJ: 8.3.2 Describe what happens during the light-independent reactions.
STA: UT.BIO.2.2.b | UT.BIO.2.3.d TOP: Foundation Edition
BLM: knowledge

151. ANS:
Sample answer: The equation for cellular respiration is $6O_2 + C_6H_{12}O_6 \rightarrow 6CO_2 + 6H_2O$ + Energy. The mouse should give off CO_2 and H_2O.

PTS: 1 DIF: L2 REF: p. 251 OBJ: 9.1.2 Define cellular respiration.

STA: UT.BIO.2.2.b | UT.BIO.2.2.c TOP: Foundation Edition
BLM: application

152. ANS:
Sample answer: The mouse requires oxygen and sugar from food (glucose) to carry out cellular respiration. Fresh air containing oxygen flows in through the tubes from outside the flasks into flasks B, C, and D. Air mixed with whatever the mouse gives off flows from flask B into flask A. The mouse receives fresh air and should be able to survive in the chamber for the duration of the experiment.

PTS: 1 DIF: L2 REF: p. 251 OBJ: 9.1.2 Define cellular respiration.
STA: UT.BIO.2.2.b | UT.BIO.2.2.c TOP: Foundation Edition
BLM: analysis

153. ANS:
Sample answer: If the mouse is carrying out cellular respiration, it will give off CO_2. The CO_2 will flow into flask A, and the phenolphthalein in flask A will change from pink to clear.

PTS: 1 DIF: L2 REF: p. 251 OBJ: 9.1.2 Define cellular respiration.
STA: UT.BIO.2.2.b | UT.BIO.2.2.c TOP: Foundation Edition
BLM: application

154. ANS:
Sample answer: The cricket, like all living organisms, is carrying out cellular respiration. However, the mouse is larger than the cricket and gives off more CO_2 than the cricket. After one hour, the cricket probably has not given off enough CO_2 to measure. If the scientist allows the experiment to continue for several hours, she will see that more CO_2 is given off by the cricket over time.

PTS: 1 DIF: L3 REF: p. 251 OBJ: 9.1.2 Define cellular respiration.
STA: UT.BIO.2.2.b | UT.BIO.2.2.c BLM: synthesis

155. ANS:
Sample answer: The mouse that had been exercising should give off more CO_2 because this mouse will be breathing more heavily. This mouse might even have an oxygen debt to repay, which means it is making up for the oxygen and energy it used up during the exercise.

PTS: 1 DIF: L2 REF: p. 265
OBJ: 9.3.2 Identify the pathways the body uses to release energy during exercise.
STA: UT.BIO.2.2.b BLM: analysis

156. ANS:
The figure shows the electron transport chain.

PTS: 1 DIF: L1 REF: p. 258
OBJ: 9.2.3 Explain how high-energy electrons are used by the electron transport chain.
STA: UT.BIO.2.2.b TOP: Foundation Edition
BLM: knowledge

157. ANS:
The electrons come from NADH and $FADH_2$, electron carriers that come from the Krebs cycle.

PTS: 1 DIF: L1 REF: p. 258
OBJ: 9.2.2 Describe what happens during the Krebs cycle. STA: UT.BIO.2.2.b
TOP: Foundation Edition BLM: knowledge

158. ANS:
They join with 4 H^+ and O_2 to form water molecules.

PTS: 1 DIF: L1 REF: p. 258
OBJ: 9.2.3 Explain how high-energy electrons are used by the electron transport chain.
STA: UT.BIO.2.2.b TOP: Foundation Edition
BLM: knowledge

159. ANS:
The H^+ ions are mostly moving into the intermembrane space. This movement causes the intermembrane space to become positively charged with respect to the matrix. This sets up the gradient needed to generate ATP from ADP using ATP synthase.

PTS: 1 DIF: L2 REF: p. 258 | p. 259
OBJ: 9.2.3 Explain how high-energy electrons are used by the electron transport chain.
STA: UT.BIO.2.2.b TOP: Foundation Edition
BLM: comprehension

160. ANS:
Sample answer: ATP synthase converts ADP into ATP.

PTS: 1 DIF: L2 REF: p. 258 | p. 259
OBJ: 9.2.3 Explain how high-energy electrons are used by the electron transport chain.
STA: UT.BIO.2.2.b TOP: Foundation Edition
BLM: comprehension

161. ANS:
Sample answer: When exposed to light, the aquatic plants will carry out both cellular respiration and photosynthesis. After a time in the dark, the plants will carry out only cellular respiration.

PTS: 1 DIF: L2 REF: p. 253
OBJ: 9.1.3 Compare photosynthesis and cellular respiration. STA: UT.BIO.2.2.b
TOP: Foundation Edition BLM: application

162. ANS:
The purpose of the indicator is to detect the presence of carbon dioxide. The plants will give off oxygen and take in carbon dioxide when they are carrying out photosynthesis. They will give off carbon dioxide and take in oxygen when they are carrying out cellular respiration. If the plants produce more carbon dioxide in cellular respiration than they are able to use, the indicator will change from blue to yellow. If the plants produce and consume the same amount of carbon dioxide, no new carbon dioxide will be produced and the indicator will not change color.

PTS: 1 DIF: L3 REF: p. 253
OBJ: 9.1.3 Compare photosynthesis and cellular respiration. STA: UT.BIO.2.2.b
BLM: evaluation

163. ANS:
The solution in test tubes 2 and 3 will turn yellow because the plants will give off CO_2 from cellular respiration but will not use it up through photosynthesis.

PTS: 1 DIF: L2 REF: p. 253
OBJ: 9.1.3 Compare photosynthesis and cellular respiration. STA: UT.BIO.2.2.b
TOP: Foundation Edition BLM: analysis

164. ANS:
After another 24 hours, test tube 2 will still be yellow. Test tube 3 will be blue again.

PTS: 1 DIF: L2 REF: p. 253
OBJ: 9.1.3 Compare photosynthesis and cellular respiration. STA: UT.BIO.2.2.b

TOP: Foundation Edition BLM: analysis

165. ANS:

Sample answer: The plant in test tube 2 remained in the dark and was not able to carry out photosynthesis, so it did not use up carbon dioxide. The carbon dioxide keeps the bromthymol blue yellow. However, the plant in test tube 3 was in the light, where it could carry out photosynthesis. This plant used up the carbon dioxide, and without carbon dioxide the color of the bromthymol blue turned back to blue.

PTS: 1 DIF: L3 REF: p. 253
OBJ: 9.1.3 Compare photosynthesis and cellular respiration. STA: UT.BIO.2.2.b
BLM: synthesis

166. ANS:

It shows various stages of mitosis in an animal cell. We know this is an animal cell because of the presence of centrioles and the shape of the cells.

PTS: 1 DIF: L2 REF: p. 282 | p. 284
OBJ: 10.2.3 Describe what happens during the four phases of mitosis.
STA: UT.BIO.2.3.a BLM: application

167. ANS:

Four

PTS: 1 DIF: L2 REF: p. 282
OBJ: 10.2.1 Describe the role of chromosomes in cell division.
STA: UT.BIO.2.3.a TOP: Foundation Edition
BLM: application

168. ANS:

X is a centriole; Y is a spindle fiber.

PTS: 1 DIF: L1 REF: p. 282
OBJ: 10.2.3 Describe what happens during the four phases of mitosis.
STA: UT.BIO.2.3.a TOP: Foundation Edition
BLM: knowledge

169. ANS:

D, A, C, B

PTS: 1 DIF: L2 REF: p. 282 | p. 283
OBJ: 10.2.3 Describe what happens during the four phases of mitosis.
STA: UT.BIO.2.3.a TOP: Foundation Edition
BLM: application

170. ANS:

The next step would be cytokinesis. It would show two daughter cells forming. Also accept interphase or G_1.

PTS: 1 DIF: L2 REF: p. 284
OBJ: 10.2.3 Describe what happens during the four phases of mitosis.
STA: UT.BIO.2.3.a TOP: Foundation Edition
BLM: analysis

171. ANS:

The student is varying the size of the cubes and testing how far a solution can diffuse into each cube; thus, she is probably testing the effect of size on the diffusion of materials into each cube. The cubes probably represent cells.

PTS: 1 DIF: L3 REF: p. 274 | p. 275
OBJ: 10.1.1 Explain the problems that growth causes for cells. STA: UT.BIO.2.3.a
BLM: analysis

172. ANS:
Surface area = length × width × the number of sides = $2 \times 2 \times 6 = 24$ cm^2. Volume = length × width × height = $2 \times 2 \times 2 = 8$ cm^3. Ratio of surface area to volume = 24/8 = 3:1.

PTS: 1 DIF: L3 REF: p. 274 | p. 275
OBJ: 10.1.1 Explain the problems that growth causes for cells. STA: UT.BIO.2.3.a
TOP: Foundation Edition BLM: analysis

173. ANS:
Students should conclude that the largest cube has the smallest ratio of surface area to volume, and the smallest cube has the largest ratio of surface area to volume.

PTS: 1 DIF: L2 REF: p. 274 | p. 275
OBJ: 10.1.1 Explain the problems that growth causes for cells. STA: UT.BIO.2.3.a
TOP: Foundation Edition BLM: analysis

174. ANS:
Wherever the vinegar soaks into the cube, it will turn the phenolphthalein clear. Thus, the student can cut each cube in half and measure the amount of each cube that has changed from pink to clear.

PTS: 1 DIF: L3 REF: p. 274 | p. 275
OBJ: 10.1.1 Explain the problems that growth causes for cells. STA: UT.BIO.2.3.a
TOP: Foundation Edition BLM: analysis

175. ANS:
The vinegar will take the longest amount of time to diffuse to the center of the 3 cm cube. It will take the shortest amount of time to reach the center of the 1 cm sides.

PTS: 1 DIF: L2 REF: p. 274 | p. 275
OBJ: 10.1.1 Explain the problems that growth causes for cells. STA: UT.BIO.2.3.a
TOP: Foundation Edition BLM: evaluation

176. ANS:
Diagram A shows cancer cells because it shows cells that are not growing in a controlled way. They have formed a tumor.

PTS: 1 DIF: L2 REF: p. 289
OBJ: 10.3.2 Explain how cancer cells are different from other cells.
STA: UT.BIO.2.3.a BLM: application

177. ANS:
Cancer cells do not respond to the signals that control the growth of most cells. As a result, cancer cells form masses (tumors). These signals include growth factors that stimulate cell division at a proper rate and signals that prevent excessive growth so that tissues do not disrupt each other. Diagram A shows cells that have divided until they have formed a tumor. These cells are dividing more quickly than normal cells do. They have started disrupting adjacent cells.

PTS: 1 DIF: L2 REF: p. 289
OBJ: 10.3.2 Explain how cancer cells are different from other cells.
STA: UT.BIO.2.3.a BLM: synthesis

178. ANS:

They can break loose from the mass they are now a part of and spread throughout the body, disrupting normal activities, forming secondary tumors, and causing serious medical problems.

PTS: 1 DIF: L2 REF: p. 289
OBJ: 10.3.2 Explain how cancer cells are different from other cells.
STA: UT.BIO.2.3.a BLM: evaluation

179. ANS:
Diagram A: These cells might have a defect in the p53 gene, which has allowed the cells to multiply more quickly and chaotically than the normal cells. Diagram B: These cells probably have a healthy copy of the p53 gene, which has stopped the cell cycle until the genetic material in these cells has been properly replicated.

PTS: 1 DIF: L2 REF: p. 289
OBJ: 10.3.2 Explain how cancer cells are different from other cells.
STA: UT.BIO.2.3.a BLM: synthesis

180. ANS:
Students may suggest removing the cancerous cells in hopes of preventing their continued division, growth, and spread throughout the body, treating them with radiation or chemicals that will destroy the cells, etc.

PTS: 1 DIF: L2 REF: p. 290
OBJ: 10.3.2 Explain how cancer cells are different from other cells.
STA: UT.BIO.2.3.a BLM: synthesis

ESSAY

181. ANS:
The cell theory states that all living things are composed of cells. It also says that cells are the basic units of structure and function in living things, and that new cells come from existing cells. The cell theory is significant to biology because all living thing are made of cells. Differences in the structure and function of different life forms are reflected in differences in their cell structures.

PTS: 1 DIF: L2 REF: p. 191 OBJ: 7.1.1 State the cell theory.
STA: UT.BIO.2.3.b TOP: Foundation Edition
BLM: analysis

182. ANS:
The cell membrane is a thin, flexible barrier around the cell. The cell wall is a strong layer that surrounds the cell membrane in some cells. The nucleus is a large structure found in some cells. It contains the cell’s genetic material and controls the cell’s activities. The fluid portion of the cell outside the nucleus (if present), is the cytoplasm. All cells have a cell membrane and cytoplasm. Only eukaryotes have a nucleus. Animal cells do not have a cell wall, but plant cells and some prokaryotes do.

PTS: 1 DIF: L3 REF: p. 193 | p. 203
OBJ: 7.1.3 Distinguish between prokaryotes and eukaryotes. STA: UT.BIO.2.3.d
BLM: synthesis

183. ANS:
Microtubules are hollow tubes of protein that help maintain the shape of a cell. Microtubules also make up cilia and flagella, which function in cell movement. Microfilaments are long, thin fibers that are narrower than microtubules. Microfilaments function in the movement and support of the cell.

PTS: 1 DIF: L3 REF: p. 199
OBJ: 7.2.2 Describe the role of vacuoles, lysosomes, and the cytoskeleton.

STA: UT.BIO.2.3.d BLM: synthesis

184. ANS:
The cell wall lies outside the cell membrane of many cells, including those of plants, algae, and fungi. It supports and protects the cell and often allows water, oxygen, carbon dioxide, and other materials to pass through it. Most cell walls are rigid and made of carbohydrates and proteins. In contrast, the cell membrane is a thin, flexible membrane made of a lipid bilayer with proteins that run through it and carbohydrate chains attached to proteins poking out on the outer surface of the cell membrane. Like the cell wall, the cell membrane provides protection and support to the cell and allows materials to pass through it. In fact, the cell membrane regulates the movement of materials into and out of the cell.

PTS: 1 DIF: L3 REF: p. 203 | p. 205
OBJ: 7.2.5 Describe the function of the cell membrane. STA: UT.BIO.2.3.d
BLM: analysis

185. ANS:
Like a piece of mosaic art, which is made of different tiles, the cell membrane is made up of many different kinds of molecules. The background is a lipid bilayer. Within this bilayer are proteins that form channels and pumps that help move materials from one side of the membrane to the other. Carbohydrates on the outer surface of the membrane act like chemical identification cards and allow cells to identify one another.

PTS: 1 DIF: L3 REF: p. 205
OBJ: 7.2.5 Describe the function of the cell membrane. STA: UT.BIO.2.3.d
BLM: analysis

186. ANS:
When a normal red blood cell is placed in a hypertonic solution, one that has a higher solute concentration than inside the cell, there is a net movement of water out of the cell. The cell will shrink due to osmotic pressure.

PTS: 1 DIF: L2 REF: p. 210 | p. 211
OBJ: 7.3.1 Describe passive transport. STA: UT.BIO.2.3.c
TOP: Foundation Edition BLM: application

187. ANS:
When sugar solutions of different concentrations are on opposite sides of a semipermeable membrane, the sugar molecules on both sides of the membrane flow across the membrane. However, there is a net flow of sugar molecules from the more concentrated solution into the less concentrated solution, until the concentrations are equal. Once equilibrium is reached, roughly equal numbers of molecules move in each direction across the membrane.

PTS: 1 DIF: L3 REF: p. 208 | p. 209
OBJ: 7.3.1 Describe passive transport. STA: UT.BIO.2.3.c
BLM: application

188. ANS:
Facilitated diffusion involves the movement of molecules across a membrane through protein channels. The molecules move from an area of high concentration to an area of lower concentration. Facilitated diffusion does not require additional energy. Active transport is the movement of particles across the cell membrane using energy. Molecules can move from an area of low concentration to an area of higher concentration in active transport. Osmosis is an example of facilitated diffusion.

PTS: 1 DIF: L2 REF: p. 209 | p. 212
OBJ: 7.3.2 Describe active transport. STA: UT.BIO.2.3.c
TOP: Foundation Edition BLM: analysis

189. ANS:
The cell from the unicellular organism carries out all the life processes of the organism. It is not specialized. The cell from the multicellular organism is specialized and carries out only certain functions in the organism, while relying on other cells in the multicellular organism to complete other life processes.

PTS: 1 DIF: L2 REF: p. 214 | p. 215
OBJ: 7.4.2 Explain how multicellular organism maintain homeostasis.
STA: UT.BIO.2.3.c TOP: Foundation Edition
BLM: analysis

190. ANS:
The levels of organization in a multicellular organism include cells, tissues, organs, and organ systems. Similar cells are grouped into tissues; tissues that work together form organs; a group of organs that work together make up an organ system. Unicellular organisms cannot have cell specialization. Instead, all of the activities of the organism must be carried out by the single cell.

PTS: 1 DIF: L2 REF: p. 214 | p. 217
OBJ: 7.4.2 Explain how multicellular organism maintain homeostasis.
STA: UT.BIO.2.3.c TOP: Foundation Edition
BLM: analysis

191. ANS:
A glucose molecule can store more than 90 times the energy of an ATP molecule. Glucose is used by cells to store large amounts of energy for long periods of time. In contrast, ATP is used to store smaller amounts of energy that will be used in the next few seconds. Cells can regenerate ATP from ADP as needed by using the energy from glucose.

PTS: 1 DIF: L2 REF: p. 227
OBJ: 8.1.1 Describe the role of ATP in cellular activities. STA: UT.BIO.2.1.a
TOP: Foundation Edition BLM: analysis

192. ANS:
Heterotrophs depend on autotrophs to harvest energy from the sun. This energy is then passed on to heterotrophs in the form of food. Without autotrophs, the sun’s energy would not be available to heterotrophs and heterotrophs would eventually die out.

PTS: 1 DIF: L2 REF: p. 228
OBJ: 8.1.2 Explain where plants get the energy they need to produce food.
STA: UT.BIO.2.2.a TOP: Foundation Edition
BLM: synthesis

193. ANS:
When light shines on a pigment, the pigment absorbs energy from that light. When the pigment chlorophyll absorbs light, much of the energy is transferred directly to electrons in the chlorophyll molecule, raising the energy levels of these electrons. This energy is then passed on in the reactions of photosynthesis.

PTS: 1 DIF: L2 REF: p. 231
OBJ: 8.2.1 Explain the role of light and pigments in photosynthesis.
STA: UT.BIO.2.2.b | UT.BIO.2.3.d TOP: Foundation Edition
BLM: analysis

194. ANS:

Chlorophyll absorbs light especially well in the red and blue regions of the visible light spectrum (reflecting green). Carotenes absorb light in the blue-green parts of the visible spectrum (reflecting yellow, orange, and red). Having more than one kind of pigments increases the range of light from which a plant can harvest energy.

PTS: 1 DIF: L2 REF: p. 230 | p. 231
OBJ: 8.2.1 Explain the role of light and pigments in photosynthesis.
STA: UT.BIO.2.2.b | UT.BIO.2.3.d BLM: analysis

195. ANS:
Electrons in the pigments in photosystem II absorb energy from light. These high-energy electrons then move through the electron transport chain to photosystem I. H^+ ions move from the stroma into the inner thylakoid membrane. $NADP^+$ becomes NADPH. The charge and concentration difference on either side of the thylakoid membrane provides the energy to make ATP via ATP synthase.

PTS: 1 DIF: L2 REF: p. 235 | p. 237
OBJ: 8.3.1 Describe what happens during the light-dependent reactions.
STA: UT.BIO.2.2.b | UT.BIO.2.3.d TOP: Foundation Edition
BLM: comprehension

196. ANS:
When energy from sunlight is absorbed by the electrons in chlorophyll, the electrons increase their energy level and move through the electron transport chain to photosystem I. The electrons in chlorophyll are replenished by water molecules. Enzymes in the inner surface of the thylakoid membrane break up each water molecule into 2 electrons, 2 H^+ ions, and half an O_2 molecule. The electrons from water replace those that chlorophyll loses to the electron transport chain.

PTS: 1 DIF: L3 REF: p. 235 | p. 236
OBJ: 8.3.1 Describe what happens during the light-dependent reactions.
STA: UT.BIO.2.2.b | UT.BIO.2.3.d BLM: synthesis

197. ANS:
The reactions that take place within the photosystems and electron transport chain require light in order to take place. ATP synthesis is dependent on the products of these reactions. Thus, the nickname "light reactions" for these reactions is not misleading. However, the light-independent reactions can take place under both light and dark conditions. They do not require darkness, so it is misleading to call them dark reactions.

PTS: 1 DIF: L2 REF: p. 233
OBJ: 8.3.2 Describe what happens during the light-independent reactions.
STA: UT.BIO.2.2.b | UT.BIO.2.3.d BLM: evaluation

198. ANS:
(a) Sample answer: In bright sunlight, the Calvin cycle occurs in the stroma. During the Calvin cycle, the products of the light-dependent reactions (ATP and NADPH) are used to convert molecules of CO_2 into high-energy sugars. (b) Sample answer: In darkness, the Calvin cycle also occurs in the stroma. During the Calvin cycle, the products of the light-dependent reactions (ATP and NADPH) are used to convert molecules of CO_2 into high-energy sugars. If the plant has been in the dark for a long period of time, there may not be enough ATP and NADPH from the light-dependent reactions to continue the Calvin cycle.

PTS: 1 DIF: L2 REF: p. 238 | p. 239
OBJ: 8.3.2 Describe what happens during the light-independent reactions.
STA: UT.BIO.2.2.b | UT.BIO.2.3.d TOP: Foundation Edition
BLM: analysis

199. ANS:
Three of the factors that affect the rate of photosynthesis are light intensity, temperature, and water. The rate of photosynthesis increases with light intensity up to a certain point, then levels off. Photosynthesis slows at extreme temperatures and usually has an optimal temperature for each kind of plant. A lack of water also slows down photosynthesis.

PTS: 1 DIF: L2 REF: p. 240
OBJ: 8.3.3 Identify factors that affect the rate at which photosynthesis occurs.
STA: UT.BIO.2.2.b BLM: comprehension

200. ANS:
CAM plants do not take in carbon dioxide through their leaves all the time, as do other plants. Instead, CAM plants take it in only at night, when temperatures are cooler. Their leaves close up during the day so that water is not lost to the warm air. Aquatic plants are not at risk from drying out during the warm day, because they live in water. Therefore, they do not need to close their leaves during the day to prevent water loss.

PTS: 1 DIF: L3 REF: p. 241
OBJ: 8.3.3 Identify factors that affect the rate at which photosynthesis occurs.
STA: UT.BIO.2.2.b BLM: analysis

201. ANS:
If the energy in glucose were released in just one step, most of the energy would be lost as heat. The gradual process of cellular respiration allows the cell to control the release of energy into packages of ATP that can be used more efficiently for cell activities.

PTS: 1 DIF: L3 REF: p. 250 OBJ: 9.1.2 Define cellular respiration.
STA: UT.BIO.2.2.b | UT.BIO.2.2.c BLM: synthesis

202. ANS:
Sample answer: Photosynthesis and cellular respiration are opposite processes. The reactants of photosynthesis are the products of cellular respiration. The products of photosynthesis are the reactants of cellular respiration. Whereas photosynthesis generates sugars, cellular respiration uses up sugars. Photosynthesis removes carbon dioxide from and releases oxygen into the atmosphere, while cellular respiration uses oxygen and gives off carbon dioxide.

PTS: 1 DIF: L2 REF: p. 253
OBJ: 9.1.3 Compare photosynthesis and cellular respiration. STA: UT.BIO.2.2.b
TOP: Foundation Edition BLM: analysis

203. ANS:
Sample answer: Glycolysis is the breakdown of glucose into 2 molecules of pyruvic acid, producing 4 ATP molecules. An initial input of 2 ATP molecules is required to start glycolysis; thus, there is a net gain of 2 ATP molecules. This process produces 2 high-energy electrons, which are passed to NAD^+ to form NADH. If oxygen is present, glycolysis leads to the Krebs cycle and the electron transport chain. If oxygen is not present, glycolysis is followed by the rest of fermentation.

PTS: 1 DIF: L2 REF: p. 254 | p. 262
OBJ: 9.2.1 Describe what happens during glycolysis. STA: UT.BIO.2.2.b
TOP: Foundation Edition BLM: synthesis

204. ANS:
Sample answer: During the Krebs cycle, pyruvic acid is broken down into carbon dioxide in a series of energy-extracting reactions. Coenzyme A forms acetyl-CoA, which later becomes citric acid. Citric acid is then broken down, CO_2 is released, and electrons are transferred to energy carriers. One molecule of pyruvic acid gives 4 molecules of NADH, 1 molecule of $FADH_2$, and 1 molecule of ATP.

PTS: 1 DIF: L2 REF: p. 256 | p. 257
OBJ: 9.2.2 Describe what happens during the Krebs cycle. STA: UT.BIO.2.2.b
TOP: Foundation Edition BLM: synthesis

205. ANS:
Sample answer: The electron carriers of cellular respiration are NAD^+ and FAD. These molecules accept high-energy electrons (thus becoming NADH and $FADH_2$) and move to the electron transport chain. The energy stored in these electron carriers is transferred to the electron transport chain. The electron transport chain, in turn, uses the energy to move hydrogen ions across the inner mitochondrial membrane, which creates a charge difference across the membrane.

PTS: 1 DIF: L2 REF: p. 258 | p. 259
OBJ: 9.2.3 Explain how high-energy electrons are used by the electron transport chain.
STA: UT.BIO.2.2.b TOP: Foundation Edition
BLM: synthesis

206. ANS:
High-energy electrons from the Krebs cycle are passed from one carrier protein to the next in the electron transport chain. The movement of these electrons through the electron transport chain powers the pumping of hydrogen ions across the inner mitochondrial membrane. The buildup of H+ ions in the inner mitochondrial space creates a charge difference across the inner mitochondrial membrane. When the ions move back across the membrane through the protein ATP synthase, the protein converts ADP into ATP.

PTS: 1 DIF: L2 REF: p. 258 | p. 259
OBJ: 9.2.3 Explain how high-energy electrons are used by the electron transport chain.
STA: UT.BIO.2.2.b TOP: Foundation Edition
BLM: comprehension

207. ANS:
Lactic acid fermentation occurs in animal muscle cells and in some microorganisms. Lactic acid fermentation converts glucose into lactic acid. Alcoholic fermentation takes place in many organisms, including yeast cells. Unlike lactic acid fermentation, alcoholic fermentation produces alcohol and carbon dioxide. Both types of fermentation result in 2 ATP molecules.

PTS: 1 DIF: L2 REF: p. 262 | p. 263
OBJ: 9.3.1 Explain how organisms get energy in the absence of oxygen.
STA: UT.BIO.2.2.b TOP: Foundation Edition
BLM: analysis

208. ANS:
Lactic acid is an indication that lactic acid fermentation is occurring in muscle cells. Lactic acid fermentation occurs only in the absence of oxygen. Thus, the heart cells with more lactic acid may not have been receiving enough oxygen, a factor that could contribute to the occurrence of a heart attack. The level of lactic acid could be measured in certain parts of the heart as an indication of risk of heart attack.

PTS: 1 DIF: L3 REF: p. 262 | p. 263
OBJ: 9.3.1 Explain how organisms get energy in the absence of oxygen.
STA: UT.BIO.2.2.b BLM: evaluation

209. ANS:
Sample answer: The first few seconds of a race are powered by the ATP that the muscle cells already have on hand. Then, the muscle cells begin producing ATP by lactic acid fermentation—this would be around the 50-meter mark of the race. After about 90 seconds, however, cellular respiration is the only way to generate a continuing supply of ATP.

PTS: 1 DIF: L2 REF: p. 264 | p. 265
OBJ: 9.3.2 Identify the pathways the body uses to release energy during exercise.
STA: UT.BIO.2.2.b TOP: Foundation Edition
BLM: application

210. ANS:
During brief periods of intense activity, muscle cells may use oxygen faster than it can be supplied by the body. When the oxygen supply gets very low, the electron transport chain cannot function because oxygen serves as its final electron acceptor. This forces the Krebs cycle to stop. In this anaerobic situation, the muscle cells can produce ATP only by means of lactic acid fermentation.

PTS: 1 DIF: L2 REF: p. 262 | p. 265
OBJ: 9.3.2 Identify the pathways the body uses to release energy during exercise.
STA: UT.BIO.2.2.b TOP: Foundation Edition
BLM: analysis

211. ANS:
During growth, a cell's volume increases more rapidly than does its surface area, causing its ratio of surface area to volume to decrease with increasing size. As a cell's ratio of surface area to volume decreases, it becomes more difficult for a cell to move needed materials in and wastes out. Thus, a normal growing cell will usually divide into two daughter cells before it becomes too large.

PTS: 1 DIF: L3 REF: p. 274 | p. 276
OBJ: 10.1.1 Explain the problems that growth causes for cells. STA: UT.BIO.2.3.a
TOP: Foundation Edition BLM: analysis

212. ANS:
As a cell grows, it functions less efficiently because it places more demands on its DNA and it is less able to move materials to their proper destinations quickly. Cell division results in two daughter cells. Each cell has its own copy of the parent cell's DNA and has a smaller size that allows it to efficiently exchange materials.

PTS: 1 DIF: L2 REF: p. 274 | p. 276
OBJ: 10.1.1 Explain the problems that growth causes for cells. STA: UT.BIO.2.3.a
TOP: Foundation Edition BLM: application

213. ANS:
Interphase consists of the G_1 phase, S phase, and the G_2 phase. During the G_1 phase, the cell grows; during the S phase, the DNA replicates; during the G_2 phase, the cell prepares for mitosis. The M phase or cell division includes mitosis and cytokinesis.

PTS: 1 DIF: L2 REF: p. 281 | p. 282
OBJ: 10.2.2 Name the main events of the cell cycle. STA: UT.BIO.2.3.a
TOP: Foundation Edition BLM: synthesis

214. ANS:
Prophase: the chromatin condenses into chromosomes, the centrioles separate (in animal cells), and the nuclear membrane breaks down; metaphase: the chromosomes line up across the midline of the cell and each chromosome is attached to a spindle fiber and centromere; anaphase: sister chromatids separate into individual chromosomes; telophase: chromosomes move to opposite sides of the dividing cell, and two new nuclear envelopes form.

PTS: 1 DIF: L2 REF: p. 282 | p. 284
OBJ: 10.2.3 Describe what happens during the four phases of mitosis.
STA: UT.BIO.2.3.a TOP: Foundation Edition

BLM: synthesis

215. ANS:

When telophase ends, each new nucleus will contain four chromosomes. The eight chromosomes form from the replication of four chromosomes. When mitosis is over, the chromatids have separated at their centromeres to form eight chromosomes, half of which move to each nucleus.

PTS: 1 DIF: L3 REF: p. 279 | p. 283
OBJ: 10.2.3 Describe what happens during the four phases of mitosis.
STA: UT.BIO.2.3.a TOP: Foundation Edition
BLM: analysis

216. ANS:

Mitosis is the division of the nucleus. Cytokinesis is the division of the cytoplasm. If mitosis occurred without cytokinesis, the cell would contain two nuclei and twice the DNA. If cytokinesis occurred without mitosis, one of the new cells would lack DNA and a nucleus altogether.

PTS: 1 DIF: L3 REF: p. 282 | p. 283
OBJ: 10.2.4 Describe the process of cytokinesis. STA: UT.BIO.2.3.a
TOP: Foundation Edition BLM: evaluation

217. ANS:

Cells at the edges of the cut are stimulated to divide rapidly, producing new cells, and healing the wound. When the cut is almost completely healed, the rate of cell division slows down. Thus, when the cells on either side of the cut are no longer in contact with one another, they divide to fill in the gap. Once the cells are in contact with one another, the cut is healed, and the cells resume their normal growth rate.

PTS: 1 DIF: L2 REF: p. 286
OBJ: 10.3.1 Describe how the cell cycle is regulated. STA: UT.BIO.2.3.a
TOP: Foundation Edition BLM: synthesis

218. ANS:

The cell cycle is regulated by signals both inside and outside a cell. Internal regulators include proteins that make sure a cell does not divide until after its DNA has been copied faithfully. They also include proteins that prevent a cell from dividing if all its chromosomes are not attached to the spindle. External controls include growth factors that stimulate cell division and molecules on the surfaces of cells that inhibit growth so that cells do not disrupt each other’s growth.

PTS: 1 DIF: L3 REF: p. 287
OBJ: 10.3.1 Describe how the cell cycle is regulated. STA: UT.BIO.2.3.a
BLM: synthesis

219. ANS:

Unlike normal cells, cancer cells do not respond to normal controls on growth and division. By dividing uncontrollably, cancer cells form tumors and spread throughout the body. A cure for cancer includes a way to both prevent cancer cells from dividing uncontrollably and to allow normal cells to continue dividing normally. Finding a way to stop the cell cycle in some cells, but not interfere with the cell cycle in other cells, has made it difficult to cure cancer.

PTS: 1 DIF: L2 REF: p. 289 | p. 280
OBJ: 10.3.2 Explain how cancer cells are different from other cells.
STA: UT.BIO.2.3.a BLM: synthesis

220. ANS:

Some people are opposed to stem cell research because the harvesting of embryonic stem cells can cause the destruction of embryos. They feel that embryos are entitled to the same rights as adults. People who believe that stem cell research should continue argue that embryos do not have the same rights as fully formed humans and that scientists must do all they can to save lives. They feel that it is unethical to restrict research. Student answers should include their own opinion on the subject.

PTS: 1 DIF: L3 REF: p. 297
OBJ: 10.4.3 Identify the possible benefits and issues relating to stem cell research.
STA: UT.BIO.4.2.d TOP: Foundation Edition
BLM: evaluation