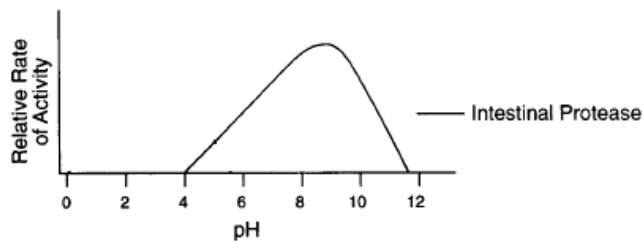


MY BIOLOGY FINAL EXAM WORKBOOK

DIRECTIONS: This study work book is due on the day of your final exam. Start now! After you have completed this study guide, you need to memorize it!



1. Look at the graph above. Describe how the action of the enzyme, intestinal protease, varies with pH.

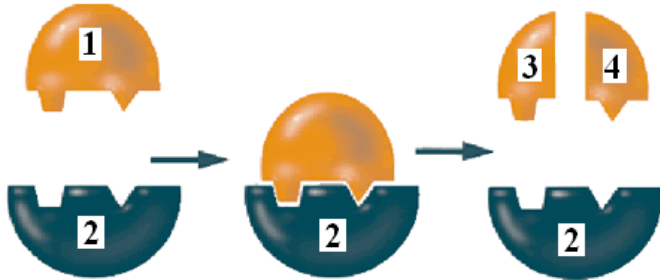
2. Answer true/false to the statements that follow regarding enzymes:

- a. Enzymes are composed of polypeptide chains. _____
- b. Enzymes form a temporary association with a reactant. _____
- c. Enzymes are destroyed when they are used and must be synthesized for each reaction. _____
- d. Enzymes are specific because of their shape and catalyze only certain reactions. _____
- e. They control the transport of materials. _____
- f. They provide energy for chemical reactions. _____
- g. They affect the rate of chemical reactions. _____
- h. They absorb oxygen from the environment. _____

3. Which type of monomer is used for the synthesis of a lipid?

4. Which molecules are the building blocks of carbohydrates?

Use the diagram below to answer the following three questions:



5. The **number 1** in the diagram represents: _____

6. The **number 2** in the diagram represents: _____

7. The **number 3 + 4** in the diagram represents: _____

8. Amino acids are the building blocks for: _____

9. A macromolecule (polymer) is composed of smaller units called _____

10. What kinds of bonds exist between two amino acids in a protein? _____

11. Circle the molecules below that represent carbohydrates

- | | | |
|--------------|----------------|-----------|
| DNA | Polysaccharide | cellulose |
| Amylase | Protein | fat |
| Wax | Glucose | glycogen |
| Sucrose | Nucleotide | Olive oil |
| Triglyceride | RNA | |

12. Circle the molecules below that are NOT macromolecules

- | | | |
|----------------|------------|--------------|
| Protein | DNA | glycerol |
| Polysaccharide | RNA | amino acid |
| Nucleotide | glucose | cellulose |
| lipid | fatty acid | triglyceride |

13. Define: activation energy

For questions 14 – 23, write the cellular organelle that matches the statement:

14. a web of microtubules that provides a support structure for the cell
15. stores cellular products or water
16. packaging of cellular products and their transport out of the cell
17. recycles unwanted cellular debris; recycles molecules and organelles
18. hair-like projections on the outside of some cells that trap particles
19. powerhouse of the cell; makes energy
20. a site where ribosomes attach; transports cellular proteins
21. carries out photosynthesis; contains chlorophyll
22. synthesizes proteins
23. brain of the cell; stores DNA
24. Which part of the light microscope did you look through (closest to the eye) to see the specimen?
25. When you look through the microscope, what is the total magnification of the specimen if you are using the 10x objective lens?
26. Which types of proteins in the cell membrane would play a role in determining your blood type and whether or not you could receive a transfusion?
27. When ions move across a membrane against a concentration gradient, this requires energy. Which type of transport does this statement describe?

28. When you place a cell into a hypotonic solution, what will happen?
29. Paramecia and Euglena are single-celled organisms that live in ponds. In such a habitat, water moves into the cell. How do these organisms maintain homeostasis (stability inside the cell)?
30. When you make French fries it is best to soak the potato sticks in salt water prior to frying. This causes the water to flow out of the potato and result in a crispier fry (than potatoes that were not soaked). Is the salt water hypotonic, isotonic or hypertonic?
31. Circle the cell that has the highest surface to volume ratio: (information on surface to volume ratio can be found in the chapter on Cells in your book)
- a. 2 x 2
 - b. 4 x 4
 - c. 12 x 12
32. When iodine reacts with starch, what color will you expect to see?
33. The cell membrane is made up of phospholipids. Which part of the phospholipids is hydrophobic?
34. When you make French fries it is best to soak the potato sticks in salt water prior to frying. This causes the water to flow out of the potato and result in a crispier fry (than potatoes that were not soaked). After potatoes have been soaking in salt water, they will be more flexible because they lost a lot of their water.
- This is evidence that _____ has occurred.
35. What is an ion?
36. Put these terms in order, from smallest to largest:
Cell, organelle, atom, molecule, macromolecule, organ, organism, tissue

37. Cell membrane pumps transport ions such as Na^+ and K^+ . Which type of transport does this statement describe?

38. Cell membrane pumps transport ions such as Na^+ (sodium) and K^+ (potassium). Na^+ and K^+ are positively charged ions. In other words, they carry an electrical charge. Describe how the electrical charge effects cell-cell communication.

39. In our experiment with dialysis tubing, starch and iodine, what does the dialysis tubing represent?

40. In our experiment with dialysis tubing, starch and iodine, which molecule flowed into the artificial cell?

_____ . How do you know? _____

41. In the Oreo cookie (☺), which part of the cookie represents the polar heads (phosphate) of the membrane bilayer?

42. One reason that plants wilt is that they have lost their _____ pressure.

When you water a plant, the water moves into the plant cell. As the cell fills with water, the membrane is pressed against the cell wall.

The cell wall is strong enough to resist the pressure exerted by the water inside the expanding cell.

The pressure that water molecules exert against the cell wall is called _____ pressure.

Which word fits into both spaces?

43. Endocytosis is a process by which cells ingest external fluid, macromolecules, and large particles, including other cells. In the process of endocytosis, the cell membrane folds around the particle or fluid being ingested. The ingested material is then trapped in a vesicle that is floating in the cytosol. There

are two types of endocytosis. One involves the ingestion of fluids, and the other involves the ingestion of large particles or whole cells.

Name the process that describes ingestion of large particles _____

Name the process that describes ingestion of fluids _____

Which organelle will digest wastes and particles that have been ingested? _____

44. Cells may use _____ to release large molecules such as proteins. Recall that proteins are made on ribosomes and packaged into vesicles by the Golgi apparatus. The vesicles then move to the cell membrane and fuse with it, delivering the proteins outside the cell.

45. Movement of ions and molecules against a concentration gradient is like pumping water from the base of a waterfall back up to the top. This is not a case of simple diffusion. Think of Niagara Falls. How do you get water back up to the top of the falls? Movement of ions and molecules against a concentration gradient requires...

46. Towards what condition does diffusion eventually lead, in the absence of other influences? Think of the slide I showed with red and blue molecules flowing across a semi-permeable membrane. Or, refer to picture in text.

47. Osmosis refers to...

48. In active transport, ATP is used. What is the purpose of ATP in active transport?

49. Movement of a molecule against a concentration gradient is called

50. Transport of molecules within cells is assisted by a system of internal membranes that make up the

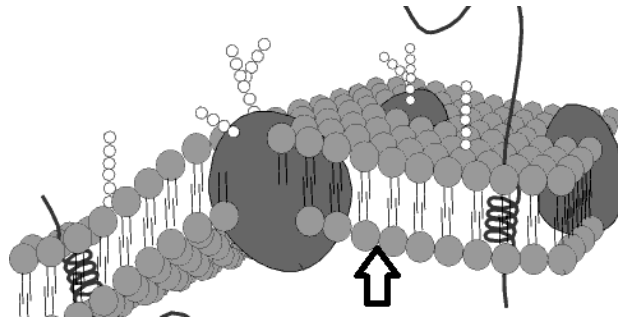
51. _____ cells have a nucleus; _____ cells have no nucleus, but their DNA is organized in a region of the cell called the nucleoid.

[for this question, use the terms “prokaryotic” or “eukaryotic”]

52. One difference between plant and animal cells is that animal cells do **NOT** have

_____ and _____

[which organelles?]

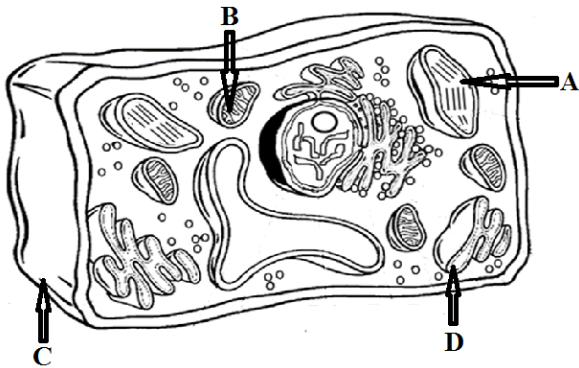


53. A model section of a cell membrane is represented above:

Which type of macromolecule is indicated by the arrow? _____

54. What properties do mitochondria and chloroplasts have in common?

Use the diagram of the cell below to answer the next **TWO** questions.



55. LABEL A, B, C, AND D:

A _____

B _____

C _____

D _____

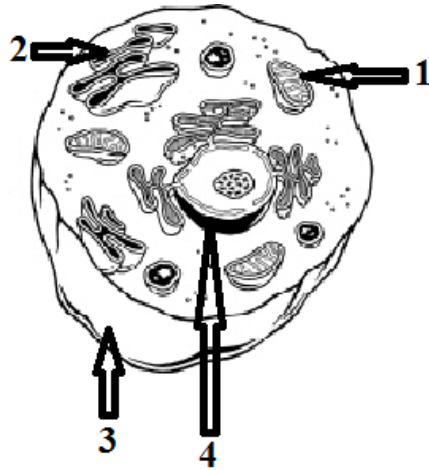
56. Which of the structures (A-D) above are found only in plants?

57. Name as many functions of the cell membrane as you can in the space below:

58. In attempt to visualize the fluid mosaic model of a membrane, we could describe the

_____ as floating in a sea of _____.

Use the diagram of the cell below to answer the next **THREE** questions.



59. What features of this cell make you think it's an animal cell?

60. In the cell above, which structure immediately identifies this cell as a eukaryote?

61. IDENTIFY 1-4 in the cell above.

1 _____

2 _____

3 _____

4 _____

62. Define "diffusion" and state whether this process requires energy.

Definition:

Energy? YES NO (circle one)

63. Put a $T = true$, or $F = false$ next to the following statements about viruses.

- a. they cannot reproduce by themselves. _____
- b. they are not made up of cells. _____
- c. they cannot carry out metabolism by themselves. _____

64. The process by which water passes in or out of the cell without the use of energy is called

65. **Explain** how the endoplasmic reticulum transports substances in the cell.

66. Exocytotic vesicles develop from the membranes of which cellular organelles?

67. **Explain** how the cytoskeleton is like human bones.

68. What is chromatin?

State the functions of the following organelles:

69. Nucleus

70. Golgi

71. Rough ER

72. Smooth ER

73. Mitochondrion

74. Chloroplast

75. Ribosomes

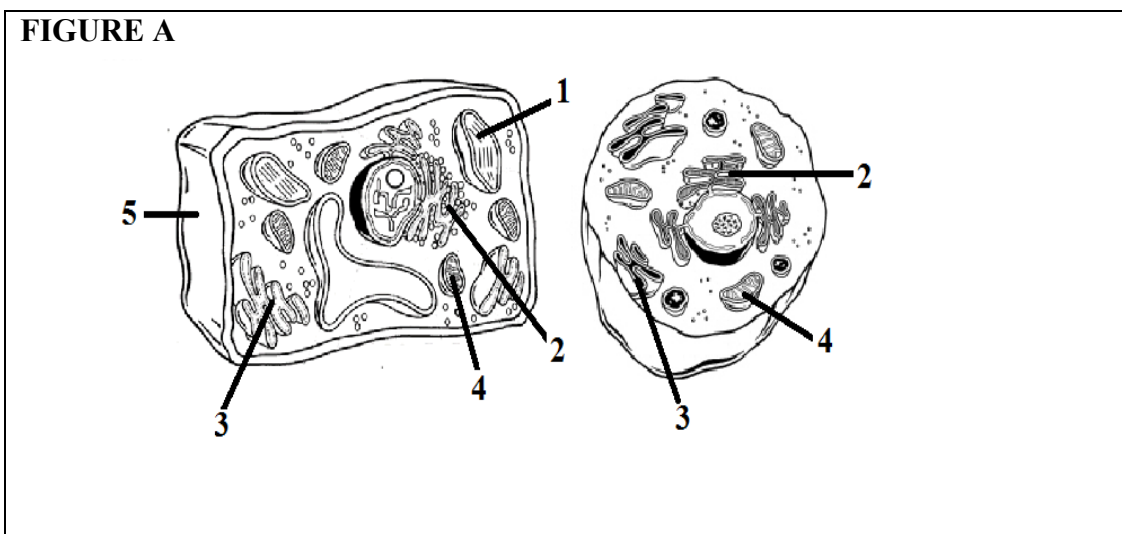
76. Cell wall

77. Cell membrane

78. Lysosome

79. Centrosome

80. nucleolus



Refer to FIGURE A (above) to answer the following question.

81. Label the organelles in the diagrams above. (write next to each number)

82. Which organelle is responsible for photosynthesis? (name it!) _____

83. Which organelles must be present within a cell of a geranium leaf for cellular respiration and photosynthesis to occur?

_____ and _____

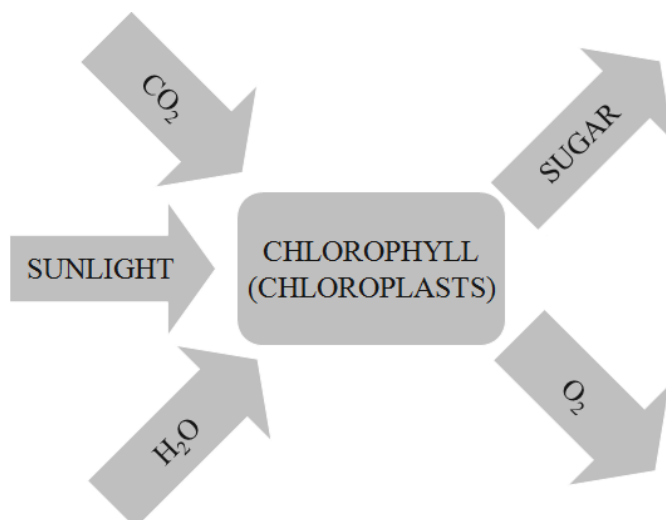
84. In plant cells, which organelle is associated with aerobic respiration? _____

85. Where in the cell does glycolysis take place? _____ (it's not the mitochondrion).

86. Where in the cell does the Krebs cycle take place? (don't just state the organelle; state where in the organelle)

87. What is the purpose of the Krebs Cycle?

Use the diagram below to answer the following question.

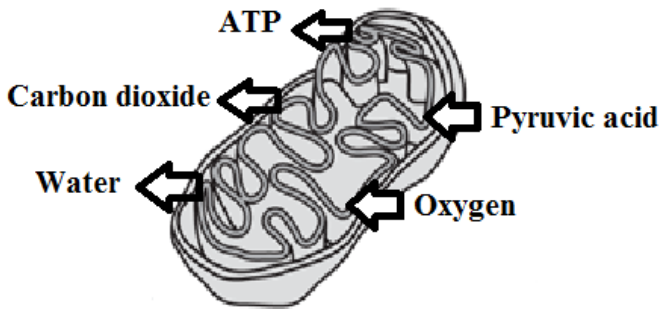


88. Which process is illustrated in the above diagram?

89. *Where* does Oxygen gas come from?

90. State the reaction for the formation of oxygen gas:

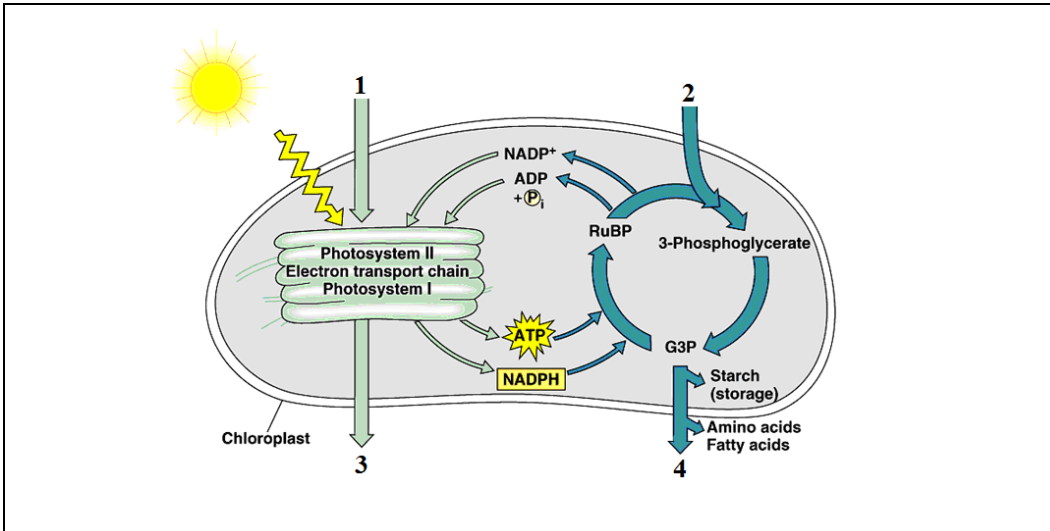
Use the diagram below to answer the following question.



91. Which process is illustrated in the above diagram?

92. An individual running a marathon may experience periods of oxygen deprivation that can lead to

_____ respiration, forming _____ acid.



Use the diagram of the chloroplast below to answer the following question.

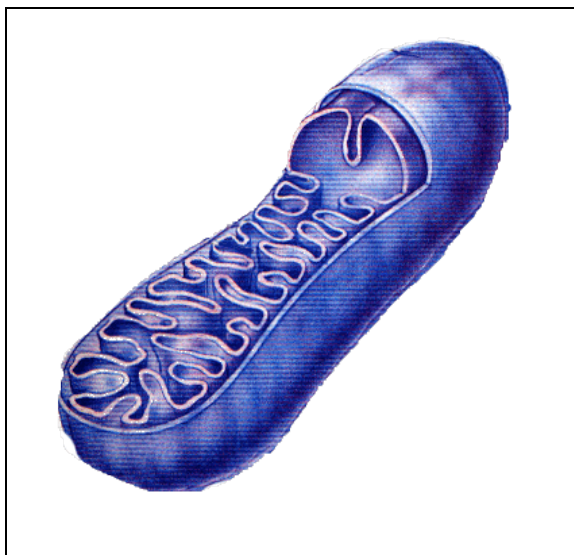
93. Which number represents Carbon dioxide? _____

94. Which number represents sugar (glucose)? _____

95. Which number represents water? _____

96. Which number represents oxygen? _____

Use the diagram below to answer the following question.



97. Which metabolic process occurs in the organelle above? _____

_____ (two words). Label the parts of the organelle. Draw arrows on the figure and label the parts: outer membrane, inner membrane, matrix, intermembrane space, cristae

Answer True/False to the following 98-107

A = True, B = False

98. all molecules diffuse through all cell membranes _____
99. endocytosis and exocytosis are similar processes, but one is sort of the reverse of the other _____
100. When the cells in a plant have low turgor pressure, the plant is rigid _____
101. A cell must expend energy to transport substances using cell membrane pumps _____
102. chlorophyll, carotenoids, and xanthophylls participate equally in photosynthesis _____
103. plants absorb light in the visible spectrum _____
104. glycolysis is an aerobic process _____
105. the formation of carbon dioxide happens in the mitochondria _____
106. the formation of oxygen happens in the mitochondria _____
107. lactic acid fermentation occurs in yeast and plants _____

MATCH THE FOLLOWING TERMS WITH THE STATEMENTS THAT FOLLOW:

- | | | |
|---------------------------|---------------------|----------------------|
| a. carrier protein | ab. Isotonic | ce. phagocytosis |
| b. concentration gradient | bc. Osmosis | be. Active transport |
| c. diffusion | bd. Plasmolysis | de. vesicle |
| d. hypertonic | be. Turgor pressure | |
| e. hypotonic | cd. Pinocytosis | |

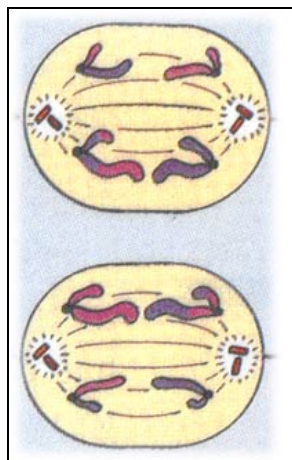
108. movement of molecules from an area of higher concentration to an area of lower concentration _____
109. difference in concentration of molecules across a space _____
110. the pressure that water molecule exert against a cell wall _____

- 111. cell drinking; fluids taken into cells _____
- 112. movement of large particles into cells _____
- 113. a membrane-bound organelle formed when a pouch pinches off from the cell membrane _____
- 114. diffusion of water _____
- 115. the solution outside the cell has a higher salt concentration than inside the cell _____
- 116. the solution outside the cell has a lower salt concentration than inside the cell _____
- 117. the salt concentration on both sides of the cell membrane is equal _____

FILL IN THE BLANKS:

- 118. Describe independent assortment:
- 119. Describe crossing over:
- 120. In which phase does crossing over occur during meiosis?
- 121. Which events occur during anaphase I of meiosis?
- 122. The sex of a human baby is usually determined by which gamete?

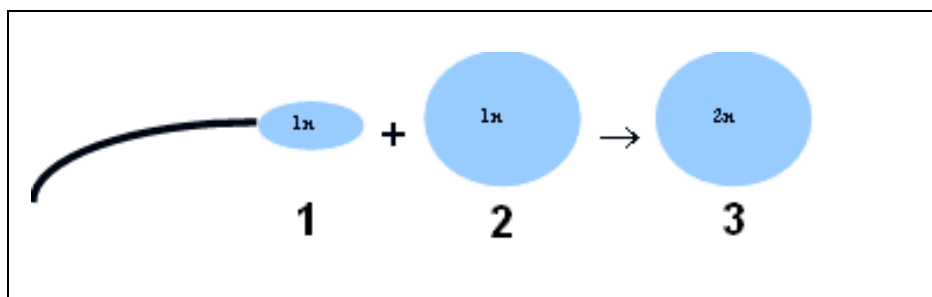
Figure B



Use the Figure B (above) to answer the following question.

123. For figure B, use the term “*sister chromatids*” to describe what happens during this phase of meiosis:
124. How many daughter cells result from meiosis II? _____
125. If an organism has a diploid number of 16, how many chromosomes does it sperm or egg cells contain? _____
126. How many autosomes are there in a normal human cheek cell? _____
127. How many sex chromosomes are there in a normal human gamete? _____
128. Meiosis and fertilization are important processes because they result in _____ (hint: this term is two words)
129. In females, gametes are produced by cells found where? _____

Use the diagram below to answer the following TWO questions.



130. the diagram above, which structure(s) is considered a haploid cell?

131. In the diagram above, in which structure(s) can homologous pairs of chromosomes normally be present?

-
132. Why do cells undergo meiosis? _____
-
133. Put the phases of the cell cycle into correct order: (G₁, G₂, M, S)
134. State what happens at each phase:
- a. M,
 - b. G₂,
 - c. S,
 - d. G₁
135. In which phase of meiosis do sister chromatids line up in the center of the cell?
136. Why are gametes genetically different from the parent cell and from each other?
137. Define: chromosome
138. Define: chromatid
139. Define: chromatin
140. What is the role of spindle fibers?
141. Define: centromere
142. What is the longest phase of the cell cycle, interphase or mitosis?
-

143. In which phase of the cell cycle is DNA replicated? _____
144. In which phase of meiosis do *homologous pairs* line up in the center of the cell?

145. In which phase does crossing over occur? _____
146. Which events occur during anaphase I of meiosis?
147. Which events occur during anaphase II of meiosis? Use the term “sister chromatids” in your description.
148. When a maternal chromosome matches up with a parental chromosome, the resulting structure is called:
T _____

STATE TRUE (T) OR FALSE (F) FOR THE QUESTIONS BELOW:

149. The end result of mitosis is four cells with half the DNA of the original cell _____
150. The end result of mitosis is four cells genetically identical to the original cell _____
151. The end result of mitosis is two cells with half the DNA of the original cell _____
152. The end result of mitosis is two cells genetically identical to the original cell _____
153. The end result of meiosis I is two daughter cells genetically identical to the original cell _____
154. The end result of meiosis I is two daughter cells that are genetically different from the original cell and from each other _____

155. The end result of meiosis I is four daughter cells genetically identical to the original cell _____
156. The end result of meiosis I is four daughter cells that are genetically different from the original cell and from each other _____
157. The end result of meiosis II is two daughter cells genetically identical to the original cell _____
158. The end result of meiosis II is two daughter cells that are genetically different from the original cell and from each other _____
159. The end result of meiosis II is four daughter cells genetically identical to the original cell _____
160. The end result of meiosis II is four daughter cells that are genetically different from the original cell and from each other _____
161. Cells undergo meiosis in order to: (circle the correct answer)
- a. allow an individual to grow
 - b. make more body cells
 - c. make gametes
 - d. keep an individual alive longer
162. Cells that undergo meiosis are: (circle the correct answer)
- a. male
 - b. female
 - c. diploid
 - d. haploid
163. Reproductive cells are produced in: (circle the correct answer)
- a. the femur
 - b. the gonads
 - c. the brain
 - d. the phalanges
164. In which phase of mitosis or meiosis is the cytoplasm divided?

165. In which phase of mitosis or meiosis does the nuclear membrane disappear?

166. A karyotype is often taken when the cell is in which phase of mitosis (when the chromosomes are easy to see and count)?

167. The sex chromosomes for a normal human female would be: _____

168. Draw a chromosome and label: 1) a chromatid, 2) sister chromatids, 3) centromere

169. What are autosomes?

170. Draw the prokaryotic chromosome:

171. What happens during cytokinesis?

172. Who was Gregor Mendel?

173. How many traits did Mendel study? What types of plants did he use?

174. What does it mean to be “pure” for a specific trait?

175. What is the difference between the P₁, F₁ and F₂ generations?

176. What is the difference between an allele and a gene?

177. How would you write dominant homozygous alleles?
178. Define: dominant
179. Define: recessive
180. Define: homozygous
181. Define: heterozygous
182. What are Punnett squares used for?
183. Complete a Punnett square to show the F_2 generation when you cross the following two parent plants: (Tt) Tall Plant (tt) short plant

184. What is the difference between a genotype and a phenotype?
185. What is the difference between a genotypic ratio and a phenotypic ratio?
186. What is a hybrid?

187. What is the difference between a monohybrid and a dihybrid cross?
188. Describe the Law of Segregation
189. Describe the Law of Independent Assortment
190. Describe the Law of Dominance
191. Describe the Law of Incomplete Dominance.
192. What does blood type refer to?
193. XX = _____, XY = _____
194. What is sex-linkage?
195. Describe three sex-linked traits.
196. What is a pedigree used for?
197. What are the three parts of a nucleotide?
198. How do nitrogen bases pair up in DNA?
199. What is the outcome if a colorblind man and a woman who is a carrier for color blindness have children? Show your work.

What is the probability that their children will be colorblind? _____

What is the probability that their children will be carriers? _____

200. Draw Figure 12-10, what disorder is explained here? How does it happen?

201. What is the difference between a germ cell mutation and a somatic mutation? Which one affects offspring / babies?

202. What is a lethal mutation?

203. Describe examples for the following mutations:

a. Deletion Mutation

b. Inversion Mutation

c. Translocation Mutation

d. Non-disjunction Mutation

e. Point Mutation

f. Substitution Mutation

g. Frame shift mutation

204. Describe a Pedigree

205. Draw a pedigree for a family with living individuals that start with mom and dad having 7 kids and one normal vision girl from that 7 has children with a colorblind man. Draw 4 kids to represent all 4 kids that could result from that and shade in the shapes of individuals who are colorblind

206. What if a male heterozygous for blood type A has kids with a female who has type O? Draw a punnett square and show results

What is the probability that they will have children with blood type O? _____

What is the probability that they will have children homozygous for A ? _____

207. What is a karyotype?

208. How would a karyotype help you diagnose

- a. Down's Syndrome?
- b. Turner's Syndrome?
- c. Klinefelter's Syndrome?

209. What if a sickle cell male mates with a normal female? What are the genotypes of the offspring?
Use a Punnett square:

What is the probability that their offspring will have sickle cell disease? _____

What is the probability that their offspring will be carriers? _____

210. What if a Hetero Huntington's Disease male mates with a Homozygous Huntington's Disease female? Make a punnett square and show results

What is the probability that their offspring will have Huntington's ? _____

What is the probability that their offspring will not be affected? _____

Is Huntington's a dominant or recessive disease? _____

211. How many different kinds of gametes can be produced by an individual with genotype **AABbCCdd**?

212. If the parent has genotype **Aa**, what is the probability of a gamete receiving a dominant allele? Draw out the punnett square and then answer the question.

PROBABILITY _____

Use the probability problem below to answer the next TWO questions.

Mendel crossed two plants with contrasting traits of seed color (Yellow and Green) to produce an F1 generation of all Yellow seeded plants. When he crossed these Yellow seeded plants of the F1 generation he got the following results for the F2 generation: 6,000 Yellow seeded plants and 2,000 Green seeded plants.

213. Draw out the punnett square on the next page and then answer the following questions

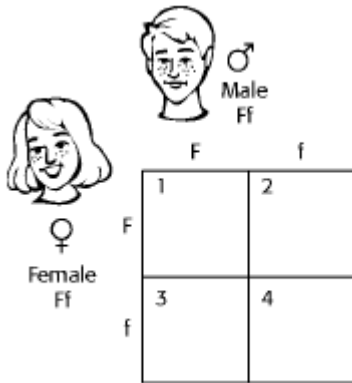
214. In the F2 generation, what is the probability that the dominant phenotype will appear?

215. In the F2 generation, what is the probability that the recessive phenotype will appear?

216. List the gametes possible for an individual with the genotype **Bb**? _____ and _____

217. List the gametes possible for an individual with the genotype **RrSStt**? _____ and _____ and _____

In humans, having freckles (F) is dominant over not having freckles (f). Use the Punnett Square below to answer the following question about inheritance of this trait when both parents have the genotype Ff X Ff.



218. Using the illustration above, which boxes show that **new combinations** of alleles may be generated in a zygote during fertilization?

219. Different forms of a gene are called _____

220. Two purple-flowered pea plants are crossed and have offspring with this ratio- **3 plants with purple flowers: 1 plant with white flowers**. What are the genotypes of the parents? Use the punnett square to help you figure this out.

GENOTYPES OF PARENTS:

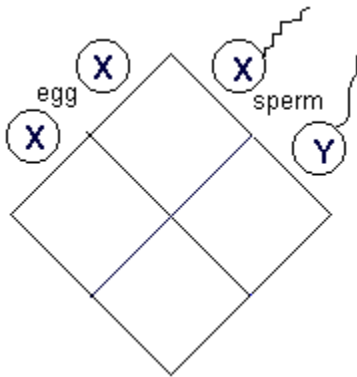
_____ AND

221. Only pink tulips result from a cross between homozygous red and homozygous white tulips. This illustrates the principle of :

222. In a monohybrid cross between a homozygous dominant parent and a homozygous recessive parent, what is the predicted RATIO of the offspring? Use the Punnett Square to help you.

ratio

Use the diagram below to answer the following question.



223. Using the Punnett Square above, what is the percent chance of these two individuals having a daughter?

224. The genotypes of organisms are primarily determined by the genotypes of their

225. A homozygous black cat and homozygous white cat are crossed. They produce some offspring speckled with both black and white fur. This expression of both phenotypes is referred to as

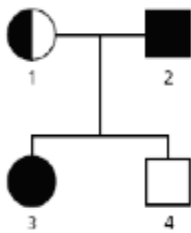
226. Mendel's law of _____ states that a random assortment of maternally and paternally derived chromosomes in meiosis results in gametes that have different combinations of these genes.

227. Name a human trait that is a polygenic: B T

228. Huntington's disease is caused by a dominant allele. If a man who is heterozygous mates with a woman without the disease, what is the predicted ratio for the offspring having the disease?

RATIO _____

Use the diagram below to answer the following question about pedigrees.



229. Which individual in the pedigree shown here is a carrier? _____

230. Why do males express X-linked traits more than females?

231. Which BLOOD TYPES will be the phenotypes resulting from the following genotypes?

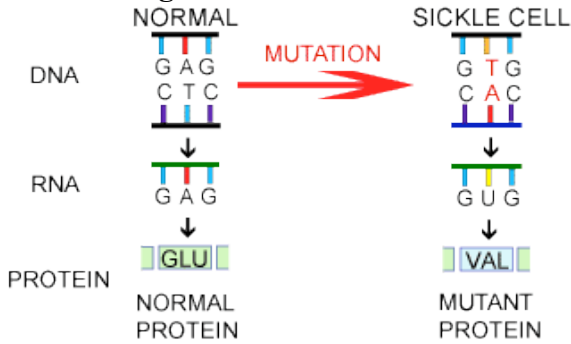
a. I^i _____

b. $I^A i$ _____

c. $I^B I^B$ _____

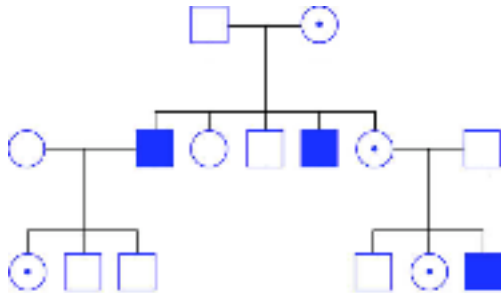
d. $I^A I^B$ _____

Use the diagram below to answer the following question.



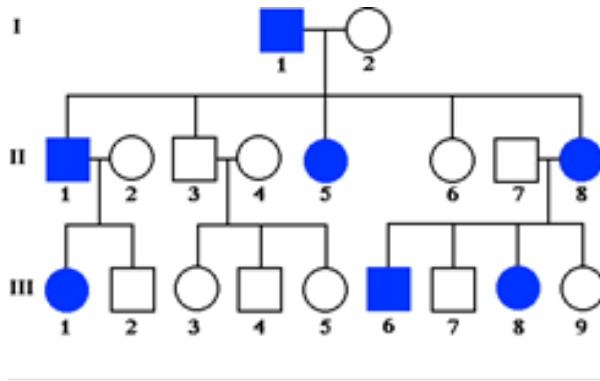
232. The difference in DNA, RNA, and the amino acid within the protein illustrated in the above diagram causes a change in the shape of red blood cells. What is the probable cause of this difference in the hemoglobin protein of sickle cell anemia?

233. What is the most likely pattern of inheritance for the following pedigree? Circle one



- a. autosomal dominant
- b. autosomal recessive
- c. X-linked dominant
- d. X-linked recessive

234. What is the most likely pattern of inheritance for the following pedigree? (circle one)



- autosomal dominant
- autosomal recessive
- X-linked dominant
- X-linked recessive

Use the Punnett Square below to answer the following question.

	GI	Gi	gi	gi
GI				5
Gi	2	3	7	
gi	1		4	6
gi				

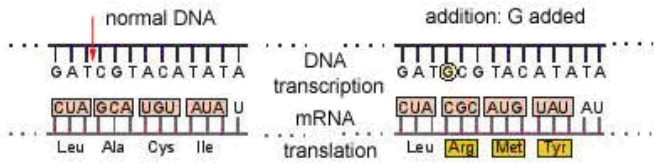
Pea Plants:
G = green pod
g = yellow pod
I = inflated pod
i = constricted pod

235. Refer to the illustration above. The phenotype represented in box 1 is _____,

236. Refer to the illustration above. The genotype represented in box 2 is _____

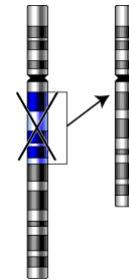
237. A mutation caused by a piece of DNA breaking away from its chromosome and becoming attached to a nonhomologous chromosome is called _____

Use the diagram below to answer the following question.

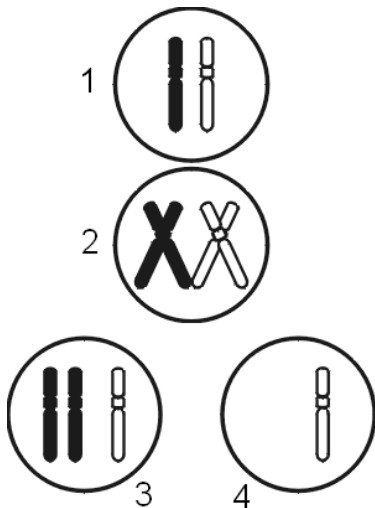


238. The above diagram illustrates this type of mutation? _____

239. Which chromosomal mutation is represented by the diagram below?



Use the following diagram of nondisjunction to answer the following question.



240. Which number represents a trisomy? _____