Honors Biology 2nd Semester Review

Modified True/False

Indicate whether the statement is true or false. If false, change the identified word or phrase to make the statement true.

1. Ciliates use flagella for feeding and movement.
2. Euglenas have cell walls composed of silica and shaped like the two sides of a pillbox.
3. The brown accessory pigment found in brown algae is phycobilin.
4. Members of the phylum Rhodophyta contain the accessory pigment phycobilin.
5. The life cycles of many algae include both a diploid and a haploid generation.

Completion

Complete each statement.

6. A ________________ is the combined genetic information of all members of a particular population.
7. Crossing-over can occur during the meiotic divisions that produce cells called ________________.
8. The number of possible phenotypes for a given trait depends on how many ________________ control the trait.
9. A polygenic trait can have many possible genotypes and ________________.
10. The pattern of natural selection that acts most strongly against gray individuals in a population that ranges from black through gray to white is ________________ selection.
11. When the phenotypes of polygenic traits are represented by a bell curve, the ________________ of individuals close together on the curve is not very different.
12. According to the ________________ principle, allele frequencies in a population will remain constant unless one or more of five specific factors cause those frequencies to change.
13. If two populations have been reproductively isolated and can no longer breed and produce fertile offspring, the process of ________________ has occurred.
14. In a particular environment, populations that are very different from each other are less likely to ________________ with each other for resources.
15. In a species that has become ________________, all members have died, and the species has ceased to exist.
16. The ________________ record provides evidence about the history of life on Earth.
17. A researcher could quickly date a new rock sample if it contained a(an) ________________ fossil.
18. After Precambrian Time, the main divisions of the geologic time scale are eras and ________________.
19. Earth’s least dense elements, including hydrogen and ________________, formed the planet’s first atmosphere.
20. In Stanley Miller and Harold Urey’s experiment, several _________________, which are the building blocks of proteins, began to accumulate.

21. It is possible that RNA was the first information-storing molecule, but over time, _________________ became the primary way in which genetic information is stored and transmitted.

22. The _________________ theory proposes that eukaryotic cells arose from living communities of several prokaryotic organisms.

23. As the Paleozoic Era closed, a(an) _________________, which is the dying out of many types of living things at one time, occurred.

**Short Answer**

24. What attributes of the garden pea plant made it an excellent organism for Gregor Mendel’s genetic studies?

25. How many recessive alleles for a trait must an organism inherit in order to show that trait?

```
\[ \begin{array}{c|cccc}
   & RY & Ry & rY & ry \\
\hline
 RY & RRYY & RRyy & RrYY & RrYy \\
 Ry & RRyy & RRyy & RrYy & Rryy \\
rY & RrYY & RrYy & rryy & rryy \\
 ry & RrYy & Rryy & rrYy & rryy \\
\end{array} \]
```

**Figure 11-2**

26. What is the phenotype ratio of the offspring in the Punnett square shown in Figure 11-2?

27. A pea plant heterozygous for height and seed color \((TtYy)\) is crossed with a pea plant heterozygous for height but homozygous recessive for seed color \((Ttty)\). If 80 offspring are produced, how many are expected to be tall and have yellow seeds?

28. How many sets of chromosomes are in a diploid cell?

29. Define *homologous chromosomes*.

30. What happens to the number of chromosomes per cell during meiosis?

31. Contrast the cells produced by mitosis with those produced by meiosis.

32. Explain how the bacteria in Griffith’s experiment were transformed.
33. If the percentage of guanine in the DNA of a certain species decreased by 5 percent over time, what would you expect to have happened to the percentage of adenine in that DNA?

34. What are the three main parts of an RNA nucleotide?

![Figure 12-3](image)

35. What is molecule B in Figure 12-3, and what is its function?

36. What must happen to a DNA molecule before RNA polymerase can make RNA?

![Figure 12-2](image)

37. According to Figure 12-2, what codons specify the amino acid arginine?

38. What causes translation to stop?

39. What is a mutation?

40. What is a carrier?

41. Why are all X-linked alleles expressed in males, even if they are recessive?
42. A man who does not have hemophilia and a woman who is a carrier of the disorder have a son. What is the probability that their son has hemophilia?

43. What is the goal of the Human Genome Project?

![Figure 19-1](image)

44. Identify structures A through F in Figure 19-1.

45. Name the two kingdoms of bacteria. List one way that these two groups differ from each other.

46. Describe two roles that bacteria have in the environment.

47. List two ways in which bacteria cause disease.

48. What is a pathogen?

49. What is a virus? Describe the basic structure of a virus.

50. What is bilateral symmetry?

51. What structures provide support for sponges?

52. Describe how a sponge obtains food and discards waste.

53. What body form is typical of the scyphozoans? Describe this body form.

54. Describe the polyp body form of cnidarians.

55. What role do freshwater snails play in the life cycle of the blood fluke Schistosoma?
USING SCIENCE SKILLS
Heterozygous male guinea pigs with black, rough hair (BbRr) are crossed with heterozygous female guinea pigs with black, rough hair (BbRr). The incomplete Punnett square in Figure 11-4 shows the expected results from the cross.

<table>
<thead>
<tr>
<th></th>
<th>BR</th>
<th>Br</th>
<th>bR</th>
<th>br</th>
</tr>
</thead>
<tbody>
<tr>
<td>BR</td>
<td>BBRR</td>
<td>BBRR</td>
<td>BbRR</td>
<td>BbRr</td>
</tr>
<tr>
<td>Br</td>
<td>BBRR</td>
<td>BBrr</td>
<td>BbRr</td>
<td>Bbrr</td>
</tr>
<tr>
<td>bR</td>
<td>BBRR</td>
<td>BbRr</td>
<td>X</td>
<td>bbr</td>
</tr>
<tr>
<td>br</td>
<td>BbRr</td>
<td>Bbrr</td>
<td>bbr</td>
<td>brr</td>
</tr>
</tbody>
</table>

**Figure 11-4**

56. Using Tables and Graphs Identify the genotype of the offspring that would be represented in the square labeled X in Figure 11-4.

57. Using Tables and Graphs Identify the phenotype of the offspring represented in the square labeled X in Figure 11-4.

58. Analyzing Data In Figure 11-4, what are the different phenotypes of the offspring?

59. Analyzing Data In Figure 11-4, what are the genotypes of the offspring that have black, rough hair?

60. Calculating What fraction of the offspring in Figure 11-4 would be expected to have white, smooth hair?
61. **Inferring** What do the letters R and I represent in Figure 11-5?

62. **Interpreting Graphics** In Figure 11-5, what is the genotype of the pink-flowered snapdragons?

63. **Inferring** Explain whether the alleles in Figure 11-5 show dominance, incomplete dominance, or codominance.

64. **Inferring** According to Figure 11-5, if red-flowered snapdragons and ivory-flowered snapdragons are crossed, what percentage of their offspring would be expected to be pink-flowered?

65. **Inferring** According to Figure 11-5, if two pink-flowered snapdragons are crossed, what percentage of their offspring would be expected to be pink-flowered?
66. **Interpreting Graphics** In Figure 11-6, what is the structure labeled X in stage B?

67. **Interpreting Graphics** In Figure 11-6, during which stage might new allele combinations form? Identify the stage.

68. **Inferring** If the stages shown in Figure 11-6 are taking place in a female animal, how many eggs will result from stage G? Explain your answer.

69. **Interpreting Graphics** List the stages in Figure 11-6 in which the cells are 2N and those in which the cells are N.
70. **Inferring** In Figure 11-6, in which stage does each cell have a single copy of each gene? Identify the stage.

**USING SCIENCE SKILLS**

![Figure 12-5]

71. **Interpreting Graphics** What process is illustrated in Figure 12-5?

72. **Interpreting Graphics** Identify structure C in Figure 12-5.

73. **Interpreting Graphics** Which labeled structure in Figure 12-5 is a codon?

74. **Inferring** What is the relationship between the codons and anticodons in Figure 12-5? How is this relationship important?

**USING SCIENCE SKILLS**

![Figure 14-1]

75. **Classifying** Which chromosomes in Figure 14-1 are autosomes?

76. **Interpreting Graphics** In the human karyotype in Figure 14-1, how many chromosomes are shown?
77. **Drawing Conclusions** Identify the sex chromosomes in Figure 14-1. Does the karyotype show the normal number of sex chromosomes? Explain.

**USING SCIENCE SKILLS**
The pedigree shows the inheritance of free earlobes and attached earlobes in five generations of a family. Attached earlobes are caused by a recessive allele \( f \). Half-shaded symbols are NOT used in this pedigree to show carriers of the allele.

![Pedigree Diagram](image)

**Figure 14-2**

78. **Inferring** Is individual 2 in Figure 14-2 homozygous or heterozygous for free earlobes? Explain.

79. **Interpreting Graphics** In Figure 14-2, how many children of individuals 4 and 5 have attached earlobes?

80. **Inferring** Can you be certain of the genotype of individual 5 in Figure 14-2? Explain.

81. **Predicting** Predict the genotype and phenotype of individual 14 in Figure 14-2.

82. **Inferring** In Figure 14-2, are any of the descendants of individuals 1 and 2 homozygous for free earlobes?
USING SCIENCE SKILLS

**Figure 15-3**

83. **Interpreting Graphics** What differences are apparent in the bodies of the three tortoise species shown in Figure 15-3?

84. **Interpreting Graphics** Which of the tortoises shown in Figure 15-3 has the longest neck?

85. **Applying Concepts** Can you tell from Figure 15-3 how closely the three tortoise species resemble the ancestral species? Why or why not?

86. **Inferring** Vegetation on Hood Island is sparse and sometimes hard to reach. How might the vegetation have affected the evolution of the Hood Island tortoise shown in Figure 15-3?

87. **Forming Hypotheses** Considering the body structure of the tortoises shown in Figure 15-3, which tortoises—a population from Pinta Island or a population from Isabela Island—might survive more successfully on Hood Island? Why?
USING SCIENCE SKILLS

Figure 16-1

88. **Interpreting Graphics** According to Graph A in Figure 16-1, what has occurred?

89. **Interpreting Graphics** According to Graph B in Figure 16-1, what has occurred?

90. **Interpreting Graphics** According to Graph C in Figure 16-1, what has occurred?

91. **Inferring** Which of the three graphs shown in Figure 16-1 might show a population of birds with members that specialize in different types of food? Explain.

92. **Inferring** What factors or conditions might have led to the change shown in Graph A of Figure 16-1?
USING SCIENCE SKILLS
Figure 17-3 shows a version of Stanley Miller and Harold Urey’s apparatus used to simulate what was thought to be conditions on early Earth.

![Diagram of Miller-Urey experiment]

**Figure 17-3**

93. **Inferring** In the apparatus in Figure 17-3, what do the electrodes produce and what does that simulate?

94. **Inferring** In Figure 17-3, what is the purpose of combining the water vapor and the mixture of gases?

95. **Inferring** In this experiment, the researchers made sure that no microscopic life forms were present in the system shown in Figure 17-3. Explain why that was necessary.

96. **Drawing Conclusions** In the experiment in Figure 17-3, what conclusions can be drawn from the mixture that was collected in the container on the bottom?

97. **Inferring** Other scientists have used high heat and nuclear radiation in experiments similar to this one. For what part of the apparatus shown in Figure 17-3 were they likely substituted?
98. **Interpreting Graphics** What does Figure 19-6 represent?

99. **Comparing and Contrasting** Look at both cycles shown in Figure 19-6. During which cycle is the host cell destroyed?

100. **Interpreting Graphics** Each stage of the cycles shown in Figure 19-6 is labeled with a letter. Which letter indicates the stage at which the bacteriophage’s DNA becomes a part of the host cell’s DNA?

101. **Interpreting Graphics** Which letter in Figure 19-6 indicates the stage at which a host cell begins producing new bacteriophages?

102. **Interpreting Graphics** Which letter in Figure 19-6 indicates the stage at which a bacteriophage injects its DNA into a host cell?
103. **Inferring** Why are sponges appropriately placed in the phylum Porifera? Use Figure 26-2 to explain.

104. **Interpreting Graphics** In Figure 26-2, which label refers to the osculum? What is this structure’s function?

105. **Interpreting Graphics** Which label in Figure 26-2 represents an archaeocyte? What is the function of archaeocytes?

106. **Applying Concepts** In Figure 26-2, which label represents the structure through which a steady current of water moves into the sponge? What is this structure called?

107. **Applying Concepts** What is the structure labeled B? How does this structure enable organisms within a sponge to carry out photosynthesis?
108. Applying Concepts To which phylum does the animal shown in Figure 27-1 belong?

109. Interpreting Graphics Which structure shown in Figure 27-1—A, B, C, or D—takes food into the animal’s body cavity? What is this structure called?

110. Interpreting Graphics Which label in Figure 27-1 points to a nerve cord? At the anterior end of the worm, what structures connect to nerve cords?

111. Interpreting Graphics What structure shown in Figure 27-1 allows the animal to sense light? What is this structure called?

112. Inferring The animal shown in Figure 27-1 uses diffusion to transport oxygen, nutrients, and wastes through its body. How does the body shape of the animal allow it to depend upon diffusion for transport?

113. Applying Concepts What is the name of the animal shown in Figure 27-2, and in what phylum does it belong?

114. Interpreting Graphics Structure A in Figure 27-2 plays a role in reproduction. What is the name and function of this structure?

115. Inferring In Figure 27-2, what is the structure labeled B? What is its function?
116. **Predicting** What structures are labeled D in Figure 27-2?

117. **Inferring** Identify structure C in Figure 27-2, and infer its relationship to structure E.

**Essay**

118. Describe the Hershey-Chase experiment. Why were the results important?

119. Describe the structure of a DNA molecule.

120. Contrast the functions of the three main types of RNA.

121. Why does Huntington’s disease remain in the human population, even though it is fatal and is caused by a dominant allele?

122. Compare the normal allele for hemoglobin with the sickle cell allele. How does this difference affect the person’s red blood cells?

123. Explain why the father of a girl who is colorblind must also be colorblind.

124. What was Charles Darwin’s greatest contribution to science, and how did he develop it?

125. Discuss Jean-Baptiste Lamarck’s contribution to the overall theory of evolution.

126. How did Thomas Malthus’s ideas about human population growth inspire Darwin’s thinking about evolution?

127. Describe the appearance of a typical euglena and explain how it moves through water.

128. Compare the structure of the colonial alga, *Volvox*, with that of *Ulva*, a true multicellular alga.