AP Biology **Name** _____

Chapter 23 Guided Reading: The Evolution of Populations
10ed

1. What is *microevolution*?

2. What are the three main mechanisms that can cause changes in allele frequency?

3. What is the only mechanism that is adaptive, or improves the match between organisms and their environment?

4. Differences among individuals show two common patterns. One type of variation is between “either-or” characters, and the other is when the character varies along continuum. Explain the underlying genetic differences that contribute to each pattern.

5. Perhaps because we tend to focus on mutations that cause changed in phenotypes, it is easy to think that every mutation will lead to a phenotypic change. Use figure 23.4 to answer the following:

    a. How many total mutations are shown in the alcohol dehydrogenase gene?

    b. How many mutations occurred in the exon areas? How many of these mutations altered the amino acid sequence of the protein?

    c. Explain how substitution error in an exon could have no effect on the amino acid sequence.

6. What is the ultimate source of new alleles?

7. What occurs in *point mutation?* Do point mutations always result in a change of phenotype?

8. What is neutral variation? Give an example from Figure 23.4

9. Chromosomal changes that delete, disrupt, or rearrange many loci at once are usually harmful. How does *gene duplication* occur? How might it play a role in evolution?

10. Much of the genetic variation that makes evolution possible comes through sexual reproduction. What are the three mechanisms by which sexual reproduction shuffles existing alleles?

    1.

    2.

    3.

11. What is a *population?*

12. What is a *gene pool*?

13. The greater the number of *fixed* alleles, the lower the species' diversity. What does it mean to say that an allele is *fixed?*

14. The *Hardy-Weinberg principle* is used to describe a population that is *not* evolving. What does this principle state?

15. There are five conditions for Hardy-Weinberg equilibrium. Enter the conditions on the left side of the chart and a brief explanation of the condition on the right side.

Conditions For Hardy-Weinberg Equilibrium	Explanation
1.	
2.	
3.	
4.	
5.	

16. In a plant population, suppose that red flowers (R) are dominant to white flowers (r). In a population of 500 individuals, 25% show the recessive phenotype. How many individuals would you expect to be homozygous dominant and heterozygous for this trait? **SHOW WORK, BOX ANSWERS**

17. In a population of plants, 64% exhibit the dominant flower color (red), and 36% of the plants have white flowers. What is the frequency of the dominant allele? **SHOW WORK, BOX ANSWER**

18. Three major factors alter allelic frequency and bring about evolutionary change. List each factor, and give an explanation.

Factor	Explanation

19. Which of the factors results in a random, nonadaptive change in allelic frequency?

20. Which of the factors tends to reduce the genetic difference between populations and make populations more similar?

21. Of the three factors you previously listed, one resulted in individuals that are better suited to their environment. Which is it?

22. Explain what happened in each of these examples of *genetic drift*.

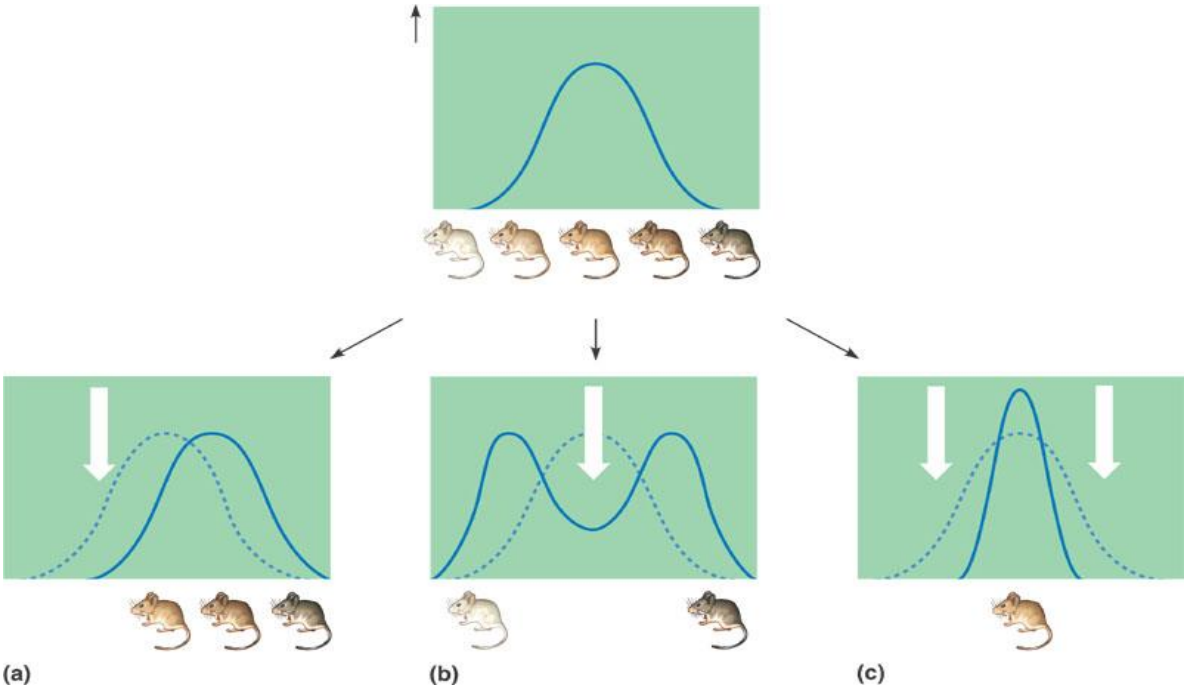
    Founder effect

    Bottleneck effect

23. Define *relative fitness.*

24. What is the *relative fitness* of a sterile mule? _____

25. **Label** each type of selection, and fill in the chart to explain what is occurring.



Type of Selection	How it Works
Stabilizing	
Directional	
Disruptive	

26. What is often the result of *sexual selection?*

27. What is the difference between *intrasexual selection* and *intersexual section?* Give an example of each type of selection.

28. Explain two ways in which genetic variation is preserved in a population.

29. Natural selection can act to maintain genetic variability due to balancing selection. Explain and give an example of the two mechanisms of balancing selection:

    a. Heterozygote advantage

    b. Frequency-dependent selection

30. Give four reasons why natural selection cannot produce perfect organisms.