

Name \_\_\_\_\_

Period \_\_\_\_\_

AP Biology

Date \_\_\_\_\_

**CHAPTER 21 GUIDED NOTES: GENES WITHIN POPULATIONS**

1. Define "descent with modification" \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

2. Evolution was not an idea original to Darwin, so what was Darwin's key contribution to this theory.

\_\_\_\_\_  
\_\_\_\_\_

3. Distinguish between Lamarck's concept of evolution and Darwin's.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

4. What is the raw material of evolution? \_\_\_\_\_

5. List the five conditions that must be met by a population for genotypes to remain unchanged from generation to generation (i.e., a population in Hardy-Weinberg equilibrium).

a. \_\_\_\_\_

b. \_\_\_\_\_

c. \_\_\_\_\_

d. \_\_\_\_\_

e. \_\_\_\_\_

6. Assuming a population is in Hardy-Weinberg equilibrium, write the equation that describes genotype frequencies.

\_\_\_\_\_

7. In reference to the Hardy-Weinberg Principle, define the following:

a.  $p^2$  \_\_\_\_\_

b.  $2pq$  \_\_\_\_\_

c.  $q^2$  \_\_\_\_\_

8. Work out these practice problems. Assuming H-W equilibrium, find both the allele and genotype frequencies.

a. In *Drosophila*, the allele for normal length wings is dominant over the allele for vestigial wings. In a population of 1,000 individuals, 160 show the recessive phenotype.

1. allele frequencies: dominant allele (**W**) = \_\_\_\_\_; recessive allele (**w**) = \_\_\_\_\_

2. genotype frequencies: **WW** = \_\_\_\_\_; **Ww** = \_\_\_\_\_; **ww** = \_\_\_\_\_

b. The allele for the hair pattern called "widow's peak" is dominant over the allele for no "widow's peak." In a population of 1,000 individuals, 360 show the dominant phenotype.

1. allele frequencies: dominant allele (\_\_\_) = \_\_\_\_\_; recessive allele (\_\_\_) = \_\_\_\_\_

2. genotype frequencies: \_\_\_\_\_ = \_\_\_\_\_; \_\_\_\_\_ = \_\_\_\_\_; \_\_\_\_\_ = \_\_\_\_\_

9. What is the value of using the Hardy-Weinberg equation when researching evolution in a population.

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10. List and briefly explain the five agents of evolutionary change.

- a. \_\_\_\_\_  
\_\_\_\_\_
- b. \_\_\_\_\_  
\_\_\_\_\_
- c. \_\_\_\_\_  
\_\_\_\_\_
- d. \_\_\_\_\_  
\_\_\_\_\_
- e. \_\_\_\_\_  
\_\_\_\_\_

11. How does genetic drift apply to each of the following? Give an example of each.

- a. Founders effect \_\_\_\_\_  
\_\_\_\_\_
- b. Bottleneck effect \_\_\_\_\_  
\_\_\_\_\_

12. On page 441, the book states, “only selection regularly produces ***adaptive*** evolutionary change, but the genetic constitution of populations, and thus the course of evolution, can also be affected by mutations, gene flow, nonrandom mating, and genetic drift.” Explain the distinction .

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

13. Describe two examples of documented cases of selection in natural populations which have resulted in evolutionary change of a population.

a. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

b. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

14. Define fitness (as it is used in evolutionary biology). \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

15. Explain "heterozygote advantage" and give an example.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

16. Distinguish between the three types of selection illustrated in these graphs of the distribution of coat color in mice.

