

Name _____

AP Biology
TEXT: *Biology, Campbell and Reece*
7th Edition
Chapter 23

Evolution: Populations
Thematic Review Guide

1. How does the “modern synthesis” theory of evolution differ from Darwin’s Theory of Natural Selection? _____

2. Population genetics puts a mathematical approach to the study of microevolution. Define each of the terms commonly used in population genetics.

a. population: _____

b. gene pool: _____

c. gene frequency: _____

3. What are the gene frequencies for the red and white flowers?

a. $p =$ _____

b. $q =$ _____

4. List the five conditions that must be met by a population to insure stability (**no evolution**).

a. _____

b. _____

c. _____

d. _____

e. _____

5. Assuming Hardy-Weinberg distribution of genes in a population, write the equation that describes genotype frequencies. _____

6. Define the following:

a. $p^2 =$ _____

b. $2pq =$ _____

c. $q^2 =$ _____

7. Work out these practice problems. Find both the genotypic and phenotypic 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.

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.

8. What is the H-W assumption that is broken when genetic drift occurs? Explain.

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

a. Founders effect: _____

b. Bottleneck effect _____

10. How does each of the following break H-W assumptions?

a. natural selection: _____

b. gene flow: _____

c. mutation: _____

d. selective mating: _____

11. Why is genetic variation important to evolution?

12. How can populations vary along a geographic axis compared to isolated populations?

13. What is the role of mutations to forming variation?

14. What factors of sexual reproduction lead to variations within a population?

15. How does diploidy preserve variation?

16. What is "balanced polymorphism"?

17. How can parasites contribute to balanced polymorphism?

18. In a biological sense, What is fitness?

20. What is the effect of sexual selection?

Extension: For each of the following, give an example or describe what is meant by the statement.

a. Natural selection cannot fashion perfect organisms: _____

b. Evolution is limited by historical constraints: _____

c. Adaptations are often compromises: _____

d. Not all evolution is adaptive: _____

e. Selection can only edit existing variations: _____
