

c. Uniformitarianism

5. How did Darwin's voyage on The *HMS* Beagle impact Darwin and aid in his development of the theory of natural selection?
6. Explain the role of adaptation in the theory of natural selection.
7. Explain the phrase “descent with modification” in your own words.
8. Summarize the observations and inferences made in Darwin’s work
9. Contrast artificial selection compared to natural selection.
10. Explain the evolution of Drug Resistance in bacteria in terms of natural selection.
11. Define the following terms:
 - a. Homologous structures
 - b. Vestigial structures
 - c. Analogous structures

12. What is biogeography and why is it important evidence for evolution?

13. How do the fossil record and sedimentary rocks provide evidence for evolution?

14. In your opinion, what is the most powerful evidence for evolution?

Chapter 23: The Evolution of Populations

1. What is it incorrect to say that individual organisms evolve?

2. BRIEFLY explain the “Modern Synthesis.”

3. Define the following terms:
 - a. Microevolution

 - b. Population

 - c. Population genetics

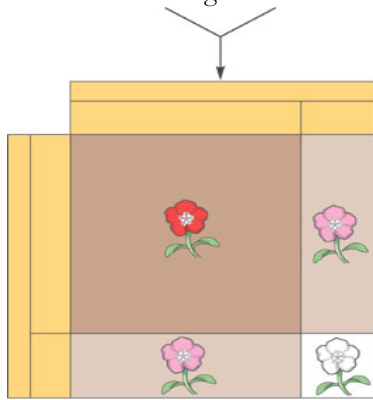
 - d. Gene pool

4. What does the Hardy-Weinberg theorem describe?

5. What is Hardy-Weinberg equilibrium?

6. What are the five conditions for H-W equilibrium to be maintained? BRIEFLY explain each condition.

7. Use the blank diagram below to relate the H-W equation to a Punnett square.



8. How can the H-W equation be used to understand genetic trends in the human population?

9. What are the two sources of variation that make evolution possible?

10. What is the relationship between mutation rates and generation span?

11. Explain the following:

a. Genetic drift

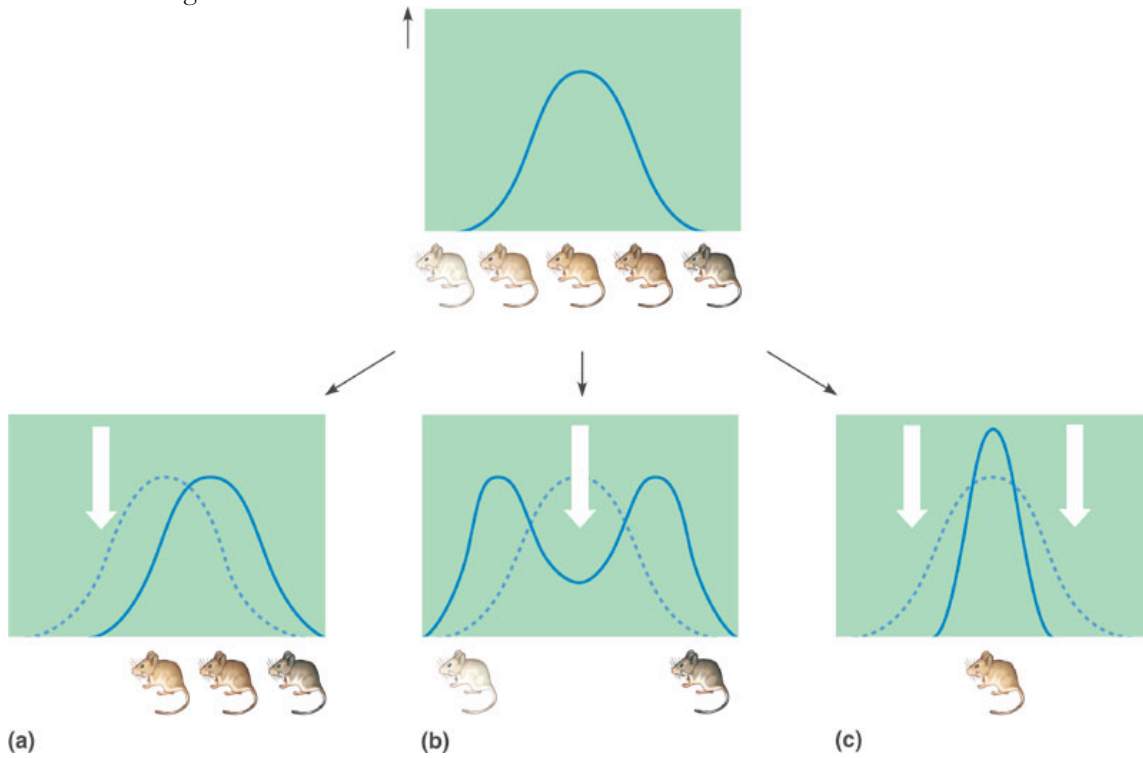
b. Bottleneck effect

c. Founder effect

d. Gene flow

12. Why is natural selection called the “primary mechanism of adaptive evolution”?
13. Give 2 examples of non-inheritable variations.
14. Explain the terms phenotypic polymorphism and genetic polymorphism in common terms and give an example of each.
15. How do we measure genetic variation?
16. How can very small differences in nucleotide sequences lead to large diversity in the human population?
17. What is geographic variation? Use the term “cline” in your explanation.
18. Explain the relationship between the term “fitness” and “relative fitness”
19. What is meant by the concept that evolution acts on phenotypes and not genotypes?

20. Use the diagram below to differentiate between the three modes of selection shown.



21. How does diploidy preserve genetic variation?

22. Explain how balanced polymorphisms maintain alleles in a population.

23. Explain each of the following and give an example of each:

a. Heterozygote advantage

b. Frequency dependent selection

c. Neutral variation

d. Sexual dimorphism

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e. Intrasexual selection

f. Intersexual selection

24. Explain why evolution can never create a perfect organism.

Chapter 24: Speciation

1. Define the following terms:

a. Speciation

b. Anagenesis

c. Cladogenesis

2. What is the “biological species” concept?

3. What are the differences between prezygotic and postzygotic barriers to reproduction?

4. Identify each of the following as prezygotic or postzygotic barriers and write a BRIEF description of each:

a. Habitat isolation

b. Temporal isolation

c. Behavioral isolation

d. Mechanical isolation

e. Gametic isolation

f. Reduced hybrid viability

g. Reduced hybrid fertility

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- h. Hybrid breakdown
5. Explain why the biological species concept is not always useful for scientists.
6. Detail these other definitions of species:
 - a. Morphological species concept
 - b. Paleontological species concept
 - c. Ecological species concept
 - d. Phylogenetic species concept
7. How does allopatric speciation occur?
8. How does sympatric speciation occur?
9. In what types of organisms are polyploidy speciation events most common? Why do you think this occurs?
10. What is adaptive radiation? Why is it most likely to occur on islands or after mass extinctions?
11. Compare and contrast the models of punctuated equilibrium to gradualism as models for the rate of evolution. Are these models mutually exclusive?
12. Define the following terms:
 - a. Heterochrony
 - b. Allometric growth
 - c. Paedomorphosis

- d. Homeotic genes
13. What impact have the *Hox* genes had on vertebrates?
14. How does the evolution of the horse exemplify the concept that evolution is driven by the interactions of the organism and its environment?
15. Explain why evolution is not goal oriented.

Chapter 25: Phylogeny and Systematics

1. Define the following terms:
 - a. Phylogeny
 - b. Systematics
 - c. Molecular systematics
 - d. Homoplasies
 - e. Taxonomy
 - f. Binomial nomenclature
 - g. Phylogenetic trees
 - h. Cladogram
 - i. Clade
 - j. Cladistics

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- k. Shared primitive character
- l. Shared derived character
2. Use the following blank diagram to compare and explain monophyletic, paraphyletic and polyphyletic. Include the definition of each term in your diagram
3. What is the relationship between the ingroup and the outgroup in classification?
4. What is the difference in the meaning between the lengths of lines in a phylogram and ultrametric tree?
5. Look up the term parsimony in the dictionary and write its definition here:
6. How is this applied to understanding evolution – what is the principle of maximum parsimony and the principle of maximum likelihood?
7. What is the difference between orthologous genes and paralogous genes?
8. What is the concept of a molecular clock and how is it useful?
9. What domains have been agreed upon?

Chapter 26: The Origin of Life on Earth and an Introduction to Biodiversity

1. Will science ever conclusively know how life began on earth? Why or why not?
2. Explain the four proposed stages in the development of life from abiotic (“non-living”) components.
3. Explain the Miller-Urey experiment and its results.
4. What are “protobionts”? Why are they not alive?
5. Why do we think that RNA evolved before DNA?
6. How does radiometric dating help us understand the age of fossils?
7. What does the fossil record show in terms of historical extinction rates?
8. What was the most “deadly” mass extinction? When did it occur? How many marine animal species became extinct?

