Unit 7: Evolution Study Guide

Advanced and ESL Biology

Name: _____ Date: _____ Block:_____

Directions: Using the textbook or classroom notes, answer the following questions.

b. Explain the biological definition of evolution

1. What is evolution? (pg. 369)

2. How does evolution change the frequency of alleles over time? (pg. 394 or 397)

Question: A marine biologist hypothesizes that <u>biological evolution</u> is occurring in certain populations of salt water turtles she is studying. To support her hypothesis, the biologist would need to document <u>a change</u> in which of the following?

a. Size of the individual turtles over a lifetime
b. Size of the population of turtles over the course of her study
c. Frequency of alleles in the population over the course of her study
d. Frequency of predation on members of the population over the course of her study

d. Discuss Darwin's principle of survival of the fittest and explain what Darwin meant by natural selection
h. Design, perform, and analyze a laboratory simulation of natural selection on a working population (teacher chooses prey items [hard candies, marshmallows]; students choose feeding adaptation [fork, toothpick, spoon] and hunt; students record results and then change prey or adaptation; and students analyze results using statistics
k. Explain how natural selection and its evolutionary consequences (e.g., adaptation or extinction) provide a scientific explanation for fossil record of ancient life-forms and the striking molecular similarities observed among the diverse species of living organisms.

3. What is artificial selection? (pg. 379)

4. What is natural selection? (pg. 381)

5. What are the requirements for natural selection to occur? (pg. 380-381)

6. How does natural selection act on alleles? (pg. 381)

7. How does natural selection act on genotypes? (pg. 381-382)

8. What did Charles Darwin say about the organisms he saw on the Galapagos Islands? (pg. 382)

9. What is fitness? (pg. 380)

10. What makes an organism "fit?" (pg. 380-381)

Question(s):

I. When cheetahs prey on a herd of gazelles, some gazelles are killed and some escape. Which part of Darwin's concept of <u>natural selection</u> might be used to describe this situation?
   a. Survival of the fittest
   b. Reproductive isolation
   c. Acquired characteristics
   d. Artificial selection

II. According to Darwin's theory of natural selection, which of the following do individuals that tend to survive have?
   a. Variations best suited to the environment
   b. The greatest number of offspring
   c. Characteristics that plant and animal breeders value
   d. Characteristics their parents acquired by use and disuse.

11. On pages 370-371 Darwin made some observations (green subtitles) about certain trends in animal species. What were some of these observations? **You may need more space**

e. Explain the influences of other scientist (e.g., Malthus, Wallace, Lyell) and of Darwin's trip on the HMS Beagle in formulating Darwin's ideas about natural selection

12. What was James Hutton's contributions to evolution? (pg. 374)

13. What did Charles Lyell say about evolution? (pg. 375)

14. What did Thomas Malthus say about evolution? (pg. 377)

f. Contrast Lamarck's and Darwin's ideas about chances in organisms over time

All answers to this section can be found on page 376

15. What was Jean-Baptist Lamarck's hypothesis about evolution?

16. What is an acquired trait?

17. What is an inherited trait?

Question(s):

I. In an experiment, suppose the tail of lizards were clipped short for thirty generations. The thirty-first generation emerged with normal-length tails. Which theory of evolution would be disproved by this observation?

   a. Natural selection
   b. Inheritance of natural variation
   c. Inheritance of acquired characteristics
   d. Survival of the fittest

II. Which example best illustrates the process of natural selection?

a. Giraffes with short necks migrated to locations best suited for their neck lengths
b. Giraffe necks varied in length and the shorter necked giraffes were at a disadvantage
c. Giraffes stretched their necks to reach for food and resulting offspring had longer necks
d. Giraffe necks varied in length, and all offspring had an equal chance of survival.

III. As part of a simulation of evolutionary process, a teacher drops 200 blue and 200 orange marbles on blue fabric. The blue and orange marbles represent individuals of the same species. Students represent predators and pick up as many marbles as possible in 30 seconds. Which prediction is most accurate?

a. Orange individuals are more likely to survive and reproduce
b. Blue individuals are more likely to survive and reproduce
c. Predators are more likely to capture blue individuals
d. Predators are equally likely to capture blue and orange individuals

g. Provide examples of behaviors that have evolved through natural selection (e.g., migration, courtship)

18. What is sexual selection? (pg. 395)

19. What are the advantages of sexual reproduction? (pg. 395)

20. What are the disadvantages of sexual reproduction? (pg. 394)

21. How are mutations related to evolution? (pg. 394)

22. What is Genetic Drift? (pg. 400)

23. What is the Founder Effect? (pg. 400)

24. **Evolution vs. Genetic Equilibrium**: Explain what the Hardy-Weinburg Principle states.

25. **List and describe** the five conditions that are required to maintain genetic equilibrium. (pg. 402). **You may need more space**…

Question(s):

I. From a genetic perspective, what is the main **disadvantage** of sexual reproduction?
   a. Sharing responsibility for raising the young
   b. Only contributing half of the individual genes
   c. Decrease genetic variation
   d. Having to choose a mate

j. Describe the basic types of selection, including disruptive, stabilizing, and directional

This section can be answered using pages 398-399

26. What is directional selection? **Give an example. Draw the curve** in the space below.

27. What is stabilizing selection? **Give an example. Draw the curve** in the space below.

28. What is disruptive selection? **Give an example. Draw the curve** in the space below.

i. Specifically describe the conditions required to be considered a species (reproductively isolated, geographical isolation.)

29. What is speciation? (pg. 404)

30. What is reproductive isolation? (pg. 404)

31. What is geographical isolation? (pg. 405)

32. What is behavioral isolation? (pg. 404)

33. What is temporal isolation? (pg. 405)

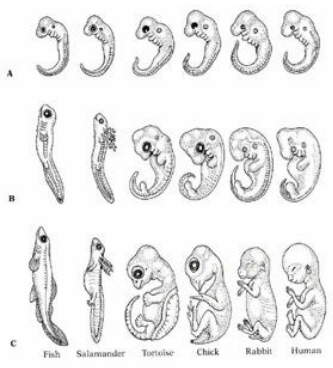
Question: What situation might develop in a population having some animals feed during midday hours and other animals feed during evening hours?

a. Genetic drift
b. Temporal isolation
c. Behavior isolation
d. Geographic isolation

1. Discuss evidence from the fields of geology, biochemistry, embryology, comparative anatomy, and comparative physiology that points to shared evolutionary relationships

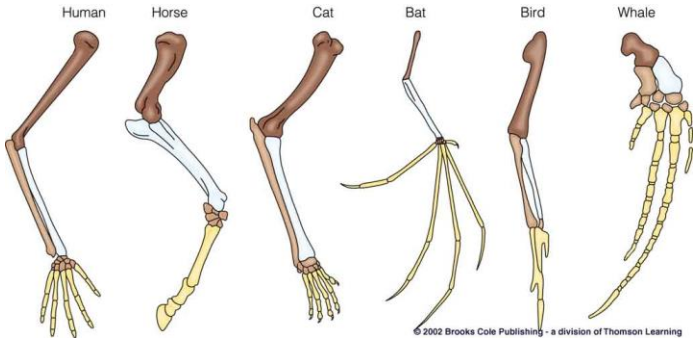
34. What does the fossil record say about evolution? (pg. 382 or 417)

35. Why is biochemistry evidence for evolution? **(pg. 425)**



36. What does biogeography say about evolution? (pg.382 or 421)

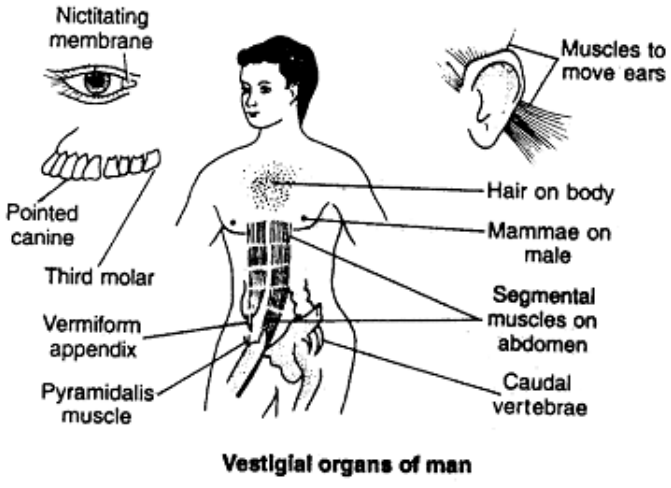
37. What does embryology say about evolution? **(**pg. 385)



38. What are homologous structures? (pg. 384)

39. What are analogous structures? (pg. 384)

40. What are vestigial structures? (pg. 384)



Vestigial organs of man

n. Distinguish between catastrophism, gradualism and punctuated equilibrium.

41. What is adaptive radiation? (pg. 436)

42. What is convergent evolution? (pg. 437)

43. What is gradualism? (pg. 439)

44. What is catastrophism? (to the Google!)

45. What is punctuated equilibrium? (pg. 439)

Question(s):

I. What is the relationship between a **wing of a bat** and the **fin of a whale?**

a. They represent derived homologies
b. These traits have arisen from disruptive selection
c. These traits have arisen independently as a result of convergence
d. They represent modified forms of a trait present in common ancestor.

II. The number and location of bones of many fossil vertebrates are similar to those in living vertebrates. Which of the following most likely explains the basis for this observation?

a. The needs of the organisms
b. The struggle for existence
c. A common ancestor
d. The inheritance of acquired traits

III. Dinosaurs dominated most of earth millions of years ago. At that time, most mammals were small and nocturnal (coming out only at night). After the extinction of the dinosaurs, mammals quickly diversified, what pattern of evolution best explains the diversification of mammals?

a. Catastrophism b. convergent evolution c. gradualism d. punctuated equilibrium