EVOLUTION EXAM RETAKE REVIEW

Chapter 15: Natural Selection

1. Describe the origin of new genetic variation in a population.
2. In northern Canada, there are two large herds of caribou that seldom encounter each other. Speculate on the amount of gene flow between these populations.
3. While observing wild birds, a fellow student asks, “Why are male cardinals such brilliant red? Doesn’t that make them more visible to predators?” Use your knowledge of sexual selection to answer how the predation risk of high visibility might be offset.
4. Identify the five principles of the Hardy-Weinberg theorem that must be true for a population to be in genetic equilibrium.
5. Cystic fibrosis is an autosomal recessive genetic disorder. This disease occurs in 0.4 out of 1000 children born in the United Kingdom. Calculate the percent of carriers (heterozygous) in the UK.
6. A biologist finds a population of small arthropods on a Pacific Island with white sand beaches between black lava flows. Most of the arthropods are either dark gray or very light gray, but less than 10 percent of the population is an intermediate gray color. Identify the pattern of selection and discuss how it might operate in this manner.
7. In lizards, it has been shown that there is an optimum size egg for survival; eggs that are too big or too small are not adaptive. Identify this pattern of selection and discuss this example.

Chapter 16: Phylogenetic Trees

1. Use the phylogenetic tree below to answer the following questions.

   a. How long ago did the common ancestor of all the organisms on the phylogenetic tree exist?
   b. Which two lines diverged 30 million years ago?
   c. List all modern descendants of the organism that was alive at the point indicated by the asterisk.
   d. When did the Giant Panda line diverge from the line that led to modern bears?
   e. What animal shares the most recent common ancestor with the Brown Bear?
   f. According to the phylogenetic tree, the red panda is most closely related to which animal?
Chapter 17: Speciation

1. Captive tigers and lions can be mated under certain conditions but will produce sterile offspring. Why are these two organisms considered to be different species?

2. Read the opening passage of Chapter 17 (page 343) to learn about cichlid fishes of Lake Malawi.
   a. Some cichlids populate the sandy areas of the lake, and some populate the rocky areas. Does this represent allopatric or sympatric speciation? Explain.
   b. In the rocky area, some of the cichlids evolved into plankton eaters, while other became algae eaters. Does this represent allopatric or sympatric speciation? Explain.

3. Describe how road construction could lead to allopatric speciation. Would the new road be expected to have the same effect for all animal species in a given area?

4. Your textbook gives several examples of prezygotic and postzygotic mechanisms (shown in parenthesis below). For each of the mechanisms given, provide another example and explain how the isolating mechanism keeps the two species from hybridizing.
   a. Mechanical isolation (orchids and wasps)
   b. Temporal isolation (leopard frogs)
   c. Behavioral isolation (frog calls)
   d. Habitat isolation (cichlids of Lake Malawi)
   e. Gametic isolation (sea urchin)
   f. Low viability of hybrid adults (Bombina toads)
   g. Hybrid infertility (mule and horse)

Chapter 18: The History of Life on Earth

1. If the half-life of a substance is 700 years. How much of the substance will remain after 2800 years?

2. Describe how life on Earth has impacted the concentration of oxygen in the atmosphere at each of the following times:
   a. 2 billion years ago:
   b. 1 billion years ago:
   c. 500 million years ago:
   d. 250 million years ago: