**Name: Section:**

**Ecocolumn FRQs**

**Directions:** Answer both questions; the suggested time is about 22 minutes for answering each question. Write your answers on the pages following the questions. Where calculations are required, clearly show how you arrived at your answer. Where explanation or discussion is required, support your answers with relevant information and/or specific examples.

1. On a field trip to two local ponds, a group of students observed a difference between two ponds in the diversity of worms and insect larvae living in the mud and debris near the edges of the ponds. Numerous factors, both biotic and abiotic, influence the distribution of aquatic organisms.
   1. The students decided that they would investigate some of the abiotic factors. List three water-quality tests that could be conducted and explain what information each test provides. Include in your answers a description of the impact of each factor on the distribution of aquatic organisms.
   2. Larvae of a certain insect are found in pond *A* but not in pond *B*. Design a controlled experiment that would help explain the observed distribution of these insect larvae. Be sure to include the following in your design.
      1. Formulate a hypothesis.
      2. Identify the variable that will be manipulated.
      3. Outline the field and/or laboratory procedures that will be followed. Describe what data you will collect.
      4. Discuss the possible results and relate them to the distribution of the insect.
   3. What are indicator species and how are they used to assess environmental quality? Give a specific example of such a species and its use.
2. Biogeochemical cycles describe the movement of certain elements (typically bound with other elements in compounds) through Earth’s atmosphere, hydrosphere, biosphere, and lithosphere. These elements and their compounds are necessary components of all life, and because they cycle, they can be used repeatedly by new generations of organisms. Each biogeochemical cycle has different pathways with various reservoirs (sources and sinks) where elements may reside for days or millions of years.
   1. The atmosphere is one important carbon reservoir.
      1. **Describe** a biological process by which carbon is removed from the atmosphere and converted to organic molecules.
      2. **Describe** a biological process by which carbon is converted from organic molecules to a gas and returned to the atmosphere.
   2. Oceans and terrestrial systems are also important carbon reservoirs.
      1. **Explain** how atmospheric carbon is incorporated into two oceanic sinks.
      2. **Identify** one terrestrial sink, other than fossil fuels, that stores carbon for thousands to millions of years.
   3. The burning of fossil fuels has been shown to increase the concentration of carbon in the atmosphere. **Discuss** TWO other human activities that increase the concentration of carbon in the atmosphere.
   4. **Identify** an environmental problem that results from elevated carbon concentrations. **Discuss** one consequence of the problem you identified.
   5. Phosphorus is another element important to all organisms.
      1. **Describe** one major way in which the phosphorus cycle differs from the carbon cycle.
      2. **Identify** one reason that phosphorus is necessary for organisms.