

Name\_\_\_\_\_

1. Why would an understanding of bacterial stoichiometry (C, N, and P) be important in running a bioreactor to clean up groundwater polluted with a toxic organic carbon? Express in terms of cost of additives to the bioreactor to maximize efficiency of toxin breakdown. (5)
2. Contrast the drawbacks and benefits of using plate counts versus direct counts to determine bacterial numbers in environmental samples. (8)
3. Describe how small-scale sensors can be used to measure environmental parameters on scales relevant to microorganisms. (10)
4. Why is acid production by *Lactobacillus* important in female humans? (5)
5. How does a microbial ecologist use tritiated thymidine ( $^3\text{H}$ -thymidine)? (5)
6. Describe the serial endosymbiosis theory, and cite evidence to support this idea. (6)
7. Draw the carbon cycle with the method used in class (aerobic above, anaerobic below, etc.). (10)
8. Diagram the microbial loop. (9)
9. Describe factors relating to rates of viral infection of microbes including factors that affect viral survival in the natural environment. (7)

10. Why are fish streamlined, but motile bacteria not? (5)
11. Describe the various phases of batch cultures, and a natural environment that may exhibit these stages over time. (6)
12. Describe how redox potential determines the order in which inorganic compounds are used to oxidize organic carbon, including respiration and anaerobic oxidations. (6)
13. Give the equations for respiration and photosynthesis. (2)
14. Describe two forms of taxis in the environment and two models of taxis that could be used to accomplish them. (6)
5. Draw and label the Monod growth curve. (5)
16. What is the most interesting animal-microbe interaction we discussed in class (to you), please describe it. (5)

Have a good summer!