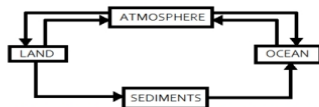


Name: \_\_\_\_\_ Period: \_\_\_\_\_ Date: \_\_\_\_\_

## Biogeochemical Cycles Worksheet

All life in the ocean is made of biomolecules containing carbon, hydrogen, oxygen, nitrogen, phosphorous, and several other elements. Where do all of these raw materials come from? They are constantly recycled between living organisms and nonliving reserves in various BIOGEOCHEMICAL CYCLES (see diagram at right). Some of these elements are in great supply while others are LIMITED. Use pages 322 – 325 of the Oceanography textbook to answer/complete the following questions on the various biogeochemical cycles.



The above diagram represents a general BIOGEOCHEMICAL CYCLE SYSTEM. The boxes represent a reservoir or reserve for that element and the lines with arrows represent the "flow" of that nutrient.

1. What is the name of the process that brings substances such as phosphorous from deep in the ocean to the surface of the ocean? \_\_\_\_\_

### Carbon Cycle

2. Which biogeochemical cycle is the largest? \_\_\_\_\_
3. What are the different ways that carbon enters the atmosphere? \_\_\_\_\_  
\_\_\_\_\_
4. What organisms are responsible for "fixing" carbon from the atmosphere? \_\_\_\_\_
5. What is the process that brings carbon from the atmosphere back onto Earth? \_\_\_\_\_
6. Why do marine organisms "almost never suffer from a deficit of available carbon?" \_\_\_\_\_  
\_\_\_\_\_

### Nitrogen Cycle

7. How much of the dissolved gases in seawater is Nitrogen? \_\_\_\_\_
8. Which types of organisms are responsible for "fixing" nitrogen from the atmosphere into usable forms? \_\_\_\_\_  
\_\_\_\_\_
9. Is nitrogen abundant or limited? \_\_\_\_\_

### Phosphorous and Silicon

10. What do organisms use phosphorous for? \_\_\_\_\_  
\_\_\_\_\_
11. How do phosphorous and silicon enter the oceans? \_\_\_\_\_
12. What happens in the rapid recycling loop for phosphorous and silicon? \_\_\_\_\_  
\_\_\_\_\_
13. What happens in the slower recycling loop for phosphorous and silicon? \_\_\_\_\_  
\_\_\_\_\_
14. What happens in the longest recycling loop for phosphorous and silicon? \_\_\_\_\_  
\_\_\_\_\_

### Iron and other Elements

15. What do organisms use iron for? \_\_\_\_\_  
\_\_\_\_\_
16. What other elements do organisms require? \_\_\_\_\_

### Critical Thinking Questions

17. Can you suggest any ways humans might be altering biogeochemical cycles? \_\_\_\_\_  
\_\_\_\_\_
18. What is a limiting factor? Which of the nutrients you just looked at is considered a limiting factor? \_\_\_\_\_
19. On the back of this page, draw a systems diagram like the one at the top of the previous page for the carbon, nitrogen, and water cycles. Use the following terms to label your arrows: *photosynthesis, respiration, transpiration, precipitation, evaporation, fossil fuel burning, denitrification by bacteria, fixing by bacteria.*