Name _____ Date _____ Hour _____

Biogeochemical Cycles WebQuest

Directions: Visit the following websites and answer the related questions. Your goal is to gain a better understanding of the carbon, nitrogen, water and phosphorus cycle.

Background: In biogeochemical cycles (including carbon, water nitrogen and phosphorus cycles), elements are transported between the atmosphere, biosphere (living things), hydrosphere (water), and geosphere (rocks, minerals, and soils). These cycles help us remember that Earth is a complex system.

Carbon Cycle:

Go to http://www.windows.ucar.edu/tour/link=/earth/Water/co2_cycle.html and answer these questions:

1. How does carbon exist in the atmosphere?

2. How are fossil fuels created?

3. Describe two ways that carbon enters the atmosphere.

4. How are the oceans involved in the carbon cycle?

5. How is the temperature of the Earth partly controlled by carbon?

6. What role do rocks have within the carbon cycle?

Go to http://www.windows.ucar.edu/earth/climate/carbon_cycle.html to play the carbon cycle game. You are a carbon atom!

7. Where are you starting within the carbon cycle?

"Click to begin your journey"

8. How much of the atmosphere is made of carbon dioxide (CO_2)?

9. By how much has CO_2 increased in the atmosphere during the past 150 years?

As you work through this game, take some notes about where you go as a carbon atom. Make sure you visit all reservoirs!

How much carbon does the surface ocean absorb from the atmosphere each year?
_____

When carbon enters the deep ocean, how long does it stay there?
_____

True or False: When plants die and decay, they bring carbon into soil.

The deep ocean accounts for more than _____ % of the Earth's carbon.

True or False: Plants both absorb CO_2 from the atmosphere and release it into the atmosphere.

True or False: Phytoplankton are tiny plants and algae that float in the ocean and take up carbon dioxide as they grow.

10. Next stop = _____
    What did you learn?

11. Next stop = _____
    What did you learn?

12. Next stop = _____
    What did you learn?

13. Next stop = _____
    What did you learn?

14. Next stop = _____
    What did you learn?

Nitrogen Cycle:

Go to: http://www.elmhurst.edu/~chm/onlcourse/chm110/outlines/nitrogencycle.html and answer these questions.

15. What is necessary for nitrogen in the air to combine with oxygen?

16. What percentage of the air we breathe is nitrogen?

17. Even though considerable nitrogen is available in the air, most plants do not use the nitrogen (N_2) found in the air. Why not?

18. In what compounds can plants use nitrogen?

19. How do animals get the nitrogen they need?

20. Atmospheric nitrogen (N_2) is pretty inert. This means that it does not easily break apart. When molecules do not break apart easily, it is difficult to impossible for organisms to use them as a nutrient source. As a result, **nitrogen fixation** is the term used to describe the process of breaking up N_2.

    a. What is atmospheric fixation?

    b. What is industrial fixation? [This is how artificial fertilizers are made.]

    .

    c. What is biological fixation? (In your answer, describe the types of plants associated with the symbiotic relationship.)

21. What do nitrifying bacteria do?

22. What is denitrification?

23. What is eutrophication?

Water Cycle:

Go to: http://www.pbslearningmedia.org/resource/ess05.sci.ess.watcyc.hydrocycle/the-hydrologic-cycle/ and answer these questions.

24. What is condensation?

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25. What is precipitation?

26. What is infiltration?

27. What factors (characteristics) affect how much infiltration can occur?

28. What is runoff?

29. What is evapotranspiration?

30. What is transpiration?

Phosphorus Cycle:

Go to: http://www.enviroliteracy.org/article.php/480.html and answer these questions.

31. Explain why phosphates are a critical part of life.

32. How is the phosphorus cycle different from other biogeochemical cycles?

33. The largest reservoir of phosphorus is in _____ rock.

34. Explain how phosphorus travels through the cycle from rock to plants and animals.