

SCIENCE 1206  
Ecosystems Sheet

Sheet 10

Name: KEY

Chapter 2.5 The Nitrogen Cycle p.66

1. What two kinds of organic molecules do cells need nitrogen to make? proteins and DNA
2. Nitrogen gas can't be used by organisms, it must be converted into nitrates first. What is the name for this process? Nitrogen fixation
3. How does lightning convert nitrogen gas into nitrates? Energy from the lightning causes  $N_2$  to react with  $O_2$  to produce nitrates
4. How do the nitrates get into plants (from where they get to us)? Nitrates dissolve in rain or surface water and move into plants through their roots.
5. What do the plants use the nitrates for? make DNA, convert nitrates into amino acids (string together to make proteins)
6. What do animals do with the protein they get from plants? Break down the proteins into amino acids, then use amino acids to make proteins.
7. Where do you find most of the bacteria you that make nitrates? Soil
8. What kinds of plants have a symbiotic relationship with these bacteria? Legumes such as clover, soybeans, peas and alfalfa.
9. What does symbiotic relationship mean? A relationship between organisms that live together.
10. How is the relationship between these plants and the nitrogen fixing bacteria symbiotic? It is mutualism. The plant provides the bacteria with sugar while the bacteria provides a built-in supply of usable nitrogen.
11. Why do farmers plant legumes in crop rotation? It maximizes the bacterial nitrogen fixation.
12. What does crop rotation mean? Rotating what is grown in an area from season to season. Also, rotating soil
13. What does it mean when a plant has yellowish leaves? there is not enough nitrogen in the soil so the plant can only make a small amount of chlorophyll.

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### Go to 2.5 The Carbon Cycle p.62

15. How much carbon dioxide is transformed into organic molecules through Photosynthesis each year? 50 to 70 billion tonnes
16. Write out the Chemical Equation for Photosynthesis.  
 $CO_2 + H_2O \rightarrow C_6H_{12}O_6 + O_2$  (unbalanced)
17. Write out the Chemical Equation for Cellular respiration.  
 $C_6H_{12}O_6 + O_2 \rightarrow H_2O + CO_2$  (unbalanced)
18. How does the carbon that forms living organisms end up back in the environment? It is returned to the atmosphere or water as  $CO_2$  from body wastes and when organisms decay
19. What happens to carbon when the decay process is delayed? Converted in rock or fossil fuels
20. What are the three main reservoirs where carbon is stored? atmosphere, oceans, Earth's crust (soil)
21. How is limestone made (we have limestone in the lab)? Limestone is made from the discarded shells and bones of living things.
22. How can the carbon in limestone be released? Volcanic activity breaks down limestone releasing  $CO_2$  and acid rain also releases  $CO_2$  back in the atmosphere.
23. Look at Figure 2. How many years is the average carbon atom held in inorganic form before it becomes part of a living thing? atmosphere - 3yrs, soil - 25 to 30 yrs, oceans - 1500yrs. (rocks even longer!)
24. Make sure you look carefully at Figure 1 The Carbon Cycle.
25. Why does organic carbon build up in a bog? In a bog, there is very little oxygen so decomposition is very slow. Carbon atoms remain locked in the dead plant material.
26. How is Coal formed? Slow decaying material ends up trapped under sediment and between layers of rock.
27. How is Oil formed? Oil is formed similar to coal, when decaying aquatic animals and plants are trapped under sediment in a low oxygen environment.

14. How do farmers rely on soil bacteria when they spread manure on their fields? The bacteria converts the protein in the manure into nitrates
15. What happens during the process of Denitrification? The nitrates are converted into nitrogen gas.
16. Why do you need to aerate your lawn in the spring (if you are thinking about making some money through lawn care, you need to know the answer to this question)? By exposing the denitrifying bacteria to oxygen, nitrates will break down much slower and will remain in the soil.
17. How do pitcher plants obtain their nitrogen when they live in such nitrogen poor soil? Pitcher plants get their nitrogen by digesting trapped animals.
18. What are the four things our body needs Phosphorus for? (a) molecules that help release chem. energy  
(b) Cell membranes (c) DNA  
(d) calcium phosphate of bones.
19. How does Phosphorus get into the food chain? When phosphates are dissolved, they can be absorbed by plants and pass into the food chain.
20. What are nutrients? chemicals that living things need.
21. Why does decomposition occur so fast in the rain forest? The rain forest is warm, has moist soil and many different types of decomposers.
22. What are the two biggest Abiotic (non-living) factors in determining the rate of decomposition? Temperature and oxygen levels.

### Go to 2.7 Agriculture and Nutrient Cycles

23. Why do farmers use fertilizers? When crops are harvested, nitrogen and phosphorus are removed from the soil so they must replace the nutrients.
24. What is an Algal Bloom and what causes it? An algal bloom is when algae in the water grows very fast. It is caused by run off of decaying plant material and fertilizers.
25. How does an Algal Bloom kill fish? When the algae die, bacteria must use oxygen to decompose it. The oxygen levels drop so this kills the fish.
26. Why do Algal Blooms usually occur in spring? This is the time of year when there would be a lot of run off (snow melting, lots of rain, etc.)

28. How have humans modified the global carbon cycle? releasing carbon from organic reservoirs faster than would normally occur, mining, burning fossil fuels, burning forest, clearing vegetation, etc.

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