

Name \_\_\_\_\_ Period \_\_\_\_\_

**Chapter 37: Soil and Plant Nutrition**

Watch for how this chapter connects to several other important topics you will study this year, including basic chemistry, nutrient cycling, and ecological relationships such as parasitism and mutualism.

**Concept 37.1 Soil contains a living, complex ecosystem**

1. In this concept, the section on Soil Conservation addresses a wide range of environmental impacts caused by agriculture and how these might be moderated. Although your own life may be urban or seem far removed from soil, human impact is significant. Describe a negative impact of each of these, and how it can be moderated:

**irrigation**

**fertilization**

**changes in soil pH**

**erosion**

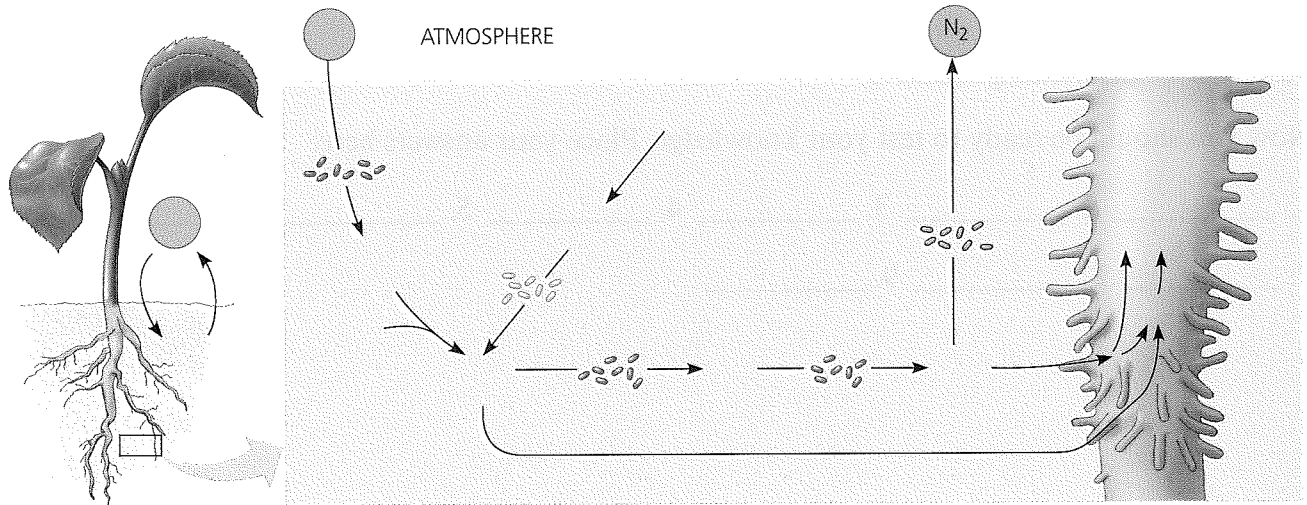
**toxic metals/organic pollutants**

**Concept 37.2 Plants require essential elements to complete their life cycle**

2. What is an *essential nutrient*?
3. What are the nine *macronutrients*? List them in order of relative abundance in plants. (You may use atomic symbols.)
4. Of all the mineral nutrients, which one contributes most to plant growth and therefore crop yields?
5. What three key molecules in plants require nitrogen? (Hint: Check Table 37.1.)
6. What is a primary role of magnesium?
7. What three macronutrients are most commonly deficient? You should notice that these are the same three nutrients found in most fertilizers.

**Concept 37.3 Plant nutrition often involves relationships with other organisms**

8. Which nutrient is most limiting to plant growth on a global scale?
9. Plants have mutualistic relationships with bacteria that help make nitrogen more available. *Nitrogen-fixing* bacteria such as *Rhizobium* are able to convert atmospheric nitrogen ( $N_2$ ), which plants cannot use, to ammonia ( $NH_3$ ), which they can use. Review the *nitrogen cycle* by labeling this diagram.



10. Where is the nitrogen-fixing bacterium *Rhizobium* found?
11. The principle of *crop rotation* employs alternation of a crop that depletes nitrogen with a legume crop that fixes nitrogen. In the United States, this often means alternation of corn with soybeans. Which of these two crops is the nitrogen depleter? \_\_\_\_\_ Which is the nitrogen fixer? \_\_\_\_\_
12. How do *mycorrhizae* enhance plant nutrition?
13. In many parts of the eastern United States, garlic mustard (*Alliaria petiolata*) has become a serious pest. What is its negative impact on native species, and how does it appear to do this?

14. Briefly describe the unusual nutritional adaptations of the following:
- a. Epiphytes
  - b. Parasitic plants
  - c. Carnivorous plants
15. What type of ecological relationship is shown by each of the above plant groups?

*Test Your Understanding Answers*

Now you should be ready to test your knowledge. Place your answers here:

1. \_\_\_\_\_ 2. \_\_\_\_\_ 3. \_\_\_\_\_ 4. \_\_\_\_\_ 5. \_\_\_\_\_ 6. \_\_\_\_\_  
7. \_\_\_\_\_ 8. \_\_\_\_\_ 9. \_\_\_\_\_