

## Learning Guide

### Tutorial: The Biology of Prokaryotes II

In this tutorial, we will continue our exploration of prokaryotes by looking at their diverse metabolic modes as well as the symbiotic relationships that bacteria participate in. We will also learn about the role of bacteria in global nitrogen and oxygen cycles. Read through the questions below before you begin reading the prokaryotes II tutorial. Then as you read the tutorial, fill in your answers to help you prepare for our class session. In addition to the questions below, as you read through the tutorial, ask yourself what did I learn on this page?

Before our class session answer the following questions from the online tutorial:

1. Distinguish between the four major modes of nutrition, noting which are unique to prokaryotes.
2. An organism was recently discovered in a salty environment that can obtain its energy from sunlight and can obtain its carbon from organic compounds. This organism is an example of a:
  - A. photoautotroph
  - B. photoheterotroph
  - C. chemoautotroph
  - D. chemoheterotroph

Defend your answer in two sentences or less:

3. Describe the three types of symbiotic relationships covered in your tutorial and give an example of each. You will have to know how to apply and recognize these relationships.

4. After reading A Real-Life Example: Growing plants in disease-suppressive soil, answer the following questions:
  - A. What hypothesis were the researchers testing in this study?
  
  - B. What is the independent variable in this study?
  
  - C. What is the dependent variable in this study?
  
5. After reading A Real-Life Example: *Bacteroides thetaiotaomicron* and the human gut, answer the following questions:
  - A. Briefly explain why commensalism is not an adequate description of our relationship with *Bacteroides thetaiotaomicron*.
  
  - B. What is our symbiotic relationship with *Bacteroides thetaiotaomicron*?
  
  - C. Is *Bacteroides thetaiotaomicron* a gram-negative or gram-positive bacterium?

6. What types of oxygen tolerance exist among organisms? Use the chart below to compare these different modes:

|  | <b>Obligate aerobe</b> | <b>Obligate anaerobe</b> | <b>Facultative anaerobe</b> |
|--|------------------------|--------------------------|-----------------------------|
| Require oxygen?                        |                        |                          |                             |
| Require an anaerobic environment?      |                        |                          |                             |
| Can use oxygen but doesn't require it? |                        |                          |                             |

7. List what concepts or ideas from this tutorial are new to you: