



The Nitrogen Cycle Game

What: Board game on the nitrogen cycle

Level: High School, including Advanced Placement, Honors, and International Baccalaureate Classes

Time: 15 minutes with educators

Make the sophisticated concept of the nitrogen cycle fun for students with this engaging board game activity!

The Nitrogen Cycle Game,

from *It's All about the Food*

Although 78% of the air we breathe is nitrogen (N) and although there is much nitrogen tied up in the organic fraction of the soil, plants are unable to use this nitrogen for their growth. A process known as nitrogen fixation – biological and synthetic industrial fixation – must occur for nitrogen in the air to be converted to forms plants can use.

Use the following game after a discussion on [nitrogen fixation](#), ammonium, volatilization, nitrate and denitrification.

It's All about the Food is a high school teacher's resource manual focuses on problem solving and critical thinking in relation to food. *It's All about the Food* is divided into three sections to teach students about food production, plant nutrients and fertilizer.

Procedure

Read the rules as a class and distribute the envelopes containing the game. Give the students a designated amount of time to play. If students in their individual group have a winner prior to the end of the designated time, let them play the game again. At the end of the allotted time for the game, have students return the game components to the envelope and review nitrogen cycle

terms, which are found on the “Student Fact” page. Finally, distribute nitrogen cycle assessment questions to assess learning.

Game Directions

Number of players per group: 2 to 6

Rules

1. Players will decide who will play first, second, third...sixth.
2. Players will place their markers in the space labeled **Atmospheric Fixation**, **Biological Fixation** or **Industrial Fixation**. Up to two markers may be placed on each of the labeled spaces for entry into the given pathways.
3. Players will take turns spinning the spinner and moving their markers according to the directions designated by where the pointer of the spinner stops. Players must move their markers in the direction indicated by the arrows on the game board.
4. If a player lands on a labeled **Kickstart** space, he or she will advance his or her marker 10 spaces. **Kickstart** spaces help equalize distances of pathways comprised of a greater number of spaces.

Winning the Game

The first player who returns his marker to “Atmospheric Nitrogen” will explain his or her point of entry (meaning of atmospheric fixation, industrial fixation, or biological fixation) and will describe the pathway followed. Once the player has successfully completed the explanation, that student is declared the winner.

An alternate version of the game can be extended over several days or played when students have ample time for playing: The player who progresses through the cycle the greatest number of times following different pathways is the winner. Each player must explain points of entry (meaning of atmospheric fixation, industrial fixation, or biological fixation) and describe pathway each time he or she completes the cycle. Completed cycles are counted. To prevent confusion, one student needs to be responsible for recording on paper the name of each student

and a brief description of each student's completed cycles. If playing the game will continue on another day, students should attach their markers to the game board with removable-magic™ tape.

Assessment:

Students should be able to answer the following questions:

1. What is nitrogen fixation?
2. Why is nitrogen fixation necessary?
3. What are the two major ways that nitrogen fixation occurs?
4. What are legumes and what do they have to do with nitrogen fixation?
5. Why is industrial fixation of nitrogen necessary?
6. Draw the nitrogen cycle. Include atmospheric, biological, and industrial fixation.

Do you know any great soil science games? We would love to hear about them! Tell us all about it at info@nutrientsforlife.org.

(Attach the following images to this article are available in *It's All About Food: Nitrogen Cycle, Nitrogen Cycle Board, Nitrogen Cycle Wheel and Player Pieces, and Student Fact Page*)

