The Cycles of Nature

Strand Life Systems

Topic Investigating the carbon cycle, water cycle, and nitrogen cycle

Primary SOL LS.6 The student will investigate and understand that organisms within an ecosystem are dependent on one another and on nonliving components of the environment. Key concepts include
a) the carbon, water, and nitrogen cycles;
b) interactions resulting in a flow of energy and matter throughout the system;
c) complex relationships within terrestrial, freshwater, and marine ecosystems; and
d) energy flow in food webs and energy pyramids.

Related SOL LS.5 The student will investigate and understand the basic physical and chemical processes of photosynthesis and its importance to plant and animal life. Key concepts include
b) transformation of water and carbon dioxide into sugar and oxygen.
c) photosynthesis as the foundation of virtually all food webs.

Background Information

Matter has been on the Earth since it was formed billions of years ago. It is used over and over again in cycles. Each type of matter has its own cycle. In cycles, matter moves through living organisms and the environment.

Materials

- Poster paper
- Markers
- Magazines
- Scissors
- Tape
- Glue
- Copies of attached labels for posters of the three cycles of nature

Vocabulary

carbon, combustion, condensation, cycle, decomposition, elements, evaporation, ground water, nitrogen, photosynthesis, precipitation, recycle, respiration, water

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Discuss with the class the carbon cycle, water cycle, and nitrogen cycle. Video clips from Internet resources may be used to demonstrate the three cycles.
2. Divide students into groups of three to participate in the following cooperative learning "Jigsaw" activity. Number each student in each group one, two, or three.

3. Have all students numbered 1 meet together to create a poster of the water cycle. Have the 2's create a poster of the nitrogen cycle and the 3's create a poster of the carbon cycle. Magazines and other craft material may be used to depict the environment and organisms involved. Distribute copies of the attached labels for students to place in the appropriate places on the posters.
4. Have students return to their original groups and teach their peers about the cycle on which they have just focused.
5. After all students have presented, allow each group time to discuss the answers to the Assessment questions listed below. Have each student write the questions and answers on his/her own response sheet and list the names of the other two members of his/her group at the top of the sheet.
6. Display the posters for future reference.

Assessment

- **Questions**
  - Why are cycles important to living things?
  - Where does water travel as it moves through the water cycle?
  - How does the water cycle serve to clean water?
  - What role do bacteria play in the nitrogen cycle?
  - What is nitrogen fixation?
  - What kinds of organisms are involved in decomposition?
  - How does carbon enter plants from the nonliving parts of the environment?
- **Journal/Writing Prompts**
  - Explain what would happen if water were to stop evaporating.
  - Explain how all three cycles could be affected if large amounts of plants/trees were destroyed (deforestation).
  - Explain the effect on the nitrogen cycle if farmers use large amounts of fertilizers on their fields.
  - Explain how the carbon cycle would be affected if decomposers were removed from the environment.
- **Other**
  - Draw and label your own interpretations of the three cycles.

Extensions and Connections (for all students)

- Divide students into small groups and have them act out the parts of the three cycles.

Strategies for Differentiation

- Students can create a mnemonic device/sentence to remember the steps of each cycle.
- Students may develop a song/rap to reinforce the steps involved in cycles of matter.
- To address varied ability levels
  - some students will use the attached labels as listed
  - others may illustrate the labels to reinforce vocabulary of each cycle
  - when the material is mastered, students will work WITHOUT labels.

Labels for Cycles of Nature Posters

The Water Cycle
Runoff
Condensation
Precipitation
Transpiration
Evaporation
Groundwater
The Nitrogen Cycle
Nitrogen in the air
Animals get nitrogen from plants
Dead animals and plants
Decomposers release nitrogen
Nitrogen uptake by plant roots
Bacteria change nitrogen back into a gas
Nitrogen-fixing bacteria in plant roots
Nitrogen fixation by lightning
The Carbon Cycle
Carbon dioxide in the air
Photosynthesis
Combustion
Respiration
Burning fossil fuels
Fossil fuels in the Earth
Death and decomposition